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CIRCULAR

No. 00-02-E

To : ALL SURVEYORS

Date : 2000. 04.20

Subject 8.8 : Instruction for approval of the Shop Primer

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

1. Application

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

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

2. Data to be submitted

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

3. Kinds of type test

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

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

4. Test Method and Acceptance Criteria

(1) Test of the properties of matter

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

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

(2) Welding test

1). Butt welding test

(a) Test method

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

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

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

(b) Method of Assessment

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

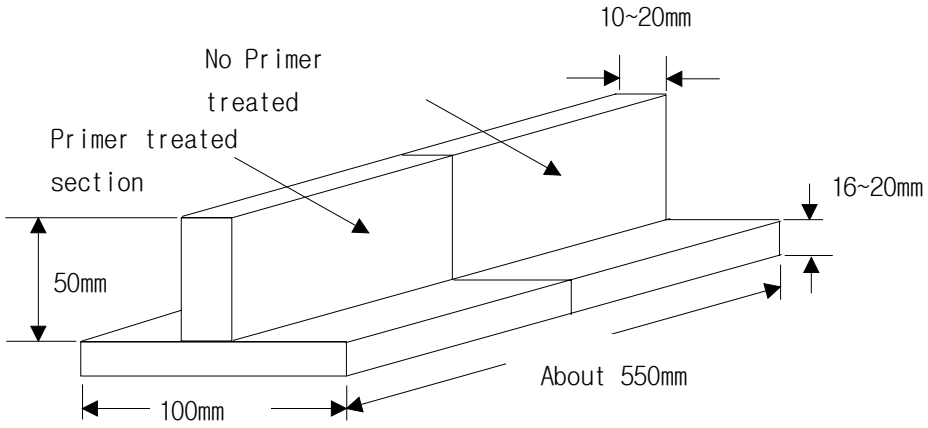
2). Filet Welding Test

(a) Testing Procedure

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

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

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



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

(b) Method of Assessment

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

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

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

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CIRCULAR

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

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

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

1. Application

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

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

2. Data to be submitted

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

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

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

(3) Listing of the base component manufacturer

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

(a) Polyol

(i) Viscosity

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

(iii) Hydroxyl value

(b) Iso-cyanate

(i) Viscosity

(ii) Iso-cyanate value

3. Data review and plant audit

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

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

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

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

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

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

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

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

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

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

4. Type test

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

Table 2.2.1 Cured elastomer properties

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

5. Notification and announcement of approval, etc.

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

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CIRCULAR

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

To : All Surveyors

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

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

1. Application

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

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

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

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

2. Data to be submitted

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

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

(2) Method of forming

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

3. Type test

(1) Test material

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

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

(2) Type test

(A) Mechanical test

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

(B) Micro-structure test and macro test

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

(C) Non-destructive test

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

(D) Hydrostatic test

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

(E) Measurement and visual inspection

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

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

(a) Test method : ASTM G48 Method A

(b) Test temperature :

① 22 Cr duplex type : +20℃

② 25 Cr duplex type : +50℃

(c) Exposure time : 24 ~ 72 hr

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

- The end -

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CIRCULAR

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

To : **All Surveyors**

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

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

1. Application

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

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

2. Kind of heat treatment and materials to be applied

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

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

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

4. Approval test

(1) Manufacturing history of test sample

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

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

(2) Test items and acceptance criteria

(A) Mechanical test

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

(B) Surface inspection

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

(C) Hardness test

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

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

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

(D) Microscopic test of metal

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

No remarkable growth of grain size and other harmful defects.

(E) Deformation

The deformation is no difficult in subsequent machining and to use

5. Plant audit

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

6. Marking of approval certificate for manufacturing process

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

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

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CIRCULAR

To : All Surveyor and whom it may concern

No : 2011-08-E
Date : 2011.04.11

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

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

1. Application

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

2. Data to be submitted

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

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

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

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

(B) Procedure to install and uninstall the software

(C) Function of the software

(D) Operating method

(3) Other documents deemed necessary by the Society

3. Functional requirements

(1) Planned Maintenance Function

Software is to have the following planned maintenance functions

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

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

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

(a) Names of machinery, equipment and their parts

(b) Maintenance items

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

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

(e) Person in charge of maintenance

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

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

(2) Maintenance Records Function

The software is to have the following maintenance record functions

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

(a) Names of machinery, equipment and their parts

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

(c) Maintenance completion date

(d) Total running hour

(e) Next inspection date

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

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

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

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

(3) Spare Parts Management Function

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

(4) Condition Monitoring Function (optional function)

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

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

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

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

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

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

(a) Planned maintenance

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

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

① Names of machinery, equipment and their parts

② Kind of measured signal

③ Measurement interval

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

(b) Measuring process and recording

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

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

4. Administration of Software

(1) Administration of Revision

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

(2) Administration of Backup

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

5. Type approval(verification) Test

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

Executive Vice President
Technical Division

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

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

(2) Welding procedure qualification test

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

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

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

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

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

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

(3) Welders

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

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

(4) Welding consumables

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

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

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

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

(The End)

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

CIRCULAR

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

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

1. Application

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

1.2 It applies to following simulators;

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

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

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

2. Normative Reference

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

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

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

.3 STCW Convention Reg. 1/12

.4 STCW Code Part A -I/12

.5 STCW Code Part A-Ⅱ/1,2,3,5

.6 COLREG Part B,C,D

.7 KIt rules Pt.9 Ch.5

3. Approval application

3.1 Submission of the data

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

3.2 Data to be submitted

.1 Data for approval;

a. Drawings and specification;

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

b. Software Quality Plan

c. Performance test procedure for field assessment;

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

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

.2 Data for reference

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

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

b. Operation and installation manual

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

4. Assessment

4.1 General

.1 Assessment consists of data assessment and field assessment.

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

4.2 Document review

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

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

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

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

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

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

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

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

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

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

4.3 Field assessment

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

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

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

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

5. Approval

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

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

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

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

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

6. Validity and renewal of certificate

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

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

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

7. Change in the approved contents

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

8. Others

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

Executive Vice President Survey Division

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

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

Annex 1.

Requirement for detailed design and funtion of Ship Handling Simulator

1. Requirement for detailed design of hip handling simulator

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

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

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

2. Detailed functional requirement of ship handling simulator

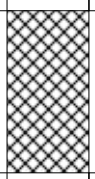
Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
1.1	Plan and conduct a passage and determine position	1. Determination of position shall be able by following equipment; ① GPS ② Radar ③ Gyro Compass (error within 1 degree is permitted) ④ Magnetic Compass			
		2.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

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

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

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

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

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

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

STATEMENT OF COMPLIANCE

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

Product : Ship Operation Simulator

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

Product Description : Bridge Operation Simulator

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

" See Appendix 1 "

Approval Condition : " See Appendix 1 "

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

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

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

KOREAN REGISTER OF SHIPPING

General Manager of
Materials and Equipment Team

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

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

Appendix 1

Product Description and/or Approval Condition

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

Product Descriptions ;

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

1. This Simulator consists of the following systems ;

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

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

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

4) Equipment Room
5) Research and Development Room

2. Software

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

3. Approved Documents

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

Approval Conditions ;

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

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

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

< The End >

CIRCULAR

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Person in charge : Gu Bon-Cheol

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

To : KR surveyors and other relevant parties

Date : 2016.05.01

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

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

1. Application

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

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

2. Type Approval Application

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

(1) Data for Approval

(a) Type test program

(b) Technical data sheet, including;

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

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

(c) Combination format, components and CAS number

(d) Material Safety Data Sheet or equivalent data

(e) Marking methods

(2) Data for Reference

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

(b) Repair methods, requirements or methods for recoat

(c) Batch Test report

(d) Service records (if any)

(e) Other data deemed necessary by the Society

3. Review of the Data for Type approval

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

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

4. Type Test

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

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

(a) Inductively Coupled Plasma, ICP,

(b) Atomic Absorption Spectrometry, AAS,

(c) X-ray Fluorescence Spectrometry, XRF,

(d) Or an equivalent method

(3) Acceptance Criteria

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

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

5. Marking of the products

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

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

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

(a) Product name, Manufacturer / Brand name

(b) Type of Anti-fouling paint

(c) Data for storage

(d) Batch number

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

Executive Vice President

Survey Division

CIRCULAR

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Person in charge : LEE Woonho

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

To : All Surveyors and whom it may concern

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

1. Application

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

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

2. Implementation

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

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

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

3. Remarks

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

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

Attachments

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

KIM Yeontae

Executive Vice President, Technical Division

<Attachment 1. List of Products eligible for MR>

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

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

<Attachment 2. Application EU RO MR Type Approval>

한 국 선 급
Korean Register

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

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

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

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

Date 신청일 ( ) YY 년 ( ) MM 월 ( ) DD 일

Applicant 신청자 (Signature or stamp 서명 또는 날인)

Address of Applicant
신청자 주소

Tel. No.
전화번호

Fax. No.
팩스번호

E-mail
전자우편

Person in Charge
수검담당자

Mobile No.
휴대전화

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

General Conditions

1. Definitions

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

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

2. Duties of the Client

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

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

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

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

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

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

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

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

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

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

3. Duties of KR

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

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

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

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

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

3.2 KR은 고객의 HSE 지침을 준수하여야 한다.

4. Competence of KR

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

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

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

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

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

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

5. Service Execution

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

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

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

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

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

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

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

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

6. Liability of KR

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

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

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

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

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

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

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

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

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

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

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

6.6 KR은 직접 수행한 작업에 대해서만 책임을 진다.

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

(i) Client's breach of Obligations

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

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

(i) 고객이 일반 의무를 위반한 경우;

(ii) 본 계약에 따라 발행된 결과물의 악용.

7. Use of information

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

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

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

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

8. Fees

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

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

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

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

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

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

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

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

9. Force Majeure

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

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

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

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

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

Guidance of EU RO Mutual Recognition for Type Approval

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

July 2020

Guidance of
EU RO Mutual Recognition for Type Approval

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

< Come into force on 1 July 2020>

SECTION 1 GENERAL

SECTION 2 EU RO FRAMEWORK DOCUMENT FOR THE MUTUAL RECOGNITION OF TYPE APPROVAL

SECTION 3 TECHNICAL REQUIREMENTS

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

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Appendix III List of Products included in EU RO MR

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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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Terms and Conditions for
Mutual Recognition of Type Approval

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

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

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

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

4. The EU ROs currently are:

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

…continued

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

a. Its expiry date; or

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

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

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

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

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

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

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

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

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

-End-

General Information

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7. Individual ROs are responsible for:

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

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

8. Manufacturer's responsibility

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

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

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

- the type of product;

- the references of the EU RO MR TAC;

- the reason(s) for refusal.

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

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

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

- End -

APPENDIX I

EU RO MR Type Approval Certificate Information

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

Certificate Heading

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

Certificate number

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

Company Information

Manufacturers Name

Street Address, City, State, Postal Code, Country

Product Information

Product

Model

Intended Service

Description

Ratings

Restrictions (limitations as outlined by the Technical requirements)

Test reports with identification number and date

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

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

Place of Issue

Issue Date

Expiration Date

Rules & Standards

Technical requirement reference

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

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

Generic Sentence

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

APPENDIX I

Generic Statement

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

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

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

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

Notes:

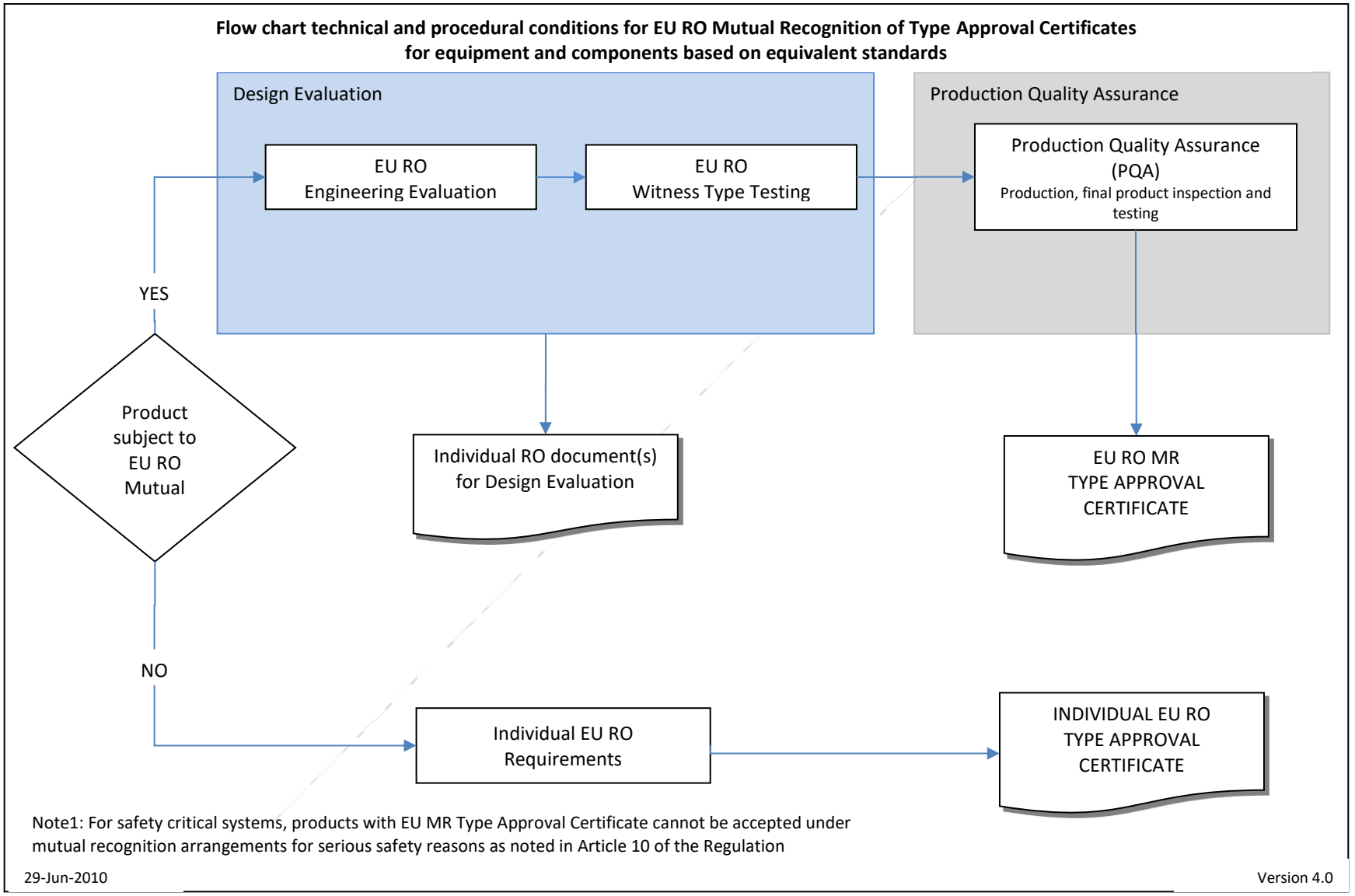
1) *Refer to the agreed MR Technical Requirements for additional MR TAC information that may be specifically applicable to certain products* - https://www.euromr.org/technical-requirements;
2) *List of MR TACs issued by the EU ROs can be found by https://www.euromr.org/links-to-mr-certificates.*
3) *As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

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

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

- End -

APPENDIX II


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

APPENDIX III

List of Products included in EU RO MR

Tier 1 (Original release date January 2013)

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

Tier 2 (Original release date July 2013)

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

Tier 3 (Original release date July 2014)

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

Tier 4 (Original release date July 2015)

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

APPENDIX III

Tier 5 (Original release date July 2016)

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

Tier 6 (Original release date January 2018)

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

Tier 7 (Original release date January 2019)

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

2019 (Original release date January 2020)

71. Insulation Monitoring Device (IMD)

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

- End -

APPENDIX IV

List of EU Recognised Organisations (EU ROs)

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

Bureau Veritas (BV) - www.veristar.com

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

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

DNV GL – www.dnvgl.com

Indian Register of Shipping – www.irclass.org

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

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

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

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

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

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

- End -

APPENDIX V

EU RO MR Design Evaluation Scheme

Procedure:

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

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

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

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

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

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

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

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

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

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

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

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

are carried out on the same unit (2).

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

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

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

- End -

APPENDIX VI

EU RO Production Quality Assurance (PQA)

Procedure:

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

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

3. Production Quality Assurance scheme

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

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

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

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

4. Periodical Assessment by the EU RO

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

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

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

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

- End -

APPENDIX VII

Agreed Technical Requirements

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

- End -

APPENDIX VIII

EU RO MR Maintenance Process

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

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

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

APPENDIX VIII

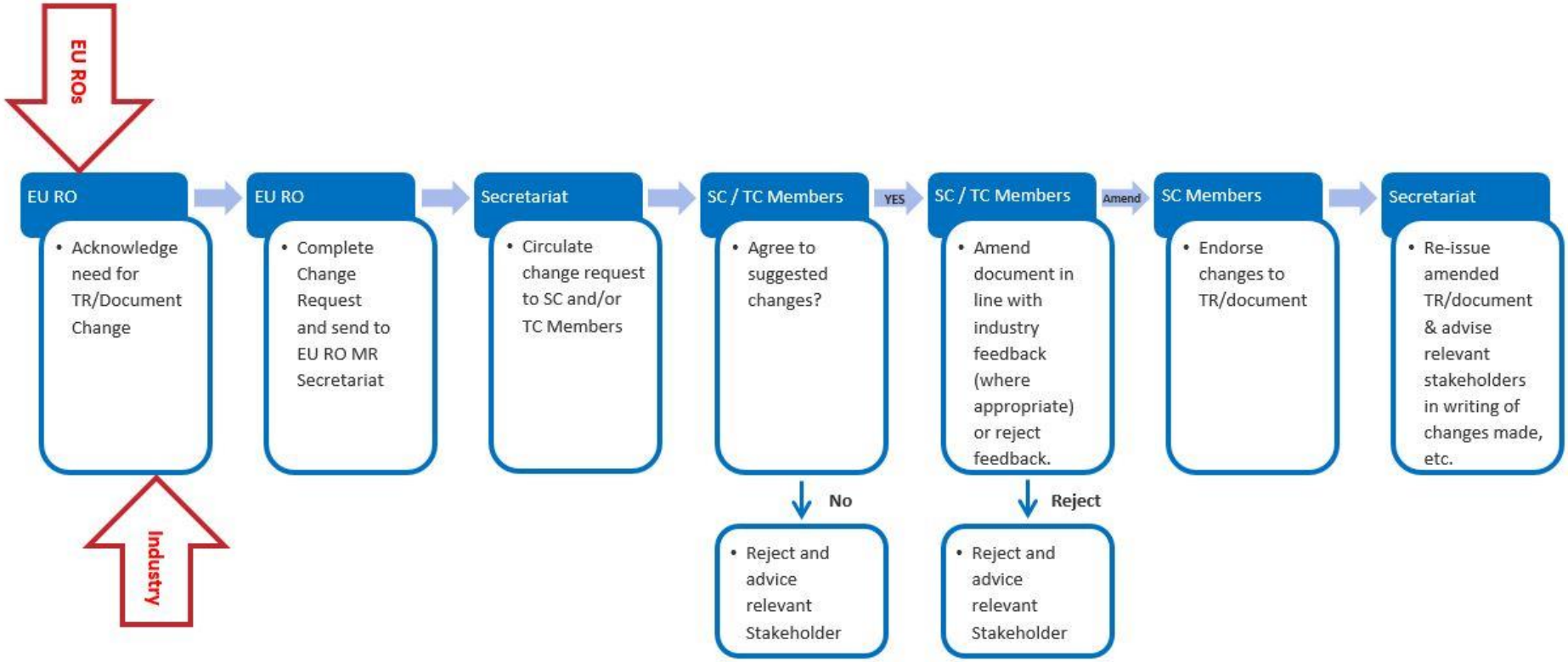


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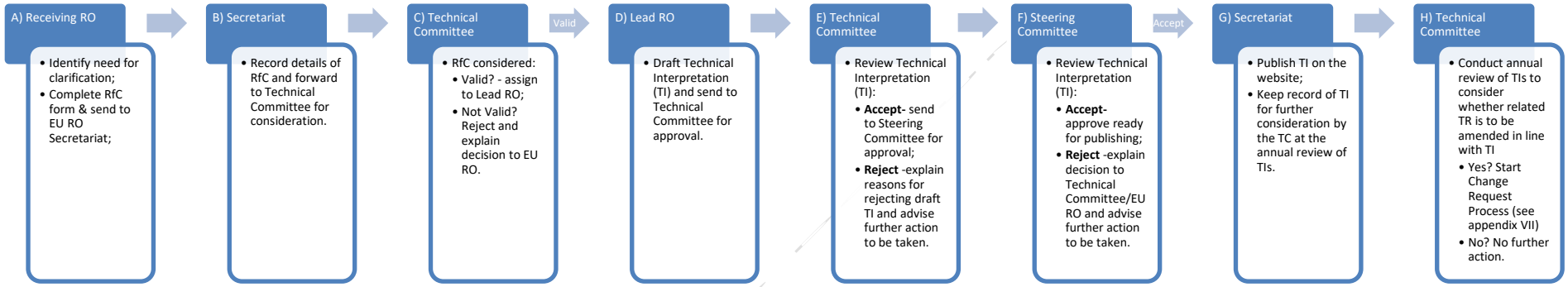
Figure 2 - EU RO MR Maintenance Process

APPENDIX IX

EU RO MR Request for Clarification (RfC) Process



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

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

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

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

APPENDIX IX

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

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

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

APPENDIX IX

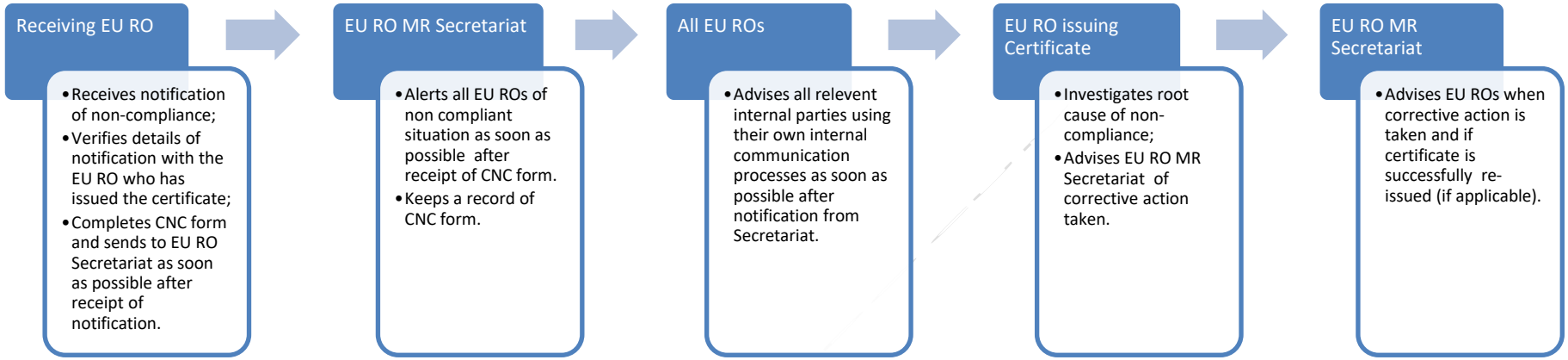
6. An annual review of TIs will be conducted by the EU RO MR Technical Committee in September each year to ensure ongoing relevance and a decision will be taken on each TI to as to whether the related Agreed Technical Requirement should be amended to incorporate the outcome of the TI – see step H) in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

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

- End -

APPENDIX X

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



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

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

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

APPENDIX X

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

   a. Date received by Secretariat;

   b. Date referred to all EU ROs;

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

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

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

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

- End –

SECTION 3 TECHNICAL REQUIREMENTS

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

KOREAN REGISTER OF SHIPPING

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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

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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

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Section 1 – Introduction

1.1 Scope and objectives

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

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

1.2 Application

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

1.3 Definitions

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

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

1.4 Guidance overview

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

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

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

Section 2 – The Human Element

2.1 Regulatory expectations

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

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

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

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

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

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

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

2.2 Human Element Considerations

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

a) Design and Layout Considerations

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

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

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

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

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

b) Ambient Environmental Considerations

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

c) Considerations Related to Human Capabilities and Limitations

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

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

d) Management and Organizational Considerations

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

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

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

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

3.1 General

3.1.1

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

3.1.2

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

3.1.3

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

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

3.2 Lighting

3.2.1 Task requirements

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

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

3.2.2 Ergonomic design principles

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

The design of lighting should :

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

3.2.3 Conditions

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

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

3.2.4 Implications for structure

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

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

3.3 Ventilation

3.3.1 Task requirements

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

3.3.2 Ergonomic design principles

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

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

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

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

3.3.3 Conditions

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

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

3.3.4 Implications for structures

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

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

3.4 Vibration

3.4.1 Task requirements

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

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

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

3.4.2 Ergonomic design principles

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

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

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

3.4.3 Conditions

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

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

3.4.4 Implications for structures

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

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

3.5 Noise

3.5.1 Task requirement

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

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

3.5.2 Ergonomic design principles

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

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

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

3.5.3 Conditions

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

3.5.4 Implications for structures

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

3.6 Access & Egress

3.6.1 Task requirements

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

3.6.2 Ergonomic design principles

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

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

3.6.3 Conditions

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

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

3.6.4 Implications for structures

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

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

Section 4 - Ergonomic Structural Arrangement Guidance

4.1 General

4.1.1

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

4.2 Lighting Design

4.2.1 Aims

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

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

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

4.2.2 Application

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

4.2.3 Locations

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

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

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

- Tanks, small holds, infrequently occupied closed spaces

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

4.2.4 Structural Arrangements

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

A) Positioning of Lighting

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

B) Illuminance distribution

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

C) Obstruction and glare:

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

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

D) Location and installation of lighting controls

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

E) Location and installation of electrical outlets:

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

4.3 Ventilation Design

4.3.1 Aims

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

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

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

4.3.2 Application

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

4.3.3 Locations

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

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

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

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

4.3.4 Structural Arrangements

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

A) Ship ventilation design

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

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

B) Location and installation of ventilation

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

4.4 Vibration Design

4.4.1 Aims

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

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

4.4.2 Application

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

4.4.3 Locations

Locations in which vibration should be minimized include the following;

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

4.4.4 Structural Arrangements

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

A) General

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

performance in the spaces normally occupied by the crew.

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

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

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

B) Vibration reduction design

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

C) Anti-vibration design in structural arrangements

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

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

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

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

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

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

to reduce the vibration of the base.

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

E) Anti-vibration design of superstructure

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

F) Anti-vibration installation design

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

4.5 Noise Design

4.5.1 Aims

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

4.5.2 Application

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

4.5.3 Locations

Locations in which noise should be minimized include the following;

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

4.5.4 Structural Arrangements

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

A) General

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

B) Noise sources and propagation

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

C) Mechanical vibration induced noise control

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

D) Noise control of ventilation system

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

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

E) Noise Prevention/Mitigation

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

F) Noise modelling

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

4.6 Access & Egress Design

4.6.1 Aims

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

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

4.6.2 Application

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

4.6.3 Locations

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

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

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

- Tanks, small holds, infrequently occupied closed spaces

4.6.4 Structural Arrangements

A) Stairs

General Principles

The following are general guidance to consider for stairs design:

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

Stair Landings

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

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

Stair Risers and Treads

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

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

Headroom

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

Design Load

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

Stair Handrails

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

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

B) Walkways and Ramps

General Principles

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

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

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

C) Vertical Ladders

General Principles

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

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

Rung Design

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

Provision of Platforms

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

Vertical ladders as Means of Access

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

Safety Cages

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

D) Work Platforms

General Principles

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

E) Egress

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

Annex A – Recommended Measurement Values

1.1 General

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

1.2 Lighting

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

Table 1 Lighting Criteria for Crew Accommodations Spaces

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

Table 2 Lighting Criteria for Navigation and Control Spaces

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

Table 3 Lighting Criteria for Service Spaces

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

Table 4 Lighting Criteria for Operating and Maintenance Spaces/Areas

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

Table 5 Lighting for Red or Low-level White Illuminance

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

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

Table 6 Maximum Brightness Ratios

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

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

1.3 Ventilation

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

A) Recommended Air temperature

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

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

B) Recommended Relative humidity

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

C) Enclosed space vertical gradient recommendation

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

D) Recommended Air velocity

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

E) Berthing Horizontal Temperature Gradient

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

F) Air exchange rate

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

Summary of Indoor Climate Requirements

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

1.4 Vibration

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

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

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

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

1.5 Access

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

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

Stair Handrail

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

Stair Handrail Arrangements

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

Walkway and Ramp Design

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

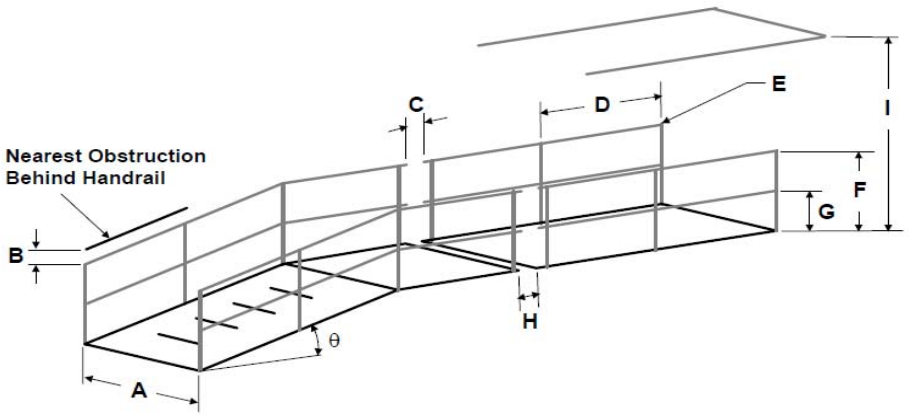
Figure 1 Walkway and Ramp Design

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

Notes

1 Toeboard omitted for clarity

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



Vertical Ladder Design and Dimensions

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

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

Figure 2 Vertical Ladders (General Criteria)

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

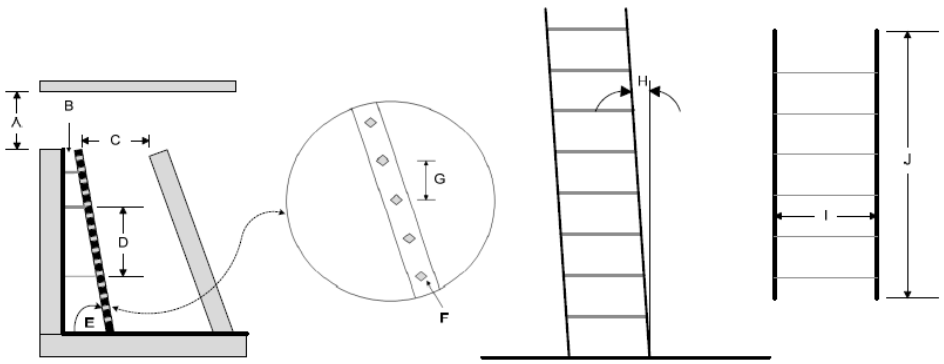


Figure 3 Staggered Vertical Ladder

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

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

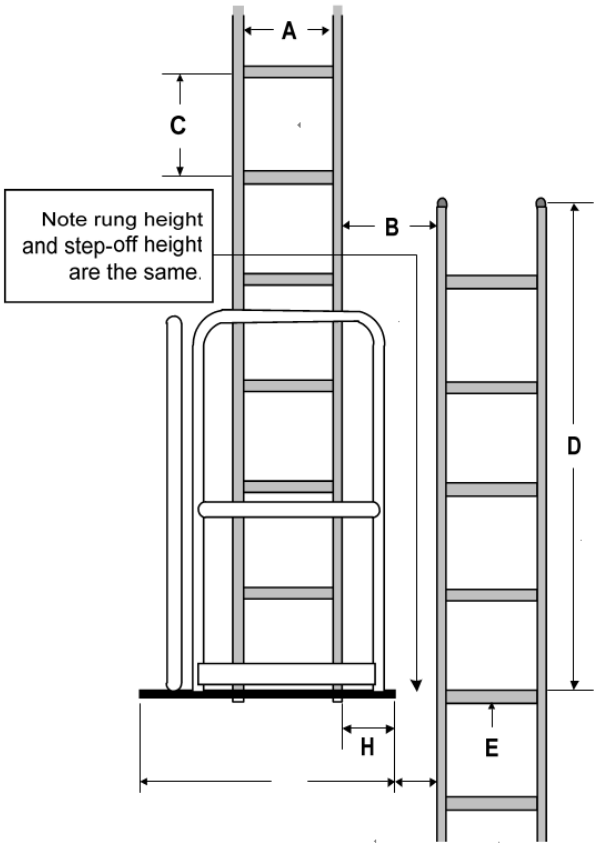


Figure 4 Vertical Ladders to Landings (Side Mount)*

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

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

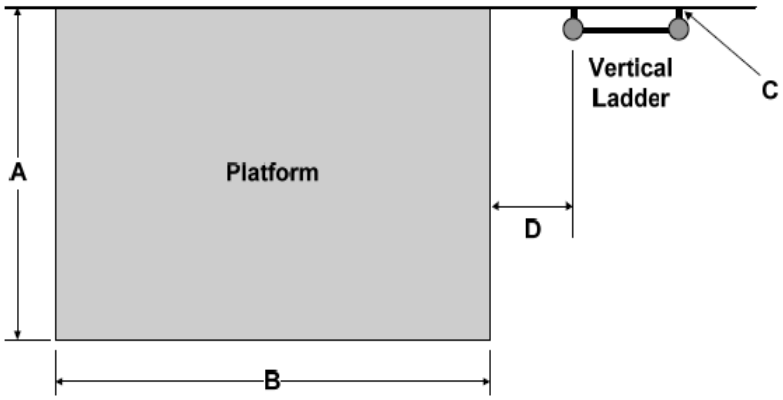
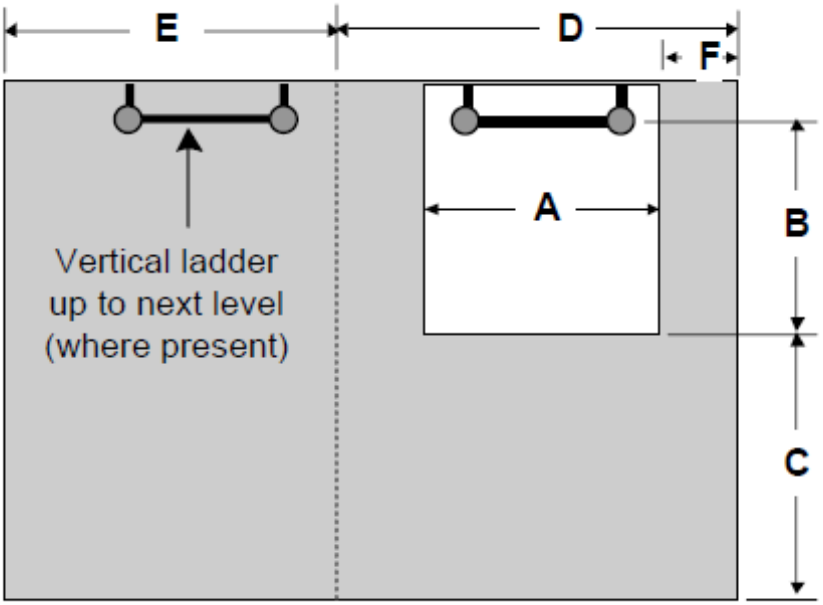


Figure 5 Vertical Ladders to Landings (Ladder through Platform)*

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

*Notes: Top view. Guardrails/Handrails not shown

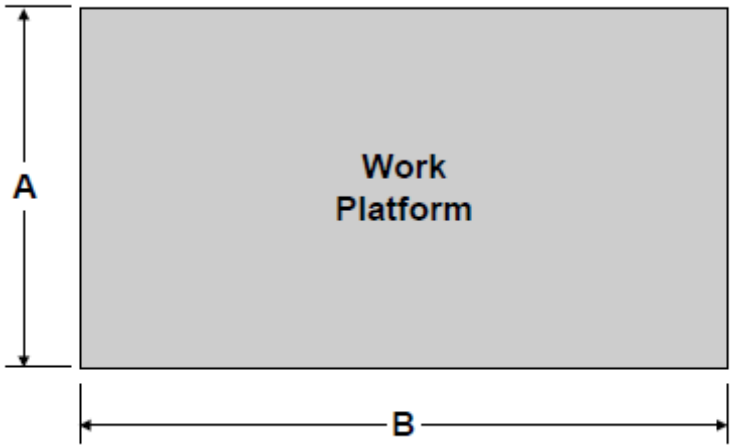


Work Platform

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

Figure 6 Work Platform Dimensions

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



Annex B – Relevant Standards, Guidelines and Practices

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

2.1 Lighting

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

2.2 Ventilation

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

2.3 Vibration

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

2.4 Noise

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

2.5 Access

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

Access

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

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No : 2016-1-E

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

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

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

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

- Below -

1. Definition

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

2. Ice Strengthening

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

2.1. Shell Plating

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

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

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

where K : material factor

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

2.2 Frames and Longitudinals

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

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

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

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

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

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

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

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

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

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

2.3. Stem

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

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

2.4. Fire Pump

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

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

담당 본부장

(Executive Vice President Concerned Division)

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Person in charge: Park Jae-sung

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

To : All Surveyors and whom it may concern

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

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

= Below =

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

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

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

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

(Part 1 Classification and Surveys)

Dec. 2019

- Main Amendments -

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

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

(1) Effective date : 1 Jan. 2020

(Date of which application for survey is submitted)

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

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

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Person in charge: PARK Jaesung

No : 2025-1-E
Date : 2025. 01. 13

To : All Surveyors and whom it may concern

Subject	**9.199 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
Ruel & Guidance Relating to the Rules for the Classification of Steel Ships, Pt 1 (Classification and Surveys)	On or after 1st Jan. 2025 or 1st Feb. 2025 (Contract date for ship construction or Date of which the application for survey is submitted)	Added the requirement for "Acceptance of materials and components approved and/or certified by other Societies". etc.
Guidance for Approval of Manufacturing Process and Type Approval, Etc.	On or after 1st Feb. 2025 (Date of which the application for type approval is submitted)	Revised requirement of watertight test for cable penetrations.

2. Furthermore, please be informed that these amendments will be included in 2025 or 2026 edition on KR Classification Technical Rules which will be published in the first half of 2025 or 2026 respectively.

Attachments:
1. Amended Rule & Guidance for the Classification of Steel Ships, Pt 1 ------ 1 copy.
2. Amended Guidance for Approval of MP and TA etc. ---------- 1 copy.

(The End)

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Jan. 2025

- Main Amendments -

(1) Effective date : 1 Jan. 2025 (The contract date for ship construction) - Retroactively

◉ Added the requirement for “Acceptance of of materials and components approved and/or certified by other Societies”.

(2) Effective date : 1 Feb. 2025 (Date of which application for survey is submitted)

◉ Revised the requirements of “Wear limit on structural members”.

(1) Effective date : 1 Jan. 2025

(The contract date for ship construction) - Retroactively

Present	Amendments
CHAPTER 1 CLASSIFICATION	**CHAPTER 1 CLASSIFICATION**
Section 3 Classification Survey during Construction *(2022)*	**Section 3 Classification Survey during Construction *(2022)***
Section 3 Intermediate Survey	**Section 3 Intermediate Survey**
301. ~ 309. 〈omitted〉	**301. ~ 309. 〈same as the current Rules〉**
310. Acceptance of design approved by other Societies *(2023)*	**310. Acceptance of design approved by other Societies *(2023)***
1. For a vessel with the design as previously approved by any Society which is subject to verification of compliance with QSCS(Quality System Certification Scheme) of IACS, the Society is to be applied for the separate procedures as specified by the Society or the IACS Procedural Requirements(PR) 42 (Procedure for Assigning Class for a New Building project when the design is already approved by an Initial Society (Based on the Classification Rules and a Memorandum of Understanding (MoU) Between a Class Society, a Shipyard and, if applicable, a Ship Owner). ~~may consider the acceptance of the design approved by that Society.~~ *(2025)* (The above amendments have already been issued as Circular (No.: 2024-07-E, 7th Nov. 2024))	**〈same as the current Rules〉**
〈newly added〉	**311. Acceptance of of materials and components approved and/or certified by other Societies [see Guidance] *(2025)*** 1. For materials and components previously approved and/or certified by any Society which is subject to verification of compliance with QSCS(Quality System Certification Scheme) of IACS in accordance with IACS PR 1B or 42, the Society is to record written documentary evidence of complying with the Society's own Rules or with other requirements confirmed acceptable in accordance with the Society's own Rules.
〈hereinafter, omitted〉	〈hereinafter, same as the current Rules〉

(2) Effective date : 1 Feb. 2025

(Date of which application for survey is submitted)

Present	Amendments
# CHAPTER 2 PERIODICAL AND OTHER SURVEYS ## Section 1 General **101. ~ 108. 〈omitted〉** **109. Wear limit on structural members *(2021)*** When the thickness of hull structural members or the scantlings of equipment, etc. exceed the wear limit, they have to be renewed with those having the original scantlings or the scantlings "considered suitable" by the Society. However, when the original scantlings were larger than the required ones, or when "deemed appropriate by the Society", these requirements may be modified taking into account of the location, extent, kind of the wear. Note : The terms "considered suitable" or "deemed appropriate by the Society" mean to comply with the requirements specified in the Classification Technical Rules such as **Pt 2** and **Pt 3** etc. of the Rules. 〈hereinafter, omitted〉	# CHAPTER 2 PERIODICAL AND OTHER SURVEYS ## Section 1 General **101. ~ 108. 〈same as the current Rules〉** **109. Wear limit on structural members *(2021)*** When the thickness of hull structural members or the scantlings of equipment, etc. exceed the wear limit, they have to be renewed with those having the original scantlings or the scantlings "considered suitable" by the Society. However, when the ~~original~~ scantlings were larger than the required ones, or when "deemed appropriate by the Society", these requirements may be modified taking into account of the location, extent, kind of the wear. Note : The terms "considered suitable" or "deemed appropriate by the Society" mean to comply with the requirements specified in the Classification Technical Rules such as **Pt 2** and **Pt 3** etc. of the Rules. 〈hereinafter, same as the current Rules〉

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

(Part 1 Classification and Surveys)

Jan. 2025

- Main Amendments -

(1) Effective date : 1 Jan. 2025 (The contract date for ship construction) - Retroactively

◉ Added the requirement for “Acceptance of of materials and components approved and/or certified by other Societies”.

(2) Effective date : 1 Feb. 2025 (Date of which the application for survey is submitted)

◉ Added the definition for “original thickness”.

(1) Effective date : 1 Jan. 2025

(The contract date for ship construction) - Retroactively

Present	Amendments
# CHAPTER 1 CLASSIFICATION ## Section 3 Classification Survey during Construction *(2022)* ## Section 3 Intermediate Survey 302., 304., 306., and 309. 〈omitted〉 〈newly added〉 〈hereinafter, omitted〉	# CHAPTER 1 CLASSIFICATION ## Section 3 Classification Survey during Construction *(2022)* ## Section 3 Intermediate Survey 302., 304., 306., and 309. 〈same as the current Guidance〉 **311. Acceptance of of materials and components approved and/or certified by other Societies [see Guidance] *(2025)*** 1. The other requirements confirmed acceptable in accordance with the Societies own Rules are to be followed with separate Instructions. 〈hereinafter, same as the current Rules〉

(2) Effective date : 1 Feb. 2025

(Date of which application for survey is submitted)

Present

Annex 1-5 Thickness Measurement Method for Hull Structural Members *(2024)*

Table 1 Wear limit on members

	Name of member	Wear limit		
		Class I [1]	Class II [1]	Class III [1]
Local Wear Limit	Strength deck plating, sheer strake and longitudinals to these members, shell plating, bottom shell plating, bulkhead plating of deep tank[4], topside sloping plating, hopper side sloping plating, inner bottom plating	20 % of original thickness	(20 % of original thickness) + 1 mm	1 mm
	Floor & girder of double bottom, web and face of primary supporting member	20 % of original thickness	25 % of original thickness	
	Effective deck[5] plating, superstructure deck plating, deck plating inside the line of cargo hatch openings, watertight bulkhead plating other than bulkhead plating of deep tank, hatch cover(including stiffeners), hatch coaming(including stiffeners), web, face and brackets of secondary stiffener[3]	25 % of original thickness	30 % of original thickness	
	Web, face and brackets of frames in cargo hold/tank	20 % of original thickness or 1.5 mm, whichever greater	25 % of original thickness or 2.5 mm, whichever greater	
	Partial corrosion (e.g pitting)	30 % of original thickness	35 % of original thickness	

(NOTES)

1) For ships classed through the Classification Survey during Construction : the Class I, II and III are as follow.

(a) Class I : It is applied to ships having one or two of the following characteristics.
(i) Ships, with of length of 90 m and above, which are classed with Classification Survey during Construction in accordance with the Rules after 1st July 1998.
(ii) Ships carry for liquid cargo, which are classed with Classification Survey during Construction in accordance with the Rules after 1st July 1998.

(b) Class II : Ships, other than in Class I and III.

(c) Class III : Ships constructed with steel, which is applied to the **Rules for the Classification of High Speed and Light Crafts** and the **Guidance Relating to the Rules for the Classification of High Speed and Light Crafts**.

2) For ships classed through the Classification Survey after Construction, the separate requirements specified by the Society are to be applied.

3) Secondary stiffener refers to the member which is supported by the primary supporting member and does not support another reinforcement member. 〈newly added〉

4) Definition of deep tank is specified in **Pt 3, Ch 15, 101.** of the Rules.

5) Definition of effective deck is specified in **Pt 3, Ch 5, 103.** of the Rules.

〈omitted〉

Annex 1-5 Thickness Measurement Method for Hull Structural Members *(2024)*

Table 1 Wear limit on members

	Name of member	Wear limit		
		Class Ⅰ [1]	Class Ⅱ [1]	Class Ⅲ [1]
Local Wear Limit	Strength deck plating, sheer strake and longitudinals to these members, shell plating, bottom shell plating, bulkhead plating of deep tank[3] ~~[4]~~, topside sloping plating, hopper side sloping plating, inner bottom plating *(2025)*	20 % of original thickness[4] *(2025)*	(20 % of original thickness) + 1 mm	1 mm
	Floor & girder of double bottom, web and face of primary supporting member	20 % of original thickness	25 % of original thickness	
	Effective deck[5] plating, superstructure deck plating, deck plating inside the line of cargo hatch openings, watertight bulkhead plating other than bulkhead plating of deep tank, hatch cover(including stiffeners), hatch coaming(including stiffeners), web, face and brackets of secondary stiffener[6] ~~[3]~~ *(2025)*	25 % of original thickness	30 % of original thickness	
	Web, face and brackets of frames in cargo hold/tank	20 % of original thickness or 1.5 mm, whichever greater	25 % of original thickness or 2.5 mm, whichever greater	
	Partial corrosion (e.g pitting)	30 % of original thickness	35 % of original thickness	

(NOTES)

1) For ships classed through the Classification Survey during Construction : the Class Ⅰ, Ⅱ and Ⅲ are as follow.

(a) Class Ⅰ : It is applied to ships having one or two of the following characteristics.
(i) Ships, with of length of 90 m and above, which are classed with Classification Survey during Construction in accordance with the Rules after 1st July 1998.
(ii) Ships carry for liquid cargo, which are classed with Classification Survey during Construction in accordance with the Rules after 1st July 1998.

(b) Class Ⅱ : Ships, other than in Class Ⅰ and Ⅲ.

(c) Class Ⅲ : Ships constructed with steel, which is applied to the **Rules for the Classification of High Speed and Light Crafts** and the **Guidance Relating to the Rules for the Classification of High Speed and Light Crafts.**

2) For ships classed through the Classification Survey after Construction, the separate requirements specified by the Society are to be applied.

3) ~~4)~~ Definition of deep tank is specified in **Pt 3, Ch 15, 101.** of the Rules.

4) Definition of original thickness is the thickness on the drawing. However, if the thickness required by the rules is separately specified for each member, that is to be followed. *(2025)*

5) Definition of effective deck is specified in **Pt 3, Ch 5, 103.** of the Rules.

6) ~~3)~~ Secondary stiffener refers to the member which is supported by the primary supporting member and does not support another reinforcement member.

〈same as the current Guidance〉

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

Jan. 2025

- Main Amendments -

(1) Effective date : 1 Feb. 2025 (Date of which the application for type approval is submitted)

◉ Revised requirement of watertight test for cable penetrations.

(1) Effective date : 1 Feb. 2025

(Date of which application for type approval is submitted)

Present	Amendment
# CHAPTER 3 TYPE APPROVAL **Section 1 ~ Section 37 〈omitted〉** **Section 38 Cable Transits through watertight bulkheads and decks** *(2021)* **3801. ~ 3802. 〈omitted〉** **3803. Type tests** (1) ~ (2) 〈omitted〉 (3) Watertightness testing Cable transits through watertight bulkheads or decks are to be so constructed that they are capable of withstanding a hydraulic test pressure conforming to the following conditions. Step 1: the specimen shall be tested for a period of at least 30 minutes under hydraulic pressure equal to the test pressure minimum 1.0 bar, No leaks are to be allowed during this test. Step 2: the specimen shall be tested for an additional 30 minutes against the design pressure **(minimum 2.5 bar)** of the installation site. The quantity of water leakage shall not exceed 1 liter. A hydrostatic pressure is to be not less than 1.5 times the nominal pressure. (4) Airtightness test If gastightness is required for the cable transits, it is to be so constructed that they are cable of withstanding for a period of at least 30 minutes under hydraulic pressure equal to the test pressure minimum 30 mbar. No leaks are to be allowed during this test and air is to be allowed as the test medium. 〈hereinafter, omitted〉	# CHAPTER 3 TYPE APPROVAL **Section 1 ~ Section 37 〈same as the current Guidance〉** **Section 38 Cable Transits through watertight bulkheads and decks** *(2021)* **3801. ~ 3802. 〈same as the current Guidance〉** **3803. Type tests** (1) ~ (2) 〈same as the current Guidance〉 (3) Watertightness testing Cable transits through watertight bulkheads or decks are to be so constructed that they are capable of withstanding a hydraulic test pressure conforming to the following conditions. Step 1: the specimen shall be tested for a period of at least 30 minutes under hydraulic pressure equal to the test pressure minimum 1.0 bar, No leaks are to be allowed during this test. Step 2: the specimen shall be tested for an additional 30 minutes against the design pressure ~~(minimum 2.5 bar)~~ of the installation site. *(2025)* The quantity of water leakage shall not exceed 1 liter. A hydrostatic pressure is to be not less than 1.5 times the nominal pressure. (4) Airtightness test If gastightness is required for the cable transits, it is to be so constructed that they are cable of withstanding for a period of at least 30 minutes under hydraulic pressure equal to the test pressure minimum 30 mbar. No leaks are to be allowed during this test and air is to be allowed as the test medium. 〈hereinafter, same as the current Guidance〉

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Person in charge :KIM Heesung

No :2025-04-E
Date :2025. 5. 19

To :All Surveyors and whom it may concern

Subject	9.202 Notice for Amendment to the KR Technical Rules
Application	Refer to Effective date for each KR Technical Rules specified in Par.1

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

Amended KR Technical Rules	Effective date	Amendments
Guidance for Classification of Steel Ships Pt 8	Immediately	AFP-C(EV) notation related items amended

2. Furthermore, please be informed that the establishment will be included in 2025 edition of KR Technical Rules which is provided on the website.

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

Amended Guidances to the Rules for Classification of Steel Ships

Pt. 8

2025. 5.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : Immediately (Circular will be issued.)

◉ Amendments for AFP-C(EV) notation - Establishment of the character for the ships which the requirement of the notation partially safisfied. AI based Camera related notation (FI) added. Requested clarification added.

Amendment	Note
# Annex 8-9 Special Requirements of Fire Protection and Fire Extinction for Cargo Ships *(2021)* ## Section 4 Protection of Cargo areas **402. Ro-ro ship and vehicle carrier** *(2022)* **1. Application** This article is applicable to the ro-ro ship and vehicle carrier which apply to the following notations. (1) AFP-C: Ships whose cargo spaces comply with the requirements specified in **402. 2** (2) AFP-C(EV): PCC notation assigned pure car carriers or pure car/truck carriers whose cargo spaces comply with the requirements specified in **402. 3** *(2024)* (A) In assignment of the AFP-C(EV), for ships that partially satisfy the requirements of **402. 3**, the characters corresponding to the satisfied items may be assigned in the bracket one or a combination of them in addition to AFP-C(EV). The characters corresponding to the items are as follows: *(2025)* (a) FD : Combined type smoke and heat detectors, fire alarms in accordance with **402. 3** (1) (A) (b) FC : Cameras (CCTV) in accordance with **402. 3** (1) (B) (c) FI : AI based cameras (AI CCTV) in accordance with **402. 3** (1) (C) (d) FT : Portable thermal imaging cameras in accordance with **402. 3** (1) (D) (e) FE : Fixed fire extinguishing arrangement in accordance with **402. 3** (2) (f) FA : Fire fighting equipement in accordance with **402. 3** (3) (A) and (B) **2. AFP-C** The fixed fire detection and fire alarm systems for all ro-ro spaces and vehicle spaces are to be capable of individually identifying each detector. **3. AFP-C(EV)** ~~*(2022)*~~*(2025)* The following requirements are to be satisfied for ro-ro spaces and vehicle spaces intended for the carriage of battery-powered electric vehicles and a plan for fighting its fire is to be available on board. (1) Fire detection and fire alarm system (A) Combined type smoke and heat detectors and fire alarms are to be arranged and installed for all ro-ro spaces and vehicle spaces. (B) Cameras (CCTV) are to be installed that can monitor the ro-ro spaces and vehicle spaces intended for the carriage of battery-powered electric vehicles. Colour video monitoring is to be available at the navigation bridge or the fire control station. (C) As an alternative to (B) above, AI-based cameras (AI CCTV) may be installed that can monitor the ro-ro spaces and vehicle spaces intended for the carriage of battery-powered electric vehicles. Colour video monitoring is to be available at the navigation bridge or the fire control station. ~~(C)~~(D) At least two explosion-proof portable thermal imaging cameras are to be provided on board to measure the temperature of the ro-ro spaces and the vehicle spaces periodically.	〈Effective date : Immdiately, Circular will be issued.〉 - Establishment of the characters for ships which parially satisfying the requirements of AFP-C(EV) notations. - For example, AFP-C(EV) (FD, FC) can be assigned for ships satisfy the requirement of 402.3(1)(A) & (B) - AI CCTV related notation added.

Amendment	Note
(2) Fixed fire extinguishing arrangement A fixed fire-extinguishing system complying with **SOLAS Reg. Ch. II-2/20.6.1** is to be fitted in ro-ro spaces and vehicle spaces. Where the fixed CO_2 fire extinguishing system is fitted for ro-ro spaces and vehicle spaces, a connection such as spool piece or flexible hose that connects the fire main system and the CO_2 discharge piping is to be provided to supply water to the CO_2 discharge nozzles. The purpose of this arrangement is to provide an auxiliary means to cool down the ro-ro spaces and vehicle spaces by supplying water to the CO_2 discharge nozzles, in case the total amount of CO_2 extinguishing agent is discharged in the event of fire or the CO_2 fire extinguishing system fails to operate. ~~(4)~~(3) Fire fighting equipment (A) In addition to the fire-fighter's outfits required by **SOLAS Reg. Ch. II-2,** at least two sets of fire-fighter's outfits are to be provided in an easily accessible location adjacent to the designated area for the carriage of battery-powered electric vehicles. (B) At least one water mist lance together with at least one fire blanket shall be provided at each cargo space where capable of being sealed and carrying battery-powered electric vehicles. ~~(5)~~(4) Recommendations for the safe operation of battery-powered electric vehicle charging In case an electric vehicle charging facility is installed on board, charging of electric vehicles is available only when safety is presented while vehicles are being unloaded. The following items are to be considered; (A) Available charging per unit shall in general be provided with low/medium power (up to 5 kW). (B) Power supply circuits serving such units shall be monitored for short circuit/ground fault with alarm to a continuously manned control station. Means to isolate these circuits shall be readily accessible for the crew and clearly marked. (C) A manual for the safe operation of the charging facility shall be available on board. The connection of chargers shall be monitored by the crew. (D) Charging shall be in an area where the impact from a fire in other units is minimized and impact from a fire starting in charges or electrical vehicle being charged is minimized. Charging of electric vehicles is available only when safety is presented while vehicles are being unloaded. Safety procedures such as sufficent ventilation while charging and limitation of the State of Charge (SOC) of the battery, etc. are to be complied with in order to minimize fire risk.	- Addition of clarification requested during internal opinion inquiry - Numbering correction

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Person in charge: Jung Jae-hun

No : 2025-6-E
Date : 2025. 5. 28

To : All Surveyors and whom it may concern

Subject	**9.204 Notice for Amendments to the KR Technical Rules (Guidance Pt.1 Annex 1-1 and Pt.3 Annex 3-6)**
Application	**1st June 2025 (the date of which application for survey is submitted)**

1. Please be informed that 2025 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 to the relevant works.

Classification Technical Rules	Effective date	Amendments
Guidance Pt.1 Annex1-1 Guidance Pt.3 Annex3-6	On or after 1st June 2025	Newly added Class Notation - Special Feature Notation 'OPEN-TOP(CC)(Hold Nos. a, b, …)'.

2. Furthermore, please be informed that these amendments will be included in 2026 edition of Rule and Guidance.

Attachments: Amendment Open-Top(Pt3 Pt1) --------- 1 copy. (The End)

Amendments of the Guidance

Pt. 1 Classification and Surveys

(Circular)

2025. 05. 28

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments: Notation 'OPEN-TOP (Holds a, b,...) newly established (in May 2025 by Circular) (Effective date : 1 June 2025 (to ships which the application for Classification Survey is submitted))

(1) As requested by the Business team, the need to establish new requirements for Container ships (or Cargo ships) without hatch covers was identified.
In reference to the contents of MSC/Circ.608 /Rev.1 Interim Guidelines for open-top container ships, new requirements for cargo ships and container ships without hatch covers were established.

2. Main Contents: Refer to the amendments

Present

〈Guidance〉 - Pt 1

Annex 1-1 Class Notation

1. Class Notations

1.1 Ship Type and Special Feature Notations

Ship Types	Special Feature Notations	Remarks
6. Cargo Ship *(2017)*	- HC(12-2) General Dry Cargo(15-1) Wood Chip Carrier(15-2) Cement Carrier(15-3) Livestock Carrier(15-4) Deck Cargo Ship(15-5) General Dry Cargo(Double Skin)(15-6) Liquid Cargo(Category OS only)(15-7) Container(15-8) *(2019)*	(12-2) : 〈omission〉 (15-1) : 〈omission〉 (15-8) : Even though cell guides are not installed on ships, but shall be assigned to the ships carrying containers generally by means of approved container securing fittings and stowage method in accordance with **Annex 7-2, Pt 7** of the Guidance. (e.g. Multi-Purpose Ship) *(2019)*

Amendment

〈Guidance〉 - Pt 1

Annex 1-1 Class Notation

1. Class Notations

1.1 Ship Type and Special Feature Notations

Ship Types	Special Feature Notations	Remarks
6. Cargo Ship *(2017)*	- 〈same as present〉 Container(15-8) *(2019)* OPEN-TOP(CC)(Hold Nos. a, b, ...)(15-9) *(2025)* OPEN-TOP(Hold Nos. a, b, ...)(15-10) *(2025)*	〈same as present〉 (15-8) : Even though cell guides are not installed on ships, but shall be assigned to the ships carrying containers generally by means of approved container securing fittings and stowage method in accordance with **Annex 7-2, Pt 7** of the Guidance. (e.g. Multi-Purpose Ship) *(2019)* (15-9) : Ships designated as not required to have hatch covers fully or partially fitted in one or more cargo holds during the voyage in accordance with **Pt3 Annex 3-6** of the Guidance. (15-10) : For assigning the notation **OPEN-TOP(CC)(Hold Nos. a, b, ...)**, for ships carrying only non-combustible cargo, the notation is to be given as **OPEN-TOP(Hold Nos. a, b, ...)** excluding **(CC)**.

Note

Present

Ship Types	Special Feature Notations	Remarks
11. Container Ship[20]	LS[20-1] LS(CL)[20-2] LS(CL, RS)[20-3] LS(CL, RS+)[20-4] LS(HHS or HHT)[20-5] *(2023)*	[20] : 〈omission〉 [20-1] : 〈omission〉 [20-2] : 〈omission〉 [20-3] : 〈omission〉 [20-4] : 〈omission〉 [20-5] : This notation shall be assigned to ships where container securing arrangements are used, and design and construction of the system are in accordance with **Ch 3, Sec 25, 2504** or **2505** of the **Guidance for Approval of Manufacturing Process and Type Approval, Etc** *(2022)*

Amendment

Ship Types	Special Feature Notations	Remarks
11. Container Ship[20]	LS[20-1] LS(CL)[20-2] LS(CL, RS)[20-3] LS(CL, RS+)[20-4] LS(HHS or HHT)[20-5] *(2023)*	[20] : 〈same as present〉 [20-1] : 〈same as present〉 [20-2] : 〈same as present〉 [20-3] : 〈same as present〉 [20-4] : 〈same as present〉 [20-5] : This notation shall be assigned to ships where container securing arrangements are used, and design and construction of the system are in accordance with **Ch 3, Sec 25, 2504** or **2505** of the **Guidance for Approval of Manufacturing Process and Type Approval, Etc** *(2022)*
	OPEN-TOP(CC)(Hold Nos. a, b, ...)[20-6] *(2025)*	[20-6] : Ships designated as not required to have hatch covers fully or partially fitted in one or more cargo holds during the voyage in accordance with **Pt3 Annex 3-6** of the Guidance.
	OPEN-TOP(Hold Nos. a, b, ...)[20-7] *(2025)*	[20-7] : For assigning the notation **OPEN-TOP(CC)(Hold Nos. a, b, ...)**, for ships carrying only non-combustible cargo, the notation is to be given as **OPEN-TOP(Hold Nos. a, b, ...)** excluding **(CC)**.

Note

〈Circular〉

Annex 3-6 Cargo Ships or Container Ships with OPEN-TOP

I. General

1. Application

(1) The class notation **OPEN-TOP(CC)(Hold Nos. a, b, ...)** is based on the 「**MSC/Circ. 608/Rev.1, dated 5 July 1994, Interim Guideline for Open-Top Containerships**」. This annex specifies additional requirements for cargo ships or container ships designed to operate without fully or partially fitted with hatch covers on one or more cargo holds.
  (A) For assigning the notation **OPEN-TOP(CC)(Hold Nos. a, b, ...)**, for ships carrying only non-combustible cargo, the notation is to be given as **OPEN-TOP(Hold Nos. a, b, ...)** excluding **(CC)**. (Refer to **VI. 1. (3)**)

(2) In order to be assigned this class Notation, agreement should be reached with the flag state regarding the application of this Annex.

(3) The ships carrying IMSBC cargoes (solid bulk cargoes) are not permitted to omit hatch covers.

2. Definitions

(1) Maximum sustained speed
Maximum sustained speed is defined as the maximum service speed taking into account speed loss due to resistance increase in regular waves. Voluntary speed loss is not taken into consideration.

(2) Minimum ship manoeuvring speed
Minimum ship manoeuvring speed is defined as the minimum speed which maintains directional control and is consistent with the operating characteristics of the ship.

(3) Green water
Green water is sea water other than spray shipped aboard the ship under normal operating conditions.

3. Freeboard

(1) Minimum freeboard is to be determined by seakeeping characteristics and stability. Model tests and calculations are to be carried out to provide the Society with:
  (A) measured data for the maximum hourly rate of ingress of green water, in $\mathrm{m}^3/\mathrm{hour}$, likely to be shipped into each cargo hold.
  (B) evaluation of the adequacy of the discharge rates from cargo hold freeing ports (if fitted).

(2) The maximum hourly rate of ingress of green water in any one open cargo hold determined from model testing is not to exceed the hatch opening area, in m^2, multiplied by 0.4 m/hour.

(3) A conventional geometrical freeboard and minimum bow height are to be calculated assuming that hatch covers are fitted. The freeboard and bow height assigned to the ship is not to be less than the equivalent geometrical freeboard determined from the **ICLL.**

(4) All seasonal freeboards are to be omitted unless the minimum geometrical freeboard and corresponding seasonal freeboards for which the ship is eligible (assuming hatch covers fitted) are greater than the freeboard for which the model tests were satisfactorily carried out. In that case, the minimum geometrical freeboard and the corresponding seasonal freeboards greater than the freeboard for which the model tests were carried out are to be assigned.

(5) The minimum freeboard and minimum bow height assigned to the ship are not too low than those corresponding to the model test conditions.

II. Loading conditions

1. Intact flooded condition

(1) For the intact flooded condition, all holds intended to be left open in navigation are to be filled

with a water level defined as follows:

(A) for **Cargo Ship**

The water level is to correspond to the volume of water ingress given in **IV.1(6).**

(B) for **Container Ship**

The water level is to correspond to all open holds completely filled with water (permeability of 0.70 for container holds) to the level of the top of the hatch side or hatch coaming or, in the case of a ship fitted with cargo hold freeing ports, to the level of those ports,

(2) For ships assigned the service notation **Cargo Ship**, the vertical hull girder bending strength in intact flooded condition is to be complied with the hull girder strength in intact flooded condition **Pt 3, Ch 3**. For ships assigned the service notation **Container Ship**, the vertical hull girder bending strength in intact flooded condition is to be complied with **Pt 14, Ch 5, Sec 2**. In addition, regarding local strength, cargo ships are to satisfy with the relevant provisions of **Pt 3,** of the Rules, and container ships are to be satisfied with the relevant provisions of **Pt 14** of the Rules. The still water bending moment is to be taken as the still water bending moment for the intact flooded condition provided by designer.

(3) The intact flooded conditions are to be included in the loading manual. Cargo holds intended to be without hatch covers during navigation and all possible combinations are to be considered and specified.

III. Procedure of model tests

1. General

(1) The model test procedure should be in accordance with **MSC/Circ. 608/Rev.1.**

(2) The Society may request an observer to observe the test. The report shall be submitted to our Classification Society for reference.

IV. Stability

1. Intact stability

(1) For container ships, it shall be in accordance with **MSC/Circ. 608/Rev.1**, and for cargo ships, it shall be in accordance with (2) to (7).

(2) The ship's stability in all loading conditions except the intact flooding conditions shall comply with the **2008 IS Code**.

(3) The stability of the ship in the intact flooded condition is to meet the survival criteria (with factor s=1) when calculated in accordance with **SOLAS Chapter II-1, Reg.7-2**.

(4) Where cargo hold freeing ports are fitted, they are to be considered closed for the purpose of determining the flooding angle, provided that the reliable and effective control of closing of these freeing ports is satisfactory to the Society.

(5) The ship in intact condition before water ingress should be assumed to be loaded at maximum draught for open-top condition taking into account the maximum allowable VCG resulting from intact and damage stability criteria.

(6) The cargo holds are to be considered empty and filled with water on the tank top. The cargo holds are to be filled with the volume of water $V_{ingress}$, in m3, accumulated for 3 hours, and taken equal to (permeability of 0.95 for cargo holds):

$$V_{ingress} = 3 \cdot (R_{GW} + 0.1 \cdot A_{HO})$$

where:

R_{GW} : Maximum hourly rate of green water, in $\mathrm{m}^3/\mathrm{hour}$, shipped in seagoing conditions as established by the comprehensive model testing.

A_{HO} : Hatch opening area, in m^2.

(7) For the condition with flooded holds and an intact ship, the free surfaces shall be determined as follows:

(A) The holds are considered empty for the calculation of the free surface, regardless of whether they are fully loaded or not.

(B) the green water entered the cargo hold and will not pour out during heeling

(C) the maximum value of the free surface moment between the filling limits envisaged in the cargo hold is to be considered. As an alternative, the correction to righting lever is sug-

gested to be based on the real shifting moment of water in the virtual empty cargo hold. As guidance, the method described in the **2008 IS Code, Pt B, Ch 3, [3.1.9]** may be applied.

(8) The calculations are to be performed for intermediate phases of hold flooding with each phase comprising of an accumulated height of water of 0,5 m until the height corresponding to the volume of water according to (6) is reached.

2. Damage stability

(1) The ships assigned the class notation **OPEN-TOP** are to comply with the damage stability criteria. The coamings of open-top holds are to be considered as unprotected openings.

V. Hold bilge dewatering system and freeing ports

1. Hold bilge dewatering system

(1) The bilge pumping system is to have a required capacity to pump, whichever is the greater below. Where the bilge pump is used, pumps are to be of the self-priming or the equivalent type and are to be so arranged that they are immediately operable when in use.
   (A) the maximum hourly rate of green water shipped in seagoing conditions as established by the comprehensive model testing specified.
   (B) an amount equal to rainfall of 0.1 $\mathrm{m/hour}$ regardless of the installation of rain covers.
   (C) the amount of shipped green water measured during the seakeeping model tests for the dead ship condition in beam sees, multiplied by safety factor 2.
   (D) four-thirds (133.3 %) of the amount of water required for fire-fighting purposes in the largest hold.
   (E) an amount equal to the capacity required for ships with closed cargo holds.

(2) The pumping of hold bilges is to be possible by at least three bilge pumps.

(3) At least one of these pumps is to have a capacity of not less than the required capacity as defined in (1) and is to be dedicated to bilge and ballast service only. It is to be located in such a way that it will not be affected by a fire or other casualty to the space containing the pumps required in (4) or the space containing the main source of power and should be supplied from the emergency switchboard.

(4) The combined output of at least two further pumps is not to be less than the required capacity as defined in (1). Where these pumps are used in common with the bilge pumps located in engine room, the capacity of each pump is to be more than 70% of the required capacity as specified in **Pt.5 Ch.6 405. 2** of the Rules for the Classification of Steel Ships. These pumps are to be supplied by the main source of electrical power or any other source of power independent of the emergency switchboard.

(5) The bilge pumping system, including the piping system, is to incorporate sufficient redundancy features so that the system will be fully operational and capable of dewatering the hold spaces at the required capacity in the event of failure of any one system component.

(6) All open-top cargo holds are to be fitted with water level detectors in accordance with MSC.188(79)/Rev.2. For single hold cargo ships, the requirements of SOLAS II-1/25 are to be satisfied, and for multiple hold cargo ship, the requirements of SOLAS II-1/25-1 are to be satisfied. In addition, the alarms are to annunciate in the machinery spaces and be independent of bilge pump controls.

(7) If the loss of suction prevents the proper functioning of the bilge system, special measures to prevent this are to be considered, such as for instance, the installation of level indicators.

(8) Open cargo hold drain wells are to be designed to ensure unobstructed discharge of water and easy access for cleaning under all conditions.

(9) Where tween decks are fitted and form wells, ample provisions are to be made for rapidly freeing the tween decks from water and for draining them through evenly distributed openings.

(10) In addition to above, the bilge piping system is to comply with the requirements of **Pt.5 Ch.6 Sec. 1, Pt.5 Ch.6 404. 1, 404. 2** and **406. 1** to **406. 5** of the Rules for the Classification of Steel Ships.

(11) Upon completion of the installation, an operational test of the hold bilge dewatering system and associated water level detectors is to be conducted.

2. Freeing ports

(1) If provided, freeing ports are to be fitted on both sides of each open cargo hold, subject to the following:
  (A) the number, size and location of the freeing ports on each side of each open hold is to be sufficient to prevent the accumulation of water above the level defined in MSC/Circ.608/Rev.1 5.12.
  (B) efficient means of closure to prevent the accidental ingress of water are to be provided. Such means are to be operated from above the freeboard deck. In the case of a ship operating in areas where icing is likely to occur, these arrangements are to be suitable to enable the ports to operate efficiently under such conditions.

VI. Fire protection

1. General

(1) The fire protection system for open-top holds is to be based on the philosophy of containing the fire in the hold(or bay) of origin and to cool adjacent areas to prevent structural damage.
(2) Whenever a fire detection system is required in the open hold area, the fire detection system is to be designed and arranged to take account of the specific hold and cargo configuration and ventilation arrangement.
(3) For ships carrying only non-combustible cargo (as defined in the FTP Code 2010, Annex 2, paragraph 1), as an alternative to the water spray system required in 2., and subject to Flag Administration acceptance an equivalent arrangement applying fire-fighting monitors based on MSC.1/Circ.1472 may be considered. In such cases, the water supply should be sufficient to operate the installed monitors.
(4) Upon completion of the installation, an operational test of the water spray system(or equivalent system) is to be conducted.

2. Water spray system

(1) Open-top holds are to be protected by a fixed water spray system. The system is to be capable of spraying water into the cargo hold from deck level downward. The system is to be designed and arranged to take account of the specific hold and cargo configuration.
(2) The water spray system is to be able to effectively contain a fire in the hold(or bay) of origin. The spray system is to be subdivided, with each subdivision to consist of a ring-line at deck level in an open cargo hold.
(3) The water spray system is to be capable of spraying the outer vertical boundaries of each open cargo hold(or bay) and of cooling the adjacent structure. The uniform application density is to be not less than 1.1 litres/min/m^2.
(4) At least one dedicated fire extinguishing pump for the hold water spray system with a capacity to serve any one open-top hold is to be provided. The pump is to be installed outside the open-top area. Where the container bays above the deck may not be adequately protected, mobile water monitors may be considered.
  The availability of water to the water spray system is to be at least 50 % of the total capacity, with adequate spray patterns in the open-top hold, and with any one dedicated pump inoperable. For the case of a single dedicated water spray pump this may be accomplished by an interconnection to an alternative source from the weather deck, and it shall be capable of supplying the cargo hold with water spray at the capacity required in (3).
(5) If tween deck panels (movable stowage platforms) are used, the area underneath the panels shall be protected with water spray system. The system design shall follow the principles specified in SOLAS II-2/19.3.1.3.

VII. Dangerous goods

1. Dangerous goods

(1) Dangerous goods for which 'stowage on deck only' is specified in the IMDG Code are not to be carried in or vertically above the open-top holds.
(2) Dangerous goods other than those described in (1) above are not to be carried in or vertically above open-top holds unless such holds are in full compliance with SOLAS Chapter II-2, Reg. 19.

(3) Segregation of dangerous goods
The stowage and segregation requirements of the IMDG Code as amended shall be applied.

⚓

CIRCULAR

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Person in charge :KIM Heesung

No :2025-06-E
Date :2025. 6. 30

To :All Surveyors and whom it may concern

Subject	9.205 Notice for Amendment to the KR Technical Rules
Application	Refer to Effective date for each KR Technical Rules specified in Par.1

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 7	1 January 2026 (Date of contract for ship construction)	IACS UR F44 Rev.3 & Corr.1
Guidance for Classification of Steel Ships Pt 7 Ch.6	1 January 2026 (Date of contract for ship construction)	IACS UR F44 Rev.3 & Corr.1
Rules & Guidance for Classification of Steel Ships Pt 8	1 January 2026 (Refer to effective date in the attachment)	Res.MSC.550(108) IACS UI SC307
Rules & Guidance for Classification of Ships Using Low-flashpoint Fuels	1 January 2026 (Date of contract for ship construction)	IACS UI GF21

2. Furthermore, please be informed that the establishment will be included in 2025 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. 7

2025. 6.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2026 (based on the contracted date) - Circular will be issued.

◉ IACS UR F44 Rev.3 & Corr.1 : Fore peak ballast tank and space arrangement on oil & chemical tankers

Present	Note
# CHAPTER 1 OIL TANKERS ## Section 10 Piping Systems and Venting Systems for Oil Tankers **1003. Piping systems for cargo oil pump rooms, cofferdams and tanks adjacent to cargo oil tanks** **〈Omitted〉** ~~**3. Fore peak ballast tank**~~ ~~The fore peak ballast tank ballasted with the system serving other ballast tanks within the cargo area are to be meet the following requirements:~~ ~~(1) The vent pipe openings are to be located on open deck at the suitable distance regarding following from sources of ignition.~~ ~~(A) Areas on open deck or semi-enclosed spaces on open deck, within a sphere of 1.5 m radius from the vent pipe openings of fore peak ballast tank : zone 1~~ ~~(B) Areas on open deck or semi-enclosed spaces on open deck, within 1.5 m surrounding the areas specified in the above (A) : zone 2~~ ~~(2) Means are to be provided on the open deck to allow measurement of flammable gas concentrations within the fore peak tank by a suitable portable instrument.~~ ~~(3) The sounding arrangement to the fore peak tank is to be direct from open deck.~~ ~~(4) The access to the fore peak tank is to be direct from open deck. Alternatively, indirect access from the open deck to the fore peak tank through an enclosed space may be accepted provided that :~~ ~~(A) In case the enclosed space is separated from cargo tanks by cofferdams, the access is to be through a gas tight bolted man-hole located in the enclosed space and a warning sign is to be provided at the manhole stating that the fore peak tank may only be opened after;~~ ~~(a) it has been proven to be gas free; or~~ ~~(b) any electrical equipment which is not certified safe in the enclosed space is isolated.~~ ~~(B) In case the enclosed space has a common boundary with the cargo tanks and is therefore hazardous, the enclosed space is to be well ventilated.~~	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3 & Corr.1 - Fully revised by UR F44 Rev. 3 & Corr.1

Amendment	Note
# CHAPTER 1 OIL TANKERS ## Section 10 Piping Systems and Venting Systems for Oil Tankers **1003. Piping systems for cargo oil pump rooms, cofferdams and tanks adjacent to cargo oil tanks** **〈Omitted〉** **3. Fore peak ballast tanks and space arrangement on oil and/or chemical tankers *(2025)* 【See Guidance】** (1) Fore peak ballast tanks and space arrangements on tankers for oil and/or chemicals (A) The fore peak tank can be ballasted with the system serving other ballast tanks within the cargo area, provided: (a) The vent pipe openings are located on open deck at a distance from sources of ignition as required by **IEC 60092-502:1999** Electrical installations in ships - Tankers - Special features; This requirement does not apply to sounding arrangements. (b) Access to the fore peak tank is direct from open deck. Alternatively, indirect access from the open deck to the forepeak tank may be from a pump-room, deep cofferdam, pipe tunnel, cargo hold, double hull space, bosun's store or similar compartment not intended for the carriage of oil or hazardous cargoes, conforming to the requirements of SOLAS II-1/3-6.3.1. Electrical equipment in such indirect access shall be of the certified safe type suitable for use in the hazardous area it opens into or shall be isolated before entry. (c) Continuous ventilation is maintained while accessing the forepeak tank. (d) The sounding arrangement to the fore peak tank is direct from open deck. (e) The forepeak tank is gas freed direct from open deck, or through a dedicated trunk to open deck. Before the manhole and the entrance of the dedicated trunk are opened, the trunk and the forepeak tank shall be confirmed as made gas free. Means are to be provided to free the space of gas without opening manholes or the entrance to a dedicated trunk. Manholes on the open deck and away from sources of ignition at the top of the dedicated trunk which are used to gas-free the space are allowed to be opened. (f) The fore peak ballast tank is considered as a hazardous zone 2 if segregated from cargo area with a cofferdam, or as a hazardous zone 1 if located adjacent to a cargo tank. For tankers where a bow thruster space is provided, the piping passing through the non-hazardous bow thruster room shall be fully welded and it is required to have the collision bulkhead valve located within the forepeak tank. (g) Means are to be provided on the open deck by a suitable portable instrument, to allow detection of toxic and flammable vapours within the FPT (based on the cargoes carried in current voyage, and since last de-ballasting of FPT was carried out), in order to ensure the FPT is fully gas freed. In the case that sounding arrangements can be used as the means for the portable instrument additional means for the purpose is not required.	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3 & Corr.1 - Fully revised by UR F44 Rev. 3

Amendment	Note
(2) Additional requirements for forward spaces not being defined as a ballast tank (A) Any spaces, voids and/or indirect accesses from the open deck or intermediate space being located adjacent to cargo tanks, and/or are defined as hazardous area zone 1 or 2, shall follow the same requirements to openings and access as reflected for fore peak ballast tanks in (1). (B) In case any spaces or voids are defined as non-hazardous spaces and have access to other non-hazardous spaces (such as bosun store), the following applies: (a) For any non-hazardous space with access to a hazardous space (example: fore peak ballast tank), the non-hazardous space must have access directly to open deck and shall be gas freed directly from open deck, and not through the non-hazardous space (example: bosun store). b) Access from bosun store to a non-hazardous space (example: void) having access to hazardous space (example: fore peak ballast tank) may be accepted through a gas tight bolted manhole, with signboard stating that the non-hazardous space cannot be entered until the space is confirmed gas free. Separation of such spaces are described in **IEC 60092-502:1999** section 4.1.4 and 4.1.5 as applicable. (3) Refer to **1003. 6** of the Guidance for the sample illustrations related to the above points.	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3 & Corr.1 - Fully revised by UR F44 Rev. 3

Amended Guidance for Classification of Steel Ships

Pt. 7

2025. 6.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2026 (based on the contracted date) - Circular will be issued

◉ IACS UR F44 Rev.3 & Corr.1 : Fore peak ballast tank and space arrangement on oil & chemical tankers

Present	Note

CHAPTER 1 OIL TANKERS

Section 10 Piping Systems and Venting Systems for Oil Tankers

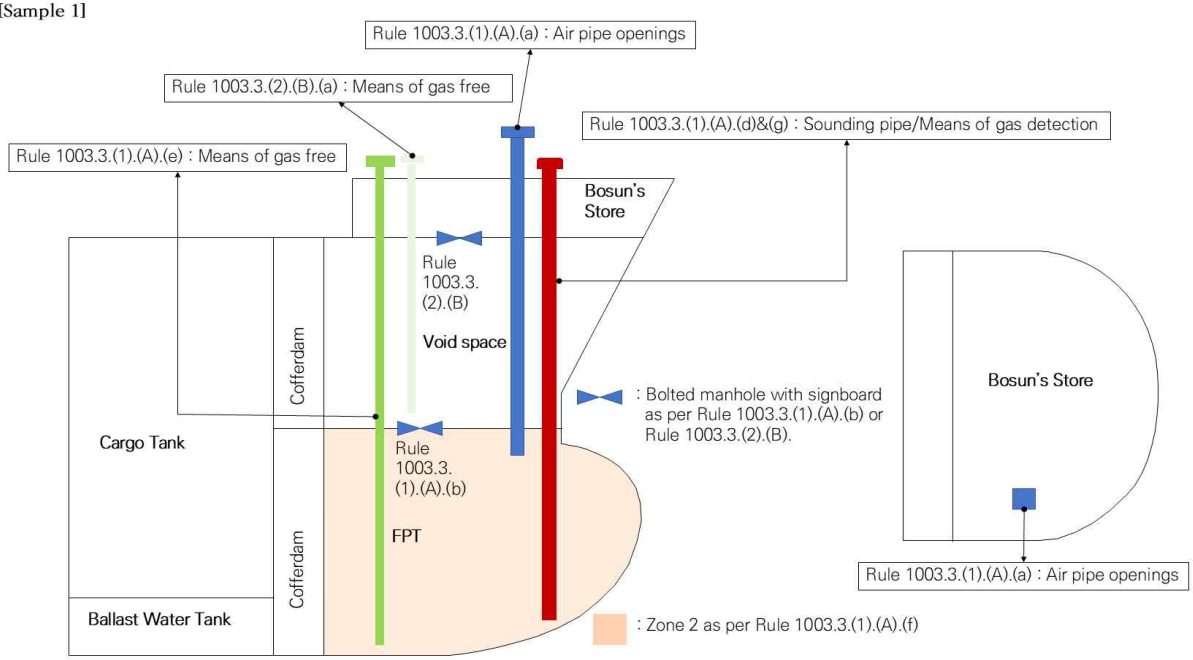
1003. Piping systems for cargo oil pump rooms, cofferdams and tanks adjacent to cargo oil tanks

〈Omitted〉

6. In application of **1003. 3** of the Rules, applicable samples are shown below. **【See Rule】**

(1) Arrangement shown in samples 1, 2, 5 and 6 are applicable to both oil tankers and chemical tankers.

[Sample 1]



〈Operational requirements〉

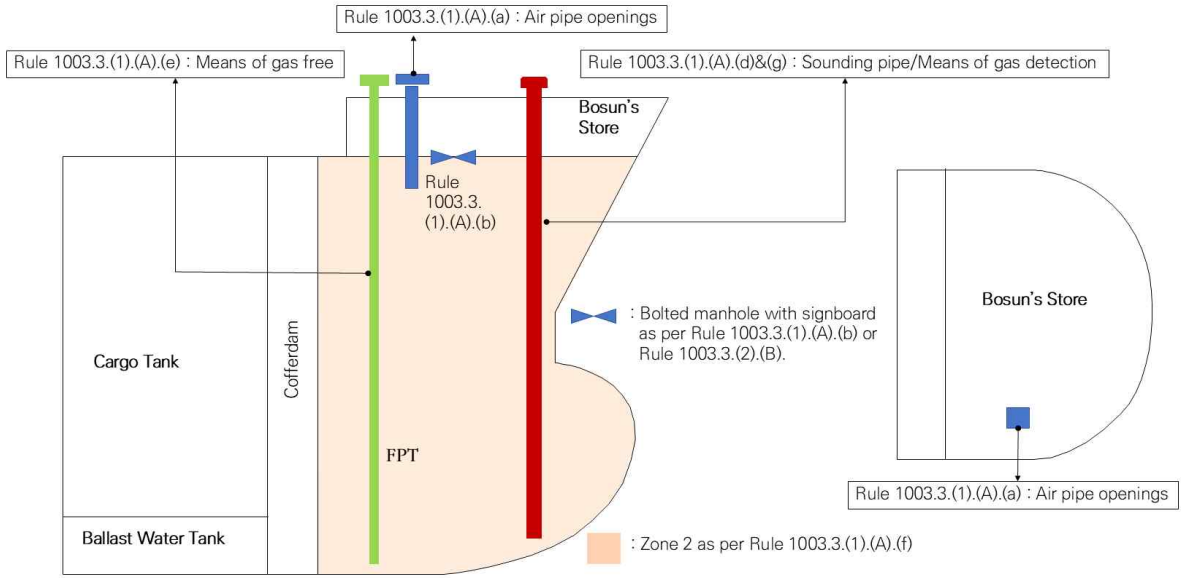
1. Continuous ventilation is maintained while accessing the FPT as per KR Rule 1003.3.(1).(A).(c).
2. To detect toxic and flammable vapours within the FPT (based on the cargoes carried in current voyage, ad since last de-ballasting of the FPT was carried out), in order to ensure the FPT is fully gas freed as per KR Rule 1003.3.(1).(A).(g).
3. Where toxic-vapour-detection equipment is not available for some cargoes which require such detection, the FPT may be ventilated by dilution method at a minimum rate of 6 air changes/hr for a minimum of 24hrs. Tank entry procedures to be done in accordance with IMO resolution A.1050(27) and IBC code 13.2.3.

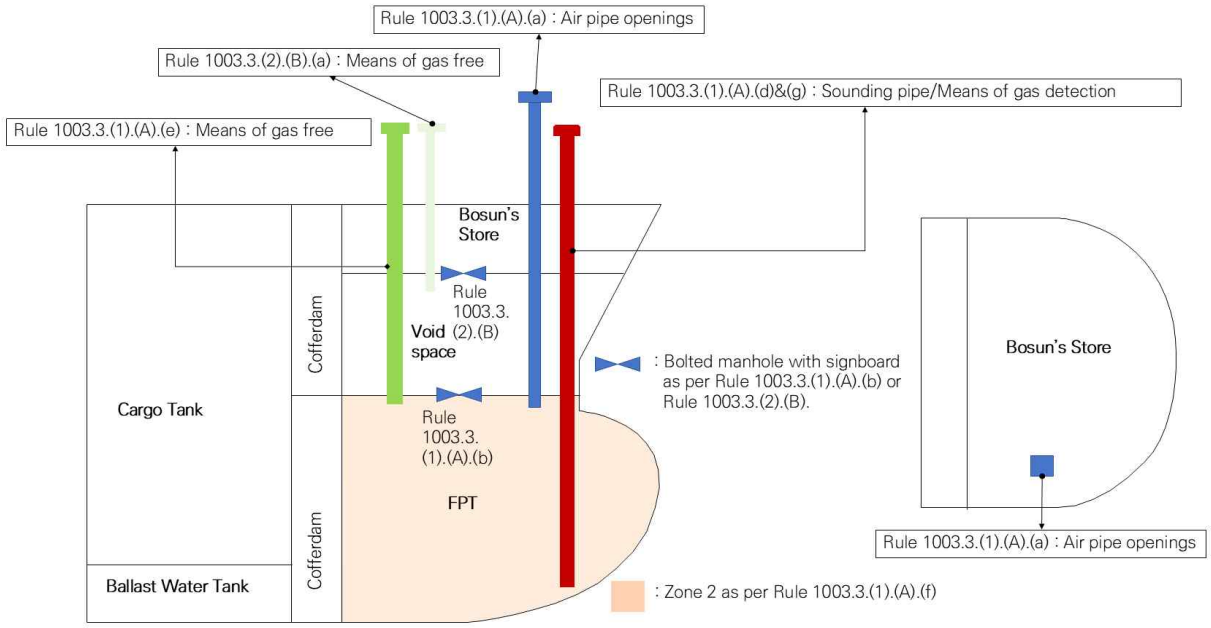
Fig 7.1.32.1 Sample arrangement applicable to both oil tankers and chemical tankers

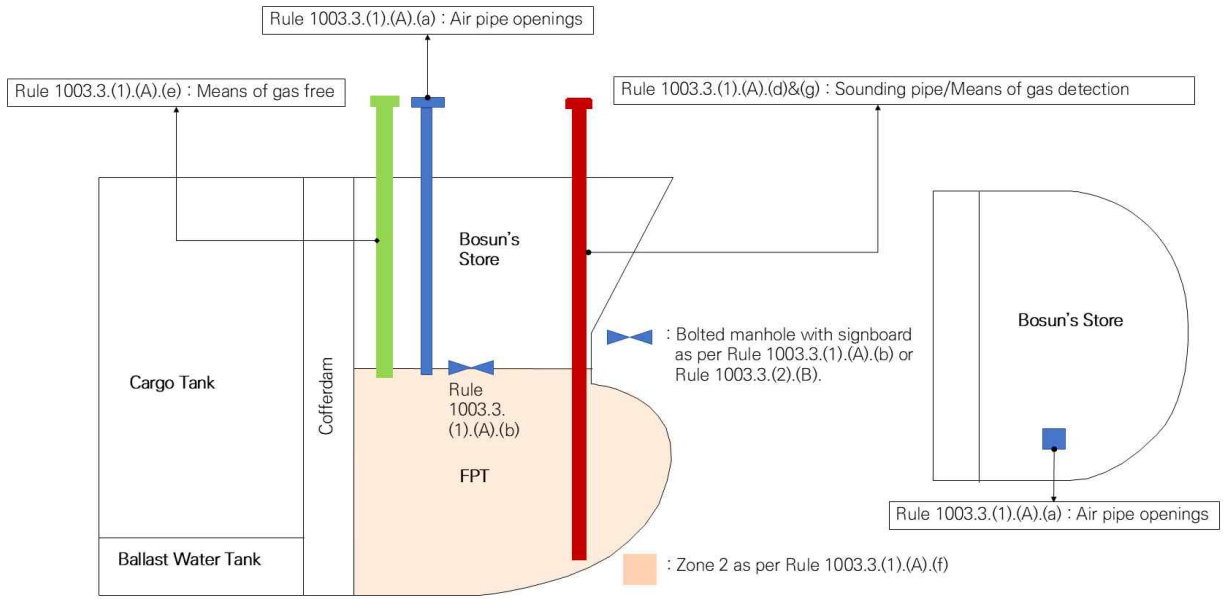
〈1 Jan. 2026 (Contracted date), Circular will be issued.〉

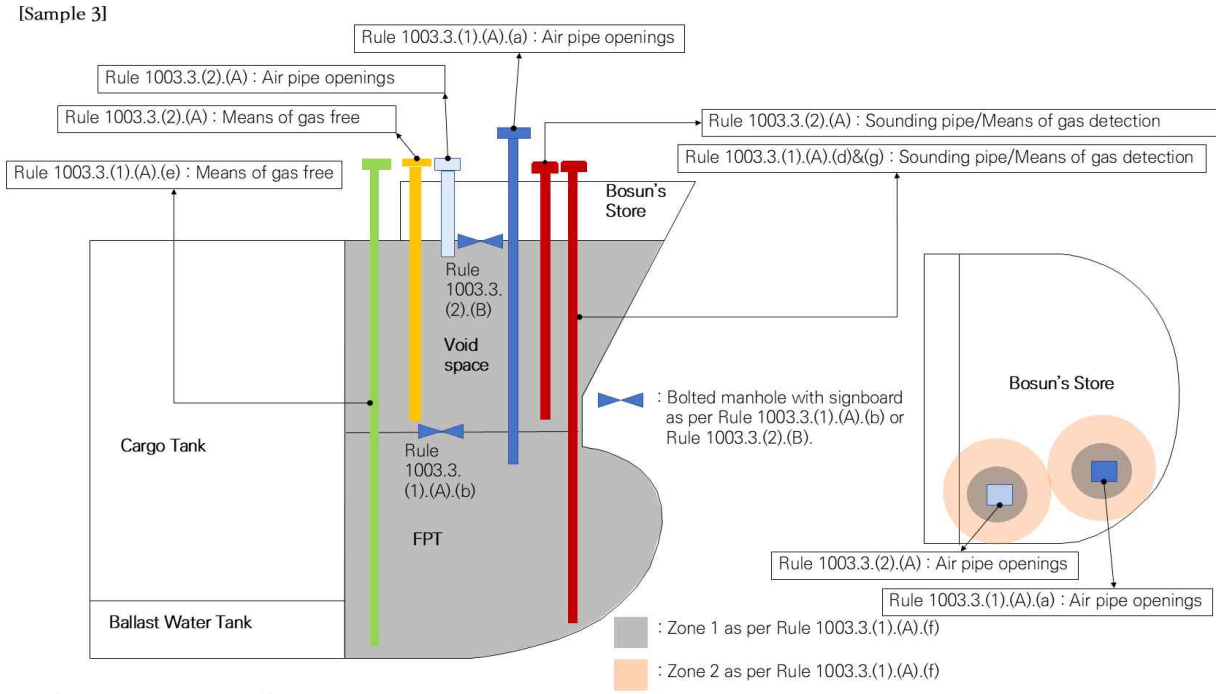
* IACS UR F44 Rev.3 & Corr.1

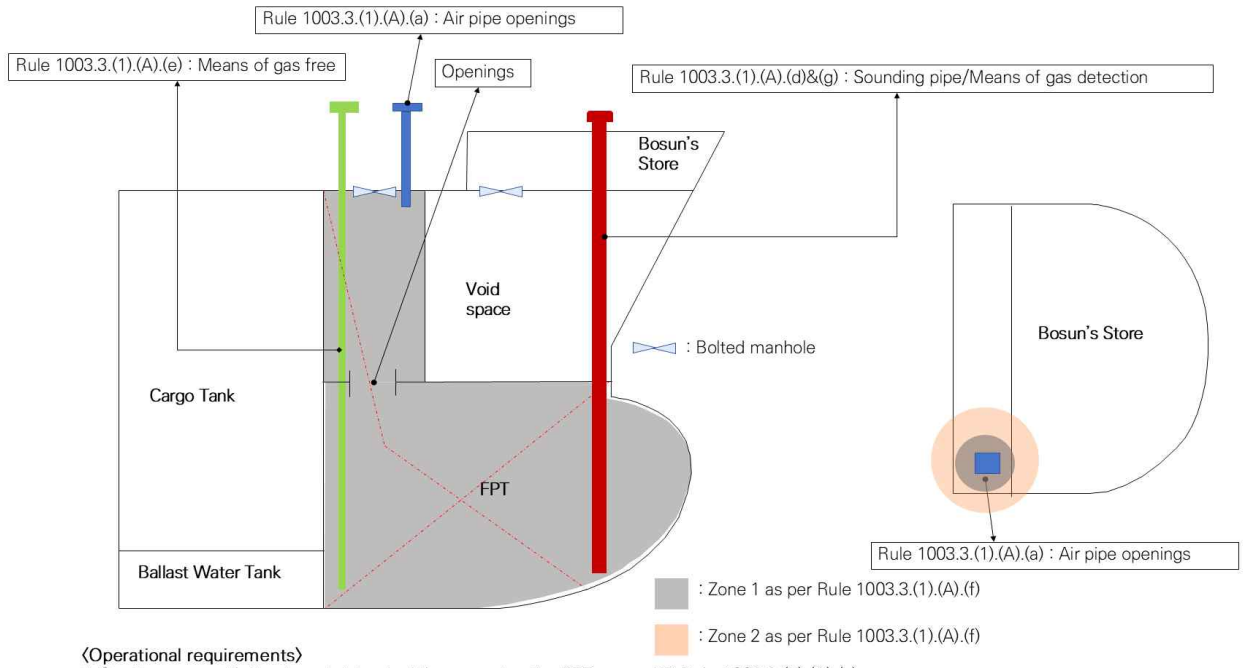
- Fully revised by UR F44 Rev. 3 & Corr.1

Present	Note
[Sample 2]  〈Operational requirements〉 1. Continuous ventilation is maintained while accessing the FPT as per KR Rule 1003.3.(1).(A).(c). 2. To detect toxic and flammable vapours within the FPT (based on the cargoes carried in current voyage, ad since last de-ballasting of the FPT was carried out), in order to ensure the FPT is fully gas freed as per KR Rule 1003.3.(1).(A).(g). 3. Where toxic-vapour-detection equipment is not available for some cargoes which require such detection, the FPT may be ventilated by dilution method at a minimum rate of 6 air changes/hr for a minimum of 24hrs. Tank entry procedures to be done in accordance with IMO resolution A.1050(27) and IBC code 13.2.3. Fig 7.1.32.2 Sample arrangement applicable to both oil tankers and chemical tankers	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3 & Corr.1 - Fully revised by UR F44 Rev. 3 & Corr.1

Present	Note
[Sample 5]  〈Operational requirements〉 1. Continuous ventilation is maintained while accessing the FPT as per KR Rule 1003.3.(1).(A).(c). 2. To detect toxic and flammable vapours within the FPT (based on the cargoes carried in current voyage, ad since last de-ballasting of the FPT was carried out), in order to ensure the FPT is fully gas freed as per KR Rule 1003.3.(1).(A).(g). 3. Where toxic-vapour-detection equipment is not available for some cargoes which require such detection, the FPT may be ventilated by dilution method at a minimum rate of 6 air changes/hr for a minimum of 24hrs. Tank entry procedures to be done in accordance with IMO resolution A.1050(27) and IBC code 13.2.3. Fig 7.1.32.5 Sample arrangement applicable to both oil tankers and chemical tankers	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3 & Corr.1 - Fully revised by UR F44 Rev. 3 & Corr.1

Present	Note
[Sample 6]  〈Operational requirements〉 1. Continuous ventilation is maintained while accessing the FPT as per KR Rule 1003.3.(1).(A).(c). 2. To detect toxic and flammable vapours within the FPT (based on the cargoes carried in current voyage, ad since last de-ballasting of the FPT was carried out), in order to ensure the FPT is fully gas freed as per KR Rule 1003.3.(1).(A).(g). 3. Where toxic-vapour-detection equipment is not available for some cargoes which require such detection, the FPT may be ventilated by dilution method at a minimum rate of 6 air changes/hr for a minimum of 24hrs. Tank entry procedures to be done in accordance with IMO resolution A.1050(27) and IBC code 13.2.3. Fig 7.1.32.6 Sample arrangement applicable to both oil tankers and chemical tankers	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3 & Corr.1 - Fully revised by UR F44 Rev. 3 & Corr.1

Present	Note
(2) Arrangement shown in samples 3 and 4 are applicable to oil tankers only.  〈Operational requirements〉 1. Continuous ventilation is maintained while accessing the FPT as per KR Rule 1003.3.(1).(A).(c). 2. To detect toxic and flammable vapours within the FPT (based on the cargoes carried in current voyage, ad since last de-ballasting of the FPT was carried out), in order to ensure the FPT is fully gas freed as per KR Rule 1003.3.(1).(A).(g). 3. Where toxic-vapour-detection equipment is not available for some cargoes which require such detection, the FPT may be ventilated by dilution method at a minimum rate of 6 air changes/hr for a minimum of 24hrs. Tank entry procedures to be done in accordance with IMO resolution A.1050(27) and IBC code 13.2.3. Fig 7.1.32.3 Sample arrangement applicable to oil tankers only	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3 & Corr.1 - Fully revised by UR F44 Rev. 3 & Corr.1

Present	Note
[Sample 4]  〈Operational requirements〉 1. Continuous ventilation is maintained while accessing the FPT as per KR Rule 1003.3.(1).(A).(c). 2. To detect toxic and flammable vapours within the FPT (based on the cargoes carried in current voyage, ad since last de-ballasting of the FPT was carried out), in order to ensure the FPT is fully gas freed as per KR Rule 1003.3.(1).(A).(g). 3. Where toxic-vapour-detection equipment is not available for some cargoes which require such detection, the FPT may be ventilated by dilution method at a minimum rate of 6 air changes/hr for a minimum of 24hrs. Tank entry procedures to be done in accordance with IMO resolution A.1050(27) and IBC code 13.2.3. Fig 7.1.32.4 Sample arrangement applicable to oil tankers only	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3 & Corr.1 - Fully revised by UR F44 Rev. 3 & Corr.1

Amended Guidance for Classification of Steel Ships

Pt. 7 Ch. 6

2025. 6.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2026 (based on the contracted date) - Circular will be issued

◉ IACS UR F44 Rev.3 : Fore peak ballast tank and space arrangement on oil & chemical tankers reflected in Pt.7. Therefore, amendment is prepared for the related requirement necessary to be applied to chemical tanker.

Amendment	Note

CHAPTER 6 Ships Carrying Dangerous Chemicals in Bulk

Section 3 Ship Arrangements

〈1 Jan. 2026 (Contracted date), Circular will be issued.〉

* IACS UR F44 Rev.3

305. Bilge and ballast arrangements 【See Rule】

1. General

(1) The discharge arrangements of permanent ballast tanks adjacent to cargo tanks may be such that ballast pumps in the machinery space are used as given as Fig **7.6.23** of the Guidance and ballast or bilges are discharged overboard through the eductor in the cargo pump room. In this case, check valve is to be provided between the ballast pump and eductor and spool piece is to be provided on the weather deck within the cargo area.

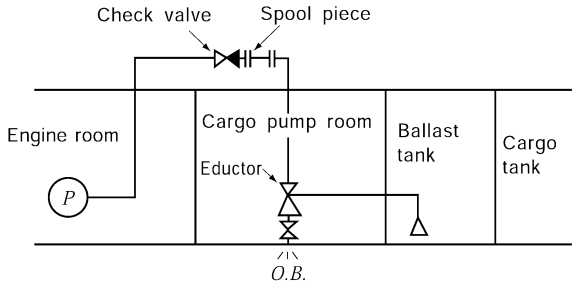
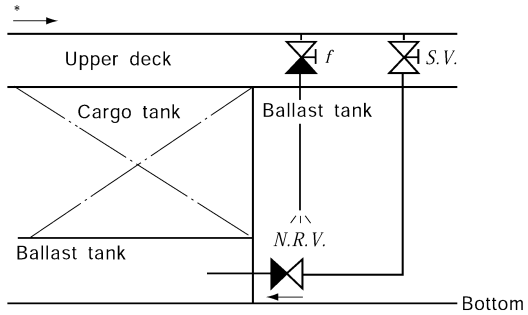


Fig. 7.6.23

(2) The words "ensure filling from tank deck level and check valves are fitted" referred to in **305. 1** of the Rules mean that exclusively used for filling from the weather deck but can not be used for discharging fitted with stop valves on the weather deck or stop valves operable from the weather deck and additionally check valves are provided as given in Fig **7.6.24** of the Guidance. Further, sufficient consideration is to be taken so as not to cause non-compliance with the damage stability requirements due to damage to pipelines or spillage of dangerous ballast or cargo into other compartments.

Amendment	Note
 * : A line to ensure filling only from the pump in machinery room N.R.V. : Non-return valve (Check valve) S.V. : Stop valve *f* : Stop valve + check valve or screw-down check valve **Fig. 7.6.24**	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UR F44 Rev.3
(3) Pipelines of ballast tanks adjacent to cargo tanks and not adjacent to cargo tanks are to be basically independent. (4) The fore peak tank, which can be ballasted with the system serving other ballast tanks within the cargo area, and its space arrangement are to comply with the requirements of **Pt.7 Ch.1 1003. 3 of the Rules and the Pt.7 Ch.1 1003. 6. (1) of the Guidance.** **2. Filling of ballast in cargo tanks** (1) The case referred to in **305. 2** of the Rules as "the filling line has no permanent connection to cargo tanks or piping and that check valves are fitted" is to be as given in Fig **7.6.25** of the Guidance. In this case, filling is to be limited to that from the open deck, where spool pieces or hoses and stop valves or check valves are required. (2) When filling is made from the open deck according to the preceding (1), the piping arrangement in cargo tanks is to be such that the filling pipe is extended as close to the bottom as practicable to minimize generation of static electricity. 〈Omitted〉 **3. Bilge pumping arrangements for the cargo area** 〈Omitted〉	- Related requirements referenced to be applied.

Amended Rules for Classification of Steel Ships

Pt. 8

2025. 6.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2026 (details refer to below), SOLAS Amendment by Res.MSC.550(108) reflected. (Circular will be issued.)

◉ Pt.8 Ch.2 101. : limitation on use of fuel amended, (Effective date : 1 Jan. 2026)

◉ Pt.8 Ch.5 302. : detection and alarm requirement slightly changed. (Effective date : 1 Jan. 2026)

◉ Pt.8 Ch.5 305. : detection and alarm for cargo ship revised. (Effective date : 1 Jan. 2026 based on the ship's construction date)

◉ Pt.8 Ch.13 related parts : SOLAS requirements for protection of vehicle, special category and open/closed ro-ro spaces, and weather decks intended for the carriage of vehicles reflected. (Effective date : 1 Jan. 2026 based on the ship's construction date)

Present	Amendment	Note
# CHAPTER 2 PROBABILITY OF IGNITION	# CHAPTER 2 PROBABILITY OF IGNITION	〈1 Jan. 2026, Circular will be issued.〉
## Section 1 Arrangements for Oil Fuel, Lubrication Oil and Other Flammable Oils	## Section 1 Arrangements for Oil Fuel, Lubrication Oil and Other Flammable Oils	* Res.MSC.550(108)
101. Limitations in the use of oils as fuel	**101. Limitations in the use of oils as fuel**	
The following limitations shall apply to the use of oil as fuel.	The following limitations shall apply to the use of oil as fuel.	
1. Except as otherwise permitted by this paragraph, no oil fuel with a flashpoint of less than 60 ℃ shall be used;	**1.** Except as otherwise permitted by this paragraph, no oil fuel with a flashpoint of less than 60 ℃ shall be used;	
2. In emergency generators oil fuel with a flashpoint of not less than 43 ℃ may be used;	**2.** In emergency generators oil fuel with a flashpoint of not less than 43 ℃ may be used;	
3. The use of oil fuel having a flashpoint of less than 60 ℃ but not less than 43 ℃ may be permitted (e.g., for feeding the emergency fire pump's engines and the auxiliary machines which are not located in the machinery spaces of category A subject to the following: (1) fuel oil tanks except those arranged in double bottom compartments shall be located outside of machinery spaces of category A (2) provisions for the measurement of oil temperature are provided on the suction pipe of the oil fuel pump (3) stop valves and/or cocks are provided on the inlet side and outlet side of the oil fuel strainers (4) pipe joints of welded construction or of circular cone type or spherical type union joint are applied as much as possible	**3.** The use of oil fuel having a flashpoint of less than 60 ℃ but not less than 43 ℃ may be permitted (e.g., for feeding the emergency fire pump's engines and the auxiliary machines which are not located in the machinery spaces of category A subject to the following: (1) fuel oil tanks except those arranged in double bottom compartments shall be located outside of machinery spaces of category A (2) provisions for the measurement of oil temperature are provided on the suction pipe of the oil fuel pump (3) stop valves and/or cocks are provided on the inlet side and outlet side of the oil fuel strainers (4) pipe joints of welded construction or of circular cone type or spherical type union joint are applied as much as possible	
4. In cargo ships, to which **Rules for ships using low-flashpoint fuels** is not applicable, the use of oil fuel having a lower flashpoint than otherwise specified in **1**, for example crude oil, may be permitted provided that such fuel is not stored in any machinery space and subject to the approval by the Administration of the complete installation; and *(2018)* **【See Guidance】**	**4.** In cargo ships, to which **Rules for ships using low-flashpoint fuels** is not applicable, the use of oil fuel having a lower flashpoint than otherwise specified in **1**, for example crude oil, may be permitted provided that such fuel is not stored in any machinery space and subject to the approval by the Administration of the complete installation; and *(2018)* **【See Guidance】**	
5. In ships, to which **Rules for ships using low-flashpoint fuels** is applicable, the use of oil fuel having a lower flashpoint than otherwise specified in **1** is permitted. *(2018)*	**5.** In ships, to which **Rules for ships using low-flashpoint fuels** is applicable, the use of oil fuel having a lower flashpoint than otherwise specified in **1** is permitted. *(2018)*	- Res.MSC.550(108), SOLAS II-2/Reg.4.2.1.8
	6. Oil fuel delivered to and used on board ships shall not jeopardize the safety of ships or adversely affect the performance of ~~the~~ machinery or be harmful to personnel. *(2025)*	
〈Omitted〉		

Amendment	Note
# CHAPTER 5 DETECTION AND ALARM ## Section 3 Protection of Accommodation and Service Spaces and Control Stations **301. Smoke detectors in accommodation spaces** Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation spaces as provided in **302.**, **303.** and **304.**. Consideration shall be given to the installation of special purpose smoke detectors within ventilation ducting. **302. Requirements for passenger ships carrying more than 36 passengers** A fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in service spaces, control stations and accommodation spaces, including corridors, stairways and escape routes within accommodation spaces. Smoke detectors need not be fitted in private bathrooms and galleys. Spaces having little or no fire risk such as voids, public toilets, carbon dioxide rooms and similar spaces need not be fitted with a fixed fire detection and fire alarm system. Detectors fitted in cabins, when activated, shall also be capable of emitting, or cause to be emitted, an audible alarm within the space where they are located. **303. Requirements for passenger ships carrying not more than 36 passengers** **〈Omitted〉**	〈1 Jan. 2026, Circular will be issued.〉 * Res.MSC.550(108) - Res.MSC.550(108)

Amendment	Note
# CHAPTER 5 DETECTION AND ALARM ## Section 3 Protection of Accommodation and Service Spaces and Control Stations 〈Omitted〉 **305. Cargo ships *(2025)*** ~~For Cargo ships, a~~Accommodation and service spaces and control stations of cargo ships shall be protected by a fixed fire detection and fire alarm system and/or an automatic sprinkler, fire detection and fire alarm system as follows depending on a protection method adopted in accordance with **Ch 7 103. 1** (1). **【See Guidance】** **1. Method IC** For ships constructed on or after 1 January 2026, a~~A~~ fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces and in all control stations and cargo control rooms. **2. Method IIC** For ships constructed on or after 1 January 2026, an~~An~~ automatic sprinkler, fire detection and fire alarm system of an approved type complying with the relevant requirements of the FSS Code shall be so installed and arranged as to protect accommodation spaces, galleys and other service spaces, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces and in all control stations and cargo control rooms. **3. Method IIIC** ~~A fixed fire detection and fire alarm system shall be so installed and arranged as to detect the presence of fire in all accommodation spaces and service spaces except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces.~~ For ships constructed on or after 1 January 2026, a fixed fire detection and fire alarm system shall be so installed and arranged as to detect the presence of fire in all accommodation spaces and service spaces providing smoke detection in corridors, stairways and escape routes within accommodation spaces, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces and in all control stations and cargo control rooms. 〈Omitted〉	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108) - SOLAS II-2/7.5.5

Amendment	Note
# CHAPTER 13 PROTECTION OF VEHICLE, SPECIAL CATEGORY AND RO-RO SPACES, OPEN AND CLOSED RO-RO SPACES, AND WEATHER DECKS INTENDED FOR THE CARRIAGE OF VEHICLES ## Section 1 General Requirements **101. Application** **1.** In addition, as appropriate, vehicle, special category and ro-ro spaces shall comply with the requirements of this regulation. **2.** On all ships, vehicles with fuel in their tanks for their own propulsion may be carried in cargo spaces other than vehicle, special category or ro-ro spaces, provided that all the following conditions are met: *(2020)* (1) the vehicles do not use their own propulsion within the cargo spaces; (2) the cargo spaces are in compliance with the appropriate requirements of regulation 19; and (3) the vehicles are carried in accordance with the IMDG Code, as defined in SOLAS VII/1.1." **3.** Passenger ships constructed before 1 January 2026, including those constructed before 1 July 2012, shall also comply with regulations **301. 6**, **304.** and **502. 3**.*(2025)* 〈Omitted〉 ## Section 2 Precaution against ignition of flammable vapours in closed vehicle spaces closed ro-ro spaces and special category spaces 〈Omitted〉	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108) - SOLAS II-2/20.2.1.3

Amendment	Note
Section 3 Detection and alarm *(2025)* Passenger ships constructed before 1 January 2026, including those constructed before 1 July 2012, shall comply with the requirements of paragraph **301. 6** not later than the first survey on or after 1 January 2028. **301. Fixed fire detection and fire alarm systems 【See Guidance】** ~~Except as provided in **303. 1**, there shall be provided a fixed fire detection and fire alarm system complying with the requirements of the FSS Code. The fixed fire detection system shall be capable of rapidly detecting the onset of fire. The type of detectors and their spacing and location shall be to the satisfaction of the Society taking into account the effects of ventilation and other relevant factors. After being installed the system shall be tested under normal ventilation conditions and shall give an overall response time to the satisfaction of the Society.~~ The requirements of **1** through **4** shall only apply to passenger ships constructed on or after 1 January 2026. Passenger ships constructed before 1 January 2026, including those constructed before 1 July 2012, shall comply with the requirements of **6** and the previously applicable Rule requirements of **301.**. The requirements of **5** shall apply to cargo ships constructed on or after 1 January 2026. Cargo ships constructed before 1 January 2026 shall comply with the previously applicable Rule requirements of **301.**. **1.** In vehicle, special category and ro-ro spaces, there shall be provided an individually identifiable fixed fire detection and fire alarm system. The system shall comply with the requirements of the Fire Safety Systems Code. (1) The fixed fire detection and fire alarm system shall provide smoke and heat detection throughout vehicle, special category and ro-ro spaces. The Society may accept linear heat detectors as the required system for heat detection. The system shall be capable of rapidly detecting the onset of fire. The location of detectors shall be to the satisfaction of the Society, taking into account the effects of ventilation and other relevant factors. After being installed, the system shall be tested under normal ventilation conditions and shall give an overall response time to the satisfaction of the Society. **2.** If a fixed water-based deluge system is used for vehicle, special category and ro-ro spaces, then a fire detection and fire alarm system identifiable to the same sections of the deluge system shall be arranged. **3.** The fire detection and fire alarm system shall be designed with a system interface which provides logical and unambiguous presentation of the information, to allow a quick and correct understanding and decision-making. In particular, section numbering of the alarm system shall coincide with that of other systems, such as a fixed water-based fire-extinguishing system or video monitoring system, if available.	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108) - SOLAS II-2/20.4&20.4.1

Amendment	Note
4. There shall be provided a fixed fire detection and fire alarm system for the area on the weather deck intended for the carriage of vehicles. The fixed fire detection system shall be capable of rapidly detecting the onset of the fire anywhere on the area. The type of detectors and their spacing and location shall be to the satisfaction of the Society, taking into account the effects of weather conditions, cargo obstruction and other relevant factors. Different settings may be used for specific operation sequences, such as during loading or unloading and during voyage, in order to reduce the false alarms. **5.** In cargo ships, vehicle spaces, special category spaces and ro-ro spaces shall be provided with a fixed fire detection and fire alarm system complying with the requirements of the Fire Safety Systems Code. The fixed fire detection system shall be capable of rapidly detecting the onset of fire. The type of detectors and their spacing and location shall be to the satisfaction of the Society, taking into account the effects of ventilation and other relevant factors. After being installed, the system shall be tested under normal ventilation conditions and shall give an overall response time to the satisfaction of the Society. **6.** For passenger ships constructed before 1 January 2026, including those constructed before 1 July 2012, a fixed fire detection and fire alarm system complying with the requirements of the Fire Safety Systems Code shall be provided in special category spaces, open and closed ro-ro and vehicle spaces. The fixed fire detection system shall be capable of rapidly detecting the onset of fire. The fixed fire detection and fire alarm system shall provide smoke and heat detection throughout vehicle, special category and ro-ro spaces. In this context, heat detectors shall comply with the spacing and coverage area requirements as applicable for smoke detectors. Heat detectors are only required where there is already a smoke detector. **302. Sample extraction smoke detection systems** Except open ro-ro spaces, open vehicle spaces and special category spaces, a sample extraction smoke detection system complying with the requirements of the FSS Code may be used as an alternative of the fixed fire detection and fire alarm system required in **301.**. **303. Special category spaces** **1.** An efficient fire patrol system shall be maintained in special category spaces. ~~However, if an efficient fire patrol system is maintained by a continuous fire watch at all times during the voyage, a fixed fire detection and fire alarm systems is not required.~~ **2.** Manually operated call points shall be spaced so that no part of the space is more than 20 m from a manually operated call point, and one shall be placed close to each exit from such spaces.	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108) - SOLAS II-2/20.4&20.4.1,

Amendment	Note
304. Video monitoring The requirements of paragraphs **1** and **2** apply to ships constructed on or after 1 January 2026. Passenger ships with vehicle, special category or ro-ro spaces constructed before 1 January 2026, including those constructed before 1 July 2012, shall comply with the requirements of paragraphs **1** and **2** not later than the first survey on or after 1 January 2028. **1.** For passenger ships, an effective video monitoring system shall be arranged in vehicle, special category and ro-ro spaces for continuous monitoring of these spaces. The system shall be provided with immediate playback capability to allow for quick identification of fire location, as far as practicable. Cameras shall be installed to cover the whole space, high enough to see over cargo and vehicles after loading. **2.** The videos recorded by this monitoring system shall be available for replay at a continuously manned control station or at the safety centre for at least seven days for installation on ro-ro passenger ships constructed on or after 1 January 2026 and 24 hours for existing ro-ro passenger ships constructed before 1 January 2026, including those constructed before 1 July 2012. The correspondence between any one video camera and the section of the fixed water-based fire-extinguishing system protecting the space covered by this camera shall be clearly displayed close to the video monitor. Continuous monitoring of the video image by the crew is not required. **Section 4 Structure protection** **401. Structure protection** **〈Omitted〉**	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108) - SOLAS II-2/20.4.4

Amendment	Note

Section 5 Fire-extinction

501. Fixed fire-extinguishing systems

1. Vehicle spaces and ro-ro spaces which are not special category spaces and are capable of being sealed from a location outside of the cargo spaces shall be fitted with one of the following fixed fire-extinguishing system:

(1) a fixed gas fire-extinguishing system complying with the provisions of the FSS Code;
(2) a fixed high-expansion foam fire-extinguishing system complying with the provisions of the FSS Code; or
(3) a fixed water-based fire fighting system complying with the provisions of the FSS Code and **2** (1) to (4). **【See Guidance】**

2. Vehicle spaces and ro-ro spaces not capable of being sealed and special category spaces shall be fitted with a fixed water-based fire-fighting system for ro-ro spaces and special category spaces complying with the provisions of the the FSS Code which shall protect all parts of any deck and vehicle platform in such spaces. Such a water-based fire-fighting system shall have: **【See Guidance】**

(1) a pressure gauge on the valve manifold;
(2) clear marking on each manifold valve indicating the spaces served;
(3) instructions for maintenance and operation located in the valve room; and
(4) a sufficient number of drainage valves to ensure complete drainage of the system.

3. The Society may permit the use of any other fixed fire-extinguishing system that has been shown that it is not less effective by a full-scale test in conditions simulating a flowing petrol fire in a vehicle space or a ro-ro space in controlling fires likely to occur in such a space.

4. When fixed pressure water-spraying systems are provided, in view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks during the operation of the fixed pressure water-spraying system; the following arrangements shall be provided:

(1) in passenger ships: **【See Guidance】**
  (A) in the spaces above the bulkhead deck, scuppers shall be fitted so as to ensure that such water is rapidly discharged directly overboard, taking into account the guidelines of MSC.1/Circ.1320;
  (B) in ro-ro passenger ships discharge valves for scuppers, fitted with positive means of closing operable from a position above the bulkhead deck in accordance with the requirements of the International Convention on Load Lines in force, shall be kept open while the ships are at sea;
  (C) any operation of valves referred to in paragraph (B) shall be recorded in the log-book;
  (D) in the spaces below the bulkhead deck, the Society may require pumping and drainage facilities to be provided additional to the requirements of regulation of SOLAS. In such case, the drainage system shall be sized to remove no less than 125 % of the combined capacity of both the water spraying system pumps and the required number of fire hose nozzles, taking into account the guidelines of MSC.1/Circ.1320. The drainage system valves shall be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells shall be of sufficient holding capacity and shall be arranged at the side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment;

Amendment	Note
(2) in cargo ships, the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. In such case, the drainage system shall be sized to remove no less than 125 % of the combined capacity of both the water spraying system pumps and the required number of fire hose nozzles, taking into account the guidelines of MSC.1/Circ.1320. The drainage system valves shall be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells shall be of sufficient holding capacity and shall be arranged at the side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment. If this is not possible the adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Society in its approval of the stability information.* Such information shall be included in the stability information supplied to the master as required by regulation of SOLAS. **5.** On all ships, for closed vehicles and ro-ro spaces and special category spaces, where fixed pressure water-spraying systems are fitted, means shall be provided to prevent the blockage of drainage arrangements, taking into account the guidelines of MSC.1/Circ.1320. Ships constructed before 1 January 2010 shall comply with the requirements of this paragraph by the first survey after 1 January 2010.	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108)
502. Fixed water-based fire-extinguishing system on weather decks intended for carriage of vehicles *(2025)* The requirements of paragraphs **1. of 502.** and **2.** of **502.** shall apply to ro-ro passenger ships constructed on or after 1 January 2026. Passenger ships with vehicle, special category or ro-ro spaces constructed before 1 January 2026, including those constructed before 1 July 2012, shall comply with the requirements of paragraph **3.** of **502.** not later than the first survey on or after 1 January 2028. *(2025)* **1.** In passenger ships, a fixed water-based fire-extinguishing system based on monitor(s) shall be installed in order to cover weather decks intended for the carriage of vehicles. The monitor(s) shall comply with the provisions of the Fire Safety Systems Code. **2.** In passenger ships, drainage shall be provided where a fixed water-based fire-extinguishing system is installed to cover weather decks intended for carriage of vehicles. The system shall be sized to remove no less than 125% of the combined capacity of both the monitor(s) and the required number of fire hose nozzles. **3.** For passenger ships constructed before 1 January 2026, including those constructed before 1 July 2012, a fixed water-based fire-extinguishing system based on monitor(s) shall be installed in order to protect areas on weather decks intended for the carriage of vehicles. Monitors shall be located in positions which ensure unobstructed protection of vehicles in the area on the weather deck intended for carriage for vehicles, as far as practicable. Operation of monitors shall be ensured by safe access ways or remote control not to be impaired by a fire in the area protected by that monitor. Capacity of each monitor shall be at least 1,250 L/min. The Society may permit lower flow rates when the required rate is not practical given the size and arrangement of the ship. The Society may also permit alternative arrangements for ships that have already installed a fixed water-based fire-extinguishing system based on monitor(s) prior to 1 January 2026.	- SOLAS II-2/20.6.2

Amendment	Note
~~502~~503. Portable fire extinguishers **1.** Portable extinguishers shall be provided at each deck level in each hold or compartment where vehicles are carried, spaced not more than 20 m apart on both sides of the space. At least one portable fire-extinguisher shall be located at each access to such a cargo space. **2.** In addition to the provision of **1**, the following fire extinguishing appliances shall be provided in vehicle, ro-ro and special category spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion: **【See Guidance】** (1) at least three water-fog applicators; and (2) one portable foam applicator unit complying with the provisions of the FSS Code, provided that at least two such units are available in the ship for use in such ro-ro spaces.	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108)
Section 6 Decision-making *(2025)* **601. Decision-making** The requirements of **1.** shall apply to passenger ships constructed on or after 1 January 2026. **1.** In passenger ships, vehicle, special category and ro-ro spaces, where fixed pressure water-spraying systems are fitted, shall be provided with suitable signage and marking on deckhead and bulkhead and on the vertical boundaries allowing easy identification of the sections of the fixed fire-extinguishing system. Suitable signage and markings shall be adapted to typical patterns of crew movement taking into consideration obstruction by cargo or fixed installations. Section number signs shall be of photoluminescent material (Refer to chapter 11 of the FSS Code for the evaluation and testing of photoluminescent material.). The section numbering indicated inside the space shall be same as section valve identification and section identification at the safety centre or continuously manned control station.	- SOLAS II-2/20.7
Section ~~6~~7 Requirements for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion as cargo *(2017)* **~~601~~701. Purpose 〈Omitted〉**	
~~602~~702. Requirements for spaces intended for carriage of motor vehicles with compressed natural gas in their tanks for their own propulsion as cargo 〈Omitted〉	- SOLAS II-2/Reg.20-1 : Re-numbering
~~603~~703. Requirements for spaces intended for carriage of motor vehicles with compressed hydrogen in their tanks for their own propulsion as cargo 〈Omitted〉	
~~604~~704. Detection 〈Omitted〉	

Amended Guidances for Classification of Steel Ships

Pt. 8

2025. 6.

Machinery Rule Development Team

- Main Amendments -

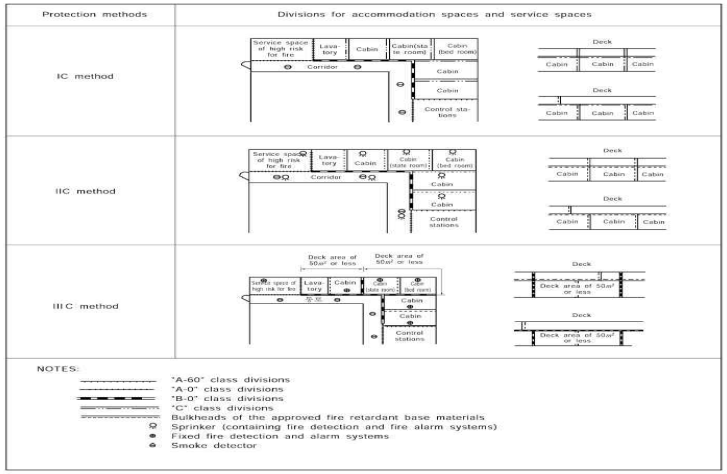
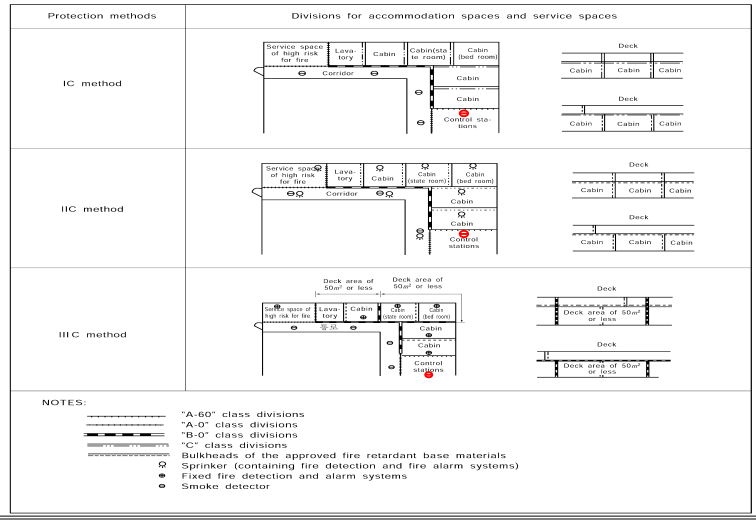
(1) Effective date : 1 Jan. 2026 (based on the contracted date), Circular will be issued.

◉ IACS UI SC 307 : UI for SOLAS requirements reflected

(2) Effective date : 1 Jan. 2026 (based on the ship's construction date), Circular will be issued.

◉ Res.MSC.550(108) reflected and related parts modified.

Amendment	Note
Section 4 Cargo Areas of Tankers **410. Protection of cargo pump-rooms in Tanker** 【See Rule】 〈Omitted〉 **3.** In applying **410. 3** of the Rules, a system for continuous monitoring of the concentration of hydrocarbon gases is to be in accordance with the followings: 【See Rule】 (1) The system may be of a sampling type provided that the system is dedicated for cargo pump rooms. In this case a sampling period is to be as short as possible. (2) "Suitable positions in order that potentially dangerous leakages are readily detected" means the zone where air circulation is reduced(e.g. recessed corners). (3) Where a gas analysing units of the sampling type with non-explosion proof measuring equipment may be located in areas outside cargo areas, e.g. in cargo control room, navigation bridge or engine room when mounted on the forward bulkhead provided the following requirements are observed: (A) Sampling lines shall not run through gas safe spaces, except where permitted under 5. (B) The gas sampling pipes shall be equipped with flame arresters. Sample gas is to be led to the atmosphere with outlets arranged in a safe location. (C) Bulkhead penetrations of sample pipes between safe and dangerous areas shall be of approved type and have same fire integrity as the division penetrated. A manual isolating valve shall be fitted in each of the sampling lines at the bulkhead on the gas safe side. (D) The gas detection equipment including sample piping, sample pumps, solenoids, analysing units etc. shall be located in a reasonably gas tight enclosure (e.g. a fully enclosed steel cabinet with a gasketed door) which is to be monitored by its own sampling point. At gas concentrations above 30% LFL inside the enclosure the entire gas analysing unit is to be automatically shut down. (E) Where the enclosure cannot be arranged directly on the bulkhead, sample pipes shall be of steel or other equivalent material and without detachable connections, except for the connection points for isolating valves at the bulkhead and analysing units, and are to be routed on their shortest ways. **4.** In applying **410. 3** and **410. 4** of the Rules, followings are to be applied. *(2025)* 【See Rule】 (1) Characteristics of the cargoes and their vapors (flammability, density, etc.) should be taken into consideration to determine the type and arrangement of detectors. (2) Suitable numbers of detectors or sampling heads should be provided in the cargo pump room at upper and lower positions, at least covering the following places: (A) (perpendicular) upper part of each cargo pump or between two cargo pumps. (B) within 30 cm above the lowest part of the cargo pump-room bottom floor. (C) not more than 1 m below the cargo pump room ceiling/head deck. (D) one detector every 10 m length or width of the cargo pump-room. (E) areas where the air circulation is reduced (e.g. recessed corners). (3) A high level of liquid in the pump room should activate a continuous audible and visual alarm signal in the pump-room, cargo control room, engine control room and on the navigation bridge. ⚓	〈1 Jan. 2026 (Contracted date), Circular will be issued.〉 * IACS UI SC 307

Present	Amendment	Note
# CHAPTER 5 DETECTION AND ALARM ## Section 3 Protection of Accommodation and Service Spaces and Control Stations **303. Requirements for passenger ships carrying not more than 36 passengers** In applying **303. 2** and **305** of the Rules, for sizing the sprinkler pumps and pressure tank of sprinkler system complying with Ch 8 of the FSS code, the calculation method is to be in accordance with the requirements of **MSC.1/Circ.1556**. *(2018)* **【See Rule】** **305. Cargo ships** As for the methods of divisions and protections for accommodation spaces and service spaces, **Fig 8.5.1** of the Guidance is to be referred to as the standard arrangements. And in case of ships built in accordance with Method IIIC, the detection system is only relevant to the accommodation block and then service spaces built away from the accommodation block need not be fitted with a fixed fire detection system. **【See Rule】**  Fig 8.5.1 Method of division and protection for accommodation spaces and service spaces	# CHAPTER 5 DETECTION AND ALARM ## Section 3 Protection of Accommodation and Service Spaces and Control Stations **303. Requirements for passenger ships carrying not more than 36 passengers** In applying **303. 2** and **305** of the Rules, for sizing the sprinkler pumps and pressure tank of sprinkler system complying with Ch 8 of the FSS code, the calculation method is to be in accordance with the requirements of **MSC.1/Circ.1556**. *(2018)* **【See Rule】** **305. Cargo ships** As for the methods of divisions and protections for accommodation spaces and service spaces, **Fig 8.5.1** of the Guidance is to be referred to as the standard arrangements. ~~And in case of ships built in accordance with Method IIIC, the detection system is only relevant to the accommodation block and then service spaces built away from the accommodation block need not be fitted with a fixed fire detection system.~~ **~~【See Rule】~~**  	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108) - Based on the amended SOLAS requirements, related parts reviewed. - UI SC 160 related parts removed. - Figure 8.5.1 revised.

Present	Amendment	Note
# CHAPTER 13 PROTECTION OF VEHICLE, SPECIAL CATEGORY AND RO-RO SPACES	# CHAPTER 13 PROTECTION OF VEHICLE, SPECIAL CATEGORY ~~AND RO-RO SPACES~~ OPEN AND CLOSED RO-RO SPACES, AND WEATHER DECKS INTENDED FOR THE CARRIAGE OF VEHICLES	〈1 Jan. 2026 (Constructed date), Circular will be issued.〉 * Res.MSC.550(108)
		- Name of chapter revised
## Section 3 Detection and alarm	~~## Section 3 Detection and alarm~~	
301. Fixed fire detection and fire alarm systems 【See Rule】 This requirement need not apply to weather decks used for carriage of vehicles with fuel in their tanks.	~~**301. Fixed fire detection and fire alarm systems** 【See Rule】~~ ~~This requirement need not apply to weather decks used for carriage of vehicles with fuel in their tanks.~~	- Deletion of 301., 501.3 and 502 because UI SC73 needs to be revised as per SOLAS amendement..
## Section 5 Fire-extinction	## Section 5 Fire-extinction	
501. Fixed fire-extinguishing systems 1. In applying **501. 1** (3) and **2** of the Rules, a fixed water-based fire fighting system complying with the provisions of the Fire Safety System Code is to be of a type approved and requirements of design and installation complying with MSC.1/Circ.1430 of the recommendation adapted by the IMO. The fire and component tests previously conducted in accordance with MSC.1/Circ.1272 are to be remained valid for the approval of new systems. 【See Rule】 2. In applying **501. 4** (1) of the Rules, (A), (B), (C) are to be applied above the bulkhead deck and (D) is to be applied below the bulkhead deck. 【See Rule】 3. In applying **301.** and **501.** of the Rules, the regulations for a fixed fire extinguishing system, fire detection, foam applicators and portable extinguishers need not apply to weather decks used for the carriage of vehicle with fuel in their tanks.	**501. Fixed fire-extinguishing systems** 1. In applying **501. 1** (3) and **2** of the Rules, a fixed water-based fire fighting system complying with the provisions of the Fire Safety System Code is to be of a type approved and requirements of design and installation complying with MSC.1/Circ.1430 of the recommendation adapted by the IMO. The fire and component tests previously conducted in accordance with MSC.1/Circ.1272 are to be remained valid for the approval of new systems. 【See Rule】 2. In applying **501. 4** (1) of the Rules, (A), (B), (C) are to be applied above the bulkhead deck and (D) is to be applied below the bulkhead deck. 【See Rule】 ~~3. In applying **301.** and **501.** of the Rules, the regulations for a fixed fire extinguishing system, fire detection, foam applicators and portable extinguishers need not apply to weather decks used for the carriage of vehicle with fuel in their tanks.~~	
502. Portable fire extinguishers In applying **502. 2** of the Rules, cargo holds loaded with vehicles with fuel in their tanks which are stowed in open or closed containers need not to be provided with portable fire extinguishers, water-fog applicators and foam applicator units. 【See Rule】 ⚓	~~**502. Portable fire extinguishers**~~ ~~In applying **502. 2** of the Rules, cargo holds loaded with vehicles with fuel in their tanks which are stowed in open or closed containers need not to be provided with portable fire extinguishers, water-fog applicators and foam applicator units. 【See Rule】 ⚓~~	- Deletion of 301., 501.3 and 502 because UI SC73 needs to be revised as per SOLAS amendement.

Amended Guidances for Classification of Steel Ships

The Classification of Ships Using Low-flashpoint Fuels

2025. 6.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2026 (based on the contracted date) - Circular will be issued.

◉ IACS UI GF21 : Fire extinguishing system requirements for methyl/ethyl alcohol fueled ship

Present	Amendment	Note
Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel *(2021)*	**Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel *(2021)***	〈1 Jan. 2026, (contracted date)〉 * IACS UI GF 21
Section 11 Fire Safety	**Section 11 Fire Safety**	
1107. Fire extinguishing of engine-room and fuel preparation space	**1107. Fire extinguishing of engine-room and fuel preparation space**	
〈Omitted〉	**〈Omitted〉**	
1. Machinery space and fuel preparation space where methyl/ethyl alcohol-fuelled engines or fuel pumps are arranged should be protected by an approved fixed fire-extinguishing system in accordance with **Pt 8**, **Ch 8** of **Rules for the classification of steel ships** and the **FSS Code**. In addition, the fire-extinguishing medium used should be suitable for the extinguishing of methyl/ethyl alcohol fires.	**1.** Machinery space and fuel preparation space where methyl/ethyl alcohol-fuelled engines or fuel pumps are arranged should be protected by an approved fixed fire-extinguishing system in accordance with **Pt 8**, **Ch 8** of **Rules for the classification of steel ships** and the **FSS Code**. In addition, the fire-extinguishing medium used should be suitable for the extinguishing of methyl/ethyl alcohol fires. In applying of this requirement, followings are to be satisfied. *(2025)* (1) Where CO2 fire extinguishing system are used as fixed gas fire-extinguishing system for Machinery space or fuel preparation space in methyl/ethyl alcohol fuelled vessels, the quantity of CO2 carried is to be sufficient to give a minimum volume of free gas equal to 50% of the gross volume of the largest space protected, including the machinery space casing. (2) As an alternative to (1), aspects, such as, but not limited to the inventory of methanol and the expected duration of a potential methanol fire in the space considered, may be considered in the risk assessment to confirm the suitability of the fire-extinguishing arrangements in machinery space, including both the fixed gas fire-extinguishing system (required by SOLAS II-2/10.5.2) and the fixed local application fire extinguishing system (required by SOLAS II-2/10.5.6). Such alternative may be subject to approval by the Society.	- UI GF 21
2. An approved alcohol-resistant foam system covering the tank top and bilge area under the floor plates should be arranged for machinery space category A and fuel preparation space containing methyl/ethyl alcohol.	**2.** An approved alcohol-resistant foam system covering the tank top and bilge area under the floor plates should be arranged for machinery space category A and fuel preparation space containing methyl/ethyl alcohol.	

CIRCULAR

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Person in charge : Choi Dae-gon

No : 2025-7-E
Date : 2025.07.21

To : All Surveyors and who it may concern

Subject	**9.206 Notice for Amendments to the KR Technical Rules (Guidance for Freight Containers)**
Application	**1 August 2025 (the date of application for certification of products)**

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

- Below –

Classification Technical Rules	Effective Date	Amendments
Guidance for Freight Containers	2025. 08. 01	- Newly added the requirements for validity and renewal of approval certificate - Deleted the requirements for withdrawal of approval where containers have not been produced continuously for more than 2 years without any special reason

2. Furthermore, please be informed that the amendments will be included in 2026 edition for Rules and Guidance on KR Classification Technical Rules which will be published in the first half of 2026.

Attachments : Amendment for "Guidance for Freight Containers" ---- 1 copy. (The end)

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

OTHER RULES AND GUIDANCE

(Guidance for Freight Containers)

2025.07

Machinery Rule Development Team

- Main Amendments -

(1) Enter into force on 1 August 2025(the date of application for certification of products)

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

Present	Amendment
CHAPTER 1 GENERAL <Omitted>	**CHAPTER 1 GENERAL** <Same as the present Guidance>
CHAPTER 2 CONSTRUCTION AND CERTIFICATION OF FREIGHT CONTAINERS	**CHAPTER 2 CONSTRUCTION AND CERTIFICATION OF FREIGHT CONTAINERS**
Section 1 <Omitted> **Section 2 Approval of Manufacturing Process**	**Section 1** <Same as the present Guidance> **Section 2 Approval of Manufacturing Process**
201. ~ 207. <Omitted>	**201. ~ 207.** <Same as the present Guidance>
208. <New>	**208. Validity and renewal of approval certificate** **1.** The approval certificate for manufacturing process will be valid within five years from the date of issue. In case where the approval certificate is renewed in accordance with the requirements specified in the preceding **207.**, the expiration date will not be changed. **2.** The manufacturer who intends to have a continuation of the approval is to submit an application to the Society three months before the due date together with following data. (1) Data related to the corrective action for approved product, if any (2) Alteration to the approved manufacturing process or specification, if any (3) Service records of approved products or similar products which are approved by this Society (minimum 6 months and over) **3.** The Society is to carry out an plant audit in accordance with the requirements specified in **204.** and may request an approval test where deemed necessary after the examination of application and documents thereof. **4.** Manufacturers who have not produced the approved grades and products during the period between renewals may be required to either carry out approval tests or, on the basis of results of production of similar grades of products, at the discretion of the Society, be preapproved.

Present	Amendment
	5. Where for operational reasons, the renewal plant audit falls outside the period of approval, the manufacturer will still be considered as approved if agreement to this audit date is made within the period of three months after expiry of the validity. In this instance, if successful, the extension of approval will be back dated to the original renewal date.
208. Withdrawal of approval The Society may withdraw the approval of manufacturing process in case any of the following (1) through (4) is relevant. (1) When test records differ from the time of approval and do not satisfy the approval conditions. (2) When a request for withdrawal is made by the manufacturer. (3) When the container is manufactured without approval of the changes in the manufacturing process according to the requirements specified in **206.** (4) When considered inappropriate by the Society. ~~(5) Where containers have not been produced continuously for more than two years without any special reason *(2022)*~~	**209. Withdrawal of approval** The Society may withdraw the approval of manufacturing process in case any of the following (1) through (4) is relevant. (1) When test records differ from the time of approval and do not satisfy the approval conditions. (2) When a request for withdrawal is made by the manufacturer. (3) When the container is manufactured without approval of the changes in the manufacturing process according to the requirements specified in **206.** (4) When considered inappropriate by the Society. (5) <Deleted>
209. <Omitted>	**210. <Same as the present Guidance>**
<hereafter, omitted>	**<hereafter, Same as the present Guidance>**

CIRCULAR

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Person in charge :KIM Heesung

No :2025-08-E
Date :2025. 7. 22

To : All Surveyors and whom it may concern

Subject	9.207 Notice for Amendment to the KR Technical Rules
Application	Immediately

1. Please be informed that the amendments of KR Technical Rules have been made to reflect IMO Resolutions 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 Ships Using Low-flashpoint Fuels	Immediately	MSC.1/Circ.1687

2. Furthermore, please be informed that the establishment will be included in 2026 edition of KR Technical Rules.

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

Amended Rules for the Classification of Steel Ships

The Classification of Ships Using Low-flashpoint Fuels

2025. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : Immediately

◉ Interim Guidelines For The Safety Of Ships Using Ammonia As Fuel (MSC.1/Circ.1687) reflected.

Present	Amendment	Note
# CHAPTER 1 GENERAL ## Section 1 General **101. Application** **1.** This Rules applies to ships using low-flashpoint fuels. However, does not apply to the ships specified in the following. (1) Ships carrying liquefied gases in bulk using their cargoes as fuel and complying with the requirements of **Pt 7**, **Ch 5** of **Rules for the classification of steel ships** (2) Ships carrying liquefied gases in bulk using other low-flashpoint gaseous fuels provided that the fuel storage and distribution systems design and arrangements for such gaseous fuels comply with the requirements of **Pt 7**, **Ch 5** of **Rules for the classification of steel ships.** (3) Notwithstanding the requirement specified in (1) and (2), some requirements of this rules may be applied if specified in **Pt 7**, **Ch 5** of **Rules for the classification of steel ships.** *(2021)* **2.** Notwithstanding the requirement specified in **1**, for the ships specified in the following (1) or (2), some requirements of this Rules may be modified, as appropriate. (1) ships to which **SOLAS II-1** does not apply; or (2) ships which are subjected to Korean Ship Safety Act and Notification having a restricted to domestic service. **3.** **Ch 5** to **Ch 15** of this Rules applies to ships using natural gas as fuel, either in its liquefied or gaseous state. **4.** **Annex 5** applies to ships using methyl/ethyl alcohol as fuel. *(2021)* **5.** **Annex 6** applies to ships using LPG as fuel. (2025) **6.** In addition to the requirements in this Rules, they meet other related requirements in **Rules for the classification of steel ships.**	# CHAPTER 1 GENERAL ## Section 1 General **101. Application** **1.** This Rules applies to ships using low-flashpoint fuels. However, does not apply to the ships specified in the following. (1) Ships carrying liquefied gases in bulk using their cargoes as fuel and complying with the requirements of **Pt 7**, **Ch 5** of **Rules for the classification of steel ships** (2) Ships carrying liquefied gases in bulk using other low-flashpoint gaseous fuels provided that the fuel storage and distribution systems design and arrangements for such gaseous fuels comply with the requirements of **Pt 7**, **Ch 5** of **Rules for the classification of steel ships.** (3) Notwithstanding the requirement specified in (1) and (2), some requirements of this rules may be applied if specified in **Pt 7**, **Ch 5** of **Rules for the classification of steel ships.** *(2021)* **2.** Notwithstanding the requirement specified in **1**, for the ships specified in the following (1) or (2), some requirements of this Rules may be modified, as appropriate. (1) ships to which **SOLAS II-1** does not apply; or (2) ships which are subjected to Korean Ship Safety Act and Notification having a restricted to domestic service. **3.** **Ch 5** to **Ch 15** of this Rules applies to ships using natural gas as fuel, either in its liquefied or gaseous state. **4.** **Annex 5** applies to ships using methyl/ethyl alcohol as fuel. *(2021)* **5.** **Annex 6** applies to ships using LPG as fuel. (2025) **6. Annex 7** applies to ships using ammonia as fuel. *(2025)* ~~6.~~**7.** In addition to the requirements in this Rules, they meet other related requirements in **Rules for the classification of steel ships.**	〈Effective date : Immediately〉 *MSC.1/Circ.1687 .

Present	Amendment	Note
CHAPTER 4 CLASSIFICATION AND SURVEYS **Section 2 Classification** **201. Class notations** Ships satisfying the requirements of this Rules may be given a notation "LFFS" as additional special feature notations and details are as follows. (2021) **1.** LFFS(DF-LNG): Dual fuel engines using LNG as fuel are installed **2.** LFFS(SF-LNG): Single fuel engines using LNG as fuel are installed **3.** LFFS(DF-Methanol): Dual fuel engines using methyl alcohol as fuel are installed **4.** LFFS(SF-Methanol): Single fuel engines using methyl alcohol as fuel are installed **5.** LFFS(DF-Ethanol): Dual fuel engines using ethyl alcohol as fuel are installed **6.** LFFS(SF-Ethanol): Single fuel engines using ethyl alcohol as fuel are installed	**CHAPTER 4 CLASSIFICATION AND SURVEYS** **Section 2 Classification** **201. Class notations** Ships satisfying the requirements of this Rules may be given a notation "LFFS" as additional special feature notations and details are as follows. *(2025)* **1.** LFFS(DF-LNG): Dual fuel engines using LNG as fuel are installed **2.** LFFS(SF-LNG): Single fuel engines using LNG as fuel are installed **3.** LFFS(DF-Methanol): Dual fuel engines using methyl alcohol as fuel are installed **4.** LFFS(SF-Methanol): Single fuel engines using methyl alcohol as fuel are installed **5.** LFFS(DF-Ethanol): Dual fuel engines using ethyl alcohol as fuel are installed **6.** LFFS(SF-Ethanol): Single fuel engines using ethyl alcohol as fuel are installed **7.** LFFS(DF-Ammonia): Dual fuel engines using ammonia as fuel are installed **8.** LFFS(SF-Ammonia): Single fuel engines using ammonia as fuel are installed	〈Effective date : Immediately〉 *MSC.1/Circ.1687 .

Amended Guidances for Classification of Steel Ships

The Classification of Ships Using Low-flashpoint Fuels

2025. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : Immediately

◉ Annex 7 is newly established as Interim Guidelines For The Safety Of Ships Using Ammonia As Fuel (MSC.1/Circ.1687) reflected.

〈Annex 7 - Newly established〉
Annex 7 Requirements for Ships Using Ammonia as Fuel (2025)

Section 1 General

101. Application

1. Unless expressly provided otherwise, this **Annex** apply to ships using ammonia as fuel. This **Annex** does not address ships using ammonia cargo as fuel.
2. The requirements of this **Annex** are prescribed in addition to the requirements in the **Rules for the Classification of Ships Using Low-flashpoint Fuels**(hereafter referred to "this Rules"). Except where specially required in this **Annex**, the relevant requirements in the Rules are to be applied. (The terms 'LNG', 'natural gas' are to be construed as 'ammonia' respectively.)

102. Definitions

For the purpose of this **Annex**, the terms used have the meanings defined in the following paragraphs. Terms not defined have the same meaning as in **Pt 8** of **Rules for the Classification of Steel Ships** and this **Rules for the Classification of Ships using Low-flashpoint Fuels**.

1. **Ammonia** means an inorganic compound represented by the chemical formula NH3. In this Annex, ammonia either in its liquefied or gaseous state is referred to as ammonia.
2. **Fuel** means ammonia, either in its liquefied or gaseous state.
3. **Fuel consumer** means any unit within the ship using ammonia as a fuel.
4. **Source of release** means a point or location from which a gas, vapour, mist or liquid may be released into the atmosphere so that an explosive and/or toxic atmosphere could be formed.
5. **Toxic area** means an area in which ammonia is or may be expected to be present.
6. **Toxic space** means an enclosed or semi-enclosed space in which ammonia is or may be expected to be present. A gas-safe machinery space is not considered to be a toxic space.
7. **Enclosed space** means any space within which, in the absence of artificial ventilation, the ventilation will be limited, and any explosive and/or toxic atmosphere will not be dispersed naturally.

103. Alternative design

1. This **Annex** contains functional requirements for all appliances and arrangements related to the usage of ammonia as fuel.
2. Appliances and arrangements of ammonia fuel systems may deviate from those set out in this **Annex**, provided such appliances and arrangements meet the intent of the goal and functional requirements concerned and provide an equivalent level of safety to the relevant sections.
3. The equivalence of the alternative design should be demonstrated as specified in **SOLAS Regulation II-1/55** and approved by the Society. However, the Society should not allow operational methods or procedures to be applied as an alternative to a particular fitting, material, appliance, apparatus, item of equipment or type thereof which is prescribed by this **Annex**.

Section 2 Goal and Functional Requirements

201. Goal

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

202. Functional requirements

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

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

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

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

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

6. Unintended accumulation of explosive, flammable or toxic gas concentrations should be prevented.

7. System components should be protected against external damage.

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

9. Sources of ammonia release should be minimized to reduce the probability of ammonia exposure to humans and the environment.

10. Measures to minimize the health hazards associated with exposure to ammonia should be provided.

11. Direct release of ammonia into the atmosphere during normal operation and during any foreseeable and controllable abnormal scenario should be avoided.

12. Safe and suitable fuel supply, storage and bunkering arrangements should be made, capable of receiving and containing the fuel in the required state without leakage. Other than when necessary for safety reasons, fuel supply, storage and bunkering arrangements should be designed to prevent venting under all normal operating conditions, including idle periods.

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

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

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

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

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

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

19. The technical documentation should permit an assessment of the compliance of the system and its components with the applicable rules, guidelines, design standards used and the principles related to safety, availability, maintainability and reliability.

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

Section 3 General Requirements

301. Goal

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

302. Risk assessment

1. A holistic risk assessment should be conducted to ensure that risks arising from the use of ammonia as fuel affecting persons on board, the environment, the structural strength, or the integrity of the ship and its sub-systems are addressed. Consideration should be given to the hazards associated with physical layout, operation and maintenance, following any reasonably foreseeable failure.

2. The risk assessment should specifically consider the ammonia system integrity with focus on its ability to prevent and isolate leakages and also evaluate potential toxicity hazards, ignition mechanisms and consequences of ignition. Special consideration should be given, but not limited to, the following specific ammonia-related hazards and topics:

(1) loss of function
(2) component damage
(3) fire
(4) explosion
(5) toxicity
(6) electric shock.

3. Risks, which cannot be eliminated, should be mitigated as necessary. Details of risks, and the means by which they are mitigated, should be documented in accordance with applicable requirements in **Guidance for Approval of Risk-based Ship Design.**

303. Limitation of explosion consequences

An explosion in any space containing any potential sources of release and potential ignition sources should not:

1. cause damage to or disrupt the proper functioning of equipment/systems located in any space other than that in which the incident occurs;

2. damage the ship in such a way that flooding of water below the main deck or any progressive flooding occurs;

3. damage work areas or accommodation in such a way that persons who stay in such areas under normal operating conditions are injured;

4. damage ship personnel normally present in work or accommodation spaces under normal operating conditions;

5. disrupt the proper functioning of control stations and switchboard rooms necessary for power distribution;

6. damage life-saving equipment or associated launching arrangements;

7. disrupt the proper functioning of fire-fighting equipment located outside the explosion-damaged space;

8. affect other areas of the ship in such a way that chain reactions involving, inter alia, cargo, ammonia and bunker oil may arise; or

9. prevent persons' access to life-saving appliances or impede escape routes.

Section 4 Classification and Surveys

401. General

1. The classification and surveys of ships intended to be classed with the Society or classed with the Society are to be in accordance with the requirements specified in this section.

2. In the case of items not specified in this section, the requirements specified in **Pt 1** of **Rules for the classification of steel ships** are to be applied.

402. Class notations

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

403. Maintenance of classification

1. Ships classed with the Society are to be subjected to the surveys to maintain the classification and are to be maintained in good condition in accordance with the requirements specified in this Annex.

2. Plans and particulars of any proposed alterations to the approved scantlings or arrangements of hull, machinery or equipment are to be submitted for approval by the Society before the work is commenced and such alterations are to be Surveyed by the Society.

404. Classification Survey during Construction

1. General

At the Classification Survey during Construction, the hull, machinery and equipment are to be examined in detail in order to ascertain that they meet the relevant requirements of this Annex.

2. Plan and Documents

For a ship in which ammonia fuelled engine is installed, plans and documents, specified below **3** and **4**, are to be submitted and approved before the work is commenced. And, the Society, where considered necessary, may require further plans and documents other than those specified below.

3. Plan and data for approval

In addition to **Ch 4, 203. 3** of this **Rules**, the following plans and documents are to be submitted.
(1) Arrangement plan required by **Ch 4, 203. 3** (1) of this **Rules** is also to include the followings;
  (A) Toxic area/Toxic space
  (B) Spaces where ammonia release mitigation systems are installed

4. Plan and data for reference

In addition to **Ch 4, 203. 4** of this **Rules**, the following plans and documents are to be submitted.
(1) The operation manual is to include response procedure for emergency ammonia release.
(2) Following plans and data of ammonia release mitigation systems
  (A) Specification of ammonia release mitigation systems
  (B) Calculation of ammonia release mitigation system capacity
(3) Data for dispersion analysis and ventilation analysis
(4) Data for a risk analysis according to **302.**

405. Periodical Surveys

Ch 4, Sec 3 of this **Rules** is to be applied.

Section 5 Ship Design and Arrangement

501. Goal

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

502. Functional requirements

This section is related to functional requirements in **202. 1 to 3, 5 to 9, 13 to 16, 18** and **20**. In particular the following apply:

1. the fuel tank(s) should be located in such a way that the probability for the tank(s) to be damaged following a collision or grounding is reduced to a minimum taking into account the safe operation of the ship and other hazards that may be relevant to the ship;
2. fuel containment systems, fuel piping and other fuel sources of release should be so located and arranged that released ammonia is led to a recovery system, treatment system or a safe location in the open air;
3. the access or other openings to spaces containing fuel sources of release should be so arranged that flammable, asphyxiating or toxic gas cannot escape to spaces that are not designed for the presence of such gases taking into account the specific gravity and dispersion characteristics of ammonia gas;
4. fuel piping and fuel supply system should be protected against mechanical damage;
5. the propulsion and fuel supply system should be so designed that safety actions after any ammonia leakage do not lead to an unacceptable loss of power;
6. the probability of an explosion in a machinery space with ammonia-fuelled machinery should be minimized; and
7. the space where machinery and equipment fuel are installed should be designed to minimize the risk of exposure of persons on board to leaked ammonia.

503. General requirements

1. Fuel storage tanks should be protected against mechanical damage.
2. Fuel storage tanks and/or equipment located on open deck should be located to ensure sufficient natural ventilation to prevent accumulation of ammonia.
3. Mustering stations and life-saving equipment, and access to such stations and equipment, should not be located in toxic areas as specified in **12-104**.
4. Air intakes, outlets and other openings into the accommodation, service and machinery spaces, control stations and other non-toxic spaces in the ship should not be located in toxic areas as specified in **12-104**.

504. Protection of fuel tanks from collision and grounding

Unless expressly provided otherwise, the requirements of **Ch 5, 302. 1** to **3** of this **Rules** should apply to ships using ammonia as fuel.

505. Machinery space arrangement

1. Machinery spaces containing ammonia fuel systems and/or ammonia-fuelled machinery should be arranged such that the spaces may be considered gas safe under all conditions, normal as well as abnormal conditions, i.e. inherently gas safe.
2. In a gas-safe machinery space, a single failure cannot lead to release of fuel gas into the machinery space.
3. A gas-safe machinery space may be arranged as a conventional machinery space.
4. A single failure within the fuel system should not lead to a fuel release into the machinery space.
5. All fuel piping within machinery space boundaries should be enclosed in a gastight enclosure, taking

into account **Ch 9, Sec 6** of this **Rules**.

6. Access to machinery spaces should not be arranged from toxic areas or toxic spaces.

506. Location and protection of fuel piping

1. Fuel pipes and fuel supply systems should not be located less than 800 mm from the ship's side.

2. Fuel piping should not be led directly through accommodation spaces, service spaces, electrical equipment rooms or control stations as defined in the **Pt. 8** of **Rules for the Classification of Steel Ships**, even though the piping is protected by secondary enclosures.

3. Fuel pipes led through ro-ro spaces, special category spaces and on open decks should be protected against mechanical damage.

507. Fuel preparation room design

1. Fuel preparation rooms

(1) Fuel process equipment should be arranged in a fuel preparation room arranged in accordance with provisions in this **Annex**. As an exemption to this provision, vaporizers, heat exchangers and motors for pumps submerged in tanks may also be located in tank connection spaces.
(2) When fuel preparation rooms cannot be located on open deck, or accessed from open deck, access should be provided through an airlock in compliance with **511.**.
(3) Fuel preparation rooms should be designed to safely contain fuel leakages. The fuel preparation room boundaries should be gastight towards other spaces in the ship.
(4) The probable maximum leakage into the fuel preparation room should be determined based on detail design, detection and shutdown systems.
(5) The material of the boundaries of the fuel preparation room should have a design temperature corresponding with the lowest temperature it can be subjected to in a probable maximum leakage scenario, unless the boundaries of the space, i.e. bulkheads and decks, are provided with suitable thermal protection.
(6) The fuel preparation room should be fitted with ventilation arrangements ensuring that the space can withstand any pressure build-up caused by vaporization of the liquefied fuel.
(7) The fuel preparation room entrance should be arranged with a sill height exceeding the liquid level resulting from a calculated maximum leakage, but should in no case be lower than 300 mm.
(8) Fuel preparation room entrances should be arranged with water screens having constantly available water supply. The water screen should be possible to activate from a safe location outside the fuel preparation room toxic zone if an ammonia leak occurs. The water screens should be arranged on the outside of the fuel preparation room. The arrangement should include the means to safely manage any ammonia effluent produced in their operation.
(9) A leakage in the fuel preparation room should not render necessary safety functions out of order due to low temperatures caused by the evaporation of leaking fuel.
(10) Fuel preparation rooms should be designed to manage any ammonia release for personnel to enter safely.

2. Tank connection spaces

(1) Fuel tank connections, flanges and tank valves should be located in a tank connection space arranged in accordance with the provisions in this Annex. Apart from fuel process equipment allowed in tank connection spaces as defined in **1. (1)**, tank connection spaces and fuel preparation rooms should not be combined.
(2) Tank connection spaces should be designed to safely contain fuel leakages. The tank connection space boundaries should be gastight towards other spaces in the ship.
(3) The material of the bulkheads of the tank connection space should have a design temperature corresponding with the lowest temperature it can be subject to in a probable maximum leakage scenario.
(4) The probable maximum leakage into the tank connection space should be determined based on detail design, detection and shutdown systems.
(5) Tank connection spaces should be fitted with ventilation arrangements ensuring that the spaces can withstand any pressure build-up caused by vaporization of the liquefied fuel.
(6) Tank connection space entrances should be arranged with a sill height exceeding the liquid level

resulting from a calculated maximum leakage, but should in no case be lower than 300 mm.

(7) Tank connection space entrances should be arranged with water screens having constantly available water supply. The water screen should be possible to activate from a safe location outside the tank connection space toxic zone if an ammonia leak occurs. The water screens should be arranged on the outside of the tank connection spaces. The arrangement should include the means to safely manage any ammonia effluent produced in their operation.

(8) Unless the access to the tank connection space is independent and direct from open deck, it should be provided through a bolted hatch. The bolted hatch should be located in a protective entry space of gastight construction with a self-closing gastight door. The access should be arranged to facilitate the evacuation of an injured person from the tank connection space by personnel wearing breathing apparatus and PPE.

(9) A leakage in the tank connection space should not render necessary safety functions out of order due to low temperatures caused by the evaporation of leaking fuel.

3. Fuel bunkering stations

(1) The location and arrangement of the bunkering station, including whether open, enclosed, or semi-enclosed, should be subject to special consideration within the risk assessment. Depending on the arrangement this may include, but is not limited to:
(A) segregation from other areas of the ship;
(B) hazardous and toxic area plans for the ship;
(C) requirements for forced ventilation;
(D) requirements for leakage detection;
(E) safety actions related to leakage detection;
(F) access to bunkering station from non-hazardous areas through airlocks; and
(G) monitoring of bunkering station by direct line of sight or closed-circuit television (CCTV).

(2) Mechanical spray shielding should be arranged around potential leakage sources from the ammonia system in the bunkering station.

(3) The bunker station should be located in an area where sufficient space for efficient work and access is ensured for the personnel involved in bunkering and their equipment while wearing SCBA and PPE, and to ensure that, in an emergency, they have a clear escape route.

508. Bilge systems

1. Bilge systems installed in areas where fuel covered by this Annex can be present should be segregated from the bilge system of spaces where fuel cannot be present.

2. Where fuel is carried in a fuel containment system requiring a secondary barrier, suitable drainage arrangements for dealing with any leakage into the hold or insulation spaces through the adjacent ship structure should be provided. The bilge system should not lead to pumps in spaces having no risks of ammonia. Means of detecting such leakage should be provided.

3. The hold or interbarrier spaces of type A independent tanks for liquid gas should be provided with a drainage system suitable for handling liquid fuel in the event of fuel tank leakage or rupture.

509. Drip trays

1. Drip trays should be fitted where leakage may occur which can cause damage to the ship structure or where limitation of the area which is affected from a spill is necessary.

2. Drip trays should be made of suitable material.

3. The drip tray should be thermally insulated from the ship's structure so that the surrounding hull or deck structures are not exposed to unacceptable cooling, in case of leakage of liquid fuel.

4. Each tray should be fitted with a drain valve to enable water to be drained over the ship's side where the tray is installed in a location where water may be retained.

5. Each tray should have a sufficient capacity to ensure that the assumed maximum amount of spill according to the risk assessment can be handled.

6. Drip trays should be provided with means to safely drain or transfer spills that contain ammonia to be contained or treated.

510. The arrangement of entrances and other openings in enclosed spaces

1. Direct access should not be permitted from a non-hazardous area to a hazardous area. Where such openings are necessary for operational reasons, an airlock which complies with **511.** should be provided.

2. Direct access should not be permitted from a non-toxic space to a toxic area or space. Where such openings are necessary for operational reasons, an airlock which complies with **511.** should be provided.

3. For inerted spaces, access arrangements should be such that unintended entry by personnel should be prevented. If access to such spaces is not from an open deck, sealing arrangements should ensure that leakages of inert gas to adjacent spaces are prevented.

4. Arrangements for fuel storage hold spaces, void space, fuel tanks and other spaces classified as hazardous/toxic areas or spaces should be such as to allow entry and inspection of any such space by ship personnel wearing PPE and breathing apparatus, as well as to allow for the evacuation of injured or unconscious ship personnel. Such arrangements should comply with the following:

(1) Access should be provided as follows:
  (A) access to all fuel tanks. Access should be directly from open decks as far as practicable;
  (B) access through horizontal openings, hatches or manholes. The size should be sufficient to allow a person wearing a breathing apparatus to ascend or descend any ladder without obstruction, and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening is to be not less than 600 mm × 600 mm;
  (C) access through vertical openings or manholes providing passage through the length and breadth of the space. The minimum clear opening should be not less than 600 mm × 800 mm at a height of not more than 600 mm from the bottom plating, unless gratings or other footholds are provided; and
  (D) circular access openings to type C tanks are to have a diameter of not less than 600 mm.

(2) The sizes referred to in **(1) (B)** and **(C)** may be decreased, if **4.** can be met to the satisfaction of the Society.

(3) Where fuel is carried in containment systems requiring secondary barriers, **(1) (B)** and **(C)** do not apply to spaces separated from hold spaces by a single gastight steel boundary. Such spaces are to be provided only with direct or indirect access from open decks, excluding any enclosed non-hazardous areas.

511. Airlocks

1. An airlock is a space enclosed by gastight bulkheads with two substantially gastight doors spaced at least 1.5 m and not more than 2.5 m apart. Unless subject to the requirements of the International Convention on Load Lines, the door sill should not be less than 300 mm in height. The doors should be self-closing without any holding back arrangements.

2. Airlocks should be mechanically ventilated at an overpressure relative to the adjacent hazardous/toxic area or space.

3. The airlock should be designed in a way that no gas can be released to safe spaces in case of the most critical event in the gas-dangerous space separated by the airlock. The events should be evaluated in the risk analysis according to **302.**.

4. Airlocks should have a simple geometrical form. They should provide free and easy passage and should have a deck area not less than 1.5 m^2. Airlocks should not be used for other purposes, for instance as storerooms.

5. An audible and visual alarm system to give a warning on both sides of the airlock should be provided to indicate if more than one door is moved from the closed position.

6. For non-hazardous/non-toxic spaces with access from hazardous/toxic spaces below deck where the access is protected by an airlock, upon loss of underpressure in the hazardous/toxic space, access to the space is to be restricted until the ventilation has been reinstated. Audible and visual alarms should be given at a manned location to indicate both loss of pressure and opening of the airlock doors when pressure is lost.

Section 6 Fuel Containment System

601. Goal

The goal of this section is to provide that ammonia storage is adequate so as to minimize the risk to personnel, the ship and the environment to a level that is equivalent to a conventional oil-fuelled ship.

602. Functional requirements

This section relates to functional requirements in **202. 1, 2, 5, 7** and **8** to **18**. In particular, the following apply:

1. the fuel containment system should be so designed that a leak from the tank or its connections does not endanger the ship, persons on board or the environment. Potential dangers to be avoided include:

(1) exposure of ship materials to temperatures below acceptable limits;
(2) flammable fuels spreading to locations with ignition sources;
(3) toxicity potential and risk of oxygen deficiency due to fuels and inert gases;
(4) restriction of access to muster stations, escape routes and life-saving appliances (LSA); and
(5) reduction in availability of LSA;

2. the pressure and temperature in the fuel tank should be kept within the design limits of the containment system and possible carriage requirements of the fuel; and

3. the fuel containment arrangement should be so designed that safety actions after any ammonia leakage do not lead to an unacceptable loss of power.

603. General requirements

1. The ammonia fuel should be stored in a refrigerated state at atmospheric pressure.

2. Tank connection spaces and fuel storage hold spaces other than for tank type C should be gastight towards adjacent spaces. These spaces should not be adjacent to accommodation spaces, service spaces, electrical equipment rooms and control stations by a single bulkhead or deck. "Adjacent" means linear contact and point contact.

3. Pipe connections to the fuel storage tank should be mounted above the highest liquid level in the tanks, except for type C fuel storage tanks. Connections below the highest liquid level may however, also be accepted for other tank types after special consideration by the Society.

4. Piping between the tank and the first valve which release liquid in case of pipe failure should have safety equivalent to a type C tank, with dynamic stress not exceeding the values given in **Ch 6, 415. 3 (1) (B)** of this **Rules**.

5. If piping is connected below the liquid level of the tank, it has to be protected by a secondary barrier up to the first valve.

6. Means should be provided whereby liquefied gas in the storage tanks can be safely emptied.

7. It should be possible to empty, purge and vent fuel storage tanks with fuel piping systems. Instructions for carrying out these procedures must be available on board. Inerting should be performed with an inert gas prior to venting with dry air to avoid an explosion-hazardous atmosphere in tanks and fuel pipes. For further information, the provisions of the **Ch 6, Sec 10** of this **Rules** should be taken into account.

604. Liquefied ammonia fuel containment

1. Unless expressly provided otherwise, the requirements of **Ch 6, Sec 4** of this **Rules** should apply to ships using ammonia as fuel.

2. The provision of **Ch 6, 401. 3** of this **Rules** related to portable tanks should not apply to ships using ammonia as fuel.

605. Portable liquefied ammonia fuel containment

1. The requirements of **Ch 6, Sec 5** of this **Rules** should not apply to ships using ammonia as fuel.

606. Compressed fuel containment

1. The requirements of **Ch 6, Sec 6** of this **Rules** should not apply to ships using ammonia as fuel.

607. Pressure relief system

1. General

(1) All fuel storage tanks should be provided with a pressure relief system appropriate to the design of the fuel containment system and the fuel being carried. Fuel storage hold spaces, interbarrier spaces and tank connection spaces, which may be subject to pressures beyond their design capabilities, should also be provided with a suitable pressure relief system. Pressure control systems specified in **609.** should be independent of the pressure relief systems.

(2) Fuel storage tanks which may be subject to external pressures above their design pressure should be fitted with vacuum protection systems.

2. Pressure relief systems for liquefied ammonia fuel tanks

(1) Liquefied ammonia fuel tanks should be fitted with a minimum of two pressure relief valves (PRVs) allowing for disconnection of one PRV in case of malfunction or leakage.

(2) Interbarrier spaces should be provided with pressure relief devices. For membrane systems, the designer should demonstrate adequate sizing of interbarrier space PRVs.

(3) The opening pressure of the pressure relief valves (PRVs) should not be higher than the vapour pressure that has been used in the design of the tank. Valves comprising not more than 50% of the total relieving capacity may be set at a pressure up to 5% above MARVS to allow sequential lifting, minimizing unnecessary release of vapour.

(4) The following temperature provisions apply to PRVs fitted to pressure relief systems:

(A) PRVs on fuel tanks with a design temperature below 0 °C should be designed and arranged to prevent their becoming inoperative due to ice formation;

(B) the effects of ice formation due to ambient temperatures should be considered in the construction and arrangement of PRVs;

(C) PRVs should be constructed of materials with a melting point above 925 °C. Lower melting point materials for internal parts and seals may be accepted provided that fail-safe operation of the PRV is not compromised; and

(D) sensing and exhaust lines on pilot-operated relief valves should be of suitably robust construction to prevent damage.

(5) In the event of a failure of a fuel tank PRV, a safe means of emergency isolation should be available, as follows:

(A) procedures should be provided and included in the operation manual (refer to Section **18**);

(B) the procedures should allow only one of the installed PRVs for the liquefied gas fuel tanks to be isolated, physical interlocks should be included to this effect; and

(C) isolation of the PRV should be carried out under the supervision of the master. This action should be recorded in the ship's log, and at the PRV.

(6) Each pressure relief valve installed on a liquefied ammonia fuel tank should be connected to a venting system, which should be:

(A) so constructed that the discharge will be unimpeded and normally be directed vertically upwards at the exit;

(B) arranged to minimize the possibility of water or snow entering the vent system; and

(C) arranged such that the height of vent exits should not be less than B/3 or 6 m, whichever is the greater, above the weather deck and 6 m above working areas and walkways. However, vent mast height could be limited to lower value according to special consideration by the Society.

(7) The outlet from the pressure relief valves should normally be located at least B (greatest moulded breadth) or 25 m, whichever is less, from the nearest:

(A) air intake, air outlet or opening to accommodation, service and control spaces, or other non-hazardous area; and

(B) exhaust outlet from machinery installations.

(8) All other fuel gas vent outlets should also be arranged in accordance with (6) and (7). Means

should be provided to prevent liquid overflow from gas vent outlets, due to hydrostatic pressure from spaces to which they are connected.

(9) In the vent piping system, means for draining liquid from places where it may accumulate should be provided. The PRVs and piping should be arranged so that liquid cannot, under any circumstances, accumulate in or near the PRVs.

(10) Suitable protection screens of not more than 13 mm square mesh should be fitted on vent outlets to prevent the ingress of foreign objects without adversely affecting the flow.

(11) All vent piping should be designed and arranged not to be damaged by the temperature variations to which it may be exposed, forces due to flow or the ship's motions.

(12) PRVs should be connected to the highest part of the fuel tank. PRVs should be positioned on the fuel tank so that they will remain in the vapour phase at the filling limit (FL) as given in **608.**, under conditions of 15° list and 0.015L trim, where L is defined in **Ch 1, 102. 25** of this **Rules**.

3. Sizing of pressure relieving system

(1) Sizing of pressure relief valves

(A) PRVs are to have a combined relieving capacity for each liquefied gas fuel tank to discharge the greater of the following, with not more than a 20 % rise in liquefied gas fuel tank pressure above the MARVS:

(a) the maximum capacity of the liquefied gas fuel tank inerting system if the maximum attainable working pressure of the liquefied gas fuel tank inerting system exceeds the MARVS of the liquefied gas fuel tanks; or

(b) vapors generated under fire exposure computed using the following formula:

$$Q = FGA^{0.82} \quad (\mathrm{m^3/s})$$

where:

Q = minimum required rate of discharge of air at standard conditions of 273.15 Kelvin (K) and 0.1013 MPa.

F = fire exposure factor for different liquefied gas fuel types:

F = 1.0 for tanks without insulation located on deck;

F = 0.5 for tanks above the deck when insulation is approved by the Society. (Approval will be based on the use of a fireproofing material, the thermal conductance of insulation, and its stability under fire exposure);

F = 0.5 for uninsulated independent tanks installed in holds;

F = 0.2 for insulated independent tanks in holds (or uninsulated independent tanks in insulated holds);

F = 0.1 for independent tanks in inerted holds (or uninsulated independent tanks in inerted, insulated holds); and

F = 0.1 for membrane tanks.

G = gas factor according to formula:

$$G = \frac{12.4}{LD}\sqrt{\frac{ZT}{M}}$$

where:

T = temperature in Kelvin at relieving conditions, i.e. 120 % of the pressure at which the pressure relief valve is set;

L = latent heat of the material being vaporized at relieving conditions, in kJ/kg;

D = a constant based on relation of specific heats k and is calculated as follows:

$$D = \sqrt{k\left(\frac{2}{k+1}\right)^{\frac{k+1}{k-1}}}$$

where:

k = ratio of specific heats at relieving conditions, and the value of which is between 1.0 and 2.2. If k is not known, D = 0.606 is to be used;

Z = compressibility factor of the gas at relieving conditions; if not known, Z = 1.0 is to be used;

M = molecular mass of the product.

The gas factor of each liquefied gas fuel to be carried is to be determined and the highest value is to be used for PRV sizing.

A = external surface area of the tank (m^2), as for different tank types, as shown in **Fig 7.1**.

(B) For tanks in fuel storage hold spaces separated from potential fire loads by cofferdams or surrounded by ship spaces with no fire load, the following should apply:

If the pressure relief valves have to be sized for fire loads, the fire factors may be reduced to the following values:

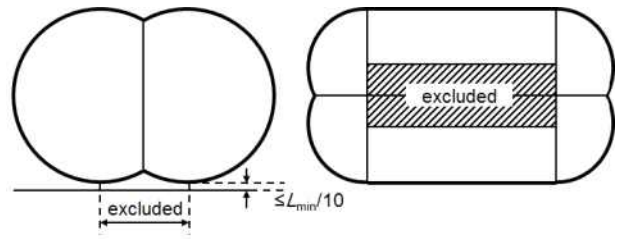
F = 0.5 to F = 0.25

F = 0.2 to F = 0.1

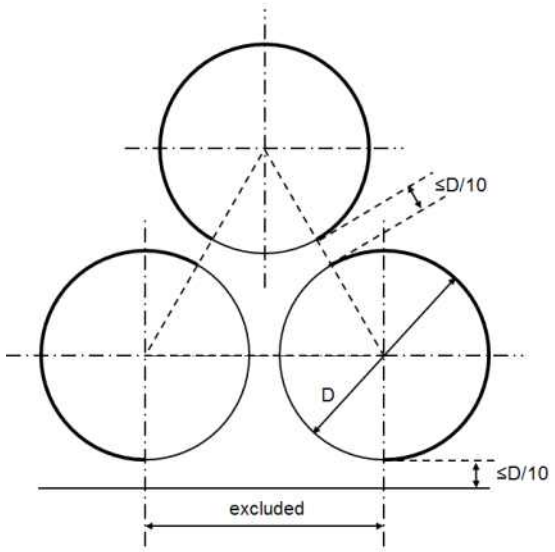
(C) The required mass flow of air at relieving conditions is given by:

$$M_{air} = Q \times \rho_{air} \qquad (kg/s)$$

where density of air (ρ_{air}) = 1.293 kg/m^3 (air at 273.15 K, 0.1013 MPa).



Bilobe tank



Horizontal cylindrical tanks arrangement

Fig 7.1 External surface area for different type of tank

(2) Sizing of vent pipe system
(A) Pressure losses upstream and downstream of the PRVs should be taken into account when determining their size to ensure the flow capacity required by (1).
(B) Upstream pressure losses
(a) the pressure drop in the vent line from the tank to the PRV inlet is not to exceed 3 % of the valve set pressure at the calculated flow rate, in accordance with (1);
(b) pilot-operated PRVs are to be unaffected by inlet pipe pressure losses when the pilot senses directly from the tank dome; and
(c) pressure losses in remotely sensed pilot lines are to be considered for flowing type pilots.
(C) Downstream pressure losses
(a) Where common vent headers and vent masts are fitted, calculations are to include flow from all attached PRVs; and
(b) The built-up back pressure in the vent piping from the PRV outlet to the location of discharge to the atmosphere, and including any vent pipe interconnections that join other tanks, is not to exceed the following values:
- for unbalanced PRVs: 10 % of MARVS;
- for balanced PRVs: 30 % of MARVS; and
- for pilot operated PRVs: 50 % of MARVS.

Alternative values provided by the PRV manufacturer may be accepted.
(D) To ensure stable PRV operation, the blow-down is not to be less than the sum of the inlet pressure loss and 0.02 MARVS at the rated capacity.

608. Loading limit for fuel tanks

1. Storage tanks for liquefied ammonia should not be filled to more than a volume equivalent to 98% full at the reference temperature as defined in **Ch 1, 102. 36** of this **Rules**. A loading limit curve for actual fuel loading temperatures is to be prepared from the following formula:

$$LL = FL\frac{\rho_R}{\rho_L}$$

where:

LL(Loading limit) = loading limit as defined in **Ch 1, 102. 27** of this **Rules**, expressed in per cent;

FL(Filling limit) = filling limit as defined in **Ch 1, 102. 16** of this **Rules**, expressed in percent, here 98 %;

ρ_R = relative density of fuel at the reference temperature; and

ρ_L = relative density of fuel at the loading temperature

2. In cases where the tank insulation and tank location make the probability very small for the tank contents to be heated up due to an external fire, special considerations may be made to allow a higher loading limit than calculated using the reference temperature, but never above 95%.

609. Maintaining of fuel storage condition

1. Control of fuel temperature and tank pressure

(1) The temperature of the liquefied ammonia in the fuel tanks should be maintained at a temperature of no more than -30 °C at all times by means acceptable to the Society. Systems and arrangements to be used for this purpose may include one, or a combination of, the following methods:
(A) reliquefaction of vapours;
(B) thermal oxidation of vapours; or
(C) liquefied ammonia fuel cooling.

The method chosen should be capable of maintaining the fuel temperature assuming no consumption for propulsion or power generation.

(2) Venting of fuel vapour for control of the tank pressure is not acceptable, except in emergency situations.

2. Design of systems

(1) For worldwide service, the upper ambient design temperature should be sea 32 °C and air 45 °C. For service in particularly hot or cold zones, these design temperatures should be increased or decreased, to the satisfaction of the Society.

(2) The overall capacity of the system should be such that it can control the temperature and pressure within the design conditions without venting to atmosphere.

3. Reliquefaction systems

(1) The reliquefaction system should be arranged in one of the following ways:

(A) a direct system where evaporated fuel is compressed, condensed, and returned to the fuel tanks;

(B) an indirect system where fuel or evaporated fuel is cooled or condensed by refrigerant without being compressed;

(C) a combined system where evaporated fuel is compressed and condensed in a fuel/refrigerant heat exchanger and returned to the fuel tanks; or

(D) if the reliquefaction system produces a waste stream containing ammonia during pressure control operations within the design conditions, these waste gases should be disposed of without venting to atmosphere.

4. Thermal oxidation systems

Thermal oxidation can be done by either consumption of the vapours according to the provisions for fuel consumers described in this annex or in a dedicated gas combustion unit. It should be demonstrated that the capacity of the oxidation system is sufficient to consume the required quantity of vapours.

5. Compatibility

Refrigerants or auxiliary agents used for refrigeration or cooling of fuel should be compatible with the fuel they may come in contact with (not causing any hazardous reaction or excessively corrosive products). In addition, when several refrigerants or agents are used, these should be compatible with each other.

6. Availability of systems

(1) The availability of the system and its supporting auxiliary services should be such that in case of a single failure (of mechanical non-static component or a component of the control systems) the fuel tank pressure and temperature can be maintained by another service/system.

(2) Heat exchangers that are solely necessary for maintaining the pressure and temperature of the fuel tanks within their design ranges should have a standby heat exchanger unless they have a capacity in excess of 25% of the largest required capacity for pressure control and they can be repaired on board without external sources.

610. Reference to the IGF Code

Ch 6 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 7 Material and General Pipe Design

701. Goal

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

702. Functional requirements

This section relates to functional requirements in **202. 1, 5** to **10** and **13**. In particular, **Ch 7, 201. 1 to 4** of this **Rules** is to be applied. In addition, the followings are to be applied :

1. Materials should be selected considering the relevant properties of ammonia. Consideration should be given to corrosiveness of the fuel according to the relevant environment conditions, including stress corrosion cracking. System components other than piping that are likely to come into contact with and be degraded by ammonia in a leakage scenario should be compatible with ammonia.
2. Fuel piping should be designed to prevent fuel from unintended accumulation in piping in consideration of the characteristics of ammonia. In addition, fuel piping should be arranged for emptying, inerting and gas freeing.

703. General

1. Fuel piping systems for liquid ammonia should as a minimum have a design pressure of 18 bar, corresponding to the vapour pressure of ammonia at 45°C, in order to prevent venting of ammonia in idle conditions. Fuel piping systems for gaseous ammonia should as a minimum have a design pressure of 10 bar. For fuel piping systems for liquid ammonia fitted with closed loop pressure relief arrangements routed back to the fuel storage tank, the minimum design pressure should as a minimum have a design pressure of 10 bar.
2. Expansion joints and bellows should not be used in ammonia fuel piping systems. Engine-mounted expansion bellows could be accepted based on evaluation, as reflected in the safety concept of the engine.
3. Anhydrous ammonia may cause stress corrosion cracking in containment and process systems made of carbon-manganese steel or nickel steel. To minimize the risk of this occurring, measures detailed in **Pt 7 Ch 5 1712. 2 to 7** of **Rules for the Classification of Steel Ships** should be taken, as appropriate.

704. Reference to the IGF Code

Ch 7 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 8 Bunkering

801. Goal

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

802. Functional requirements

This section relates to functional requirements in **202. 1 to 12** and **14 to 18**. In particular the following apply **Ch 8, 201.** of this **Rules** is to be applied.

803. Bunkering Station

1. General

(1) Enclosed or semi-enclosed bunkering stations should be gastight towards adjacent spaces. The term "adjacent" includes linear contact and point contact.
(2) Air intakes and openings in accommodation spaces, service spaces, engine rooms and control stations should not be located in hazardous and toxic areas associated with bunkering stations.
(3) Connections and piping should be so positioned and arranged that any damage to the bunkering piping does not cause damage to the ship's fuel containment system resulting in an uncontrolled fuel discharge.
(4) Bunkering piping should not be led through accommodation spaces, service spaces, electrical equipment rooms or control stations. Where bunkering piping is arranged in other enclosed spaces, bunkering piping should pass through a secondary enclosure meeting the requirements of **905. 1**.
(5) Arrangements should be made for safe management of any spilled fuel.
(6) Suitable means should be provided to relieve the pressure and remove ammonia contents from pump suctions and bunker lines. Ammonia is to be discharged to the fuel tanks or other suitable location.
(7) The surrounding hull or deck structures should not be exposed to unacceptable cooling, in case of leakage of fuel.

2. Ship's fuel hoses

(1) Liquid and vapour hoses used for fuel transfer should be compatible with the fuel and suitable for the fuel temperature.
(2) Hoses subject to tank pressure, or the discharge pressure of pumps or vapour compressors, should be designed for a bursting pressure not less than five times the maximum pressure the hose can be subjected to during bunkering. Hoses should be regularly visually inspected, and hydrostatic pressure tested periodically at not more than a five-year interval.
(3) Where fuel hoses are stored on the open deck or in a storage room, arrangements should be made for safe storage of the hoses.

804. Manifold

1. The bunkering manifold should be designed to withstand the external loads during bunkering. The connections at the bunkering station should be arranged in order to achieve a dry-disconnect operation in one of the followings ways:
(1) a dry-disconnect/connect coupling;
(2) a manual connect coupler or hydraulic connect coupler, used to connect the bunker system to the receiving vessel bunkering manifold presentation flange; or
(3) a bolted flange to flange assembly.

2. When intended to use either of the connections specified in paragraphs **1 (2)** and **1 (3)**, these should be combined with operating procedures that ensure a dry-disconnect is achieved. The arrangement should be subject to special consideration informed by a bunkering arrangement risk assessment conducted at the design stage and considering dynamic loads at the bunkering manifold connection, the safe operation of the ship and other hazards that may be relevant to the ship during bunkering operation. The fuel handling manual required by **1802. 3** shall include documentation that the bunkering arrangement risk assessment was conducted, and that special consideration was granted under this requirement.

3. An emergency release coupler (ERC)/emergency release system (ERS) or equivalent means should be provided, unless installed on the bunkering supply side of the bunkering line. It should enable a quick physical disconnection "dry break-away" of the bunker system in an emergency event.

805. Bunkering system

1. An arrangement for purging fuel bunkering lines with inert gas should be provided.
2. The bunkering system should be so arranged that no gas is discharged to the atmosphere during filling of storage tanks. Vapour return line, where fitted, should be sized adequately taking into consideration the expansion ratio of the fuel during bunkering operations.
3. A manually operated stop valve and a remote operated shutdown valve in series, or a combined manually operated and remote valve should be fitted in every bunkering line close to the connecting point. It should be possible to operate the remote valve in the control location for bunkering operations and/or from another safe location.
4. A bunkering-safety link (BSL), or an equivalent means for automatic and manual ESD communication to the bunkering source should be fitted.
5. Means should be provided for draining any fuel from the bunkering pipes upon completion of operation.
6. Bunkering lines should be arranged for inerting and gas freeing. Means to confirm the absence of residual liquid should be provided. When not engaged in bunkering, the bunkering pipes should be free of gas, or residual liquid, unless the consequences of not gas freeing are evaluated and approved by the Society.
7. In case bunkering lines are arranged with a cross-over, it should be ensured by suitable isolation arrangements that no fuel is transferred inadvertently to the ship side not in use for bunkering.
8. If not demonstrated to be required at a higher value due to pressure surge considerations a default time as calculated in accordance with **Ch 16, 702. 7** of this **Rules** from the trigger of the alarm to full closure of the remote operated valve required by **3** should be adjusted.
9. Sampling valves, if fitted, should be arranged at suitable locations in the bunkering line to allow verification procedures to confirm that the bunkering line is safe before opening any flanges. A double shut-off, blank flange or plug should be installed on sampling valves in the bunkering line.

Section 9 Fuel supply to consumers

901. Goal

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

902. Functional requirements

This section is related to functional requirements in **202. 1 to 6, 8 to 12** and **14 to 18**. In particular, the following apply:

1. the fuel supply system should be designed so as to avoid direct release of ammonia to the atmosphere during normal operation and during any foreseeable and controllable abnormal scenario, while providing safe access for operation and inspection. The causes and consequences of ammonia gas release should be given special consideration when carrying out the risk assessment required by **302.**;
2. the piping system for fuel transfer to the fuel consumers should be designed in a way that a failure of one barrier cannot lead to a leak from the piping system into the surrounding area causing danger to the persons on board, the environment or the ship;
3. fuel lines outside the machinery spaces should be installed and protected so as to minimize the risk of injury to personnel and damage to the ship in case of leakage;
4. the fuel supply system should be designed and arranged not to cause unintentional phase changes within the fuel supply system; and
5. operational gas releases should be collected and handled by a suitable ammonia release mitigation system.

903. Redundancy of fuel supply

1. For single fuel installations, the fuel supply system should be arranged with full redundancy and segregation all the way from the fuel tanks to the fuel consumer, so that a leakage in one system does not lead to an unacceptable loss of power.
2. For single fuel installations, the fuel storage should be divided between two or more tanks. The tanks should be located in separate compartments.
3. For type C tank only, one tank may be accepted if two completely separate tank connection spaces are installed for the one tank.

904. Safety functions of fuel supply system

1. Fuel storage tank inlets and outlets should be provided with valves located as close to the tank as possible. Valves required to be operated during normal operation (Normal operation in this context is when fuel is supplied to fuel consumers and during bunkering operations.) which are not accessible should be remotely operated. Tank valves, whether accessible or not, should be automatically operated when the safety system required in **1502. 2.** is activated.
2. The main fuel supply line and return lines to each fuel consumer or set of consumers should be equipped with a manually operated stop valve and an automatically operated "master fuel valve" coupled in series or a combined manually and automatically operated valve. The valves should be situated in the part of the piping that is outside the machinery space containing fuel consumers and placed as near as possible to the installation for heating the fuel, if fitted. The master fuel valve should automatically cut off the fuel supply when activated by the safety system required in **1502. 2.**.
3. The automatic master fuel valve should be operable from safe locations on escape routes inside a machinery space containing a fuel consumer, the engine control room, if applicable; outside the machinery space, and from the navigation bridge.
4. The fuel supply lines to fuel preparation rooms should be equipped with automatically operated shut-off valves situated at the bulkhead inside the fuel preparation room.
5. Each fuel consumer should be provided with "double block and bleed" valves arrangement. These valves should be arranged as outlined in (1) or (2) so that when the safety system required in **1502. 2.** is activated, this will cause the shutoff valves that are in series to close automatically and

the bleed valve to open automatically, and:

(1) the two shutoff valves should be in series in the fuel pipe to the fuel consuming equipment. The bleed valve should be in a pipe that vents to a suitable ammonia release mitigation system that portion of the fuel piping that is between the two valves in series; or

(2) the function of one of the shutoff valves in series and the bleed valve can be incorporated into one valve body, so arranged that the flow to the fuel utilization unit will be blocked and the ventilation opened.

6. The two valves should be of the fail-to-close type, while the ventilation valve should be fail-to-open.

7. The fuel supply system should include an ammonia release mitigation system capable of collecting and handling ammonia releases, including but not limited to:

(1) bleed from double block and bleed arrangements on the fuel piping systems;
(2) releases from the opening of pressure relief valves in the fuel piping system; and
(3) releases from purging and draining operations of fuel pipes.

8. The release mitigation system should be capable of reducing the ammonia concentration to below 110 ppm. Discharges from the release mitigation system should be arranged in accordance with **607. 2. (7)**.

9. Where fuel supply systems supply ammonia in the liquid state, relevant bleed lines and vent lines should be led to the fuel tank or gas-liquid separator or similar device to prevent ammonia liquid from being released to the atmosphere.

10. The double block and bleed valves should also be used for normal stop of the engine.

11. In cases where the master fuel valve is automatically shut down when the safety system as required in **1502. 2.** is activated, the complete fuel supply branch downstream of the double block and bleed valve should be automatically purged through the ammonia release mitigation system.

12. There should be one manually operated shutdown valve in the fuel supply line to each engine upstream of the double block and bleed valves to assure safe isolation during maintenance on the engine. Where fuel is recirculated from each engine to the fuel supply piping, one manually operated shutoff valve should also be provided downstream of the double block bleed valve in the fuel return piping for each engine.

13. For single-engine installations and multi-engine installations, where a separate master valve is provided for each engine, the master fuel valve and the double block and bleed valve functions can be combined.

14. Where gaseous ammonia fuel is supplied to a consumer, provisions should be made to prevent ammonia condensate from entering the consumer.

905. Fuel distribution outside of machinery space

1. Fuel pipes should be protected by a secondary enclosure. This enclosure can be a duct or a double wall piping system. The duct or double wall piping system should be fitted with gas detection as required in **1508.**. Other solutions providing an equivalent safety level may also be accepted by the Society.

2. The provision in **1** need not to be applied for fuel pipes located in a fuel preparation room or tank connection space.

3. Where gas detection as required in **1508. 2. (2)** is not fit for purpose, the secondary enclosures around liquefied fuel pipes shall be provided with leakage detection by means of pressure or temperature monitoring systems, or any combination thereof.

4. The provision in **1** also applies for fuel vent pipes, except for open-ended fully welded fuel vent pipes in open air.

906. Reference to the IGF Code

Ch 9 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 10 Power Generation Including Propulsion and Other Gas Consumer

1001. Goal

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

1002. Function requirements

This section is related to functional requirements in **202. 1, 12, 14, 17** and **18**. In particular, the following apply:

1. the exhaust systems should be configured to prevent any accumulation of unburnt fuel;

2. unless designed with the strength to withstand the worst-case overpressure due to ignited fuel leaks, engine components or systems containing or likely to contain an ignitable ammonia gas and air mixture should be fitted with suitable pressure relief systems. Dependent on the particular engine design this may include the air inlet manifolds and scavenge spaces;

3. the explosion venting should be led away from where persons may normally be present;

4. all fuel consumers should have a separate exhaust system; and

5. the possibility of ammonia leakage from fuel consumers into the auxiliary system, such as cooling water systems and its consequences, should be minimized.

1003. Reference to the IGF Code

Ch 10 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 11 Fire Safety

1101. Goal

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

1102. Functional requirements

This section is related to functional requirements in **202. 2, 4,** to **7, 13, 15, 16** and **18**.

1103. Reference to the IGF Code

Ch 11 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 12 Explosion Prevention

1201. Goal

Ch 12, 101. of this **Rules** is to be applied.

1202. Functional requirements

This section is related to functional requirements in **202. 2 to 5, 7, 8, 13, 15** and **18**. In particular the following apply:

1. Ch 12, 201. of this **Rules** is to be applied.

1203. Reference to the IGF Code

Ch 12 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 12-1 Prevention of Exposure to Toxicity

12-101. Goal

The goal of this section is to provide for the prevention of exposure to toxic gases.

12-102. Functional requirements

This section is related to functional requirements in **202. 2 to 5, 7, 9, 14** and **17**. In particular, the following apply:

1. The probability of exposure to toxic gases should be reduced to a minimum by considering arrangement and location of:

(1) potential sources of ammonia release, such as valves flanges and fittings;
(2) outlet from pressure relief valves;
(3) openings from spaces where ammonia leakages may occur;
(4) bunker stations;
(5) active or passive systems to prevent ammonia propagation to adjacent spaces or areas;
(6) openings to the vessel interior needing to be protected from intake of toxic gas; and
(7) safe havens, life-saving appliances and emergency escapes.

12-103. General requirements for toxic exposure protection

1. Toxic area and space classification is a method of analysing and classifying the areas where ammonia vapour is or may be expected to be present. The objective of the classification is to limit the risk of direct exposure to ammonia for persons on board.

2. Toxic areas and spaces are defined to allow for a safe arrangement preventing cross-contamination from ammonia releases, and to facilitate safe arrangement of life-saving appliances, emergency escapes, air intakes, outlets and other openings into the accommodation, service and machinery spaces, control stations and other non-toxic spaces.

12-104. Provision for toxic area and space classification

1. Toxic areas include, but are not limited to:

(1) areas on open deck within 10 m of any flanges, valves, and other potential leakage sources in ammonia fuel systems;
(2) areas on open deck within B or 25 m, whichever is less, from outlets from the pressure relief valves installed on a liquefied fuel gas tank and all other fuel gas vent outlets;
(3) areas on open deck within B or 25 m, whichever is less, from outlets from interbarrier spaces for tanks of IMO type A;
(4) areas on open deck within 10 m from outlets from interbarrier spaces for tanks of IMO type B;
(5) areas on open deck within 10 m from outlets from secondary enclosures around ammonia piping, ventilation outlets from tank connection spaces and fuel preparation rooms and other spaces containing ammonia leakage sources;

(6) areas on open deck within 5 m from inlets to secondary enclosures around ammonia piping, ventilation inlets to tank connection spaces and fuel preparation rooms and other spaces containing ammonia leakage sources; and
(7) areas on open deck within 5 m from entrance openings to spaces containing ammonia leakage sources.

2. Toxic spaces include, but are not limited to:
(1) the interiors of fuel tanks, any pipework for pressure-relief or other venting systems for fuel tanks, pipes and equipment containing fuel;
(2) tank connection spaces, interbarrier spaces and fuel storage hold spaces for tank containment systems requiring secondary barriers;
(3) fuel preparation rooms;
(4) annular space of secondary enclosures around fuel pipes; and
(5) enclosed and semi-enclosed spaces in which potential sources of release, such as single-walled piping containing fuel, are located.

3. In addition to the toxic area requirements in this section, a dispersion analysis should be carried out in order to determine the extent of a toxic area. The gas dispersion analysis should demonstrate that ammonia concentrations exceeding 220 ppm do not reach:
(1) air intakes, outlets and other openings into the accommodation;
(2) service and machinery spaces;
(3) control stations;
(4) other non-toxic spaces in the ship; and
(5) other areas, as specified by the Society.

4. The toxic area determined by the dispersion analysis should extend the minimum area as defined in **1**, or lead to additional mitigation measures.

5. The dispersion analysis boundary conditions should be approved by the Society.. The analysis should include discharges from the pressure relief valves protecting the tank containment system, discharges from secondary barriers around fuel tanks and discharges from secondary enclosures around ammonia leakage sources.

12-105. Provision for safe havens

A safe haven providing refuge in case of a release of ammonia should be arranged in one or more enclosed spaces with a cumulative total capacity to accommodate all persons on board. Safe havens should be arranged, as necessary, at essential locations for the ship's operation. The space should be designed to minimize the risk of exposure to ammonia during release of ammonia. This may be achieved by measures including, but not limited to, arrangement of ventilation systems or by arranging self-sustaining air supply for the space.

Section 13 Ventilation

1301. Goal

The goal of this section is to provide for the ventilation required for safe operation of ammonia- fuelled machinery and equipment where ammonia is used as fuel.

1302. Functional requirements

This section is related to functional requirements in **202. 2, 5, 8, 9, 11, 13, 14** and **17**.

1303. Reference to the IGF Code

Ch 13 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 14 Electrical Installation

1401. Goal

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

1402. Functional requirements

This section is related to functional requirements in **202. 1, 2, 4, 7, 8, 12, 13** and **16 to 18**. In particular, the following apply:

1. Electrical generation and distribution systems, and associated control systems, are to be designed such that a single fault will not result in the loss of ability to maintain fuel tank pressure and temperature within normal operating limits.

1403. Reference to the IGF Code

Ch 14 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 15 Control, Monitoring and Safety Systems

1501. Goal

The goal of this section is to provide for the arrangement of control, monitoring and safety systems that support an efficient and safe operation of the ammonia-fuelled installation as covered in the other sections of this Annex.

1502. Functional requirements

This section is related to functional requirements in **202. 1, 2, 12, 13 to 15, 17** and **18**. In particular, the following apply:

1. the control, monitoring and safety systems of the ammonia-fuelled installation should be so arranged that the remaining power for propulsion and power generation is in accordance with **903. 1** in the event of single failure;

2. an ammonia safety system should be arranged to close down the fuel supply system automatically, upon failure in systems as described in **table 1** and upon other fault conditions which may develop too fast for manual intervention;

3. the safety functions should be arranged in a dedicated gas safety system that is independent of the gas control system in order to avoid possible common cause failures. This includes power supplies and input and output signal;

4. the safety systems including the field instrumentation should be arranged to avoid spurious shutdown, e.g. as a result of a faulty gas detector or a wire break in a sensor loop; and

5. where two or more fuel supply systems are required to meet the provisions, each system should be fitted with its own set of independent fuel control and fuel safety systems.

1503. General requirements

Suitable instrumentation devices should be fitted to allow a local and a remote reading of essential parameters to ensure a safe management of the whole fuel gas equipment including bunkering.

1504. Requirements for bunkering and fuel tank monitoring

1. Level indicators for fuel tanks

With regard to level indicators for fuel tanks:

(1) each fuel tank should be fitted with liquid level gauging device(s), arranged to ensure a level reading is always obtainable whenever the fuel tank is operational. The device(s) should be designed to operate throughout the design pressure range of the liquefied gas fuel tank and at temperatures within the fuel operating temperature range;

(2) where only one liquid level gauge is fitted, it should be arranged so that it can be maintained in an operational condition without the need to empty or gas-free the tank; and

(3) fuel tank liquid level gauges may be of the following types:

(A) indirect devices, which determine the amount of fuel by means such as weighing or in-line flow metering; or

(B) closed devices, which do not penetrate the fuel tank, such as devices using radioisotopes or ultrasonic devices.

2. Overflow control

With regard to overflow control:

(1) each fuel tank should be fitted with a high liquid level alarm operating independently of other liquid level indicators and giving an audible and visual warning when activated;

(2) an additional sensor operating independently of the high liquid level alarm should automatically actuate a shutoff valve in a manner that will both avoid excessive liquid pressure in the bunkering line and prevent the fuel tank from becoming liquid full;

(3) the position of the sensors in the fuel tank should be capable of being verified before commissioning. At the first occasion of full loading after delivery and after each dry-docking, testing of high-level alarms should be conducted by raising the fuel liquid level in the fuel tank to the alarm point;

(4) all elements of the level alarms, including the electrical circuit and the sensor(s), of the high,

and overfill alarms, should be capable of being functionally tested. Systems should be tested prior to fuel operation; and

(5) where arrangements are provided for overriding the overflow control system, they should be such that inadvertent operation is prevented. When this override is operated, a continuous visual indication is to be provided at the navigation bridge, continuously manned central control station or onboard safety centre.

3. The vapour space of each fuel tank should be provided with a direct pressure reading gauge. Additionally, an indirect pressure indication should be provided on the navigation bridge, continuously manned central control station or onboard safety centre.

4. The pressure indicators should be clearly marked with the highest and lowest pressure permitted in the fuel tank.

5. A high-pressure alarm and, if vacuum protection is required, a low-pressure alarm should be provided on the navigation bridge and at a continuously manned central control station or onboard safety centre. Alarms should be activated before the set pressures of the safety valves are reached.

6. Each fuel pump discharge line and each liquid and vapour bunker manifold should be provided with at least one local pressure indicator.

7. The local pressure indicators should be provided to indicate the pressure between ship's bunker manifold valves and hose connections to the bunkering facility.

8. Fuel storage hold spaces and interbarrier spaces without open connection to the atmosphere should be provided with pressure indicator.

9. For submerged fuel pump motors and their supply cables, arrangements should be made to alarm in low-liquid level and automatically shut down the motors in the event of low-low liquid level. The automatic shutdown may be accomplished by sensing low pump discharge pressure, low motor current, or low-low liquid level. This shutdown should give an audible and visual alarm on the navigation bridge, continuously manned central control station or onboard safety centre.

10. Each fuel tank should be provided with devices to measure and indicate the temperature of the fuel.

1505. Bunkering control

1. Control of the bunkering should be possible from a safe location remote from the bunkering station. At this location the tank pressure, tank temperature, and tank level should be monitored. Remotely controlled valves required by **805. 3** should be capable of being operated from this location. Overfill alarm and automatic shutdown should also be indicated at this location.

2. If ammonia leakage is detected in the secondary enclosure around the bunkering lines, an audible and visual alarm should be provided at the bunkering control location. The bunker valve and other valves required to isolate the leakage should be automatically closed by the safety system in accordance with **table 1**.

1506. Gas compressor monitoring

1. Gas compressors should be fitted with audible and visual alarms both on the navigation bridge and in the engine control room. As a minimum, the alarms should include low gas input pressure, low gas output pressure, high gas output pressure and compressor operation.

2. Where bulkhead penetrations are used to separate the drive from a hazardous space, temperature monitoring for the bulkhead shaft glands and bearings should be provided, which automatically give a continuous audible and visual alarm on the navigation bridge or in a continuously manned central control station.

1507. Gas engine monitoring

In addition to the instrumentation provided in accordance with **Pt 5** of **Rules for the classification of steel ships**, indicators should be fitted on the navigation bridge, the engine control room and the maneuvering platform for:

1. operation of the engine in case of ammonia-only engines; or
2. operation and mode of operation of the engine in the case of dual fuel engines.

1508. Leakage detection

1. Where gas detection should cause shutdown in accordance with **table 1**, detector voting should be applied where two units should detect gas to activate shutdown. A failed detector should be considered as an active detection.
2. Permanently installed gas detectors should be fitted in:
   (1) tank connection spaces;
   (2) all secondary enclosures around fuel pipes;
   (3) machinery spaces containing gas piping, gas equipment or gas consumers;
   (4) fuel preparation rooms;
   (5) bunkering stations and other enclosed spaces containing fuel piping or other fuel equipment not protected by a secondary enclosure;
   (6) other enclosed or semi-enclosed spaces where fuel vapours may accumulate including inter-barrier spaces and fuel storage hold spaces of independent tanks other than type C;
   (7) airlocks and entry spaces to tank connection spaces;
   (8) gas heating circuit expansion tanks;
   (9) motor rooms for compressors as specified in **1506. 2** (if fitted);
   (10) at ventilation inlets to accommodation and machinery spaces where required based on the risk assessment in **302.**;
   (11) at ventilation inlets for safe haven; and
   (12) at outlet from tank pressure relief valves.
3. The number of detectors in each space should be considered taking into account the size, layout and ventilation of the space, and each space shall be covered by sufficient number of detectors to allow for voting in accordance with **table 1**.
4. The detection equipment should be located where gas may accumulate and in the ventilation outlets. Gas dispersal analysis should be used to find the best location of gas detectors.
5. Gas detection equipment should be designed, installed and tested in accordance with a recognized standard.
6. Fuel piping should also be arranged with the detection of liquid leakages in the secondary enclosure at the lowest point.
7. Each tank connection space, fuel preparation room and bunker station should be provided with liquid leakage detection. Alarm should be given at high liquid level and low temperature indication should activate the safety system.
8. An audible and visible alarm should be activated at an ammonia vapour concentration of 110 ppm as specified in **table 1**. The safety system should be activated at an ammonia vapour concentration of 220 ppm with actions as specified **table 1**. In addition, at an ammonia vapour concentration, a visual local indication should be given at all entrances to enclosed spaces affected.
9. Audible and visible alarms from the leakage detection equipment should be located on the navigation bridge, in the continuously manned central control station and inside and outside the space where the leakage is detected.
10. Gas detection required by this section should be continuous without delay.

1509. Prevention of condensation in fuel supply line

1. Where gaseous ammonia fuel is supplied to a consumer, the following should be monitored:
   (1) fuel pipe wall temperature; and
   (2) fuel pressure.
2. The control system should be capable of calculating the dynamic dew point based on measurements of fuel pressure and fuel pipe wall temperature. If fuel pipe wall temperature falls within 10 °C of the calculated dew point of the fuel, the fuel system should shut down and fuel system should be

purged of ammonia fuel.

1510. Ventilation

Any reduction of the required ventilating capacity in tank connection spaces, fuel preparation rooms or other enclosed spaces containing fuel piping or other fuel equipment not protected by a secondary enclosure should give an audible and visual alarm on the navigation bridge or in a continuously manned central control station or safety centre. Loss of ventilation should result in automatic closing of valves as specified in **table 1**.

1511. Safety functions of fuel supply systems

1. If the fuel supply is shut off due to activation of an automatic valve, the fuel supply should not be opened until the reason for the disconnection is ascertained and the necessary precautions taken. A readily visible notice giving instruction to this effect should be placed at the operating station for the shutoff valves in the fuel supply lines.
2. A caution placard or signboard should be permanently fitted in the machinery space containing gas-fuelled engines, stating that heavy lifting, implying danger of damage to the fuel pipes, should not be done unless the fuel supply lines are free from ammonia.
3. Compressors, pumps and fuel supply should be arranged for manual remote emergency stop from the following locations as applicable:
   (1) navigation bridge;
   (2) cargo control room;
   (3) onboard safety centre;
   (4) engine control room;
   (5) fire-control station; and
   (6) adjacent to the exit of fuel preparation rooms.
4. The ammonia compressor should also be arranged for manual local emergency stop.

Table 1 Monitoring of ammonia fuel installation

Parameter	Alarm	Automatic shutdown of bunker valve	Automatic shutdown of tank valve(s)	Automatic shutdown of fuel preparation room valve(s)	Automatic shutdown of master valve(s)	Remarks
Ammonia detection in enclosed spaces at 25 ppm	X (See Remarks)					Local indication at all entrances to the space, no alarm at the alarm system
High-level fuel tank	X					
High-high level fuel tank	X	X	X			
Submerged fuel pumps, low level in tank	X					Stop fuel pumps at low-low liquid level
Ammonia detection in bunker station at 110 ppm	X					
Ammonia detection in bunker station at 220 ppm		X				
Liquid leakage detection in bunker station	X	X				Close valve at low temperature
Ammonia detection in secondary enclosure around bunkering lines at 110 ppm	X					
Ammonia detection in secondary enclosure around bunkering lines at 220 ppm		X	X			
Liquid leakage detection in secondary enclosure around bunkering lines	X	X	X			
Ammonia detection in tank connection space at 110 ppm	X					
Ammonia detection on two detectors in tank connection space at 220 ppm	X		X			
Liquid leakage detection in tank connection space	X		X			Close valve at low temperature
Ammonia detection in fuel preparation room at 110 ppm	X					

Table 1 Monitoring of ammonia fuel installation (continued)

Parameter	Alarm	Automatic shutdown of bunker valve	Automatic shutdown of tank valve(s)	Automatic shutdown of fuel preparation room valve(s)	Automatic shutdown of master valve(s)	Remarks
Ammonia detection on two detectors in fuel preparation room at 220 ppm	X			X		
Liquid leakage detection in fuel preparation room	X			X		Close valve at low temperature
Ammonia detection in secondary enclosure of fuel supply piping at 110 ppm	X					
Ammonia detection on two detectors in secondary enclosure of fuel supply piping at 220 ppm	X		X	X	X	All valves required to isolate the leakage should close. Transient releases which are expected in normal operation of the consumers should not cause shutdown of the consumers.
Liquid leakage detection in secondary enclosure of fuel supply pipes	X		X	X	X	All valves required to isolate the leakage should close
Reduced ventilation in tank connection space	X					
Loss of ventilation in tank connection space			X			
Reduced ventilation in fuel preparation room	X					
Loss of ventilation in fuel preparation room				X		
Manually activated emergency shutdown of master fuel valve(s) engine	X				X	
Ammonia concentration from discharge of ARMS at 110 ppm	X					

An alarm as indicated in **table 1** should include an audible and visual alarm at a manned location in accordance with the 2009 Code on Alerts and Indicators.

Section 16 Manufacture, Workmanship And Testing

1601. Goal

The provisions of **Ch 16** of this **Rules**, should apply to ships using ammonia as fuel, where appropriate.

Section 17 Drills And Emergency Exercises

1701. Drills and emergency exercises

1. Drills and emergency exercises on board should be conducted at regular intervals.

2. Such ammonia-related exercises could include for example:

(1) tabletop exercise;
(2) review of fuelling procedures based on the fuel handling manual;
(3) responses to potential contingences;
(4) tests of equipment intended for contingency response; and
(5) reviews that assigned seafarers are trained to perform assigned duties during fuelling and contingency response.

3. Ammonia-related exercises may be incorporated into periodical drills required by SOLAS.

4. The response and safety system for hazards and accident control should be reviewed and tested.

Section 18 Operation

1801. Goal

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

1802. Functional Requirements

This section is related to functional requirements in **202. 1 to 3, 10, 12, 15, 16** and **17**. In particular, the following applies:

1. a copy of IMO Interim Guidelines, or national regulations incorporating the provisions of the same, should be on board every ship covered by this Annex;

2. maintenance procedures and information for all ammonia-related installations should be available on board;

3. the ship should be provided with operational procedures including a suitably detailed fuel handling manual, such that trained personnel can safely operate the fuel bunkering, storage and transfer systems; and

4. the ship should be provided with suitable emergency procedures.

1803. Reference to the IGF Code

Ch 18 of this **Rules** should be taken into account, where applicable, in order to fulfil the functional requirements.

Section 19 Training

1901. Goal

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

1902. Functional Requirements

1. The company should ensure that seafarers on board ships using ammonia fuel should have completed training to attain the abilities that are appropriate to the capacity to be filled, and duties and responsibilities to be taken up.
2. The master, officers, ratings and other personnel on ships using ammonia fuel should have received training and be qualified in the use of gaseous fuel in accordance with the STCW Convention and the STCW Code, taking into account the specific hazards of ammonia.

Section 20 Personnel Protection

2001. Goal

The goal of this section is to ensure that protective equipment is provided for persons on board, considering both routine operations and emergency situations and possible short- or long-term effects of ammonia exposure.

2002. Functional Requirements

This section is related to functional requirements in **202. 1, 12** and **16**. In particular, the following applies:

1. for the protection of crew members who are engaged in operations, maintenance of ammonia fuel systems, and emergency response, the ship should have on board protective equipment suitable for ammonia exposure, taking the exposure risk of different operations into account;
2. for the protection and treatment of crew members affected by ammonia leakages, the ship should have on board suitable emergency equipment; and
3. suitable respiratory and eye protection for emergency escape purposes should be provided for every person on board.

2003. Protective equipement

1. Suitable protective equipment, including eye protection, to a recognized national or international standard, should be provided for protection of crew members engaged in normal operations related to the ammonia fuel system.
2. Personal protective and safety equipment required in this section should be kept in suitable, clearly marked lockers located in readily accessible places.

2004. Emergency equipement

1. Suitably marked decontamination showers and eyewashes should be available in convenient locations:
   (1) close to bunkering stations;
   (2) close to exit from tank connection spaces;
   (3) close to exit from fuel preparation rooms;
   (4) in machinery spaces for ammonia-fuelled consumers; and
   (5) close to lifeboat embarkation stations.
2. The showers and eyewashes should be operable in all ambient conditions. A heating system with temperature control is required if pipe routeing of the water supply exposes the piping to freezing conditions. Water supply capacity should be sufficient for simultaneous use of at least two units. Thermal insulation is not considered as an alternative to a system with temperature control.

3. A stretcher that is suitable for hoisting an injured person from spaces, such as tank hold spaces, should be kept in a readily accessible location.

4. The ship should have onboard medical first aid equipment, including oxygen resuscitation equipment, based on the requirements of the Medical First Aid Guide (MFAG) for ammonia.

5. Suitable respiratory and eye protection for emergency escape purposes should be provided for every person on board, subject to the following:
   (1) filter-type respiratory protection is unacceptable;
   (2) self-contained breathing apparatus should have at least 15 minutes of service time; and
   (3) emergency escape respiratory protection should not be used for fire-fighting or cargo handling purposes and should be marked to that effect.

2005. Safety equipement

1. Sufficient, but not less than three complete sets of safety equipment, should be provided in addition to fire-fighter's outfits required by **SOLAS regulation II-2/10.10**. These additional sets should provide adequate personal protection to permit entry and work in a gas-filled space, and be equipped with two-way portable radiotelephone apparatus comprising of earpiece with microphone and push-to-talk units. This equipment should consider the nature of ammonia.

2. Each complete set of safety equipment should consist of:
   (1) one self-contained positive pressure air breathing apparatus incorporating full face mask not using stored oxygen and having a capacity of at least 1,200 litres of free air. Each set should be compatible with that required by **SOLAS regulation II-2/10.10**;
   (2) gastight protective clothing, boots and gloves to a recognized standard;
   (3) steel-cored rescue line with belt; and
   (4) explosion-proof lamp.

3. An adequate supply of compressed air should be provided and should consist of:
   (1) at least one fully charged spare air bottle for each breathing apparatus required by **1**;
   (2) an air compressor of adequate capacity capable of continuous operation, suitable for the supply of high-pressure air of breathable quality; and
   (3) a charging manifold capable of dealing with sufficient spare breathing apparatus air bottles for the breathing apparatus required by **1**.

4. The compressed air equipment should be inspected at least once a month by a responsible officer and the inspection should be logged in the ship's records. This equipment should also be inspected and tested by a competent person at least once a year.

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To : All Surveyors and whom it may concern

No : 2025-9-E
Date : 2025.08.04

Subject	9.208 Notice for amendment of KR Technical Rules (Pt 9 Ch 2 of Rules/Ch 16 of Guidance for LFFS)
Application	Immediately

1. Please be informed that 2025 KR 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 to the relevant works.

Relevant Rules/Guidance	Application Date	Amendments
Pt 9 Ch 2 of the Rules for the Classification of Steel Ship (Cargo Handling Appliances)	Immediately (based on the date for construction contract)	- Revision of the application of periodical survey window of ships not subject to SOLAS - Revision of the requirements for documents to be submitted and criteria for acceptance of certificate at Registration Survey after Construction
Ch 16 of the Guidance for Low Flash Point Fuel Ships	Immediately (based on the date for construction contract)	- Revision of the requirements for overall performance test and cold spot inspection

2. Furthermore, please be informed that these amendments will be incorporated in 2026 edition of the KR Technical Rules.

Amendments of the Rules for the Classification of Steel Ships

(Circular)

Pt. 9 Ch. 2 Crago Handling Appliance

2025. 08.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments : (Effective Date : Immediately)

(1) Maintenance of Periodic Inspection Period Window for Cargo Handling Gear on Ships Not Subject to SOLAS Regulation II-1/3-13

: This amendment is intended to ensure the applicability of the inspection window requirements for annual surveys to cargo handling appliance that is not subject to the SOLAS Convention.

- Ch 2, 202. 2 (2) of the rules has been amended.

(2) Clarification of Document Submission Requirements for Registration Inspections after construction under the 2025 Rules

: The 2025 Rules introduced a registration survey during construction and after construction, and it may be misunderstood that documents for registration survey after construction are exempted and self-inspection certificates are acceptable. This amendment is intended to clarify that submission of drawings and other relevant documents is required for registration survey after construction, and to limit the scope of inspection certificates to those issued by the IACS member Society, not by the manufacturer.

- A new requirement has been added to Ch 2 203. 3 (1) (A) of the rules, and renumbered following requirements.

2. Main Contents: Refer to the amendments

Present	Amendment	Note
CHAPTER 2 CARGO HANDLING APPLIANCES **Section 2 Surveys** **202. Surveys of Cargo Handling Appliances** **1. Kinds of Surveys** 〈omitted〉 **2. Due range** The timing of the Surveys of cargo handling appliances are to be in accordance with the followings: (1) 〈omitted〉 (2) Lifting appliances assigned a safe working load shall be subjected to an annual survey at intervals not exceeding 12 months. *(2025)* (3) ~ (5) 〈omitted〉 **3. Periodical Surveys carried out in Advance** 〈omitted〉 **203. Registration Surveys** **1. Registration surveys during construction** ***(2025)*** (1) ~ (3) 〈omitted〉 **2. Registration Surveys after Construction** ***(2025)*** (1) Cargo handling appliances assigned the class notation LG(F) (A) Verification of inspection certificates, or materials and equipment certificates for cargo handing appliances (B) ~ (C) 〈omitted〉 (2) ~ (3) 〈omitted〉	**CHAPTER 2 CARGO HANDLING APPLIANCES** **Section 2 Surveys** **202. Surveys of Cargo Handling Appliances** **1. Kinds of Surveys** 〈same as the present〉 **2. Due range** The timing of the Surveys of cargo handling appliances are to be in accordance with the followings: (1) 〈same as the present〉 (2) Lifting appliances assigned a safe working load shall be subjected to an annual survey at intervals not exceeding 12 months. However, for domestic vessels not subject to the SOLAS Convention or where separate instructions are provided by the flag Administration, annual survey may be carried out within 3 months before or after each anniversary date of periodical survey for Classification. *(2025)* (3) ~ (5) 〈same as the present〉 **3. Periodical Surveys carried out in Advance** 〈same as the present〉 **203. Registration Surveys** **1. Registration surveys during construction** ***(2025)*** (1) ~ (3) 〈omitted〉 **2. Registration Surveys after Construction** ***(2025)*** (1) Cargo handling appliances assigned the class notation LG(F) (A) Submission of Drawings and Other Documents specified in **1** (1) *(2025)* (B) Verification of inspection certificates, or materials and equipment certificates for cargo handing appliances issued by a member Society of IACS *(2025)* (C) ~ (D) 〈same as the present〉 (2) ~ (3) 〈same as the present〉	

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

(Circular)

2025. 08.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments : **(Effective Date : Immediately)**

(1) Revision of inspection conditions for overall performance test and cold spot inspection.

: The requirement for conducting the tests/inspections under fully loaded condition as previously specified for the initial LNG bunkering, has been removed(requirements in Ch 16, 501. 3 and 4)

2. Main Contents: Refer to the amendments

Present	Amendment	Note
# CHAPTER 16 MANUFACTURE, WORKMANSHIP AND TESTING ## Section 5 Testing *(2019)* **501. Testing and Inspections during Construction** **1. ~ 2. 〈omitted〉** **3. Gas-trial ~~and fuel full loading test~~ 【See Rules】** (1) In accordance with the requirements in **501. 6** and **702. 5** of the Rules, the following tests are to be conducted in the attendance of the Surveyor to verify the performance of the fuel containment installations and fuel handling equipment : (A) Gas-trial On items given in **Table 16.1**, tests are to be conducted to verify the performance of the fuel containment system fuel handling equipment and instrumentation using a suitable quantity of the fuel after the completion of all the construction work. ~~However, for fuel tanks which do not require either cool-down operations or the fuel pressure/temperature controls specified in **Ch 6, 901. 1** of the Rules, omission of this test may be accepted if substitution is made by the operating test with the substituting medium to verify the performance of equipments specified in item 5 and 6 of **Table 16.1**, except for the case where the tank is of the first fuel tank manufactured by the manufacturer of fuel tanks.~~ ~~(B) Fuel full loading test~~ ~~Where deemed necessary by the Society, tests are to be conducted after completion of all the construction work to verify that the fuel containment installations, fuel handling equipment and instrumentation satisfy the design conditions under the fully loaded condition of fuel.~~	# CHAPTER 16 MANUFACTURE, WORKMANSHIP AND TESTING ## Section 5 Testing *(2019)* **501. Testing and Inspections during Construction** **1. ~ 2. 〈omitted〉** **3. Gas-trial 【See Rules】** (1) In accordance with the requirements in **501. 6** and **702. 5** of the Rules, the tests specified in **Table 16.1** are to be conducted in the presence of the Surveyor to verify the performance using a sufficient quantity of the fuel to carry out all the tests after the completion of all construction work. *(2025)*	

Present	Amendment	Note
(2) The kinds of real liquid fuel and gas used in the gas-trial ~~and fuel full loading test specified in the preceding (1)~~ are to be such that reproduction of the most severe conditions of those design conditions of the fuel containment system, the transfer installations, the reliquefaction system, etc. In addition, the verification relative to design temperatures is to be made by reproducing the condition that the fuel on the basis of which design temperature has been determined is cooled down as close to the design temperature as practicable. ~~(3) The quantities of the real fuel and vapour used in the gas-trial and fuel full loading test referred to in the preceding (1) are to be sufficient to conducting the tests specified in (1).~~ ~~(4) The fuel full loading test to capacity specified in the preceding (1) (B) may be conducted simultaneously with the gas-trial indicated in the preceding (1) (A).~~	(2) The kinds of real liquid fuel and gas used in the gas-trial are to be such that reproduction of the most severe conditions of those design conditions of the fuel containment system, the transfer installations, the reliquefaction system, etc. In addition, the verification relative to design temperatures is to be made by reproducing the condition that the fuel on the basis of which design temperature has been determined is cooled down as close to the design temperature as practicable. *(2025)*	
4. Cold spot inspection 【See Rules】 (1) The cold spot inspection of fuel tanks specified in **501. 7** of the Rules is to be carried out during the fuel full loading test to capacity specified in **3** ~~(1)~~ for the membrane tank, and when necessary, independent tank. *(2024)*	**4. Cold spot inspection 【See Rules】** (1) The cold spot inspection of fuel tanks specified in **501. 7** of the Rules is to be carried out during the gas-trial to capacity specified in **3** for the membrane tank, and when necessary, independent tank. *(2025)*	

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No : 2025 - 10 - E
Date : 04 Aug. 2025

To : All Surveyors and whom it may concern

Subject	9.209 Notice for Establishment to the KR Technical Rules
Application	1 September 2025

1. Please be informed that the amendments have been made to reflect Requests for Establishment/Revision of Classification Technical Rules, and you are kindly requested to apply the amendments on the relevant works according to effective date.

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

Classification Technical Rules	Effective Date	Main Amendments
Guidance for Photovoltaic Systems Onboard Ships	The contract date for ship construction on or application date for survey on or after 01.09.2025	-Establishment of type approval requirements for photovoltaic systems -Introduction of a new class notation for ships equipped with photovoltaic systems

Attachment: Establishment for the Classification Technical Rules (K/E) --- each 1 copy.

(The End)

2025

Guidance for Photovoltaic Systems Onboard Ships

GC-45-E

KR

APPLICATION OF "GUIDANCE FOR PHOTOVOLTAIC SYSTEMS ONBOARD SHIPS"

1. Unless expressly specified otherwise, the requirements in the Guidance apply to photovoltaic systems onboard ships for which contracts for construction are signed or for which the application for Classification Survey is submitted to the Society on or after 1 September 2025.

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CHAPTER 1 GENERAL

Section 1 General

101. Background

1. As part of efforts to combat climate change and achieve carbon neutrality, the installation of photovoltaic modules on ships has been steadily increasing.
2. Photovoltaic cells generate electricity through photoelectric conversion without emitting exhaust gases. These systems can operate in both grid-connected configurations and stand-alone systems onboard ships.
3. Photovoltaic modules are generally installed on exposed decks with high solar irradiance conditions. Standards are required to support their reliable application as onboard power sources.

102. Purpose

1. This guidance outlines installation methods to ensure the safety and reliability of photovoltaic systems installed onboard ships.
2. It also provides type approval criteria for photovoltaic systems and their components to validate their intended functionality.

103. Application

1. This guidance applies to photovoltaic systems with a rated capacity of 2 kW or more when installed on ships.
2. It is applicable to non-concentrating photovoltaic modules and does not apply to concentrating photovoltaic modules.

104. Definitions

Unless otherwise defined in this Guidance, terminology shall follow the definitions provided in the **Rules for the Classification of Steel Ships**.

1. **Photovoltaic power:** The direct conversion of sunlight directly into electrical energy via the photovoltaic effect.
2. **Photovoltaic cell:** A semiconductor element used in photovoltaic generation.
3. **Photovoltaic module:** A structured assembly of photovoltaic cells interconnected in series and/or parallel, designed to withstand long-term exposure to environmental conditions and mechanical stress.
4. **Photovoltaic string:** An electrical assembly composed of photovoltaic modules connected in series.
5. **Photovoltaic array:** A mechanical and electrical assembly comprising multiple photovoltaic modules or strings, including structures supports, that converts solar energy into DC electricity and supplies it.
6. **Photovoltaic system:** An assembly of components that converts solar energy into electricity and supplie-selectrical power.
7. **Support structure:** In photovoltaic equipment, a support structure (also referred to as “racking”) is a structural componentt used to physically support one or more modules and to position them in a fixed or sun-tracking orientation.
8. **Junction box:** An enclosure where circuits are electrically connected and that includes protective devices, designed to be sealed or otherwise protected from environmental exposure.
9. **Blocking diode:** A diode connected in series with a module or array to prevent reverse current flow.
10. **Bypass diode:** A diode connected across one or more modules to allow current to bypass shaded or faulty cells, thereby preventing hot spot damage caused by reverse voltage bias.

11. **Energy storage system:** A system composed of an energy storage device, power conversion equipment (if necessary), control units, and auxiliary components. It supplies or absorbs electrical energy at the necessary voltage and power levels, can respond to variations in load power.

12. **Hot spot:** A localized area of intense heating within a photovoltaic module, occuring when the operating current exceeds the short-circuit current of a shaded or defective cell (or group of cells,) forcing them into reverse bias. This condition causes the affected cells to dissipate energy as heat, potentially leading to overheating. The resulting voltage stress or damage may create a localized shunt path, allowing a significant portion of the module current to flow through it.

13. **Short-circuit current:** The current produced by a photovoltaic cell or module when its terminals are short-circuited, measured under specified irradiance and temperature conditions.

105. Class notations

1. Ships that comply with the requirements specified in this Guidance will be assigned the additional installations notation **SolarPV**.

106. Equivalency

1. The equivalence of alternative and novel features which deviate from or are not directly applicable to the Guidance is to be in accordance with **Pt 1, Ch 1, 105.** of **Rules for the Classification of Steel Ships.**

Section 2 Drawings and Data for Approval and Onboard Retention

201. General

1. In addition to the drawings and data required in accordance with **Pt 6, Ch 1** of the **Rules for the Classification of Steel Ships**, the drawings and data specified in **202.** shall be submitted to the Society for approval, as applicable.

202. Drawings and data for approval

1. Drawings and data to be submitted by the shipyard

(1) Wiring diagram of power system
(2) Wiring diagram of control system
(3) General arrangement of photovoltaic systems
(4) Operation manual
  (A) Description of the Power Mangement System (PMS) for the photovoltaic systems, including its location and arrangement plan, as applicable
(5) Control strategy for interconnection with other generating sources, as applicable
(6) Drawings and data related to computer-based systems in accordance with **Pt 6, Ch 2, Sec 4** of the **Rules for the Classification of Steel Ships**, as applicable
(7) Drawings and data related to computer-based systems, in accordance with **Pt 6, Ch 2, Sec 4** of the **Rules for the Classification of Steel Ships**, as applicable
(8) Short circuit calculation
  (A) Maximum calculated short-circuit current values at the main switchboards and downstream distribution boards
  (B) Rated breaking and making capacities of protective devices
(9) Wiring diagram of the fire detection and alarm system, if independent from vessel's marine systems
(10) List of alarms and shutdowns as required by the manufacturer
(11) List of all photovoltaic system installed in the hazardous areas, as applicable
(12) Structural load analysis report and design loads applied in the structural design of the support structure
(13) Detailed drawings of the foundation and support structures for the photovoltaic system
(14) Nondestructive testing (NDT) records for critical welds of steel support structures, where applicable
(15) Procedure for temporary removal of photovoltaic array(s), as applicable
(16) Test procedure and reporting after installation
(17) Control consoles and/or control panels for photovoltaicc systems
(18) Documentation of the photovoltaic system in accordance with clause 4 of IEC 62446-1

203. Drawings and data to be retained onboard

1. Procedure for temporary removal of photovoltaic array(s), as applicable

2. Maintenance manual

3. Photovoltaic system documentation in accordance with clause 4 of IEC 62446-1 and clause 4 of IEC 62446-2, shall be retained onboard and include the following:

(1) Performance benchmark data
(2) Records, including test results ⚓

CHAPTER 2 TESTS FOR PHOTOVOLTAIC SYSTEMS

Section 1 General

101. General

1. Manufacturing, testing, inspection, and associated data shall comply with the specifications and recognized standards required by this Guidance.

2. For aspects of manufacturing, testing, and inspection of photovoltaic systems not specified in this section, the applicable requirements of **Pt 6,** the **Rules for the Classification of Steel Ships**, shall apply.

Section 2 Type Approval for Photovoltaic Systems

201. Type approval for photovoltaic systems

1. The photovoltaic system and its components shall, in principle, be type-approved in accordance with the criteria specified in **Table 1** and the procedure for type approval shall follow the **Guidance for Approval of Manufacturing Process and Type Approval, etc**. However, alternative test methods may be applied if deemed equivalent by the Society

2. The type approval certificate shall be submitted to the Society and retained onboard for verification by Surveyors.

Table 1 Type approval criteria for photovoltaic systems

No.	Components	Test standards
1	Photovoltaic Modules	IEC 61215 series IEC 61730 series IEC 61701(1)
2	Bypass Diodes and Blocking Diodes (if applicable)	IEC 61701(1)
3	Power Converters	IEC 62109 series(1)(2)
4	Junction Boxes	IEC 62790(1)
5	All Components(4)	IEC 60068-2-6 Test kb(3)

(Notes)
(1) Salt mist test shall be carried out in accordance with IEC 61701 or Test Kb of IEC 60068-2-52.
(2) IEC 62109-1 provides general testing requirements for power converters used in the photovoltaic system. IEC 62109-2 and IEC 62109-3 are to be referenced for alternative or additional testing requirements applicable to the power converters technology used in the photovoltaic system. In addition, when power converters are connected to main source of electrical power of 50 kVA or more, they shall be type-approved in accordance with **Ch. 3**, **Sec. 3** of the **Guidance for Approval of Manufacturing Process and Type Approval, etc**.
(3) All components of the photovoltaic system shall be tested in accordance with IEC 60068-2-6 Test Fc (Vibration Test). The acceptance criteria shall follow Item 8 of **Table 3.23.1** in **Ch.3, Sec.23** of the **Guidance for Type Approval of Manufacturing Process and Type Approval, etc**.
(4) It is considered as module-integrated equipment as defined in IEC 62109-3:2020 (see IEC62109-3:2020, clause 1)

Section 3 Commissioning Test

301. General

1. The test procedure shall be submitted to the Society for approval.
2. A visual inspection shall be carried out for the components of the photovoltaic system.
3. A ship equipped with a photovoltaic system shall be tested in accordance with **302,** in addition to the standard onboard test requirements. The Society may require additional or modified test items and requirements, if deemed necessary.

302. Tests after installation

1. Commissioning tests for photovoltaic arrays shall follow the procedures specified in IEC 62446-1:2016, 5.3.4 and shall include the following:.
   (1) 6.1: Continuity of protective earthing and equipotential bonding conductors
   (2) 6.2: Polarity test
   (3) 6.3: Test of photovoltaic string junction boxes
   (4) 6.4: Measurement of open-circuit voltage of photovoltaic string
   (5) 6.5: Measurement of current of photovoltaic string
   (6) 6.6: Functional test
   (7) 6.7: Insulation resistance test of the photovoltaic array
2. **Interface verification test**
   (1) Verify the interface between the photovoltaic system and the energy storage system.
   (2) Verify the interface between the energy storage system and the energy management system.
3. **Test of alarms and safety devices**
   (1) Test the operation of alarms and automatic shutdown devices, including overcurrent protection.
4. **Functional verification of associated systems**
   (1) Verify the functionality of systems associated with the photovoltaic system.
5. **Synchronization test**
   (1) Perform a synchronization test when the photovoltaic system is connected to the main power source .
   (2) Verify whether the output of the connected energy storage system remains synchronized with the main source of electrical power, even when the photovoltaic system is generating less than its rated output or is not generating power.
   (3) Verify whether an alternative power source automatically supplies power to the main switchboard when the output of the connected energy storage system decreases. ⚓

CHAPTER 3 SYSTEMS AND EQUIPMENT

Section 1 General

101. General

1. A separate power source shall be provided considering periods of no sunlight when the photovoltaic system is connected to the main power source.
2. The photovoltaic system shall be type-approved or comply with national standards, recognized international standards, or other standards deemed equivalent.
3. All materials used in the photovoltaic system and its support structure shall be designed and approved for use in marine and offshore environments.
4. Electrical equipment not specified in this Chapter shall comply with the applicable requirements of **Pt 6** of the **Rules for the Classification of Steel Ships.**

102. Materials

1. Components and associated materials used in photovoltaic systems shall be flame retardant and moisture resistant.
2. Materials shall be corrosion-resistant or treated with corrosion-resistant coatings appropriate for the installation location and environmental conditions.
3. Conductive materials shall be copper, copper alloys, stainless steel, or other materials that provide equivalent or superior electrical, thermal, and mechanical safety performance.

103. Construction

1. All components shall be safely constructed to withstand deformation, loosening, and other forms of mechanical damage.
2. Parts that may come into contact with personnel, or require regular maintenance and inspection, shall be free from sharp projections or edges.
3. Connections within the photovoltaic system shall be constructed to prevent loosening under environmental operating conditions.
4. Components of the system intended for replacement or disassembly shall be designed to allow for safe and convenient handling.
5. Dual-rated equipment with voltage or frequency conversion functions shall allow the converted voltage and frequency to be readily identified. However, equipment with automatic conversion functionality is exempted.
6. Electrical components and accessories shall be rated for voltages or power levels equal to or exceeding the maximum values expected during service.
7. In general, the design of the photovoltaic system shall optimize the orientation and curvature of photovoltaic modules.

104. Arrangement and location of area

1. The support structure shall be permanently secured to the hull by welding or equivalent means, and the underlying hull structure shall be properly reinforced. However, the photovoltaic array, excluding the support structure, may be removed in accordance with the temporary removal procedure.

105. Protective devices

1. Electrical installations shall be adequately protected against all overcurrent conditions, including

short-circuits.

Section 2 System Design

201. General

1. General

(1) The output voltage and frequency of the photovoltaic system shall remain within the limits specified in **Pt 6, Ch 1, 201. 5.** (3) of the **Rules for the Classification of Steel Ships**.

(2) Harmonic distortion of the photovoltaic system shall comply with **Pt 6, Ch 1, 201. 8** of the **Rules for the Classification of Steel Ships**.

(3) Additional requirements for DC distribution systems shall comply with the **Guidance for DC Distribution Systems**.

2. System design

(1) The photovoltaic system shall be designed in accordance with the requirements and considerations of IEC 62548.

(2) A single failure in the photovoltaic system shall not adversely affect other onboard systems.

(3) The photovoltaic system shall be capable of interrupting abnormal current flow and shall be equipped with effective protective devices.

202. Construction and design

1. Photovoltaic modules and arrays are generally configured as shown in **Figure 1;** however, configurations may vary depending on the manufacturer's design.

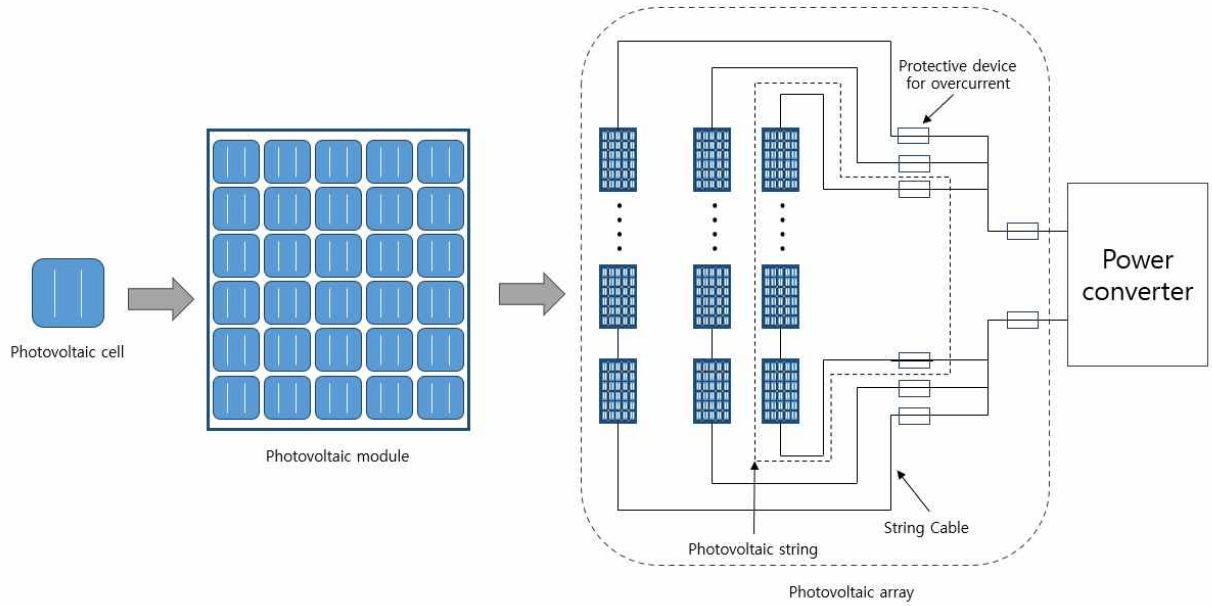

Figure 1 Configuration of photovoltaic modules and arrays

2. Degree of protection

(1) The photovoltaic system shall have a degree of protection suitable for its intended installation location.

(2) Components of the photovoltaic system installed on exposed decks shall have a minimum degree of protection of IP56.

203. Integration with energy storage system

1. In general, the output of photovoltaic arrays fluctuates with environmental conditions and rated power is achieved only under limited conditions. Therefore, the photovoltaic system shall be integrated with an energy storage device to stabilize, store, and distribute the generated power to the ship's power system.

2. Systems used for battery charging shall comply with 5.1.7 and 6.5.6 of IEC 62548:2016.

3. Energy storage systems and power converters shall be designed and constructed in accordance with **Pt 6, Ch 1, Sec 12** or **Sec 13** of the **Rules for the Classification of Steel Ships, as** applicable.

4. Where lithium-ion batteries are used as the energy storage device, the relevant requirements of the **Guidance for Battery Systems on Board Ships** shall be complied with.

204. Control, monitoring and safety system

1. General

(1) The control, monitoring and safety systems of the photovoltaic system shall comply with the basic requirements specified in **Pt 6, Ch 2** of **Rules for the Classification of Steel Ships**.

(2) For control, monitoring, and safety systems not specifically addressed in this section, appropriate arrangements may be accepted as deemed appropriate by the Society.

(3) Adequate fire protection equipment shall be provided in the vicinity of the photovoltaic system.

2. Control and monitoring system

(1) Performance monitoring of the photovoltaic system shall comply with IEC 61724, and control and monitoring parameters shall be measured in accordance with the relevant requirements of the IEC 60904 series.

(2) If a dedicated subsystem is provided for the control and monitoring of the photovoltaic system, it shall interface with the higher-level control and monitoring system.

(3) The following parameters related to the photovoltaic system shall be monitored in real time. The listed items may be added to or modified depending on the type and capacity of photovoltaic system.

(A) Output power

(B) Current and voltage

(C) Solar irradiance on the tilted and horizontal plane

(D) Module temperature

(E) Ambient temperature and wind speed

(F) Energy production

(4) The module temperature in item (3) (D) shall be measured using one or more temperature sensors installed on the rear surface of a representative module within the photovoltaic array.

3. Safety system

(1) A monitoring device shall be provided to detect the normal and abnormal operating conditions of the photovoltaic system.

(2) Protective devices shall be installed to prevent faults in the photovoltaic system from adversely affecting the ship's electrical systems.

(3) An emergency stop device shall be located in an accessible area. The emergency stop circuit shall be independent of the control, monitoring, and alarm systems.

205. Electrical protection system

1. General

(1) Protection requirements for photovoltaic arrays shall comply with clause 6 of IEC 62548:2016 and include the following:

(A) 6.1.2 – Disconnection of photovoltaic arrays from the main AC power output circuit

(B) 6.2 – Protection against electric shock

(C) 6.3 – Protection against thermal effects

(D) 6.4 – Protection against the effects of insulation faults

(E) 6.5 – Protection against overcurrent

(F) 6.6 – Protection against the effects of lightning and overvoltage

2. Disconnection

(1) The operation and maintenance manual for the photovoltaic system shall include procedures for both normal and emergency disconnection, including the electrical isolation of system components.

(2) The photovoltaic system shall comply with 13.2 and 13.3 of IEC 62446-2 regarding safety and isolation procedures.

3. Shading and hot spot prevention

(1) The design and installation of the photovoltaic system shall minimize the risk of partial or full shading and the formation of hot spots. The photovoltaic array shall be cleaned regularly to prevent shading and hot spots caused by salt deposits or foreign materials, in accordance with the system's operation and maintenance procedures.
(2) For further details on systems incorporating bypass or blocking diodes, refer to **306**.

Section 3 Electrical and Associated Installations

301. General

1. The photovoltaic system shall comply with the requirements specified in clause 7 of IEC 62548.
2. All equipment in the photovoltaic system shall be clearly labeled and marked in accordance with clause 10 of IEC 62548.

302. Temperature rating

1. According to IEC 62548:2016, 7.3.7.2, photovoltaic modules frequently operate at temperatures approximately 40°C above ambient. Components in contact with or located near the modules shall be rated accordingly. Insulating materials shall be selected in accordance with **Pt 6, Ch 1** of the **Rules for the Classification of Steel Ships**.
2. The photovoltaic system shall be designed in accordance with **Pt 6, Ch 1, 201. 6** of the **Rules for the Classification of Steel Ships**, considering the ambient temperature conditions on the open decks.
3. In accordance with IEC 62548:2016, 5.1.9, modules and associated components shall be equipped with appropriate ventilation and cooling (or heating) to ensure operation within the rated automatic temperature range and maintain optimal performance.
4. In accordance with IEC 62548:2016, 7.2, the maximum voltage and the voltage correction factors for the photovoltaic array shall be calculated based on the lowest expected operating temperature.

303. Cables

1. Cables used in the photovoltaic system shall be designed and installed in accordance with the following requirements:
   (1) **Pt 6, Ch 1, Sec 5** of the **Rules for the Classification of Steel Ships**
   (2) IEC 62548:2016, 7.3.7

304. Power converters

1. Power conversion equipment for the photovoltaic system shall be designed and installed in accordance with the following requirements:
   (1) **Pt 6, Ch 1, 1201** of the **Rules for the Classification of Steel Ships** (as applicable)
   (2) IEC 62109 series

305. Junction boxes

1. Junction boxes for photovoltaic modules shall be designed and installed in accordance with the following requirements:
   (1) **Pt 6, Ch 1, 511.3** and **511.4** of the **Rules for the Classification of Steel Ships**
   (2) IEC 62790 series

306. Bypass diodes and blocking diodes

1. Bypass diodes may be used in the photovoltaic system to prevent reverse voltage bias and hot spots, and blocking diodes may be used to prevent reverse current.
2. Bypass diodes and blocking diodes shall comply with the following requirements:
   (1) Bypass diodes: IEC 62548:2016, 7.3.2.1 and 7.3.11
   (2) Blocking diodes: IEC 62548:2016, 7.3.12

307. Support structure

1. Support structures or mounting methods (e.g. adhesives, bolts, ties, or other means) for photovoltaic modules shall be designed in accordance with IEC 62548:2016, 5.2, taking into account wind effects, operational modes, and loading conditions.

2. Inspection records for critical welds in support structures constructed of steel shall be included in the non-destructive testing (NDT) drawings.

Section 4 Installation

401. General

1. The photovoltaic system shall comply with the applicable requirements of **Pt 6,** the **Rules for the Classification of Steel Ships** and those specified in this Guidance.
2. The hull structure shall posses adequate strength and rigidity to support the maximum anticipated loads from the photovoltaic system. The deck load imposed by the installed photovoltaic system shall not exceed the deck's rated load-bearing capacity. If the load exceeds the allowable limit, the hull structure shall be assessed in accordance with the **Guidance for Direct Strength Assessment** in **Appendix 3-2** of **Pt 3, the Rules**.
3. The installation location and arrangement of the photovoltaic system shall be designed to minimize the potential for full or partial shading of the array and to reduce potential hazards associated with reflected light, including glare and reflection from the photovoltaic modules.
4. For photovoltaic arrays intended for temporary removal, the support structures or mounting methods shall facilitate safe removal, storage, and reinstallation by crew members. For additional details, refer to section 403.

402. Installation in hazardous area

1. As a general principle, the photovoltaic system shall not be installed in hazardous areas.
2. If installation in a hazardous area is unavoidable, the electrical equipment shall comply with the requirements of **Pt 6**, **Ch 1**, **Sec 9** of the **Rules for the Classification of Steel Ships**.

403. Physical protection of installation

1. Photovoltaic arrays shall be installed in locations protected from physical impacts or damage and shall not interfere with the normal operation of the ship.
2. It is recommended that photovoltaic arrays be designed for temporary removal under conditions where physical damage may occur, such as during extreme weather or cargo handling operations.
3. For photovoltaic arrays designed for temporary removal, a documented procedure for safe electrical and physical disconnection, storage, and reinstallation shall be submitted for review and retained onboard. The procedure submitted for approval shall include verification steps to the satisfaction of the attending Surveyor.

404. Access and crew protection

1. Electrical equipment shall be arranged in locations that are accessible and suitable for inspection or adjustment, and shall comply with IEC 62548:2016, 7.3.3.2.
2. Photovoltaic modules installed in areas subject where personnel may walk over them shall be designed to withstand pedestrian impact. Fall prevention measures, such as anti-slip coating or temporary guardrails, shall be provided.

405. Navigation safety

1. The photovoltaic system shall be designed to eliminate or minimize potential hazards caused by sunlight reflection, including glint and glare from the photovoltaic modulesf.
2. The system shall be installed so that it does not obstruct visibility from the navigation bridge, in accordance with **Pt 9, Ch 5** of the **Rules for the Classification of Steel Ships**. ⚓

Guidance
for Photovoltaic Systems Onboard Ships

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To : All Surveyors and whom it may concern

No : 2025-11-E
Date : 2025.08.28

Subject	9.210 Notice for amendment of KR Technical Rules (Guidance on Strength Assessment of Container ships Considering the Whipping Effect / Pt 1 Classification and Surveys Annex 1-1 Class Notations)
Application	Immediately

1. Please be informed that 2025 KR 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 to the relevant works.

Relevant Rules/Guidance	Application Date	Amendments
Guidance on Strength Assessment of Container ships Considering the Whipping Effect	Immediately (based on the date for construction contract)	- Introduction of a simplified evaluation formula for the contribution of whipping.
Pt 1 Classification and Surveys Annex 1-1 Class Notations	Immediately (based on the date for construction contract)	- Class Notation – Change in Additional Special Feature Notations

2. Furthermore, please be informed that these amendments will be incorporated in 2026 edition of the KR Technical Rules.

(서식번호 : FI-03-03) (20.06.2018)

Amendments of the Rules

(Circular)

Pt 1 Classification and Surveys

Annex 1-1 Class Notations

2025. 8.

Hull Rule Development Team

- Major revisions -

1. Class Notation – Change in Additional Special Feature Notations
   - Change in class notation following the revision of the "Guidance on Strength Assessment of Containerships considering the Whipping Effect".
   - WHIP ⇒ SeaTrust(WHIP) or SeaTrust(WHIP+)

Present	Amendment	Note
(Remarks) [35] : The following Additional Special Feature Notations are to be appended to ships complying with the relevant requirements. The Additional Special Feature Notations are to be located under Service Restriction Notations of Hull after Special Feature Notations regardless whether they are hull items or machinery items. *(2023)*		

Additional Special Feature Notations		Relevant Requirements
SeaTrust (DSA1, DSA2, FSA1, FSA2, FSA3, SPR1, SPR2, HCM) *(2020)*	DSA1, DSA2, FSA1, FSA2, FSA3	to ships comply with the Guidance for the direct structure and fatigue assessment specified in **Pt 3, Annex 3-2** and **3-3**. However, the (CSR) notation includes SeaTrust(DSA1, FSA2[NA]) notations, not additionally assigned. For container ships in accordance with **Pt 14**, ships complying with **Pt 14, Ch 7** and **Ch 9** are assigned the notation SeaTrust(DSA1, FSA2). The notations of FSA1 to FSA3 are assigned including the following notation about evaluated sea area: [NA] : North Atlantic, [WW] : Worldwide, (e.g. SeaTrust(FSA1[NA]), SeaTrust(FSA1[WW])). The notation of [XX years] can be assigned to FSA1 to FSA3 additionally when exceeding the following design fatigue life: to ships comply with **Pt 13** and **Pt 14** : 25 years, to other ships : 20 years, (e.g. SeaTrust(FSA1[WW, 30 years])).
	SPR1, SPR2	to ships comply with the fatigue strength requirements specified in **Guidance for Fatigue Strength Assessment Including Springing.**
	HCM	to ships comply with the Guidance for the hull construction monitoring procedure, **Pt 3, Annex 3-4.** However, for the ship built in accordance with **Common Structural Rules for Bulk Carriers and Oil Tankers(Pt 13)**, Hull Consturction Monitoring notation, SeaTrust(HCM), shall be assigned mandatory.
WHIP *(2017)*		to ships comply with the strength requirements specified in **Guidance on Strength Assessment of Containerships considering the Whipping Effect**
〈omitted〉		〈omitted〉

〈continued〉

〈continued〉

<table>
<tr><th>Present</th><th>Amendment</th><th>Note</th></tr>
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(e.g. SeaTrust(FSA1[NA]), SeaTrust(FSA1[WW])).
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to ships comply with Pt 13 and Pt 14 : 25 years,
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Amendments of the Rules

(Circular)

Guidance on Strength Assessment of Container ships Considering the Whipping Effect

2025. 8.

Hull Rule Development Team

- Major revisions -

1. Introduction of a simplified evaluation formula for the contribution of whipping.
   - Present: The assessment of the whipping contribution is to be carried out using either the design wave method or the design sea state method based on hydro-elastic simulation.
   - Reason for modification: In consideration of the time and effort required for hydro-elastic simulation, a simplified evaluation formula is introduced to reduce the cost of analysis.
   - Amendment: A new simplified method is introduced for application to ships with a length of 350 m or less.

Present	Amendment	Note
CHAPTER 1 GENERAL	**CHAPTER 1 GENERAL**	
Section 1 General	**Section 1 General**	
101. Application	**101. Application**	
1. Purpose of these guidances is to estimate the extreme load considering the whipping effect and to evaluate the structural integrity of the ship. It is applied to the ship which requires consideration of the whipping effect due to slamming load, in accordance with **Pt 14, Ch 5, Sec 2, 2.4.1** of **Rules for the Classification of Steel Ships.** Other ships may be applied in consultation with the Society. *(2022)*	1. Purpose of these guidances is to estimate the extreme load considering the whipping effect and to evaluate the structural integrity of the ship. It is applied to container ships with a breadth greater than 32.26 m in accordance with **Pt 14, Ch 5, Sec 2, 2.4.1** of **Rules for the Classification of Steel Ships.** Other ships may be applied in consultation with the Society. *(2025)*	
2. The whipping phenomenon is a dynamic response induced by an impact load such as slamming on the ship, which can be superimposed on the load response component caused by the motion of the ship to increase the overall response. Therefore, it is necessary to sufficiently study the whipping phenomenon in ships having characteristics such as high speed and bow shape that can cause large slamming load and low natural frequency of the hull girder.	2. The whipping phenomenon is a dynamic response induced by an impact load such as slamming on the ship, which can be superimposed on the load response component caused by the motion of the ship to increase the overall response. Therefore, it is necessary to sufficiently study the whipping phenomenon in ships having characteristics such as high speed and bow shape that can cause large slamming load and low natural frequency of the hull girder.	
3. In order to estimate the extreme load considering the whipping phenomenon, it is required to analyze hydro-elastic simulation and statistical analysis of the ship, and the program used for analysis should be approved by the Society.	3. In order to estimate the extreme load considering the whipping phenomenon, it is required to analyze hydro-elastic simulation and statistical analysis of the ship, and the program used for analysis should be approved by the Society.	
4. When considering the whipping effect by methods other than those provided in these guidances, sufficient data on the applied theory, program and verification should be provided and approved by the Society.	4. When considering the whipping effect by methods other than those provided in these guidances, sufficient data on the applied theory, program and verification should be provided and approved by the Society.	
〈newly added〉	5. For container ships with a length not exceeding 350 m, the whipping effect may be considered in accordance with **Ch 4, Sec 2**. *(2025)*	
102. Class Notations	**102. Class Notations *(2025)***	
Upon applicant's request, the Society may assign **"WHIP"** notations once review of compliance with these regulations is completed and satisfied to the Society.	Upon applicant's request, the Society may assign following notations once review of compliance with this guidance is completed and satisfied to the Society.	

Present	Amendment	Note
	– SeaTrust(WHIP) : Simplified method (see **Ch 4, Sec 2**) – SeaTrust(WHIP+) : Hydro-elastic simulation method (see **Ch 4, Sec 3** or **Sec 4**) The WHIP class notation assigned prior to July 2025 is considered equivalent to the SeaTrust(WHIP+) notation.	
CHAPTER 2 SELECTION OF DESIGN WAVE AND DOMINANT SEA STATE 〈omitted〉	**CHAPTER 2 SELECTION OF DESIGN WAVE AND DOMINANT SEA STATE** 〈same as the current Rules〉	
CHAPTER 3 HYDRO-ELASTIC SIMULATION 〈omitted〉	**CHAPTER 3 HYDRO-ELASTIC SIMULATION** 〈same as the current Rules〉	
CHAPTER 4 EVALUATION OF HULL GIRDER STRENGTH CONSIDERING THE WHIPPING EFFECT	**CHAPTER 4 EVALUATION OF HULL GIRDER STRENGTH CONSIDERING THE WHIPPING EFFECT**	
Section 1 General	**Section 1 General**	
101. General	**101. General**	
1. This chapter deals with the evaluation of the ultimate strength of the hull considering the whipping effect on the vertical wave bending moment obtained by the design wave method and the design sea state method.	**1.** This chapter deals with the evaluation of the ultimate strength of the hull considering the whipping effect on the vertical wave bending moment obtained by the simplified method, the design wave method, and the design sea state method. *(2025)*	
2. In cases where methods other than those given in this chapter are to be applied, sufficient data on theory and program verification shall be submitted to the Society for approval.	**2.** In cases where methods other than those given in this chapter are to be applied, sufficient data on theory and program verification shall be submitted to the Society for approval.	
〈newly added〉	**3.** The simplified method may be applied to container ships with a length of 350 m or less. *(2025)*	

Present	Amendment	Note
3. The design wave method has the advantages of short computation time and simple procedure but the results could be rather conservative as the slamming load could be overestimated since the actual irregular sea state is calculated as a substitute of a single regular wave. 4. The design sea state method simulates the actual sea state and the irregular wave so that the slamming load can be approximated, therefore, the reliability of the result is high. However, compared with the design wave method, relatively longer analysis time is required, and it is difficult to ensure the reproducibility of the time series load response data. Therefore, statistical analysis based on multiple analysis data is required. 〈continued〉	4. The design wave method has the advantages of short computation time and simple procedure but the results could be rather conservative as the slamming load could be overestimated since the actual irregular sea state is calculated as a substitute of a single regular wave. 5. The design sea state method simulates the actual sea state and the irregular wave so that the slamming load can be approximated, therefore, the reliability of the result is high. However, compared with the design wave method, relatively longer analysis time is required, and it is difficult to ensure the reproducibility of the time series load response data. Therefore, statistical analysis based on multiple analysis data is required. 〈continued〉	

Present	Amendment	Note
〈newly added〉	**Section 2 Estimation of Whipping Contribution by Simplified Method *(2025)***	

201. Application

This method is to be used when an approximate estimation of the whipping contribution is intended based on the principal particulars of the ship.

202. Estimation of extreme loads by the simplified method

The vertical wave bending moment amidships including the effect of whipping, M_{Whip}, is given as follows:

$$M_{Whip} = \max\left(M_{Rigid} + M_{Vib}, 1.28 \cdot M_{Rigid}\right)$$

M_{Rigid} : Vertical wave bending moment without whipping effect.
In this case, the value M_W as specified in **Pt 14, Ch 4, Sec 4, 3.2.1** of the **Rules for the Classification of Steel Ships** is to be used.

M_{Vib} : The vertical bending moment due to whipping, determined by the following equation:

$$M_{Vib} = \sqrt{\frac{I_{y-n50}}{L}} \cdot \exp\left\{0.14 \cdot \ln(J_{Bow}) + 0.16 \cdot \ln(J_{Stern}) + 10.6\right\}$$

I_{y-n50} : Net vertical moment of inertia of hull girder in accordance with **Pt 14, Ch 5, Sec 1, 1.5.1** of the **Rules for the Classification of Steel Ships**.

L : Rule length in accordance with **Pt 14, Ch 1, Sec 4, 3.1.1** of the **Rules for the Classification of Steel Ships**.

J_{Bow} : Impulse due to bow slamming (kN·s), determined by the following equation:

$$J_{Bow} = 0.47 \cdot f_{Bow} \cdot (0.2L) \cdot B \cdot \left(V_{E,\,Bow} - 3.5\right)^2$$

f_{Bow} : Bow flare shape coefficient in accordance with **Pt 14, Ch 4, Sec 4, 3.2.1** of the **Rules for the Classification of Steel Ships**.

B : Moulded breadth in accordance with **Pt 14, Ch 1, Sec 4, 3.1.3** of the **Rules for the Classification of Steel Ships**.

$V_{E,Bow}$: Entry velocity for bow slamming (m/s), given as follows:

$$V_{E,Bow} = -0.013 \cdot L + 14.3$$

J_{Stern} : Impulse due to bow slamming (kN·s), determined by the following equation:

$$J_{Stern} = 1.2 \cdot f_{Stern} \cdot (0.1L) \cdot B \cdot (V_{E,Stern} - 3.5)^2$$

f_{Stern} : Transom shape coefficient, given as follows:

$$f_{Stern} = \sqrt{\frac{B}{D_{Tr}}}$$

D_{Tr} : Transom depth used for impulse estimation, defined as the vertical distance (m) measured from h_1 to h_2, as illustrated in Fig. 4.1.

The height h_1 (m) is defined as the lowest height of the outer shell plate on the centerline of the transom cross-section.

The height h_2 (m) is defined as the lesser of the stern mooring deck height and the lowest height of the vertical side shell plate in the transom cross-section.

$V_{E,Stern}$: Entry velocity for stern slamming (m/s), given as follows:

$$V_{E,Stern} = -0.005 \cdot L + 9.25$$

Transom section

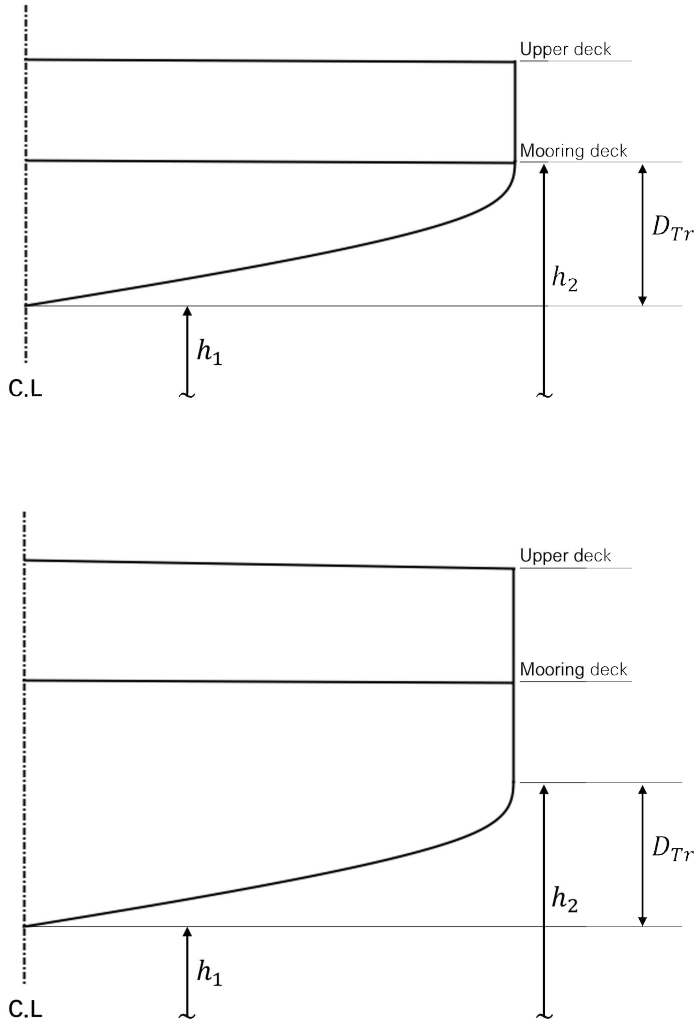

Fig 4.1 Transom depth used for impulse estimation

Present	Amendment	Note
Section 2 Estimation of whipping contribution by design wave method	**Section 3 Estimation of whipping contribution by design wave method**	
201. 〈omitted〉	**301. 〈same as the current Rules〉**	
202. 〈omitted〉	**302. 〈same as the current Rules〉**	
Section 3 Estimation of whipping contribution by design sea state method	**Section 4 Estimation of whipping contribution by design sea state method**	
301. 〈omitted〉	**401. 〈same as the current Rules〉**	
302. 〈omitted〉	**402. 〈same as the current Rules〉**	
303. 〈omitted〉	**403. 〈same as the current Rules〉**	
304. 〈omitted〉	**404. 〈same as the current Rules〉**	
Section 4 Estimation of whipping contribution of vertical bending moment and ultimate hull girder strength	**Section 5 Estimation of whipping contribution of vertical bending moment and ultimate hull girder strength**	
401. Calculation of whipping contribution of vertical bending moment *(2022)* The whipping contributions defined in Sec 2 and 3 can be rewritten as: 〈omitted〉	**501. Calculation of whipping contribution of vertical bending moment** *(2025)* The whipping contributions defined in Sec 2, 3 and 4 can be rewritten as: 〈same as the current Rules〉	
402. 〈omitted〉 ⚓	**502. 〈same as the current Rules〉** ⚓	

CIRCULAR

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Person in charge: SONG Jongchun

To : All Surveyors and whom it may concern

No : 2025-12-E
Date : 2025. 9 19

Subject	**9.211 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 2025 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/Guidance for the Classification of Steel Ships, Pt 1 (Classification and Surveys)	On or after 1st Jan. 2026 (Date of which the application for survey is submitted)	**1) IACS PR42(Rev.1 Nov. 2024) reflected etc.** : The term related to QSCS amended for clarity. **2) IACS PR1A(Rev.10 Oct. 2024) reflected** : Regarding TOC(Transfer of Class), additional plans/documents required for Passenger Ships have been newly added.
Rules/Guidance for the Classification of Steel Ships, Pt 8 (Fire protection and Fire Extinction)	On or after 1st Jan. 2026 (Date of which the application for survey is submitted)	**1) Res.MSC.550(108) reflected etc.** : Introduction of New Fire Safety Requirements for Vehicles, Special Category Spaces, Open/Closed Ro-Ro Spaces, and Weather Decks Intended for the Carriage of Motor Vehicles.
Rules for the Classification of Ships Using LFF	On or after 1st Jan. 2026 (Date of which contract of construction is assigned)	**1) Res.MSC.550(108) reflected etc.** : Revision of wording for clarification of requirements, etc.

Guidance for Approval of Service Suppliers	On or after 1st Jan. 2026 (Date of which the application for survey is submitted)	**1) IACS UR Z17(Rev.19 Oct. & Rev.20 Nov 2024) reflected** : The term related to QSCS amended for clarity etc. **2) Details related to "Practical Demonstration" deleted** **:** In case of the deleted sentences, they are not included in IACS UR Z17.

2. Furthermore, please be informed that these amendments will be included in 2026 edition on KR Classification Technical Rules which will be published in the first half of 2026.

Attachments:

1. Amendments to the R/G for the Classification of Steel Ships, Pt 1 ------ 1 copy.
2. Amendments to the R/G for the Classification of Steel Ships, Pt8 ------ 1 copy.
3. Amendments to the Rules for the Classification of LFFS ------ 1 copy.
4. Amendments to the Guidance for Approval of Service Suppliers ------ 1 copy.

(The End)

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Aug. 2025

- Main Amendments -

(1) Effective date : 1 Jan 2026 (Date of which the application for survey is submitted)

◉ IACS Procedures Volume 3, related to QSCS

- Reflected IACS PR 42(Rev.1 Nov 2024) etc.

(1) Effective date : 1 Jan. 2026

(Date of which the application for survey is submitted)

- IACS Procedures Volume 3, related to QSCS

Present	Amendments
# CHAPTER 1 CLASSIFICATION ## Section 3 Classification Survey during Construction *(2022)* 301. ~ 309. 〈omitted〉 310. Acceptance of design approved by other Societies *(2023)* 1. For a vessel with the design as previously approved by **any Society which** is subject to verification of compliance with QSCS(Quality System Certification Scheme) **of IACS**, the Society is to be applied for the separate procedures as specified by the Society or the IACS Procedural Requirements(PR) 42 (Procedure for Assigning Class for a New Building project when the design is already approved by an Initial Society (Based on the Classification Rules and a Memorandum of Understanding (MoU) Between a Class Society, a Shipyard and, if applicable, a Ship Owner). *(2025)* 311. Acceptance of materials and equipment approved and/or inspected by other Societies *(2025)* 1. For materials and equipment previously approved and/or certified by any Society which is subject to verification of compliance with QSCS(Quality System Certification Scheme) of IACS in accordance with PR 1B or 42, the Society is to record written documentary evidence of complying with the Society's own Rules or with other requirements confirmed acceptable in accordance with the Society's own Rules. (The above amendments have been already issued as Circular (No.: 2025-01-E, 13th Jan. 2025)) 〈hereinafter, omitted〉	# CHAPTER 1 CLASSIFICATION ## Section 3 Classification Survey during Construction *(2022)* 301. ~ 309. 〈same as the current Rules〉 310. Acceptance of design approved by other Societies *(2023)* 1. For a vessel with the design as previously approved by **any Society which** is subject to verification of compliance with QSCS(Quality System Certification Scheme~~-hereinafter called the QSCS~~) in accordance with Section 5 of Annex 1 to the QSCS of IACS, the Society is to be applied for the separate procedures as specified by the Society or the IACS Procedural Requirements(PR) 42 (Procedure for Assigning Class for a New Building project when the design is already approved by an Initial Society (Based on the Classification Rules and a Memorandum of Understanding (MoU) Between a Class Society, a Shipyard and, if applicable, a Ship Owner). *(2026)* 311. Acceptance of materials and equipment approved and/or inspected by other Societies *(2025)* 1. For materials and equipment previously approved and/or inspected by **any Society which** is subject to verification of compliance with the QSCS~~(Quality System Certification Scheme)~~ in accordance with Section 5 of Annex 1 to the QSCS of IACS in accordance with PR 1B or 42, the Society is to record written documentary evidence of complying with the Society's own Rules or with other requirements confirmed acceptable in accordance with the Society's own Rules. *(2026)* 〈hereinafter, same as the current Rules〉

Present	Amendments
Section 4 Classification Survey after Construction	**Section 4 Classification Survey after Construction**
401. ~ 402. 〈omitted〉	**401. ~ 402. 〈same as the current Rules〉**
403. Classification Survey of ships classed by other Societies or TOC(Transfer of Classification) ***(2017)*** **【See Guidance】** When a ship holding class with **any Society which** is subject to verification of compliance with QSCS(Quality System Certification Scheme) **of IACS** is intended for classification, plans and documents to be submitted and survey items, etc. are to be in accordance with the Guidance relating to the Rules. In case of Passenger Ships and Fishing Vessels, the procedures pertaining to "TOC" shall be applied. But survey items are to be in accordance with **401.** Classification Survey after Construction.	**403. Classification Survey of ships classed by other Societies or TOC(Transfer of Classification)** ***(2017)*** **【See Guidance】** When a ship holding class with **any Society which** is subject to verification of compliance with the QSCS~~(Quality System Certification Scheme)~~ in accordance with Section 5 of Annex 1 to the QSCS of IACS is intended for classification, plans and documents to be submitted and survey items, etc. are to be in accordance with the Guidance relating to the Rules. *(2026)* In case of Passenger Ships and Fishing Vessels, the procedures pertaining to "TOC" shall be applied. But survey items are to be in accordance with **401.** Classification Survey after Construction.
404. Stability ***(2023)*** **〈omitted〉** Note : 1) **〈omitted〉** 2) The term "the sufficient information based on previous stability experiments" means the information on stability experiments approved by **any Society which** is subject to verification of compliance with QSCS(Quality System Certification Scheme) **of IACS** or the relevant flag state(including recognized organizations authorized by the relevant flag state to act on its behalf) 〈hereinafter, omitted〉	**404. Stability** ***(2023)*** **〈same as the current Rules〉** Note : 1) **〈same as the current Rules〉** 2) The term "the sufficient information based on previous stability experiments" means the information on stability experiments approved by **any Society which** is subject to verification of compliance with the QSCS~~(Quality System Certification Scheme)~~ in accordance with Section 5 of Annex 1 to the QSCS of IACS or the relevant flag state(including recognized organizations authorized by the relevant flag state to act on its behalf) *(2026)* 〈hereinafter, same as the current Rules〉

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

(Part 1 Classification and Surveys)

Aug. 2025

- Main Amendments -

(1) Effective date : 1 Jan. 2026 (Date of which the application for survey is submitted)

◉ IACS Procedures Volume 3, related to QSCS

- Reflecting IACS PR 42(Rev.1 Nov 2024) etc.

◉ Reflecting IACS PR 1A(Rev.10 Oct 2024).

- Regarding TOC(Transfer of Class), additional plans/documents required for passenger ships have been newly added.

(1) Effective date : 1 Jan. 2026

(Date of which application for survey is submitted)

Present	Amendments
# CHAPTER 1 CLASSIFICATION ## Section 4 Classification Survey after Construction **401. Classification Survey after Construction** 【See Rule】 *(2023)* **1. ~ 2.** 〈omitted〉 **3.** In the case of Passenger Ships and Fishing Vessels that are TOC, the survey items of para. 1. and 2. of the Rules and above para 1. and 2. are to be applied. However, the following survey may be applied to passenger ships of less than 5 years of age that are to be transferred of classification without alteration or modification from **any Society which** is subject to verification of compliance with QSCS(Quality System Certification Scheme) **of IACS**. *(2023)* (1) ~ (4) 〈omitted〉 **4.** Where the vessel has, during any portion of the five years prior to the request for classification being received, been previously classed by the Society or **a Society** subject to verification of compliance with QSCS and has not been subject to alteration or modification since class was withdrawn, the survey requirements may be specially considered but are not to be less than the following: *(2020)* (1) 〈omitted〉 (2) for vessels previously classed with **a Society** subject to verification of compliance with QSCS - surveys the same as those required by **403.** of the Guidance.	# CHAPTER 1 CLASSIFICATION ## Section 4 Classification Survey after Construction **401. Classification Survey after Construction** 【See Rule】 *(2023)* **1. ~ 2.** 〈same as the current Guidance〉 **3.** In the case of Passenger Ships and Fishing Vessels that are TOC, the survey items of para. 1. and 2. of the Rules and above para 1. and 2. are to be applied. However, the following survey may be applied to passenger ships of less than 5 years of age that are to be transferred of classification without alteration or modification from **any Society which** is subject to verification of compliance with the QSCS~~(Quality System Certification Scheme)~~ in accordance with Section 5 of Annex 1 to the QSCS **of IACS**. *(2026)* (1) ~ (4) 〈same as the current Guidance〉 **4.** Where the vessel has, during any portion of the five years prior to the request for classification being received, been previously classed by the Society or **a Society** subject to verification of compliance with the QSCS in accordance with Section 5 of Annex 1 to the QSCS and has not been subject to alteration or modification since class was withdrawn, the survey requirements may be specially considered but are not to be less than the following: *(2026)* (1) 〈same as the current Guidance〉 (2) for vessels previously classed with **a Society** subject to verification of compliance with the QSCS in accordance with Section 5 of Annex 1 to the QSCS - surveys the same as those required by **403.** of the Guidance. *(2026)*

Present	Amendments
403. Classification Survey of ships classed by other classes or TOC(Transfer of Classification) ***(2020)*** **【See Rule】** When a ship holding class with **any Society which** is subject to verification of compliance with QSCS(Quality System Certification Scheme) **of IACS** is intended for classification, plans and documents to be submitted and items to be surveyed etc., are listed as below. Where deemed necessary by the Society, the list of plans and documents other than those specified below are to be notified to the Owner and there are to be submitted for reference to the Society. **1. Plan and document** (1) ~ (3) 〈omitted〉 (4) For oil tankers, pumping arrangement at the forward and after ends and drainage of cofferdams and pump rooms are to be submitted. 〈newly added〉 (5) ~ (8) 〈omitted〉 〈hereinafter, omitted〉	**403. Classification Survey of ships classed by other classes or TOC(Transfer of Classification)** ***(2020)*** **【See Rule】** When a ship holding class with **any Society which** is subject to verification of compliance with the QSCS~~(Quality System Certification Scheme)~~ in accordance with Section 5 of Annex 1 to the QSCS **of IACS** is intended for classification, plans and documents to be submitted and items to be surveyed etc., are listed as below. Where deemed necessary by the Society, the list of plans and documents other than those specified below are to be notified to the Owner and there are to be submitted for reference to the Society. *(2026)* **1. Plan and document** (1) ~ (3) 〈same as the current Guidance〉 (4) For oil tankers, pumping arrangement at the forward and after ends and drainage of cofferdams and pump rooms are to be submitted. (5) Additional plans/documents required for passenger ships *(2026)* (A) Fire control drawings (B) Drawings of structural fire protection (including passive fire protection) (C) HVAC line diagrams and ducting arrangements (D) In case of ro-ro passenger ships, plans and documents related to fixed and movable ramps. (6) ~~(5)~~ ~ (9) ~~(8)~~ 〈same as the current Guidance〉 〈hereinafter, same as the current Guidance〉

Amendments of the Rules for the Classification of Steel Ships

(Circular)

Pt. 8

2025. 09.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments

(1) Resolution MSC 550(108) Reflecting the amendments to SOLAS II-2 (effective on and after 1 January 2026)

: Ch 7, 501. Protection of cargo space boundaries. : Deleting fire protection requirements for special category spaces and Ro-Ro spaces for passenger ships carrying 36 or more persons due to the duplication of requirement in Ch 13.

: Ch 13, Sec 4. Structural fire protection of vehicles, special category, open/closed Ro-Ro spaces and weather decks intended for carriage of vehicles are revised and arrangement of openings for those spaces are newly added.

2. Main Contents: Refer to the amendments

Present	Amendment
# CHAPTER 7 CONTAINMENT OF FIRE	# CHAPTER 7 CONTAINMENT OF FIRE
## Section 1 ~ 4 〈omitted〉	## Section 1 ~ 4 〈same as the present〉
## Section 5 Protection of Cargo Space Boundaries	## Section 5 Protection of Cargo Space Boundaries
501. Protection of cargo space boundaries	501. Protection of cargo space boundaries
~~1. In passenger ships carrying **more than 36 passengers**, the boundary bulkheads and decks of special category and ro-ro spaces shall be insulated to "A-60" class standard. However, where a category ⑤, ⑨, ⑩ space, as defined in **102. 3** (2), is on one side of the division the standard may be reduced to "A-0". Where fuel oil tanks are below a special category space, the integrity of the deck between such spaces may be reduced to "A-0" standard.~~	
2. In passenger ships, indicators shall be provided on the navigating bridge which shall indicate when any fire door leading to or from the special category spaces is closed.	1. In passenger ships, indicators shall be provided on the navigating bridge which shall indicate when any fire door leading to or from the special category spaces is closed.
3. In tankers, for the protection of cargo tanks carrying crude oil and petroleum products having a flashpoint not exceeding 60℃, materials readily rendered ineffective by heat shall not be used for valves, fittings, tank opening covers, cargo vent piping, and cargo piping so as to prevent the spread of fire to the cargo. **【See Guidance】**	2. In tankers, for the protection of cargo tanks carrying crude oil and petroleum products having a flashpoint not exceeding 60℃, materials readily rendered ineffective by heat shall not be used for valves, fittings, tank opening covers, cargo vent piping, and cargo piping so as to prevent the spread of fire to the cargo. **【See Guidance】**
## Section 6 〈omitted〉	## Section 6 〈same as the present〉

Present	Amendment
# CHAPTER 13 PROTECTION OF VEHICLE, SPECIAL CATEGORY AND RO-RO SPACES	# CHAPTER 13 PROTECTION OF VEHICLE, SPECIAL CATEGORY, OPEN AND CLOSED RO-RO SPACES, AND WEATHER DECKS INTENDED FOR THE CARRIAGE OF VEHICLES (2026)
## Section 1 〈omitted〉	## Section 1 〈omitted〉
## Section 2 Precaution against ignition of flammable vapours in closed vehicle spaces closed ro-ro spaces and special category spaces	## Section 2 Precaution against ignition of flammable vapours in closed vehicle spaces closed ro-ro spaces and special category spaces
201. Ventilation systems	201. Ventilation systems
1. ~ 4. 〈omitted〉	1. ~ 4. 〈same as the present〉
5. Permanent openings 【See Guidance】	5. Permanent openings 【See Guidance】
Permanent openings in the side plating, the ends or deckhead of the space shall be so situated that a fire in the cargo space does not endanger stowage areas and embarkation stations for survival craft and accommodation spaces, service spaces and control stations in superstructures and deckhouses above the cargo spaces.	In cargo ships, permanent openings in the side plating, the ends or deckhead of the space shall be so situated that a fire in the cargo space does not endanger stowage areas and embarkation stations for survival craft and accommodation spaces, service spaces and control stations in superstructures and deckhouses above the cargo spaces. *(2026)*
202. ~ 205. 〈omitted〉	202. ~ 205. 〈same as the present〉
## Section 3 〈omitted〉	## Section 3 〈omitted〉

Present	Amendment
Section 4 Structure protection	**Section 4 Structural fire protection and arrangement of openings *(2026)***
401. Structure protection ~~Notwithstanding the provisions of **Ch 7, 102.**,~~ in passenger ships carrying more than 36 passengers, the boundary bulkheads and decks of special category spaces and ro-ro spaces shall be insulated to "A-60" class standard. However, where a category ⑤, ⑨, ⑩ space, as defined in ~~regulation~~ **Ch 7, 102. 2** (3) (B), is on one side of the division the standard may be reduced to "A-0". Where fuel oil tanks are below a special category space or a ro-ro space, the integrity of the deck between such spaces, may be reduced to "A-0" standard. 〈newly added〉	**401. Structural fire protection *(2026)*** **1.** In passenger ships carrying more than 36 passengers, the boundary bulkheads and decks of special category and ro-ro spaces shall be insulated to A-60 class standard. However, where a category ⑤, ⑨, ⑩ space, as defined in **Ch 7, 102. 2** (3) (B), is on one side of the division, the standard may be reduced to A-0. Where fuel oil tanks are below a special category space, the integrity of the deck between such spaces may be reduced to A-0 standard. **2.** Where a special category space or ro-ro space is sub-divided with internal decks, the fire rating of these decks shall be determined based on the capacity and arrangement of the fixed water-based fire-extinguishing system. If the fixed water-based fire-extinguishing system cannot simultaneously cover the applicable area above and below a given deck, this deck shall be of A-30 standard while any ramps and doors between decks shall be made of steel and of a design being as tight as practical. *(2026)* **402. Arrangement of openings in ro-ro spaces and special category spaces *(2026)*** **1.** Openings in the side plating, the ends or deckhead of the ro-ro space shall be situated and arranged so that a fire in the ro-ro space does not endanger: (1) stowage areas for survival craft; (2) embarkation stations and assembly stations, including access to such stations; and (3) accommodation spaces, control stations and normally occupied service spaces in superstructures and deckhouses above the ro-ro space. Openings are not permitted for all decks directly below these objects and within a safety distance of minimum 6.0 m measured horizontally.

Present	Amendment
	2. This requirement does not apply to openings fitted with closing arrangements, such as ramps and doors. Ramps and doors shall be of steel for all decks directly below accommodation spaces, control stations and normally occupied service spaces, and minimum A-0 for all decks directly below survival craft, embarkation stations and assembly stations. **3.** Openings are, however, accepted in ro-ro spaces below accommodation spaces, control stations and normally occupied service spaces, when the fire integrity of the ship's side, including windows and doors, is A-60 on boundaries in a rectangular area measured 6.0 m horizontally forward and aft of the openings and vertically minimum two deck levels above the deck level with the opening. A-0 windows protected by a water-based system with an application rate of at least 5.0 $\mathrm{L/(min \cdot m^2)}$ may be accepted as equivalent to A-60 windows. Ventilation inlets shall be designed to minimize the risk of contamination. **【See Guidance】** **4.** Openings for mechanical ventilation of ro-ro and special category spaces are permitted below accommodation spaces, service spaces and control stations in superstructures, if the opening is protected by a closing device, with a closing arrangement not likely to be cut off in case of a fire in the ro-ro spaces, capable of being closed from a readily accessible position. The closing device shall be made of steel or other fire-resistant material. Such openings are not permitted below survival craft, the emergency generator and air intakes for the engine-room(s). **5.** Notwithstanding the above, air intakes serving machinery used for the ship's main propulsion, power generation and emergency power generation shall be in a position minimizing the risk of being contaminated by a fire in the ro-ro space or special category space. **403. Arrangement of weather deck intended for the carriage of vehicles** ***(2026)*** **1.** Appropriate arrangements shall be made so that a fully developed fire on weather decks intended for the carriage of vehicles does not endanger:

Present	Amendment
	(1) stowage areas for survival craft; (2) embarkation stations and assembly stations including access to these; and (3) accommodation spaces, control stations and normally occupied service spaces in superstructures and deckhouses adjacent to the weather deck. **2.** Appropriate arrangements shall be made providing a safety distance, measured horizontally, of more than 6.0 m from the designated vehicle lanes to accommodation spaces, control stations and normally occupied service spaces in superstructures and deckhouses adjacent to the weather deck. **3.** The safety distance can be reduced to 3.0 m when boundaries, including windows and doors, within 6.0 m are of A-60 integrity. Alternatively, A-0 boundaries protected by a water-based system with an application rate of at least 5.0 $L/(min \cdot m^2)$ may be accepted as equivalent. **4.** Survival craft and embarkation stations, including access to these, shall be protected with a safety distance of more than 12.0 m. Safety distances shall be measured horizontally. **5.** Notwithstanding the above, air intakes serving machinery used for the ship's main propulsion, power generation and emergency power generation shall be in a position minimizing the risk of being contaminated by a fire on the weather deck intended for carriage of vehicles.

Amendments of the Guidance relating to the Rules for the Classification of Steel Ships

(Circular)

Pt. 8

2025. 09.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments (effective on or after 1 January 2026)

(1) To align the requirement of the Guidance with those of MSC.1/Circ.1684

: Ch9 503. 3 has been amended.

(2) To align the requirements of with Guidance with those of MSC.1/Circ.1511(Rev.1)

: Ch10 203. 6 (2) and 8 (2) have been amended..

(3) To reflect the amendment of IACS UI 269/Rev.2

: Ch10 203. 9 (3) has been newly added.

(4) To reflect the footnote of Resolution MSC.550(108)

: Ch13 402. has been newly added.

2. Main Contents: Refer to the amendments

Present	Amendment
# CHAPTER 9 STRUCTURAL INTEGRITY	# CHAPTER 9 STRUCTURAL INTEGRITY
## Section 5 Protection of Cargo Tank Structure Against Pressure Or Vacuum In Tankers	## Section 5 Protection of Cargo Tank Structure Against Pressure Or Vacuum In Tankers
501. ~ 502. 〈omitted〉	501. ~ 502. 〈omitted〉
503. Safety measures in cargo tanks	503. Safety measures in cargo tanks
1. ~ 2. 〈omitted〉	1. ~ 2. 〈omitted〉
3. For ships that apply pressure sensors in each tank as an alternative secondary means of venting as per **503. 2** of the Rules, the setting of the over-pressure alarm is to be above the pressure setting of the P/V-valve and the setting of the under-pressure alarm is to be below the vacuum setting of the P/V-valve. The alarm settings are to be within the design pressures of the cargo tanks. The settings are to be fixed and not arranged for blocking or adjustment in operation. An exception is permitted for ships that carry different types of cargo and use P/V valves with different settings, one setting for each type of cargo. The settings may be adjusted to account for the different types of cargo.	3. In applying **503. 2** and **Ch 2, 403. 2** (2), for ships that apply pressure sensors in each tank as an alternative secondary means of venting as per **503. 2** of the Rules, the setting of the over-pressure alarm is to be above the pressure setting of the P/V-valve and the setting of the under-pressure alarm is to be below the vacuum setting of the P/V-valve. The alarm settings are to be within the design pressures of the cargo tanks. The settings are to be fixed and not arranged for blocking or adjustment in operation. An exception is permitted for ships that carry different types of cargo and use P/V valves with different settings, one setting for each type of cargo. The settings may be adjusted to account for the different types of cargo. *(2026)*
504. 〈omitted〉	504. 〈omitted〉

Present	Amendment
# CHAPTER 10 ESCAPE	# CHAPTER 10 ESCAPE
## Section 2 Means of escape	## Section 2 Means of escape
201. ~ 202. 〈omitted〉	**201. ~ 202. 〈same as the present〉**
203. Means of escape from machinery spaces	**203. Means of escape from machinery spaces**
1. ~ 5. 〈omitted〉	**1. ~ 5. 〈same as the present〉**
6. In applying **203. 1** (1), (4) and (6) of the Rules**,** the following requirements are to be applied. (1) 〈omitted〉 (2) Machinery spaces may include working platforms and passageways, or intermediate decks at more than one deck level. In such case, the lower part of the space should be regarded as the lowest deck level, platform or passageway within the space. Smaller working platforms in-between deck levels, or only for access to equipment or components, need not be provided with two means of escape. (3) 〈omitted〉	**6.** In applying **203. 1** (1), (4) and (6) of the Rules**,** the following requirements are to be applied. (1) 〈same as the present〉 (2) Machinery spaces may include working platforms and passageways, or intermediate decks at more than one deck level. In such case, the lower part of the space should be regarded as the lowest deck level, platform or passageway within the space. At deck levels, other than the lowest one, where only one means of escape other than the protected enclosure is provided, self-closing fire doors shall be fitted in the protected enclosure at that deck level. Smaller working platforms in-between deck levels, or only for access to equipment or components, need not be provided with two means of escape. *(2026)* (3) 〈omitted〉
7. 〈omitted〉	**7. 〈same as the present〉**
8. In applying **203. 2** (1), (3), (5) and (6) of the Rules, the following requirements are to be applied. (1) 〈omitted〉 (2) Machinery spaces of category A may include working platforms and passageways, or intermediate decks at more than one deck level. In such case, the lower part of the space should be regarded as the lowest deck level, platform or passageway within the space. Smaller working platforms in-between deck levels, or only for access to equipment or components, need not be provided with two means of escape.	**8.** In applying **203. 2** (1), (3), (5) and (6) of the Rules, the following requirements are to be applied. (1) 〈same as the present〉 (2) Machinery spaces of category A may include working platforms and passageways, or intermediate decks at more than one deck level. In such case, the lower part of the space should be regarded as the lowest deck level, platform or passageway within the space. At deck levels, other than the lowest one, where only one means of escape other than the protected enclosure is provided, self-closing fire doors shall be fitted in the protected enclosure at that deck level. Smaller working platforms in-between deck levels, or only for access to equipment or components, need not be provided with two means of escape. *(2026)*

Present	Amendment
(3) ~ (4) 〈omitted〉	(3) ~ (4) 〈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.	**9.** In applying **203. 2** (2) and (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.	(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.	(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) The dispensations allowed in the last sentence of **203. 2** (2) and by **203. 2** (3) of the Rules, are to apply regardless of the ship's size. *(2026)*
205. 〈omitted〉	**205. 〈same as the present〉**

Present	Amendment
CHAPTER 13 PROTECTION OF VEHICLE, SPECIAL CATEGORY AND RO-RO SPACES	CHAPTER 13 PROTECTION OF VEHICLE, SPECIAL CATEGORY, OPEN AND CLOSED RO-RO SPACES, AND WEATHER DECKS INTENDED FOR THE CARRIAGE OF VEHICLES
〈새롭게 추가〉	Section 4 Structural fire protection and arrangement of openings
	402. Arrangement of openings in ro-ro spaces and special category spaces
	1. In applying **402. 3** of the Rules, for the design of ventilation intakes refer to **Ch 3, Sec 1** of the Rules, **Ch 6, 101.** of the Rules, **Ch 7, 601. 5** of the Rules, and **Ch 13, 201. 4** of the Rules. **【See Rules】**

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

(Circular)

2025. 09.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments (effective from January 1, 2026)

(1) Reflection of IGF Code Amendments by Res.MSC.551(108)

- Revised the wording of the requirements in Ch 5, 302.1(3), 302.2(4), and 1201.1
- Revised the wording of the requirements in Ch 6, 703.1(1) and 901.1
- Revised the wording of the requirement in Ch 11, 301.1

(2) Reflection of internally identified request of revision (addition of "ITP for fuel containment system" on the list of document for approval)

- Requirement of Ch 4, 203. 3 (2) (k) has been newly added.

2. Main Contents: Refer to the amendments

Present	Amendment
# CHAPTER 4 CLASSIFICATION AND SURVEYS	# CHAPTER 4 CLASSIFICATION AND SURVEYS
## Section 2 Classification	## Section 2 Classification
203. Classification Survey during Construction	**203. Classification Survey during Construction**
1. ~ 2. 〈omitted〉	**1. ~ 2. 〈same as the present〉**
3. Plan and data for approval (1) Arrangement plans showing location of: (A) ~ (H) 〈omitted〉 (2) Following plans and data of the fuel containment system: (A) Drawing of gas tanks including information on non-destructive testing of welds and strength and tightness testing of tanks (B) Drawings of support and staying of gas tanks (C) Specification of materials in gas tanks and gas piping systems (D) Specifications of welding procedures for gas tanks (E) Specification of stress relieving procedures for independent tanks type C (thermal or mechanical) (F) Specification of design loads and structural analysis of gas tanks (G) A complete stress analysis for gas tanks (H) Specification of cooling-down procedure for gas tanks (I) Arrangement and specifications of second barriers (J) Drawings and specifications of gas tank insulation (K) Drawing of marking plate for gas tanks 〈newly added〉 (3) ~ (8) 〈omitted〉	**3. Plan and data for approval** (1) Arrangement plans showing location of: (A) ~ (H) 〈same as the present〉 (2) Following plans and data of the fuel containment system: (A) Drawing of gas tanks including information on non-destructive testing of welds and strength and tightness testing of tanks (B) Drawings of support and staying of gas tanks (C) Specification of materials in gas tanks and gas piping systems (D) Specifications of welding procedures for gas tanks (E) Specification of stress relieving procedures for independent tanks type C (thermal or mechanical) (F) Specification of design loads and structural analysis of gas tanks (G) A complete stress analysis for gas tanks (H) Specification of cooling-down procedure for gas tanks (I) Arrangement and specifications of second barriers (J) Drawings and specifications of gas tank insulation (K) Drawing of marking plate for gas tanks <u>(L) Inspection/survey plans for the liquefied gas fuel containment system</u> (3) ~ (8) 〈same as the present〉
4. 〈omitted〉	**4. 〈same as the present〉**

Present	Amendment
# CHAPTER 5 SHIP DESIGN AND ARRANGEMENT ## Section 3 Arrangement of Fuel Tanks **302. Location of fuel tanks** **1.** The fuel tanks are to be protected from external damage caused by collision or grounding in the following way(see **Fig 5.1**): (1) ~ (2) 〈omitted〉 (3) For independent tanks the protective distance is to be measured to the tank shell (the primary barrier of the tank containment system). For membrane tanks the distance is to be measured to the bulkheads surrounding the tank insulation.. (4) ~ (8) 〈omitted〉 **2.** As an alternative to **1** (1) above, the following calculation method may be used to determine the acceptable location of the fuel tanks: (1) ~ (3) 〈omitted〉 (4) For independent tanks the protective distance is to be measured to the tank shell (the primary barrier of the tank containment system). For membrane tanks the distance is to be measured to the bulkheads surrounding the tank insulation. (5) ~ (8) 〈omitted〉 **3. 〈omitted〉**	# CHAPTER 5 SHIP DESIGN AND ARRANGEMENT ## Section 3 Arrangement of Fuel Tanks **302. Location of fuel tanks** **1.** The fuel tanks are to be protected from external damage caused by collision or grounding in the following way(see **Fig 5.1**): (1) ~ (2) 〈same as the present〉 (3) For independent tanks the protective distance is to be measured to the tank shell (the primary barrier of the fuel containment system). For membrane tanks the distance is to be measured to the bulkheads surrounding the tank insulation.. (4) ~ (8) 〈same as the present〉 **2.** As an alternative to **1** (1) above, the following calculation method may be used to determine the acceptable location of the fuel tanks: (1) ~ (3) 〈same as the present〉 (4) For independent tanks the protective distance is to be measured to the tank shell (the primary barrier of the fuel containment system). For membrane tanks the distance is to be measured to the bulkheads surrounding the tank insulation. (5) ~ (8) 〈same as the present〉 **3. 〈same as the present〉**

Present	Amendment
# CHAPTER 5 SHIP DESIGN AND ARRANGEMENT ## Section 12 Airlocks **1201. Airlocks** **1.** An airlock is a space enclosed by gastight bulkheads with two substantially gastight doors spaced at least 1.5 m and not more than 2.5 m apart. Unless subject to the requirements of the International Convention on Load Lines, the door sill is to not be less than 300 mm in height. The doors are to be self-closing without any holding back arrangements. **2.** Airlocks are to be mechanically ventilated at an overpressure relative to the adjacent hazardous area or space. The ventilating fans for air-lock space and their air intakes are to be provided in the gas-safe space. In this case, the ventilating fans may not comply with the requirements in **Ch 13, 303. 1**. ~~Protection screens of not more than 13 mm×13 mm square mesh are to be fitted in outside openings of ventilation ducts.~~ **3. ~ 7. 〈omitted〉**	# CHAPTER 5 SHIP DESIGN AND ARRANGEMENT ## Section 12 Airlocks **1201. Airlocks** **1.** An airlock is a space enclosed by gastight bulkheads with two substantially gastight doors spaced at least 1.5 m and not more than 2.5 m apart. Unless subject to the requirements of the International Convention on Load Lines, the sill height of the door leading to the hazardous area is to not be less than 300 mm in height. The doors are to be self-closing without any holding back arrangements. **2.** Airlocks are to be mechanically ventilated at an overpressure relative to the adjacent hazardous area or space. The ventilating fans for air-lock space and their air intakes are to be provided in the gas-safe space. In this case, the ventilating fans may not comply with the requirements in **Ch 13, 303. 1**. **3. ~ 7. 〈same as the present〉**

Present	Amendment
# CHAPTER 6 FUEL CONTAINMENT SYSTEM	# CHAPTER 6 FUEL CONTAINMENT SYSTEM
## Section 4 Liquefied Gas Fuel Containment	## Section 4 Liquefied Gas Fuel Containment
415. Tank types	**415. Tank types**
1. 〈omitted〉	**1. 〈same as the present〉**
2. Type B independent tanks	**2. Type B independent tanks**
(1) ~ (6) 〈omitted〉	(1) ~ (6) 〈same as the present〉
(7) Stress categories	(7) Stress categories
For the purpose of stress evaluation, stress categories are defined in this section as follows:	For the purpose of stress evaluation, stress categories are defined in this section as follows:
(A) ~ (F) 〈omitted〉	(A) ~ (F) 〈same as the present〉
(G) 〈omitted〉	(G) 〈same as the present〉
where:	where:
S_1 = distance in the meridional direction over which the equivalent stress exceeds $1.1f$	S_1 = distance in the meridional direction over which the equivalent stress exceeds $1.1f$
S_2 = distance in the meridional direction to another region where the limits for primary general membrane stress are exceeded;	S_2 = distance in the meridional direction to another region where the limits for primary general membrane stress are exceeded;
R = mean radius of the vessel;	R = mean radius of the vessel;
t = wall thickness of the vessel at the location where the primary general membrane stress limit is exceeded; and	t = wall thickness of the vessel at the location where the primary general membrane stress limit is exceeded; and
	f = allowable primary general membrane stress.
(H) 〈omitted〉	(H) 〈same as the present〉
3. ~ 4. 〈omitted〉	**3. ~ 4. 〈same as the present〉**

Present	Amendment
# CHAPTER 6 FUEL CONTAINMENT SYSTEM ## Section 7 Pressure Relief System **703. Sizing of pressure relieving system** **1. Sizing of pressure relief valves** (1) PRVs are to have a combined relieving capacity for each liquefied gas fuel tank to discharge the greater of the following, with not more than a 20 % rise in liquefied gas fuel tank pressure above the MARVS: (A) 〈omitted〉 (B) vapors generated under fire exposure computed using the following formula: **【See Guidance】** $Q = FGA^{0.82}$ $(\mathrm{m}^3/\mathrm{s})$ where: Q = minimum required rate of discharge of air at standard conditions of 273.15 Kelvin (K) and 0.1013 MPa. F = fire exposure factor for different liquefied gas fuel types: 〈omitted〉 (2) ~ (3) 〈omitted〉 **2. 〈omitted〉**	# CHAPTER 6 FUEL CONTAINMENT SYSTEM ## Section 7 Pressure Relief System **703. Sizing of pressure relieving system** **1. Sizing of pressure relief valves** (1) The pressure relief system for each liquefied gas fuel tank is to be designed so that, regardless of the state of any one PRV, the capacity of the residual PRVs meets the combined relieving capacity requirements of the system. The combined relieving capacity is to be the greater of the following, with no more than 20% rise in liquefied gas fuel tank pressure above the MARVS. The tank is to not be loaded until the full relieving capacity is restored: (A) 〈same as the present〉 (B) vapors generated under fire exposure computed using the following formula: **【See Guidance】** $Q = FGA^{0.82}$ $(\mathrm{m}^3/\mathrm{s})$ where: Q = minimum required rate of discharge of air at standard conditions of 273.15 Kelvin (K) and 0.1013 MPa. F = fire exposure factor for different liquefied gas fuel tank types: 〈same as the present〉 (2) ~ (3) 〈same as the present〉 **2. 〈same as the present〉**

Present	Amendment
# CHAPTER 6 FUEL CONTAINMENT SYSTEM	# CHAPTER 6 FUEL CONTAINMENT SYSTEM
## Section 9 Maintaining of Fuel Storage Condition	## Section 9 Maintaining of Fuel Storage Condition
901. Control of tank pressure and temperature	**901. Control of tank pressure and temperature**
1. With the exception of liquefied gas fuel tanks designed to withstand the full gauge vapour pressure of the fuel under conditions of the upper ambient design temperature, liquefied gas fuel tanks' pressure and temperature are to be maintained at all times within their design range by means acceptable to the Society, e.g. by one of the following methods: **【See Guidance】** (1) ~ (4) 〈omitted〉 〈omitted〉	**1.** With the exception of liquefied gas fuel tanks designed to withstand the full gauge vapour pressure of the fuel under conditions of the upper ambient design temperature, liquefied gas fuel tanks' pressure and temperature are to be maintained at all times within their design range by means acceptable to the Society, e.g. by one or more of the following methods: **【See Guidance】** (1) ~ (4) 〈same as the present〉 〈same as the present〉
2. 〈omitted〉	**2. 〈same as the present〉**
# CHAPTER 11 FIRE SAFETY	# CHAPTER 11 FIRE SAFETY
## Section 3 Fire Protection	## Section 3 Fire Protection
301. Fire protection	**301. Fire protection**
1. Any space containing equipment for the fuel preparation such as pumps, compressors, heat exchangers, vaporizers and pressure vessels is to be regarded as a machinery space of category A ~~for fire protection purposes~~. **【See Guidance】**	**1.** Fuel preparation rooms are, for the purpose of the application of **Pt 8, Ch 7** of **Rules for the classification of steel ships**, to be regarded as a machinery space of category A. **【See Guidance】**
2. ~ 7. 〈omitted〉	**2. ~ 7. 〈same as the present〉**

Amended Guidance for Approval of Service Suppliers

Aug. 2025

- Main Amendments -

(1) Effective date : 1 Jan 2026 (Date of which the application for survey is submitted)

◉ Reflecting IACS UR Z17(Rev.19 Oct 2024 & Rev.20 Nov 2024)

◉ Reflecting the admendment request by the Survey Team

(1) Effective date : 1 Jan. 2026

(Date of which application for survey is submitted)

Present	Amendments
# CHAPTER 1 INTRODUCTION ## Section 1 〈omitted〉 ## Section 2 Approval and Certification **201. Procedure for approval and certification** 1. ~ 3. 〈omitted〉 4. Certification Certification is conditional on a "practical demonstration"* of the performance of the specific service as well as satisfactory reporting being carried out. (1) At initial audits, when the service supplier is already certified by other QSCS certified Society according to the provision of this Guidance(or UR Z17), this may be verified through documentary review that a practical demonstration has already been carried out. (2) At renewal audits, verification by documentary review of jobs undertaken since the previous audit and that have been accepted by a QSCS certified Society is acceptable and is sufficient to satisfy this requirement. *(2023)* *Note : practical demonstration *(2022)* Practical demonstration, including satisfactory reporting, shall be carried out at the presence of society's surveyor to verify that the supplier provides adequate service competence specified in the documentations submitted. However, in case of renewal audit, a part or the whole of it may be dispensed with subject to confirm the evidence of performance verified by class surveyor.	# CHAPTER 1 INTRODUCTION ## Section 1 〈same as the current Guidance〉 ## Section 2 Approval and Certification **201. Procedure for approval and certification** 1. ~ 3. 〈same as the current Guidance〉 4. Certification *(2026)* Certification is conditional on a "practical demonstration"* of the performance of the specific service as well as satisfactory reporting being carried out. (1) At initial audits, when the service supplier is already certified by other ~~QSCS certified~~ Society subject to verification of compliance with QSCS(Quality System Certification Scheme-hereinafter called the QSCS) in accordance with Section 5 of Annex 1 to the QSCS according to the provision of this Guidance(or UR Z17), this may be verified through documentary review that a practical demonstration has already been carried out. *(2026)* (2) At renewal audits, verification by documentary review of jobs undertaken since the previous audit and that have been accepted by a ~~QSCS certified~~ Society subject to verification of compliance with the QSCS in accordance with Section 5 of Annex 1 to the QSCS is acceptable and is sufficient to satisfy this requirement. *(2026)* * Note : Details related to practical demonstration are to be followed for the separate requirements as specified by the Society. *(2026)* ~~Practical demonstration, including satisfactory reporting, shall be carried out at the presence of society's surveyor to verify that the supplier provides adequate service competence specified in the documentations submitted.~~ ~~However, in case of renewal audit, a part or the whole of it may be dispensed with subject to confirm the evidence of performance verified by class surveyor.~~

Present	Amendments
(3) The assigned surveyor submits the following data as a result of practical demonstration to survey team with a copy of the checklist, non-conformity report. (A) Initial audit : Pictorial data(a photo or a movie), A sample of service report In case of initial audit, if it is difficult to carry out the practical demonstration, a result of practical demonstration verified by IACS members, which was verified its conformity to QSCS, may be accepted. Furthermore, if the company used to be approved by KR, the practical demonstration may be exempted based on the evidences which are required in renewal audit. When a result of practical demonstration verified by IACS members is not confirmed at the initial audit for firm engaged in thickness measurement on ships or mobile offshore unit, the practical demonstration shall be conducted onboard KR classed vessel. (B) Renewal audit : A copy of the latest previous service report which was provided to KR classed vessel within recent 3 years In case of renewal audit, if the service report does not exists due to the service supplier has provided no services, the assigned surveyor accepts the service report verified by IACS members, which was verified its conformity to QSCS, or requires the service supplier a practical demonstration and submits the data in (a)of the above to survey team and keep the original data in the branch office.	~~(3) The assigned surveyor submits the following data as a result of practical demonstration to survey team with a copy of the checklist, non-conformity report.~~ ~~(A) Initial audit : Pictorial data(a photo or a movie), A sample of service report~~ ~~In case of initial audit, if it is difficult to carry out the practical demonstration, a result of practical demonstration verified by IACS members, which was verified its conformity to QSCS, may be accepted. Furthermore, if the company used to be approved by KR, the practical demonstration may be exempted based on the evidences which are required in renewal audit.~~ ~~When a result of practical demonstration verified by IACS members is not confirmed at the initial audit for firm engaged in thickness measurement on ships or mobile offshore unit, the practical demonstration shall be conducted onboard KR classed vessel.~~ ~~(B) Renewal audit : A copy of the latest previous service report which was provided to KR classed vessel within recent 3 years~~ ~~In case of renewal audit, if the service report does not exists due to the service supplier has provided no services, the assigned surveyor accepts the service report verified by IACS members, which was verified its conformity to QSCS, or requires the service supplier a practical demonstration and submits the data in (a)of the above to survey team and keep the original data in the branch office.~~

Present	Amendments
Appendix Part A - Approval of Service Suppliers listed in IACS UR Z17	**Appendix Part A - Approval of Service Suppliers listed in IACS UR Z17**
Section 16. Firms engaged in Commissioning Testing of Ballast Water Management Systems (BWMS) (Z17 Annex 1-18) *(2022)*	**Section 16. Firms engaged in Commissioning Testing of Ballast Water Management Systems (BWMS) (Z17 Annex 1-18)** *(2022)*
1601. ~ 1602. 〈omitted〉	1601. ~ 1602. 〈same as the current Guidance〉
1603. Operators	1603. Operators
1. Service Suppliers are expected to be able to perform both the biological sampling and assessment of self-monitoring parameters and has responsibility for document that the requirements to the operator are satisfied. Therefore, operators who conduct commissioning testing are to:	1. Service Suppliers are expected to be able to perform both the biological sampling and assessment of self-monitoring parameters and has responsibility for document that the requirements to the operator are satisfied. Therefore, operators who conduct commissioning testing are to:
(1) ~ (2) 〈omitted〉	(1) ~ (2) 〈same as the current Guidance〉
(3) Have knowledge of IMO BWM.2/Circ.70/Rev.**1**, as may be amended - 'Guidance for the Commissioning Testing of Ballast Water Management Systems' and **IMO BWM.2/Circ.42/Rev.2** - 'Guidance on Ballast Water Sampling and Analysis for Trial Use in accordance with the BWM Convention and Guidelines (G2)', as may be amended;	(3) Have knowledge of IMO BWM.2/Circ.70/Rev.**1**~~, as may be amended~~ - 'Guidance for the Commissioning Testing of Ballast Water Management Systems', IACS Recommendation 180 'Recommendation for conducting commissioning testing of Ballast Water Management Systems' and **IMO BWM.2/Circ.42/Rev.2** - 'Guidance on Ballast Water Sampling and Analysis for Trial Use in accordance with the BWM Convention and Guidelines (G2)', as may be amended; *(2026)*
(4) ~ (10) : 〈omitted〉	(4) ~ (10) : 〈same as the current Guidance〉
1604. ~ 1606. 〈omitted〉	1604. ~ 1606. 〈same as the current Guidance〉
1607. Reference Documents	1607. Reference Documents
1. The Service Supplier is to have access to the following documents, as may be amended: *(2023)*	1. The Service Supplier is to have access to the following documents, as may be amended: *(2023)*
(1) ~ (6) 〈omitted〉	(1) ~ (6) 〈same as the current Guidance〉
(7) IMO Resolution A.1156(32) - Survey Guidelines under the Harmonized System of Survey and Certifications (HSSC), as amended (for BWMS that were Type Approved to the 2016 G8)	(7) IMO Resolution A.1156(32) - Survey Guidelines under the Harmonized System of Survey and Certifications (HSSC), as amended (for BWMS that were Type Approved to the 2016 G8)
〈newly added〉	(8) IACS Recommendation 180 'Recommendation for conducting commissioning testing of Ballast Water Management Systems' *(2026)*

CIRCULAR

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To : All Surveyors and whom it may concern

No : 2025 - 13 - E
Date : 30 Sep. 2025

Subject	9.212 Notice for revision(s) to the released amendments to KR Technical Rules
Application	Refer to Effective date(s) specified in the attachments

1. Thank you for your interest in KR Technical Rules.

2. Please be informed that the amendments have been made to reflect IACS Resolutions, IMO Circulars and Requests for Establishment/Revision of Classification Technical Rules, and you are kindly requested to apply the amendments to the relevant works according to effective date.

3. Furthermore, please be informed that the amendments will be included in 2026 edition on Classification Technical Rules which will be published in the first half of 2026.

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

Classification Technical Rules	Effective Date(s)	Amendment(s)
Rules for the Classification of Steel Ships Pt 5	1st January 2026 (Date of contract for ship construction)	IACS UR M46(Rev.4) IACS UR M52(Rev.3)
	1st January 2026 (Date of contract for ship construction or application for testing/certification is carried out)	IACS UR M10(Rev.5) IACS UR M25(Rev.5)
Guidance Relating to the Rules for the Classification of Steel Ships Pt 5	1st January 2026 (Date of contract for ship construction)	IACS UR M52(Rev.3) IACS UI SC306(New)
	1st January 2026	IACS UR M10(Rev.5)

	(Date of contract for ship construction or application for testing/certification is carried out)	IACS UR P4(Rev. 8)
Rules for the Classification of Steel Ships Pt 6	1st January 2026 (Date of contract for ship construction)	IACS UI SC305(New)
Guidance Relating to the Rules for the Classification of Steel Ships Pt 6	1st January 2026 (Date of contract for ship construction)	IACS UI SC11(Rev.2) IACS UI SC305(New) IACS UR E15(Rev.5)
Guidance Relating to the Rules for the Classification of Steel Ships Pt 7	1st January 2026 (Date of contract for ship construction)	MSC.1/Circ.1683
Guidance Relating to the Rules for the Classification of Steel Ships Pt 8	1st January 2026 (Date of contract for ship construction)	MSC.1/Circ.1683 MSC.1/Circ.1684 IACS UI SC140(Rev.4)
Rules for Ships Using Low-flashpoint Fuels	1st January 2026 (Date of contract for ship construction)	Resolution.MSC.551(108)
Guidance for Prevention Systems of Pollution from Ships	1st January 2026 (Date of contract for ship construction)	IACS UR M86(New)
Guidance for Approval of Manufacturing Process and Type Approval, etc.	1st January 2026 (Date of application for type approval certification)	IACS UR M10(Rev.5) IACS UR M85(New) IACS UR E10(Rev.10)
Guidance for Cyber Resilience of Ships and Systems	1st October 2025 (Date of contract for ship construction)	New notation development and requirement revision

Attachments: Amendments for the Classification Technical Rules (K/E) (The End)

KR Technical Rule Amendments

Ⅰ. Rules for Classification of Steel Ships Part 5 Machinery Installations ····· 2
Ⅱ. Guidance Relating to the Rules for the Classification of Steel Ships
Part 5 Machinery Installations ····· 15
Ⅲ. Rules for Classification of Steel Ships
Part 6 Electrical Equipment and Control Systems ····· 28
Ⅳ. Guidance Relating to the Rules for the Classification of Steel Ships
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Ⅹ. Guidance for Cyber Resilience of Ships and Systems ····· 80

Amendments to the Rules for Classification of Steel Ships

Pt. 5 Machinery Installations

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Ships contracted for construction on or after 2026/01/01

- ◉ Reflecting IACS UR M46 (Rev.4) adding reference requirements for inclination.
- ◉ Reflecting IACS UR M52 (Rev.3) to the requirements Aftmost propeller shaft bearing and Stern tube bearing/sealing device

(2) Ships contracted for construction or application for testing/certification is carried out on or after 2026/01/01

- ◉ Reflecting IACS UR M25 (Rev.5) about astern power for main propulsion
- ◉ Reflecting IACS UR M10 (Rev.5) to the requirements for construction/installation of crankcase.

Present

CHAPTER 1 GENERAL

Section 1 General

103. Construction, materials and installation

1. Inclinations and ship accelerations and motions

(1) **Inclincation** The construction, installation, lubricating system and cooling system of machinery are to be such that they cause no hindrance to their proper operations under the condition as given in Table 5.1.2. This Society may consider deviations from these angles of inclination, taking into consideration the type, size and service conditions of the ship.

Table 5.1.2 Angle of inclination

Type of machinery installations	Angle of inclination (deg)[2]			
	Athwart-ships		Fore-and-aft	
	Static	Dynamic	Static	Dynamic
Main and auxiliary machinery	15	22.5	5[4]	7.5
Safety equipment (emergency power installations, emergency fire pumps and their devices) Switch gear[1] (electrical and electronic appliances and remote control systems)	22.5[3]	22.5[3]	10	10

NOTES:
(1) No undesired switching operation or operational changes are to occur.
(2) Athwartships and fore-and-aft inclinations may occur simultaneously.
(3) In ships for the carriage of liquefied gases and of chemicals the emergency power supply must also remain operable with the ship flooded to a final athwartships inclination up to a maximum of 30 degrees.
(4) Where the length of the ship exceeds 100 m, the fore-and-aft static angle of inclination may be taken as $500/L$ degrees. (L : Length of the ship as defined in **Part 3, Ch 1, 102.** of the Rules, m)

〈omitted〉

Amendment

CHAPTER 1 GENERAL

Section 1 General

103. Construction, materials and installation

1. Inclinations and ship accelerations and motions

(1) **Inclincation** The construction, installation, lubricating system and cooling system of machinery are to be such that they cause no hindrance to their proper operations under the condition as given in Table 5.1.2. This Society may consider deviations from these angles of inclination, taking into consideration the type, size and service conditions of the ship.

Table 5.1.2 Angle of inclination

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NOTES:
(1) No undesired switching operation or operational changes are to occur.
(2) Athwartships and fore-and-aft inclinations may occur simultaneously.
(3) In ships for the carriage of liquefied gases and of chemicals the emergency power supply must also remain operable with the ship flooded to a final athwartships inclination up to a maximum of 30 degrees. (See Pt 7, Ch 5, 207. 2 (2), or Pt 7, Ch 6, 209. 3 (2) of the Rules)
(4) Where the length of the ship exceeds 100 m, the fore-and-aft static angle of inclination may be taken as $500/L$ degrees. (L : Length of the ship as defined in **Part 3, Ch 1, 102.** of the Rules, m)

〈omitted〉

Present	Amendment
# CHAPTER 1 GENERAL ## Section 1 General **103. Construction, materials and installation** *(Omitted)* **5. Astern power for main propulsion** (1) In order to maintain sufficient maneuverability and secure control of the ship in all normal circumstances, the main propulsion machinery is to be capable of reversing the direction of thrust so as to bring the ship to rest from the maximum service speed. The main propulsion machinery is to be capable of maintaining in free route astern at least 70 % of the ahead revolutions corresponding to the maximum continuous ahead power. (2) For the main propulsion systems with reversing gears, controllable pitch propellers or electric propeller drive, running astern should not lead to the overload of propulsion machinery. *〈To be continued on next page〉*	# CHAPTER 1 GENERAL ## Section 1 General **103. Construction, materials and installation** *(Omitted)* **5. Astern power for main propulsion** (1) ~~In order to maintain sufficient maneuverability and secure control of the ship in all normal circumstances, the main propulsion machinery is to be capable of reversing the direction of thrust so as to bring the ship to rest from the maximum service speed. The main propulsion machinery is to be capable of maintaining in free route astern at least 70 % of the ahead revolutions corresponding to the maximum continuous ahead power.~~ The minimum astern power required by SOLAS II-1 / 28.1 to secure proper control of the ship in all normal circumstances is to be determined by the ship designer and is not to exceed the maximum permissible astern power (MPAP) for which the propulsion plant is designed. Astern trials are to be conducted in accordance with the provisions of ISO 19019:2005, section 5.4: Astern trials. (2) ~~For the main propulsion systems with reversing gears, controllable pitch propellers or electric propeller drive, running astern should not lead to the overload of propulsion machinery.~~ Where steam turbines are used for main propulsion, the astern trial is to demonstrate that they are to be capable of ~~maintaining~~ operating at their maximum permissible astern power (MPAP) ~~in free route astern at least 70% of the ahead revolutions corresponding to the maximum continuous ahead power~~ for a period of at least 15 minutes. The astern trial is to be limited to 30 minutes or in accordance with manufacturer's recommendation to avoid overheating of the turbine due to the effects of "windage" and friction. *〈To be continued on next page〉*

Present	Amendment
103. Construction, materials and installation	**103. Construction, materials and installation**
(Omitted)	*(Omitted)*
5. Astern power for main propulsion	**5. Astern power for main propulsion**
(3) Where steam turbines are used for main propulsion, they are to be capable of maintaining in free route astern at least 70 % of the ahead revolutions corresponding to the maximum continuous ahead power for a period of at least 15 minutes. The astern trial is to be limited to 30 minutes or in accordance with manufacturer's recommendation to avoid overheating of the turbine due to the effects of "windage" and friction.	(3) ~~Where steam turbines are used for main propulsion, they are to be capable of maintaining in free route astern at least 70 % of the ahead revolutions corresponding to the maximum continuous ahead power for a period of at least 15 minutes. The astern trial is to be limited to 30 minutes or in accordance with manufacturer's recommendation to avoid overheating of the turbine due to the effects of "windage" and friction.~~ ~~For the~~ Main propulsion systems with reversing gears, controllable pitch propellers or electric propeller drive are to be designed for the maximum permissible astern power, ~~running astern~~ which should not lead to the overload of propulsion machinery. (A) The designed maximum astern power, as referred to in **SOLAS II-1/3.15**, defining the maximum astern speed for the design of the main steering gear and rudder stock as per **SOLAS II-1/29.3.4** and **Rule Pt 4, Ch 1, 101**, shall not to be taken less than the MPAP.
(4) Main propulsion systems are to undergo tests to demonstrate the astern response characteristics. The tests are to be carried out at least over the manoeuvring range of the propulsion system and from all control positions. A test plan is to be provided by the yard and accepted by the surveyor. If specific operational characteristics have been defined by the manufacturer these shall be included in the test plan.	(4) ~~Main propulsion systems are to undergo tests to demonstrate the astern response characteristics.~~ The astern tests are to be carried out ~~at least over the manoeuvring range of the propulsion system and~~ from ~~all~~ control positions. A test plan is to be provided by the yard and accepted by the surveyor. If specific operational characteristics have been defined by the manufacturer these shall be included in the test plan.
(5) The reversing characteristics of the propulsion plant, including the blade pitch control system of controllable pitch propellers, are to be demonstrated and recorded during trials.	~~(5) The reversing characteristics of the propulsion plant, including the blade pitch control system of controllable pitch propellers, are to be demonstrated and recorded during trials.~~

Present	Amendment
# CHAPTER 2 MAIN AND AUXILIARY ENGINES ## Section 2 Reciprocating Internal Combustion Engines **202. Construction and installation** **1. – 5. 〈Omitted〉** **6. Lubricating oil arrangements** (1) Where the crankcases are of closed type, they are to be arranged so that the contained oil may be drained at any time. Lubricating oil drain pipes from the engine sump to the drain tank are to be submerged at their outlet ends. (2) Lubricating oil pipe lines are to be provided with a pressure gauge or other appropriate means at a suitable position to indicate that the proper circulation is maintained. (3) Lubricating devices for rotor shafts of exhaust gas turbochargers are to be designed so that the lubricating oil may not be drawn into the charging air.	# CHAPTER 2 MAIN AND AUXILIARY ENGINES ## Section 2 Reciprocating Internal Combustion Engines **202. Construction and installation** **1. – 5. 〈Omitted〉** **6. Lubricating oil arrangements** (1) Where the crankcases are of closed type, they are to be arranged so that the contained oil may be drained at any time. Lubricating oil drain pipes from the engine sump to the drain tank are to be continuously submerged at their outlet ends. (2) Lubricating oil pipe lines are to be provided with a pressure gauge or other appropriate means at a suitable position to indicate that the proper circulation is maintained. (3) Lubricating devices for rotor shafts of exhaust gas turbochargers are to be designed so that the lubricating oil may not be drawn into the charging air.

Present	Amendment
203. Safety devices	**203. Safety devices**
1. – 4. 〈Omitted〉	**1. – 4. 〈Omitted〉**
5. Ventilation of crankcase	**5. Ventilation of crankcase 【See Guidance】**
(1) Ventilation of crankcase, and any arrangement which could produce a flow of external air within the crankcase, is in principle not permitted except for dual fuel engines where crankcase ventilation is to be provided to prevent the accumulation of leaked gas.	(1) Ventilation of crankcase, and any arrangement which could produce a flow of external air ~~within~~ into the crankcase, is in principle not permitted except for ~~dual fuel~~ engines fueled with gas or low-flashpoint fuel, ~~where crankcase ventilation is to be provided to prevent the accumulation of leaked gas.~~ where it may be necessary to maintain the gas concentration in the crankcase below LEL provided.
(2) Crankcase ventilation pipes, where provided, are to be as small as practicable to minimize the in rush of air after a crankcase explosion.	(2) Crankcase ventilation pipes, where provided, are to be as small as practicable to minimize the in rush of air after a crankcase explosion.
(3) If a forced extraction of the oil mist atmosphere from the crankcase is provided (for mist detection purposes for instance), the vacuum in the crankcase is not to exceed 25 mm of water head.	(3) ~~If a forced extraction of the oil mist atmosphere from the crankcase is provided (for mist detection purposes for instance), the vacuum in the crankcase is not to exceed 25 mm of water head.~~ When forced extraction of crankcase atmosphere is provided, the crankcase pressure level is not to influence the reliable function of measurement and safety devices (such as oil mist detection) in the crankcase.
(4) To avoid interconnection between crankcases and the possible spread of fire following an explosion, crankcase ventilation pipes and oil drain pipes for each engine are to be independent of any other engine.	(4) To avoid interconnection between crankcases and the possible spread of fire following an explosion, crankcase ventilation pipes and oil drain pipes for each engine are to be independent of any other engine.
〈Newly added〉	**6.** For engines fuelled with gas or low-flashpoint fuel a detailed evaluation regarding the safety of crankcase is to be carried out justifying that: 1) either the gas concentration in the crankcase remains below the LEL without specific measures, or 2) the risk of a crankcase explosion is reduced through specific measures (see, for example, **5.** or **13.**).

Present	Amendment
	〈Following requirement number revised by newly inserting 203. 6.〉
6. Protective devices for scavenge manifolds (1) For crosshead type engines, scavenge spaces in open connection to the cylinders are to be connected to an fire extinguishing system, which is to be entirely separate from the fire extinguishing system of the engine room. (2) Scavenge spaces in open connection to the cylinders are to be provided with explosion relief valves for preventing an overpressure in the event of explosion and minimizing the possibility of injury to personnel.	**~~6.~~7. Protective devices for scavenge manifolds** (1) For crosshead type engines, scavenge spaces in open connection to the cylinders are to be connected to an fire extinguishing system, which is to be entirely separate from the fire extinguishing system of the engine room. (2) Scavenge spaces in open connection to the cylinders are to be provided with explosion relief valves for preventing an overpressure in the event of explosion and minimizing the possibility of injury to personnel.
7. Protection of starting air pipes The starting air mains are to be protected against the explosion arising from improper functioning of starting valves by the following arrangements: (1) An isolating non-return valve or equivalent thereto is to be provided at the starting air supply connection to each engine. (2) In direct reversing engines having a main starting manifold, a bursting disc or flame arrester is to be fitted at the starting valve on each cylinder; in non-reversing engines having a main starting manifold, at least one such device is to be fitted at the supply inlet to the starting air manifold on each engine. However, the above mentioned device may be omitted for engines having bore not exceeding 230 mm.	**~~7.~~8. Protection of starting air pipes** The starting air mains are to be protected against the explosion arising from improper functioning of starting valves by the following arrangements: (1) An isolating non-return valve or equivalent thereto is to be provided at the starting air supply connection to each engine. (2) In direct reversing engines having a main starting manifold, a bursting disc or flame arrester is to be fitted at the starting valve on each cylinder; in non-reversing engines having a main starting manifold, at least one such device is to be fitted at the supply inlet to the starting air manifold on each engine. However, the above mentioned device may be omitted for engines having bore not exceeding 230 mm.
8. Alarms of lubricating oil system Lubricating system to be used for main and auxiliary engines above 37 kW is to be provided with alarm devices which give visual and audible alarm in the event of failure of lubricating oil pressure supply or appreciable reduction in pressure of the lubricating oil supply.	**~~8.~~9. Alarms of lubricating oil system** Lubricating system to be used for main and auxiliary engines above 37 kW is to be provided with alarm devices which give visual and audible alarm in the event of failure of lubricating oil pressure supply or appreciable reduction in pressure of the lubricating oil supply.
9. Protection of high pressure fuel pipe All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors are to comply with the requirements specified in **Pt 8, Ch 2, 102. 5** (2).	**~~9.~~10. Protection of high pressure fuel pipe** All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors are to comply with the requirements specified in **Pt 8, Ch 2, 102. 5** (2).

Present	Amendment
10. Oil mist detection arrangements of crankcase (1) Following engines are to be provided with oil mist detection arrangements(or engine bearing temperature monitors or equivalent devices) obtained type approval. **【See Guidance】** *〈Omitted〉* *〈Newly added〉* **11. Alarms of exhaust gas turbocharger** For all turbochargers of Categories B and C, indications and alarms as listed in the **Table 5.2.2** are required. Indications may be provided at either local or remote locations	~~10.~~11. **Oil mist detection arrangements of crankcase** (1) Following engines are to be provided with oil mist detection arrangements(or engine bearing temperature monitors or equivalent devices) obtained type approval. **【See Guidance】** *〈Omitted〉* 12. Plans of showing details and arrangements of oil mist detection and alarm arrangements are to be submitted for approval in accordance with **Table 5.1.4 (**item 26). **【See Guidance】** 13. Where it is proposed to use the introduction of inert gas into the crankcase to minimise a potential crankcase explosion, details of the arrangements are to be submitted to the classification society for consideration. **【See Guidance】** ~~11.~~14. **Alarms of exhaust gas turbocharger** For all turbochargers of Categories B and C, indications and alarms as listed in the **Table 5.2.2** are required. Indications may be provided at either local or remote locations

Present	Amendment
# CHAPTER 2 MAIN AND AUXILIARY ENGINES ## Section 2 Reciprocating Internal Combustion Engines **204. Crankshafts** **1. Application** The following requirements are to be applied to the crankshafts of reciprocating internal combustion engines. **2. Required diameter** The required diameter of crankpins or journals is not to be less than that given by the following formula: *〈omitted〉* **205. Dimensions of crank arms** **1. Solid shaft** For solid shafts, the thickness and breadth of crank arms are to comply with the following formula or the conditions shown in **Fig 5.2.1** in connection with the diameters of crankpin and journal. However, the thickness of crank arms is not to be less than 0.36 times the diameter of crankshaft. When the actual diameter of crankshaft is larger than the minimum required diameter of crankshaft, the left side of the following formula may be multiplied by $(d_c/d)^3$. **【See Guidance】** *〈omitted〉*	# CHAPTER 2 MAIN AND AUXILIARY ENGINES ## Section 2 Reciprocating Internal Combustion Engines **204. Crankshafts** **1. Application** The following requirements are to be applied to the crankshafts of reciprocating internal combustion engines. **2. Required diameter** The required diameter of crankpins ~~or~~ and journals is not to be less than that given by the following formula: *〈omitted〉* **205. Dimensions of crank arms** **1. Solid shaft** For solid shafts, the thickness and breadth of crank arms are to comply with the following formula or the conditions shown in **Fig 5.2.1** in connection with the diameters of crankpin and journal. However, the thickness of crank arms is not to be less than 0.36 times the diameter of ~~crankshaft~~ crankpins and journals. When the actual diameter of crankshaft is larger than the minimum required diameter of crankshaft, the left side of the following formula may be multiplied by $(d_c/d)^3$. **【See Guidance】** *〈omitted〉*

Present	Amendment
# CHAPTER 3 PROPULSION SHAFTING AND POWER TRANSMISSION SYSTEMS ## Section 2 Shaftings **206. Stern tube bearing and sealing device** **1.** The length of stern bearing in the stern tube or of strut bearing supporting the weight of propeller is to comply with the following requirements. (1) The bearings are to be type approved by the Society in their materials, construction and lubricating arrangements when rubber or synthetic materials are used. (2) For sea water lubricated bearings, the length of the bearing is to be not less than 4 times the required diameter of the shaft in way of the bearing. However when rubber or synthetic materials are used, where the material has been proven satisfaction of society through testing and operating experience, consideration may be given to an increased bearing pressure or a lessened bearing length. In this case, the length of the bearing is to be not less than 2 times the required diameter of the shaft in way of the bearing. *(2020)* (3) For oil lubricated bearings of white metal or synthetic materials, the length of the bearing is to be not less than 2 times the required diameter of the shaft in way of the bearing. The length of the bearing may be less provided the nominal bearing pressure is not more than 0.8 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft. For oil lubricated bearings of synthetic materials, the length of the bearing may be less provided the nominal bearing pressure is not more than 0.6 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft. However, the minimum length is to be not less than 1.5 times the actual diameter. **【See Guidance】** *〈Continuing on the next page〉*	# CHAPTER 3 PROPULSION SHAFTING AND POWER TRANSMISSION SYSTEMS ## Section 2 Shaftings **206. ~~Stern tube bearing and sealing device~~ Aftmost propeller shaft bearing, Stern tube bearing and sealing device** **1.** The length of stern bearing in the stern tube or of strut bearing supporting the weight of propeller is to comply with the following requirements. (1) The bearings are to be type approved by the Society in their materials, construction and lubricating arrangements when rubber or synthetic materials are used. ~~(2) For sea water lubricated bearings, the length of the bearing is to be not less than 4 times the required diameter of the shaft in way of the bearing. However when rubber or synthetic materials are used, where the material has been proven satisfaction of society through testing and operating experience, consideration may be given to an increased bearing pressure or a lessened bearing length. In this case, the length of the bearing is to be not less than 2 times the required diameter of the shaft in way of the bearing. *(2020)*~~ ~~(3) For oil lubricated bearings of white metal or synthetic materials, the length of the bearing is to be not less than 2 times the required diameter of the shaft in way of the bearing. The length of the bearing may be less provided the nominal bearing pressure is not more than 0.8 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft. For oil lubricated bearings of synthetic materials, the length of the bearing may be less provided the nominal bearing pressure is not more than 0.6 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft. However, the minimum length is to be not less than 1.5 times the actual diameter.~~ **【See Guidance】** *〈Continuing on the next page〉*

Present	Amendment
(4) The oil lubricated stern tube is always to be filled with oil and the lubricating oil is to be cooled by submerging the stern tube in the water of the after peak tank or by other suitable means. Means for ascertaining the temperature of the oil in the stern tube are also to be provided. Where a gravity tank supplying lubricating oil to the stern tube bearing is fitted, it is to be located above the load water line and provided with a low level alarm device. Adequate means are to be provided to supply ample amount of sea water for lubrication and cooling in the sea water lubricated stern tube.	~~(4) The oil lubricated stern tube is always to be filled with oil and the lubricating oil is to be cooled by submerging the stern tube in the water of the after peak tank or by other suitable means. Means for ascertaining the temperature of the oil in the stern tube are also to be provided. Where a gravity tank supplying lubricating oil to the stern tube bearing is fitted, it is to be located above the load water line and provided with a low level alarm device. Adequate means are to be provided to supply ample amount of sea water for lubrication and cooling in the sea water lubricated stern tube.~~ (2) For oil lubricated bearings of white metal, (A) The length of the bearing is to be not less than 2 times the required diameter of the shaft in way of the bearing. (B) The length of the bearing may be less provided the nominal bearing pressure is not more than 0.8 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft. **【See Guidance】** (3) For oil lubricated bearings of synthetic materials, (A) The length of the bearing is to be not less than 2 times the required diameter of the shaft in way of the bearing. (B) The length of the bearing may be less provided the nominal bearing pressure is not more than 0.6 MPa as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft. However, the minimum length is to be not less than 1.5 times the actual diameter. **【See Guidance】** (C) Where the material has proven satisfactory testing and operating experience, consideration may be given to an increased bearing pressure subject to the approval by the Society. (4) For sea water lubricated bearings, (A) The length of the bearing is to be not less than 4 times the required diameter of the shaft in way of the bearing. (B) However when synthetic materials are used, where the material has been proven satisfaction of the Society through testing and operating experience, consideration may be given to an increased bearing pressure or a lessened bearing length. In this case, the length of the bearing is to be not less than 2 times the required diameter of the shaft in way of the bearing.
〈Continuing on the next page〉	

Present	Amendment
(5) For grease lubricated bearings, the length of a grease lubricated bearing is to be not less than 4.0 times the required diameter of the shaft in way of the bearing. *(2021)*	(5) For grease lubricated bearings, the length of a grease lubricated bearing is to be not less than 4.0 times the required diameter of the shaft in way of the bearing. *(2021)*
2. The sealing devices other than gland packing type sea water sealing device are to be type approved by the Society in their materials, construction and arrangement. **【See Guidance】**	**2.** The sealing devices other than gland packing type sea water sealing device are to be type approved by the Society in their materials, construction and arrangement. **【See Guidance】**
〈Newly added〉	**3. Stern tube** (1) For oil lubricated stern tube, follow the below requirements; (A) The oil lubricated stern tube is always to be filled with oil. (B) The lubricating oil is to be cooled by submerging the stern tube in the water of the after peak tank or by other suitable means. Means for ascertaining the temperature of the oil in the stern tube are also to be provided. (C) Where a gravity tank supplying lubricating oil to the stern tube bearing is fitted, it is to be located above the load water line and provided with a low level alarm device. However, if the gravity tank is designed for a stern tube system where its static pressure is lower than the water pressure and does not cause any issues, it may be installed below the summer load waterline. (D) Means for ascertaining the temperature of the lubricating oil in the stern tube are to be provided. (2) For sea water lubricated stern tube, adequate means are to be provided to supply ample amount of sea water for lubrication and cooling.

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

Pt. 5 Machinery Installations

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Ships contracted for construction on or after 2026/01/01

- ◉ Reflecting IACS UR M52 (Rev.3) to the requirements Aftmost propeller shaft bearing and Stern tube bearing/sealing device
- ◉ Reflecting IACS UI SC306(New) to the requirements for the valve piercing collision bulkhead.

(2) Ships contracted for construction or application for testing/certification is carried out on or after 2026/01/01

- ◉ Updating reference clauses by reflecting IACS UR M10(Rev.5) in Pt 1 & Pt 5 Annex 5-7
- ◉ Reflecting IACS UR M10 (Rev.5) to the requirements for construction/installation of crankcase.
- ◉ Reflecting IACS UR P4 (Rev.4) to Annex 5-6.

Present	Amendment
# Pt. 1 Classification and Surveys ## CHAPTER 2 PERIODICAL AND OTHER SURVEYS *(2023)* ### Section 5-1 Special Survey (Machinery, Electrical Installations and Additional Installations) **502. Requirements of survey** **1.** In application to **502. 1** (1) (a) of the Rules, where total running hours for an internal combustion engine is confirmed and found in satisfactory by the Surveyor, the survey may be extended until next overhauling hours recommended by the manufacturer since the previous overhauling survey. However, the interval is not to exceed 5 years from the date of the previous overhauling survey. And the survey item of essential valves and valve arrangements are to be included the isolating non-return valve for starting air mains against explosion as specified in **Pt 5, Ch 2, 203.** 9 of the Rules. **【See Rule】** 〈Omitted〉	# Pt. 1 Classification and Surveys ## CHAPTER 2 PERIODICAL AND OTHER SURVEYS *(2023)* ### Section 5-1 Special Survey (Machinery, Electrical Installations and Additional Installations) **502. Requirements of survey** **1.** In application to **502. 1** (1) (a) of the Rules, where total running hours for an internal combustion engine is confirmed and found in satisfactory by the Surveyor, the survey may be extended until next overhauling hours recommended by the manufacturer since the previous overhauling survey. However, the interval is not to exceed 5 years from the date of the previous overhauling survey. And the survey item of essential valves and valve arrangements are to be included the isolating non-return valve for starting air mains against explosion as specified in **Pt 5, Ch 2, 203.** ~~9~~ 8 of the Rules. **【See Rule】** 〈Omitted〉

Present	Amendment
# Pt. 5 Machinery Installations # CHAPTER 2 MAIN AND AUXILIARY ENGINES ## Section 1 General **101. Application** **1.** In application to **101. 1** of the Rules, the small auxiliary engines may apply to the following; *(2017)* **【See Rule】** (1) For auxiliary engines having output of less than 100 kW driving generators (including emergency generator) or essential auxiliaries. (A) The submission of plans and documents may be omitted. However, plans or documents to confirm that the engines are comply with requirements in **Ch 1, 103. 1** and **Ch 2, 203. 9** of the Rules, are to be submitted to attending Surveyor. (B) Materials used in the main components may comply with *Korean Industrial Standards or equivalent.* (C) For tests except visual inspections of engine assembly and shop tests, if manufacturers carry out internal tests and submit test reports, the presence of the Surveyor may be omitted. (2) The requirements for the plans and documents, materials, tests of auxiliary engines driving cargo handling machinery are in accordance with **Pt 9, Ch 2** of the Rules. **2. Welding** In application to **101. 5** of the Rules, the general requirements for principal component with welded construction are to be comply with **Ch 5, Sec 4** of the Rules. **【See Rule】** **3. Electronically controlled reciprocating internal combustion engines** In application to **101. 7** of the Rules, the additional requirements specified otherwise by the Society are to be in accordance with **Annex 5-8**. **【See Rule】** 〈Omitted〉	# Pt. 5 Machinery Installations # CHAPTER 2 MAIN AND AUXILIARY ENGINES ## Section 1 General **101. Application** **1.** In application to **101. 1** of the Rules, the small auxiliary engines may apply to the following; *(2017)* **【See Rule】** (1) For auxiliary engines having output of less than 100 kW driving generators (including emergency generator) or essential auxiliaries. (A) The submission of plans and documents may be omitted. However, plans or documents to confirm that the engines are comply with requirements in **Ch 1, 103. 1** and **Ch 2, 203. ~~9~~ 10** of the Rules, are to be submitted to attending Surveyor. (B) Materials used in the main components may comply with *Korean Industrial Standards or equivalent.* (C) For tests except visual inspections of engine assembly and shop tests, if manufacturers carry out internal tests and submit test reports, the presence of the Surveyor may be omitted. (2) The requirements for the plans and documents, materials, tests of auxiliary engines driving cargo handling machinery are in accordance with **Pt 9, Ch 2** of the Rules. **2. Welding** In application to **101. 5** of the Rules, the general requirements for principal component with welded construction are to be comply with **Ch 5, Sec 4** of the Rules. **【See Rule】** **3. Electronically controlled reciprocating internal combustion engines** In application to **101. 7** of the Rules, the additional requirements specified otherwise by the Society are to be in accordance with **Annex 5-8**. **【See Rule】** 〈Omitted〉

Present	Amendment
Section 2 Reciprocating Internal Combustion Engines	**Section 2 Reciprocating Internal Combustion Engines**
203. Safety devices	**203. Safety devices**
1. In application to **203. 2** of the Rules, other acceptable means may be considered as follows. *(2021)* **【See Rule】** (1) Methods to prevent over pressure by tension of cylinder head bolts (2) Devices that activate the alarm and automatically stop or slow down the engine when cylinder overpressure occurs by installing cylinder pressure sensors capable of continuously monitoring (3) Other devices deemed appropriate by the Society	**1.** In application to **203. 2** of the Rules, other acceptable means may be considered as follows. *(2021)* **【See Rule】** (1) Methods to prevent over pressure by tension of cylinder head bolts (2) Devices that activate the alarm and automatically stop or slow down the engine when cylinder overpressure occurs by installing cylinder pressure sensors capable of continuously monitoring (3) Other devices deemed appropriate by the Society
2. In application to **203. 4** of the Rules, manual and name plate for relief valves of crankcase are to be in accordance with the following. **【See Rule】** *〈Omitted〉* *〈Newly added〉*	**2.** In application to **203. 4** of the Rules, manual and name plate for relief valves of crankcase are to be in accordance with the following. **【See Rule】**
	3. In application to **203. 5** (1) of the Rules, ventilation systems for the crankcase of engines fueled with gas or low-flashpoint fuel are to be arranged in accordance with the following. **【See Rule】** (1) It is demonstrated that the risk connected with a crankcase explosion is not increased by the ventilation system. (2) The operation of the ventilation system is monitored. (3) The automatic safety actions to be activated or the risk mitigation measures to be implemented in case of detection of a ventilation failure are specified by the engine manufacturer and justified in the safety concept of the engine.
	4. In application to **203. 5** (1) of the Rules, LEL means the Lower Explosive Limit, as defined in the paragraph 3.6.12 of **IEC 60079-10-1:2021**. The lowest applicable LEL of all possible gas or low flashpoint fuels, fuel vapours or mixture is to be considered. **【See Rule】**
〈Continuing on the next page〉	*〈Continuing on the next page〉*

Present	Amendment
3. In application to **203. 10** (1) of the Rules, bearing temperature monitors or equivalent devices are to be in accordance with the following. **【See Rule】** (1) Bearing temperature monitors of low speed reciprocating internal combustion engines are to be capable of monitoring temperature(or oil outlet temp.) of main bearing, crank bearing and crosshead bearing. (2) Bearing temperature monitors of medium and high speed reciprocating internal combustion engines are to be capable of monitoring temperature(or oil outlet temp.) of main bearing and crank bearing. (3) An equivalent device could be interpreted as measures applied to high speed engines where specific design features to preclude the risk of crankcase explosions are incorporated. *〈Newly added〉*	~~3.~~ 5. In application to **203. ~~10~~11** (1) of the Rules, engine bearing temperature monitors or equivalent devices are to be in accordance with the following. **【See Rule】** ~~(1) Bearing temperature monitors of low speed reciprocating internal combustion engines are to be capable of monitoring temperature(or oil outlet temp.) of main bearing, crank bearing and crosshead bearing.~~ ~~(2) Bearing temperature monitors of medium and high speed reciprocating internal combustion engines are to be capable of monitoring temperature(or oil outlet temp.) of main bearing and crank bearing.~~ ~~(3) An equivalent device could be interpreted as measures applied to high speed engines where specific design features to preclude the risk of crankcase explosions are incorporated.~~ (1) For crosshead engines, "engine bearing" of the term includes at least journal and connecting rod bearings and the crosshead bearings. (2) For trunk piston engines, "engine bearing temperature monitors" may be accepted as an alternative to the oil mist detector only when the temperature of all bearings, including the piston pin bearings, are monitored. (3) "equivalent devices" includes measures applied to engines where specific design features to preclude the risk of crankcase explosion are incorporated, subject to appropriate by the Society. (4) The example of acceptable "temperature moniotrs or equivalent devices" are as the followings; (A) A temperature monitoring system of the bearing concerned (B) A bearing oil oulet temperature monitoring system (C) A splash oil temperature monitoring system (D) Measures applied to engines where specific design features to preclude the risk of crankcase explosions are incorporated, subject to appropriate by the Society.
4. In application to **203. 10** (1) of the Rules, where an overriding for automatic shutoff arrangements is installed, the documents on the consequences are to be submitted to this Society for approval. *〈Continuing on the next page〉*	~~4.~~ 6. In application to **203. ~~10~~11** (1) of the Rules, where an overriding for automatic shutoff arrangements is installed, the documents on the consequences are to be submitted to this Society for approval. **【See Rule】** *〈Continuing on the next page〉*

Present	Amendment
5. In application to **203. 10** (2) of the Rules, the engine designer's and oil mist manufacturer's instructions are to be included the following particulars. **【See Rule】** (1) Schematic layout of engine oil mist detection and alarm system showing location of engine crankcase sample points and piping or cable arrangements together with pipe dimensions to detector. (2) Evidence of study to justify the selected location of sample points and sample extraction rate (if applicable) in consideration of the crankcase arrangements and geometry and the predicted crankcase atmosphere where oil mist can accumulate. (3) The manufacturer's maintenance and test manual.(A copy of the manual is to be provided on board ship.) (4) Information relating to type or in-service testing of the engine with engine protection system test arrangements having approved types of oil mist detection equipment.	~~5.~~ 7. In application to **203. ~~10~~11** (2) of the Rules, the engine designer's and oil mist manufacturer's instructions are to be included the following particulars. **【See Rule】** (1) Schematic layout of engine oil mist detection and alarm system showing location of engine crankcase sample points and piping or cable arrangements together with pipe dimensions to detector. (2) Evidence of study to justify the selected location of sample points and sample extraction rate (if applicable) in consideration of the crankcase arrangements and geometry and the predicted crankcase atmosphere where oil mist can accumulate. (3) The manufacturer's maintenance and test manual.(A copy of the manual is to be provided on board ship.) (4) Information relating to type or in-service testing of the engine with engine protection system test arrangements having approved types of oil mist detection equipment.
6. In application to **203. 10** (8) of the Rules, the details are to be submitted for consideration are to be in accordance with the following. **【See Rule】** (1) Engine particulars (type, power, speed, stroke, bore and crankcase volume, etc.) (2) Details of arrangements prevent the build up of potentially explosive conditions within the crankcase, e.g., bearing temperature monitoring, oil splash temperature, crankcase pressure monitoring, recirculation arrangements. (3) Evidence to demonstrate that the arrangements are effective in preventing the build up of potentially explosive conditions together with details of in-service experience. (4) Operating instructions and the maintenance and test instructions.	~~6.~~ 8. In application to **203. ~~10~~11** (8) of the Rules, the details are to be submitted for consideration are to be in accordance with the following. **【See Rule】** (1) Engine particulars (type, power, speed, stroke, bore and crankcase volume, etc.) (2) Details of arrangements prevent the build up of potentially explosive conditions within the crankcase, e.g., bearing temperature monitoring, oil splash temperature, crankcase pressure monitoring, recirculation arrangements. (3) Evidence to demonstrate that the arrangements are effective in preventing the build up of potentially explosive conditions together with details of in-service experience. (4) Operating instructions and the maintenance and test instructions.
〈Newly added〉	9. In application to 203. 12 of the Rules, arrangements and details of oil mist detection and alarm systems including evidence of studies justifying the selected location of sample points and the sample extraction rate(if applicable) from the crankcase and spaces in **203. 4** (8) of the Rules, supported by a confirmation from the manufacturer are to be submitted to the Society for reference. **【See Rule】**
〈Continuing on the next page〉	*〈Continuing on the next page〉*

Present	Amendment
〈Newly added〉	(1) As an alternative to the evidence of studies, an oil mist inlet test may be performed on a running engine. Test conditions such as setup, records or engine loads are to be agreed upon between engine designer, oil mist detector (OMD) manufacturer and respective class society. The test engine is to be chosen to demonstrate OMD arrangement suitability to cover a specified range of engine types and configurations. To allow a repeatable and comparable test, an oil mist generator. **10.** In application to **203. 13** of the Rules, where it is proposed to use the introduce inert gas into the crankcase to minimise a potential crankcase explosion, the details of arrangements are to be follow the **Annex 8-5** of the guidance. **【See Rule】**

Present

Annex 5-7 Reciprocating Internal Combustion Engines Fuelled by Natural Gas*(2025)*

Table 3 Monitoring and safety system functions for DF or GF engines

Monitored parameters [H=High L=Low O=Abnormal status]		Alarm	Automatic activation of the double block-and-bleed valves	Automatic switching over to oil fuel mode(1)	Engine shutdown
Abnormal pressures in the gas fuel supply line	O	●	●	●	●(5)
Gas fuel supply systems - malfunction	O	●	●	●	●(5)
〈Omitted〉					

NOTES: [● = apply]
(1) - (5) 〈omitted〉
(6) Where required by **Ch 2, 203. 10** of the Rules
(7) Automatic safety actions to be activated as specified by the engine manufacturer.
(8) Only for trunk piston engines. This pressure sensor cannot replace or substitute a gas detector.
(9) Only for trunk piston engines. Slow down applies to crosshead engines.

Amendment

Annex 5-7 Reciprocating Internal Combustion Engines Fuelled by Natural Gas*(2025)*

Table 3 Monitoring and safety system functions for DF or GF engines

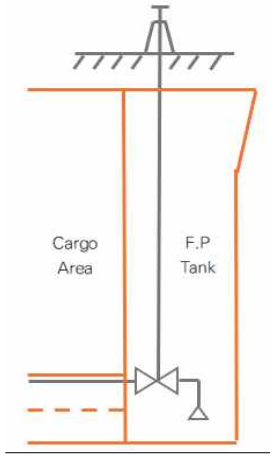
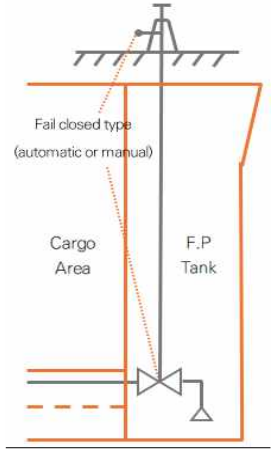
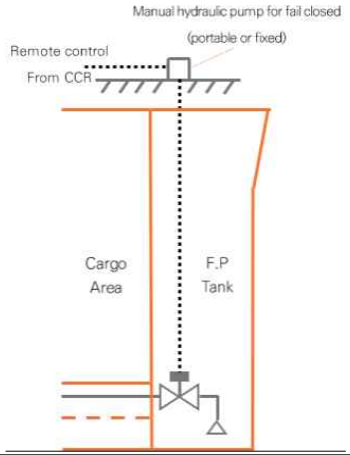
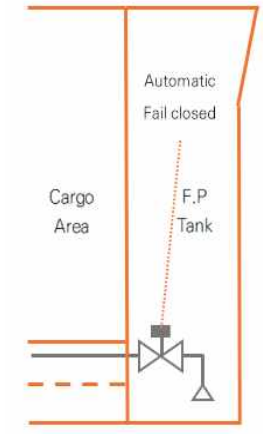
Monitored parameters [H=High L=Low O=Abnormal status]		Alarm	Automatic activation of the double block-and-bleed valves	Automatic switching over to oil fuel mode(1)	Engine shutdown
Abnormal pressures in the gas fuel supply line	O	●	●	●	●(5)
Gas fuel supply systems - malfunction	O	●	●	●	●(5)
〈Omitted〉					

NOTES: [● = apply]
(1) - (5) 〈omitted〉
(6) Where required by **Ch 2, 203. ~~10~~ 11** of the Rules
(7) Automatic safety actions to be activated as specified by the engine manufacturer.
(8) Only for trunk piston engines. This pressure sensor cannot replace or substitute a gas detector.
(9) Only for trunk piston engines. Slow down applies to crosshead engines.

Present	Amendment
# CHAPTER 3 PROPULSION SHAFTING AND POWER TRANSMISSION SYSTEMS ## Section 2 Shaftings **206. Stern tube bearing and sealing device** **1.** In application to **206. 1.** (3) of the Rules, where the length of oil lubricated bearings is less than 2 times the required calculation diameter of the propeller shaft in way of the bearing, the following are to be satisfied with. **【See Rule】** (1) Improvement in condition of bearing loads The relative contact condition between propeller shaft and its bearing in the longitudinal direction is to be improved by employing the slope alignment (including the slope boring) and uniform distribution of bearing loads are to be ensured. For approval of the above, an slop alignment calculation sheet (bending moment, bending stress bearing pressure, bearing load, amount of deflection, angle of inclination, etc.) satisfying the following, and installation instruction is to be submitted. (A) The design of slop alignment is based on the static external force.(the review for shaft alignment variation due to dynamic external force such as bending moment, bending stress and other variation factors is above and beyond the requirements). (B) An absolute static bending moment value acting on any section of propeller shaft shall not exceed the absolute static moment value acting on the aft end of the stern tube bearing. 〈Omitted〉	# CHAPTER 3 PROPULSION SHAFTING AND POWER TRANSMISSION SYSTEMS ## Section 2 Shaftings **206. ~~Stern tube bearing and sealing device~~ Aftmost propeller shaft bearing, Stern tube bearing and sealing device** **1.** In application to **206. 1.** (2) and (3) of the Rules, where the length of oil lubricated bearings is less than 2 times the required calculation diameter of the propeller shaft in way of the bearing, the following are to be satisfied with. **【See Rule】** (1) Improvement in condition of bearing loads (A) Shaft alignment calculations and shaft alignment procedures are to be submitted for review, and the tests and inspections shall be satisfied, according to **Annex 5-12.** (B) If necessary, th relative the relative contact condition between propeller shaft and its bearing in the longitudinal direction is to be improved by employing the slope alignment (including the slope boring) and distribution of loads are to be ensured on bearings. ~~The relative contact condition between propeller shaft and its bearing in the longitudinal direction is to be improved by employing the slope alignment (including the slope boring) and uniform distribution of bearing loads are to be ensured. For approval of the above, an slop alignment calculation sheet (bending moment, bending stress bearing pressure, bearing load, amount of deflection, angle of inclination, etc.) satisfying the following, and installation instruction is to be submitted.~~ ~~(A) The design of slop alignment is based on the static external force.(the review for shaft alignment variation due to dynamic external force such as bending moment, bending stress and other variation factors is above and beyond the requirements).~~ ~~(B) An absolute static bending moment value acting on any section of propeller shaft shall not exceed the absolute static moment value acting on the aft end of the stern tube bearing.~~ 〈Omitted〉

Present	Amendment
# CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT ## Section 1 General **107. General requirements for piping arrangement** **1. -6. 〈Omitted〉** **7. Watertight Bulkhead 【See Rule】** (1) In application to **107. 8** of the Rules, suction pipes of the stern tank are to be fitted with stop valves at the fore side of the bulkhead. (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) *〈Omitted〉*	# CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT ## Section 1 General **107. General requirements for piping arrangement** **1. -6. 〈Omitted〉** **7. Watertight Bulkhead 【See Rule】** (1) In application to **107. 8** of the Rules, suction pipes of the stern tank are to be fitted with stop valves at the fore side of the bulkhead. ~~(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.~~ (2) In application to **107. 8** (2) of the Rules, it may be in accordance with the followings; (A) The valve fitted on the pipe piercing ship's collision bulkhead below the bulkhead deck of passenger ships and the freeboard deck of cargo ships may be either a deck standing manual type or a mechanically powered type with a fail-close arrangement. The valve of the fail-close arrangement shall be of an automatic fail-close type, or shall have an additional manual-closing function activate from a position above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. Examples are provided as the below. (B) For ships of less than 500 gross tonnage and engaged in under coastal services, **107. 8** (2) of the Rules shall not be applied. (C) ~~(B) If it is not possible to install a screw down valve, a butterfly valve may be fitted. In this cases, a butterfly valve~~ In case a butterfly valve is installed, it 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) *〈Omitted〉*

Amendment

Type of arrangement	Example of valve installation	Type of arrangement	Example of valve installation
Case 1	Unacceptable	Case 2	Acceptable
- Manual deck stand controlled from the freeboard deck or bulkhead deck - When fail, the valve remains at its current position		- Manual deck stand controlled from the freeboard deck or bulkhead deck - Fail-close type valve (automatic close, or manual close from the freeboard deck or bulkhead deck) - Example of manual close Manual close shall be capable of being closed by a manual hydraulic pump activated from a position above the bulkhead deck/freeboard deck	
Case 3	Acceptable	Case 4	Acceptable
- Actuated mechanically and controlled remotely from cargo control room, etc. - Manual fail-close from abvoe the freeboard deck or bulkhead deck - Example of manual close Manual close shall be capable of being closed by a manual hydraulic pump activated from a position above the bulkhead deck/freeboard deck		- Actuated mechanically and controlled remotely from cargo control room, etc. - Automatic fail-close	

Present	Amendment
Annex 5-6 Plastic Piping System *(2023)*	**Annex 5-6 Plastic Piping System *(2023)***
6. Installation	**6. Installation**
(1) - (6) *〈Omitted〉*	(1) - (6) *〈Omitted〉*
(7) Penetration of divisions	(7) Penetration of divisions
(A) Where plastic pipes pass through "A" or "B" class divisions, arrangements are to be made to ensure that the fire endurance is not impaired. These arrangements are to be tested in accordance with fire test procedures for "A" and "B" bulkheads specified in **Ch 3, 2604. 2** of the **"Guidance for Approval of Manufacturing Process and Type Approval, etc.".**	(A) Where plastic pipes pass through "A" or "B" class divisions, arrangements are to be made to ensure that the fire endurance is not impaired. These arrangements are to be tested in accordance with fire test procedures for "A" and "B" bulkheads specified in **Ch 3, 2604. 2** of the **"Guidance for Approval of Manufacturing Process and Type Approval, etc.".**
(B) When plastic pipes pass through watertight bulkheads or decks, the water-tight integrity of the bulkhead or deck is to be maintained. For pipes not able to satisfy the requirements in **4**.(1).(E), a metallic shut-off valve operable from above the freeboard deck should be fitted at the bulkhead or deck.	(B) When plastic pipes pass through watertight bulkheads or decks, the water-tight integrity of the bulkhead or deck is to be maintained. For pipes not able to satisfy the requirements in **4**.(1).(E), a metallic shut-off valve operable from above the freeboard deck should be fitted at the bulkhead or deck.
(C) If the bulkhead or deck is also a fire division and destruction by fire of plastic pipes may cause the inflow of liquid from tanks, a metallic shut-off valve operable from above the freeboard deck is to be fitted at the bulk-head or deck.	(C) If the bulkhead or deck is also a fire division and destruction by fire of plastic pipes may cause the inflow of liquid from tanks, a metallic shut-off valve operable from above the freeboard deck is to be fitted at the bulk-head or deck.
〈Newly added〉	(D) For passenger ships, the penetrations used for the passage of plastic piping systems through a watertight bulkheads or decks shall be of a type approval in accordance with **Ch 3, Sec 41** of the **Guidance for Approval of Manufacturing Process and Type Approval, etc.** This requirement shall not apply to cable penetrations in watertight bulkheads and decks.
〈Omitted〉	*〈Omitted〉*

Amendments to the Rules for Classification of Steel Ships

Pt. 6 Electrical Equipment and Control Systems

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Ships contracted for construction on or after 2026/01/01

◉ IACS UI SC305(New Dec. 2024): Single essential propulsion components and their reliability

Present	Amendment
CHAPTER 1 ELECTRICAL EQUIPMENT	**CHAPTER 1 ELECTRICAL EQUIPMENT**
Section 1 - 15 〈same as the present Rules〉	**Section 1 - 15 〈same as the present Rules〉**
Section 16 Electric Propulsion Unit	**Section 16 Electric Propulsion Unit**
1601. - 1602. 〈same as the present Rules〉	1601. - 1602. 〈same as the present Rules〉
1603. Rotating machines *(2025)* 1. - 7. 〈same as the present Rules〉 8. 〈newly added〉	1603. Rotating machines *(2025)* 1. - 7. 〈same as the present Rules〉 8. Single essential propulsion components and their reliability (UI SC305) *(2026)* In accordance with SOLAS Regulation II-1/26.2, single essential propulsion components and their reliability shall comply with the following requirements. (1) The possibility of failures in electric machines shall be considered. Sufficient propulsion capacity shall be maintained or restored within due time for the following failure modes of electric machines, as a minimum: (A) winding insulation failures; and (B) excitation failures. (2) Single electric propulsion motors (both single and dual winding with a single rotor) for main propulsion shall not be considered to provide the reliability required for a single essential propulsion component. A separate propulsion unit sufficient to give the ship a navigable speed should be required for such arrangements. (3) Propulsion arrangements with two independent rotors on a single shaft shall be considered to provide the required reliability, provided it is possible to de-excite or de-flux each of the rotors individually and to supply independently the stators.
1604. - 1608. 〈same as the present Rules〉	1604. - 1608. 〈same as the present Rules〉
Section 17 - 18 〈same as the present Rules〉	**Section 17 - 18 〈same as the present Rules〉**

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

Pt. 6 Electrical Equipment and Control Systems

2025. 9.

Machinery Rule Development Team

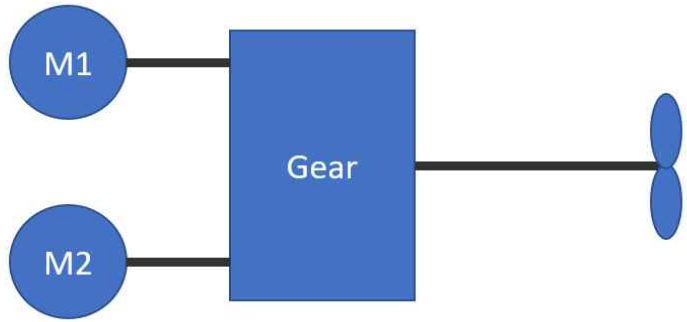
- Main Amendments -

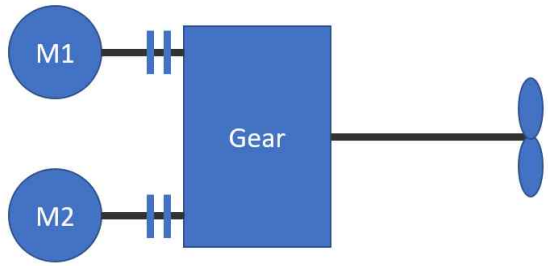
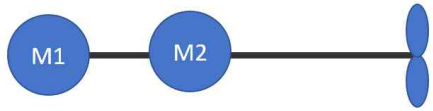
(1) Ships contracted for construction on or after 2026/01/01

◉ IACS UI SC11(Rev.2 Nov. 2024): Precautions against shock, fire and other hazards of electrical origin
◉ IACS UI SC305(New Dec. 2024): Single essential propulsion components and their reliability
◉ IACS UR E15(Rev.5 Jan. 2025): Electrical service required to be operable under fire conditions and fire resistant cables

Present	Amendment
CHAPTER 1 ELECTRICAL EQUIPMENT	**CHAPTER 1 ELECTRICAL EQUIPMENT**
Section 1 - 4 〈same as the present Rules〉	**Section 1 - 4 〈same as the present Rules〉**
Section 5 Cables *(2025)*	**Section 5 Cables *(2025)***
501. - 503. 〈same as the present Rules〉	**501. - 503. 〈same as the present Rules〉**
504. Installation of cables 【See Rule】	**504. Installation of cables 【See Rule】**
1. Precaution against fire protection	1. Precaution against fire protection
(1) - (2) 〈same as the present Rules〉	(1) - (2) 〈same as the present Rules〉
(3) In application to **504. 3** (3) of the Rules, the followings are to be complied with.	**(3) In application to 504. 3 (3) of the Rules, the followings are to be complied with.**
(A) 〈same as the present Rules〉	(A) 〈same as the present Rules〉
(B) In application to **504. 3** (3) of the Rules, the followings are to be complied with.	(B) ~~In application to **504. 3** (3) of the Rules, the followings are to be complied with.~~ Compliance with the requirements for cables and cable installation used for the purpose of (A) may be achieved by either of the following measures: *(2026)*
(a) Cables being of a fire resistant type complying with IEC 60331-1:2018 for cables of greater than 20 mm overall diameter, otherwise IEC 60331-21:1999+AMD1:2009 or IEC 60331-2:2018 for cables with an overall diameter not exceeding 20 mm, are installed and run continuous to keep the fire integrity within the high fire risk area. (see **Fig 6.1.7** of the Guidance) *(2022)*	(a) Cables being of a fire resistant type complying with IEC 60331-1:2018 for cables of greater than 20 mm overall diameter, ~~otherwise IEC 60331-21:1999+AMD1:2009 or~~ and IEC 60331-2:2018 for cables with an overall diameter not exceeding 20 mm, are installed and run continuous to keep the fire integrity within the high fire risk area. (see **Fig 6.1.7** of the Guidance) *(2022)*
(b) 〈same as the present Rules〉	(b) 〈same as the present Rules〉
Systems that are self monitoring, fail safe or duplicated with cable runs as widely separated as is practicable may be exempted.	~~Systems that are self monitoring, fail safe or duplicated with cable runs as widely separated as is practicable may be exempted.~~
	(c) Systems that are self monitoring, fail safe or duplicated with cable runs as widely separated as is practicable may be exempted.

Present	Amendment
(C) 〈same as the present Rules〉	**(C) 〈same as the present Rules〉**
(D) The definition for "high fire risk areas" is the following:	(D) The definition ~~for~~ of "high fire risk areas" is, at a minimuum, to be considered as follows: ~~the following~~:
(a) Machinery spaces as defined by **Pt 8, Ch 1, 103. 30** of the Rules, except spaces having little or no fire risk as defined by **Pt 8, Ch 7, 102. 3** (2) (B) ⑩ of the Rules.	(a) Machinery spaces as defined by **Pt 8, Ch 1, 103. 30** of the Rules, except spaces having little or no fire risk as defined by **Pt 8, Ch 7, 102. 3** (2) (B) ⑩ of the Rules. (Including the interpretations for tables 9.3, 9.4, 9.5, 9.6, 9.7 and 9.8 given in MSC/Circ.1120 as amended by MSC.1/Circ.1436 and MSC.1/Circ.1510)
(b) Spaces containing fuel treatment equipment and other highly flammable substances	(b) Spaces containing fuel treatment equipment and other highly flammable substances
(c) Galley and Pantries containing cooking appliances	(c) Galley and Pantries containing cooking appliances
(d) Laundry containing drying equipment	(d) Laundry containing drying equipment
(e) Spaces as defined by **Pt 8, Ch 7, 102. 3** (2) (B) ⑧, ⑫, ⑭ of the Rules for ships carrying more than 36 passengers	(e) ~~Spaces as defined by **Pt 8, Ch 7, 102. 3** (2) (B) ⑧, ⑫, ⑭ of the Rules for ships carrying more than 36 passengers~~ Cargo spaces except cargo tanks for liquids with flashpoint above 60°C and except cargo spaces exempted in accordance with SOLAS regulations II-2/10.7.1.2 or II- 2/10.7.1.4; and
〈newly added〉	(f) Vehicle, ro-ro and special category spaces.
	(E) In application to **504. 3** (2) of the Rules, the following spaces are to be as a minimum considered as "other high fire risk areas":
	(a) Cargo spaces except cargo tanks for liquids with flashpoint above 60°C and except cargo spaces exempted in accordance with SOLAS regulations II-2/10.7.1.2 or II- 2/10.7.1.4;
	(b) Vehicle, ro-ro and special category spaces;
	(c) Spaces containing flammable liquids; and
	(d) Pantries containing cooking appliances.
(E) - (F) 〈same as the present Rules〉	~~(E) - (F)~~ (F) - (G) 〈same as the present Rules〉
(4) 〈same as the present Rules〉	(4) 〈same as the present Rules〉
2. - 5. 〈same as the present Rules〉	**2. - 5. 〈same as the present Rules〉**
506. - 511. 〈same as the present Rules〉	**506. - 511. 〈same as the present Rules〉**

Present	Amendment
Section 6 - 15 〈same as the present Rules〉 **Section 16 Electric Propulsion Unit** **1603. 〈newly added〉**	**Section 6 - 15 〈same as the present Rules〉** **Section 16 Electric Propulsion Unit** **1603. Rotating Machines *(2026)*** **1.** In application to **1603. 8** of the Rules, examples of acceptable arrangements for roatating machines are illustrated in **Figures 6.1.8 to 6.1.10**.  Fig 6.1.8 Asynchronous machines or machines that can be de-excited

Present	Amendment
	 Fig 6.1.9 Permanent magnet machines with clutches  Fig 6.1.10 Asynchronous machines or machines that can be de-excited
1604. 〈same as the present Rules〉	1604. 〈same as the present Rules〉
Section 17 - 18 〈same as the present Rules〉	Section 17 - 18 〈same as the present Rules〉

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

Pt. 7 Ships of Special Service

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Ships contracted for construction on or after 2026/01/01

◉ MSC.1/Circ.1683 : UI for gas free arrangement reflected in Pt.7 Ch.1 & Ch.6

PART 7 Ships of Special Service

CHAPTER 1 1 Oil Tankers

Section 10 Piping Systems and Venting Systems for Oil Tankers

1001. General 【See Rule】

1. In case where double bottom used as other than cargo oil tank is provided below cargo oil tank, the requirements specified in **Sec 10** of the Rules and additionally the requirements specified in the following are to be complied with ;

(1) The air pipes and sounding pipes provided in double bottom may pass through cargo oil tanks. In this case, all pipe joints in the cargo oil tanks are to be of welded joints with a sufficient thickness according to the requirements of **Table 7.1.8.** Further, consideration is to be given to the piping arrangement for expansion and contraction of the pipes.

(2) Valve operating rods are not to pass through any part subjected to liquid head at all time, such as the inner bottom plate of the cargo tank.

(3) Pipes conveying liquid and bilge suction pipes for tank or void space at the forward position of the ship are to comply with the following requirements:

(A) Pipes for tank or void space adjacent to the forward end of cargo oil tank may be led to the aft pump room. Fuel oil transfer pipes may be led to the pump provided in the engine room.

(B) Pipes for forepeak tank or void space not adjacent to cargo oil tank may be led to the pump provided in the engine room or the pump to provided in the aft pump room. Where this tank used ballast tank, ballast pipe may be led to the pipes for ballast tank adjacent to the cargo oil tank

(C) Where ballast pipes are arranged without passing through cargo oil tanks, piping for fore peak ballast tanks not located adjacent to cargo oil tanks may be led to the pipe lines for ballast tanks located adjacent to cargo oil.(As for bilge pipes, the requirements of **1003. 1.** (3) of the Rules are to apply) To the contrary, however, ballast pipes for ballast tanks located adjacent to cargo oil tanks are not to be led to the pumps which are installed in the engine room for the use of the ballast tanks not located adjacent to cargo oil tanks.

Table 7.1.8 The sounding pipes and air pipes passing through cargo oil tanks

Nominal diameter(mm)	Thickness of pipe	Reference(1)
$A < 100$	8.7	Sch. 160
$100 \leq A < 200$	11.1	Sch. 120
$200 \leq A < 250$	12.7	Sch. 80
$250 \leq A$	15.1	Sch. 80

Note:
(1) Standard specified in *KSD* 3562 and *KSD* 3570

2. All cargo piping (including cargo tank venting piping, relief valve discharge piping, cargo tank purging and gas-freeing piping/ducts), except those serving for inerting gas supply and for bow or stern loading and unloading arrangement, should be arranged within the cargo areas, as defined in **Pt 8 Ch 1 103. 6** of the **Rules for the Classification of Steel Ships**.

Amendment

PART 7 Ships of Special Service

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〉

3. In application to **1002. 4** of the Rules, Piping systems to be connected to cargo oil piping are to be dealt with under the following requirements; **【See Rule】**

(1) Pumps and pipes in any piping system connected to cargo oil pipes are to be dealt with as those in the cargo oil piping system. However, for piping systems specified in **1002. 2** (4), **9** (6), **1003. 1** (2), **2** (2), Guidance **Pt 8. Appendix 8-5. 2** (10) (g) and item (2) below, this requirement may be dispensed with. The piping systems connected to cargo oil piping mean those connected to cargo oil pipes having openings thereto. Hence, for example, hydraulic oil pipes for the control of cargo oil piping system are not regarded as the piping system connected to the cargo oil piping.

(2) In case where the cargo oil piping system is connected to;

(A) Tank vent pipes : The requirements in Guidance **Pt 8. Appendix 8-5 2** (10)(g) & (h) are to be complied with. Ventilating fans except inert gas blowers, are to be installed within the ~~dangerous spaces.~~cargo area. ~~Where the ventilators are located in a enclosded non-hazardous area, it is to comply with the following requirements.~~ However, gas-freeing air-supply fan(s)/blower(s) and related air-supply piping/ducts may be located in the forecastle area, outside of the cargo area, subject to the requirements in **Pt 8 Ch 2 406. 3** of the Guidance. *(2025)*

~~a) The air supply piping from the ventilator is to have automatically actuated shut-off valve and non-return valve in series.~~

~~b) The valves of a) above are to be located at the bulkhead where the air supply piping leaves the non-hazardous area, with at least the non-return valve on the outside.~~

~~c) Shut-off valve is to be opened after the ventilator has started, and automatically closed after the ventilator has stopped. Procedures for the operation of ventilators and valves are to be posted near the place of operation.~~

~~d) The intake of the ventilator is to be derived from a safe place (eg open deck) outside the ventilated space.~~

~~e) Ventilators is to be of non-sparking type.~~

〈Continued〉

Amendment

PART 7 Ships of Special Service

CHAPTER 6 Ships Carrying Dangerous Chemicals in Bulk

Section 3 Ship Arrangements

301. Cargo segregation 【See Rule】

〈Omitted〉

3. Cargo piping

Cargo piping is not to pass through the spaces specified in **301. 3** of the Rules and, in addition, spaces such as fuel oil tanks, fresh water tanks and control stations.

4. In applying **301. 2**, **301. 4** and **305. 3** of the Rules, all cargo piping (including cargo tank venting piping, relief valve discharge piping, cargo tank purging and gas-freeing piping/ducts), except those serving for inerting gas supply and for bow or stern loading and unloading arrangement, should be arranged within the cargo areas, as defined in **Pt 8 Ch 1 103. 6** of the Rules and in **Pt 7 Ch 6 106. 6** of the **Rules for the Classification of Steel Ships**. However, gas-freeing air-supply fan(s)/blower(s) and related air-supply piping/ducts may be located in the forecastle area, outside of the cargo area, subject to the requirements in **Pt 8 Ch 2 406. 3** of the Guidance. *(2025)*

〈Omitted〉

Section 8 Cargo Tank Venting and Gas-freeing Arrangements

806. Cargo tank gas-freeing 【See Rule】

1. The method and instruction of cargo tank gas-freeing are to be described on the Cargo Operation Manual in detail. Where gas-freeing air-supply fan(s)/blower(s) and related air-supply piping/ducts are located in the forecastle area, outside of the cargo area, in accordance with the requirements in **Pt 8 Ch 2 406. 3** of the Guidance, procedures complying with **Pt 8 Ch 2 406. 3** (7) are to be included in the manual. *(2025)*

2. Openings for gas-freeing are to be arranged at places as far as at least the distance specified in **803.** or **1512.** of the Rules from all openings or air intakes of accommodation or service spaces.

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

Pt. 8 Fire Protection and Fire Extinction

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Ships contracted for construction on or after 2026/01/01

◉ MSC.1/Circ.1683 : UI for gas free arrangement reflected in Pt.8
◉ Reflecting MSC.1/Circ.1684 and IACS UI SC140(Rev.4) to Ch 9 Sec 5.

Amendment

PART 8 Fire Protection and Fire Extinction

CHAPTER 2 PROBABILITY OF IGNITION

Section 4 Cargo Areas of Tankers

406. Inerting, purging and gas freeing

1. In applying **406. 2** of the Rules, "the Guidance as provided separated" means **21** of **Annex 8-6.** special requirements of the Guidance. **【See Rule】**

2. In applying **406. 3** of the Rules, the outlets mentioned in (1) (2) (3) are to be located in compliance with **403. 4** (1) (C) of the Rules as far as the horizontal distance is concerned. **【See Rule】**

3. In applying **406. 1** of the Rules, all cargo piping (including cargo tank venting piping, relief valve discharge piping, cargo tank purging and gas-freeing piping/ducts), except those serving for inerting gas supply and for bow or stern loading and unloading arrangement, should be arranged within the cargo areas, as defined in **103. 6** of the Rules and in **Pt 7 Ch 6 106. 6** of the **Rules for the Classification of Steel Ships**. However, gas-freeing air-supply fan(s)/blower(s) and related air-supply piping/ducts may be located in the forecastle area, outside of the cargo area, subject to the followings. *(2025)* **【See Rule】**

   (1) The air-supply piping/ducts should not be permanently connected to cargo piping or cargo tank venting piping/ducts and additionally the following conditions should also be met.

      (a) the connection should be made with detachable connections (e.g. spool pieces, detachable ducts/hoses, etc.) and two shut-off valves fitted as specified in (b) below. Such detachable connections should be located within the cargo area.

      (b) a non-return valve should be provided within the cargo area at the cargo side (i.e. between the said detachable connection and cargo tank(s)). A shut-off valve should be fitted at the fan/blower side (i.e. between the said detachable connection and the fan(s)/blower(s)), and another shut-off valve should be fitted at the cargo side (i.e. between the said detachable connection and cargo tank(s)). The shut-off valve at the cargo side may or may not be located after the non-return valve and therefore, a single non-return valve with a positive means of closure can be located between the said detachable connection and cargo tank(s) in lieu of the combination of the said non-return valve and shut-off valve at the cargo side.

      (c) the shut-off valve at the fan/blower side should open after the air-supply fan(s)/blower(s) is/are started. This should be triggered/activated by the fan discharge pressure.

      (d) the shut-off valve at the fan/blower side should automatically close when the air-supply fan(s)/blower(s) is/are stopped or in the event of loss of gas freeing air pressure.

      (e) when the air-supply duct is arranged penetrating through the bulkhead facing the cargo area, the shut-off valve at the fan/blower side should be fitted directly on the bulkhead. This shut-off valve may or may not be located inside the fan/blower room. Alternatively, the shut-off valve at the fan/blower side may be fitted on the open deck apart from the bulkhead. In all cases, electrical parts (if any) of this shut-off valve should, if fitted in a hazardous area, be of certified safe type (Refer to IEC 60092-502-1999) for use in the concerned hazardous area (Zone 1 or Zone 2).

〈Continued〉

Amendment

(2) the part of the air-supply piping/duct from air intakes of the fan(s)/blower(s) till the shut-off valve at the fan/blower side, except the part necessary to extend into a hazardous area (depending on the location of this shut-off valve), should be arranged in a non-hazardous area. The air intakes for the gas-freeing fans/blowers should be located on the open deck and in a non-hazardous area.

(3) when not being used in gas-freeing operation, the said detachable connection should be dismantled, with all the openings closed with blank flanges; and a warning plate should be provided in the vicinity of each opening, stating "This opening is to be closed with a blank flange when not in gas-freeing operation".

(4) the air-supply fan(s)/blower(s), as well as the associated piping/ducts, should not be used for any other purpose.

(5) the air-supply fan(s)/blower(s) should be of the non-sparking type in accordance with **Pt 8 Ch 3 104.** of the **Rules for the Classification of Steel Ships**.

(6) electrical motor(s) driving the air-supply fan(s)/blower(s) should be of the explosionproof type when fitted in the duct or located- in the cargo area.

(7) suitable and clear operational procedures should be provided stating, inter alia:

(a) the flexible hose, detachable duct or spool piece can only be connected and fixed to the piping/duct just or within 10 minutes before the gas-freeing operation.

(b) the shut-off valves can only be opened after the air-supply fan(s)/blower(s) are put into operation and this action should be interlocked with the fan discharge pressure.

〈Continued〉

Present	Amendment
# CHAPTER 9 STRUCTURAL INTEGRITY	# CHAPTER 9 STRUCTURAL INTEGRITY
## Section 5 Protection of Cargo Tank Structure Against Pressure or Vacuum In Tankers	## Section 5 Protection of Cargo Tank Structure Against Pressure or Vacuum In Tankers
503. Safety measures in cargo tanks	**503. Safety measures in cargo tanks**
1. In applying **503. 2** of the Rules, a P/V breaker fitted on the IG main may be utilized as the required as the required secondary means of venting. Where the cargo is homogenous or for multiple cargoes where the vapours are compatible and do not require isolation. The height requirements of **Ch 2, 403. 4** & **502.** of the Rules and the requirements for devices to prevent the passage of flame of **Ch 2, 403. 3** are not applicable to the P/V breaker provided the settings are above those of the venting arrangements required by **501.** of the Rules. Where the venting arrangements are of the free flow type and the masthead isolation valve is closed for the unloading condition, the IG systems will serve as the primary underpressure protection with the P/V breaker serving as the secondary means. **【See Rule】**	1. ~~In applying **503. 2** of the Rules, a P/V breaker fitted on the IG main may be utilized as the required as the required secondary means of venting. Where the cargo is homogenous or for multiple cargoes where the vapours are compatible and do not require isolation. The height requirements of **Ch 2, 403. 4** & **502.** of the Rules and the requirements for devices to prevent the passage of flame of **Ch 2, 403. 3** are not applicable to the P/V breaker provided the settings are above those of the venting arrangements required by **501.** of the Rules. Where the venting arrangements are of the free flow type and the masthead isolation valve is closed for the unloading condition, the IG systems will serve as the primary underpressure protection with the P/V breaker serving as the secondary means. **【See Rule】**~~
2. Inadvertent closure or mechanical failure of the isolation valves required by **Ch 2, 403. 2** (2) of the Rules & **Annex 8-5, 2** (10) (B) need not be considered in established the secondary means where the cargo is homogenous or for multiple cargoes where the vapours are compatible and do not require isolation since the valves are operated under control of the responsible ships officer and a clear visual indication of the operational status of the valves, and the possibility of mechanical failure of the valves is remote to their simplicity.	2. ~~Inadvertent closure or mechanical failure of the isolation valves required by **Ch 2, 403. 2** (2) of the Rules & **Annex 8-5, 2** (10) (B) need not be considered in established the secondary means where the cargo is homogenous or for multiple cargoes where the vapours are compatible and do not require isolation since the valves are operated under control of the responsible ships officer and a clear visual indication of the operational status of the valves, and the possibility of mechanical failure of the valves is remote to their simplicity.~~
3. For ships that apply pressure sensors in each tank as an alternative secondary means of venting as per **503. 2** of the Rules, the setting of the over-pressure alarm is to be above the pressure setting of the P/V-valve and the setting of the under-pressure alarm is to be below the vacuum setting of the P/V-valve. The alarm settings are to be within the design pressures of the cargo tanks. The settings are to be fixed and not arranged for blocking or adjustment in operation. An exception is permitted for ships that carry different types of cargo and use P/V valves with different settings, one setting for each type of cargo. The settings may be adjusted to account for the different types of cargo.	1. ~~3.~~ For ships that apply pressure sensors in each tank as an alternative secondary means of venting as per **503. 2** of the Rules, the setting of the over-pressure alarm is to be above the pressure setting of the P/V-valve and the setting of the under-pressure alarm is to be below the vacuum setting of the P/V-valve. The alarm settings are to be within the design pressures of the cargo tanks. The settings are to be fixed and not arranged for blocking or adjustment in operation. An exception is permitted for ships that carry different types of cargo and use P/V valves with different settings, one setting for each type of cargo. The settings may be adjusted to account for the different types of cargo.**【See Rule】**

Amendments to KR Technical Rules

Rules for Ships Using Low-flashpoint Fuels

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Ships contracted for construction on or after 2026/01/01

◉ Reflecting Resolution.MSC.551(108) regarding IGF Code

Present	Amendment
CHAPTER 3 GENERAL REQUIREMENTS	**CHAPTER 3 GENERAL REQUIREMENTS**
Section 2 Risk Assessment	**Section 2 Risk Assessment**
201. Risk assessment	**201. Risk assessment**
2. For ships using natural gas as fuel, the risk assessment required by 1 need only be conducted where explicitly required by the followings:	2. For ships using natural gas as fuel, the risk assessment required by 1 need only be conducted where explicitly required by the followings:
(1) 1001. 5 and 1201. 3 of Ch 5	(1) 1001. 5 and 1201. 3 of Ch 5
(2) 401. 1 and 415. 4 (7) (B) of Ch 6	(2) 401. 1 and 415. 4 (7) (B) of Ch 6
(3) 301. 1 of Ch 8,	(3) 301. 1 of Ch 8, 402. of Ch 8,
(4) 401. 1 and 701. of Ch 13	(4) 401. 1 and 701. of Ch 13
(5) 801. 1 (10) of Ch 15	(5) 801. 1 (10) of Ch 15
(6) 104. 4 and 106. 8 of Annex 2	(6) 104. 4 and 106. 8 of Annex 2
CHAPTER 7 MATERIAL AND GENERAL PIPE DESIGN	**CHAPTER 7 MATERIAL AND GENERAL PIPE DESIGN**
Section 3 Pipe Design	**Section 3 Pipe Design**
302. Wall thickness	**302. Wall thickness**
1. The minimum wall thickness is to be calculated as follows:	1. The minimum wall thickness is to be calculated as follows:
$t = \frac{t_0 + b + c}{1 - \frac{a}{100}}$ (mm)	$t = \frac{t_0 + b + c}{1 - \frac{\lvert a \rvert}{100}}$ (mm)
[same]	[same]
a = negative manufacturing tolerance for thickness (%).	a = negative manufacturing tolerance for thickness (%). negative manufacturing tolerance for thickness (%), i.e. where a is the manufacturing tolerance of −5%, |a| is equal to 5 and shall be entered into the formula as 1− (5/100).

Present	Amendment
# CHAPTER 8 BUNKERING ## Section 4 Manifold **401. Manifold** The bunkering manifold is to be designed to withstand the external loads during bunkering. The connections at the bunkering station are to be of dry-disconnect type equipped with additional safety dry break-away coupling/self-sealing quick release. The couplings are to be of a standard type.	# CHAPTER 8 BUNKERING ## Section 4 Manifold **401. Manifold** The bunkering manifold shall be designed to withstand the external loads during bunkering. The connections at the bunkering station shall be arranged in order to achieve a dry-disconnect operation in one of the followings ways **1.** A dry-disconnect / connect coupling in accordance with a standard at least equivalent to those acceptable to the Organization **2.** A manual connect coupler or hydraulic connect coupler, used to connect the bunker system to the receiving vessel bunkering manifold presentation flange **3.** A bolted flange to flange assembly.
402. (New)	**402.** When intended to use either of the connections specified in paragraphs **Ch 8, 401. 2** and **401. 3** these shall be combined with operating procedures that ensure a dry-disconnect is achieved. The arrangement shall be subject to special consideration informed by a bunkering arrangement risk assessment conducted at the design stage and considering dynamic loads at the bunkering manifold connection to a recognized standard acceptable to the Administration, the safe operation of the ship and other hazards that may be relevant to the ship during bunkering operation. The fuel handling manual required by Ch.18 201.3 shall include documentation that the bunkering arrangement risk assessment was conducted, and that special consideration was granted under this requirement.
403. (New)	**403** An emergency release coupler (ERC) / Emergency Release System (ERS) or equivalent means shall be provided, unless installed on the bunkering supply side of the bunkering line, and the said means shall be in accordance with a standard equivalent to those acceptable to the Organization it shall enable a quick physical disconnection Ądry break-awayĄ of the bunker system in an emergency event."

Present	Amendment
# CHAPTER 9 FUEL SUPPLY TO CONSUMERS ## Section 3 Redundancy of Fuel Supply **301. Redundancy of fuel supply** 1. For single fuel installations the fuel supply system is to be arranged with full redundancy and segregation all the way from the fuel tanks to the consumer, so that a leakage in one system does not lead to an unacceptable loss of power.	# CHAPTER 9 FUEL SUPPLY TO CONSUMERS ## Section 3 Redundancy of Fuel Supply **301. Redundancy of fuel supply** **1.** For single fuel installations the fuel supply system shall be arranged with redundancy and segregation, so that a leakage in one system, or failure of one of the fuel supply essential auxiliaries, does not lead to an unacceptable loss of power. In the event of a leakage or failure, and in accordance with SOLAS regulation II-1/26.3, the Administration, having regard to overall safety considerations, may accept a partial reduction in propulsion capability from normal operation.
## Section 4 Safety Functions of Gas Supply System **401. Safety functions of gas supply system** 7. In cases where the master gas fuel valve is automatically shutdown, the complete gas supply branch downstream of the double block and bleed valve are to be automatically ventilated assuming reverse flow from the engine to the pipe. 8. There is to be one manually operated shutdown valve in the gas supply line to each engine upstream of the double block and bleed valves to assure safe isolation during maintenance on the engine.	## Section 4 Safety Functions of Gas Supply System **401. Safety functions of gas supply system** **7.** In cases where the master gas fuel valve is automatically shut down when the safety system as required in **Ch 15, 201. 2** is activated, the complete gas supply pipe between this master gas fuel valve and the double block and bleed valves and between the double block and bleed valves and the consumer shall be automatically vented. **8.** There shall be one manually operated shutdown valve in the gas supply line to each gas consumer upstream of the double block and bleed valves to assure safe isolation during maintenance on the gas consumer.

Present	Amendment
Section 6 Fuel Supply to Consumers in Gas-safe Machinery Spaces	**Section 6 Fuel Supply to Consumers in Gas-safe Machinery Spaces**
601. Fuel supply to consumers in gas-safe machinery spaces	**601. Fuel supply to consumers in gas-safe machinery spaces**
1. Fuel piping in gas-safe machinery spaces are to be completely enclosed by a double pipe or duct fulfilling one of the following conditions: 【See Guidance】 (1) the gas piping is to be a double wall piping system with the gas fuel contained in the inner pipe. The space between the concentric pipes is to be pressurized with inert gas at a pressure greater than the gas fuel pressure. Suitable alarms are to be provided to indicate a loss of inert gas pressure between the pipes. When the inner pipe contains high pressure gas, the system is to be so arranged that the pipe between the master gas valve and the engine is automatically purged with inert gas when the master gas valve is closed; or *(2) Same* *(3) Same*	1. Gas fuel piping in gas-safe machinery spaces are to be completely enclosed by a double pipe or duct fulfilling one of the following conditions: 【See Guidance】 (1) the gas fuel piping is to be a double wall piping system with the gas fuel contained in the inner pipe. The space between the concentric pipes shall be pressurized with inert gas at a pressure greater than the gas fuel pressure. Suitable alarms are to be provided to indicate a loss of inert gas pressure between the pipes; or *(2) Same* *(3) Same*
Section 8 Design of Ventilated Duct, Outer Pipe Against Inner Pipe Gas Leakage	**Section 8 Design of Ventilated Duct, Outer Pipe Against Inner Pipe Gas Leakage**
801. The design pressure of the outer pipe or duct The design pressure of the outer pipe or duct of fuel systems is not to be less than the maximum working pressure of the inner pipe. Alternatively for fuel piping systems with a working pressure greater than 1.0 MPa, the design pressure of the outer pipe or duct is not to be less than the maximum built-up pressure arising in the annular space considering the local instantaneous peak pressure in way of any rupture and the ventilation arrangements.	**801. The design pressure of the outer pipe or duct** The design pressure of the outer pipe or duct of fuel systems shall not be less than the maximum working pressure of the inner pipe. Alternatively, the design pressure of the outer pipe or duct may be calculated in accordance with **802.**

Present	Amendment
802. High-pressure fuel piping the design pressure of the ducting 1. For high-pressure fuel piping the design pressure of the ducting is to be taken as the higher of the following:	**802. The alternative design pressure of outer pipe or duct** 1. Alternatively to **801.**, the design pressure of the outer pipe or duct is to be taken as the higher of the following
804. Testing and Dimension of Ducts For low pressure fuel piping the duct is to be dimensioned for a design pressure not less than the maximum working pressure of the fuel pipes. The duct is to be pressure tested to show that it can withstand the expected maximum pressure at fuel pipe rupture.	**804. Testing ~~and Dimension~~ of Ducts** The duct is to be pressure tested to show that it can withstand the expected maximum pressure at fuel pipe rupture
CHAPTER 11 FIRE SAFETY **Section 6 Dry Chemical Powder Fire-extinguishing System**	**CHAPTER 11 FIRE SAFETY** **Section 6 Dry Chemical Powder Fire-extinguishing System**
601. Dry chemical powder fire-extinguishing system 2. In addition to any other portable fire extinguishers that may be required elsewhere in IMO instruments, one portable dry powder extinguisher of at least 5 kg capacity is to be located near the bunkering station.	**601. Dry chemical powder fire-extinguishing system** 2. In addition to any other portable fire extinguishers that may be required elsewhere in IMO instruments, one portable dry powder extinguisher of at least 5 kg capacity shall be located near the bunkering station and in the fuel preparation room.
CHAPTER 12 EXPLOSION PREVENTION **Section 5 Hazardous Area Zones**	**CHAPTER 12 EXPLOSION PREVENTION** **Section 5 Hazardous Area Zones**
501. Zone "0" Zone "0" includes, but is not limited to: 1. The interiors of fuel tanks 2. Pipes and equipment containing fuel 3. Any pipe work of pressure-relief or other venting systems for fuel tanks *4. (New)*	**501. Zone "0"** Zone "0" includes, but is not limited to: 1. The interiors of fuel tanks 2. Pipes and equipment containing fuel 3. Any pipe work of pressure-relief or other venting systems for fuel tanks 4. Interbarrier spaces as defined by **Ch 1, 102. 15 (2)**

Present	Amendment
502. Zone "1" This zone includes, but is not limited to: 1. tank connection spaces, fuel storage hold spaces(Fuel storage hold spaces for type C tanks are normally not considered as zone "1") and interbarrier spaces;	**502. Zone "1"** This zone includes, but is not limited to: 1. tank connection spaces, fuel storage hold spaces(Fuel storage hold spaces for type C tanks are normally not considered as zone "1") ~~and interbarrier spaces;~~
CHAPTER 15 CONTROL, MONITORING AND SAFETY SYSTEMS **Section 4 Bunkering and Liquefied Gas Fuel Tank Monitoring** **401. Level indicators for liquefied gas fuel tanks** 3. Liquefied gas fuel tank liquid level gauges may be of the following types: (1) indirect devices, which determine the amount of fuel by means such as weighing or in-line flow metering; or (2) closed devices, which do not penetrate the liquefied gas fuel tank, such as devices using radio-isotopes or ultrasonic devices; *(3) (new)*	**CHAPTER 15 CONTROL, MONITORING AND SAFETY SYSTEMS** **Section 4 Bunkering and Liquefied Gas Fuel Tank Monitoring** **401. Level indicators for liquefied gas fuel tanks** **3.** Liquefied gas fuel tank liquid level gauges may be of the following types: (1) indirect devices which determine the amount of fuel by means such as weighing or in-line flow metering; or (2) closed devices which do not penetrate the liquefied gas fuel tank, such as devices using radio-isotopes or ultrasonic devices; (3) closed devices which penetrate the liquefied gas fuel tank but which form part of a closed system and keep the gas fuel from being released. Such devices shall be considered as tank connections. If the closed gauging device is not mounted directly onto the tank, it shall be provided with a shut-off valve located as close as possible to the tank
CHAPTER 18 OPERATION **Section 4 Regulations for Bunkering Operations** **401. Responsibilities** 1. Before any bunkering operation commences, the master of the receiving ship or his representative and the representative of the bunkering source (Persons In Charge, PIC) shall: (1) agree in writing the transfer procedure, including cooling down and if necessary, gassing up; the maximum transfer rate at all stages and volume to be transferred;	**CHAPTER 18 OPERATION** **Section 4 Regulations for Bunkering Operations** **401. Responsibilities** 1. Before any bunkering operation commences, the master of the receiving ship or his representative and the representative of the bunkering source (Persons In Charge, PIC) shall: (1) agree in writing the transfer procedure, including cooling down and if necessary, gassing up; the maximum transfer rate at all stages; minimum and maximum limiting transfer pressure and temperature; bunkering line PRVs settings; and volume to be transferred

Amendments to KR Technical Rules

Guidance for Prevention Systems of Pollution from Ships

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Ships contracted for construction on or after 2026/01/01

◉ Incorporation of IACS UR M86 (Nov. 2024) Revision of monitoring and safety requirements related to EGCS (Exhaust Gas Cleaning System)
◉ Amendment to para. 205. 3. (2), Sec. 2 of Ch. 2 to align the Korean and English texts.
◉ Amendment to correct reference clauses for para. 303, Sec. 3 of Ch. 3 and para. 104, Sec. 1 of Ch. 7.

Present	Amendment
CHAPTER 2 Nitrogen oxide Emission Abatement Systems **Section 2 Selective Catalytic Reduction(SCR) system** **205. Handling urea solution as reductant agent** **3. Piping system and venting system of urea solution storage tank** (1) The reductant piping and venting systems are to be independent of other ship service piping and/or systems. Reductant piping systems are not to be located in accommodation, service spaces, or control stations. The vent pipes of the storage tank are to terminate in a safe location on the weather deck and the tank venting system is to be arranged to prevent entrance of water into the urea tank. (2) Reductant tanks are to be of steel or other equivalent material with a melting point above 925℃. Pipes/piping systems are to be of steel or other equivalent material with melting point above 925℃, except downstream of the tank valve, provided this valve is metal seated and arranged as fail-to-closed or with quick closing from a safe position outside the space in the event of fire; in such case, type approved plastic piping may be accepted even if it has not passed a fire endurance test. Reductant tanks and pipes/piping systems are to be made with a material compatible with reductant or coated with appropriate anti-corrosion coating. (2020) (3) Material requirement "to be of steel or other equivalent material" in (2) with a melting point	**CHAPTER 2 Nitrogen oxide Emission Abatement Systems** **Section 2 Selective Catalytic Reduction(SCR) system** **205. Handling urea solution as reductant agent** **3. Piping system and venting system of urea solution storage tank** (1) The reductant piping and venting systems are to be independent of other ship service piping and/or systems. Reductant piping systems are not to be located in accommodation, service spaces, or control stations. The vent pipes of the storage tank are to terminate in a safe location on the weather deck and the tank venting system is to be arranged to prevent entrance of water into the urea tank. (2) Reductant tanks and pipes/piping systems are to be of steel or other equivalent material with a melting point above 925℃. ~~Pipes/piping systems are to be of steel or other equivalent material with melting point above 925℃, except downstream of the tank valve, provided this valve.~~If the tank valve is metal seated and arranged as fail-to-closed or with quick closing from a safe position outside the space in the event of fire~~; in such case, type approved plastic piping may be accepted~~ this requirement does not apply to the downstream of the tank valve. In such cases, type-approved plastic piping located downstream of the tank valve may be exceptionally accepted even if it has not passed a fire endurance test. Reductant tanks and pipes/piping systems are to be made with a material compatible with reductant or coated with appropriate anti-corrosion coating. (2026) (3) Material requirement "to be of steel or other equivalent material" in (2) with a melting point

Present	Amendment
CHAPTER 3 Sulphur oxide Emission Abatement Systems	**CHAPTER 3 Sulphur oxide Emission Abatement Systems**
Section 2 Exhaust Gas Cleaning(EGC) system	**Section 2 Exhaust Gas Cleaning(EGC) system**
(...)	(...)
205. EGC System Configuration	**205. EGC System Configuration**
(...)	(...)
3. Redundancy (Applicable when only the "CEmS-EGC(R)" class notation)	**3. Redundancy (Applicable when only the "CEmS-EGC(R)" class notation)**
(1) Redundancy of equipment is to be provided for those rotating and reciprocating components that form part of the EGC essential supplementary systems, such as pumps, fans, blowers, etc.	(1) Redundancy of equipment is to be provided for those rotating and reciprocating components that form part of the EGC essential supplementary systems, such as pumps, fans, blowers, etc.
(...)	(...)
(6) If the Society considers that the redundancy of the pump and blower (including the exhaust fan) required above is acceptable to the Society, the provision of spare parts made up of rotating parts, including motors and bearings may be permitted.	(6) If the Society considers that the redundancy of the pump and blower (including the exhaust fan) required above is acceptable to the Society, the provision of spare parts made up of rotating parts, including motors and bearings may be permitted.
4. Exhaust gas by-pass/dry operation	**4. Exhaust gas by-pass/dry operation**
EGC units that incorporate a wet washwater scrubbing process are to be capable of being operated without the washwater system in operation or are to be installed with an exhaust bypass arrangement or changeover system to enable continued operation of the fuel oil combustion machinery in the event the exhaust emission abatement system is not in operation, either through operational selection or equipment failure. As applicable, evidence of material suitability is to be submitted for dry running of SOx scrubbers. Such a device may not be required if the flow of unrestricted exhaust gas is ensured and there is no risk of a failure that results in the stop of the oil burning machinery.	EGC units that incorporate a wet washwater scrubbing process are to be capable of being operated without the washwater system in operation or are to be installed with an exhaust bypass arrangement or changeover system to enable continued operation of the fuel oil combustion machinery in the event the exhaust emission abatement system is not in operation, either through operational selection or equipment failure. As applicable, evidence of material suitability is to be submitted for dry running of SOx scrubbers. Such a device may not be required if the EGCS is designed for dry operation, the flow of unrestricted exhaust gas is ensured, and there is no risk of a failure that results in the stop of the oil burning machinery.

Present	Amendment
207. EGC System Piping **1. Exhaust Gas Piping Systems** (1) Exhaust Gas Piping/Scrubber Materials (...) (2) Exhaust Gas Piping Valves (A) Valves used in the EGC system are to comply with the relevant requirements specified in Pt 5, Ch 6 of the Rules for the Classification of Steel Ships. The valves are to be constructed of corrosion resistant materials and the valves located at the front of the SOx scrubber may be the same material as the valve of the the oil burning machinery. (B) Isolation and bypass valves used in EGC system exhaust piping systems are to prevent the passage of exhaust gases to other fuel oil combustion machinery or machinery spaces. Where bypass arrangements for the SOx scrubber unit are provided, the isolation and bypass valves are to be arranged in an interlocked, fail safe manner, such that free flow of exhaust gases to the atmosphere at all times is possible, either through the scrubber unit or through the bypass. Bypass valves are to be provided with a local position indicator. (C) Valves are to be installed in accessible locations, clear of or protected from obstructions, moving equipment, and hot surfaces, in order to permit regular inspection and periodic servicing.	**207. EGC System Piping** **1. Exhaust Gas Piping Systems** (1) Exhaust Gas Piping/Scrubber Materials (...) (2) Exhaust Gas Piping Valves (A) Valves/dampers used in the EGC system are to comply with the relevant requirements specified in Pt 5, Ch 6 of the Rules for the Classification of Steel Ships. The valves are to be constructed of corrosion resistant materials and the valves located at the front of the SOx scrubber may be the same material as the valve of the the oil burning machinery. (B) Isolation and bypass valves/dampers used in EGC system exhaust piping systems are to prevent the passage of exhaust gases to other fuel oil combustion machinery or machinery spaces. Where bypass arrangements for the SOx scrubber unit are provided, the isolation valves/dampers and bypass valves/dampers are to be arranged in an interlocked, fail safe manner, such that free flow of exhaust gases to the atmosphere at all times is possible, either through the scrubber unit or through the bypass. Bypass valves are to be provided with a local position indicator. (C) In installations with individually controlled bypass and uptake dampers, an interlock is required to prevent both dampers from being closed at the same time. The interlock can comprise a pressure sensor upstream of the dampers, interfaced to the EGCS safety system, opening the bypass damper in case of high back pressure. (~~C~~D) Valves are to be installed in accessible locations, clear of or protected from obstructions, moving equipment, and hot surfaces, in order to permit regular inspection and periodic servicing.

Present	Amendment
208. System Design **1. General** (1) The EGC control system is to be integrated with, or in direct communication with, the engine control system. (2) The system is to be designed such that a single fault of a component will not lead to a potentially dangerous situation for human safety and the vessel. Data describing the identification of hazards associated with the design and operation of the exhaust gas cleaning system and the means of safeguard or control is to be submitted.	**208. System Design** **1. General** (1) The EGC control system is to be integrated with, or in direct communication with, the engine control system. (2) The system is to be designed such that a single fault of a component will not lead to a potentially dangerous situation for human safety and the vessel. ~~Data describing the identification of hazards associated with the design and operation of the exhaust gas cleaning system and the means of safeguard or control is to be submitted.~~ An FMEA, or equivalent, demonstrating the safety system design basis is to be submitted to the Society, when the control system is connected to an integrated control system of a vessel. (3) For vessels with unmanned propulsion machinery space, the alarm and monitoring systems of the EGCS can be integrated in the vessel's centralized monitoring systems.

Present	Amendment
3. Safety Shutdown System (1) An independent shutdown system is to be provided. The automatic safety shutdown system is to be based on the following: (A) Means are to be provided to indicate the parameters causing shutdown. (B) Upon activation of the safety shutdown system, alarms are to be given at the normal control position and at the local control position. (C) In the event where shutdown by the safety shutdown system is activated, the restart should not occur automatically, unless after the system is reset manually. (2) Monitoring and safety shutdowns are to be in accordance with **Table 3.2.3** of this Section.	**3. Safety Shutdown System** (1) An independent shutdown system is to be provided to ensure that failures or malfunctions in the control and alarm systems do not impair the operation of the safety system.. The automatic safety shutdown system is to be based on the following: ~~(A) Means are to be provided to indicate the parameters causing shutdown.~~ ~~(B) Upon activation of the safety shutdown system, alarms are to be given at the normal control position and at the local control position.~~ (A) Upon activation of the safety shutdown system, visual and audible alarms are to be indicated at both the local and remote control positions. Visual alarms are to include a means of indicating the parameters causing shutdown. (B) In addition to the automatic shutdown system, manual emergency shutdown arrangements are to be provided at both the local and remote the control positions. (C) In the event where shutdown by the safety shutdown system is activated, the restart should not occur automatically, unless after the system is manually reset ~~manually.~~ (2) Monitoring and safety shutdowns are to be in accordance with **Table 3.2.3** of this Section, and the safety shutdown is to be automatically activated under the conditions specified therein.

Present

Table 3.2.3 Monitoring and Safety System Functions for EGC Systems *(2020)*

Parameters	Display	Alarm activated	Automatic Shutdown
EGC exhaust fan/blower motors	Run	Stop	
EGC exhaust bypass, isolation, mixing valves, where provided	Position		
Exhaust gas temperature after EGC unit(except if dry running can be used)	●	H	
Differential pressure across EGC scrubber unit or EGC circuit or pressure before EGC unit(except if dry running can be used)	●	H	HH
EGC washwater pumps, alkali system pumps or dry system supply device	Run	Stop	
EGC washwater and alkali system supply pressure	●	L	
EGC washwater system supply temperature(Closed/Hybrid type)	●	H	
EGC alkali system supply temperature	●	L/H	
Water level in EGC scrubber	●	H	HH
Alkali storage tank temperature		L/H	
Alkali storage tank level	●	L/H	
Alkali system drip tray level		H	
EGC residue tank level	●	H	
Power supply fail of control, alarm, monitoring or safety device		Fail	

Amendment

Table 3.2.3 Monitoring and Safety System Functions for EGC Systems *(2020)*

	Group 1		Group 2
Parameters	Display	Alarm activated	Automatic Shutdown and EGC bypass(1)
EGC exhaust fan/blower motors(3)	Run	Stop	
EGC exhaust bypass, isolation, mixing valves, where provided	Position(4)		
Exhaust gas temperature after EGC unit(except if dry running can be used)	●	H	●(HH)
Differential pressure across EGC scrubber unit or EGC circuit or pressure before EGC unit(2)(except if dry running can be used)	●	H	HH
EGC washwater pumps, Chemical treatment fluid (Alkali) system pumps or dry system supply device	Run	Stop	
EGC washwater and chemical treatment fluid (Alkali) system supply pressure	●	L	
EGC washwater system supply temperature(Closed/Hybrid type)	●	H	
EGC Chemical treatment fluid (Alkali) system supply temperature	●	L/H	
Water level in EGC scrubber	●	H	HH
Chemical treatment fluid (Alkali) storage tank temperature		L/H(5)	
Chemical treatment fluid (Alkali) storage tank level	●	L/H(5)	
~~Alkali system drip tray level~~ Chemical treatment fluid leakage detection in system drip tray or drain / residue tank		H(6)	
~~EGC residue tank level~~	~~●~~	~~H~~	
Power supply fail of control, alarm, monitoring or safety device		Fail	

Gr.1 Common sensor for indication and alarm, Gr.2 Sensor for shut down and bypass

Notes
(1) Automatic stopping of all EGCS pumps. Automatic bypass of the EGC unit is required when the EGC unit is not suitable for operation in the dry condition.
(2) As applicable in accordance with the specific EGC system design and installation.
(3) If applied.
(4) See 207.1.(2) of Sec 2.
(5) 207.1.(2) 6 of Sec 3.
(6) If necessary, 207.3(4) of Sec 3.

Present	Amendment
# CHAPTER 7 Onboard Carbon Capture and Storage system ## Section 1 General **104. Plans and Documents** (...) **2. Plans and Documents for approval** (1) General arrangement of OCCS system (2) Specification of OCCS system (3) Analysis for compatibility with fuel consumers (incl. **404. 3** (2))	# CHAPTER 7 Onboard Carbon Capture and Storage system ## Section 1 General **104. Plans and Documents** (...) **2. Plans and Documents for approval** (1) General arrangement of OCCS system (2) Specification of OCCS system (3) Analysis for compatibility with fuel consumers (incl. 304 ~~**404. 3** (2)~~)

Amendments to KR Technical Rules

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

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Application date for type approval certification on or after 2026/01/01

◉ Updating reference clauses reflecting IACS UR M10(Rev.5)
◉ IACS UR E10(Rev.10 Aug. 2024): Test specification for type approval
◉ Deleted reference clauses and requriements related to the type approval of propeller shaft aftmost bearing
◉ Reflecting IACS UR M85(New) to Ch 3 Sec 42 about Type approval of propeller shaft aftmost bearing

Present	Amendment
# CHAPTER 3 TYPE APPROVAL	# CHAPTER 3 TYPE APPROVAL
## Section 10 Crankcase Oil Mist Detection and Alarm Equipment	## Section 10 Crankcase Oil Mist Detection and Alarm Equipment
1003. Design requirements Oil mist detection arrangements are to be designed and fitted in accordance with the following requirements. (1) The oil mist detection arrangements are to be installed in accordance with the engine designer's and oil mist manufacturer's instructions and recommendations. Items and contents to be included in the instructions and recommendations are to comply with the requirements in **Pt 5, Ch 2, 203.** 10 of the Guidance relating to the Rules. (2) Alarms and shutdowns for the oil mist detection arrangements and the system arrangements are to be in accordance with the requirements in **Pt 9, Ch 3, Sec 3.** (3) Where sequential oil mist detection arrangements are provided the sampling frequency and time is to be as short as reasonably practicable. (4) The oil mist detection arrangements are to provide an indication that any lenses fitted in the equipment and used in determination of the oil mist level have been partially obscured to a degree that will affect the reliability of the information and alarm indication. (5) The oil mist detection arrangements are to provide a alarm indication in the event of a foreseeable functional failure in the equipment and installation arrangements. (6) Where oil mist detection equipment includes the use of programmable electronic systems, the arrangements are to be in accordance with the requirements in **Pt 9, Ch 3, 302.** (7) Oil mist detection arrangements are to be capable of being tested on the test bed and onboard under engine at standstill and engine running at normal operating conditions.	**1003. Design requirements** Oil mist detection arrangements are to be designed and fitted in accordance with the following requirements. (1) The oil mist detection arrangements are to be installed in accordance with the engine designer's and oil mist manufacturer's instructions and recommendations. Items and contents to be included in the instructions and recommendations are to comply with the requirements in **Pt 5, Ch 2, 203.** ~~10~~ 7 of the Guidance relating to the Rules. (2) Alarms and shutdowns for the oil mist detection arrangements and the system arrangements are to be in accordance with the requirements in **Pt 9, Ch 3, Sec 3.** (3) Where sequential oil mist detection arrangements are provided the sampling frequency and time is to be as short as reasonably practicable. (4) The oil mist detection arrangements are to provide an indication that any lenses fitted in the equipment and used in determination of the oil mist level have been partially obscured to a degree that will affect the reliability of the information and alarm indication. (5) The oil mist detection arrangements are to provide a alarm indication in the event of a foreseeable functional failure in the equipment and installation arrangements. (6) Where oil mist detection equipment includes the use of programmable electronic systems, the arrangements are to be in accordance with the requirements in **Pt 9, Ch 3, 302.** (7) Oil mist detection arrangements are to be capable of being tested on the test bed and onboard under engine at standstill and engine running at normal operating conditions.

Present	Amendment
# CHAPTER 3 TYPE APPROVAL	# CHAPTER 3 TYPE APPROVAL
## Section 1 - 22 〈same as the present Rules〉	## Section 1 - 22 〈same as the present Rules〉
## Section 23 Automatic and Remote Control Systems	## Section 23 Automatic and Remote Control Systems
2301. - 2303. 〈same as the present Rules〉	**2301. - 2303. 〈same as the present Rules〉**
2304. Type test	**2304. Type test**
1. Hardware	**1. Hardware**
(1) 〈same as the present Rules〉	(1) 〈same as the present Rules〉
(2) **Test methods and criteria**	(2) **Test methods and criteria**
(A) After the drawings and documents submitted in accordance with the requirements in **2302.** have been examined, tests are to be carried out in accordance with the testing condition and method of **Table 3.23.1** in the presence of the Society's surveyor, and they are to be proven to satisfy the criteria of Table 3.23.1.	(A) After the drawings and documents submitted in accordance with the requirements in **2302.** have been examined, tests are to be carried out in accordance with the testing condition and method of **Table 3.23.1** in the presence of the Society's surveyor, and they are to be proven to satisfy the criteria of Table 3.23.1.
	Table 3.23.1 〈See the next page〉
(B) - (D) 〈same as the present Rules〉	(B) - (D) 〈same as the present Rules〉
2. - 3. 〈same as the present Rules〉	**2. - 3. 〈same as the present Rules〉**
## Section 23 - 41 〈same as the present Rules〉	## Section 23 - 41 〈same as the present Rules〉

〈Present〉

Table 3.23.1 Environmental Test Items, Testing Conditions and Methods, and Criteria *(2025)*

<table>
<tr><th>No.</th><th>Test item</th><th>Testing condition and method</th><th>Criteria</th></tr>
<tr><td>1-8</td><td colspan="3">〈same as the present Rules〉</td></tr>
<tr><td>9</td><td>Inclination test</td><td>· The equipment is at an operating condition and check the operation of the equipment with 22.5° static inclination.
· The equipment is at an operating condition and check the operation of the equipment with rolling of 22.5° at period of about 10 seconds for not less than 15 min.
· The test is carried out in three axis directions.
· These inclination tests are normally not required for equipment with no moving parts.

· Detailed test methods are referred to IEC 60092-504:2016.</td><td>〈same as the present Rules〉</td></tr>
<tr><td>10</td><td>Insulation resistance test</td><td>· Measure the insulation resistance between current carrying parts and between current parts and earth when measured with the following application voltage.

<table><tr><th>Rated voltage : Un(V)</th><th>Test voltage(D.C. voltage)(V)</th></tr><tr><td>Un ≤ 65</td><td>2 × Un, min. 24</td></tr><tr><td>Un > 65</td><td>500</td></tr></table>
· The insulation resistance measurement shall be carried out before and after a series of environmental tests: the damp heat test, cold test, salt mist test, and high voltage test.
· For the equipment containing circuits in which the application of the test voltage is not desirable, the test voltage is applied after removing the circuits.</td><td></td></tr>
<tr><td>11</td><td>High voltage test</td><td>· Apply the following test voltage, alternating of a frequency of 50Hz or 60Hz, between current carrying parts and between current-carrying parts connected and earth for 1 minute.

〈same as the present Rules〉</td><td></td></tr>
<tr><td>12-16</td><td colspan="3">〈same as the present Rules〉</td></tr>
<tr><td>17</td><td>Conducted radio frequency immunity test</td><td>〈same as the present Rules〉
· Detailed test methods are referred to Test level 2 of IEC 61000-4-6:2013.</td><td>〈same as the present Rules〉</td></tr>
<tr><td>18</td><td colspan="3">〈same as the present Rules〉</td></tr>
<tr><td>19</td><td>Surge immunity test</td><td>〈same as the present Rules〉
· Detailed test methods are referred to Test level 2 of IEC 61000-4-5:2017.</td><td>〈same as the present Rules〉</td></tr>
<tr><td>20</td><td>Radiated emission test</td><td>〈same as the present Rules〉
· Detailed test methods are referred to CISPR 16-2-3:2016 and IEC 60945:2002(for 156 ~ 165 MHz).</td><td>〈same as the present Rules〉</td></tr>
<tr><td>21</td><td>Conducted emission test</td><td>〈same as the present Rules〉
· Detailed test methods are referred to CISPR 16-2-1:2017.</td><td>〈same as the present Rules〉</td></tr>
<tr><td>22-23</td><td colspan="3">〈same as the present Rules〉</td></tr>
</table>

〈Amendments〉

Table 3.23.1 Environmental Test Items, Testing Conditions and Methods, and Criteria *(2026)*

<table>
<tr><th>No.</th><th>Test item</th><th>Testing condition and method</th><th>Criteria</th></tr>
<tr><td>1-8</td><td colspan="3">〈same as the present Rules〉</td></tr>
<tr><td>9</td><td>Inclination test</td><td>~~· The equipment is at an operating condition and check the operation of the equipment with 22.5° static inclination.~~
~~· The equipment is at an operating condition and check the operation of the equipment with rolling of 22.5° at period of about 10 seconds for not less than 15 min.~~
~~· The test is carried out in three axis directions.~~
~~· These inclination tests are normally not required for equipment with no moving parts.~~

-Static test
a) inclined to the vertical at an angle of at least 22.5°
b) inclined to at least 22.5° on the other side of the vertical and in the same plane as in (a), c) inclined to the vertical at an angle of at least 22.5° in plane at right angles to that used in (a),
d) inclined to at least 22.5° on the other side of the vertical and in the same plane as in (c).
Note: The period of testing in each position should be sufficient to fully evaluate the behaviour of the equipment.

-Dynamic test
· Using the directions defined in a) to d) above, the equipment is to be rolled to an angle of 22.5° each side of the vertical with a period of 10 seconds.
· The test in each direction is to be carried out for not less than 15 minutes.
· On ships for the carriage of liquified gases and chemicals, the emergency power supply is to remain operational with the ship flooded up to a maximum final athwart ship inclination of 30° (see Pt 7, Ch 5, 207. 2 (2) and Ch 6, 209. 3. (2) of the Rules)
Note: These inclination tests are normally not required for equipment with no moving parts.

· Detailed test methods are referred to IEC 60092-504:2016.</td><td>〈same as the present Rules〉</td></tr>
<tr><td>10</td><td>Insulation resistance test</td><td>· Measure the insulation resistance ~~between current carrying parts and~~ between ~~current~~conductive parts and earth, and, where appropriate, between phases, using an insulation tester with the following test voltage ~~when measured with the following application voltage.~~

<table><tr><th>Rated voltage : Un(V)</th><th>Test voltage(D.C. voltage)(V)</th></tr><tr><td>Un ≤ 65</td><td>2 × Un, min. 24</td></tr><tr><td>Un > 65</td><td>500</td></tr></table>
· The insulation resistance measurement shall be carried out before and after a series of environmental tests: the damp heat test, cold test, salt mist test, and high voltage test.
· ~~For the equipment containing circuits in which the application of the test voltage is not desirable, the test voltage is applied after removing the circuits.~~ Certain components e.g. for EMC protection may be required to be disconnected for this test.</td><td></td></tr>
</table>

11	High voltage test	· Apply the following test voltage~~, alternating of a frequency of 50Hz or 60Hz, between current carrying parts and between current-carrying parts connected and earth for 1 minute.~~ at a frequency of 50Hz or 60Hz for 1 minute between conductive parts and earth, and between separate circuits. 〈same as the present Rules〉	
12-16	〈same as the present Rules〉		
17	Conducted radio frequency immunity test	〈same as the present Rules〉 · Detailed test methods are referred to Test level 2 of IEC 61000-4-6:~~2013~~ 2023.	〈same as the present Rules〉
18	〈same as the present Rules〉		
19	Surge immunity test	〈same as the present Rules〉 · Detailed test methods are referred to Test level 2 of IEC 61000-4-5:2014+AMD1:2017.	〈same as the present Rules〉
20	Radiated emission test	〈same as the present Rules〉 · Detailed test methods are referred to CISPR 16-2-3:2016+AMD1:2019+AMD2:2023 and IEC 60945:2002(for 156 ~ 165 MHz).	〈same as the present Rules〉
21	Conducted emission test	〈same as the present Rules〉 · Detailed test methods are referred to CISPR 16-2-1:2014+AMD1:2017.	〈same as the present Rules〉
22-23	〈same as the present Rules〉		

Present	Amendment
Section 15 Machinery and Equipment for Ships	**Section 15 Machinery and Equipment for Ships**
1501. Application	**1501. Application**
1. The requirements of this Section apply to tests and inspection for the approval of the machinery and equipment listed below for which approval of the Society is to be obtained in advance before being fitted in ships. *(2018)* (1) Kind 1 propeller shafts with corrosion resisting (**Pt 5, Ch 1, 102. 3** of the Rules) (2) Resin Chock (**Pt 5, Ch 2, 202. 1** (3), **Pt 5, Ch 3, 103. 1** and **Pt 5, Ch 7, 106.** of the Rules) (3) Resilient mountings for reciprocating internal combustion engine (Pt 5, Ch 2, 202. 1 (3) of the Rules). In addition, this guidance may apply for type approval of the resilient mountings for gear transmissions, generators, steam turbines, gas turbines and auxiliary machinery at the request of the manufacturers. *(2020)* (4) Stern tube bearings (**Pt 5, Ch 3, 206. 1** of the Rules) (5) Stern tube sealing devices (**Pt 5, Ch 3, 206. 2** of the Rules) (6) Flexible couplings (**Pt 5, Ch 3, 406. 2** of the Rules) (7) Pipes of special materials **(Pt 5, Ch 6, 102. 5. (1)** of the Rules except for plastic pipes) (8) Cargo pipings, pumps and cargo hoses of ships carrying liquefied gases in bulk (**Pt 7, Ch 5, 513.** of the Rules) (9) Fuel pipings and pumps for ships using low-flashpoint fuels (**Ch 16, 701.** and **703.** of Rules for Ships using Low-flashpoint Fuels) (10) Expansion bellows for fuel cell fuel system (**Ch 2, 701. 4** of the **Guidance for Fuel Cell Systems on board ships**) (11) Others as deemed necessary by the Society	**1.** The requirements of this Section apply to tests and inspection for the approval of the machinery and equipment listed below for which approval of the Society is to be obtained in advance before being fitted in ships. *(2018)* (1) Kind 1 propeller shafts with corrosion resisting (**Pt 5, Ch 1, 102. 3** of the Rules) (2) Resin Chock (**Pt 5, Ch 2, 202. 1** (3), **Pt 5, Ch 3, 103. 1** and **Pt 5, Ch 7, 106.** of the Rules) (3) Resilient mountings for reciprocating internal combustion engine (Pt 5, Ch 2, 202. 1 (3) of the Rules). In addition, this guidance may apply for type approval of the resilient mountings for gear transmissions, generators, steam turbines, gas turbines and auxiliary machinery at the request of the manufacturers. *(2020)* ~~(4) Stern tube bearings (Pt 5, Ch 3, 206. 1 of the Rules)~~ (4) Stern tube sealing devices (**Pt 5, Ch 3, 206. 2** of the Rules) (5) Flexible couplings (**Pt 5, Ch 3, 406. 2** of the Rules) (6) Pipes of special materials **(Pt 5, Ch 6, 102. 5. (1)** of the Rules except for plastic pipes) (7) Cargo pipings, pumps and cargo hoses of ships carrying liquefied gases in bulk (**Pt 7, Ch 5, 513.** of the Rules) (8) Fuel pipings and pumps for ships using low-flashpoint fuels (**Ch 16, 701.** and **703.** of Rules for Ships using Low-flashpoint Fuels) (9) Expansion bellows for fuel cell fuel system (**Ch 2, 701. 4** of the **Guidance for Fuel Cell Systems on board ships**) (10) Others as deemed necessary by the Society
〈Omitted〉	*〈Omitted〉*

Present

1503. Type tests

1. General

The tests specified in the relevant provisions of the Rules and their Guidance relating to the machinery and equipment, and additionally, the detailed tests peculiar to the machinery and equipment as prescribed in **Par 2** are to be carried out.

2. Details of Tests

In the type test program, the test items specified in Table 3.15.1 as applicable to the machinery and equipment concerned and additionally those deemed necessary by the Society are to be included.

Table 3.15.1 Type test item of machinery and equipment of ship (continued)

Kinds	Type test item
Stern tube bearings	(A) Confirmation tests for the characteristics of materials (a) In the case of vulcanized rubber, the following tests specified in **KS M 6518** (i) Tensile test (ii) Hardness test (iii) Tension set test (iv) Adhesion test (v) Test for adhesion to metals (except those not to be adhered to metals) (vi) Tear test (vii) Compression set test (viii) Dipping test (in the case of a water-lubricated system, tests are to be carried out using sea water) (ix) Aging test (b) In the case of materials other than those specified above in (a), tests according to pertient national standards or other equivalent standards concerning the contents of (a) according to the materials. (B) Abrasion test (C) Running test (In this case, confirm that the bearing pressures during the tests are to be verified are not less than 0.8 MPa for an oil-lubricated system, and are not less than 0.2 *MPa* for a water-lubricated system respectively.) (D) "Type test program" submitted according to **102. 3** (1) (A) is to include the following items: (a) Drawing of the test rig (b) Drawing of the product (specified the materials, dimensions, etc.) (c) Condition of tests (lubrication system, shaft speed, bearing load, hydraulic pressure, test time, etc.)

〈Omitted〉

Amendment

1503. Type tests

1. General

The tests specified in the relevant provisions of the Rules and their Guidance relating to the machinery and equipment, and additionally, the detailed tests peculiar to the machinery and equipment as prescribed in **Par 2** are to be carried out.

2. Details of Tests

In the type test program, the test items specified in Table 3.15.1 as applicable to the machinery and equipment concerned and additionally those deemed necessary by the Society are to be included.

Table 3.15.1 Type test item of machinery and equipment of ship (continued)

Kinds	Type test item
~~Stern tube bearings~~	~~(A) Confirmation tests for the characteristics of materials~~ ~~(a) In the case of vulcanized rubber, the following tests specified in **KS M 6518**~~ ~~(i) Tensile test~~ ~~(ii) Hardness test~~ ~~(iii) Tension set test~~ ~~(iv) Adhesion test~~ ~~(v) Test for adhesion to metals (except those not to be adhered to metals)~~ ~~(vi) Tear test~~ ~~(vii) Compression set test~~ ~~(viii) Dipping test (in the case of a water-lubricated system, tests are to be carried out using sea water)~~ ~~(ix) Aging test~~ ~~(b) In the case of materials other than those specified above in (a), tests according to pertient national standards or other equivalent standards concerning the contents of (a) according to the materials.~~ ~~(B) Abrasion test~~ ~~(C) Running test (In this case, confirm that the bearing pressures during the tests are to be verified are not less than 0.8 MPa for an oil-lubricated system, and are not less than 0.2 *MPa* for a water-lubricated system respectively.)~~ ~~(D) "Type test program" submitted according to **102. 3** (1) (A) is to include the following items:~~ ~~(a) Drawing of the test rig~~ ~~(b) Drawing of the product (specified the materials, dimensions, etc.)~~ ~~(c) Condition of tests (lubrication system, shaft speed, bearing load, hydraulic pressure, test time, etc.)~~

〈Omitted〉

Present	Amendment
〈Newly Added〉	

Section 42 Synthetic materials for aftmost propeller shaft bearings

4201. General

1. The requirement of this Section applies to the synthetic materials for aftmost propeller shaft bearings in accordance with **Pt 5, Ch 3 206. 1** (1) of the Rules.

2. The qualification for design and application of aftmost propeller shaft bearings are to be provided and guaranteed by the manufacturer.

3. Testing and inspection are to be carried out in accordance with ths requirement of this Section.

4202. Date to be sumitted

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

(1) Product name
(2) Name and address of the manufacturer, including details for all relevant production places.
(3) Reference of applicable Rules and Standards which the product are to comply with.
(4) Details of products information
  (A) Material type
  (B) Lubrication type
  (C) Isotropic or anisotropic behaviour
  (D) Elastomeric or non-elastomeric type
(5) Limitations of the product
(6) Product specification, technical data sheet, and installation maunal including:
  (A) Maximum nominal surface pressure
  (B) Product dimensions
    (a) Minimum and maximum dimensions
    (b) Other, if relevant
  (C) Commonly acceptable mating material(type of shaft material, roughness, hardness, etc.)
  (D) Running clearance
  (E) Maximum operating temperature
(7) Safety data sheet
(8) Description of production processes.
(9) Description of quality assurance system or copy of **ISO 9001** certificate.
(10) In-service experience, if available.
(11) List of tests and measuring equipment including calibration certificate.

4203. Type tests

1. Test program

(1) Test program is to include following items;
  (A) Description of products to be approved
  (B) Description of the selected test samples
  (C) Content of tests (test items, test standard, test conditions, acceptance criteria, etc.)
  (D) Description of the wear testing stands and the test conditions
(2) The extent of the test program is to test the material properties of **3.** In particular a reduction or complete suppression of the approval tests may be accepted by the Society taking into account:
  (A) Documentation of approval tests performed
  (B) The proven track record

〈Continuing on the next page〉

Present	Amendment
〈Newly Added〉	**2. Wear test** (1) Unless otherwise specified in this section, the requirements for the wear test is refer to **ASTM G77-17** or other national or international equivalent standards, with the following data: (A) Material of the shaft used in the test and its properties are to be specified and shall be equivalent to typical mating material e.g. alloyed steel or stainless steel or copper alloy. (B) Diameter of shaft: the shaft diameter depends on the bearing size. The running clearance shall be considered in the abrasion test. (C) Motion of shaft: continuous rotation. (D) Circumferential velocity shall be 6 m/s for oil or water lubrication and should be 3 m/s for grease lubrication. (D) Lubrication: sea water or substitute ocean water (23℃±2℃), or mineral oil (80℃± 2℃), or grease (80℃±2℃) according to the applicable lubrication type. (E) Surface roughness of test shaft: R_a shall not exceed 0.5 μm for stainless steel and R_a shall not exceed 0.8μm for copper alloy. (F) Interface pressure : maximum nominal surface pressure±10% (G) Duration of test: until the coefficient of friction and wear rate remains constant at least 192h. Wear of bushings shall be measured continuously or regularly. If regularly, wear to be measured by disassembling every 48 hours until a constant wear rate has been achieved (minimum of four points of measurements). (2) Parameters to be recorded (A) Dimensions of test specimen (B) Wear in relation to time (C) Coefficient of friction in relation to time (D) Temperature of test specimen during test cycle (E) Deviation of load from the maximum nominal surface pressure **3. Characteristics of materials (Material properties)** (1) The properties of non-elastomeric materials for aftmost propeller shaft bearings are to comply with the requirements of **Table 3.42.1.** The properties of elastomeric materials for aftmost propeller shaft bearings are to comply with the requirements of **Table 3.42.2.**

Table 3.42.1 Type testing for non-elastomeric materials for aftmost propeller shaft bearings

Test items	Test standard[1)]	Number of specimens for each sample[2)]	Test conditions	Acceptance criteria
Compressive strength (MPa)	ISO 604:2002, ASTM D695-2015	5[3)]		- Min. 85 MPa in the case of isotropic materials. - Min. 85 MPa for specimens parallel to sheet plane in the case of anisotropic materials. Min. 100 MPa for specimens normal to sheet plane in the case of anisotropic materials.
Compressive modulus (MPa)	ISO 604:2002, ASTM D695-2015	5		- Min. 850 MPa in the case of isotropic materials. - Min. 850 MPa for specimens parallel to sheet plane in the case of anisotropic materials. Min. 1000 MPa for specimens normal to sheet plane in the case of anisotropic materials.

〈Continuing on the next page〉

Present	Amendment
〈Newly Added〉	**Table 3.42.1 Type testing for non-elastomeric materials for aftmost propeller shaft bearings**

Test items	Test standard [1)]	Number of specimens for each sample[2)]	Test conditions	Acceptance criteria
Water swelling [volume, %], only required for water lubrication	ISO 175: 2010	3	- Exposure period: 4 weeks - Test liquid: Substitute ocean water ASTM D1141-98(2021) - Test Temperature : (a) 20℃±2℃ (b) 60℃±2℃ or advised maximum working temperature by manufacturer, whichever is higher. - Test specimen size : 50 x 50 x t mm (t is min. 4 mm or the min. thickness of the bushing product) - Testing immediately after extraction (wet condition).	Volumetric swelling≤3%
Oil swelling (for oil lubricated system) [volume, %], only required for oil lubrication	ISO 175: 2010	3	- Exposure period: 4 weeks - Test liquid: oil No.3 (ISO 1817:2022) - Test Temperature: 20℃±2℃. - Test specimen size: 50x50xt mm (t is min. 4 mm or the min. thickness of the bushing product.) - Testing immediately after extraction (wet condition).	Volumetric swelling≤3%
Compressive strength and modulus change when immersed in water, only required for water lubrication	ISO 604: 2002; ASTM D695-2015	5[3)]	- Exposure period: 4 weeks - Test liquid: Substitute ocean water (ASTM D1141) - Test Temperature: 20℃±2℃	Min. 80% retention of minimum specified compressive strength and modulus before water immersion

〈Continuing on the next page〉

Present	Amendment
〈Newly Added〉	

Table 3.42.1 Type testing for non-elastomeric materials for aftmost propeller shaft bearings

Test items	Test standard [1)]	Number of specimens for each sample[2)]	Test conditions	Acceptance criteria
Temperature resistance	ISO 604: 2002; ASTM D695-2015	5[3)]	Compressive strength and compressive modulus at maximum temperature (60 ℃±2 ℃ or advised maximum working temperature by manufacturer, whichever is higher).	Min. 80% retention of minimum specified compressive strength and modulus at 20 ℃±2 ℃
Wear test	Refer to **4203. 2**	1		

(Note)
(1) Other testing standards may also be accepted, provided that they are suitable for testing of the synthetic material selected for application in aftmost propeller shaft bearings.
(2) The number of specimens is to be prepared for each sample.
(3) Test at least five specimens for each sample in the case of isotropic materials. Test at least ten specimens, five normal to and five parallel to sheet plane, for each sample in the case of anisotropic materials.

Table 3.42.2 Type testing for elastomeric materials for aftmost propeller shaft bearings

Test items	Test standard[1)]	Number of specimens for each sample[2)]	Test conditions	Accceptance criteria
Tensile strength (MPa)	ISO 37:2017, Method A, of ASTM D412-16(2021), ASTM D638-22	3		- Min.10 MPa for rubber bearing - Min.30 MPa for other elastomeric earing
Elongation (%)	ISO 37:2017, Method A, of ASTM D412-16(2021), ASTM D638-22	3		- Min. 150 % for rubber bearing - Min. 60 % for other elastomeric bearing
Hardness	ISO 48-4:2018; ASTM D2240-15(2021)	3		

〈Continuing on the next page〉

Present	Amendment
〈Newly Added〉	**Table 3.42.2 Type testing for elastomeric materials for aftmost propeller shaft bearings**

Test items	Test standard[1)]	Number of specimens for each sample[2)]	Test conditions	Acceptance criteria
Water swelling [volume, %], only required for water lubrication	ISO 1817:2022	3	- Exposure period: 4 weeks - Test liquid: Substitute ocean water (ASTM D1141) - Test Temperature : (a) 20 ℃±2 ℃ (b) 60 ℃±2 ℃ or advised maximum working temperature by manufacturer, whichever is higher. - Test specimen size : 50 x 50 x t mm (t is min. 4 mm or the min. thickness of the bushing product) - Testing immediately after extraction (wet condition).	Volumetric swelling≤3%
Oil swelling (%) (for oil lubricated system) , only required for oil lubrication	ISO 1817:2022	3	- Exposure period: 4 weeks - Test liquid: oil No.3 (ISO 1817) - Test Temperature: 20 ℃±2 ℃. - Test specimen size: 50 x 50 x t mm (t is min. 4 mm or the min. thickness of the bushing product.) - Testing immediately after extraction (wet condition).	Volumetric swelling≤3%
Tensile strength and elongation change when immersed in water, only required for water lubrication	ISO 37:2017, Method A, of ASTM D412-16(2021), ASTM D638-22	3	- Exposure period: 4 weeks - Test liquid: Substitute ocean water (ASTM D1141) - Test Temperature: 20 ℃±2 ℃	Min. 80% retention of minimum specified tensile strength and elongation before water immersion

〈Continuing on the next page〉

Present	Amendment
〈Newly Added〉	**Table 3.42.2 Type testing for elastomeric materials for aftmost propeller shaft bearings**

Test items	Test standard[1)]	Number of specimens for each sample[2)]	Test conditions	Acceptance criteria
Temperature resistance	ISO 37:2017; ISO 7743:2017; Method A of ASTM D412-16(2021); ASTM D638-22	3	Tensile strength and elongation at maximum temperature (60 ℃±2 ℃ or advised maximum working temperature by manufacturer, whichever is higher).	Min. 80 % retention of minimum specified tensile strength and elongation at 20 ℃±2 ℃
Adhesion to metals(MPa) (except those not to be adhered to metals)	ISO 813:2019; ISO 1827:2022	3		
Change of properties due to aging(%)	ISO 37:2017; ISO 7743:2017; Method A of ASTM D412-16(2021); ASTM D638-22	3	After oven aging for tension and elongation tests. Test specimens shall be subjected to circulating air at maximum temperature (60 ℃±2 ℃ or advised maximum working temperature by manufacturer, whichever is higher) for 96 hours. Tension and elongation tests shall be performed not less than 20 hours and not more than 48 hours after removal from the aging environment.	Min. 75 % retention of Tensile strength and elongation before aging
Wear test	Refer to **4203. 2**	1		

(Note)
(1) Other testing standards may also be accepted, provided that they are suitable for testing of the synthetic material selected for application in aftmost propeller shaft bearings.
(2) The number of specimens is to be prepared for each sample.

4. Test product

(1) At least three representative diameter products of each kind of product shall be selected for type approval testing, except for the wear test where one representative product may be selected
(2) Each kind of product means:
(A) Same chemical composition range
(B) Same reinforcement, only applicable to composite materials
(C) Same production process

〈Continuing on the next page〉

Present	Amendment
〈Newly Added〉	(3) The test products used for type approval testing are to be selected from the manufacturer's production line or stock by a Surveyor of the Society as one of the following: (A) Fininshed certified component itself: or (B) On samples taken from earlier stages in the production of the component, when applicable. **5. Test laboratories** (1) The selected test facility shall have accreditation according to ISO/IEC 17025 for carrying out and recording of the material property tests required by this section. The test facility and the testing arrangements are to be to the satisfaction of the Classification Society. If the test laboratory does not have the relevant accreditation, then specified testing will need to be witnessed by a Surveyor of the Society. **4204. Type approval certificate** **1.** Type Approval Certificate based on the test reports and manufacturer's technical documentation e.g., installation/ engineering manuals is to be issued by the Society. **2.** The Type Approval Certificate shall contain the general information as defined by the Society Rules. As minimum, the following information is specifically applicable to products relevant to this document and shall be included on the relevant Type Approval Certificate: (1) Product description and properties in accordance with **4203. 3.** (2) Maximum nominal surface pressure (3) Maximum operating temperature

Amendments to KR Technical Rules

Guidance for Cyber Resilience of Ships and Systems

2025. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Ships contracted for construction on or after 2025/10/01

◉ Newly added + notation and revised the notation names
◉ Revised requirements

Present	Amendment
# CHAPTER 1 GENERAL ## Section 1 General **101. - 103. 〈same as the present Rules〉** **104. Class notations *(2025)*** Ships complying with the Guidance will be assigned with an additional following notation **1. 〈same as the present Rules〉** **2. Cyber Resilience+**: Ships having Cyber Resilience and implementing essential cyber security management system(CSMS) based on cyber risk management process in accordance with the requirements in **Ch 2, Sec 1** through **Sec 5** of this Guidance. **3. 〈same as the present Rules〉** **4. 〈newly added〉** ## Section 2 - 3 〈same as the present Rules〉	# CHAPTER 1 GENERAL ## Section 1 General **101. - 103. 〈same as the present Rules〉** **104. Class notations *(2026)*** Ships complying with the Guidance will be assigned with an additional following notation **1. 〈same as the present Rules〉** **2. Cyber Resilience+(CSMS)**: Ships having Cyber Resilience and implementing essential cyber security management system(CSMS) based on cyber risk management process in accordance with the requirements in **Ch 2, Sec 1** through **Sec 5** of this Guidance. **3. 〈same as the present Rules〉** **4.** IT systems additionally requested by the applicant may be included within the scope of applicable systems in accordance with **103. 2**, and the class notation "**+**" may be additionally assigned to such ships (e.g., Cyber Resilience (CSMS)+). However, unless explicitly specified in this guidance for the additionally included IT systems, the requirements of **Ch 2** and **Ch 3** shall not be applied to such systems. ## Section 2 - 3 〈same as the present Rules〉

Present	Amendment
# CHAPTER 2 CYBER RESILIENCE OF SHIPS ## Section 1 General **101. 〈same as the present Rules〉** **102. Application** **1. – 3. 〈same as the present Rules〉** **4.** The requirements of **Sec 4** of this Chapter additionally apply to ships having Class Notation of Cyber Resilience+. *(2025)* **5. 〈newly added〉**	# CHAPTER 2 CYBER RESILIENCE OF SHIPS ## Section 1 General **101. 〈same as the present Rules〉** **102. Application** **1. – 3. 〈same as the present Rules〉** **4.** The requirements of **Sec ~~4~~ 5** of this Chapter additionally apply to ships having Class Notation of Cyber Resilience~~+~~(CSMS). *(2026)* **5.** For ships assigned with the class notation of "**Cyber Resilience+**" or "**Cyber Resilience(CSMS)+**", the following requirements shall apply to the additionally included IT systems, as far as applicable: (1) 401.1 Vessel Asset Inventory (2) 402.1 Security Zones and Network Segmentation (3) 402.2 Network Protection Safeguards (4) 402.3 Antivirus, Antimalware, Antispam and Other Protections from Malicious Code (5) 402.4 Access Control (6) 402.7 Use of Mobile and Portable Devices

Present	Amendment
Section 2 Survey *(2025)*	**Section 2 Survey *(2025)***
201. 〈same as the present Rules〉	**201. 〈same as the present Rules〉**
202. Classification Survey	**202. Classification Survey**
1. During Design and Construction phase (1) - (4) 〈same as the present Rules〉 (5) 〈newly added〉	**1. During Design and Construction phase** (1) - (4) 〈same as the present Rules〉 (5) For ships assigned with the class notation "**Cyber Resilience(CSMS)**", the following documents shall be additionally submitted for approval: (A) Ship Cyber Risk Assessment Report (B) Ship Cyber Risk Management Plan and Corrective Action Results (if applicable) (C) Ship Cyber Incident Response and Recovery Manual
2. 〈same as the present Rules〉	**2. 〈same as the present Rules〉**
203. 〈same as the present Rules〉	**203. 〈same as the present Rules〉**
Section 3 - 4 〈same as the present Rules〉	**Section 3 - 4 〈same as the present Rules〉**

Present	Amendment
Section 5 Requirements for Ship Cyber Security Management System *(2025)* **1.1.1.**	**Section 5 Requirements for Ship Cyber Security Management System *(2025)*** **1.1.2.**
501. General	**501. General**
1. Application	**1. Application**
(1) The requirements in this Section specify additional requirements for implementing the essential Cyber Security Management System(CSMS) based on the cyber risk management process in the operational phase of the ship. In addition to the requirements of this Section, the relevant requirements for Maintenance Survey in **Ch 2, 203.** for ship cyber resilience shall be basically complied with.	(1) ~~The requirements in this Section specify additional requirements for implementing the essential Cyber Security Management System(CSMS) based on the cyber risk management process in the operational phase of the ship. In addition to the requirements of this Section, the relevant requirements for Maintenance Survey in **Ch 2, 203.** for ship cyber resilience shall be basically complied with.~~ The requirements of this section specify the requirements for Cyber Security Management System (CSMS) of ships assigned with the class notation "**Cyber Resilience(CSMS)**".
(2) The requirements in this Section support compliance with the regulation for cyber risk management of ships as per IMO Resolution MSC.428(98).	(2) ~~The requirements in this Section support compliance with the regulation for cyber risk management of ships as per IMO Resolution MSC.428(98).~~ Ships complying with the requirements of this section shall be deemed to satisfy the requirements for ship cyber risk management in accordance with IMO Resolution MSC.428(98).
(3) 〈newly added〉	(3) Ships complying with the requirements of this Section shall, as a baseline, also comply with the relevant requirements of **Ch 2**, **Sec 1** through **4**, regarding ship cyber resilience.

Present	Amendment
2. Limitation If any cyber security-related regulation required by International Conventions, flag state laws, or domestic laws of ports of call are not specified in this Guidance, they will not be included in the Surveys conducted by this Society, and the responsibility for the compliance with such regulations lies with the shipowner. (2) 〈newly added〉	**2. Limitation** (1) If any cyber security-related regulation required by International Conventions, flag state laws, or domestic laws of ports of call are not specified in this Guidance, they will not be included in the Surveys conducted by this Society, and the responsibility for the compliance with such regulations lies with the shipowner. (2) The requirements of this Section specify the minimum requirements for a cyber security management system based on the ship cyber risk management process during operation and do not imply the prevention of all cyber incidents.
3. Definition (1) Initial Survey: the first survey conducted upon the request of the shipowner for additional application of the requirements of this Section.	**3. Definition** (1) CSMS Initial Survey: the first survey conducted in accordance with the requirements of this Section after delivery of the ship. ~~upon the request of the shipowner for additional application of the requirements of this Section.~~ (Note) For ships assigned with the class notation "**Cyber Resilience(CSMS)**" during the construction, the CSMS initial survey shall be conducted at the time of the first annual survey.
502. Approval documents	**502. Approval documents**
1. Ship cyber security and resilience program The Ship cyber security and resilience program shall conform to the requirements in **504.1**.	**1. Ship cyber security and resilience program (hereinafter, CSMS Manual)** ~~The Ship cyber security and resilience program shall conform to t he requirements in **504.1**.~~ (1) Cyber security organization chart and job descriptions of security personnel (2) Cyber risk management policy (3) Cyber security education and training policy (4) Physical security policy (5) Outsider security policy (6) Internal audit procedures for ship cyber security

Present	Amendment
2. Documents or data for reference Shipowner shall submit the following for reference. (1) Ship cyber risk assessment report and risk management plan (2) Cyber security organization chart and job description of security personnel	~~**2. Documents or data for reference**~~ ~~Shipowner shall submit the following for reference.~~ ~~(1) Ship cyber risk assessment report and risk management plan~~ ~~(2) Cyber security organization chart and job description of security personnel~~
	2. Ship Cyber Risk Assessment Report (1) List of cyber threats (2) Cyber risk assessment results (3) Cyber risk management plan and corrective action results (if applicable)
3. Subsequent Annual Survey The survey shall be carried out in accordance with the requirements of **503. 1** (2).	~~**3. Subsequent Annual Survey**~~ ~~The survey shall be carried out in accordance with the requirements of **503. 1** (2).~~
	3. Cyber Incident Response and Recovery Plan (1) Organization chart and emergency contact network for cyber incident response (2) Cyber incident response and recovery procedures
	4. Data for reference (1) Cyber security training record (2) Software security-related patch update records (3) Internal audit plan or results for cyber security

Present	Amendment
503. Surveys **1. Initial Survey** (1) Approval of a document The shipowner shall submit the documents specified in **502.** and be approved by this Society before the initial survey according to this Section. (2) Survey During the initial survey, the shipowner shall provide this Society with the following evidence demonstrating the appropriate implementation of the requirements in **504.** However, the evidence is not limited to these items. (A) Ship cyber risk assessment report and risk management result (B) Cyber security training plan and result (C) Cyber security incident report (if any) (D) 〈newly added〉 (D) Internal audit result related to cyber security (3) 〈newly added〉 **2. – 3. 〈same as the present Rules〉**	**503. Surveys** **1. CSMS Initial Survey** (1) Approval of a document The shipowner shall submit the documents specified in **502.** and be approved by this Society before the initial survey ~~according to this Section~~. (2) Survey ~~During the initial survey, the shipowner shall provide this Society with the following evidence demonstrating the appropriate implementation of the requirements in **504.** However, the evidence is not limited to these items.~~ During the CSMS initial survey, the shipowner shall present to the attending surveyor the following evidence or objective records, demonstrating compliance with the relevant requirements of **504.** of this Chapter, based on the approved CSMS Manual. (A) Ship cyber risk assessment report and ~~risk management result~~ implementation status of cyber risk management plan (B) Cyber security training ~~plan and result~~ record (C) ~~Cyber security incident report (if any)~~ Implementation status of physical security (D) Status of outsider security management (E) Internal audit result related to cyber security (3) Issuance of CSMS Statement of Compliance (SoC) A CSMS Statement of Compliance shall be issued to a ship upon completion of the initial survey in accordance with the requirements of this Section. **2. – 3. 〈same as the present Rules〉**

Present	Amendment
504. Additional requirements **1. Cyber security policy** (1) Ship cyber security and resilience program The Ship cyber security and resilience program specified in **Ch 2, 203. 1** (2) shall additionally address the following policies: (A) Policy for cyber risk management (B) Roles and responsibilities for cyber security management (C) Policy for Crew Awareness and Training (D) Policy for internal audit regarding cyber security (2) The shipowner shall place, review and manage the Ship cyber security and resilience program onboard. (3) The shipowner shall designate and assign responsibility and authority to the personnel who have the competencies to operate and manage the program.	**504. Additional requirements** **1. Ship cyber security management policy** ~~(1) Ship cyber security and resilience program~~ ~~The Ship cyber security and resilience program specified in **Ch 2, 203. 1** (2) shall additionally address the following policies:~~ ~~(A) Policy for cyber risk management~~ ~~(B) Roles and responsibilities for cyber security management~~ ~~(C) Policy for Crew Awareness and Training~~ ~~(D) Policy for internal audit regarding cyber security~~ ~~(2) The shipowner shall place, review and manage the Ship cyber security and resilience program onboard.~~ ~~(3) The shipowner shall designate and assign responsibility and authority to the personnel who have the competencies to operate and manage the program.~~ (1) A CSMS manual, specifying the methods, procedures, and responsible personnel for the operation of the ship's CSMS shall be kept on board, regulary reviewed, and properly managed. (2) Personnel with the necessary competence to operate and manage the ship's CSMS shall be designated, with clear assignment of responsibilities and authority.

Present	Amendment
2. Cyber risk management (1) The shipowner shall establish a cyber risk management process, including identification, analysis, evaluation, and processing of cyber risks to CBS and networks in a ship. (2) Internal and external cyber threats that may adversely affect the operation of CBSs and networks on board ship shall be identified and listed. (3) The Cyber risk assessment for CBSs and networks on board ship shall be conducted periodically taking into account cyber threats and vulnerabilities. (4) Priorities for risk level shall be determined based on the results of the Cyber risk assessment, and improvement actions shall be taken if deemed necessary.	**2. Ship cyber risk management process** ~~(1) The shipowner shall establish a cyber risk management process, including identification, analysis, evaluation, and processing of cyber risks to CBS and networks in a ship.~~ ~~(2) Internal and external cyber threats that may adversely affect the operation of CBSs and networks on board ship shall be identified and listed.~~ ~~(3) The Cyber risk assessment for CBSs and networks on board ship shall be conducted periodically taking into account cyber threats and vulnerabilities.~~ ~~(4) Priorities for risk level shall be determined based on the results of the Cyber risk assessment, and improvement actions shall be taken if deemed necessary.~~ (1) A cyber risk management process, specifying the methods and procedures for identifying, analyzing, assessing, and addressing cyber risks related to onboard systems, equipment, and networks, shall be established and implemented. (2) Internal and external cyber threats that may negatively impact the operation of onboard systems, equipment, and networks shall be identified and documented. (3) A periodic cyber risk assessment shall be conducted, considering cyber threats and vulnerabilities affecting assets within the cyber security management scope. (4) Based on the results of cyber risk assessment, a risk management plan shall be established by prioritizing cyber risks, and appropriate mitigation measures shall be implemented.

Present	Amendment
4. Incident Response and Recovery (1) The shipowner shall define the roles and responsibilities of the organization or crews responsible for immediate response and recovery activities to system operation and security issues in a ship. (2) An emergency contact network shall be established and kept it up to date to enable prompt communication with internal and external personnel. (3) In the event of a cyber incident onboard ship, procedures shall be established and implemented to notify the appropriate competent authorities and report to the relevant person in charge.	~~**4. Incident Response and Recovery**~~ ~~(1) The shipowner shall define the roles and responsibilities of the organization or crews responsible for immediate response and recovery activities to system operation and security issues in a ship.~~ ~~(2) An emergency contact network shall be established and kept it up to date to enable prompt communication with internal and external personnel.~~ ~~(3) In the event of a cyber incident onboard ship, procedures shall be established and implemented to notify the appropriate competent authorities and report to the relevant person in charge.~~ **4. Physical Security** (1) Physical security policies shall be established and implemented to control unauthorized access to onboard systems, equipment, and facilities. (2) Physical access control measures shall be provided to ensure that only authorized personnel can access protected areas containing critical assets on board. (3) where access monitoring devices, such as CCTV, are installed for surveillience of protected areas, unauthorized access to the recording devices of such monitoring systems shall be controlled. (4) Upon installation of new systems on board, it shall be verified that at least the same level of physical security as existing systems is applied.

Present	Amendment
5. Cyber security internal audit (1) Cyber security internal audit procedure shall be established and conducted periodically.	~~**5. Cyber security internal audit**~~ ~~(1) Cyber security internal audit procedure shall be established and conducted periodically.~~ **5. Outsider Security** (1) In order to prevent security incidents caused by outsiders on board, a security policies shall be established and implemented to control the use of mobile devices, data, as well as maintenance activities, by outsiders. (2) Outsiders shall be restricted from accessing shipboard systems and equipment, except where access is permitted under the supervision of onboard personnel. (3) Where temporary system access rights must be granted to outsiders on board, an appropriate approval procedure by the responsible person shall be followed. (4) Outsiders shall use the systems in compliance with the shipboard security procedures, and when connecting outsider-owned equipment to the systems, a prior security inspection shall be conducted.
6. 〈newly added〉	**6. Cyber Incident Response and Recovery Plan** (1) A cyber incident response and recovery plan, including the types of incidents and corresponding response methods and procedures, shall be maintained on board and kept up to date. (2) An organization and designated personnel responsible for immediate response to and recovery from cyber incidents affecting shipboard systems shall be established, and their roles and responsibilities shall be defined. (3) An emergency contact network shall be established and kept up to date to enable prompt communication with internal and external stakeholders. (4) Procedures shall be established and implemented for reporting to the appropriate competent authority and notifying the responsible persons in the event of a cyber incident. ⚓

CIRCULAR

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To : All Surveyors and whom it may concern

No : 2025-14-E
Date : 2025. 11. 3

Subject	**9.213 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 2025 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 Jan. 2026 (The application date for survey)	**1) Amendment to the Special Provisions for Ships Subject to the Korean Ship Safety Act or the Fishing Vessel Act** : Deletion of the condition that excluded cargo handling ramps from the scope of cargo handling appliances.
Rules/Guidance for the Classification of Steel Ships, Pt 7 (Special Service, Ch5, 6)	On or after 1st Jan. 2026 (The contract Date for ship construction)	**1) Res.MSC.524(106) reflected etc.** : Revision of requirement for Hi-Mn Austenitic Steel for cryogenic service
Rules/Guidance for the Classification of Steel Ships, Pt 9 (Additional Installation, Ch 2)	On or after 1st Jan. 2026 (The application date for survey)	**1) Addition of the certificate type CG(SOF) and amendment of the timing for certificate issuance.** **2) Revision of Annual Survey Interval** : Change of the default setting from ILO Convention No.152 (12 months) to the SOLAS periodic inspection scheme. **3) Revision of Annual Survey Items** : The operational test of safety and protective devices is revised to be a mandatory item. **4) Incorporation of MSC.1/Circ.1663**

		: Reflection of the requirements related to maintenance and operating manuals.
Rules/Guidance for the Classification of Ships Using LFF	On or after 1st Jan. 2026 (The contract Date for ship construction)	**1) Res.MSC.524(106) reflected etc.** : Revision of requirement for Hi-Mn Austenitic Steel for cryogenic service
Guidance for Offshore Support Vessel(OSV)	On or after 1st Jan. 2026 (The application date for survey)	**1) Amendments Following the Establishment of Guidance for Anchor Handling Appliance** : Revised to refer to the requirements of the guidance for Anchor Handling Appliance for anchor handling winches and associated equipment.
Guidance for Anchor Handling Appliance	On or after 1st Jan. 2026 (The installation date of the anchor handling appliance)	**1) New establishment.** : Incorporation of the requirements of MSC.1/Circ.1662, as well as harmonization with relevant provisions for cargo handling appliances.

2. Furthermore, please be informed that amendments to Rules and Guidance relating to the Rules will be incorporated in the 2027 edition of KR Classification Technical Rules, while the amendments to Guidance will be reflected in the 2026 edition of the KR Classification Technical Rules.

Attachments:

1. Amendments to the Rules for the Classification of Steel Ships, Pt 1 ------ 1 copy.
2. Amendments to the R/G for the Classification of Steel Ships, Pt7 ------ 1 copy.
3. Amendments to the R/G for the Classification of Steel Ships, Pt9 ------ 1 copy.
4. Amendments to the R/G for the Classification of LFFS ------ 1 copy.
5. Amendments to the Guidance for Offshore Support Vessel(OSV) ------ 1 copy.
6. Establishment of the Guidance for Anchor Handling Appliance ------ 1 copy.

(The End)

Amendments to the Rules for the Classification of Steel Ships

(Circular)

Pt. 1 Classification and Surveys

2025. 11.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments : (Effective Date : 1 January 2026)

(1) In accordance with the entry into force of SOLAS II-1/3-13, lifting appliance which is classified "equipment used for loading, transporting or discharging cargo" or "equipment used for lifting movable bulkheads" has been revised to include loading ramps as part of lifting appliances (effective from 1 January 2026)

:

- Amendment to paragraph 11 of 1901, Special Provisions for Ships Subject to the Korean Ship Safety Act or the Fishing Vessel Act, in Part 1, Chapter 2, Section 19 of the Rules for the Classification of Steel Ships.

2. Main Contents: Refer to the amendments

Present	Amendment
# CHAPTER 2 PERIODICAL AND OTHER SURVEYS	# CHAPTER 2 PERIODICAL AND OTHER SURVEYS
## Section 19 Special Requirements for Ships Subject to Korean Ship Safety Act or Fishing Vessels Act	## Section 19 Special Requirements for Ships Subject to Korean Ship Safety Act or Fishing Vessels Act
1901. Special requirements for ships subject to Korean Ship Safety Act【See Guidance】	**1901. Special requirements for ships subject to Korean Ship Safety Act【See Guidance】**
1. ~ 10. 〈omitted〉	**1. ~ 10. 〈omitted〉**
11. In application to Pt 9, Ch 2(Cargo handling appliances), the cargo handling appliances~~, except cargo ramps~~, of safe working load not less than 1 ton are to be included. (2019)	**11.** In application to Pt 9, Ch 2(Cargo handling appliances), the cargo handling appliances of safe working load not less than 1 ton are to be included. *(2026)*

RULES FOR CLASSIFICATION(STEEL SHIPS)

(Rule for Pt 7 Ch 5)

2025.11.

Hull Rule Development Team

- Main Amendments -

(1) Enter into force on 1 January 2026 (the contract date for ship construction)

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

- To reflect the revision item of MSC.523(106)

Present	Amendment
Chapter 5 Ships Carrying Liquefied Gases in Bulk	**Chapter 5 Ships Carrying Liquefied Gases in Bulk**
Section 1 ~ Section 5 <Omitted>	**Section 1 ~ Section 5 <Same as the present Rule>**
Section 6 Materials of Construction and Quality Control	**Section 6 Materials of Construction and Quality Control**
601. ~ 603. 〈Omitted〉	601. ~ 603. 〈Same as the present Rule〉
604. Requirements for metallic materials (IGC Cdoe 6.4) 1. General requirements for metallic material The requirements for materials of construction are shown in the tables as follows: Table 7.5.4 ~ Table 7.5.5b 〈Omitted〉 Table 7.5.6 : Plates, sections and forgings for cargo tanks, secondary barriers ad process pressure vessels for design temperature below -55°C and down to -165°C. Table 7.5.7 ~ Table 7.6.8 〈Omitted〉 ~~For cargo tanks using high manganese austenitic steel for cryogenic service, Annex 7A 4[High manganese austenitic steel for Cryogenic Service] should be applied. (2021)[See Guidance]~~	604. Requirements for metallic materials (IGC Cdoe 6.4) 1. General requirements for metallic material The requirements for materials of construction are shown in the tables as follows: Table 7.5.4 ~ Table 7.5.5b 〈Same as the present Rule〉 Table 7.5.6 : Plates, sections and forgings for cargo tanks, secondary barriers ad process pressure vessels for design temperature below -55°C and down to -165°C. Table 7.5.7 ~ Table 7.6.8 〈Same as the present Rule〉
605. ~ 607. 〈Omitted〉	605. ~ 607. 〈Same as the present Rule〉
Section 7 ~ Section 19 <Omitted>	**Section 7 ~ Section 19 <Same as the present Rule>**

<Present>

Table 7.5.6 PLATE, SECTIONS AND FORGINGS[1] FOR CARGO TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURE BELOW -55°C AND DOWN TO -165°C[2]. Maximum thickness 25mm[3][4](2022)[See Guidance]

Minimum design temp.(°C)	Chemical composition[5] and heat treatment	Impact test temp.(°C)
-60	1.5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6]	-65
-65	2.25 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-70
-90	3.5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-95
-105	5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-110
-165	9 % nickel steel - double normalized and tempered or quenched and tempered[6]	-196
-165	Austenitic steels, such as types 304, 304 , 316, 316 , 321 and 347 solution treated[9]	-196
<New>	<New>	<New>
-165	Aluminium alloys; such as type 5083 annealed	Not required
-165	Austenitic Fe-Ni alloy (36 % nickel). Heat treatment as agreed	Not required
1. TENSILE AND TOUGHNESS(IMPACT) TEST REQUIREMENTS		
1.1 Sampling frequency		
Plates	Each “piece” to be tested	
Sections and forgings	Each “batch” to be tested	
1.2 Toughness(Charpy V-notch test)		
Plates	Transverse teset pieces. Minimum average energy value (KV) 27J	
Sections and forgings	Longitudinal teset pieces. Minimum average energy value (KV) 41J	

Notes:

(1)~(10) <Omitted>

(11) This table is generally applicable for material thickness up to 50mm. Proposals for greater thicknesses shall be approved by the Society.

(12) <New>

(13) <New>

<Amendment>

Table 7.5.6 PLATE, SECTIONS AND FORGINGS[1] FOR CARGO TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURE BELOW -55°C AND DOWN TO -165°C[2]. Maximum thickness 25mm[3][4](2022)[See Guidance]

Minimum design temp.(°C)	Chemical composition[5] and heat treatment	Impact test temp.(°C)
-60	1.5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6]	-65
-65	2.25 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-70
-90	3.5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-95
-105	5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-110
-165	9 % nickel steel - double normalized and tempered or quenched and tempered[6]	-196
-165	Austenitic steels, such as types 304, 304 , 316, 316 , 321 and 347 solution treated[9]	-196
-165	High manganese austenitic steel-hot rolling and controlled cooling[12][13]	-196
-165	Aluminium alloys; such as type 5083 annealed	Not required
-165	Austenitic Fe-Ni alloy (36 % nickel). Heat treatment as agreed	Not required
1. TENSILE AND TOUGHNESS(IMPACT) TEST REQUIREMENTS		
1.1 Sampling frequency		
Plates	Each “piece” to be tested	
Sections and forgings	Each “batch” to be tested	
1.2 Toughness(Charpy V-notch test)		
Plates	Transverse teset pieces. Minimum average energy value (KV) 27J	
Sections and forgings	Longitudinal teset pieces. Minimum average energy value (KV) 41J	

Notes:

(1)~(10) <Same as the present Rule>

(11) This table is generally applicable for material thickness up to 50mm. Proposals for greater thicknesses shall be approved by the Society. High manganese austenitic steel is excluded.

(12) The use of the material shall meet Annex 2-11 of Guidance Part 2 and Annex 7A-4 of Guidance Part7 Chapter 6.

(13) The impact test may not be omitted for high manganese austenitic steel.

RULES FOR CLASSIFICATION(STEEL SHIPS)

(Guidance for Pt 7 Ch 5)

2025.11.

Hull Rule Development Team

- Main Amendments -

(1) Enter into force on 1 January 2026 (the contract date for ship construction)

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

- To reflect the revision item of MSC.523(106)

Present	Amendment
Chapter 5 Ships Carrying Liquefied Gases in Bulk **Section 1 ~ Section 19 <Omitted>** **Annex 7A-1 ~ Annex 7A-3 <Omitted>** **Annex 7A-4 High manganese austenitic steel for Cryogenic Service** **Section 1 General** 101. Scope 1. 〈Omitted〉 102. Application 1. 〈Omitted〉 ~~2. High manganese austenitic steel for cryogenic service is used for only domestic voyage. When high manganese austenitic steel for cryogenic service is used for international voyage, it is to be approved by the relevant adminstration.~~ 3. High manganese austenitic steel is applicable to cargo tanks such as Ammonia anhydrous, Butane(all isomers), Butane-propane mixture, Carbon dioxide(High Purity and reclaimed quality), Ethane, Ethylene, Methane(LNG), Pentane(all isomers) or Propane. 4. The post-weld stress relief heat treatment referenced in Rules Part 7 Chapter 5, 1712.2.(2) is waived for ammonia cargo tanks. **<Below omitted>**	**Chapter 5 Ships Carrying Liquefied Gases in Bulk** **Section 1 ~ Section 19 <Same as the present Guidance>** **Annex 7A-1 ~ Annex 7A-3 <Same as the present Guidance>** **Annex 7A-4 High manganese austenitic steel for Cryogenic Service** **Section 1 General** 101. Scope 1. 〈Same as the present Guidance〉 102. Application 1. 〈Same as the present Guidance〉 2. High manganese austenitic steel is applicable to cargo tanks such as Ammonia anhydrous, Butane(all isomers), Butane-propane mixture, Carbon dioxide(High Purity and reclaimed quality), Ethane, Ethylene, Methane(LNG), Pentane(all isomers) or Propane. 3. The post-weld stress relief heat treatment referenced in Rules Part 7 Chapter 5, 1712.2.(2) is waived for ammonia cargo tanks. **<Below Same as the present Guidance>**

Amendments to the Rules for the Classification of Steel Ships

(Circular)

Pt. 9 Ch. 2 Crago Handling Appliance

2025. 11.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments : (Effective Date : 1 January 2026)

(1) Issuance of Factual Statement on Load Testing for Cargo Handling Appliances Assigned with Class Notation LG(P)

:

- Reflecting the requirements for maintenance and operating manuals as stipulated in MSC.1/Circ.1663.
- With regard to the period of Annual Surveys, changing the default setting from the 12-month interval under ILO Convention No. 152 to the periodical survey scheme applied under SOLAS.
- Upgrading the "operational testing of safety and protective devices" from an optional to a mandatory inspection item within the scope of the Annual Survey.
- In relation to the class notation LG(P), establishing the CG(SOF) certificate for un-certified cargo handling appliances and revising the timing of certificates' issuance under Pt 9, Ch 2, 103.

2. Main Contents: Refer to the amendments

Present	Amendment
# CHAPTER 2 CARGO HANDLING APPLIANCES ## Section 1 General	# CHAPTER 2 CARGO HANDLING APPLIANCES ## Section 1 General
101. 〈omitted〉	**101. 〈omitted〉**
102. Definitions ***(2025)*** For the purpose of the Rules, the terms are defined as following below unless otherwise defined **1. ~ 18. 〈omitted〉** 〈newly added〉	**102. Definitions** ***(2025)*** For the purpose of the Rules, the terms are defined as following below unless otherwise defined **1. ~ 18. 〈omitted〉** **19. A member Society of IACS** is any Society that is subject to verification of compliance with the QSCS (Quality System Certification Scheme), in accordance with Section 5 of Annex 1 of QSCS of IACS. **20. Thorough examination** is a detailed assessment carried out annually in the presence of the Surveyor to determine whether the cargo handling appliances comply with the applicable requirements. **21. Certified** means that the lifting appliance or loose gear has been documented as compliant to these Rules and that such compliance has been verified by surveyor the this Society. **22. Maintenance** means any activity carried out by a responsible person to keep the lifting appliance or loose gear in proper working condition for continued safe use. **23. Operational testing** means a test carried out by a responsible person to verify the correct functioning of a component or the operation of the lifting appliance and/or associated loose gear. **24. Self-inspection** means an assessment carried out by a responsible person to confirm that the lifting appliance or loose gear is in proper working condition for continued safe use.
103. 〈omitted〉	**103. 〈omitted〉**

Present	Amendment
Section 2 Surveys	**Section 2 Surveys**
201. 〈omitted〉	**201. 〈same as the present〉**
202. Surveys of Cargo Handling Appliances	**202. Surveys of Cargo Handling Appliances**
1. Kinds of Surveys The kinds of Surveys for cargo handling appliances are as follows: (1) Registration Survey (A) Registration Survey during Construction (B) Registration Survey after Construction (2025) (2) Periodical Survey *(2025)* (A) Annual Survey (B) Load Test (3) Occasional Survey	**1. Kinds of Surveys** The kinds of Surveys for cargo handling appliances are as follows: (1) Registration Survey (A) Registration Survey during Construction (B) Registration Survey after Construction (2025) (2) Periodical Survey *(2026)* (A) Annual Survey (Thorough examination) (B) Special Survey (Load tests + Thorough examination) (3) Occasional Survey
2. Due range The timing of the Surveys of cargo handling appliances are to be in accordance with the followings: (1) 〈omitted〉 (2) Lifting appliances assigned a safe working load shall be subjected to an annual survey at intervals not exceeding 12 months. However, for domestic vessels not subject to the SOLAS Convention or where separate instructions are provided by the flag Administration, annual survey may be carried out within 3 months before or after each anniversary date of periodical survey for Classification. *(2025)* (3) ~ (5) 〈omitted〉	**2. Due range** The timing of the Surveys of cargo handling appliances are to be in accordance with the followings: (1) 〈same as the present〉 (2) Annual surveys are to be carried out within 3 months before or after each anniversary date of periodical survey for Classification. However, in the case of cargo handling appliances to be used in a port State that has ratified ILO Convention No, 152, an annual survey is to be carried out 12 months from the date of the previous survey. A flag State, port State or coastal State that has not ratified ILO Convention No. 15 may also require survey at 12 month intervals. *(2026)* (3) ~ (5) 〈same as the present〉
3. Periodical Surveys carried out in Advance 〈omitted〉	**3. Periodical Surveys carried out in Advance** 〈same as the present〉

Present	Amendment
203. Registration Surveys	203. Registration Surveys
1. Registration surveys during construction ***(2025)***	**1. Registration surveys during construction** ***(2025)***
(1) Drawings and Other Documents to be Submitted 【See Guidance】	(1) Drawings and Other Documents to be Submitted 【See Guidance】
(A) 〈omitted〉	(A) 〈same as the present〉
(B) The relevant drawings and documents listed in the following (a) through (k) are to be submitted for approval for cargo handling appliances to be newly constructed;	(B) The relevant drawings and documents listed in the following (a) through (l) are to be submitted for approval for cargo handling appliances to be newly constructed;
(a) ~ (j) 〈omitted〉	(a) ~ (j) 〈same as the present〉
〈newly added〉	(k) Procedures for Load tests *(2026)*
(k) Other drawings and documents as deemed necessary by the Society	(l) Other drawings and documents as deemed necessary by the Society
(C) The relevant drawings and documents listed in the following (a) through (f) are to be submitted for reference for cargo handling appliances to be newly constructed; *(2019)*	(C) The relevant drawings and documents listed in the following (a) through (f) are to be submitted for reference for cargo handling appliances to be newly constructed; *(2019)*
(a) ~ (b) 〈omitted〉	(a) ~ (b) 〈same as the present〉
〈newly added〉	(c) Maintenance manual for cargo handling appliances *(2026)*
(c) Operation manual for lifting appliances	(d) Operation manual for lifting appliances
(d) Procedures for non-destructive testing	(e) Procedures for non-destructive testing
~~(e) Procedures for Load tests~~	
(f) Other drawings and documents as deemed necessary by the Society	(f) Other drawings and documents as deemed necessary by the Society
(D) 〈omitted〉	(D) 〈same as the present〉
(2) ~ (3) 〈omitted〉	(2) ~ (3) 〈same as the present〉
2. Registration Surveys after Construction ***(2025)***	**2. Registration Surveys after Construction** ***(2025)***
(1) Cargo handling appliances assigned the class notation LG(F)	(1) Cargo handling appliances assigned the class notation LG(F)
(A) ~ (B) 〈omitted〉	(A) ~ (B) 〈same as the present〉
(C) On board operational tests and load tests. However, load test may be deferred to the next scheduled load test, if certificates and inspection records issued by a member Society of IACS are maintained. *(2022)*	(C) On board operation tests and load tests. However, load test may be deferred to the next scheduled load test, if certificates and inspection records issued by a member Society of IACS are maintained. *(2026)*
(D) Other tests considered necessary by the Society	(D) Other tests considered necessary by the Society
(2) Cargo handling appliances assigned the class notation LG(P)	(2) Cargo handling appliances assigned the class notation LG(P) *(2026)*
(A) Inspection equivalent to the periodical surveys specified in 204. for cargo handling appliances that do not meet the criteria specified in (1).	(A) Load test
~~(3) Other tests considered necessary by the Society~~	(B) Thorough examination

Present	Amendment
204. Periodical Surveys *(2025)*	**204. Periodical Surveys** (2025)
1. Annual Surveys 【See Guidance】	**1. Annual Surveys** 【See Guidance】
〈newly added〉	During annual surveys, a thorough examination of the cargo handling appliances are to be carried out, and the maintenance records, including self-inspections conducted in accordance with the maintenance manual for each appliance, are to be verified. *(2026)*
(1) Derrick Systems	(1) Derrick Systems
(A) 〈omitted〉	(A) 〈same as the present〉
(a) Items to be examined	(a) Items to be examined
(i) ~ (iii) 〈omitted〉	(i) ~ (iii) 〈same as the present〉
(iv) Safety devices and protective devices	(iv) Operation tests of the safety devices and protective devices *(2026)*
(v) ~ (vi) 〈omitted〉	(v) ~ (vi) 〈same as the present〉
(b) Items to be examined where considered necessary by the Surveyor	(b) Items to be examined where considered necessary by the Surveyor
(i) ~ (ii) 〈omitted〉	(i) ~ (ii) 〈same as the present〉
~~(iii) Operation tests of the safety devices and protective devices~~	
(B) 〈omitted〉	(B) 〈same as the present〉
(2) Cranes	(2) Cranes
〈omitted〉	〈same as the present〉
(A) Items to be examined	(A) Items to be examined
(a) ~ (d) 〈omitted〉	(a) ~ (d) 〈same as the present〉
(e) Safety devices and protective devices	(e) Operation tests of the safety devices and protective devices *(2026)*
(f) ~ (g) 〈omitted〉	(f) ~ (g) 〈same as the present〉
(B) Items to be examined where considered necessary by the Surveyor	(B) Items to be examined where considered necessary by the Surveyor
(a) ~ (c) 〈omitted〉	(a) ~ (c) 〈same as the present〉
~~(d) Operation tests of the safety devices and protective devices~~	
(3) Cargo Ramps	(3) Cargo Ramps
〈omitted〉	〈same as the present〉
(A) Items to be examined	(A) Items to be examined
(a) ~ (e) 〈omitted〉	(a) ~ (e) 〈same as the present〉
(f) Safety devices and protective devices	(f) Operation tests of the safety devices and protective devices *(2026)*
(g) ~ (h) 〈omitted〉	(g) ~ (h) 〈same as the present〉

Present	Amendment
(B) Items to be examined where considered necessary by the Surveyor (a) ~ (c) 〈omitted〉 ~~(d) Operation tests of safety devices and protective devices~~ (4) Cargo Lifts 〈omitted〉 (A) Items to be examined (a) ~ (d) 〈omitted〉 (e) Safety devices and protective devices (f) ~ (g) 〈omitted〉 (B) Items to be examined where considered necessary by the Surveyor (a) ~ (b) 〈omitted〉 ~~(c) Operation tests of the safety devices and protective devices~~ (5) ~ (6) 〈omitted〉 **2. 〈omitted〉** **Section 3 ~ 8 〈omitted〉**	(B) Items to be examined where considered necessary by the Surveyor (a) ~ (c) 〈same as the present〉 (4) Cargo Lifts 〈same as the present〉 (A) Items to be examined (a) ~ (d) 〈same as the present〉 (e) Operation tests of the safety devices and protective devices *(2026)* (f) ~ (g) 〈same as the present〉 (B) Items to be examined where considered necessary by the Surveyor (a) ~ (b) 〈same as the present〉 (5) ~ (6) 〈same as the present〉 **2. 〈same as the present〉** **Section 3 ~ 8 〈same as the present〉**

Present	Amendment
Section 9 Certification, Marking and Documentation	**Section 9 Certification, Marking and Documentation**
901. ~ 902. 〈omitted〉	**901. ~ 902. 〈same as the present〉**
903. Marking of Safe Working Load, etc.	**903. Marking of Safe Working Load, etc.**
1. Marking for Lifting Appliances *(2025)*	**1. Marking for Lifting Appliances** *(2025)*
(1) ~ (4) 〈omitted〉 (5) In addition to the markings specified in (1), (2) and (3) above, the same markings (except the stamp mark of the Society) are to be made at the conspicuous places with paint, etc. In this case, the size of letters should not be less than 77 mm in height. (6) If on completion of a thorough examination, the competent person considers the lifting appliance to be unsafe for operation or not in compliance with the applicable requirements of the Administration, then that lifting appliance should be taken out of service until any deficiency is rectified to the satisfaction of a competent person. The lifting appliance should be clearly marked "not to be used" and the status should be recorded in a register of lifting appliances.	(1) ~ (4) 〈same as the present〉 (5) In addition to the markings specified in (1), (2) and (3) above, the same markings (except the stamp mark of the Society) are to be made at the conspicuous places by a permanent method, etc. In this case, the size of letters should not be less than 77 mm in height. *(2026)* (6) If on completion of a thorough examination, the Surveyor considers the lifting appliance to be unsafe for operation or not in compliance with the applicable requirements of these Rules, then that lifting appliance should be taken out of service until any deficiency is rectified to the satisfaction of the Surveyor. The lifting appliance should be clearly marked "not to be used" and the status should be recorded in a register of lifting appliances. *(2026)*
2. Marking for Loose Gear	**2. Marking for Loose Gear**
(1) ~ (2) (3) In addition to the markings specified in (1) above, grabs, lifting beams, lifting magnets, spreaders and similar other loose gear are to be marked with the safe working load and the self-weight of them with paint, etc. In this case the size of letters should not be less than 77 mm in height. (4) 〈omitted〉 (5) If on completion of a thorough examination, the competent person considers the lifting appliance to be unsafe for operation or not in compliance with the applicable requirements of the Administration, then that lifting appliance should be taken out of service until any deficiency is rectified to the satisfaction of a competent person. The lifting appliance should be clearly marked "not to be used" and the status should be recorded in a register of lifting appliances. *(2025)*	(1) ~ (2) (3) In addition to the markings specified in (1) above, grabs, lifting beams, lifting magnets, spreaders and similar other loose gear are to be marked with the safe working load and the self-weight of them by a permanent method, etc. In this case the size of letters should not be less than 77 mm in height. *(2026)* (4) 〈omitted〉 (5) If on completion of a thorough examination, the Surveyor considers the loose gear to be unsafe for operation or not in compliance with the applicable requirements of these Rules, then that loose gear should be taken out of service until any deficiency is rectified to the satisfaction of the Surveyor. The loose gear should be clearly marked "not to be used" and the status should be recorded in a register of lifting appliances. *(2026)*

Present	Amendment
904. Documentation	**904. Documentation**
1. Kinds of Documents The kinds of the documents issued by the Society for lifting appliances and loose gear are to be as specified in the followings: *(2025)* (A) ~ (F) 〈omitted〉 〈newly added〉	**1. Kinds of Documents** The kinds of the documents issued by the Society for lifting appliances and loose gear are to be as specified in the followings: *(2025)* (A) ~ (F) 〈same as the present〉 (G) Factual Statement of Test and Thorough Examination of Non-certified Lifting Appliances(Form CG(SOF)) *(2026)*
2. ~ 4. 〈omitted〉	**2. ~ 4. 〈same as the present〉**
905. Preservation of Documents	**905. Preservation of Documents**
1. 〈omitted〉	**1. 〈same as the present〉**
2. Instruction Manual The instruction manual mentioned in **Par 1** above is to note essential items necessary for operation and maintenance of the cargo handling appliances among those given in the following (A) through (H): (A) General arrangement of lifting appliances *(2025)* (B) Arrangement drawing of loose gear(including rigging arrangement) (C) List of loose gear (D) Design conditions(including safe working load, wind speed, trim and heel of ship, etc.) (E) List of materials (F) Operation manual(including functions of safety systems and protective systems) (G) Load testing procedure (H) Maintenance and control procedures 〈새롭게 추가〉	**2. Instruction Manual** (1) The instruction manual mentioned in **Par 1** above is to note essential items necessary for operation and maintenance of the cargo handling appliances among those given in the following (A) through (H): (A) General arrangement of lifting appliances *(2025)* (B) Arrangement drawing of loose gear(including rigging arrangement) (C) List of loose gear (D) Design conditions(including safe working load, wind speed, trim and heel of ship, etc.) (E) List of materials (F) Operation manual(including functions of safety systems and protective systems) (G) Load testing procedure (H) Maintenance manual *(2026)* (2) It should be ensured that the documentation on board can be unambiguously related to the actual cargo handling appliance, i.e. by referring to the unique serial number. *(2026)*

Present

Table 9.2.29 Timing of Issuance

Kind of Documents		Timing of Issuance
A	Document in **904. 1** (A)	When the application for assignment is made and the ship passes the Registration Survey for the first time
B	Document in **904. 1** (B)	(1) When the application for assignment is made and the ship passes the Registration Survey for the first time ~~(2) When the cargo handling appliances that are installed additionally pass the Registration Survey~~ (3) When the safe working load, etc. is altered (4) When the ship passes the load tests specified in **204. 2** ~~(1)~~ *(2025)*
	Document in **904. 1** (C)	
C	Document in **904. 1** (D)	(1) When the application for assignment is made and the ship passes the Registration Survey for the first time ~~(2) When the cargo handling appliances that are installed additionally pass the Registration Survey~~ (3) When loose gear is replaced or repair at time of the Periodical Surveys and the Occasional Survey, and when the contents of autonomous inspection is recognised appropriate by the Society
	Document in **904. 1** (E) and (F)	

Amendment

Table 9.2.29 Timing of Issuance *(2026)*

Kind of Documents		Timing of Issuance
A	**CG1**	When the application for assignment is made and the cargo handling appliance passes the Registration Survey for the first time
B	**CG2**	(1) When the application for assignment is made and the cargo handling appliance passes the Registration Survey in accordance with **203. 1** and **203. 2** (1) for the first time
	CG2(U)	(2) When the safe working load, etc. of the cargo handling appliance registered in accordance with **203.1** and **203. 2**(1) is altered (3) When the cargo handling appliance registered in accordance with **203. 1** and **203. 2** (1) passes the Special Surveys specified in **204. 2**
C	**CG3**	(1) When the application for assignment is made and the cargo handling appliance passes the Registration Survey in accordance with **203. 1** and **203. 2** (1) for the first time
	CG4 & CG5	(2) When loose gear is replaced or repaired at time of the Periodical Surveys and the Occasional Survey, and when the contents of self-inspection is recognised appropriate by the Society
D	**CG(SOF)**	(1) When the application for assignment is made and the cargo handling appliance passes the Registration Survey in accordance with **203. 2** (2) for the first time (2) When the safe working load, etc. of the cargo handling appliance registered in accordance with **203. 2** (2) is altered (3) When the cargo handling appliance registered in accordance with **203. 2** (2) passes the Special Surveys specified in **204. 2**

Amendments to the Guidance relating to the Rules for the Classification of Steel Ships

(Circular)

Pt. 9 Ch. 2 Crago Handling Appliance

2025. 11.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments : (Effective Date : 1 January 2026**)**

(1) Reflection of the requirement of MSC.1/Circ.1663.

:

- Incorporation of the requirements of MSC.1/Circ.1663 concerning maintenance and operating manuals.
- Incorporation of the requirements of MSC.1/Circ.1663 concerning the marking of loose gear.

2. Main Contents: Refer to the amendments

Present	Amendment
# CHAPTER 2 CARGO HANDLING APPLIANCES ## Section 2 Surveys 201. ~ 202. 〈omitted〉 203. Registration Surveys **1. Registration survey during Construction** ***(2025)*** (1) Drawings and Other Documents to be Submitted 【See Rule】 In application to **203. 1** (1) of the Rules, the following are to be applied. (A) ~ (C) 〈omitted〉 〈newly added〉	# CHAPTER 2 CARGO HANDLING APPLIANCES ## Section 2 Surveys 201. ~ 202. 〈omitted〉 203. Registration Surveys **1. Registration survey during Construction** ***(2025)*** (1) Drawings and Other Documents to be Submitted 【See Rule】 In application to **203. 1** (1) of the Rules, the following are to be applied. (A) ~ (C) 〈omitted〉 (D) A maintenance manual for a lifting appliance should be provided by the manufacturer. The maintenance manual should, as a minimum, include the following for each lifting appliance: *(2026)* (a) description of the required self-inspection regime and maintenance schedules specific to the lifting appliance, checklists and a list of key tools or other items for use when carrying out self-inspections and maintenance (b) instructions for routine repairs/maintenance (c) technical maintenance information (d) information on recommended lubricants, oil and filter change (e) information on slewing bearing maintenance, if applicable (f) lists of replaceable parts/components, as well as the self-inspection/maintenance/replacement procedures for these parts/components (g) lists of sources of spare parts (h) model forms for records of self-inspections and maintenance (i) operational testing procedures, as well as the pre/post-operational testing self-inspection procedures (j) list of components requiring particular attention during inspections, as well as the self-inspection/maintenance procedures for these components

Present	Amendment
	(k) recommended intervals for replacement and overhaul of components and equipment (l) information on the preservation of the coating and corrosion protection system (m) information regarding special self-inspection and maintenance in cases where the lifting appliance is not operated for long periods of time
〈newly added〉	(E) An operations manual for a lifting appliance should be provided by the manufacturer. An operations manual should, as a minimum, include the following for each lifting appliance: *(2026)* (a) design, operational and environmental limitations (b) compatible loose gear (c) safety instructions (d) operating procedures, including special procedures, if any
(2) ~ (3) 〈omitted〉	(2) ~ (3) 〈omitted〉
204. Periodical Surveys *(2025)*	**204. Periodical Surveys** *(2025)*
1. Annual Surveys 【See Rule】	**1. Annual Surveys** 【See Rule】
(1) In application to **204. 1** (1) of the Rules, at Annual Surveys, the structural members and loose gear in which corrosion, abrasion, or other defects specified in the following are found are, as a rule, to be repaired or renewed: (A) ~ (B) 〈omitted〉 (C) Loose gear(except wire ropes) For loose gear except wire ropes, those corresponding to any of the followings: (a) Those in which injurious deformation occurred (b) Those in which injurious deformation occurred (c) Those in which amount of abrasion or corrosion reaches 10 % or more of the original dimensions (d) Blocks whose sheaves do not rotate smoothly (D) Wire ropes	(1) In application to **204. 1** (1) of the Rules, at Annual Surveys, the structural members and loose gear in which corrosion, abrasion, or other defects specified in the following are found are, as a rule, to be repaired or renewed: (A) ~ (B) 〈omitted〉 (C) Loose gear(except wire ropes) For loose gear except wire ropes, those corresponding to any of the followings: (a) Those in which injurious deformation occurred (b) Those in which cracks occurred *(2026)* (c) Those in which amount of abrasion or corrosion reaches 10 % or more of the original dimensions (d) Blocks whose sheaves do not rotate smoothly (D) Wire ropes
(2) 〈omitted〉	(2) 〈omitted〉

Present	Amendment
Section 3 ~ 8 〈omitted〉	Section 3 ~ 8 〈omitted〉
〈newly added〉	**Section 9 Certification, Marking and Documentation** **903. Marking of Safe Working Load, etc.** *(2026)* **1. Marking for Loose Gear** In application to 9**03. 2** of the Rules, at least the following information should be marked for each item of loose gear. .1 ramshorn hooks: range of sling angle; .2 block and hook blocks; .1 rope diameter; .2 rigging plan identification mark (for blocks) if any; .3 lifting beams, spreaders, frames; .1 tare weight; .2 allowable sling angles; .3 details of the safe application of the SWL in case of complex equipment which can be utilized in different ways; .4 grabs; .1 tare weight

RULES FOR CLASSIFICATION(STEEL SHIPS)

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

2025.11.

Hull Rule Development Team

- Main Amendments -

(1) Enter into force on 1 January 2026 (the contract date for ship construction)

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

- To reflect the revision item of MSC.524(106)

Present	Amendment
Chapter 1 ~ Chapter 6 <Omitted>	**Chapter 1 ~ Chapter 6 <Same as the present Rule>**
Chapter 7 Material and General Pipe Design	**Chapter 7 Material and General Pipe Design**
Section 1 ~ Section 3 <Omitted>	**Section 1 ~ Section 3 <Same as the present Rule>**
Section 4 Materials	**Section 4 Materials**
401. Metallic materials	401. Metallic materials
1. Materials for fuel containment and piping systems are to comply with the minimum regulations given in the following tables:	1. Materials for fuel containment and piping systems are to comply with the minimum regulations given in the following tables:
Table 7.1 ~ Table 7.2b 〈Omitted〉	Table 7.1 ~ Table 7.2b 〈Same as the present Rule〉
Table 7.3 Plates, sections and forgings for fuel tanks, secondary barriers and process pressure vessels for design temperature below minus 55°C and down to minus 165°C.	Table 7.3 Plates, sections and forgings for fuel tanks, secondary barriers and process pressure vessels for design temperature below minus 55°C and down to minus 165°C.
Table 7.4 ~ Table 7.5 〈Omitted〉	Table 7.4 ~ Table 7.5 〈Same as the present Rule〉
2. ~ 5. 〈Omitted〉	2. ~ 5. 〈Same as the present Rule〉
~~6. For fuel tanks using high manganese austenitic steel for cryogenic service, Annex 4[High manganese austenitic steel for Cryogenic Service] should be applied.~~	
Chapter 8 ~ Chapter 18 <Omitted>	**Chapter 8 ~ Chapter 18 <Same as the present Rule>**

<Present>

Table 7.5.6 PLATE, SECTIONS AND FORGINGS[1] FOR FUEL TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURE BELOW -55°C AND DOWN TO -165°C[2]. Maximum thickness 25mm[3][4](2022)[See Guidance]

Minimum design temp.(°C)	Chemical composition[5] and heat treatment	Impact test temp.(°C)
-60	1.5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6]	-65
-65	2.25 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-70
-90	3.5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-95
-105	5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-110
-165	9 % nickel steel - double normalized and tempered or quenched and tempered[6]	-196
-165	Austenitic steels, such as types 304, 304 , 316, 316 , 321 and 347 solution treated[9]	-196
<New>	<New>	<New>
-165	Aluminium alloys; such as type 5083 annealed	Not required
-165	Austenitic Fe-Ni alloy (36 % nickel). Heat treatment as agreed	Not required
1. TENSILE AND TOUGHNESS(IMPACT) TEST REQUIREMENTS		
1.1 Sampling frequency		
Plates	Each “piece” to be tested	
Sections and forgings	Each “batch” to be tested	
1.2 Toughness(Charpy V-notch test)		
Plates	Transverse teset pieces. Minimum average energy value (KV) 27J	
Sections and forgings	Longitudinal teset pieces. Minimum average energy value (KV) 41J	

Notes:

(1)~(10) <Omitted>

(11) This table is generally applicable for material thickness up to 50mm. Proposals for greater thicknesses shall be approved by the Society.

(12) <New>

(13) <New>

<Amendment>

Table 7.5.6 PLATE, SECTIONS AND FORGINGS[1] FOR FUEL TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURE BELOW -55°C AND DOWN TO -165°C[2]. Maximum thickness 25mm[3][4](2022)[See Guidance]

Minimum design temp.(°C)	Chemical composition[5] and heat treatment	Impact test temp.(°C)
-60	1.5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6]	-65
-65	2.25 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-70
-90	3.5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-95
-105	5 % nickel steel - normalized or normalized and tempered or quenchedand tempered or TMCP[6][7]	-110
-165	9 % nickel steel - double normalized and tempered or quenched and tempered[6]	-196
-165	Austenitic steels, such as types 304, 304 , 316, 316 , 321 and 347 solution treated[9]	-196
-165	High manganese austenitic steel-hot rolling and controlled cooling[12][13]	-196
-165	Aluminium alloys; such as type 5083 annealed	Not required
-165	Austenitic Fe-Ni alloy (36 % nickel). Heat treatment as agreed	Not required
1. TENSILE AND TOUGHNESS(IMPACT) TEST REQUIREMENTS		
1.1 Sampling frequency		
Plates	Each “piece” to be tested	
Sections and forgings	Each “batch” to be tested	
1.2 Toughness(Charpy V-notch test)		
Plates	Transverse teset pieces. Minimum average energy value (KV) 27J	
Sections and forgings	Longitudinal teset pieces. Minimum average energy value (KV) 41J	

Notes:

(1)~(10) <Same as the present Rule>

(11) This table is generally applicable for material thickness up to 50mm. Proposals for greater thicknesses shall be approved by the Society. High manganese austenitic steel is excluded.

(12) The use of the material shall meet Annex 2-11 of Guidance Part 2 and Annex 4 of Guidance for Ships Using Low-flashpoint Fuels.

(13) The impact test may not be omitted for high manganese austenitic steel.

RULES FOR CLASSIFICATION(STEEL SHIPS)

(Guidance for Ships Using Low-flashpoint Fuels)

2025.11.

Hull Rule Development Team

- Main Amendments -

(1) Enter into force on 1 January 2026 (the contract date for ship construction)

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

- To reflect the revision item of MSC.524(106)

Present	Amendment
Chapter 1 ~ Chapter 18 <Omitted> **Annex 1 ~ Annex 3 <Omitted>** **Annex 4 High Manganese Austenitic Steel for Cryogenic Service** **Section 1 General** 101. Scope 1. <Omitted> 102. Application 1. 〈Omitted〉 ~~2. High manganese austenitic steel for cryogenic service is used for only domestic voyage. When high manganese austenitic steel for cryogenic service is used for international voyage, it is to be approved by the relevant adminstration.~~ 3. High manganese austenitic steel is applicable to cargo tanks such as Ammonia anhydrous, Butane(all isomers), Butane-propane mixture, Carbon dioxide(High Purity and reclaimed quality), Ethane, Ethylene, Methane(LNG), Pentane(all isomers) or Propane. 〈Below Omitted〉	**Chapter 1 ~ Chapter 18 <Same as the present Guidance>** **Annex 1 ~ Annex 3 <Same as the present Guidance>** **Annex 4 High Manganese Austenitic Steel for Cryogenic Service** **Section 1 General** 101. Scope 1. <Same as the present Guidance> 102. Application 1. 〈Same as the present Guidance〉 2. High manganese austenitic steel is applicable to cargo tanks such as Ammonia anhydrous, Butane(all isomers), Butane-propane mixture, Carbon dioxide(High Purity and reclaimed quality), Ethane, Ethylene, Methane(LNG), Pentane(all isomers) or Propane. 〈Below Same as the present Guidance〉

Amended Guidance for OSV(Offshore Support Vessels)

2025.11.

HRT

- Main Amendments -

(1) Background of Amendment

1) MSC.1/Circ.1662 Reflection of ‘guidelines for anchor handling’ (effective from 1 January 2026)
: In accordance with SOLAS Chapter II-1/ Regulation 3-13, a separate guidance has been established for the approval and periodic inspection of anchor handling winches. Accordingly, the provisions related to anchor handling appliances in the OSV Guidelines (Anchor Handling and Towing Vessels) have been revised to refer to Guidance for Anchor Handling Appliances

(2) Revised content : See the below table

Present	Amendment
CHAPTER 5 ANCHOR HANDLING AND TOWING VESSELS	CHAPTER 5 ANCHOR HANDLING AND TOWING VESSELS
Section 1 General ~ Section 4 Hull Equipment 〈omitted〉	Section 1 General ~ Section 4 Hull Equipment 〈same as the present〉
Section 5 Anchor Handling/Towing Winch and Accessories	Section 5 Anchor Handling/Towing Winch and Accessories
〈Added newly〉	501. General *(2026)* Unless otherwise specified in this section, the requirements for anchor handling/towing winch and accessories are to comply with the requirements of Guidance for Anchor Handling Appliances.
501. Arrangement and Control 1. 〈omitted〉 2. 3. 〈omitted〉	~~501.~~ 502. Arrangement and Control 1.〈same as the present〉 2. 3. 〈same as the present〉

Present	Amendment
502. Mechanical Design 1. ~ 5. 〈deleted〉	~~502.~~ 503. Mechanical Design The requirements for mechanical design of anchor handling/towing winch are to comply with the requirements of **Guidance for Anchor Handling Appliances.** *(2026)*
503. Towing Pins and Towing Eyes 〈omitted〉	~~503.~~ 504. Towing Pins and Towing Eyes 〈same as the present〉
504. Shark Jaws 〈omitted〉	~~504.~~ 505. Shark Jaws 〈same as the present〉
505. Stern Roller 〈omitted〉	~~505.~~ 506. Stern Roller 〈same as the present〉
506. A-frame or Shear Leg Type Crane 〈omitted〉	~~506.~~ 507. A-frame or Shear Leg Type Crane 〈same as the present〉
507. Tests 〈omitted〉	~~507.~~ 508. Tests 〈same as the present〉
Section 6 Machinery ~ Section 7 Fire Protection and Fire Extinguishing Systems 〈omitted〉	Section 6 Machinery ~ Section 7 Fire Protection and Fire Extinguishing Systems 〈same as the present〉

2026

Guidance for Anchor Handling Appliance

GC-46-E

KR

APPLICATION OF "GUIDANCE FOR ANCHOR HANDLING APPLIANCE"

1. Unless expressly specified otherwise, the requirements of this Guidance apply to anchor handling appliances installed on ships on or after 1 January 2026.

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CHAPTER 1 GENERAL

Section 1 General

101. General

1. This guidance apply to the anchor handling appliances that are subject to **SOLAS regulation II-1/3-13**, and which are installed on the ships classed with the Society or intended to be registered under the Society. Such appliances are generally installed on offshore support vessel (OSV), work vessel, etc.
2. Except as otherwise specifically provided in this guidance, the materials, equipment, devices, and construction of anchor handling appliances are to comply with the relevant requirements of the **Rules for the Classification of Steel Ships**(hereinafter referred to as the Rules).
3. Anchor handling appliances installed before 1 January 2026, and not registered under the Society are to be registered in accordance with this guidance no later than the date of the first renewal survey on or after 1 January 2026.
4. This guidance do not apply to windlasses or anchor windlasses used for the operation of the ship's own anchoring system.

102. Definitions

1. **Anchor handling appliance** refers to anchor handling winches, associated equipment and wires. Associated equipment generally include stern rollers, towing pins, shark jaws, etc.
2. **Anchor handling winch** means any winch for the purpose of deploying, recovering and repositioning anchors and mooring lines in subsea operations.
3. **Structural members** mean the structural parts of anchor handling appliances that transmit maximum line pull.
4. **A wire** means a dedicated line (wire rope, synthetic rope or chain cable) used for the handling of anchors by means of an anchor handling winch. The wire may include connecting loose gear.
5. **Loose gears** mean articles of ship's equipment such as chains, rings, hooks, shackles, clamps, etc., by means of which a load can be attached to an anchor handling appliance but which does not form an integral part of the appliance or load.
6. **Chain stopper** means a device used for securing and holding a section of wire, thereby relieving the load on the winch drum..
7. **Brake holding force** means the maximum force for which the winch brake is designed.
8. **Brake holding capacity** means the maximum line pull that the winch brake can withstand without slipping of the brake.
9. **Maximum line pull** means the maximum sustained force the winch is capable of pulling.
10. **Static bollard pull** means the maximum sustained pulling force a vessel is capable of generating at maximum power (i.e. 100% maximum continuous rating (MCR)) and zero forward speed. It is abbreviated to "BP" and expressed in tons (t)
11. **Safe working load** means the maximum static load at which the anchor handling winch or wire is used for anchor handling or towing purposes under specified operating conditions. It is abbreviated to "SWL" and expressed in tons (t). The safe working load shall not exceed the maximum line pull and static bollard pull.
12. **Responsible person** means a person appointed by the master or company as defined in SOLAS regulation IX/1, as appropriate, possessing the knowledge and experience required for the performance of duties specified in this Guidance.
13. **Overload test** means a test in excess of the maximum line pull, carried out in the presence of a competent person in order to check the structural integrity of the anchor handling winches and their

attachment to and adequacy of their supporting structure.

14. **A member Society of IACS** means any Society that is subject to verification of compliance with the QSCS (Quality System Certification Scheme), in accordance with Section 5 of Annex 1 of QSCS of IACS.

15. **Thorough examination** means a detailed assessment carried out annually in the presence of the Surveyor to determine whether the anchor handling appliances comply with the applicable requirements.

16. **Commissioning Test** measns a comprehensive examination conducted upon initial installation on board or upon assignment application, and subsequently at Special Surveys, to verify that the appliance functions in accordance with its design intent and complies with the applicable safety and performance requirements.

17. **Certified** means that the anchor handling appliance has been documented as compliant with this Guidance, and such compliance has been verified by a surveyor of this Society.

18. **Maintenance** means any activity carried out by a responsible person to keep the anchor handling appliance in good working condition for continued safe use.

19. **Operational testing** means a test carried out by a responsible person to verify the correct functioning of a component or operation of the anchor handling appliance or its components.

20. **Self-inspection** means an assessment carried out by a responsible person to ascertain if the anchor handling appliances are in good working condition for continued safe use.

103. Equivalence

The equivalence of alternative designs and novel features which deviated from or are not directly applicable to this Guidance is to be in accordance with **Pt 1, Ch 1, 105.** of the Rules. ⚓

CHAPTER 2 CLASSIFICATION SURVEYS

Section 1 General

101. General

1. Unless otherwise specified in this chapter, anchor handling appliances are to comply with the relevant requirements of **Pt 1** of the Rules.

2. Application

(1) The requirements in this chapter apply to the tests and surveys for the anchor handling appliances.

(2) Where the structural members of the anchor handling appliances are permanently fitted to the hull structure or where they form an integral part thereof, the tests and surveys for these parts are to comply with the requirements in this Chapter and, in addition they are to comply with the relevant requirements of other Parts of the Rules.

(3) At the Periodical Surveys, the Surveyor may require surveys other than those specified in **Sec 3** in this Chapter if deemed necessary.

(4) At Annual Surveys, the Surveyor may reduce the extent and contents of the tests and surveys specified in **301.** if deemed appropriate, taking into account the purpose, construction, age, history, results of previous surveys, and the current condition of the anchor handling appliances.

3. Preparation for Surveys and Others

(1) All necessary preparations required for the survey, as well as any additional preparations deemed necessary by the Surveyor in accordance with the requirements of this guidance, are to be made by the applicant for the survey. These preparations are to include provisions for an easy and safe access, necessary facilities, and necessary records for the execution of the survey.

(2) The applicant for the survey is to arrange a responsible person who is well conversant with the survey items and responsible for the preparation of the survey to provide the necessary assistance to the Surveyor according to Surveyor's requests during the survey.

(3) The survey may be suspended where necessary preparations have not been made, any appropriate attendant mentioned in the previous (2) is not present, or the Surveyor considers that the safety for execution of the survey is not ensured.

(4) Where repairs are deemed necessary as a result of the survey, the Surveyor will notify his recommendations to the applicant of the survey. Upon this notification, the repair is to be made to the satisfaction of the Surveyor.

3. Presentation of Certificates

All of the certificates for anchor handling appliances issued by the Society are to be kept on board and presented to the Surveyor when requested at the tests and surveys.

4. Records of the Surveys

The "Register of Ship's Anchor Handling Appliances including Wires" is to be made necessary entries on it and endorsed by the Surveyor at the completion of the Surveys.

5. Notification of Survey Results

(1) The Society is to notify the results of the Survey to the applicant in a form of Survey Report.

(2) The Survey Report in (1) above is to be kept on board and presented to the Surveyor when requested at the subsequent Survey.

102. Surveys of Anchor Handling Appliances

1. Kinds of Surveys

The kinds of Surveys for anchor handling appliances are as follows:

(1) Registration Surveys
  (A) Registration Surveys during Construction
  (B) Registration Surveys after Construction

(2) Periodical Surveys
  (A) Annual Surveys(Thorough examination)
  (B) Special Surveys(Commissioning test and thorough examination)

(3) Occasional Surveys

2. Due range

The timing of the Surveys of anchor handling appliances are to be in accordance with the followings:

(1) A Registration Surveys are to be carried out when the safety working load, etc. are assigned for the first time.
(2) The thorough examinations are to be carried out within 3 months before or after each anniversary date of periodical surveys for Classification.
(3) The commissioning tests are to be carried out at the Registration Survey and at the interval of 5 years from the date of completion of the previous commissioning test.
(4) Occasional Survey is to be carried out as follows except periodical survey.
(5) Notwithstanding (2) to (3) above, the postponement of inspection due to the force majeure is to be in accordance with the requirements specified in **Pt 1, Ch 1, 906. 6** of the Rules.

3. Periodical Surveys carried out in Advance

Periodical Surveys may be carried out in advance of the due date of each Survey upon application by the Owner.

103. Class notation

1. The anchor handling appliance that complies with the requirements stipulated in this Guidance and passes the Registration Survey specified in **Sec 2** is given the notation **AH(F)**. However, the anchor handling appliance that only passes the inspections specified in **203. 2** is given the notation **AH(P)**.

2. The anchor handling appliance intended also for towing that complies with the requirements stipulated in this Guidance and passes the Registration Survey specified in **Sec 2** is given the notation **AHT(F)**. However, the anchor handling appliance intended also for towing that only passes the inspections specified in **203. 2** is given the notation **AHT(P)**.

Section 2 Registration Surveys

201. Drawings and Other Documents to be Submitted

1. At a Registration Survey, it is to be ascertained that the strength and construction of the anchor handling appliances comply with this guidance based on the drawings and documents submitted to the Society. In this case, the applicant is to submit the relevant drawings and documents listed in below.

2. The relevant drawings and documents for approval

(1) For newly manufactured anchor handling appliances, the relevant drawings and documents listed from (A) to (L) are to be submitted for approval.
  (A) General arrangement of anchor handling appliances (including maximum line pull and safe working load)
  (B) Detailed drawings of anchor handling winch and its supporting structure (including structural dimensions, material specifications, and joint details)
  (C) Detailed drawings of stern roller, towing pin, shark jaw, and its supporting structure
  (D) Arrangement of wire
  (E) List of wire(showing the construction, dimensions, materials and locations. For those in compliance with the well-known code or standard, the type symbol may be used in place of dimensions and materials)
  (F) Construction drawings of driving gears
  (G) Power system diagram
  (H) Drawings of operation and control mechanism
  (I) Drawings of safety devices
  (J) Drawings of protective devices
  (K) Procedures for commissioning tests
  (L) Other drawings and documents as deemed necessary by the Society
(2) If the whole or part of the anchor handling appliances is manufactured at the same workshop in accordance with already approved drawings and documents, the approval of drawings and docu-

ments other than (A) and (B) may be omitted.
(A) Application for omission of drawing submission
(B) General arrangement of anchor handling appliances (including maximum line pull and safe working load)

3. The relevant drawings and documents for reference

(1) For newly manufactured anchor handling appliances, the relevant drawings and documents listed from (A) to (F) are to be submitted for reference.
(A) Specifications for anchor handling appliances
(B) Calculation sheets or check sheets relevant to drawings and documents for approval specified in **2** above
(C) Maintenance manual for anchor handling appliances
(D) Operation manual for anchor handling appliances
(E) Procedures for non-destructive testing
(F) Other drawings and documents as deemed necessary by the Society

(2) In addition to (1), submission of drawings of hydraulic motors, hydraulic pumps, steam cylinders, pneumatic motors, or internal combustion engines for operation of anchor handling appliances is to be in accordance with the following requirements in (A) to (C) according to the output:
(A) Where the output is less than 375 kW:
Submission of drawings may be omitted. However, name of manufacturer, type and principal particulars are to be described in the approval drawings of winches employed.
(B) Where the output is 375 kW or more:
Principal particulars, drawings of structural details and strength calculation sheet are to be submitted in one set for reference.
(C) Others:
Where the machinery is installed in ships under the classification of the Society for the first time, the requirements in (B) above are to be applied even when the output is less than 375 kW.

(3) The manuals specified in (1) (C) and (D) are to comply with the following requirements.
(A) A maintenance manual for an anchor handling appliances should be provided by the manufacturer. The maintenance manual should, as a minimum, include the following for each anchor handling appliance:
(a) description of the required self-inspection regime and maintenance schedules specific to the anchor handling winch, checklists and a list of key tools or other items for use when carrying out self-inspections and maintenance
(b) instructions for routine repairs/maintenance
(c) technical maintenance information
(d) information on recommended lubricants, oil and filter change
(e) information on bearing maintenance, if applicable
(f) lists of replaceable parts/components, as well as the self-inspection/maintenance/replacement procedures for these parts/components
(g) lists of sources of spare parts
(h) model forms for records of self-inspections and maintenance
(i) operational test procedures, as well as the pre/post-operational test self-inspection procedures
(j) list of components requiring particular attention during inspections, as well as the self-inspection/maintenance procedures for these components
(k) recommended intervals for replacement and overhaul of components and equipment
(l) information on the preservation of the coating and corrosion protection system
(m) information regarding special inspection and maintenance in cases where the anchor handling winch is not operated for long periods of time
(B) An operations manual for the anchor handling appliances should be provided by the manufacturer. The operations manual should, as a minimum, include the following for each anchor handling appliance:
(a) design, operational and environmental limitations
(b) compatible loose gear, if any
(c) safety instructions
(d) operating procedures, including emergency procedures, if any

4. At a Registration Survey of anchor handling appliances not built under Survey, the drawings and data to be submitted are to be same as specified in **2** and **3** above. However, some of these drawings

and documents may be omitted submitting the past survey records and certificates if deemed appropriate by the Society.

5. Notwithstanding **4** above, anchor handling appliances that have applied for the class notation **AH(P)** or **AHT(P)** for registration with the Society in accordance with **Ch 1, 101. 3** may be exempted from submitting design-related drawings and data listed in **2** and **3** above.

202. Registration surveys during construction

1. Examinations for Workmanship

(1) The workmanship of anchor handling appliances is to be examined and ascertained to be in good order when any of the following (A) through (E) is relevant;
  (A) When requested by the Society during the process of manufacturing and assembling structural members
  (B) When structural members are installed on board the ship
  (C) For driving gears, at the times when the finishing work on major parts is completed and when the Surveyor considers necessary during the process of manufacture
  (D) When the subcontracted materials, parts or equipment are incorporated to the anchor handling appliances
  (E) Other cases when considered necessary by the Society

(2) Anchor handling appliances are to be examined and ascertained to be in good order by the following tests and surveys;
  (A) Testing as specified in **Pt 2, Ch 1** of the Rules where the materials need to be in compliance with the requirements in **Pt 2, Ch 1** of the Rules
  (B) Testing as specified in **Pt 2, Ch 2** of the Rules where the welding works need to be in compliance with the requirements in **Pt 2, Ch 2** of the Rules
  (C) Non-destructive testing where requested by the Surveyor
  (D) Shop trial of the driving gears
  (E) Operation tests of the anchor handling appliances
  (F) Operation tests of the safety devices and protective devices(including braking tests and electric power source cut-off tests with a testing weight equal to the maximum line pull applied)
  (G) Other tests considered necessary by the Society

(3) The driving unit and winch of the anchor handling equipment, in addition to the requirements of items (1) and (2), are to be in accordance with the following test and inspection guidelines.
  (A) Tests and examinations for driving machines, etc. for anchor handling appliances are to be in accordance with the following requirements (a) to (d):
    (a) Hydraulic motors and regulating valves attached thereto:
      (ⅰ) Where the output is less than 375 kW, shop tests may be replaced with the tests conducted by the manufacturer. In this case the Society may require submission of the test results, if it deems necessary.
      (ⅱ) Where the output is 375 kW or more, for tests except performance verification tests and open-up examinations, if manufacturers carry out internal tests and submit test reports, the presence of the Surveyor may be omitted. The hydraulic(water or oil) test is to be carried out at a pressure of 1.5 times the design pressure.
      (ⅲ) Notwithstanding the requirements (ⅰ) and (ⅱ) where the driving machines are installed on the class ship of the Society for the first time, the hydraulic test, performance verification test, and open-up examination are all to be carried out in the presence of the Surveyor.
    (b) Hydraulic pumps:
      Hydraulic pumps are to be dealt with in similar ways to (a) (ⅰ) to (ⅲ) above depending on the outputs of the driving motors.
    (c) Steam cylinders, pneumatic motors and internal combustion engines:
      These are to be dealt with in similar ways to (a) (ⅰ) to (ⅲ) above depending on each output. The hydraulic tests for the steam cylinders are to be carried out at a pressure of 1.5 times the design steam pressure and those for the valves directly connected to the cylinder are to be carried out at a pressure of 2 times the design steam pressure.
    (d) Driving motors for winches or hydraulic pumps and their control equipment:
      These are to comply with the requirements specified in **Pt 6** of the Rules and to pass the tests and examinations specified in **Pt 6** of the Rules thereof.
  (B) Winches anchor handling winches are to be subjected to the tests and examinations men-

tioned in the following (a) and (b) at the shop tests after completion of assembly, including installation of driving machines, etc. In this case, one winch selected from those of the same type manufactured at the same time and to be installed on the same ship is to be tested in the presence of the Surveyor, and if the results are satisfactory, tests and examinations for other winches may be substituted by confirmation of the test results issued by the manufacturer.

(a) Electro-hydraulic winches

(ⅰ) Visual examinations and checking of the construction:
It is to be ascertained that no practically injurious defects exist in materials and workmanship and each movable part moves smoothly.

(ⅱ) No-load test:
The winch is to be operated with no load at the maximum speed for 30 minutes(15 minutes for each normal and reverse rotation) and be ascertained that the performance and each structural part is in good order.

(ⅲ) Load tests:
The winch is to hoist and lower the rated load for a period of 30 minutes continuously. (Pause of 20 seconds may be inserted between each hoisting and lowering operation, and effective lift is desirable to be 10 m or more.) During this operation, the temperature rise of the bearings, the hoisting speeds, the lowering speeds and the input power are to be measured and ascertained that they are in good order.

(ⅳ) Braking tests:
During hoisting and lowering the rated load for the winch, return the control handle to the neutral position and check the slip of the load to be 1.5 m or less. Manual releasing test of the brake is also to be carried out and ascertained to be in good order.

(ⅴ) Speed control tests

(ⅵ) Emergency assurance tests:
The emergency assurance devices provided in the winches is to be ascertained of the performance by cutting off power supply during lowering the rated load.

(ⅶ) Overload tests:
The winch is to hoist and lower a test load specified in **302. 2** several times. The winch is to be stopped at least three times during lowering the load and ascertained to be in good order.

(ⅷ) Adjustment of the over-pressure preventive device:
The adjusted pressure is to be checked as necessary.

(ⅸ) Open-up examinations
The Society may require an open-up examination of the part where abnormality is found.

(ⅹ) Other tests deemed necessary by the Surveyor.

(b) The shop test for steam winches, electric winches, and winches driven by internal combustion engines are also to be carried out in accordance with the requirements specified in (a) above for electro-hydraulic winches (except (a) (ⅷ) above).

2. On board installation survey

(1) Survey for connection between the structural members and hull structure
(A) Survey for welded connection between the structural members and hull structure
(B) Non-destructive test (When considered necessary by the Surveyor)
(2) Commissioning tests
(3) Other tests considered necessary by the Society

203. Registration Surveys after Construction

1. Anchor handling appliances assigned the class notation AH(F) or AHT(F)

(1) Submission of drawing and other data specified in **201.**
(2) Verification of inspection certificates, or materials and equipment certificates issued by a member Society of IACS for anchor handing appliances
(3) Commissioning tests. However, if the certificates and inspection records issued by a member Society of IACS are properly maintained, only the functional test may be performed, and the commissioning tests may be deferred to the next scheduled commissioning tests.

(4) Other tests considered necessary by the Society

2. Anchor handling appliances assigned the class notation AH(P) or AHT(P)

(1) Thorough examinations

(2) Commissioning tests

Section 3 Periodical Surveys

301. Annual Surveys

The Annual Surveys are to include a thorough examination of the anchor handling appliance as described below, and the maintenance records, including self-inspections in accordance with the maintenance manual for each appliance, shall be verified.

1. Anchor handling winch and associated equipment

(1) At Annual Surveys, the following items in (A) are to be visually examined for anchor handling winch and associated equipment, and ascertained to be in good order. Where considered necessary by the Surveyor, the items in (B) are to be examined.

(A) Items to be examined

(a) Structural members

(b) Connection between the structural members and hull structure

(c) Driving systems

(d) Operation tests for safety devices and protective devices

(e) Markings of the maximum line pull, etc., and the effectiveness of the relevant certificates

(f) Preservation of the instruction manuals on board the ship

(B) Items to be examined where considered necessary by the Surveyor

(a) Checking of plate thickness of the structural members, non-destructive testing and open-up examinations of the topping brackets, goose neck brackets and derrick heel lugs

(b) Open-up examination of the driving systems

(C) Criteria for repair or renewal of the structural members

The corrosion, abrasion, or other defects specified in the following are found in structural member are, as a rule, to be repaired or renewed:

(a) Structural members in which amount of wear and tear reaches 10 % of the original dimensions. However, this may not be applied where steel plates having enough margin to the thickness required by this guidance is used.

2. Wire

(1) At Annual Surveys, the following items in (A) through (C) of wire are to be visually examined and ascertained to be in good order. However, where considered necessary by the Surveyor, the items in (B) are to be opened up and examined.

(A) Wire ropes for their full length

(B) Loose gear (rings, hooks, shackles, cramps, etc.)

(C) Markings of the safe working loads and identification symbols, and the effectiveness of the relevant certificates

(2) In case where some of wire need to be repaired or renewed at times other than at the Periodical Surveys, the Society may accept an autonomous inspection carried out by ship's master or his representative. In this case, the personnel who carried out an autonomous inspection is to record the following (A) through (F) for the wire renewed in the Register of Ship's Anchor Handling Appliances including Wire, and show this Register of Ship's Anchor Handling Appliances including Wire and the certificates of the wire concerned to the Surveyor for his approval at the next Periodical Survey or Occasional Survey.

(A) Names and identification symbols

(B) Locations in service

(C) Safe working loads

(D) Testing loads

(E) Dates of renewal or repairs and dates of commencement of use

(F) Reasons for renewal or repairs

(3) Criteria for repair or renewal of wire

The corrosion, abrasion, or other defects specified in the following are found in wire are, as a rule, to be repaired or renewed:

(A) Wire ropes
(a) Those in which 5 % or more of total number of independent wires(except filler wires) were broken within a length of 10 times the diameter of wire rope
(b) Those in which reduction in diameter of the wire rope reaches 7 % or more of the diameter
(c) Those in which kink or other injurious deformation occurred
(d) Those in which significant corrosion occurred at the surface of independent wires or inside the wire rope
(e) Those deemed necessary by the Surveyor
(B) Loose gear
(a) Those in which injurious deformation occurred
(b) Those in which crack occurred
(c) Those in which amount of abrasion or corrosion reaches 10 % or more of the original dimensions

302. Special Surveys

The Special Surveys are to be carried out by performing the commissioning test specified in paragraph **1**, followed by the thorough examination prescribed in **Ch 2, 301**.

1. Test Method

(1) In the case of anchor handling appliance that is being designated for the first time with a safe working load, etc., the commissioning test method is to conform to the requirements of (A) to (B).
(A) The commissioning test should include the following:
(a) Function tests: The correct working of the winch and its control system are to be verified over the entire operating range through a functional test at the light load.
(b) An overload test: The capacity and integrity of the anchor handling winch, the attachment of the winch to ship and the adequacy of the ship's supporting structure are to be verified.
(c) Test of emergency release and residual holding force in the wire: The test is to be performed with the wire attached to an onshore fixed strong point, or an anchor on the seabed or a similar arrangement.
(d) Test of residual brake holding force after emergency release: The residual brake holding force after emergency release is to be verified.
(e) Performance test: The performance of the whole winch system including static bollard pull test and brake holding capacity test is to be verified. Where it is not practicable to verify the brake holding capacity by testing, the same may be demonstrated through calculations. Anchor handling winches that are not designed for towing do not need to undergo the bollard pull test.
(B) In case of wire, the test load is to be loaded in the method considered as appropriate by the Society.

2. Overload test

(1) At Overload Tests, anchor handling appliances are to be examined under the supervision of a Surveyor by applying loads at least equal to the following test loads. However, the wire (including accessories) with overload test records and certificates, as well as the wire for anchor handling appliances in accordance with the requirement in **203. 2**, may undergo the overload test with the test load specified in (A).
(A) The test loads for anchor handling winch and associated equipment are to be as given in **Table 2.1.** However, in cases where the winch and associated equipment are also intended for towing purposes, the test may be substituted with a static bollard pull test.

Table 2.1 Test Load for Anchor Handling Winch and associated equipment

Safe Working Load SWL (t)	Test load T(t)
$SWL < 20$	$1.25 \times SWL$
$20 \leq SWL < 50$	SWL + 5
$50 \leq SWL$	$1.1 \times SWL$

(B) The test loads for loose gears are to be as given in **Table 2.2.** However, in cases where the loose gears are also intended for towing purposes, the test loads are to be as given in **Table 2.3.**

Table 2.2 Test Loads for Loose gear

Article of Gear	Safe Working Load SWL (t)	Test load T(t)
Chain, ring, hook, shackle, clamp, and similar gear	$SWL \leq 25$	$2 \times SWL$
	$25 < SWL$	$(1.22 \times SWL) + 20$

Table 2.3 Test Loads for Loose gear for Towing

Article of Gear	Static Bollard Pull BP (t)	Test load (t)
Towing hook, and similar gear	$BP < 50$	$2 \times BP$
	$50 \leq BP < 150$	$BP + 50$
	$150 \leq BP$	$1.33 \times BP$

(C) The test loads for ropes are to satisfy the following formula;

$$T \geq W \cdot f$$

where,
T : Test loads for ropes (t)
W : maximum line pulls of ropes (t)
f : Safety factors specified in **Ch 3, 202.**

(2) Overload Tests for anchor handling winches which are newly constructed, as a rule, are to be carried out after having been assembled at the shops, as well as after having been installed on board the ships. If the results of the shop tests are satisfactory for one anchor handling winch selected from those of the same type manufactured at the same time and to be installed on the same ship, those for other anchor handling winches my be substituted by confirmation of the test results issued by the manufacturer. If it is considered by the Surveyor that the Overload Tests are impractical at the manufacturer's shop, the Overload Tests at the shop may be dispensed with subject to carrying out the Overload Tests on board.

Section 4 Occasional Surveys

401. General

1. Occasional survey shall be conducted in the following cases other than the period when the anchor handling appliance is subject to regular inspection:
(1) When the safe working load of the anchor handling winch is to be changed
(2) When changes affecting the strength, stability or life of the anchor handling winch are to be made
(3) When changes affecting the main structural parts of the anchor handling winch are to be made
(4) When any parts or functions of the anchor handling winch affecting the strength, safety or structural integrity are to be modified
(5) In other cases deemed necessary by our classification society

2. After repairs, modifications or alterations of a major character, anchor handling winches are to be

tested in accordance with **302. 1** (1) (A). If the emergency release system is affected by these repairs, modifications or alterations of a major character, the anchor handling winches are to be additionally tested in accordance with **302. 1** (1) (A) (c) and (d).

3. Occasional survey shall confirm that the anchor handling appliance satisfies the criteria specified in this Guidance. ⚓

CHAPTER 3 ANCHOR HANDLING APPLIANCE

Section 1 Anchor Handling Winches and Associated Equipment

101. General

1. Application

The requirements in this section apply to the structural parts of anchor handling winches and associated equipment.

102. Design Loads

1. Scantlings of foundations and supports of anchor handling winches are to be based on 1.5 times the specified maximum line pull or the maximum brake holding capacity of the winch whichever is the greater. In the case of anchor handling winches intended for towing, scantlings are to be based on minimum 2.2 times the maximum static bollard pull of the vessel.
2. Scantlings of foundations and supports of shark jaws are to be based on 2 times the safe working load as specified by the designer.
3. Scantlings of foundations and supports of towing pins are to be based on 2 times the safe working load specified by the designer.
4. Scantlings of foundations and supports of stern roller are to be based on 2 times the safe working load as specified by the designer or 2 times the specified maximum line pull of the anchor handling winch whichever is the greater.

103. Strength and Construction

1. General

(1) The strength of structural members is to be analyzed to determine their dimensions according to requirements in **102.** The strength assessment is to be based on net scantlings

(2) For structures connected by bolts and nuts, proper considerations are to be given to the decrease of effective sectional areas.

(3) When considered necessary by the Society may require the confirmation of the appropriateness of strength analyses by examination of models or the things in question.

2. Supporting structure and foundation

(1) The stress in the supporting structure and foundation due to the design loads specified in **102.** is not to exceed the allowable stress values for each type of stress specified in **Table 3.1**.

Table 3.1 Allowable Stress σ_a

Kind of stress		
Tension	Shear	Combined stress(for DSA)
$0.9\sigma_Y$	$0.52\sigma_Y$	$1.0\sigma_Y$

(NOTES)

1. σ_Y : Specified yield stress or proof stress of material $(\mathrm{N/mm^2})$
   For steel material of $\sigma_Y \geq 0.83 \cdot \sigma_T$, the value of $0.83 \cdot \sigma_T$ is to be applied instead on σ_Y. where σ_T : Specified tensile stress of material$(\mathrm{N/mm^2})$

2. The combined stress is to be the value obtained from the following formula:

$$\sqrt{\sigma_x^2 + \sigma_y^2 - \sigma_x\sigma_y + 3\tau_{xy}^2} \qquad (\mathrm{N/mm^2})$$

where,

σ_x : Applied stress in x-direction at the middle of plate thickness $(\mathrm{N/mm^2})$
σ_y : Applied stress in y-direction at the middle of plate thickness $(\mathrm{N/mm^2})$
τ_{xy} : Applied shear stress in the $x-y$ plane $(\mathrm{N/mm^2})$

3. Anchor handling winch

(1) The anchor handling winch is to be capable of withstanding the maximum forces from hoisting, rendering, and braking, including dynamic effects, without exceeding the following stress values.
   (A) When hoisting including dynamic effects at relevant layer: $0.75\sigma_Y$
   (B) When braking at relevant layer as specified in **302. 2** (D): $0.75\sigma_Y$
   (C) When rendering loads when the drum starts to rotate in the opposite direction of the applied driving torque: $0.95\sigma_Y$

(2) Buckling and fatigue is to be considered according to a recognized standard or the relevant requirements of the Rules.

4. Associated equipment

(1) Chain stopper
The chain stopper is to be capable of withstanding the load specified in **102. 2**, including dynamic effects, without exceeding an allowable stress ($\sigma_a = 0.75\sigma_Y$) corresponding to 75% of the specified yield strength or proof stress of the material.

(2) Towing pins
The towing pins are to be capable of withstanding the loads and towline angles specified in **102. 3**, including dynamic effects, without exceeding an allowable stress ($\sigma_a = 0.75\sigma_Y$) corresponding to 75% of the specified yield strength or proof stress of the material.

(3) Stern roller
   (a) The length of the stern roller is to be kept to a minimum while being sufficient to accommodate the widest anticipated anchor to be served.
   (b) The minimum outer diameter of the stern roller is to be not less than 17 times the diameter of the anchor handling wire rope.
   (c) The stern roller is to be capable of withstanding the loads specified in **102. 4**, including dynamic effects, without exceeding an allowable stress ($\sigma_a = 0.75\sigma_Y$) corresponding to 75% of the specified yield strength or proof stress of the material.

5. Anchor handling winch Fixing Bolts

(1) Any material having a tensile strength exceeding 1.18 $\mathrm{kN/mm^2}$ and yield stress exceeding 1.06 $\mathrm{kN/mm^2}$ is not to be used for the bolts fixing the slewing-rings except when special considerations have given to the strength characteristics of the bolts.

(2) Special considerations are to be given to the tightening force of fixing bolts.

(3) The fixing bolts are to be capable of withstanding the loads specified in **102.**, including dynamic effects, without exceeding an allowable stress ($\sigma_a = 0.60\sigma_Y$) corresponding to 60% of the specified yield strength or proof stress of the material.

Section 2 Wire

201. General

1. Application

The requirements in this section apply to the wire(including loose gear) used in anchor handling appliances.

202. Rope

1. The rope for handling anchors shall be wire rope or fiber rope of appropriate diameter.

2. Splicing of wire ropes in the middle is not permitted.

3. The wire ropes are to be subjected to suitable corrosion prevention treatment.

4. In application to **603. 1** of the Rules, terminal treatments of ropes are to comply with the following (1) through (6), as a standard:

(1) A loop splice should have at least three tucks with a whole strand of rope, followed by two tucks with half the wires cut out of each strand.

(2) All tucks other than the first should be against the lay of the rope. If another form of splice is used, it should be as efficient as that described in (1) above.

(3) A splice in which all the tucks are with the lay of the rope should not be used in the construction of a sling or in any part of a cargo handling appliance where the rope is apt to twist about its axis.

(4) If a loop is made or a thimble secured to a wire rope by means of a compressed metal ferrule, the ferrule should be made to a manufacturer's standard conforming to the following (A) through (E):

(A) The material used for the manufacture of the ferrule should be suitable, particularly to withstand plastic deformation without any sign of cracking.

(B) The correct size(both in diameter and length) of ferrule should be used for the diameter of the rope.

(C) The end of the rope that looped back should pass completely through the ferrule.

(D) The correct dies should be used for the size of the ferrule.

(E) The correct closing or compression pressure should be applied to the dies.

(5) Where zinc or other alloy is cast in socket to hold the end of rope, work is to be done in accordance with the manufacturer's criteria conforming to the following requirements (A) through (D):

(A) Rope length necessary to make alloy casting is to be ensured.

(B) Oil and dirt adhering to independent wires are to be completely removed and proper clean surfaces are to be ensured by treatment before casting work.

(C) Casting temperature suitable to the characteristics of the alloy is to be properly maintained.

(D) Socket is to be preheated before casting of alloy.

(6) The terminal fitting of any wire rope should be capable of withstanding the following loads (A) or (B).

(A) Not less than 95 % of the minimum breaking load of the rope in the case of a rope of a diameter of 50 mm or less

(B) Not less than 90 % of the minimum breaking load of the rope in the case of a rope of a diameter above 50 mm

5. The safety factor of wire rope is to be greater than the values specified in **Table 3.2**. The safety factor of fiber rope is to be greater than 1.5 times the safety factor of wire rope.

Table 3.2 Safety factor of wire rope

Safe Working Load SWL (t)	Safety factor
$SWL < 10$	2.5
$10 \leq SWL < 160$	$(760 - SWL)/300$
$160 \leq SWL$	2.0

6. The rope safety factor of anchor handling equipment used for towing is calculated by replacing the safe working load (SWL) in **5** with the static bollard pull (BP).

7. The breaking strength of rope is to be greater than the values obtained by multiplying the safe working load or, where applicable, static bollard pull by the safety factor.

203. Loose Gears

1. The breaking strength of each loose gear is to be greater than the value obtained by multiplying the safe working load by safety factor of 2.5. The breaking strength for loose gear for towing is to be greater than the static bollard pull times 2.5.

Section 3 Machinery, Electrical Installations and Control Engineering Systems

301. General

1. Application

The requirements in this section apply to the machinery, electrical installations and control engineering systems used in the anchor handling appliances.

302. Machinery

1. General

The driving systems of the anchor handling appliances are to operate steadily at the rated speed under the maximum line pull.

2. Hoisting Machinery

(1) The construction of the hoisting machinery is to comply with the following requirements (A) through (E):

(A) The drum end flange diameter is to have an allowance corresponding to not less than 2.5 times the rope diameter as measured from the outer rim of the outermost layer of ropes in service condition.

(B) The pitch circle diameter of winch drum is to be not less than 15 times the diameter of the wire rope and 6.5 times the diameter of the fiber rope.

(C) The length of winch drum is to generally be designed to accommodate at least 50 m of wire rope on the inner layer.

(D) The braking system complying with the following requirements (a) through (d) is to be provided:

(a) The brake is to normally act directly on drum.

(b) The brake is to be capable of holding at least 1.25 times the maximum torque created from maximum line pull including dynamic effect, and the brake is to be capable of stopping the rotation of the drum from its maximum speed. In the case of anchor handling winch also used for towing purposes, the holding capacity is to be sufficient to withstand the torque created when 80% of the minimum breaking load of the towline acts on the first layer.

(c) The power operated braking system is to operate automatically when the manoeuvring is returned to its neutral position.

(d) The power-operated braking system is to operate automatically in the event of a power supply failure. In this case, an emergency retrieval system for anchor lowering is to be provided.

(E) Clutchable drums are to be provided with effective locking system capable of restricting rotation of the drum. The locking system is be, as a rule, capable of resisting the torque not less than 1.25 times the torque required when the maximum line pull is applied to the anchor handling appliances.

(2) The winding of the wire rope into the winch drum is to comply with the following (A) and (B) except in cases where the winch drum is equipped with the over-winding prevention device.

(A) For grooved winch drums, the angle between the direction in which the wire rope is caught in the groove of the drum and the direction of the wire rope when it is caught in the groove (i.e. the limiting fleet angle) is to be 4° or less.
(B) For winch drums other than grooved drums, the limiting fleet angle is to be 2° or less.

(3) The rope end is to be secured to the drum in such a manner tat it functions as a weak link in case of the rope needs to be released and that it does not damage any part of the rope.
(A) The wire rope shall be capable of withstanding a load equal to twice the drum load while at least four full turns remain on the drum.
(B) Under normal operating conditions, when the complete working length of rope has been paid out, at least 3 full turns are to remain on an an ungrooved drum, and at least 2 full turns are to remain grooved drum.

3. Spooling device

Anchor handling winches are to be equipped with remotely operated spooling devices.

4. Chain stopper

(1) Anchor handling vessels are to be equipped with chain stoppers.
(2) A chain stopper is to be equipped with an audible alarm which is activated when the stopper is either being engaged or disengaged.
(3) A chain stopper is to be equipped with an emergency release that is functional in all conditions, including dead-ship situations.
(4) Emergency release of chain stopper is to include disengaging of pins and other equipment that may prevent releasing the wire or cause the wire to get stuck/entangled during release.
(5) Emergency release of the chain stopper is to be designed for remote operation in order to minimize the risk of injury to personnel.
(6) The emergency release mechanism of the chain stopper is to be protected against unintentional activation.
(7) Instructions for the operation of the emergency release are to be clearly displayed at the navigation bridge and locally at the emergency release control mechanism.
(8) After an emergency release, the chain stopper system us to be inspected for signs of damage or deterioration. Any identified damage or deterioration should be rectified before the chain stopper is put back into service.

303. Power Supply

1. General

(1) The equipment, piping and cables consisting of the electric, hydraulic, pneumatic or steam power supply system and their arrangements are, as a rule, to comply with the relevant requirements of the Rules.
(2) The construction, strength etc. of internal combustion engine used as the prime mover are to comply with the requirements in **Pt 5** of the Rules.
(3) The drive device of the anchor handling winch is to be capable of maintaining at least 1.25 times the maximum torque generated by the maximum line pull including dynamic effects without releasing the rope.

304. Control Engineering Systems

1. General

(1) The electric, hydraulic or pneumatic equipment used for the control, alarm and safety systems are, as a rule, to comply with the relevant requirements of the Rules.
(2) The control, alarm and safety systems are to be designed on the basis of the principle of fail-safe.

2. Control System

(1) Control systems are to be so arranged as not interfere with the operator or qualified other personnel giving signals for operation.
(2) The anchor handling winches are to be capable of hoisting and lowering in a controlled manner, and to be provided with adjustable speed control between the minimum and maximum speeds.
(3) The winch operating controls are to be designed to pay out the wire by moving the control lever away from the winch operator and heave in by pulling the control lever towards the operator. All operating controls are to d be permanently marked with signs indicating their purpose and the

operating direction.

(4) The winch operating controls are to be of the "hold-to run" type, which will cause the hoisting or lowering motion to automatically stop when the control lever is released by the operator.

(5) For electric winches, local power disconnecting switch is to be provided at the position in the proximity of the place of operation.

3. Safety System

(1) Anchor handling winches are to be equipped with tension control to ensure that the system is not overloaded in the event that the anchor being handled gets stuck, entangled or is exposed to similar situations.

(2) Winches are to be provided with continuous load monitors and an audible and visual overload alarm.

(3) The overload alarm are to be programmable for lower levels of load.

4. Protection System

(1) For the rotating parts of the driving machinery, electrical installations and steam pipes, necessary means to protect the operator are to be provided.

(2) Steam winches are to be arranged not to interfere with the operator's field of vision by the steam.

(3) Anchor handling winches should be designed to facilitate emergency release of the load on the wire in a safe and controlled manner, both under normal as well as dead-ship conditions.

(4) The controls for actuation of the emergency release should be placed at the main control station. Emergency release function may also be available at the local control station.

(5) Emergency release control should be protected against unintentional activation.

(6) The design and operation of the emergency release should take into consideration restrictions on the pay-out speed of the wire due to inertia and any restrictions due to onboard arrangements.

(7) Instructions for the operation of the emergency release should be clearly displayed at the navigation bridge and locally at the winch.

(8) After an emergency release, the complete anchor handling winch system is to be inspected for signs of damage or deterioration. Any identified damage or deterioration is to be rectified before the anchor handling winch is put back into service.

Section 4 Certification, Marking and Documentation

401. General

1. Application

The requirements in this Section apply to the certification, marking and documentation of the anchor handling appliances.

402. Assignment of Safe Working Load, etc.

1. General

The Society assigns the maximum line pull, etc., for the anchor handling appliances that have passed the inspection and load tests specified in **Sec 2.**

403. Marking of Safe Working Load

The safe working load (t) of the anchor handling appliances is to be permanently marked on the equipment by welding bead or an equivalent method.

1. Marking for Anchor Handling Winches

(1) Anchor handling winches are to be provided with a permanently affixed name plate which should include at least the following information.

(A) details of the manufacturer (name, address)

(B) model name/number

(C) serial number

(D) date of manufacture and date of installation

(E) details of power supply
(F) details of wire (e.g. length, diameter)
(G) maximum brake holding capacity, metric tons
(H) maximum line pull, metric tons
(I) safe working load, metric tons
(J) maximum static bollard pull, metric tons
(K) placeholder for the classification society's surveyor's stamp
(L) drum size
(M) winch speed

(2) If upon completion of a thorough examination, the Surveyor considers the anchor handling winch to be unsafe for operation or not in compliance with the applicable requirements of this guidance, then that anchor handling winch is to be taken out of service until any deficiency is rectified to the satisfaction of the Surveyor. The anchor handling winch is to be clearly marked "not to be used" and the status is to be recorded in Register of Ship's Anchor Handling Appliances.

2. Marking for Wire

(1) On the loose gear other than wire ropes and fibre ropes, the test load, the maximum line pull and the identification symbols are to be marked by using stamps at the conspicuous place and no adverse effects are to be caused for both their strength and service. On grabs, lifting beams, lifting magnets, spreaders and similar other loose gear, the self-weight of them are to be stamped additionally.

(2) The stamp marks are to be coated with anti-corrosive paint and framed with paint for easy recognition.

(3) Notwithstanding the requirements in (1) and (2) above, where it is difficult to make direct stamp mark or marking with paint, other means may be taken when approved by the Society.

(4) If upon completion of a thorough examination, the Surveyor considers the wire of the anchor handling appliance to be unsafe for operation or not in compliance with the applicable requirements of this guidance, then that wire should be taken out of service until any deficiency is rectified to the satisfaction of the Surveyor. The wire is to be clearly marked "not to be used" and the status is to be recorded in Register of Ship's Anchor Handling Appliances.

404. Documentation

1. Kinds of Documents

The kinds of the documents issued by the Society for anchor handling appliances and loose gear are to be as specified in the followings:

(A) Register of Ship's Anchor Handling Appliances (Form AH1)
(B) Certificate of Test and Thorough Examination of Anchor Handling Appliances(Form AH2)
(C) Certificate of Test and Thorough Examination of Loose Gear for Anchor Handling Appliances(Form AH3)
(D) Certificate of Test and Thorough Examination of Wire Rope for Anchor Handling Appliances(Form AH4)
(E) Certificate of Test and Thorough Examination of Fibre Rope for Anchor Handling Appliances(Form AH5)
(F) Factual Statement of Test and Thorough Examination of Non-certified Anchor Handling Appliances(Form AH(SOF))

2. Timing of Issuance of Documents

The timing of issuance of documents specified in **Par 1** above is to be as given in **Table 3.3** depending on the tests and survey.

Table 3.3 Timing of Issuance

Kind of Documents		Timing of Issuance
A	AH1	When, upon application for assignment, the anchor handling appliance passes the Registration Survey for the first time
B	AH2	(1) When, upon application for assignment, the anchor handling appliance passes the Registration Survey specified in **Ch 2, 202.** or **203. 1** for the first time (2) When the safe working load, etc. of anchor handling appliances registered according to **Ch 2, 202.** or **203. 1** is altered (3) When the anchor handling appliance registered according to **Ch 2, 202.** or **203. 1** passes the Special Surveys specified in **Ch 2, 302.**
C	AH3 AH4 AH5	(1) When, upon application for assignment, the anchor handling appliance passes the Registration Survey specified in **Ch 2, 202.** or **203. 1** for the first time (2) When wire (including loose gear) is replaced or repair at time of the Periodical Surveys and the Occasional Survey, and when the contents of autonomous inspection is recognised appropriate by the Society
D	AH(SOF)	(1) When, upon application for assignment, the non-certified anchor handling appliance passes the Registration Survey after construction specified in **Ch 2, 203. 2** for the first time (2) When the safe working load, etc. of anchor handling appliance registered in accordance with **Ch 2, 203. 2** is altered (3) When the anchor handling appliance registered according to **Ch 2, 203. 2** passes the Special Surveys specified in **Ch 2, 302.**

3. Revocation of the Documents

(1) The whole or part of the certificates specified in **Par 1** above will be revoked when either of the following (A) through (I) is relevant:
- (A) When application is made by the shipowner for cancellation or alteration of the assignment of the safe working load, etc.
- (B) When the construction, arrangement or rigging of the anchor handling appliances are altered
- (C) When the anchor handling appliances are removed
- (D) When the surveys specified in **Sec 2** are not subjected to
- (E) When the anchor handling appliances are considered to be unserviceable by the Surveyor
- (F) When the contents in the certificates are intentionally altered
- (G) When the contents in the certificates have become illegible due to foul or damage
- (H) When the specified fee covering the survey is not paid
- (I) In case where the Society has a doubt on the effectiveness of the certificates, etc.

(2) The certificates which become invalid in accordance with the provisions in (1) above are to be returned to the Society without delay.

4. Reissuance and Corrections of Documents

In case where the certificates, etc. become invalid in accordance with the provisions of the preceding **Par 3** (1) above or lost, the Society will reissue the certificates or make necessary corrections thereto depending on the circumstances involved.

405. Preservation of Documents

1. General

The Certificates issued by the Society in accordance with the requirements in **404.**, and the instruction manual for anchor handling appliances are to be preserved aboard the ship.

2. Instruction Manual

(1) The instruction manual mentioned in **Par 1** above is to note essential items necessary for operation and maintenance of the anchor handling appliances among those given in the following (A) through (M).

(A) General arrangement of anchor handling appliances
(B) Date of manufacture and date of installation
(C) Details of power supply
(D) Details of wire (e.g. length, diameter)
(E) Maximum brake holding capacity, metric tons
(F) Maximum line pull, metric tons
(G) Safe working load, metric tons
(H) Maximum static bollard pull, metric tons
(I) Placeholder for the classification society's surveyor's stamp
(J) Drum size
(K) Winch speed
(L) Commission testing procedures
(M) Operation manual and maintenance manual

(2) It should be ensured that the documentation on board can be unambiguously related to the actual winch, i.e. by referring to the unique serial number. ⚓

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No : 2025-15-E
Date : 2025.12.12

To : All Surveyors and who it may concern

Subject	**9.214 Notice for Establishment to the KR Technical Rules (Guidance for Approval of Additive Manufacturing(3D Printing))**
Application	**1 January 2026** **(the date of application for certification of products)**

1. Please be informed that the establishment has been made to the "Guidance for Approval of Additive Manufacturing(3D Printing)", as below/attachments and you are kindly requested to apply the establishment on the relevant works.

- Below –

Classification Technical Rules	Effective Date	Establishment
Guidance for Approval of Additive Manufacturing(3D Printing)	2026. 01. 01	- New approval requirements have been established for products manufactured or repaired using Additive Manufacturing(3D Printing), a new manufacturing technology. - Reflects IACS Rec. 186(New Mar 2025)

2. Furthermore, please be informed that the establishment will be included in 2026 edition for Rules and Guidance on KR Classification Technical Rules which will be published in the first half of 2026.

Attachments : Establishment for "Guidance for Approval of Additive Manufacturing(3D Printing)" ---- 1 copy. (The end)

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

2026

Guidance for Approval of Additive Manufacturing(3D Printing)

GC-45-E

KR

APPLICATION OF
"Guidance for Approval of Additive Manufacturing(3D Printing)"

1. Unless expressly specified otherwise, the requirements in this Guidance apply to products(materials, parts, components) for approval on or after 1 January 2026.

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CHAPTER 1 GENERAL

Section 1 General

101. Application

1. This Guidance provides procedures and methods that can be applied to type approval of feedstock, approval of manufacturing process, product inspection, AM repair, etc. for metal equipment on marine and offshore manufactured by additive manufacturing (3D printing) technology to be applied as an alternative to the traditional materials manufacturing process, such as rolling, casting, forging, welding in construction.

   (1) The scope of this Guidance is the additive manufacturing using Powder Bed Fusion(PBF) process, Directed Energy Deposition(DED) process and Binder Jetting(BJT) process.
   (2) The feedstock type are limited to wire, powder and binder.
   (3) In case other additive manufacturing method and feedstock of (1) and (2) are to be used, it is to be agreed with the Society.

2. This Guidance does not apply to hull structural members as defined in **Pt.3, Ch.1, Sec.4 of the Rules**. The approval of any proposal to apply metallic additive manufacturing (AM) processes for hull structure members is subject to the Society

3. For parts subject to classification, the manufacturer is to follow this Guidance. With the agreement of the Society, recognized international or national standards may be accepted instead of this Guidance for certified parts.

4. For metallic parts damaged in-service, an AM process could be selected for repair, which is similar to a welding repair for damaged metallic parts. The repair procedure or repair facility should be qualified and approved.

5. For the situations and projects involving reverse engineering, any such arrangements should be formally agreed to by the designer/original equipment manufacturers (OEMs), part manufacturer and end user.

6. The matters not specified in this Guidance are subject to the respective requirements of the **Rules and Guidance for the Classification of Steel Ships** and the **Guidance for Approval of Manufacturing Process and Type Approval, Etc.**.

7. In addition, the matters not provided for in the **Rules and Guidance for the Classification of Steel Ships** and of the **Guidance for Approval of Manufacturing Process and Type Approval** are to be approved by the Society and may comply with the relevant National or International standards.

8. If it is impracticable to apply the requirements specified in this Guidance, alternative methods are to be discussed by the Society.

102. Definition of Terms

1. The definitions of terms used in this Guidance are as follows. The definitions of terms are to be in accordance with the Rules and Guidance for Steel Ships unless otherwise specified in this Guidance.

   (1) 3D printer : a machine used for 3D printing
   (2) 3D printing : the fabrication of objects through the deposition of a material using a print head, nozzle, or other printer technologies
   (3) Additive Manufacturing(AM) : a process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methods and forming manufacturing
   (4) Additive Manufacturing system(AM system) : software and machinery for Additive Manufacturing
   (5) Additive Manufacturing machine(AM machine) : the hardware, machine control software, setup software, and peripherals required to complete the manufacturing cycle as part of the additive manufacturing system

(6) Feedstock : bulk raw material supplied to the AM process; generally supplied in various forms such as liquid, powder, suspension, wire, filament, sheet, etc. This Guidance mainly deals with feedstock of powder type and wire type.
(7) Post processing : one or more process steps taken after the completion of an additive manufacturing build cycle in order to achieve the desired properties in the final product
(8) Powder batch : as a feedstock, reusable and unusable powder or a mixture of both powder. The powder batch can be used in one or more production using different process parameters.
(9) Powder bed : the manufacturing zone within the additive manufacturing system where the powder feedstock is melted or selectively fused by thermal energy to produce an output
(10) Process parameters : set of operating parameters and system settings used during a build cycle
(11) AM file format : file format for communicating AM model data including a description of the 3D surface geometry with native support for color, materials, lattices, textures, constellations and metadata
(12) Directed Energy Deposition, DED : additive manufacturing process in which focused energy is used to fuse materials by melting as they are being deposited. The focused thermal energy means a focused energy source (eg laser, electron beam or plasma arc) that melts the material to be deposited.
(13) Powder Bed Fusion, PBF : an AM process that uses energy source to sinter or melt powder particles in the powder bed for making the desired shape
(14) Wire Arc Additive Manufacturing, WAAM : an AM process that manufactures 3D structure by melting wire using arc source similar to the conventional welding process
(15) Binder Jetting, BJT : Additive manufacturing process in which a liquid bonding agent is selectively deposited to join powder materials
(16) AM facility : Equivalent to AM manufacturer, which is considered as an entity with the capability of making an AM final part/component/material following a qualified process to meet the requirements by the client or purchaser
(17) Green part : A green part is a body that is made of powdered material that has been compressed and is held together with a binding material
(18) Brown part : A brown part is a green part which has been heated and/or chemically treated to remove the binding material. It is a body ready to be sintered/infiltrated to become a final part.
(19) Component : A part or member of some equipment or a system
(20) Conformity : Where a design, product, process or service demonstrates compliance with defined specific requirements
(21) Design analysis : Investigative methodology selectively used to assess the design
(22) Design review and approval : Part of the appraisal process to evaluate specific aspects of the design including drawing or solid model review and approval supported by the final material specification
(23) Equivalent : An acceptable, no less effective alternative to the specified criteria
(24) Essential Parameters : Any parameter is considered to be essential when any aspect falling outside the qualified range affects the mechanical properties or final part quality. Essential parameters are to be defined in the specification and are required to be reviewed and surveyed. Any change of essential parameters outside the qualified range requires requalification.
(25) Infiltration : A process of filling the pores of an un-sintered or sintered object with a metal or alloy of lower melting point than that of the object
(26) Installation : The assembling and final placement of components, equipment and subsystems to permit operation of the system
(27) Modification : A limited change that does not affect the current approval
(28) Part, sepcific : A specific part or component with the same geometric requirements, material requirements and function requirements.
(29) Part, family : A family of parts (or similar parts) with the same function requirements, material requirements and same design features or shape but different size or section thickness.
(30) Part, similar : A similar part with similar function requirements, the same material requirements and similar design features including different shape, size, thickness.
(31) Performance test : A technical operation where a specific performance characteristic is determined
(32) Prototype test : Investigations on the first or one of the first new parts for optimization, fine tuning of equipment/system parameters and verification of the expected running behavior
(33) Reverse Engineering : A process to disassemble and examine or analyze in detail (a product or device) to discover the concepts involved in manufacture, usually to produce something

similar (a product or device). i.e. AM building a new product by scanning an existing product. Consideration of intellectual property (IP) issues should be addressed on a case-by-case basis.

(34) Sintering : A thermal treatment of a powder or compact, at a temperature below the melting point of the main constituent, for the purpose of increasing its strength by the metallurgical bonding of its particles

2. The classification of additive manufacturing techniques covered in this Guidance is shown in **103.** and the principle of each additive manufacturing techniques is shown in **Figures** of **103.**.

103. Metallic AM Process

1. This Guidance covers the following metallic AM processes for marine and offshore applications, which can be further subcategorized as **Table 1.1**.

Table 1.1 Metallic AM Process

Powder Bed Fusion (PBF) Process	Directed Energy Deposition (DED) Process(1)	Binder Jetting (BJT)(2)(3)
• PBF-LB: Powder Bed Fusion-Laser Beam • PBF-EB: Powder Bed Fusion-Electron Beam	• DED-LB: Directed Energy Deposition-Laser Beam • DED-EB: Directed Energy Deposition-Electron Beam • DED-PA: Directed Energy Deposition-Plasma Arc • DED-GTA: Directed Energy Deposition-Gas Tungsten Arc • Directed Energy Deposition-Gas Metal Arc	• BJT

(Notes)

(1) Directed Energy Deposition (DED) Process including Powder DED and Wire DED (also, named Wire Arc Additive Manufacturing, WAAM)

(2) Binder Jetting (BJT) or equivalent processes including post build sintering or an infiltration process to achieve the required material properties.

(3) Due to the process characteristics of BJT or equivalent processes, the final part, after de-binder and sintering/infiltration, may contain more and larger porosities than those parts built through the PBF and DED processes. Additionally, it is important to be aware of dimensional changes due to shrinkage of the final part during the sintering process. Metallic parts through BJT or equivalent processes should be limited to non-cyclic loading applications until more successful service experiences are obtained.

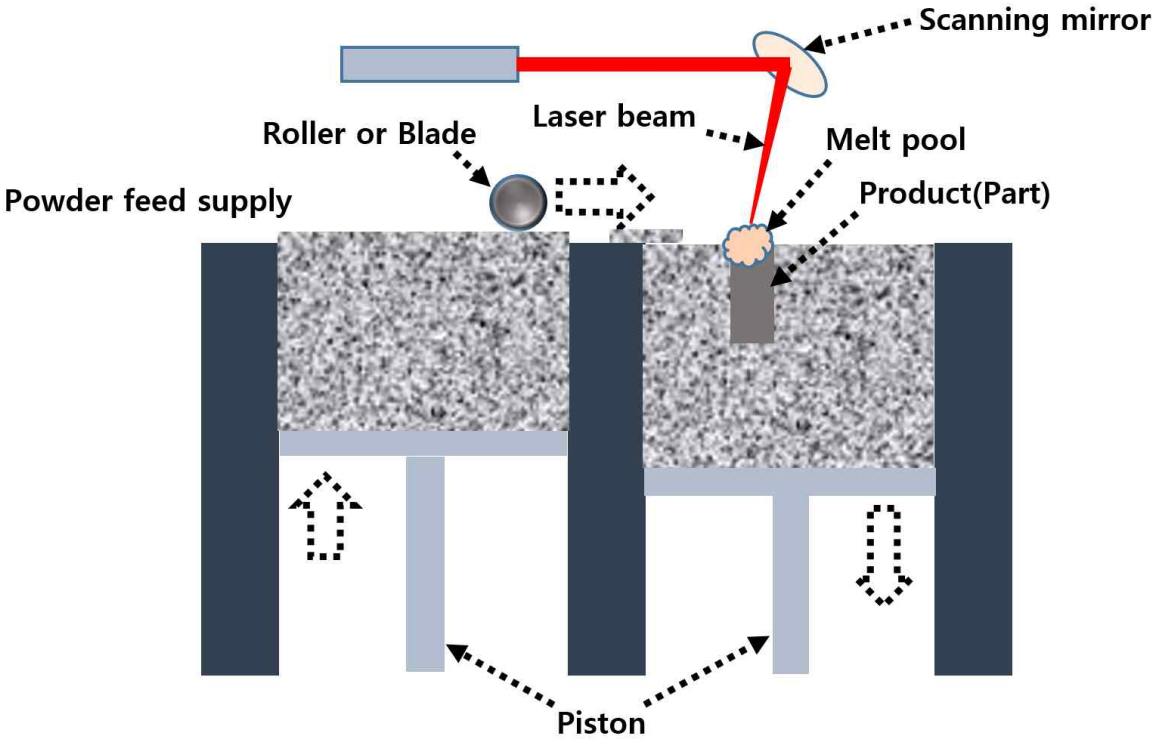

Fig 1.1 Schematic for PBF-LB Process

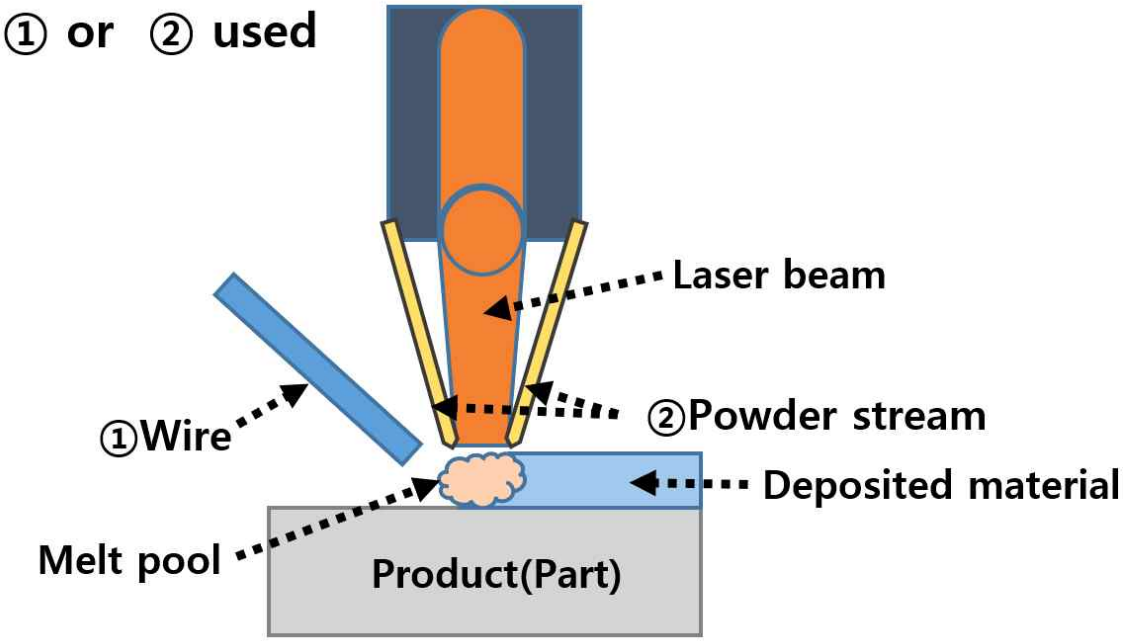

Fig 1.2 Schematic for DED-LB Process

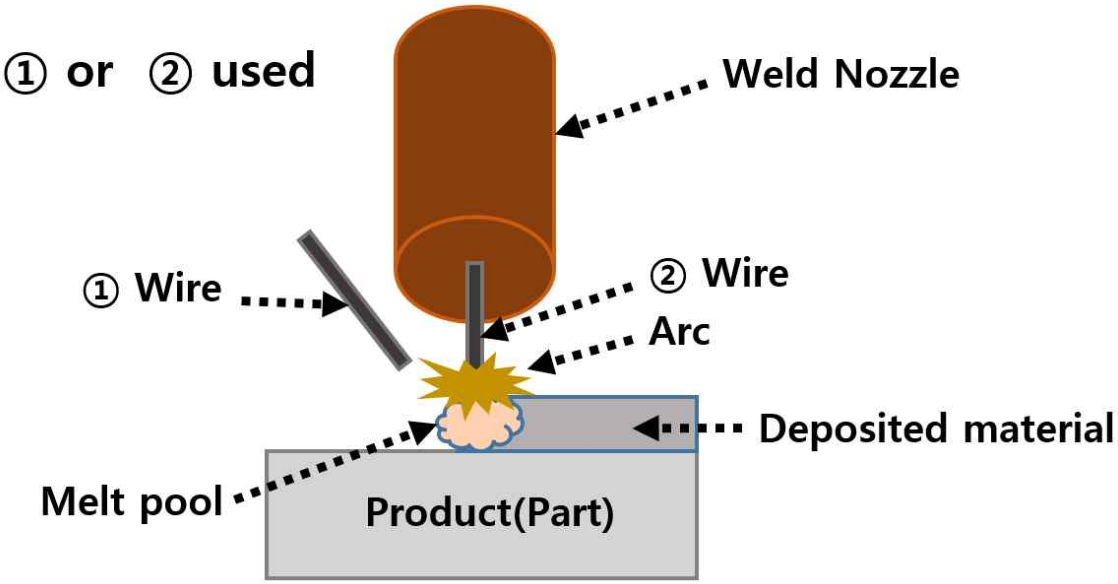

Fig 1.3 Schematic for WAAM Process

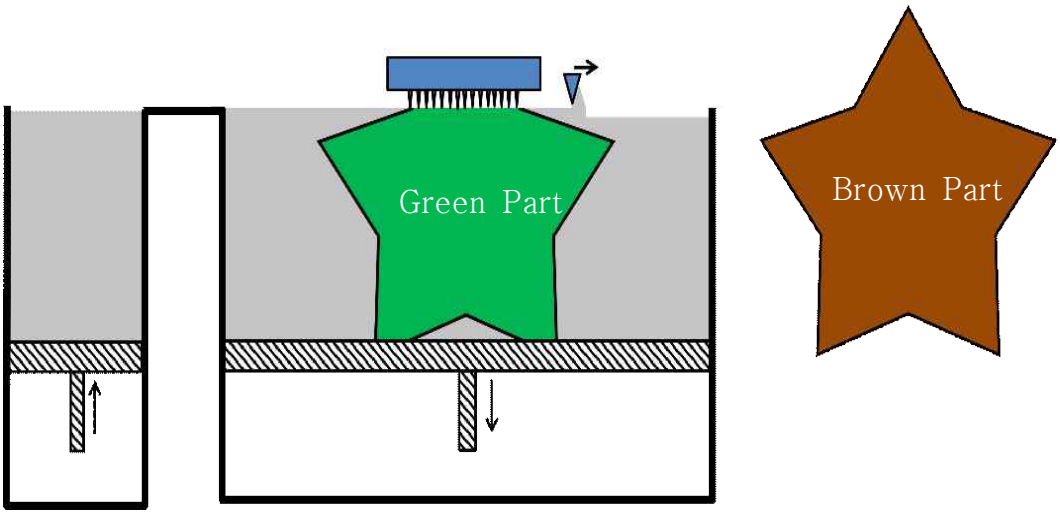

Fig 1.4 Schematic for Binder Jetting Process

104. Parts Categories

1. Parts Categories

(1) Part is technically defined as the combination of geometric requirements by CAD model or drawing(OEM/designer), material requirements by material specification(OEM/designer) and function requirements for the system(Purchaser). The part fabricated by the additive manufacturer should include the pre-build layout as specified in **Ch.4, 202.** and a certificate of conformity which details the results of materials testing, inspection and non-destructive testing.

(2) Parts are categorized into "class items" and "certified items".

(3) For class items, AM metallic parts should meet the existing requirements in accordance with the applicable **Rules and Guidance for the Classification of Steel Ships** of the Society.

(4) For certified items, AM metallic parts should meet applicable specifications in accordance with industry standards, designer or OEM requirements.

2. Criticality Levels

(1) The criticality level of the AM metallic part can be determined from the service environment, a risk analysis and the potential consequence of part failure. For certified items, criticality levels should be determined by the part designer/manufacturer and agreed with the purchaser. Class items should be in accordance with Class Rules, unless otherwise agreed by the part designer/manufacturer and the Society. Criticality levels are determined as follows.

(A) Non-critical application, refer to services for habitability in **Pt 6, Ch.1, 101. 4. (14) of the Rules** for machinery.

(B) Critical application, refer to primary essential services in **Pt 6, Ch.1, 101. 4. (13) (A) of the Rules** and secondary essential services in **Pt 6, Ch.1, 101. 4. (13) (B) of the Rules** for machinery or structural members other than hull structural members.

3. Test Levels

(1) For qualification/approval and quality control during production, test levels can be referred to the additive manufacturing level (AM Level).

(A) AM Level 1 for certified items for non-critical applications other than class items

(B) AM Level 2 for certified items for critical applications other than class items

(C) AM Level 3 for items subject to classification (hereinafter referred to as class items)

(2) The agreed AM Level should be retained in the additive manufacturer's qualification/approval and production records.

Section 2 Approval and Certification Process

201. Approval and certification process

1. The general process for approval and certification requirements is to be in accordance with **Fig 1.5** as follows.

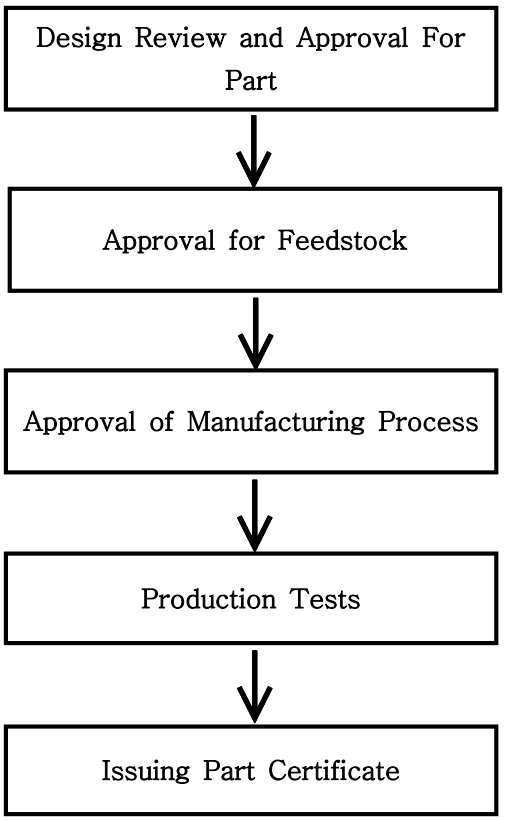

Fig 1.5 General Process for Approval and Certification

202. Details of Process

1. The details of requirements for AM feedstock, procedures, part and final material for approval are shown in **Table 1.1** and listed as follows.
   (1) Approval should be requested by the client, along with the submitted information and a detailed inspection and test plan (ITP) (refer to, **Ch.3** for AM Feedstock Approval, **Ch.4** for AM Part Qualification and Approval and **Ch.5** for Additively Manufactured – Final Materials Approval, and **Ch.7** for AM Repair Facility Approval).
   (2) The ITP should be agreed and should include Part Design, AM Procedure Specification (AMPS), Post Process, Non-destructive Testing (NDT), Materials Testing, Functional Testing, Part Qualification and Certification Plan, Repair Methodology Plan.
   (3) The part design should be reviewed for geometry modification or a different material grade from the original design.
   (4) The CAD model or drawing for AM Level 3 should be reviewed and approved in accordance with classification Rules. The CAD model or drawing for AM Level 2 and Level 1 could be reviewed and type approval could be issued in accordance with industry standards.
   (5) The feedstock should be qualified according to international standards/specifications defined by the purchase specification for certified items, such as **ISO 17296-2:2015**, **ISO/ASTM**

52907:2019. The feedstock should be approved for class items by the Society. The approval of feedstock materials should be in accordance with Ch.3. The qualified/approved feedstock material should be linked to the feedstock supplier by a contractual agreement.

(6) For certified items, the purchaser should specify via a purchase order the requirements for manufacturer qualification. For this purpose, they can specify international standards/specifications, such as ISO/ASTM 52920:2023. For class items, the AM manufacturer should be approved by the Society in accordance with Ch.4 and Ch.5. The range of approval should be determined by the Society and approved materials should be included in the approval of manufacturing process.

(7) If applicable, additive manufacturing repair procedures should be qualified according to international standards/specifications defined by purchase specification for certified items. Additive manufacturing repair procedures and facilities should be approved for class items by the Society in accordance with Ch.7.

(8) The Society should witness testing, review test results, complete the facility survey and issue an approval letter or certificate.

(9) During production, witness by the Society for final part acceptance is required prior to the issue of approval or certificates for class items in accordance with applicable Rules and in accordance with applicable industry standards for certified critical items. For non-critical items, witness by the Society is subject to agreement between the manufacturer and purchaser.

2. The initial survey should be conducted in accordance with the relevant steps in this Section and Table 1.2. The approval tests should be witnessed by the attending surveyor. The annual survey should include a plan to demonstrate the essential parameters in Table 1.2 which should be followed during production. Approval and certificate for an AM part can be issued by the Society with documented qualification/production stages in accordance with Table 1.2.

Table 1.2 Approval and Certification Requirements

Qualification or Production Stages	Section or Subsection Number in this Guidance	Certified Items		Class Items
		AM Level 1	AM Level 2	AM Level 3
		Non-Critical	Critical	
		Requirements		
Part Design Review and Approval	Ch.2	MQ	MQ	CS
Powder Feedstock	Ch.3, 201. and 202.	MQ	MQ	CS
Wire Feedstock	Ch.3, 201. and 203.	MQ	MQ	CS
AM Procedure Specification	Ch.4, Sec.2	MQ	CS	CS
Post Processing	Ch.4, 204.	MQ	CS	CS
Inspection and Testing	Ch.6, 202.	MQ	CS	CS
Prototype Part Qualification	Ch.4	MQ	MQ	CS
Functional Testing	Ch.4, 402.	MQ	MQ	CS
Range of Approval	Ch.4, 502.	MQ	CS	CS
Part Certification during Production	Ch.6, 205.	MQ	CS	CS
Approval for AM Feedstock	Ch.3	MQ	MQ	CS
Approval of Manufacturing Process for AM Final Material	Ch.5	MQ	CS	CS
Approval for AM Repair Facility	Ch.7	MQ	CS	CS

(Notes)
(1) "MQ" in the table indicates manufacturer qualified requirements determined by the manufacturer, designer and purchaser, which may optionally include the Rules of the Society and recognized standard requirements.
(2) "CS" in the table indicates approved requirements by the Society.

3. The AM process and documentation steps for an AM Part are shown in **Table 1.3**.

Table 1.3 Process and Documentation Steps

Step 1: Purchaser Specification
• Purchaser's Details • Part Design Requirement • Acceptance Criteria • Decision on appropriate AM Level 1, 2, 3 • Additional Requirements by Specification or by Application
Step 2: Qualification Records
• Qualified and Documented Procedure with support of Qualified Specific Part and Final AM Material Grade
Step 3: Risk Assessment or Justification
• AM Level 3 may require qualification for each specific part • AM Level 2 may accept a part family qualification • AM Level 1 may recognize a qualification of a similar part with the same design feature family
Step 4: Production
• Apply Qualified Procedure and Specification • Production • Production Testing • Inspection of Part • Materials Tests for Required Properties by Design • Verify Test Results against Acceptance Criteria
Step 5: Documentation
• Accepted with Compliance Record • Engineering Justification for non-conformance, specifically agreed by Purchaser and the Society
(Notes) (1) If a part is planned to be repaired, the evaluation plan and acceptance criteria should be agreed with the Society for Level 2 and 3 items.

CHAPTER 2 DESIGN REVIEW AND APPROVAL

Section 1 General

101. General

1. The quality and performance of the AM part should be considered for part design requirements and the material requirements, with appropriate control of essential parameters during the manufacturing process including pre-build, build and post-build.
2. The additive manufacturer should prepare a product design package, refer to Table 2.1, including additive manufacturing procedures, specifications in accordance with the purchase specification, the purchase order including all the requirements for the fabrication of all built parts, etc.

Table 2.1 Product Design Package

No.	Item
1	Design Code, Rules, Standards, or Manufacturer/OEM's Specifications
2	AM Level (1, 2 or 3)
3	Revision controlled drawing, CAD model or digital build file including test coupons (for reference)
4	The applicable material specification with acceptance criteria for each intended part/application
5	Design analysis report, if applicable
6	Powder/wire/binder specification
7	AM pre-build, build and post-build specification/procedure
8	Inspection and Testing Plan
9	Any other specifications, requirements or procedures identified as necessary by the additive manufacturer or purchaser.

3. Part solid model/drawing and materials specifications should be qualified in accordance with Ch.4, Sec.4 and included in the qualification records in accordance with the applicable Sec.2 and Sec.3.
4. The qualified specifications and procedures for the AM part should be followed and retained in the additive manufacturer's production records.

Section 2 Design Requirements

201. Drawing or Solid Model

1. Part design includes the creation of the part drawing or solid model for end-use and should consider the achievable material properties defined in the final material specification.
2. The CAD model or drawing for the final AM part should include requirements for final geometry, dimensions, and tolerances in accordance with an internationally recognized industry standard, e.g.: ASME Y14.46:2018, Y14.41:2019, Y14.5:2018.
3. If the CAD model or drawing for the final AM part is redesigned, optimized by topology, or generated by design algorithms, the CAD model for the final AM part should be calculated or simulated using engineering software to verify design compliance and integrity for service. The design analysis report including the applicable procedure and results should be submitted for review by the Society for Level 3.
4. The optimized design requirements for the final AM part should demonstrate at least an equivalent level of functionality and integrity, such as the capability to withstand the applied loads or the applied environmental conditions to traditionally manufactured parts, which the Society should accept and approve for Level 3, and could accept and approve for Levels 1 and 2.
5. The revision number of the solid model, drawing or digital build file should be included in the AM part approval and included in manufacturer's production records.

Section 3 Materials Requirements

301. Material Specification

1. Refer to **Table 2.2**, the material specification should include all material properties, including the specified AM process, for the final delivered condition and the acceptance criteria for the AM part or material. The selected material specification/grade with the heat treatment condition should be identified in the final AM material specification.

2. Depending on the intended application, the acceptable material properties should provide equivalency to traditional manufactured materials in accordance with applicable Rules of the Society or alternatively with internationally recognized industry standards or the designer's specifications.

3. Due to the inherent morphology of the AM process, consideration may be given to use an AM material with alternative chemistry and enhanced mechanical/corrosion properties, which are equivalent to or exceed the material properties typically required in the service condition, such as impact, fatigue, wear, or corrosion resistance. The selected final AM material should be appropriate for the loading condition, the functionality, the environment, and should be approved by the Society as an alternative new manufacturing method for the specified part/application.

4. The following items in **Table 2.2** should be specified in the AM material specification for the final delivered condition. In the case of AM materials for AM Level 3, the material specification, including the following items in **Table 2.2**, should be submitted to the Society for approval.

Table 2.2 Final Material Specification

No.	Item
1	Material type and grade
2	Manufacturing process, including the AM process and any post-build heat treatment process
3	Chemical composition
4	Microstructure, such as grain size, and metallographic analysis
5	Fusion density, applicable to powder processes and not required for wire DED
6	Tensile properties
7	Charpy impact properties and test temperature, if required, according to the design temperature and material grade
8	Hardness tests, if required
9	Other special properties such as fatigue, fracture mechanics properties, corrosion, erosion, or wear resistance, if required for the intended application
10	Non-destructive testing methods, test level, quality level, and acceptance criteria
(Notes) (1) Microstructure, fusion density and special properties are required during qualification/approval but are optional for production.	

CHAPTER 3 TYPE APPROVAL OF FEEDSTOCK

Section 1 General

101. General

1. This requirements of this Chapter apply to approval procedure and tests for Type Approval of feedstock.
2. This Guidance can also be used for feedstock qualified by the AM manufacturer for an AM manufacturer approval and applied under a commercial agreement between the two parties, the AM manufacturer and the feedstock supplier.
3. If the traditionally manufactured parts are class items, feedstock materials should be approved by the Society. For certified items, the approval for feedstock materials could be agreed by purchase specification.
4. Approval for feedstock materials involves a documentation review, an audit of the facility and the witness of approval tests. Unless otherwise agreed, the Class approval is valid subject to Periodical(annual) inspection and/or endorsement by the attending Surveyor. An additional audit may be requested at Periodical(annual) inspection.

102. Approval application

1. The applicant

The applicant is, in principle, to be the manufacturer of the Parts. However, the applicant, where deemed appropriate by the Society, need not always be the manufacturer of the Parts.

2. The manufacturer wishing to obtain a type approval is to submit a copy of the application of type approval (refer to **Annex 6** of **the Guidance for Approval of Manufacturing Process and Type Approval, Etc.**) of the Society, together with three copies of the required data for approval and two copies of the required data for reference, to the Society.

3. Data to be submitted

(1) Data for approval

The following items of **Table 3.1** are to be submitted to the Society. Where test methods and procedure are specified into this **Guidance**, **KS**, **ISO** standard, etc., the relevant standards may be indicated and replaced.

Table 3.1 Approval Application for Additive Manufacturing Feedstock

No.	Item
1	An outline of the organization including the quality management system, a facility description, details of organization and quality control responsibilities
2	Manufacturing process description or flow charts indicating all process steps
3	A list of documented manufacturer's procedures, specifications, documentation, reports and product certificates
4	Documented procedures for feedstock identification and traceability using lot control and batch control
5	Documented historical data for parts built using the feedstock, if available
6	Inspection and testing plan (ITP)

(2) Data for reference

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

(A) Performance used for purposes other than additive manufacturing (welding, etc.)

(B) Performance approved or applied by industries other than ship and offshore

Section 2 Feedstock Specification Approval

201. General

1. An additive manufacturing feedstock specification should be prepared for each material grade for which approval is requested. Prior to conducting approval tests, the feedstock specification and ITP should be submitted and approved by the Society/AM manufacturer.

2. The feedstock supplier should maintain a quality management system, which should, at least, meet the minimum requirements in accordance with internationally recognized quality standards such as ISO 9001:2015.

3. Feedstock material should be qualified using feedstock materials approval tests in accordance with Sec.3.

4. If approval is already granted by other Classification Societies, evidence of the approval together with documentation of performed approval tests should be submitted. The indicated approval tests in this Chapter could be reduced with the agreement of the Society.

5. The feedstock specification should be submitted to the Society/AM manufacturer for review and approval. A description and specification of the feedstock should be prepared in accordance with 202. for a powder feedstock specification together with the followings and with 203. for a wire feedstock specification.
   (1) ISO 3954:2007 or ASTM B215:2020 can be referred to for powder sampling. The material grade may be a trade name, common name, or typical material designation.
   (2) The chemical composition is to be tested and determined by a suitable testing procedure such as wet chemical process, atomic absorption spectrometry, flame emission spectroscopy, X-ray fluorescence analysis, or other recognized methods. Industry standards may be referenced to determine the content of interstitial elements such as carbon, nitrogen, hydrogen, sulphur, and oxygen.
   (3) Powder size and distribution are to be tested in accordance with ASTM E2651:2019 or other equivalent standards, such as sieving in accordance with ASTM B214:2022 for DED powder, static or dynamic image analysis, light scattering, laser diffraction in accordance with ASTM B822:2020 or other recognized methods. The powder size distribution (PSD) may be described by D10, D50 and D90. D10 is the first decile (e.g.,1/10 of the statistical population is below this value). D50 is the median value (e.g., 50% of the statistical population is below this value). D90 is the last decile (e.g., 90% of the statistical population is below this value). Other powder size distribution methods may also be specified by the powder manufacturer. For a powder DED process, the maximum powder size may be specified depending upon the powder feeding system.
   (4) Morphology can be affected by the powder manufacturing process. The preferred inspection method is by scanning electronic microscopy (SEM), secondary electron imaging, or other recognized methods.
   (5) Flowability can be affected by multiple factors such as powder size and distribution, cohesive strength by moisture, inter-particles friction, powder sphericality, etc. Industry standards, such as ASTM B213:2020, may be referenced to test flowability through piping, nozzle, funnel, etc.

202. Powder Feedstock

1. Powder Feedstock Specification

(1) For powder feedstock material specification, documentation, handling, and storage, internationally recognized industry standards, such as ISO 17296-2:2015, ISO/ASTM 52907:2019, can be referred to by the manufacturer.
(2) Refer to Table 3.2, the powder specification should be defined with the applicable powder manufacturing process and the range of essential parameters. Refer to Table 3.3, the non-essential parameters should be indicated for information.
(3) Unless otherwise agreed the powder specification could be qualified for certified items by the manufacturer and should be approved for class items by the Society, to a range of parameters, refer to Sec.3 and Sec.4. Any change of essential parameters outside the qualified range requires requalification. The essential parameters for powder feedstock include the following

items in Table 3.2.

Table 3.2 Essential Parameters for Powder Feedstock

No.	Essential parameters for powder feedstock
1	Material grade
2	Powder manufacturing process, including the melting and atomization process, type of gas used, environmental conditions.
3	Post-atomization process, such as sieving.
4	Chemical composition
5	Powder size range
6	Particle size distribution
7	Powder morphology and internal microstructure
8	Flowability
9	The applicable additive manufacturing process (e.g., powder for PBF-LB, powder for PBF-EB, powder for DED, or powder for BJT)

(4) Non-essential parameters for powder feedstock include the following items in Table 3.3.

Table 3.3 Non-essential Parameters for Powder Feedstock

No.	Non-essential parameters for powder feedstock
1	Density, such as apparent density, tap density, skeletal density, and fusion density
2	Thermal properties, such as solidus, liquidus temperature for reference
3	Oxygen content
4	Moisture content, etc.

(5) The manufacturer should ensure that feedstock materials comply with all local and national regulations for environment, handling and safety.

2. Powder Feedstock Documentation

(1) The powder supplier should issue a statement of conformity in accordance with the additive manufacturer's powder feedstock specification. For each powder lot and/or batch supplied, the powder supplier shall document, for raw material control and traceability, the information given in Table 3.4.

Table 3.4 Documentation for Powder Feedstock

No.	Item
1	Procurement information (Powder should be sourced from a feedstock supplier approved by the Society for class items.)
2	Powder supplier's contact information
3	Lot and Batch Number
4	Powder description
5	Powder manufacturing process, including the melting and atomization process, type of gas used, environmental conditions
6	Post-atomization process, such as sieving
7	Sampling methods such as chute splitting, blending or spin riffling
8	Testing method, standard, and results required by the powder material specification
9	Packing date, quantity, handling requirements, shelf life and storage instructions
10	SDS

(Notes)

(1) The control of powder feedstock is by Lot Number and Batch Number. Powder from the single Lot Number and single Batch Number indicates that quantity of feedstock produced under traceable and controlled conditions from a single manufacturing process cycle. The size of the feedstock lot is determined by the feedstock supplier. A single powder lot is used as feedstock in build cycles. Powder from the single Lot Number and multiple Batch Number indicates that quantity of feedstock produced under traceable and controlled conditions from a single manufacturing process cycle. The remaining feedstock of insufficient quantity to complete the build cycle that has been used in multiple AM machines is combined, blended and used to finish the powder lot. Powder from multiple Lot Numbers indicates that more than one powder lot is used as feedstock in build cycles. Multiple lots are usually blended before being loaded into the feed region.

(2) Samples taken for testing should be representative of the powder lot, ensuring homogeneity when split. ASTM B215 can be referred to for sampling of metallic powders subject to a prior customer/supplier agreement. The sampling method(s) should be reported. For sampling metal powder, the preferred method is to use a dynamic sampling technique like chute splitting or spin riffling to ensure a representative sample is collected by dividing the powder stream while it is flowing, minimizing segregation issues that can occur with static sampling methods.

3. Powder Recycling

(1) Powder should be protected against damage, contamination, and deterioration during handling, storage, and recycling.

(2) For the DED powder process, only powder which has not exited the DED nozzle may be recycled.

(3) For the PBF or applicable BJT processes, powder recycling with mixed lots is not allowed. Powder recycling for the same lot may be allowed in accordance with procedures agreed by the Society. Procedures for powder recycling may consider the following factors in Table 3.5.

Table 3.5 Factors for Powder Recycling

No.	Factors
1	The documented methods for tracking the progression of powder recycling
2	Limitation for powder recycling times
3	Performance of the final delivered material property by the recycled powder
4	The documented control procedures, such as sieving, blending, testing oxygen, moisture, or other practices
5	Test results of the essential parameters should be within the specified range of virgin powder, if applied
6	Implementation of procedures for prevention of cross contamination on multi-materials use by one machine. Alternatively, linking one machine for one type of material

203. Wire Feedstock

1. Wire Feedstock Specification

(1) For wire feedstock, internationally recognized industry standards such as AWS A5.01:2019, AWS A5.32:2021, ASME BPVC. II. C:2023 or other equivalent standards such as ISO 14175:2008 can be referred to by the manufacturer.

(2) The wire specification should be defined including the manufacturing process and the acceptable range for the essential parameters in Table 3.6. Any non-essential parameters should be indicated for information in the procedure qualification record specified in Ch.4, 205..

(3) Unless otherwise agreed, the wire specification should be qualified for certified items by the manufacturer or approved for class items by the Society. Qualification should include the acceptable range for the parameters. Any change of the following essential parameters outside the qualified range requires requalification.

Table 3.6 Essential Parameters for Wire Feedstock

No.	Essential parameters
1	Material grade
2	Mechanical properties
3	Chemical composition
4	Wire size
5	Tolerance and surface condition(Ra) throughout the length
6	The applicable additive manufacturing process for which the wire feedstock can be used

2. Wire Feedstock Documentation

(1) The wire material supplier should issue a statement of conformity and document the following information in **Table 3.7** for raw material control and traceability per lot per batch.

Table 3.7 Documentation for Wire Feedstock

No.	Information
1	Wire should be sourced from a feedstock supplier approved by the Society for class items.
2	Wire supplier's contact information
3	Lot and Batch Number
4	Wire description such as wire size, material grade, AWS designation, F No., A No. if applicable
5	Wire manufacturing process
6	Associated shielding gas
7	Testing method and results as required by the wire specification
8	Packing date, quantity, and instructions for handling, storage, incoming control
9	As-built properties and Post Weld Heat Treatment (PWHT) properties, if applicable
10	SDS

204. Binder Feedstock

1. If required, the binder feedstock specification should be qualified by the AM facility. The following factors in **Table 3.8** should be specified or considered by the manufacturer.

Table 3.8 Factors for Binder Feedstock

No.	Factors
1	Material grade
2	Chemical composition
3	Viscosity
4	Surface tension
5	Thermogravimetric analysis
6	Flash point
7	Evaporation temperature
8	Curing temperature
9	Storage, handling, and expiration date, if applicable

(Notes)
(1) Additional factors which should be considered during binder selection include: deposition method, compatibility with building process, interaction between binder and powder, effects on the strength of the as-built part, stability, and burnout characteristics.

2. The binder feedstock is a secondary material, which is a liquid bonding agent or glue that binds the metal/ceramic particles together. The binder feedstock can affect the binder jetting and sintering/infiltration process but should not affect the quality of the final part. The final material properties and part dimensions should be achieved by the post-build sintering/infiltration process. The qualification of binder materials should be documented by the AM facility and submitted to the Society, if deemed necessary.

Section 3 Type Test

301. Type test

1. General

(1) The properties of feedstock (mechanical properties, material types, etc.) are to be met the requirements of additive manufacturing machines and end users.

(2) Additives, such as intentionally added pigments, can affect the properties of feedstock, so retesting is required if changed.

(3) The type test can be conducted by feedstock manufacturer or by an organization designated by the manufacturer / the Society, and inspected by the Surveyor.

(4) Type tests are required for each feedstocks and material type. In addition, type tests are required for each additive position.

(5) Additional tests may be required by the Surveyor as deemed necessary.

2. Specimen

(1) The manufacturer selects the shape (cylindrical, rectangular, etc.) of the samples(test coupons) so that the required test specimens can be sufficiently collected, and manufactures two samples(test coupons) with different shapes. The additive directions are to be recorded.

(2) Unless otherwise specified, the specimen is taken at 1/4 of the sample(test coupon)'s thickness.

(3) Only the heat treatment recommended by the feedstock manufacturer or required by the additive manufacturing manufacturer can be applied to the samples(test coupons). After all hest treatment, the specimen can be taken.

(4) An appropriate non-destructive test is to be carried out on the samples(test coupons) before the specimen is taken.

(5) The shape of the specimen is in accordance with **Part 2** of the Rules.

3. Approval test and acceptance criteria

Unless otherwise agreed, the following approval tests in **Table 3.9** should be carried out and test results should be reported using AM built test coupons in accordance with **Ch.6, Sec.2** for inspection and testing. The results should be included in qualification records. Test coupons should represent the performance of the feedstock.

Table 3.9 Approval Tests and Test Results for Additive Manufacturing Feedstock

No.	Test Items
1	Visual inspection: Sample ID and results
2	Dimension inspection: Sample ID and results
3	Surface flaw inspection: Sample ID and results
4	If specified, embedded flaw inspection: Sample ID and results
5	3 tension tests: Sample ID, sample orientation, sample size and test results including yield strength, tension strength, failure type and location
6	If required, 1 set of Charpy impact tests, applicable to materials with ductile-to-brittle transition: Sample ID, sample orientation, sample size and test results
7	If applicable, bend tests: 2 bend tests in the Z and 2 bend tests in X or Y direction for wire arc DED processes and test results
8	Hardness test for the interface cross-section and heat affected zone (HAZ) in the substrate for an integrated build: Sample ID, hardness values or hardness profile from AM build material to HAZ
9	Microstructure examination: Sample ID, part thickness at the section plane, section plane angle relative to build platform, magnification, and results
10	Chemical analysis: Sample ID and results
11	Density test: Sample ID and results
12	Other tests: other tests may be performed if the manufacturer assesses them to be useful for qualification of the feedstock or if they are specified by the powder purchaser.

302. Marking

The marks of feedstock that accepted the test is as follows.

(1) Additive manufacturing techniques used for each type of feedstock and material grades are added together.

(2) It is followed examples as below.

(A) AMF(Additive Manufacturing Feedstock)-P(Powder)-PBF-LB(Powder Bed Fusion-Laser Beam)
-16Cr5Ni(Stainless steel casting for propeller) : *AMF-P-PBF-LB-16Cr5Ni*

(B) AMF(Additive Manufacturing Feedstock)-W(Wire)-DED-LB(Directed Energy Deposition-Laser Beam)
-16Cr5Ni(Stainless steel casting for propeller) : *AMF-W-DED-LB-16Cr5Ni*

Section 4 Survey & Range of Approval

401. Survey

1. Initial Survey

The manufacturer should be audited by the attending Surveyor. The initial survey of feedstock production facilities should include witness of the feedstock manufacturing process, survey of manufacturing control for repeatability of the AM feedstock quality, evaluation of the quality management system, document control for the manufacturing procedure and specification, and quality control for sampling, testing, reporting etc.

2. Witness of Approval Tests

The approval tests should be witnessed by the attending Surveyor.

3. Periodical Inspection(Annual Survey)

It is in accordance with **Ch 3, Sec 2, 204.** of **Guidance for Approval of Manufacturing Process and Type Approval, etc.**. The periodical inspection(annual survey) should be carried out by the attending Surveyor. The periodical inspection(annual survey) should include a plan to demonstrate the essential parameters are followed during production. During the periodical inspection(annual survey), full or partial approval tests could be requested based on the performance of the annual production record.

402. Information to be Submitted for Approval by the Society

For class parts, the following items in **Table 3.10** should be submitted to the Society:

Table 3.10 Information to be Submitted for Additive Manufacturing Feedstock Approval

No.	Item
1	Operator qualifications record
2	Feedstock material specification and documentation
3	Recommend AM build parameters for the feedstock material
4	Types of approval tests, test standards and test results in accordance with **301.**
5	Witness of the qualification approval tests
6	Qualification records with a certifying statement acknowledging the validity of the data and certifying the qualification tests and test results
7	Agreed plan for quality control during feedstock production

403. Range of Approval

Upon satisfactory completion of the feedstock specification review and survey, approval will be granted by the Society. The following information is to be stated in the approval certificate issued by the Society:

1. Feedstock supplier
2. Feedstock Mark
3. Qualified feedstock material specification in accordance with **202.** for powder feedstock and **203.** for wire feedstock and **204.** for binder feedstock ⚓

CHAPTER 4 APPROVAL OF MANUFACTURING PROCESS－PRODUCT(PART)

Section 1 General

101. General

1. Application

The requirements of **this Chapter** apply to approval procedures and tests for the approval of manufacturing process of manufacturers who manufacture products(parts) using additive manufacturing technology.

102. Approval application

1. The manufacturer wishing to obtain the approval of manufacturing process is to submit a copy of the application of approval for manufacturing process (refer to **Annex 6** of **the Guidance for Approval of Manufacturing Process and Type Approval, Etc.**) of the Society together with three copies of the required data for the approval and two copies of the required data for reference to the Society.
2. When applying for approval, the manufacturer should consider the product's approval range.
3. **Data to be submitted**

(1) Data for approval

The following documents in **Table 4.1** should be submitted for AM part approval, for review and survey by the Society. The Society may request additional documents.

Table 4.1 Information to be Submitted for Additively Manufactured Part Final Approval and Certification

No.	Item
1	Documentation identifying the part as either a class part or certified part
2	AM Level 1, 2, or 3
3	If applicable, CAD model or drawing for the final AM part and supporting engineering calculations or simulations for the model
4	If applicable, a digital build model of the part and test coupons for building, including orientation, support structures, etc., for reference
5	Evidence of approval for the AM manufacturer for class items or evidence of certification of the AM manufacturer by an appropriate inspection body for certified items
6	Final material specification including material grade, composition, properties requirements, and the NDT test standard and acceptance criteria
7	Evidence of approval of the feedstock material for class items or evidence of certification of the feedstock material by an appropriate inspection body for certified items
8	The AM procedure specification
9	The post-build procedure specification
10	Qualification records for the part approval, including inspection and testing results with traceability of applied parameters
11	Functionality testing procedures and results
12	Agreed plan for installation, operation, and survey
13	Inspection and test plan for the part certification during production, refer to **Ch.6**.
(Notes) (1) The results of tests and inspections are submitted after the tests and inspections are completed.	

(2) Data for reference

In addition to the **Ch 2, Sec 1, 102.** of **the Guidance for Approval of Manufacturing Process and Type Approval, Etc.**, the following data is to be submitted.

(A) Manufacturer's feasibility verification data

(B) Data for design

(a) Design Requirements (Legal and Regulatory Requirements)

(b) Design concept

(c) Component complexity

(d) Design optimization

(i) Prepared 3D Model Information

(ii) Procedures for reviewing the quality of the 3D model and suitability for AM (e.g. inner surfaces, overhanging features)

(iii) Details about scaling, slicing, sub-division, hatch strategies, simulation models, and boundary conditions

(iv) Information on how to place a product that is fabricated in the optimal direction by adding fixtures, supports or other required shapes (see **ISO/ASTM 52921** for build orientation)

(v) Information for integration of topology optimization with design for additive tools, lattice structures, geometric compensation approaches, optimization of input file, slicing and build orientation for achieving part tolerances (minimizing and optimal removal of support structures)

(vi) Model calculation of distorted geometry result performed in advance

(e) Final design

(C) Data relating to facilities
  (a) Facility descriptions, ambient conditions(and control) and other related information
  (b) Specifications, functions and limitations of additive manufacturing systems (e.g. model number, software and firmware version)
  (c) Parameter setting of AM machine and variable parameters that operator can control
  (d) Details of accreditation of AM machine
  (e) Operator qualification
  (f) Details of data sensing and logging procedures to input file version verification, trace file revisions and machine logging
  (g) Identification ensuring full traceability
  (h) Generating reports on control data
  (i) AM machine preparation and raw material verification
  (j) Loading and retrieval of build data
  (k) Optimal process variables (laser power, scan speed, height and gap of layer, respectively height and width, overlap rate building direction, printing strategy including number and spacing of parts, etc.) and their control range
  (l) Scan and deposition strategies and monitoring methods
  (m) Sieving type and mesh size
  (n) Details of gases used during the process, flow rate
  (o) Preheating of feedstock
(D) Data relating to software
  (a) Details of STL/AMF files and preprocessing software used
  (b) Procedures for quality check of STL/AMF files (e.g. magic software)
  (c) Details of the software version and IP rights for the design to be printed
  (d) Methods for data encryption, compression, and other cyber security issues
(E) Data relating to manufacturing process
  (a) Standard for operating procedures
  (b) Work instructions for each part/component
  (c) Risk assessment
  (d) Test procedures on site
  (e) Instructions for Installation, operation and maintenance
  (f) Pre-maintenance items
  (g) Performance test items
  (h) Calibration data
  (i) Manufacturing parameters
(F) The following data are to be additionally submitted depending on the type of techniques.
  (a) Laser Powder Bed Fusion
    (i) Laser (e.g. power, spot dimensions, exposure time, focus position)
    (ii) Scanning strategy (e.g. scan speed, layer thickness)
    (iii) Point distance (distance between successive laser spots)
    (iv) Hatch distances and conditions (shift between tracks in the plane of the beam scanning and track distance)
    (v) Laser absorptivity or reflectance (e.g. substrate material may require shot blasting to reduce reflectance)
    (vi) Build environmental controls (e.g. inert gas, build platform preheating temperature, build space temperature and pressure, recoater blades);
    (vii) External environmental controls (e.g. temperature, humidity)
    (viii) Powder feedstock (e.g. particle size range and distribution, morphology)
    (ix) Baseplate control (e.g. selected baseplate material for build, cleanliness of the baseplate)
  (b) Laser Metal Deposition
    (i) Laser (e.g. power, spot dimensions)
    (ii) Nozzles (coaxial, three-beam or side feeder)
    (iii) Travel speed
    (iv) Standoff distance (distance between nozzle tip and surface)
    (v) Shielding gas (e.g. Ar or He, gas flow rate and direction)
    (vi) Heat input and cooling characteristics
    (vii) External environmental controls (e.g. temperature, humidity)
    (viii) Powder feedstock (particle size range and distribution, morphology, feed rate, flow rate, deposition rate)

(ix) Laser absorption/reflectance (e.g. substrate material may require shot blasting to reduce reflectance)
(x) Baseplate control (e.g. selected baseplate material for build, cleanliness of the baseplate)

(c) Wire Arc Additive Manufacturing
(i) Consumables manufacturing information
(ii) WAAM procedures and positions
(iii) Technical details (e.g. weaving, multi-wire)
(iv) Consumables, including flux and shielding gas
(v) Consumables control (e.g. drying conditions)
(vi) Chemical composition of the deposit
(vii) Process parameters
(viii) Preheating and Interpass Temperature
(ix) Cleaning between layers and inspection during production
(x) Baseplate control (e.g. selected baseplate material for build, cleanliness of the baseplate)
(xi) Post heat treatment

(d) Post processing
(i) Waiting time for the object on the machine platform after finishing the additive work
(ii) Machining or other surface finishing work
(iii) Methods for taking out the object from the machine's platform
(iv) Removal of powder particles from the inner hollow part
(v) Object cleaning
(vi) Methods for removal of support from the product
(vii) Details of post heat treatment
(viii) Machining or other surface finishing work, such as treatment with abrasive media or shot peening, and related requirements
(ix) Density achieved, as well as methods how this is verified
(x) Process for cleaning the AM machine after printing
(xi) Heat treatment method for stress relief

103. Data review

The Society examines the approval test program for approval of manufacturing process submitted in accordance with the requirements in 102. 3 and where deemed appropriate, the test program is approved and returned to the manufacturer.

104. Type approval of feedstock

1. The AM manufacturer apply to AM process based on various parameters used in type approval of feedstock.

2. When the Society agrees, the approval of manufacturing process can be carried out by submitting the feedstock specification and the statement of conformity in Ch 3 even without type approval of feedstock.

105. Feedstock control

1. Storage of feedstock
(1) Feedstock is to be stored by separating and labelling for each type, and humidity is to be controlled in designated storage areas.
(2) Powder feedstock is not to be mixed with different types or batches during transportation or storage.
(3) A system is to be settled to clearly manage the distinction between used and reused feedstock.

2. Reuse of powder
(1) When reusing feedstock, obstructions are not to be mixed and to be filtered out by proper facilities.
(2) The manufacturer should identify how many times the feedstock is reused. For identifying, the manufacturer should test whether the reused feedstock has a quality equivalent that of the unreused feedstock and submit the result. The number of reuses identified in the type approval of

feedstock can be accepted.

Section 2 Additive Manufacturing Process Specification(AMPS)

201. General

1. The AMPS should be documented by the additive manufacturer for controlling and monitoring both the essential parameters and non-essential parameters that may affect the final part quality.
2. The AMPS should be qualified using a range of parameters in association with the approval tests by the Society. Any change of essential parameters beyond the range should be requalified. Test witnessing is required for class items and certified critical items.
3. The applicable essential and non-essential parameters should be documented by the AM facilities/manufacturers. Any parameter that influences heat source/input and heat deposition/history should be considered as an essential parameter.
4. The additive manufacturing procedure should be included in the additive manufacturer's production records.

202. Pre-Build Procedure

1. The following pre-build process characteristics in **Table 4.2** should be defined and identified, which may be supported by slicing software for the preparation of the manufacturing procedure.

Table 4.2 Pre-build Process Characteristics

No.	Pre-build process characteristics
1	Part location and orientation
2	Test coupon location and orientation
3	Machining allowance for part and test coupon, if applicable
4	Build location and nesting, if applicable
5	Build surface, direction, and gravity direction, if applicable
6	Support/infill structure, if applicable
7	Appropriate cleaning procedure for build platform

(Notes)

(1) Part orientation should be identified relative to a specified build surface, such as the build platform or incorporated substrate. If applicable or required, the build location should be identified using X, Y, Z directions in accordance with internationally recognized industry standards, such as ISO 17295:2023.

(2) For PBF or applicable BJT processes, the part may be oriented and optimized using pre-build software, to reduce the build time or thermal residual stress. For PBF processes, the location of a single part may be specified within a build envelope. Multiple build locations may be necessary when multiple parts are built simultaneously within the same building envelope.

(3) For DED processes, parts may be oriented vertically, horizontally or to other angles determined by machine flexibility to manipulate the substrate.

(4) Test coupons should be identified in the build layout with a unique label. If the build layout and build surface are depicted, the build location, orientation, and related tolerance for test coupons are also to be indicated in accordance with internationally recognized industry standards such as ISO 17295:2023. Digital build models of parts and test coupons should be submitted for reference as part of the submission.

(5) For PBF or applicable BJT processes, test coupons may be built as near-net-shape test samples or test samples could be retrieved from the sufficient test blocks.

(6) For DED processes, test coupons may be taken from a prolongated part/artifact, or a separate test block that represents the part features or part section thickness, which can be specially considered and agreed to by the Society.

(7) For PBF or applicable BJT processes, overhangs and sacrificial support structures may be applied for support during fabrication, if required. Alternatively, the part may be re-oriented during the building process to avoid overhang if this is possible. If specified, a bounded surface or volume region may be used to define locations to limit or require support/infill structure. If not specified, a default support/infill structure may be applied depending upon the machine and software.

2. Internationally recognized industry standards, such as ISO/ASTM 52950:2021, may be referred to for an overview of data processing. Digital files may include derivatives from the original CAD model (e.g., STL, AMF, STEP or 3MF).

3. Digital build files should be accurately exported, especially for the critical features, documented and submitted for information, if deemed necessary by the Society. During exporting digital building files, the conversion of digital building file from solid model to machine recognized model/code should be verified and any errors should be fixed automatically by available software or manually by the operator.

203. Build Procedure

1. General

(1) Building parameters related to heat source/input, refer to **2.** for PBF processes and **3.** for DED processes, and heat deposition/history, refer to **2.** for PBF processes and **3.** for DED processes, are considered as essential parameters and should be specified in the procedure specification,

controlled, and qualified within the range.

(2) Non-essential operating parameters identified by experience or fixed parameters imposed by the machine system should be documented and controlled as much as possible, including the build platform, build environment, and any other related parameters.

(3) If process characteristics are required for in-process monitoring during building, those requirements should be monitored for conformance, such as machine building errors, failures, or defect inspection.

2. Powder Bed Fusion (PBF)

(1) For powder processes, internationally recognized industry standards, such as **ISO/ASTM 52904:2019**, can be referred to by the manufacturer for inclusion in the procedure specification.

(2) PBF-EB has similar capabilities as PBF-LB but demonstrates differences due to different beam sources. Compared with PBF-LB, the beam energy transferred by the electron beam is higher. The process may operate at higher temperatures, with faster build rates and relatively lower resolutions. Additionally, the powder bed is preheated to slightly below melting temperature, which results in less thermally induced stress.

(3) The parameters in **Table 4.3** should be defined in the PBF-LB or PBF-EB procedure specification.

Table 4.3 Additive Manufacturing Procedure Specification for PBF Process

No.	Item
1	Heat Source: a. Beam type, such as laser or electron beam b. Beam power c. Beam size d. Beam frequency or waveform control e. Beam splitting f. Beam focus setting
2	Deposition: a. Layer thickness b. Scan pattern/strategy c. Travel speed d. Hatch overlap, distance/spacing e. Specific settings control for edges or surfaces
3	Build Environment for PBF-LB: a. Build platform material specification/designation, thickness, surface finish, dimension, parallelism, and tolerance b. Build platform preheat temperature c. Shielding gas composition and flow rate d. Supplemental gas shielding e. Build chamber gas composition f. Environmental enclosure hardware and configuration
4	Build Environment for PBF-EB: a. Build platform material specification/designation and thickness b. Build platform preheat temperature c. Vacuum pressure d. Build Environment
5	Other Parameters: a. Re-coater blade type, material, or roller wear b. Powder dosing rate c. Ambient environmental conditions d. Feedstock condition, such as powder lot, batch number, virgin or recycled

3. Directed Energy Deposition (DED)

For DED processes, internationally recognized industry standards, such as ASTM F3187:2016, can be referred to by the manufacturer for inclusion in the procedure specification. The parameters in Table 4.4 should be defined in the DED procedure specification.

Table 4.4 Additive Manufacturing Procedure Specification for DED Process

No.	Item
1	Heat Source: a. Type of beam/arc b. Beam/arc power c. Beam/arc size d. Heat pulse frequency or waveform control e. Preheating by beam splitting (not applicable to DED-PA, DED-GTA, and DED-GMA) f. Use of energized (pre-heated) wire (not applicable to Powder DED) g. Beam/arc focus setting (not applicable to DED-PA, DED-GTA, and DED-GMA)
2	Deposition: a. Programmed layer thickness (applicable to laser powder DED, not applicable to other DED processes) b. Scan pattern/toolpath c. Travel speed d. Hatch overlap, distance/spacing (applicable to laser powder DED, not applicable to other DED processes) e. Feed rate f. Start working distance/nozzle standoff distance (not applicable to DED-PA, DED-GTA, and DED-GMA) g. Specific settings that may affect edge and surface build condition h. Wire delivery parameters such as incidence angle, offset distance or path orientation (not applicable to powder DED) i. The applied techniques such as weaving, multi-wires or pulse for wire DED, if applicable j. Start and stop point
3	Build Environment: a. Build platform material specification/designation, thickness, surface finish, dimension, and tolerance b. Build platform preheat temperature c. Inter-pass temperature and inter-pass cleaning, if applicable d. Shielding gas composition and flow rate (not applicable to DED-EB) e. Powder carrier gas flow rate (applicable to powder DED) f. Supplemental gas shielding (not applicable to DED-EB) g. Supply gas composition (not applicable to DED-EB) h. Build chamber gas composition, if applicable i. Vacuum pressure (applicable to DED-EB only) j. Environmental enclosure hardware and configuration
4	Other parameters: a. Orientation of heat source impingement b. Ambient environment conditions, such as temperature, moisture, etc. c. Feedstock type, such as powder or wire
(Notes) (1) If the substrate is integrated within the final part, the mechanical and metallurgical properties at the bonding interface, together with any inspection requirements, should be included in the qualification tests. The substrate for qualification should be representative of the substrate for production.	

4. Binder Jetting (BJT)

The main parameters in Table 4.5 should be defined in the BJT or equivalent procedure specification. These factors are the AM build parameters, which should be controlled for the dimensions of the green part. The final dimensions and quality are determined by the sintering/infiltration process of the brown part.

Table 4.5 Main Parameters for BJT Process

No.	Main parameters for BJT
1	Layer thickness
2	Powder spread, if applicable
3	Build speed
4	Binder saturation, if applicable
5	Drying time and heater powder ratio, if applicable
6	Build orientation
7	Travel strategy

5. In-Process Monitoring or Controlling

(1) Some AM systems may have subsystems using one or more real-time sensors to monitor or control various performance and status indications during building, such as melt pool temperature, size, lack of fusion, spattering, and other parameters.

(2) If subsystems can change or can control any qualified essential parameters, subsystems should be included in the AMPS and are required in qualification records, including details of the monitoring or controlling type and method, monitoring or controlling system settings and the qualified essential parameters. Subsystems are not required in AMPS and qualification records, if they do not change or do not control any qualified essential parameters.

204. Post-Build Procedure

1. General

(1) The post-build process required to meet the quality and properties of the final delivered part should be provided in documented procedures or specifications.

(2) The parameters such as temperature, soak time, and cooling media should be specified and controlled by the heat treatment facility. Reference should be made to industry standards depending upon materials.

(3) If specified, allowances for machining could be referred to internationally recognized industry standards or manufacturer's practices.

(4) The same post-build heat treatment processes should be applied to the test coupons and the sacrificial/actual parts if the post-build process affects the final delivered material properties or is defined as an essential parameter.

2. Powder Removal

The manufacturer's procedure should include a process for removal of loose powder from parts manufactured by PBF or BJT processes. The residual powder in the part may cause health and safety issues for personnel while working during the post processing steps, especially for reactive materials such as titanium-based or aluminum-based powder. Any health and safety risks should be identified and either designed out or minimized.

3. Heat Treatment

Heat treatment, where specified, should be in accordance with Class Rules, internationally recognized industry standards, or best practice suited to the materials, refer to the same traditionally

manufactured material grade. To avoid distortion, the part should be adequately supported during heat treatment as appropriate for the component shape/complexity.

4. Part Removal

(1) Procedures should be prepared by the manufacturer for part removal or support structure removal. The following information in **Table 4.6** should be documented.

Table 4.6 Procedure for Part Removal

No.	Item
1	Suitable build platform temperature when the part is planned to be removed from build chamber
2	If applicable, powder removal needs to be verified before heat treatment
3	Applicable methods and tools, such as band saw, slow speed saw, manual tools, machining, grinding etc.
4	Step-by-step instructions

(2) Generally, to reduce residual stress, stress relief heat treatment should be carried out before the part is removed. However, this might not be applicable for large parts due to the furnace capacity. Therefore, there are some cases where parts may be removed before stress relief heat-treatment. Depending upon materials, special attention to avoid cracking may be required and this should be specially considered and agreed to by the Society.

(3) The removal of support structures should be done in a manner to avoid detrimental impact on the part. This can be proactively considered during design for the ease of removal of the interface between the support structure and the part.

5. Surface Finish or Machining

Surface finishing is important for fatigue, non-destructive testing, maintaining tolerance, surface texture and appearance. Surface finish should be in accordance with the manufacturer's procedure. Surface finishing or additional machining operations should be performed after the applicable heat treatment processing due to potential deformation and discoloring/oxidization during heat treatment.

205. Additive Manufacturing Procedure Specification Qualification

1. Refer to **Table 4.7**, the purpose of procedure qualification is to demonstrate the capabilities of an AM procedure to produce a specific AM build component, AM feedstock, AM final material, or repair part by an AM process to meet the requirements.
2. The AM procedure specification (AMPS) should document the required variables to ensure the repeatability of the AM process. Procedure qualification records should document the data recorded during qualification testing, including the applied parameters and corresponding test results.
3. Qualification records for AMPS should be established and documented for review and survey when approval is requested for an AM part, AM feedstock, AM manufacturers for final material, AM repair facilities, refer to **Table 4.7**.
4. The qualification procedure of an AM repair facility, as described in **Ch.7**, requires both a procedure specification and documented qualification records. See also **Ch.6, 203. (4)** for Repair of an AM Part.

Table 4.7 Additive Manufacturing Procedure Specification Qualification

Qualification records for AMPS	
Item	Detail
AM Part	The qualification procedure for an AM part, as described in **Ch.4, Sec.2**, requires the procedure specification and the documented qualification records for the delivered part and should meet all the design requirements in **Ch.2**.
AM Feedstock	The qualification procedure for AM feedstock, as described in **Ch.3**, requires the procedure specification and documented qualification records to meet the requirements for the final delivered feedstock material in **Ch.3, Sec.3**.
AM Materials	The qualification procedure for an AM manufacturer for final material, as described in **Ch.5**, requires the procedure specification and documented qualification records for the final delivered material and should meet the acceptance criteria in **Ch.5, Sec.2**.
AM Repair	The qualification procedure for an AM repair facility, as described in **Ch.7**, is applicable when using an AM process for repair of in-service damaged parts. The part(s) will require a procedure specification and documented qualification records.

Section 3 Plant Audit

301. Plant audit

1. Purpose

The Society will, where deemed appropriate upon review of documents and data submitted, carry out the plant audit in the presence of the Surveyor to verify that the manufacturer has a technical capability to continuously produce the proposed products of equal level in quality under the stable workmanship to the satisfaction of the Society.

2. Items to be audited

The plant audit is to apply to the following items for each manufacturing plant and each product.

(1) Quality system in general
  (A) Establishment and implementation of quality system
  (B) Observance and establishment of procedure for handling of customer complaints
  (C) Education and training of employees

(2) Control of process and quality
  (A) Observance of work instruction
  (B) Observance and confirmation of Q.C flow charts
  (C) Control of nonconforming product and corrective action
  (D) Feedstock management

(3) Control of manufacturing and inspection equipment
  (A) Observance and establishment of maintenance procedure for manufacturing equipment and software
  (B) Calibration and control of inspection equipment

(4) Others
  (A) Updating of documents such as applicable standards, etc.
  (B) Comprehension of related requirements for class surveys

(5) Audit methods and acceptance criteria are to be as deemed appropriate by the Society.

3. Time for audit

The time of the audit is to correspond, in principle, to either the time when the proposed product is manufactured or the time when the approval test is carried out. In this case, the manufacturer is to provide the necessary information related to this audit.

4. Exemption of audit

When the manufacturer submits the application of newly produced product with the same manufacturing facilities and similar method of manufacture for products which have been approved by the Society, the audit items may be exempted wholly or partly according to the review result of the documents.

Section 4 Approval Test

401. Approval test

1. General

(1) Test method and acceptance criteria are to be submitted before approval test.

(2) The number, direction, and location of the specimens are to be discussed in advance with Surveyor.

(3) A generic procedure qualification for prototype parts is required in accordance with 205.. Refer to Table 4.8, AMPS and qualification records for part approval should be documented with revision control. Evidence should be provided that the technical/design requirements are achievable for the required application.

Table 4.8 Additively Manufactured Prototype Part Qualification

AMPS and qualification records for part approval	
No.	Detail
1	Test coupons and a prototype AM part should be built in the same build batch using the established digital build volume model including part location and orientation, support structure, machining stock, and the test sample's location and direction to meet the same specifications as for production.
2	Test coupons should represent the actual part or the worst-case scenario, such as edge of build platform in the Z direction for laser-based process.
3	As applicable, the height/length of each separately built tensile specimen in the Z direction should be at least the maximum height of the intended part for the PBF or applicable BJT process. If not applicable for a large part/component, the standardized tensile sample with 50 mm (2 in.) gauge length should be tested or multiple tensile samples should be tested in the Z direction to cover the height/length of the large part/component.
4	As applicable, for DED processes the samples should be retrieved from the prolongation of the intended part to replace the sacrificial part tests, considering that prolongation has similar dimensions (e.g., section thickness of the part). For separate coupons, the test samples should represent the intended part and features. For PBF process, the samples can be built separately from the intended part and at least one sample should be built for each laser zone, if applicable.
5	The relationship between controlled/specified process parameters as inputs and test results as output, in accordance with the part model and the materials specification, should be established by qualification records for the specific combination of parameters.
6	The relationships of dimensions and material properties between test coupons and the intended AM part should be established. The test coupons are used to assist quality control continuity during fabrication or production.
7	The test coupons and the specific part are to achieve the required properties by approval tests in accordance with applicable Class Rules, industry standards, or designer/OEM specification.

2. Test coupons(Samples)

(1)The test coupon(sample) is to be represented the approval range considering follows.
- Material type or grade
- Manufacturing process
- Type and manufacturer of feedstock
- Types and brand of facilities
- Product type or shape
- Maximum size or weight
- Heat treatment or post processing

(2) One test coupon(sample) with the maximum size and one with the average size are to be manufactured separately. If only products of the same size are produced, two products are to be manufactured for test coupon(sample).

(3) Selection of test samples and approval tests, in principle, are to be carried out in the presence of the Surveyor. However density, micro structure, corrosion resistance, fatigue, residual stress or in case the Society deems the test unnecessary may be omitted.

(4) When the sample (product) has a shape and dimensions that are difficult to be taken all of the required specimens, it can be added layers to the insufficient direction (x, y, z).

(5) The specimens are to be taken after the final conditions including heat treatment and surface treatment of the product are completed.

402. Approval Tests for Prototype Part

1. The prototype part qualification for approval includes materials tests such as mechanical tests, metallurgical tests, non-destructive tests and functional tests. If the prototype part is built by an approved additive manufacturer in accordance with Ch.5, a reduced scope for mechanical and metallurgical testing could be agreed by the Society.

2. Unless otherwise agreed, the test samples, methods, and test quantity denoted in Table 4.9 for PBF processes, Table 4.10 for DED processes and Table 4.11 for BJT or equivalent processes should be followed.

3. Charpy impact testing may be specially considered and agreed to by the Society, depending upon materials, design temperature, and build process.

4. Depending upon the intended parts and applications, supplementary tests may be required, such as for fatigue, fracture mechanics, corrosion, wear, erosion, weldability, and residual stress measurements.

5. Depending on the application, function tests could be proof load tested for a load bearing part, pressure/leak tested for a pressure bearing part or balance tested for a rotary machinery part etc.

6. Alternative approval test samples, methods, and quantities may be accepted by the Society provided that the AM manufacturer submits explanations showing that they are technically similar.

Table 4.9 Approval Tests for Powder Bed Fusion Process

Sampling	Types of Tests	AM Level 1	AM Level 2	AM Level 3 for Class
		Certified and Non-Critical	Certified and Critical	
Test Specimen	Visual Inspection	Yes	Yes	Yes
	Surface Flaw Inspection	Yes	Yes	Yes
	Embedded Flaw Inspection	By Agreement	By Agreement	By Agreement
	Chemistry	Feedstock certificate	AM built coupon	AM built coupon
	Tensile	1	3	5
		1 in Z at one corner	3 in Z (diagonal 2 corners and 1 center)	5 in Z (4 corners and 1 center)
	Impact, if applicable	By Agreement	1 set	3 sets
			1 set in Z, at corner	1 set in Z, 1 set in X and 1 Set in Y, at corner
	Hardness	By Agreement	3	6
			1 at 1/8 below surface, 1 at 1/4 thickness, 1 at center	2 at 1/8 below surface, 2 at 1/4 thickness, 2 at center
	Microstructure	By Agreement	2	4
			1 in Z and 1 in X/Y	2 in Z and 2 in X/Y
	Density	Optional - to be agreed	3	3
Component Tests	Visual Inspection	Yes	Yes	Yes
	Surface Flaw Inspection	Yes	Yes	Yes
	Embedded Flaw Inspection	By Agreement	Yes	Yes
	Hardness Tests	If Applicable	If Applicable	If Applicable
	Function Tests	Yes	Yes	Yes

(Notes)

(1) For PBF-EB processes, tensile and Charpy test directions and quantities could be specially considered and agreed to by the Society.

(2) X, Y, Z is the direction of the build, refer to internationally recognized industry standards. Number count refers to the number of test specimens to be taken in each location, e.g. tensile '1 in Z at one corner' equates to "1 tensile test in the Z direction taken from one corner".

Table 4.10 Approval Tests for Directed Energy Deposition Process

Sampling	Types of Tests	AM Level 1	AM Level 2	AM Level 3 for Class
		Certified and Non-Critical	Certified and Critical	
Test Specimen	Visual Inspection	Yes	Yes	Yes
	Surface Flaw Inspection	Yes	Yes	Yes
	Embedded Flaw Inspection	By Agreement	By Agreement	By Agreement
	Chemistry	Feedstock certificate	AM built coupon	AM built coupon
	Tensile	1	3	6
		1 in Z	3 in Z	3 in Z, 3 in X or Y
	Impact, if applicable	By Agreement	1 set	3 sets
			1 set in Z	1 set in Z, 1 set in X and 1 set in Y
	Hardness	By Agreement	3	6
			1 at 1/8 below Surface, 1 at 1/4 Thickness, 1 at Center	2 at 1/8 below Surface, 2 at 1/4 Thickness, 2 at Center
	Microstructure	By Agreement	2	4
			1 in Z and 1 in X/Y	2 in Z and 2 in X/Y
	Density, if powder DED	By Agreement	3	3
	Bend, if wire DED	By Agreement	4	4
			2 in Z and 2 in X/Y	2 in Z and 2 in X/Y
Component Tests	Visual Inspection	Yes	Yes	Yes
	Surface Flaw Inspection	Yes	Yes	Yes
	Embedded Flaw Inspection	By Agreement	Yes	Yes
	Hardness Tests	If Applicable	If Applicable	If Applicable
	Function Tests	Yes	Yes	Yes

(Notes)

(1) For part approval by DED processes, reference or sacrificial parts are applicable for approval tests in lieu of test coupons.

(2) If the DED procedure is qualified for an integrated build platform, the AM part or material should not be removed from the build platform for the final delivered condition. As a minimum, six tensile samples should be retrieved and tested for each integrated build platform material. Three tensile samples should represent the interface and heat affected zone (HAZ). The other three samples should represent the AM build materials in the gauge length. Charpy tests for integrated build qualification could be specially considered and agreed to by the Society. The interface and HAZ should be characterized and documented, with reference to traditional welding procedure qualification. Two bend tests in the Z and two bend tests in the X or Y direction for wire arc DED processes should be included for the integrated build component for AM Level 2 and AM Level 3 during the qualification stage.

(3) Number count refers to the number of test specimens to be taken in each location, e.g. tensile '1 in Z' equates to "1 tensile test in the Z direction".

Table 4.11 Approval Tests for Binder Jetting or Equivalent Process

Sampling	Types of Tests	AM Level 1	AM Level 2	AM Level 3 for Class
		Certified and Non-Critical	Certified and Critical	
Test Specimen	Visual Inspection	Yes	Yes	Yes
	Surface Flaw Inspection	Yes	Yes	Yes
	Embedded Flaw Inspection	By Agreement	By Agreement	By Agreement
	Chemistry	Feedstock certificate	AM built coupon	AM built coupon
	Tensile	1	2	3
		1 in any direction	1 in Z and 1 in X/Y	Agreed direction
	Impact, if applicable	By Agreement	1 set	2 sets
			1 set in Z, any location	1 set in Z, 1 set in X/Y, any location
	Hardness	By Agreement	3	3
	Microstructure	By Agreement	1	1
	Density	By Agreement	3	3
Tests Component	Visual Inspection	Yes	Yes	Yes
	Surface Flaw Inspection	Yes	Yes	Yes
	Embedded Flaw Inspection	By Agreement	Yes	Yes
	Hardness Tests	If Applicable	If Applicable	If Applicable
	Function Tests	Yes	Yes	Yes

(Notes)
(1) Number count refers to the number of test specimens to be taken in each location, e.g. tensile '1 in any direction' equates to "1 tensile test taken in the X, Y, or Z direction".

403. Marking

For AM products which have satisfactorily complied with the required tests, "-AM" is to be suffixed to the product marking.

Section 5 Survey & Range of Approval

501. Survey

1. Initial Survey

The manufacturer should be audited by the attending Surveyor. The initial survey of additive manufacturing facilities for production should include follows.

(1) Witness of the additive manufacturing process
(2) Survey of manufacturing control for repeatability
(3) Evaluation of the quality management system
(4) Document control for the manufacturing procedure, specification and quality control for sampling, testing, reporting
(5) Incoming control for feedstock materials
(6) Outgoing control for the AM build final parts or materials etc.

2. Witness of Approval Tests

The approval tests should be witnessed by the attending Surveyor.

3. Annual Survey

The annual survey should be carried out by the attending Surveyor. The annual survey should include a plan to demonstrate the essential parameters are followed. During the annual survey, full or partial approval tests could be requested based on the performance of the annual production record.

502. Range of Approval

1. Refer to **Table 4.12**, the range of approval should consider the combination of the qualified model and procedures/specifications.

Table 4.12 Range of Approval for AM Part

No.	Item
1	Documentation identifying the part as either a class or a certified part
2	AM Level (1, 2, or 3)
3	CAD model or drawing with revision number
4	Materials specification of final delivered condition
5	AM machine model
6	Feedstock material linked to feedstock supplier
7	AM procedure specification including pre-build, build and post-build
8	The intended application of the finished part (e.g., the equipment/system in which the part is to be installed)

2. The approval range for the size of each product is in accordance with the relevant **Classification Technical Rules**.
3. Approval of AM Level 3 parts, such parts may be qualified and approved with the support of the qualification record of a specific part.
4. Approval of AM Level 2 parts, a family of parts may be qualified and approved with the support of a risk analysis for the part family and/or with simulation model results, both of which should be specially considered and agreed to by the Society.
5. Approval of AM Level 1 parts, a similar part may be qualified and approved with the support of a risk analysis for the design feature family and/or with simulation model results, both of which

could be specially considered and agreed by the Society.

6. Change in the range of approval

(1) Requalification should be carried out if there are any quality concerns for the delivered part or if there are any changes as defined in Ch.6.

(2) Supplementary tests can be carried out and recorded to expand the range of approval. To extend the range of approval from AM Level 1 to AM Level 2, the manufacturer should complete the additional tests specified for AM Level 2.

(3) To extend the range of approval from AM Level 1 to AM Level 3 or AM Level 2 to AM Level 3, the manufacturer should complete the additional tests specified for AM Level 3.

(4) Additional testing for expanding the range of approval may also include the supplementary tests specified in Ch.4, Sec.4. ⚓

CHAPTER 5 APPROVAL OF MANUFACTURING PROCESS-ADDITIVELY MANUFACTURED METALLIC MATERIALS

Section 1 General

101. General

1. For class items, the manufacturer should be approved in accordance with **this Chapter**. For certified items, the approval of the manufacturer should be agreed by a purchase specification.
2. Manufacturers should comply with the applicable requirements in their quality management system. The machine, procedure and personnel should be qualified and documented. The procedure should be followed during production by the manufacturer.
3. The manufacturer should prepare the manufacturing specifications/procedures, qualified using approved tests of qualification build block or coupons. The manufacturing specifications/procedures should be approved with repeatedly and consistently achievable AM final materials properties.
4. Manufacturers should be evaluated with reference to both quality management system and AM capability. In addition, the sub suppliers or outsourcing of any services or production should be reviewed by using a specification/procedure. The sub suppliers or outsourcing may include a feedstock supplier, a post-build heat treatment shop, a machine shop, a laboratory for testing, NDT facilities, or service supplier.
5. Class approval involves a documentation review, an audit of the facility/manufacturer and witness of the approval tests. Unless otherwise agreed, the approval is valid for a maximum of 5 years subject to annual verification and/or endorsement by the attending Surveyor. Renewal approval should be requested and issued with the effective date being the 5 years anniversary date from the previous approval. An additional audit may be requested if there is any quality concern.

102. Approval application

1. The manufacturer wishing to obtain the approval of manufacturing process is to submit a copy of the application of approval for manufacturing process (refer to **Annex 6** of **the Guidance for Approval of Manufacturing Process and Type Approval, Etc.**) of the Society together with three copies of the required data for the approval and two copies of the required data for reference to the Society.

2. When applying for approval, the manufacturer should consider the product's approval range.

3. Data to be submitted

(1) Data for approval

Approval should be requested by the AM manufacturer, and submitted with the information listed in **Table 5.1** and a detailed inspection and test plan (ITP). The Society may request additional documents.

Table 5.1 Approval Application for Manufacturer – Additively Manufactured Metallic Materials

No.	Submitted documents
1	An outline description of the manufacturer including their quality management system (see **(A) (a)**), a facility description (see **(A) (b)**), and details of the manufacturer's organization and quality control (see **(A) (c)**)
2	Additive manufacturing capability (see **(B)**)
3	Documentation for manufacturing equipment (see **(C)**)
4	Documentation for operators (see **(D)**)
5	A list of documented manufacturing procedure specifications, supporting documentation and test reports and the/any AM product/part/material certificates
6	Inspection and testing plan for qualification and production
7	Documented procedures for incoming feedstock materials identification and traceability using batch control
8	Documented historical data for previously built AM final parts or materials

(A) Description of Manufacturer

(a) Quality Management System (QMS)

The review and survey of the AM manufacturer by the Society should cover the facility description, organization, quality, and AM capability and should include any historical data for the AM manufacturer approval, to the satisfaction of the Society. A formal QMS in accordance with an internationally recognized standard is not mandatory, however, the AM manufacturer is to have a QMS in place which is documented, controlled, auditable, and embedded in the organizational structures.

(b) Facility Description

General information for the facility should include the following items in Table 5.2.

Table 5.2 Description for the Facility

No.	General information for the facility
1	Name and address of AM facility
2	General relevant information and background
3	Estimated annual production of finished parts for AM products, and a brief description of intended applications

(c) Organization and Quality

High level organization should provide the following items in Table 5.2.

Table 5.3 Organization and Quality

No.	Item
1	Organizational chart
2	Organization of the quality control department and the staff employed
3	Qualification of the operators involved in activities related to the quality of the part/material
4	Certification of compliance with the quality system with internationally recognized industry standards, where applicable
5	A management system of engineering specifications, procedures with revision control, and documentation for part/sample labelling and traceability
(Notes) (1) If recognized certification is not available, then adequate controls should be demonstrated through a review of the manufacturer's QMS.	

(B) Additive Manufacturing Capability

The following items in **Table 5.4** should be provided for AM capability.

Table 5.4 Additive Manufacturing Capability

No.	Item
1	Approval certificates/documentation already granted by the Society, if any
2	List of machines and materials/parts for approval
3	Manufacturing flow chart for the AM Process
4	Feedstock handling and storage procedure
5	Final delivered part/material handling and storage procedure
6	Details of the various equipment used or outsourcing facilities, including pre-build, AM build, and post-build activities (e.g., furnace, condition and recording method of heat treatment)
7	Non-destructive and destructive testing facilities or service suppliers intended to be used, if outsourced
8	Information about the different types of material grades the facility intends to manufacture, with frequency of manufacturing, and any previous examples
9	Information about the different types of AM processes the facility intends to use to fabricate parts with the manufacturing frequency and any previous examples
10	Previous examples of the different types of test coupons/manufactured parts at the facility
11	Information about maximum weights, dimensions, section thickness the facility is capable of handling
(Notes) (1) The manufacturers should take responsibility for feedstock quality, storage, handling and re-use, if applicable.	

(C) Documentation for Manufacturing Equipment

(a) The manufacturer should establish and document evidence to demonstrate the following items in Table 5.5(refer to internationally recognized industry standards depending upon the AM process).

Table 5.5 Documentation for Manufacturing Equipment

No.	Item
1	Documentation to confirm that process equipment and ancillary systems can operate within the established/specified limits and tolerances.
2	Documentation that test coupons throughout the build envelope can achieve the required properties by approval tests for a standard qualification build.

(b) The written quality procedures and machine qualification records should be documented for equipment calibration, maintenance, monitoring, and control by the manufacturer in their quality management system and submitted to the Society if deemed necessary.

(c) Documentation of a machine should include the following information in Table 5.6.

Table 5.6 Documentation for AM Machine Qualification

No.	Documentation items
1	Machine manufacturer
2	Machine model
3	Serial number
4	Any additional components which impact build parameters
5	Software version
(Notes) (1) Any changes to the above items should be documented as a change of machine. Any change should be linked to a machine model number. A serial number for the same machine model number is not considered as a change of machine. If multiple machines with different serial numbers are used, they should be separately documented.	

(D) Documentation for Operators

(a) Operators should be competent with documented practical experience and knowledge tests (such as written exams, internal training, external training, certification by the third party, or a combination of these factors).

(b) The operator should have the appropriate competence of understanding of the qualified additive manufacturing procedure specification (AMPS) and operating practices in accordance with the approved procedures for the part or material qualification builds.

(c) For practical skills, the operator should demonstrate the necessary process steps on the machine and demonstrate the necessary capabilities to follow a preliminary/qualified AM procedure specification.

(d) For the procedure, part and material qualification or production, the operator should be assessed based on the practical qualification/approval tests in accordance with the requirements of the procedure for material approval and/or part approval tests and as specified in the manufacturer's operating procedures.

(e) The range of documentation for the operator should include the combination of process, feedstock material and machine, refer to Table 5.7.

Table 5.7 Documentation for AM Machine Operators Qualification

Item	Detail
Metal AM process	Change of process should be requalified.
Feedstock material group	Change of material group should be requalified.
Machine	Change of machine should be requalified.

(f) The written quality procedures and operator performance/qualification records should be documented and managed by the manufacturer in their quality management system and available to the Society, as requested.

Section 2 Approval Test

201. General

1. A procedure should be qualified to produce AM final material/part. General requirements in **Ch.4, 205.** are applicable to the AM facility/manufacturer/materials qualification. Additional procedure qualification requirements for the approval of additive manufacturers are included in **this Chapter** with AM final materials properties in accordance with **Ch.2, Sec.3** for final material specification.
2. AMPS and qualification records should be established by specification and documentation control to demonstrate that the material requirements meet the technical/design requirements in accordance with Class Rules, industry standards, or the designer/OEM specification.

202. Approval test

1. Sufficient test coupons for the final delivered condition should be prepared for all qualification tests. Repeatability should be demonstrated and agreed to by the Society, refer to **Table 5.8**.

Table 5.8 Approval Tests for Additive Manufacturer

No.	Test coupons
1	Test coupons with or without a sacrificial/actual part should be built using standard qualification builds and should achieve the required material properties confirmed by approval tests.
2	For PBF or applicable BJT processes, test samples for approval tests should be evenly distributed on the overall build platform and represent a worst-case scenario for samples during production.
3	For DED processes, test samples should represent the intended section thickness such as thin and thick test blocks.
4	Test samples should represent the intended AM part and applications or worst-case scenario, such as edge of the build platform with fast cooling rate.
5	The relationship between input variables and output results should be established for the specific combination of parameters by qualification records for manufacturer approval.
6	Test quantities could be specially considered and agreed by the Society, if the AM facility/manufacturer can provide historical test results for the technically same combination of machine, feedstock, procedure, and final material of the final delivered condition.

2. If part approval and facility approval are carried out concurrently, the procedure qualification for part approval and facility approval should be combined in one build batch. The test methods, quantities, and acceptance criteria for approval tests should meet the requirements, whichever is more stringent.
3. Approval tests, test methods, and acceptance criteria should be related to the material specification of the final delivered condition and agreed to before testing samples are prepared. Test coupons should represent the performance of the overall build envelope. Alternative tests may be specially considered and agreed to by the Society.
4. Unless otherwise agreed, the following approval tests should be carried out and test results should be reported using the AM built test coupons in accordance with **Ch.6, Sec.2** for inspection and testing and included in the qualification records, refer to **Table 5.9**.

Table 5.9 Documentation for Approval Tests and Test Results

Types of tests	Recorded items in test results
Visual inspection	Sample ID and results
Dimension inspection	Sample ID and results
Surface flaw inspection	Sample ID and results
Embedded flaw inspection	Sample ID and results
Tensile tests	3 in Z (refer to ASME PTB-13:2021) and 3 in X/Y including sample ID, sample orientation, sample size and test results including yield strength, tension strength, failure type and location
Charpy tests for materials with ductile-to-brittle transition (if applicable)	3 sets of Charpy impact test including sample ID, sample orientation, sample size and test results
Bend tests for wire arc DED processes (if applicable)	2 in the Z and 2 in X/Y direction
Microstructure examination	Sample ID, part thickness at the section plane, section plane angle relative to build platform, magnification, and results
Chemical analysis	Sample ID and results
3 fusion density tests for powder feedstock	Sample ID and results
Residual stress measurement (if applicable and required)	Sample ID and results
Other tests	Other tests may be performed depending on material grade or intended application, such as fatigue test, corrosion test or weldability test.
(Notes) (1) Additional Charpy tests may be requested by the purchase specification at a different test temperature, such as 20 ℃ below the specified temperature, at the specified temperature, or 20 ℃ above the specified temperature. (2) Test direction for tensile, Charpy and bend tests could refer to Annex C of AWS D20.1	

203. Marking

For AM products which have satisfactorily complied with the required tests, "-AM" is to be suffixed to the product marking.

Section 3 Survey & Range of Approval

301. Survey

1. Initial Survey

The manufacturer should be audited by the attending Surveyor. The initial survey of additive manufacturing facilities for production should include follows.

(1) Witness of the additive manufacturing process
(2) Survey of manufacturing control for repeatability
(3) Evaluation of the quality management system
(4) Document control for the manufacturing procedure, specification and quality control for sampling, testing, reporting
(5) Incoming control for feedstock materials
(6) Outgoing control for the AM build final parts or materials etc.

2. Witness of Approval Tests

The approval tests should be witnessed by the attending Surveyor.

3. Annual Survey

The annual survey should be carried out by the attending Surveyor. The annual survey should include a plan to demonstrate the essential parameters are followed. During the annual survey, full or partial approval tests could be requested based on the performance of the annual production record.

302. Information to be Submitted for Approval by the Society

The following documents in **Table 5.10** should be submitted for AM facility approval, for review and survey by the Society.

Table 5.10 Information to be Submitted for Additive Manufacturer Approval

No.	Documentation items
1	Quality management system
2	Additive manufacturing capability
3	Machine and operator qualification record, if requested by the Society
4	Build volume model or test plan for standard qualification build
5	Feedstock procurement specification and data sheet with testing results
6	AM procedure specification including pre-build, build, and post-build
7	Procedure specification qualification records linked to the material grade
8	Destructive and non-destructive testing standard and testing report
9	Material specification for final delivered condition

303. Range of Approval

1. The range of approval for the AM facility/manufacturer should be the combination of the following qualified specifications including any revisions.
   (1) Machine
   (2) Feedstock material approved or qualified in accordance with **Ch.3**
   (3) AM procedure specification including pre-build, build, and post-build
   (4) Materials specification of final delivered condition
   (5) Supplementary tests can be carried out and recorded to expand the range of approval. Requalification should be carried out if there is any quality concern for the delivered AM part or material.
2. Notes
   (1) For AM Level 1, 2 and 3, all test results should meet the minimum design requirements.
   (2) Unless otherwise agreed, powder and wire feedstock should be type approved in accordance with **Ch 3**. The manufacturer can procure approved feedstock from different approved suppliers/brands. The approved feedstock type and grade should be documented for each specific supplier.
   (3) Unless otherwise agreed, the approval tests in **this Chapter** should be carried out for Approval of Manufacturing Process.
   (4) For AM Level 2 and 3, each material grade should be qualified and approved. For AM Level 1, a family of materials may be qualified and approved with the support of a risk analysis and/or physics simulation, which could be specially considered and agreed to by the Society. The material group could be categorized to.
      (A) A: Unalloyed, low-alloyed steels and high alloyed ferritic steels
      (B) B: Austenitic, martensitic and precipitation hardening steels
      (C) C: Titanium and Titanium alloys, Niobium, Zirconium and other reactive materials
      (D) D: Aluminum alloys
      (E) E: Magnesium alloys
      (F) F: Nickel alloys, Cobalt alloys
      (G) G: Other than above, such as Copper alloys, Ceramic
   (5) The post-build heat treatment condition should be recorded during the qualification and the same heat treatment condition should be followed during production. Typical heat treatment conditions for AM final parts/materials include follows.
      (A) A: As build
      (B) SR: Stress Relief
      (C) SA: Solution Annealed
      (D) HIP: Hot Isostatic Pressed
      (E) Other: Other Delivery Conditions ⚓

CHAPTER 6 APPROVAL FOR PRODUCT(PART)

Section 1 General

101. General

1. The provisions of **this Chapter** apply to approval procedures and tests for inspection of products using additive manufacturing techniques.

2. During production, the approved, certified, classed parts should follow the qualified AMPS requirements for feedstock, pre-build, build and post-build. The inspection and testing reports should be documented by batch control and included in the additive manufacturer's production records to provide evidence that part design requirements have been achieved during the manufacturing process.

3. The production batch is to be randomly selected and tested to represent all parts/components with the same batch feedstock, the same equipment, the same operator, the same process parameters, and the same post-processing.

4. Qualified Additive Manufacturing Process Specifications

   Production for approved or certified parts with batch control should be completed following the steps in **Table 6.1**.

Table 6.1 Qualified Additive Manufacturing Process Specifications for Production

Step No.	Item	
1	Items/functions to be Qualified	CAD model or drawing or digital build model with revision number
2	Qualified	Feedstock material specification linked to feedstock supplier by contractual agreement
3	Qualified	AM procedure specification
4	Qualified	Post-build heat treatment procedure/specification, if applicable
5	Items/functions to be verified by manufacturer and customer as agreed	Machine maintenance, qualification, and calibration, operator knowledge - practices and qualification, the applicable essential and non-essential parameters, pre-build check of the digital file, test coupons, machine hardware and software, sufficient raw materials for the build cycle, planned or un-planned interruption etc.
6	Inspection and testing plan (ITP) to be agreed	The test scope for production control should be included in the ITP agreed by the purchaser and manufacturer. As a minimum, the test scope for AM Level 1 should be included in the ITP. Other applicable tests in **Ch.4, Sec.4** could be added based on design requirements and the intended service environment. The test scope for AM Level 2 and Level 3 should be appropriately adjusted to a higher test frequency, quantity or extent above the test scope defined for Level 1. This should be defined in the purchase specification, and specifically considered and agreed to by the Society.

Section 2 Test and Inspection

201. General

1. The test procedure and acceptance criteria for individual products are in accordance with the **Classification Technical Rules** or equivalent International/National Standards relevant to the products, and the approval test is carried out in the presence of the Surveyor.
2. The manufacturer should inform to the Surveyor about the Specifications with the customer that can affect the mechanical properties and quality of the product, and discuss the inspection method and acceptance criteria before test.
3. The Surveyor may require additional tests because AM is new technique.

202. Test method

1. General

(1) The inspection and testing should verify that the technical design requirements and function requirements are met repeatedly, accurately, and consistently using representative parts and/or testing coupons through non-destructive or destructive testing methods.
(2) The inspection and testing of representative parts and/or test coupons should be performed after all post-build processes. Material testing should be carried out after heat treatment and may exclude machining and surface finishing. NDT should be carried out with appropriate machining and surface finishing.
(3) Testing should be in accordance with applicable Class Rules, industry standards, or designer/OEM specifications for quality control during production. The frequency of production testing should follow the agreed ITP, referred to **Table 6.1** Step 6.

2. Test and inspection plan

(1) The test and inspection plan based on the approval of manufacturing process are to be submitted to the Surveyor.
(2) The test and inspection plan are to be described for identifying the different parts with the approval of manufacturing process.
(3) **Classification Technical Rules** or equivalent International/National standards relevant to the test methods and acceptance are to be provided.
(4) The manufacturer may propose items not specified in the **Classification Technical Rules** or international / national standards considered equivalent.
(5) Test and inspection can be carried out after the submitted test and inspection plan have been satisfied by the Surveyor.

3. Samples

(1) The number of samples are to be in accordance with the **Classification Technical Rules** or equivalent International/National standards relevant to products. The samples(product) are to be represented the shape of the products and have the maximum and average size of the products.
(2) If it is determined that the product is special, additional sample may be produced for test.
(3) Considering the quantity of products produced, the number of samples may be increased/decreased appropriately after approval by the Society.
(4) When the samples(product) has a shape and dimensions that are difficult to take all specimens, it can be laminated to the product by adding it in the required direction(x, y, z).
(5) The specimens are to be taken from samples after the final conditions including heat treatment and surface treatment of the samples have been completed.

4. Test method

(1) Chemical Composition
The chemical composition should be analyzed in accordance with internationally recognized industry standards such as **ASTM A751**, and the results should be documented including all elements. The chemical composition should meet the requirements of the materials specification of the final delivered condition, see **Ch.2, Sec.3**.
(2) Microstructure
Samples should be prepared in accordance with internationally recognized industry standards. The microstructure after the final heat treatment should be examined using optical microscopy

or scanning electron microscopy(SEM). The following information in **Table 6.2** should be documented for qualification and production if required.

Table 6.2 Documentation for Material Microstructure

No.	Information
1	Sample ID
2	Part thickness at sectioning plane
3	Sectioning plane angle relative to build platform
4	Pictures at a quarter and half thickness with different magnifications, such as 5X, 100X, 500X or in line with the facility's procedures
5	Reported description of microstructure with grain size or other observation
6	Characterization of flaws or defects, such as morphology, type, size, location, frequency, if applicable

(3) Tensile Properties

Tensile properties should be tested in accordance with internationally recognized industry standards such as Class Rules, **ASTM E8:2022**. Subsize samples are acceptable for PBF or applicable BJT processes with a minimum gauge diameter of 6.25 mm (0.25 in.) according to **ASTM E8:2022**. Other alternative sample sizes may be specially considered and agreed to by the Society. At least one tensile test, preferably in the Z orientation, should be carried out and the test results should be reported in accordance with **ASTM F2971-13:2021** and documented for qualification and production including, as a minimum, the items in **Table 6.3**.

Table 6.3 Documentation for Tensile Properties

No.	Item
1	Tensile sample information such as identification, gauge length, diameter for round samples or width and thickness for flat samples, and the sample orientation
2	Test temperature should be stated if it is not room temperature
3	Test results such as yield strength, ultimate tensile strength, elongation, reduction of area, and tensile failure type and location
(Notes) (1) At elevated temperatures different tensile properties to those at room temperature may be specified as additional requirements by the materials specification. If specified, tensile properties should be carried out in accordance with internationally recognized industry standards, such as Class Rules or **ASTM E8:2022**. (2) If required by the design, tensile properties may be tested at a defined temperature above the design temperature for the intended part application. (3) If required, the acceptance criteria for elevated temperature tensile properties should be defined in material specification for the final delivered condition.	

(4) Impact Properties

If required by material specification, at least one set of Charpy V-Notch impact tests should be carried out in accordance with Class Rules. Test results should be documented and include the following items in **Table 6.4**.

Table 6.4 Documentation for Impact Properties

No.	Item
1	Charpy sample information such as identification, sample size, and notch orientation
2	Test temperature
3	Test results for qualification and production such as absorbed energy, crystallinity percentage, and lateral expansion
4	Ductile to brittle transition temperatures if required during qualification

(5) Hardness

Three hardness tests can be applied for quality control in accordance with the manufacturer's procedure. These could be the Brinell Hardness test, the Rockwell Hardness test, the Vickers hardness test or other applicable hardness testing methods in accordance with internationally recognized industry standards. Hardness can also be a finished product design requirement.

(6) Bend Test

If required, two bend tests should be carried out. Bend test sample size and bending mandrel can refer to the bend tests required for welding procedure qualification, or other internationally recognized industry standards.

(7) Special Properties

(A) Other special properties may need testing during qualification depending upon the material specification and intended application, which may include fusion density, fatigue properties, corrosion properties, wear, erosion, fracture toughness, high or low temperature properties, etc.

(B) The inspection and testing plan and testing procedures should be submitted to the Society for review. Test results should be documented for qualification. The sampling of special properties for production control, including frequency and quantity, should be in accordance with the approved or agreed test plan.

(C) Weldability testing may need to be performed depending on the fabrication, installation, and build process, etc. If welding is planned, specific testing will be considered and agreed to by the Society.

(8) Non-destructive Testing

(A) General

(a) The final delivered part should be non-destructively tested by NDT personnel certified to the appropriate level of a nationally recognized scheme for the applied techniques, such as those schemes specified in **Guidance for Approval of Service Suppliers**. A surveyor witness is required for NDT processes for classification and certification. The NDT timing (delayed time between NDT starting and completion of fabrication) should be considered, refer to **Pt2, Annex 2-7** and **Annex 2-12 of the Guidance**, which may be material dependent.

(b) The extent of NDT should be in accordance with the agreed NDT plan.

(c) For class items, NDT should be carried out in accordance with **Pt2, Annex 2-7 of the Guidance**(conventional NDT techniques) and **Pt2, Annex 2-12 of the Guidance**(advanced NDT techniques) and meet the corresponding product standards, e.g., Class Rules or other standards acceptable to the Society. The requirements for NDT suppliers, including certified operator and supervisor levels, should follow **Guidance for Approval of Service Suppliers**.

(d) For certified items, NDT should be carried out in accordance with recognized national/international standards and meet the design specification.

(B) Visual Examination

100% visual examination is required. The acceptance criteria should follow internationally recognized industry standards and the purchaser's specification, and should include surface finish, tolerance, and dimensions.

(C) Surface Flaw Examination

Surface examination should follow the applicable NDT techniques in **Pt2, Annex 2-7** or **Annex 2-12 of the Guidance**. The as-built surface of AM part may give false indications, so, where surface NDT is required, the surface should be made suitable for the NDT method applied.

(D) Embedded Flaw Examination

Conventional ultrasonic or radiographic inspection should refer to **Pt2, Annex 2-7 of the Guidance**. Further guidance on NDT is given in **Pt.2, Ch.1 of the Rules**, for products corresponding to equivalent forged or cast components. Advanced NDT should refer to **Pt2, Annex 2-12 of the Guidance**. Computerized Tomography (CT) scan may be applied where defined in the project specifications.

(E) In-Situ Process Monitoring

(a) In-situ process monitoring can be a viable method for qualification/production control, which can partially/fully replace surface or embedded flaw inspection, depending on the level and the agreed ITP.

(b) Before adoption in production, the in-situ process monitoring technology should be verified and validated, by suitable NDT techniques, with supporting data, in conjunction with agreed inspection quality levels, test levels and acceptance criteria. The acceptance of in-situ process monitoring for inspection could be qualified and agreed by the Society.

(i) The in-situ process monitoring model-based approach should apply the in-situ sensor data to monitor the AM build process. Methods and algorithms such as machine learning models may be utilized to calibrate and map layer-wise images to laser scan vectors. Images/Spectral/Data are stacked and exported to standardized 3D data formats to enable easy inspection and comparison to post-build a 3D CT or UT/RT surface or embedded flaw. Procedures are to be in place to address discrepancies between in-situ indications as identified during process monitoring and subsequent NDT results, including additional diagnostic scanning or other verification measures.

(ii) The in-situ process monitoring model can be validated using the data captured by high-resolution CT scans as verified data (actual flaw location and size).

(iii) NDT indications or defects, e.g. gas porosity, keyhole pores, lack of fusion, is classified or categorized by outputs/resultant data of the machine learning model, if applicable.

(iv) Unless otherwise agreed, the probability of detection for in-situ process monitoring should meet the 90%/95% reliability of flaw detection. e.g. 100 layers were selected for analysis and detection of flaws in 90 layers can meet the lower bound of 95% confidence interval for the defined flaw size in accordance with the acceptance criteria of the applicable requirements of **Pt2, Annex 2-7** and **Annex 2-12 of the Guidance**, **ISO 5817:2023**, **ISO 10675-1:2021**, **ISO 10675-2:2021** or equivalent standards, which may depend on the section thickness of the part. In-situ flaw detection procedures should be documented, and capability should be supported by procedure verification and validation results.

(v) When in-situ process monitoring is adopted during initial qualification and production, repeatability and data detection should be verified, and results should be analyzed, with at least 10% of the cross-validated data verified by the traditional or advanced NDT techniques. (e.g. 10 parts use an in-situ process for flaw detection, at least 1 part should be inspected using traditional or advanced NDT techniques). To accept in-situ process monitoring for small-batch or one-off critical parts, the Society may require a higher percentage of cross-checking, commensurate with the criticality of the component and the agreed ITP.

203. Identification, Retesting and Surveys

1. Identification

The manufacturer should adopt a system for the identification of AM parts e.g. build batch number control, which will enable the parts to be traceable to the applied AM process and test report, and the Surveyor should be given full facility access for tracing the material when required.

2. Retesting

Material retesting for parts subject to classification requirements should follow Class Rules. For certified parts, material retesting may be specifically agreed. Test results for the original test and retest should be reported for class and certified parts.

3. Surveys

(1) Surveyor witness for functional testing, such as pressure or proof load tests, is required for class and certified critical parts during the prototype part qualification stage and may be required for class parts during production. Functional testing could be carried out at a workshop or on-board, subject to a factory acceptance test and/or a site acceptance test as specified in the approved ITP or contract agreement. Surveyor witness after installation should be agreed in accordance with the applicable Society requirements.

(2) A surveyor witness for material testing is required for class and certified parts during the prototype qualification stage. During the production stage, surveyor witness for material testing is required for a class part but is optional for a certified part.

- Notes: AM parts may need additional survey when in service, when compared to traditionally manufactured parts. This may be required because AM parts do not yet have sufficient marine service history. This should be identified early on as part of the design and build philosophy.

4. Repair for AM Part

(1) Unless otherwise agreed, repair of an AM class part is prohibited without approval by the purchaser and the Society.

(2) If repair of the AM part during production is needed, repair procedures and the method for repair should be suitably established and agreed to by the Society prior to repair.

204. Repair of AM Part Damaged In-service

1. If repair of an AM class part in service is needed, repair procedures and the method for repair should be suitably established and agreed to by the original additive manufacturer or AM repair facility and the Society prior to repair, refer to **Ch.7**.

2. For the repair of non-class AM parts damaged in service, the repair procedure and the method of repair should be according to the applicable specifications per industry standards, designer/OEM requirements, refer to **Ch.7**.

205. Part Certificate

A part certificate should be issued by the Society for class. Certificates for certified items should be issued by the manufacturer and should be supported by the manufacturer's documents in accordance with **Ch.6, Sec.1** and **Sec.2** as applicable. Unless otherwise agreed, certification should be furnished for the final delivered part by the additive manufacturer indicating.

(1) Material grade
(2) Chemical composition
(3) Reference to the Additive Manufacturing Procedure Qualification Record
(4) Tensile test results
(5) Charpy test results, if applicable
(6) Hardness, if applicable
(7) Nondestructive test results
(8) Any additional specialized test results
(9) Function test results, if applicable
(10) Other intermediate processes such as heat treatment, surface finish, machining conditions

206. Marking

For AM products which have satisfactorily complied with the required tests, "-AM" is to be suffixed to the product marking.

Section 3 Non-Conformance and Documentation

301. Non-Conformance

1. If parts do not conform to the specified requirements, non-conformance reports should be generated, documented, and maintained by the additive manufacturer. Parts may be accepted or rejected with or without reworking based on engineering justification, which should be agreed to by the Society and purchaser.
2. The manufacturer should keep a record of all non-conformities, where warranted, and should carry out root-cause investigations, if systematic errors are identified within any part of the process or components.

302. Documentation

The following items in **Table 6.5** should be documented by the manufacturer in accordance with the quality management system/program and provided as production records with full traceability.

Table 6.5 Documentation for Production Records

No.	Item
1	AMPS with revision control including the feedstock specification, the final material specification, and the procedure (pre-build, build and post-build) specification
2	Drawing, solid model, software or digital build file with revision control
3	Type Approval Number or Feedstock test report
4	Additive manufacturing procedure qualification report
5	Part certificate
6	Any other part/application specific tests including test results and acceptance criteria
7	Any non-conformance reports

CHAPTER 7 APPROVAL FOR ADDITIVE MANUFACTURING REPAIR FACILITY

Section 1 General

101. General

1. **This Chapter** is to apply the additive manufacturing process to repair damaged parts back to the approved design.
2. **This Chapter** may also apply when applying the additive manufacturing process to repair products manufactured using conventional (non-additive) methods. However, additional verification may be required at the interface between the additively manufactured and conventionally manufactured areas, and this will be determined in agreement with the Society.
3. If the parts are class items, the repair facility or repair process should be approved by the Society. If the parts are not class items, the repair process should be qualified by the repair facility and the repair facility may be recognized by the purchaser or approved by the Society.
4. Approval for a repair facility involves a documentation review, an audit of the facility and the witness of approval tests. Unless otherwise agreed, the approval is valid for a maximum of 5 years subject to annual verification and/or endorsement by the attending Surveyor. An additional audit may be requested.

102. Approval application

Approval should be requested by the client, along with supporting information and a detailed inspection and test plan (ITP), refer to **Table 7.1**.

Table 7.1 Approval Application for Additive Manufacturing Repair Facility

No.	Item
1	An outline description of the repair facility including the quality management system, a facility description, details of the organization and quality control responsibilities
2	Additive manufacturing repair capability
3	Programme of inspection and evaluation of damaged parts prior to repair
4	A list of documented repair facility's repair procedures, specifications, documentation and reports and any historical repair certificates or data

Section 2 Repair Procedure Specification and Approval

201. General

The additive manufacturing procedure specification for repair should be prepared for each material and each part. Prior to conducting the repair procedure qualification tests, the repair procedure should be submitted and approved by the Society.

202. Repair Procedure Specification Approval

The repair procedure specification should be submitted to the Society for review and approval. A general description of the procedure should be prepared in accordance with **Ch.4, 203.** and **205.**.

203. Approval Test

1. Test coupons should represent the shape of the intended parts such as flat or cylinder test coupons, and the specific form of repair as allowed by the application standard for the intended use.v
2. Refer to **Table 7.2**, test coupons should be sufficient to complete the required approval tests. Based on the design requirements, the repair facility should select the applicable tests in **Table 7.3**. Test methods and test results should be in accordance with **Table 7.4**.
3. Unless otherwise agreed, the following approval tests in **Table 7.2** should be carried out and test results should be reported in accordance with **Ch.6, Sec.2** for inspection and testing and included in the qualification records.

Table 7.2 Documentation for Approval Tests and Test Results

Types of tests	Recorded items in test results
Visual inspection	Sample ID and results
Dimension inspection	Sample ID and results
Surface flaw inspection	Sample ID and results
Embedded flaw inspection (if required)	Sample ID and results
3 tensile tests for interface cross-section (if required and applicable to the damage)	Sample ID, sample orientation, sample size and test results including yield strength, tension strength, failure type and location
1 set of Charpy impact test for interface cross-section, applicable to materials with ductile-to-brittle transition (if required and applicable to the damage)	Sample ID, sample orientation, sample size and test results
Bend tests for wire arc DED processes (if applicable)	2 in the Z and 2 in X/Y direction
Hardness test for interface cross-section and heat affected zone (HAZ) in substrate	Sample ID, hardness values or hardness profile from AM build material to HAZ
Microstructure and macrostructure examination (if required)	Sample ID, part thickness at the section plane, section plane angle relative to build platform, magnification, and results
Chemical analysis	Sample ID, and results

Table 7.3 Approval Tests for Additive Manufacturing Repair Process

Material	Test items (as listed in **Table 7.4**)
Structural Steels	(1) (2) (3) (4) (5)
Nonferrous Metals for Structural Use	(1) (2) (3) (4) (5)
Corrosion Resistant Layer	(2) (4) (6) (7)
Wear-resisting Layer	(1) (3) (4) (5) (7)
Other material or other application	According to the technical design requirements, such as (6) or (9)

Table 7.4 Test Methods

Test Type		Sampling and Test Process	Acceptance Criteria for Test Results
(1)	Tensile Test (Room and High Temperature)	Refer to Class Rules or relevant internationally or nationally recognized standards and **this Chapter**	The minimum tensile strength should meet the design technical requirements and not to be lower than the base metal value
(2)	Bending Test		The bent surface of the specimen is not to reveal any crack exceeding 3 mm
(3)	Impact Test		Meet the base metal requirements, or design technical requirements
(4)	Hardness Test		The repair layer is to meet the design technical requirements, and the heat affected zone and base metal are to meet the recognized standards
(5)	Macro Section Test		Well fused, no defect
(6)	Corrosion Test, if required		Meet the design technical requirements
(7)	Chemical Composition		Meet the design technical requirements
(8)	Microstructure		Meet the design technical requirements
(9)	Fatigue Test, if required		Meet the design technical requirements

Section 3 Survey & Range of Approval

301. Survey

1. Initial Survey

The manufacturer should be audited by the attending Surveyor. The initial survey of additive manufacturing repair facilities should include follows.

(1) Witness of the additive manufacturing repair process
(2) Survey of repair control for agreed repeatability
(3) Evaluation of the quality management system, document control for repair procedure, specification and quality control for sampling, testing, reporting
(4) Incoming control for feedstock
(5) Inspection and testing procedure of damaged traditionally manufactured parts
(6) Outgoing inspection and testing procedure for the final repair parts through AM process etc.

2. Witness of Approval Tests

The approval tests should be witnessed by the attending Surveyor.

3. Annual Survey

The annual survey should be carried out by the attending Surveyor. The annual survey should include a plan to demonstrate the essential parameters are followed by production of a test coupon. During the annual survey, full or partial approval tests could be requested based on the performance of the annual production/repair record.

302. Information to be Submitted for Approval by the Society

The following items in **Table 7.5** should be submitted to the Society.

Table 7.5 Information to be Submitted for Additive Manufacturing Repair Facility Approval

No.	Documentation items
1	Documentation of the damaged part including the original dimensions and material grade for substrate, allowed wastage, method of defect excavation and verification of defect removal.
2	Audit report for the repair facility by the Society
3	Operator qualifications record
4	AM build material specification and documentation
5	AM repair procedure specification
6	Types of approval tests, test standards and test results in **Sec 2**
7	Surveyor's report of the witness of the repair procedure qualification approval tests
8	Qualification records with a certifying statement acknowledging the validity of the data and certifying the qualification tests and test results
9	Agreed plan for nondestructive testing during production
10	Agreed plan for in-service survey

303. Range of Approval

1. For repair of a damaged metallic part, a repair procedure specific approval letter should be issued to the repair facility by the Society, refer to **Table 7.6**.

Table 7.6 Range of Approval for Additive Manufacturing Repair Facility

No.	Items to be included in approval letter
1	Qualified feedstock linked to feedstock supplier
2	Qualified procedure(s) for repair
3	Compatible substrate material grade(s)
4	Applicable range of part size or section thickness

2. In addition, the approved AM repair procedure may be applied to other application scopes provided supplementary tests are carried out to expand the range of approval. ⚓

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No : 2026-1-E
Date : 2026. 2. 13

To : All Surveyors and whom it may concern

Subject	**9.215 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 2025 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, Annex 1-1 (Classification and Surveys)	On or after 1st Mar. 2026 (The contract Date for ship construction)	1) The requirements for Offshore Support Vessel (OSV) have been supplemented to include Cable Laying Vessel, and the class notation “Cable Layer” is now assigned accordingly. 2) The requirements for Offshore Support Vessel (OSV) have been supplemented to include Crew Transfer Vessel, and the class notation “CTV” is now assigned accordingly.
Guidance for Offshore Support Vessel(OSV)	On or after 1st Mar. 2026 (The contract Date for ship construction)	1) The requirements for Offshore Support Vessel (OSV) have been supplemented to include Cable Laying Vessel, and the class notation “Cable Layer” is now assigned accordingly. 2) The requirements for Offshore Support Vessel (OSV) have been supplemented to include Crew Transfer Vessel, and the class notation “CTV” is now assigned accordingly. 3) The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

		4) Removal of duplicate stability requirements and clarification of their meaning

2. Furthermore, please be informed that these amendments and will be reflected in the 2026 edition of the KR Classification Technical Rules and Guidances.

Attachments:

1. Amendments to the Guidance for Offshore Support Vessel(OSV) and the R/G for the Classification of Steel Ships, Pt 1 Annex1-1 ------ 1 copy.

(The End)

Amended Guidance for OSV(Offshore Support Vessels)

2026. 2.

HRT, MRT

- Main Amendments -

(1) Background of Amendment

1) The requirements for Offshore Support Vessel (OSV) have been supplemented to include Cable Laying Vessel, and the class notation “Cable Layer” is now assigned accordingly.
2) The requirements for Offshore Support Vessel (OSV) have been supplemented to include Crew Transfer Vessel, and the class notation “CTV” is now assigned accordingly.
3) The requirements for ships carrying industrial ersonnel(IP)(Annex 1) have been supplemented.
4) Removal of duplicate stability requirements and clarification of their meaning

(2) Revised content : See the below table

(3) Effective date : ships contracted for construction on or after 1 Mar. 2026.

Present	Amendment	Note
# CHAPTER 1 GENERAL ## Section 1 General ### 101. Application 1. Requirements stipulated in this Guidance apply to the Offshore Support Vessels (hereinafter referred to as vessels in this Guidance) defined in **202**. 2. Unless otherwise specified in this Guidance, relevant requirements of **Rules for the Classification of Steel Ships** are to be applied. 3. The hull structures, equipment and scantlings of ships, to be classified for restricted service, may be appropriately modified according to the conditions of service. 4. The Society may request additional requirements, depending upon utility and designated operations. **101. ~ 105.** 〈omitted〉	# CHAPTER 1 GENERAL ## Section 1 General ### 101. Application 1. Requirements stipulated in this Guidance apply to the Offshore Support Vessels (hereinafter referred to as vessels in this Guidance) defined in **202**. 2. Unless otherwise specified in this Guidance, relevant requirements of **Rules for the Classification of Steel Ships** are to be applied. 3. The hull structures, equipment and scantlings of ships, to be classified for restricted service, may be appropriately modified according to the conditions of service. 4. The Society may request additional requirements, depending upon utility and designated operations. 5. The cargo ships and high-speed cargo craft of 500 gross tonnage and above engaged on international voyages that carry more than 12 industrial personnel (IP) are required to comply with **Annex 1** in addition to this guidance. 〈Added newly〉 (1) Wherever in this guidance, or in the **IP Code**, the number of industrial personnel appears as a parameter, it shall be the aggregate number of industrial personnel(IP), special personnel(SP) and passengers carried on board, where the number of passengers shall not exceed 12. **101. ~ 105.** 〈same as the present〉	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly. - The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
Section 2 Definition **201. Application** ⟨omitted⟩ **202. Offshore support vessel** "Offshore Support Vessel" is a self-propelled vessel whose regular trade is to provide services in support of exploration, exploitation, or production of offshore energy or alternative energy resources. These services may include but are not limited to: transportation of supplies and equipment, towing and anchoring of offshore structures, fire fighting, handling heavy surface and subsea loads, oil spill recovery and wind turbine installation. OSV is defined according to their purpose as follows: (1) **Offshore supply vessel** is specified in **Ch 4, 101. 1.** (2) **Anchor handling and towing vessel** is specified in **Ch 5, 101. 1.** (3) **Heavy lift vessel** is specified in **Ch 6, 101. 1.** (4) **Wind turbine installation vessel** is specified in **Ch 7, 101. 1.** (5) **Fire fighting vessel** is specified in **Ch 8, 101.** (6) **Oil recovery vessel** is specified in **Ch 9, 101. 1.**	**Section 2 Definition** **201. Application** ⟨same as the present⟩ **202. Offshore support vessel** "Offshore Support Vessel" is a self-propelled vessel whose regular trade is to provide services in support of exploration, exploitation, or production of offshore energy or alternative energy resources. These services may include but are not limited to: transportation of supplies and equipment, towing and anchoring of offshore structures, fire fighting, handling heavy surface and subsea loads, oil spill recovery and wind turbine installation. OSV is defined according to their purpose as follows: (1) **Offshore supply vessel** is specified in **Ch 4, 101. 1.** (2) **Anchor handling and towing vessel** is specified in **Ch 5, 101. 1.** (3) **Heavy lift vessel** is specified in **Ch 6, 101. 1.** (4) **Wind turbine installation vessel** is specified in **Ch 7, 101. 1.** (5) **Fire fighting vessel** is specified in **Ch 8, 101.** (6) **Oil recovery vessel** is specified in **Ch 9, 101. 1.** (7) **Cable laying vessel** is specified in **Ch 10, 101. 1.** ⟨Added newly⟩ (8) **Crew transfer vessel** is specified in **Ch 11, 101. 1.** ⟨Added newly⟩	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly. - The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Crew Transfer Vessels, and the class notation "CTV" is now assigned accordingly.

Present	Amendment	Note
	203. Definition of terms 〈Added newly〉 **1. A passenger** is every person other than: (1) the master and the members of the crew or other persons employed or engaged in any capacity on board a ship on the business of that ship and (2) a child under one year of age. (3) Industrial personnel (IP) (4) Special personnel (SP) **2. Industrial personnel (IP)** means all persons transported or accommodated on board for the purpose of offshore industrial activities performed on board other ships and/or offshore facilities. **3. Special personnel(SP)** means all persons who are not passengers or members of the crew or children of under one year of age and who are carried on board in connection with the special purpose of that ship **or because of special work being carried out aboard that ship.** **4. IP Code means** the International Code of Safety for Ships Carrying Industrial personnel, as adopted by the Maritime Safety Committee by resolution MSC.527(106), as may be amended. **5. Offshore industrial activities** mean the construction, maintenance, decommissioning, operation or servicing of offshore facilities related, but not limited, to exploration and exploitation of resources by the renewable or hydrocarbon energy sectors, aquaculture, ocean mining or similar activities. **6. Carriage** means transportation, accommodation or both. **7. HSC Code** means the International Code of Safety for High-Speed Craft, 2000, as adopted by the Maritime Safety Committee of the Organization by resolution **MSC.97(73),** as amended. **8. IP area** is every area or space where IP are normally intended to stay during voyage or are allowed to access. **9 Personnel transfer** means the full sequence of the operation of transferring personnel and their equipment at sea to or from a ship to which this Code applies and from or to another ship or an offshore facility **10. Essential systems** mean systems referred to in **SOLAS regulation II-2/21.4.**	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
# CHAPTER 2 CLASSIFICATION AND SURVEYS ## Section 1 General 〈omitted〉 ## Section 2 Classification **201. Classification 〈omitted〉** **202. Class notations** 1. The class will be distinguished by the class notations and the class notations assigned to the Offshore Support Vessels classed with the Society are to be in accordance with the requirements specified in **Pt 1, Ch 1, 201.** of **Rules for the Classification of Steel Ships.** However, Offshore Support Vessel shall be assigned as a ship type notation and the Special Feature Notation shall be assigned as followings. (1) Special Feature Notation may be assigned as the following according to the specialized functional service of the Offshore Support Vessel. (A) ~ (G) 〈omitted〉 (H) for other services : Special Feature Notation considered appropriate by the Society **〈omitted〉**	# CHAPTER 2 CLASSIFICATION AND SURVEYS ## Section 1 General 〈Same as the present〉 ## Section 2 Classification **201. Classification 〈Same as the present〉** **202. Class notations** 1. The class will be distinguished by the class notations and the class notations assigned to the Offshore Support Vessels classed with the Society are to be in accordance with the requirements specified in **Pt 1, Ch 1, 201.** of **Rules for the Classification of Steel Ships.** However, Offshore Support Vessel shall be assigned as a ship type notation and the Special Feature Notation shall be assigned as followings. (1) Special Feature Notation may be assigned as the following according to the specialized functional service of the Offshore Support Vessel. (A) ~ (G) 〈Same as the present〉 (H) for Submarine cable laying, maintenance and repair service : Cable layer 〈Added newly〉 (I) for Personnel transfer : CTV 〈Added newly〉 (J) ~~(H)~~ for other services : Special Feature Notation considered appropriate by the Society **〈same as the present〉**	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly. - The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Crew Transfer Vessels, and the class notation "CTV" is now assigned accordingly.

Present	Amendment	Note
# CHAPTER 3 STRUCTURES AND EQUIPMENT ## Section 1 Stability 〈omitted〉 101. 〈omitted〉 **102. Stability Information for Master and Standard Loading Conditions** For offshore supply vessels, the requirements in "The Guidance for Stability Information for Master" **Pt 1 Annex 1-2. 3** of the **Guidance relating to the Rule for the Classification of Steel Ships** are to be applied. 〈omitted〉	# CHAPTER 3 STRUCTURES AND EQUIPMENT ## Section 1 Stability 101. 〈same as the present〉 ~~**102. Stability Information for Master and Standard Loading Conditions**~~ ~~For offshore supply vessels, the requirements in "The Guidance for Stability Information for Master" **Pt 1 Annex 1-2. 3** of the **Guidance relating to the Rule for the Classification of Steel Ships** are to be applied.~~ 〈same as the present〉	- Overlaps with the content of 101. (addressed in Pt 1, Ch 1, 307. Stability of Rules for the Classification of Steel Ships)

Present	Amendment	Note
CHAPTER 5 ANCHOR HANDLING AND TOWING VESSELS **Section 1 General** 101. ~ 102. 〈omitted〉 **Section 2 Stability** 201. General 1. Intact stability are to be in accordance with this section in addition to **Ch 3, Sec 1.** However, for ships specifically approved by the Society, these requirements may be waived. 2. Stability is to be considered especially to the ships that have specially designated operations. 3. Stability calculations and corresponding information for the Master are to be submitted for review and approval. 4. The submission of evidence showing approval by an Administration of stability of the vessel for the towing operations in accordance with a recognized standard may be acceptable. 202. ~ 203 〈omitted〉 〈omitted〉	**CHAPTER 5 ANCHOR HANDLING AND TOWING VESSELS** **Section 1 General** 101. ~ 102. 〈same as the present〉 **Section 2 Stability** 201. General 1. Intact stability during the operation of vessel are to be in accordance with ~~this section in addition to **Ch 3, Sec 1.** However, for ships specifically approved by the Society, these requirements may be waived.~~ the additional requirement of IS Code (2008) / PART B / Chapter 2 / 2.7 Ships engaged in anchor handling operations or IS Code (2008) / PART B / Chapter 2 / 2.8 Ships engaged in towing and escort operations, depending on the operational purpose of the vessel. 2. Stability is to be considered especially to the ships that have specially designated operations. 3. Stability calculations and corresponding information for the Master are to be submitted for review and approval. 4. The submission of evidence showing approval by an Administration of stability of the vessel for the towing operations in accordance with a recognized standard may be acceptable. 202. ~ 203. 〈deleted〉 〈same as the present〉	- Removal of duplicate stability requirements and clarification of their meaning - Overlaps with the content of 201.

Present	Amendment	Note
# CHAPTER 6 HEAVY LIFT VESSELS ## Section 1 General 101. ~ 102. 〈omitted〉 ## Section 2 Stability 201. General 1. Intact stability is to be in accordance with this section in addition to the relevant requirement of Ch 3, Sec 1. However, for ships specifically approved by the Society, these requirements may be waived. 2. Stability to be considered especially to the ships that have specially designated operations. 3. The submission of evidence showing approval by an Administration of stability of the vessel for the lifting operations in accordance with a recognized standard may be accepted. 4. The dynamic load chart for each crane shall be included in the Trim and Stability Booklet and shall be posted at the crane operator's station in the clear view of the crane operator. 202. Calculation on stability In applying the requirements in Pt 1, Annex 1-2 of Rules for the Classification of Steel Ships, the heeling lever resulting from designated operations is to be considered the most unfavorable for stability. 203. 〈omitted〉 〈omitted〉	# CHAPTER 6 HEAVY LIFT VESSELS ## Section 1 General 101. ~ 102. 〈same as the present〉 ## Section 2 Stability 201. General 1. Intact stability during the operation of vessel is to be in accordance with ~~this section in addition to the relevant requirement of Ch 3, Sec 1. However, for ships specifically approved by the Society, these requirements may be waived.~~ the additional requirement of IS Code (2008) / PART B / Chapter 2 / 2.9 Ships engaged in lifting operations. 2. Stability to be considered especially to the ships that have specially designated operations. 3. The submission of evidence showing approval by an Administration of stability of the vessel for the lifting operations in accordance with a recognized standard may be accepted. 4. The dynamic load chart for each crane shall be included in the Trim and Stability Booklet and shall be posted at the crane operator's station in the clear view of the crane operator. ~~202. Calculation on stability~~ ~~In applying the requirements in Pt 1, Annex 1-2 of Rules for the Classification of Steel Ships, the heeling lever resulting from designated operations is to be considered the most unfavorable for stability.~~ 203. 〈deleted〉 〈same as the present〉	- Removal of duplicate stability requirements and clarification of their meaning - Overlaps with the content of 201.

Present	Amendment	Note
〈Added newly〉	# CHAPTER 10 CABLE LAYING VESSEL(2026) ## Section 1 General ### 101. Application 1. The requirements in this Chapter apply to Cable Laying Vessels (Cable Layer) (hereinafter referred to as "ships" in this Chapter) for submarine cable laying, maintenance and repair service 2. The ships should comply with the requirements of this chapter in addition to **Ch 1** to **Ch 3**. ### 102. Definition 〈Added newly〉 1. **Cable Laying Equipment** means equipment used for laying or recovering cables at a specified tension and speed, including Linear Cable Engines, Cable Tensioners, Carousels and Storage Winches 2. **Linear Cable Engine (LCE)** means equipment that grips a cable by means of multiple rollers and is used to lay or recover the cable in a linear direction at a specified tension and speed. 3. **Cable Tensioner** means equipment used to control the tensile force applied to a cable so as to maintain a constant tension and to prevent excessive tension or slackening of the cable. 4. **Carousel** means equipment used during marine operations for storing flexible pipelines, umbilicals, cables and other products during transportation and installation, in which the product is stored in horizontal or vertical layers around a central vertical core. 5. **Reel** means equipment used for storing flexible pipes, umbilicals, risers and other offshore products during transportation and installation. 6 .**Traction Winch** means a winch usually consisting of two drums, the operating principle of which is based on the friction build-up between the drums and the wire rope, and which is used to generate and control the tension required for laying or recovering cables or wire ropes. 	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation “Cable Layer” is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	7. **Storage Winch** means a winch arranged to operate in combination with a traction winch, the purpose of which is to store the wire rope and to provide a constant hold-back force to the traction winch. The storage winch has relatively low load capability compared with the traction winch. ## Section 2 Stability ### 201. General 1. Intact stability are to be in accordance with **Ch 3, Sec 1**. However, for ships specifically approved by the Society, these requirements may be waived.	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	**Section 3 Hull Structures** **301. General** 1. Hull structures are to be in accordance with this section in addition to relevant requirements in **Ch 3, Sec 2.** **302. Work Deck** 1. The work deck is to withstand uniform deck loadings specified by the designer and provided with an allowance for corrosion and wear. 2. The work deck is to be away from engine room intakes and exhausts to protect personnel from harmful gases, excessive temperature and noise. In addition, obstructions from tank vents are to be avoided. **303. Deck plating for helicopter landing** 1. Where decks for Helicopter taking off and landing are provided, it shall comply with the relevant requirements of **Pt 3, Ch 5** of **Rules for the Classification of Steel Ships.**	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	**Section 4 Hull Equipment** **401. General** 1. Hull equipment is o be in accordance with this section in addition to relevant requirements in **Ch 3, Sec 3.** 2. In cases where equipment and devices are installed for designated operations, suitable measures are to be prepared that does not damage the safety of the ship. **402. Cranes** **1. General** (1) If a crane is installed, it shall comply with the relevant requirements of **Pt 9, Ch 2** of **Rules for the Classification of Steel Ships.** **2. Crane Supporting Structure** Crane supporting structure is to comply with the requirements of **Ch 6, 402.** **Section 5 Machinery** **501. General** 1. The machinery installations of cable laying vessels are to comply with the relevant requirements of Chapter 3, Section 4, in addition to those specified in this Section. 2. The requirements of this Section apply to all mechanical, hydraulic and electrical drive systems used during cable laying, recovery and storage operations.. 3. Equipment and systems(including components) used solely for cable laying operations may be exempted from classification, provided that they are designed and manufactured in accordance with standards recognized by the Society, such as international standards or other equivalent specifications.	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	4. The standards applied to the design of such equipment are to be clearly indicated and the relevant documentation is to be submitted for review. **502. Main Propulsion and Thrusters** 1. Sufficient propulsion power and thrusters are to be provided so as to ensure safe maneuvering and maintaining of the vessel's operational capability during cable laying and transit operations. 2. Control systems for propulsion and auxiliary thrusters are to be provided with means for automatic shutdown and alarm in the event of overload or power failure, and redundant control and power supply arrangements are to be ensured so that loss of thrust does not occur during operations. **503. Drive Systems for Cable Laying Equipment** 1. Drive systems for cable laying equipment (such as carousel, reel, storage winch and linear cable engine) may be powered from the vessel's main power supply or an independent power source, and are to have adequate capacity for the intended operational loads. 2. Hydraulic pumps, electric motors and control valves are to be capable of maintaining cable tension and speed within the required limits, and are to be provided with emergency stop, manual stop and automatic stop functions. 3. Exhaust and cooling arrangements for such drive systems are to be located so as not to interfere with ventilation of cable storage areas or the cable control room. 4. Upon completion of installation, sea trials are to be carried out for the cable laying equipment, and the trials are to include verification of normal operation, control performance, emergency stopping functions and the performance of safety devices. 5. During sea trials of the cable laying equipment, due care is to be taken regarding rotating components, hot surfaces and other associated hazards, and the consequences of failure of such equipment or their systems are to be duly considered.	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	6. Records of the sea trials for the cable laying equipment, including major test items and results, are to be submitted to the Society for confirmation by the attending Surveyor. **504. Safety and Control Systems** 1. The principal operating parameters of the cable laying equipment, such as cable tension, speed and torque, are to be capable of being monitored from the control room, and automatic shutdown or alarm functions are to be activated in the event of abnormal conditions. 2. Remote and automatic control functions of the equipment are to be arranged so as to be operable from the navigation bridge or cable control room, and redundant arrangements of control and communication circuits are to be provided. 3. Cable laying equipment are to be provided with Emergency Stop and Emergency Release devices, and are to be arranged so as to enable safe stopping even in the event of electrical power failure or loss of hydraulic pressure. **505. Survey** 1. General. (1) Surveys and attendance are to comply with the relevant requirements of **Ch 2, Sec.2** and **Sec.3** (2) Where considered necessary by the Surveyor, or upon the request of the Owner, the scope of survey may be specially considered so that additional inspections or witnessing of tests may be carried out. 2. Annual Survey During the annual survey, cable laying equipment is to be examined with due consideration to the following items, in addition to the applicable survey requirements:	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	(1) General external condition of the equipment, including damage, deformation, wear and corrosion. (2) Condition of supporting structures. (3) Excessive clearances and lubrication condition of main rotating parts, hinged connections and joints. (4) Condition of wire ropes, including end attachments, with respect to wear and corrosion. (5) General external condition of hydraulic and electrical installations. (6) Functional testing of control, safety and emergency stop systems. 3. Special Survey During the special survey, cable laying equipment is to be examined in accordance with the requirements of the annual survey, and in addition, the following items are to be confirmed by surveyor. (1) Open-up inspection of major pins, bolts and connections, or verification of maintenance and inspection records, as applicable. (2) Where deemed necessary, functional testing or load testing taking into account the design loads. (3) Comprehensive functional testing of control, protection and safety systems.	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	**Section 6 Positioning System** **601. Positioning System** 1. General Ships are to be capable of maintaining their positions safely during cable laying, maintenance and repair service. The means to maintain position may be a mooring system with anchors, dynamic positioning system or a combination of both. 2. Dynamic Positioning System Dynamic positioning systems, when used to maintain the vessel's position during heavy lifting operations, are to comply with the requirements for the class notation DPS(2) or DPS(3) in accordance with **Pt 9, Ch 4** of **Rules for the Classification of Steel Ships.** **602. Supporting Structure for Cable laying Equipment** Supporting structure of cable laying equipment is to be in accordance with the requirements of **Ch 6, 402.**	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	**SECTION 7 FIRE PROTECTION AND FIRE FIGHTING** **701. General** 1. Fire protection and fire fighting requirements for cable laying vessels are to comply with **Ch.3 Sec.6** of this Guidance. 2. For open decks or working areas where cable laying equipment is installed, fire fighting arrangements suitable for the risk level and characteristics of the area may be provided in order to prevent the spread of fire in the event of fire occurrence. 3. For areas where cable laying equipment is installed, the installation criteria for fire fighting systems are to be determined taking into account the relevant requirements of the **FSS Code** and **Pt 8 of the Rules for the Classification of Steel Ships.**	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation "Cable Layer" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	# CHAPTER 11 CREW TRANSFER VESSEL ## Section 1 General 1. The requirements in this Chapter apply to Crew transfer vessels (CTV) (hereinafter referred to as "ships" in this Chapter) of not more than 500 gross tonnage, carrying no more than 12 passengers, and primarily engaged in transporting industrial personnel (IP). 2. The ships should comply with the requirements of this chapter in addition to **Ch 1** to **Ch 3**. 3. For high speed and/or light crafts, the **Rules for the Classification of High Speed and Light Craft** are to be applied. ## Section 2 Stability ### 201. General 1. Intact stability are to be in accordance with this section in addition to **Ch 3, Sec 1**. However, for ships specifically approved by the Society, these requirements may be waived. 2. Stability to be considered especially to the ships that have specially designated operations. ## Section 3 Hull Structures ### 301. General 1. Hull structures are to be in accordance with this section in addition to relevant requirements in **Ch 3, Sec 2.**	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Crew Transfer Vessels, and the class notation "CTV" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	**Section 4 Hull Equipment** **401. General** 1. Hull equipment is o be in accordance with this section in addition to relevant requirements in **Ch 3, Sec 3.** 2. In cases where equipment and devices are installed for designated operations, suitable measures are to be prepared that does not damage the safety of the ship. **Section 5 Safe Transfer of Personnel** Safe transfer personnel is to be in accordance with relevant requirements in **Annex 1, 102. 2.** However, for ships specifically approved by the Society or the relevant flag state, these requirements may be waived.	- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Crew Transfer Vessels, and the class notation "CTV" is now assigned accordingly.

Present	Amendment	Note
〈Added newly〉	**Annex 1 SHIPS CARRYING INDUSTRIAL PERSONNEL (IP)** **101. General** **1. Application** (1) Matters not specified in this annex shall be governed by the **IP Code**. (2) **IP Code** requirements may be regarded as complying with the requirements of this annex. **102. Goal and functional requirements** **1. Industrial personnel(IP)(IP Code 2.1)** (1) Goal The goal of this paragraph is to provide: (A) for safe operations during the carriage of industrial personnel; and (B) that industrial personnel are medically fit and familiar with the hazards associated with the operational environment including the risks associated with personnel transfer operations. (2) Functional requirements In order to achieve the goal set out in **(1)** above, the following functional requirements are embodied in the regulations in **103.**: Means shall be provided to ensure that industrial personnel: (A) are medically fit; (B) are able to communicate with the ship's crew; (C) have received appropriate safety training; (D) have received onboard ship-specific safety familiarization; and (E) have received onboard familiarization with the ship's transfer arrangements and equipment.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	2. Safe transfer of personnel(IP Code 2.2) (1) Goal The goal of this paragraph is to provide for the safety of all persons involved in personnel transfer, including safe and suitable means of transfer and the capability of safely carrying out the operations connected to personnel transfer. (2) Functional requirements In order to achieve the goal set out in (1) above, the following functional requirements are embodied in the regulations in 103.: (A) Means shall be provided to avoid injuries during personnel transfer. (B) Arrangements for personnel transfer shall be: (a) designed, constructed and maintained to withstand the loads they are subjected to; (b) designed and engineered to fail to a safe condition in the event of a loss or reduction in their associated functionality; and (c) capable of safely returning persons in transfer to a safe location after loss of power. (C) Means for position keeping shall be provided and arranged in a manner that prevents accidents during transfer of personnel and is suitable for the mode of operation and interactions with other ships or offshore facilities. (D) Means shall be provided to ensure that the information on the number of industrial personnel on board and their identity is kept updated to assist in ensuring that the actual number of persons on board is known at all times.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	3. Subdivision and stability(IP Code 2.3) (1) Goal The goal of this paragraph is to provide for adequate stability of the ship, in both the intact and damaged conditions, taking intoconsideration the total number of persons on board. (2) Functional requirement In order to achieve the goal set out in (1) above, the ship shall be designed with weathertight and watertightboundaries providing for an adequate stability standard, in both the intact and damaged conditions, taking into account thetotal number of persons on board. This functional requirement is embodied in the regulations in 104. and 105. 4. Machinery installations(IP Code 2.4) (1) Goal The goal of this paragraph is to provide for machinery installations capable of delivering the required functionality to ensure safenavigation and safe carriage of persons on board both during normal operation and in any emergency situation, taking intoaccount the total number of persons on board. (2) Functional requirements In order to achieve the goal set out in (1) above, the following functional requirements are embodied in the regulations in 104. and 105.; (A) where the capacity needed to ensure the required functionality of any machinery system is dependent on the number of persons on board (e.g. bilge pumping systems), necessary additional capacity shall be provided; (B) steering gear systems shall be capable of maintaining steerage after any incident affecting machinery installations; and (C) essential systems shall have the necessary redundancy or isolation, or a combination thereof, in order to ensure the capability of safely accommodating persons on board after any incident affecting machinery installations, taking into account the number of persons on board.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	5. Electrical installations(IP Code 2.5) (1) Goal The goal of this paragraph is to provide for: (A) emergency sources of power capable of delivering the required functionality of essential systems in emergency situations, taking into account the total number of persons on board; and (B) protection of all persons on board from electrical hazards. (2) Functional requirements In order to achieve the goal set out in (1) above, the following functional requirements are embodied in the regulations in 104. and 105.; (A) emergency power supply to essential systems shall have the necessary redundancy or isolation, or a combination thereof, to ensure the capability of safely accommodating persons on board after damage, taking into account the number of persons on board and the time for orderly evacuation; and (B) precautions against shock, fire and other hazards of electrical origin shall be provided. 6. Periodically unattended machinery spaces(IP Code 2.6) (1) Goal The goal of this paragraph is to ensure that, if and when a machinery space is periodically unattended, this does not impair thesafety of the ship or the persons on board. (2) Functional requirements In order to achieve the goal set out in (1) above, the following functional requirements are embodied in the regulations in 104. and 105.; (A) periodically unattended machinery spaces shall provide safe operations, taking into account the number of persons on board; and (B) a periodically unattended machinery space shall be equipped with additional controls, monitoring and alarm systems to provide safe operation, taking into account the number of persons on board, in order to achieve a safety equivalent to that of a normally attended machinery space.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	7. Fire safety(IP Code 2.7) (1) Goal The goal of this paragraph is to fulfil the fire safety objectives of SOLAS or the basic fire safety principles of the HSC Code, taking into account the number of persons on board. (2) Functional requirement In order to achieve the goal set out in (1) above, the means to fulfil the fire safety functional requirements of SOLAS or the basic fire safety principles of the HSC Code, taking into account the number of persons on board, are embodied in the regulations in 104. and 105. 8. Life-saving appliances and arrangements(IP Code 2.8) (1) Goal The goal of this paragraph is to provide for appropriate and sufficient means to ensure safe abandonment of the ship and recovery of persons. (2) Functional requirements In order to achieve the goal set out in (1) above, the following functional requirements are embodied in theregulations in 104. and 105.; (A) the capacity of the survival craft shall be sufficient to accommodate all persons on board; (B) appropriate and sufficient personal life-saving appliances shall be available for all persons on board; (C) sufficient space for assembling and mustering must be ensured; (D) onboard communication and alarm systems shall be provided to ensure emergency communication to all persons on board; and (E) means shall be provided to ensure the safe recovery of persons.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	9. Dangerous goods(IP Code 2.9) (1) Goal The goal of this paragraph is to provide for the safe carriage of industrial personnel while transporting and handling dangerousgoods on ships certified in accordance with this Annex, taking into consideration the total number of persons on board. (2) Functional requirement In order to achieve the goal set out in (1) above, any hazard caused by the transportation and handling of dangerousgoods shall be taken into account and the risk to all persons on board shall be minimized, having regard to the nature of the dangerous goods. This functional requirement is embodied in the regulations in 104. and 105.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	103. Regulations 1. Industrial personnel(IP)(IP Code 3.1) (1) In order to meet the functional requirements set out in 102. 1, (2), (A), all industrial personnel shall be at least 16 years of age and documentary evidence shall be made available to the master that they are physically and medically fit to fulfil all therequirements in this regulation, based on a standard acceptable to the Administration. (2) In order to meet the functional requirements set out in 102. 1, (2), (B),. all industrial personnel shall demonstrate adequateknowledge of the working language on board in order to be able to communicate effectively and understand any instructions given by the ship's crew. (3) In order to meet the functional requirements set out in 102. 1, (2), (C), all industrial personnel shall, prior to boarding the ship, receive training or instruction with respect to: (A) personal survival that includes: (a) knowledge of emergency situations that may occur on board a ship; (b) the use of personal life-saving equipment; (c) safely entering the water from a height, and survival in the water; and (d) boarding a survival craft from the ship and water while wearing a lifejacket; (B) fire safety that includes knowledge of the types of fire hazards on board ships and precautionary measures to be taken to prevent a fire; and (C) personal safety and social responsibilities that include: (a) understanding the authority of the master or their representative on board; (b) complying with instructions provided by the shipboard personnel; and (c) understanding safety information, symbols, signs and alarm signals found on board ships.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	(4) Notwithstanding the requirements of **(3)**, suitably qualified industrial personnel based on a standard acceptable tothe Administration may be considered to meet the functional requirements set out in **102. 1, (2), (C)** (5) No industrial personnel shall be carried on board the ship unless the master has been provided with documentation confirming that such personnel have received the training or instructions required by this regulation. (6) In order to meet the functional requirement set out in **102. 1, (2), (D)**, all industrial personnel shall, prior to leaving port or immediately after boarding, receive onboard ship-specific safety familiarization that includes: (A) the layout of the ship; (B) the location of personal life-saving appliances, muster and embarkation stations, emergency escape routes and first aid stations; (C) the safety information, symbols, signs and alarms on board; and (D) action to be taken in the event of an alarm sounding or the declaration of an emergency. (7) In order to meet the functional requirement set out in **102. 1, (2), (E)**, all industrial personnel shall, prior to beingtransferred, receive familiarization in the ship's procedures, arrangements and any additional safety measures or equipment for the transfer of personnel to other ships and/or offshore facilities.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	2. Safe transfer(IP Code 3.2) (1) In order to meet the functional requirement in 102. 2, (2), (A), the following applies: (A) Personnel transfer appliances and arrangements shall be kept clean, properly maintained and regularly inspected to ensure that they are safe to use. (B) The rigging and use of the personnel transfer arrangements shall be supervised by a responsible officer and operated byproperly trained personnel. Safety procedures shall be established and followed by personnel engaged in rigging and operatingany mechanical equipment. (C) Means of communication shall be provided between the supervising responsible officer and the navigation bridge. (D) All personnel transfer arrangements shall be permanently marked to enable identification of each appliance for the purposes of survey, inspection and record-keeping. A record of use and maintenance shall be kept on board the ship. (E) Prior to commencing personnel transfer operations, the personnel transfer arrangements shall be checked to ensure they are functioning properly. (F) Means shall be provided to ensure safe and unobstructed passage for industrial personnel between the personnel transfer arrangements and where they are being transported or accommodated on board. (G) Lighting capable of being supplied by the emergency source of power shall be provided to illuminate the personnel transferarrangements, the water below the transfer arrangements and the passage specified in (F) above. (H) The deck area for personnel transfer shall be designated and free from obstructions. (I) A job safety analysis shall be carried out when planning, and before executing, personnel transfer at sea. The analysis shall take into account environmental conditions, as well as operational and equipment limitations.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	(J) When planning personnel transfer, the guidance developed by the Organization(**MSC-MEPC.7/Circ.10**) or other relevant guidance acceptable to the Administration should be taken into account. (2) In order to meet the functional requirement in **102. 2, (2), (B)**, personnel transfer arrangements shall be designed, constructed, tested and installed in accordance with standards acceptable to the Administration or requirements of a classification society which is recognized by the Administration in accordance with the provisions of **SOLAS regulation XI-1/1**. (3) In addition, the following applies: (A) The design of the personnel transfer arrangements shall be suitable for the arrangement on the ship. (B) An analysis shall be performed in order to evaluate failures in IP transfer arrangements and all its associated systems which might impair the availability of the transfer arrangements and/or endanger the safety of the persons involved. Appropriate analysis may be QFA or FMEA and their associated reports. (a) consider the effects of failure in all the equipment and systems due to single failure, fire in any space or flooding of any watertight compartment that could affect the availability of the transfer arrangements; and (b) provide solutions to ensure the availability of the IP transfer arrangements and the safety of all persons involved upon such failures identified in **(a)**. (C) Where a single failure results in failure of more than one component in a system (common cause failure), all the resulting failures shall be considered together. Where the occurrence of a failure leads directly to further failures, all those failures shall be considered together.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	(4) In order to meet the functional requirement in **102. 2, (2), (C)**, the manoeuvrability of the ship together with the expected need for the ship to keep position over time shall be evaluated, to ensure the correct use of position-keeping equipment. (5) In order to meet the functional requirement in **102. 2, (2), (D)**, procedures shall be in place to ensure correct information on the number and identity of personnel on board at all times.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	104. Additional regulations for ships certified in accordance with SOLAS Chapter 1 1. General(IP Code 4.1) (1) Unless expressly provided otherwise in this part, ships carrying industrial personnel shall meet the SOLAS requirements for cargo ships and the applicable regulations in this part. (2) Ships complying with (1) in addition to the applicable regulations in this part are considered to meet the goals and functional requirements in 102. 3 to 102. 9. 2. Subdivision and stability(IP Code 4.2) (1) In order to meet the functional requirement set out in 102. 3, (2), the following applies: (A) Where the ship is certified to carry more than 240 persons on board, it shall meet the requirements of SOLAS regulation II-1/5 as though the ship is a passenger ship and the industrial personnel are counted as passengers. However, SOLAS regulationII-1/5.5 is not applicable. (B) Subdivision and damage stability shall be in accordance with SOLAS chapter II-1, where the ship is considered a passengership and industrial personnel are counted as passengers, with the value R as follows: (a) where the ship is certified to carry more than 240 persons, the value R is assigned as R; (b) where the ship is certified to carry not more than 60 persons, the value R is assigned as 0.8R; or (c) for more than 60 persons, but not more than 240 persons, the value R shall be determined by linear interpolation between the values given in sub-paragraphs (a) and (b) above.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	$R = 1 - \frac{5{,}000}{L_s + 2.5N + 15{,}225}$ Where: $N = N_1 + 2\ N_2$ N_1 = number of persons for whom lifeboats are provided N_2 = number of persons (including officers and crew) the ship is permitted to carry in excess of N_1 (C) Where the conditions of service are such that compliance with **2. (1), (B)** above on the basis of $N_1 + 2\ N_2$ is impracticable and where the Administration considers that a suitably reduced degree of hazard exists, a lesser value of N may be taken but in no case less than $N_1 + N_2$. (D) For ships to which **2. (1), (B), (a)** above applies, the requirements of **SOLAS regulations II-1/8 and II-1/8-1** and of **SOLAS chapter II-1 parts B-2, B-3 and B-4** shall be applied as though the ship is a passenger ship and the industrial personnel are passengers. However, **SOLAS regulations II-1/14** and **II-1/18** are not applicable. (E) For ships to which **2. (1), (B), (b)** and **2. (1), (B), (c)** above apply, except as provided in paragraph 2.1.6 below, the provisions of **SOLAS chapter II-1, parts B-2, B-3 and B-4** shall apply as though the ship is a cargo ship and the industrial personnel are crew. However, the requirements of **SOLAS regulations II-1/8** and **II-1/8-1** need not be applied and **SOLAS regulations II-1/14 and II-1/18** are not applicable. (F) All ships certified in accordance with this regulation shall comply with **SOLAS regulations II-1/9, II-1/13, II-1/19, II-1/20 and II-1/21** as though the ship is a passenger ship.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	3. Machinery installations(IP Code 4.3) (1) In order to meet the functional requirement set out in 102. 4, (2), (A), the ship shall comply with SOLAS regulation II-1/35-1 as though the ship is a passenger ship. (2) In order to meet the functional requirement set out in 102. 4, (2), (B), where the ship is certified to carry more than 240 persons on board, it shall comply with the requirements of SOLAS regulation II-1/29 as though the ship is a passenger ship. 4. Electrical installations(IP Code 4.4) (1) In order to meet the functional requirement set out in 102. 5, (2), (A), the following applies: (A) for installations in ships of more than 50 m in length carrying not more than 60 persons on board, the requirements in SOLAS regulation II-1/42.2.6.1 shall apply in addition to the requirements in SOLAS regulation II-1/43; and (B) for installations in ships carrying more than 60 persons on board, SOLAS regulation II-1/42 shall apply. (2) In order to meet the functional requirement set out in 102. 5, (2), (B), for installations on ships carrying more than 60 persons on board, SOLAS regulation II-1/45.12 shall apply. 5. Periodically unattended machinery spaces(IP Code 4.5) In order to meet the functional requirements set out in 102. 6, (2), ships carrying more than 240 persons on board shall be considered as passenger ships in relation to SOLAS chapter II-1, part E.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	6. Fire safety(IP Code 4.6) (1) In order to meet the functional requirements set out in 102. 7, (2) and 102. 4, (2), (C), the following applies: (A) where the ship is certified to carry more than 240 persons on board, the requirements of SOLAS chapter II-2 for passenger ships carrying more than 36 passengers shall apply; and (B) where the ship is certified to carry more than 60, but not more than 240 persons on board, the requirements of SOLAS chapter II-2 for passenger ships carrying not more than 36 passengers apply, except that SOLAS regulations II-2/21 and 22 need not apply. 7. Life-saving appliances and arrangements(IP Code 4.7) (1) In order to meet the functional requirement set out in 102. 8, (2), the following applies: (A) for ships carrying more than 60 persons on board, the requirements of SOLAS chapter III for passenger ships engaged on international voyages, which are not short international voyages, shall apply; (B) regardless of the number of the persons on board, SOLAS regulations III/2 and III/19.2.3 are not applicable; (C) where the term "passenger" is used in SOLAS chapter III, it shall be read to mean industrial personnel as prescribed in SOLAS regulation XV/2.3; and (D) notwithstanding (C) above, the required number of infant or child lifejackets shall be calculated solely based on the number of passengers on board.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	8. Dangerous goods(IP Code 4.8) (1) General Industrial personnel may only bring dangerous goods on board for the purpose of their role off the ship and with the prior consent of the master of the ship. These dangerous goods shall be considered as cargo and shall be transported in accordance with part A of SOLAS chapter VII. (2) Carriage of dangerous goods in packaged form In order to meet the functional requirements in 102. 9, (2): (A) for ships certified to carry more than 240 persons on board, SOLAS regulation II-2/19.3.6.2 for passenger ships carrying more than 36 passengers shall apply; and (B) for the purpose of the requirements of the IMDG Code, ships certified to carry more than 240 persons on board shall be considered as passenger ships and those certified to carry 240 or fewer persons on board shall be considered as cargo ships. (3) Carriage of dangerous goods in solid form in bulk In order to meet the functional requirements in 102. 9, (2): (A) for ships certified to carry more than 240 persons on board, SOLAS regulation II-2/19.3.6.2 for passenger ships carrying more than 36 passengers shall apply; and (B) for the purpose of the requirements of the IMSBC Code, industrial personnel shall be considered as personnel in the context of personnel protection. (4) Carriage of dangerous liquid chemicals, liquefied gases and oil (A) In order to meet the functional requirements in 102. 9, (2), when simultaneously carrying dangerous liquid chemicals and/or liquefied gases as cargo in bulk and industrial personnel, the ship shall either be certified in accordance with therequirements of parts B or C of SOLAS chapter VII or meet and be certified in accordance with a standard not inferior to that developed by the Organization.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	In addition: (a) carriage of toxic products, low-flashpoint products or acids shall not be allowed when the total number of persons on board exceeds 60; (b) for the purpose of carrying industrial personnel, the areas and spaces on ships where industrial personnel are not permitted to enter shall be clearly marked; (c) the arrangements for personnel transfer shall be located outside the cargo area; (d) the access to the arrangements for personnel transfer shall, as far as practicable, be located outside the cargo area; and (e) embarkation or personnel transfer and loading or unloading of cargo shall not take place simultaneously. (B) In order to meet the functional requirements in **102. 9, (2)**, when simultaneously carrying oil as cargo, as defined in Annex I of MARPOL, and industrial personnel, the additional requirements in **(A)** above shall apply. (C) low-flashpoint products mean: (a) noxious liquid substances with a flashpoint not exceeding 60°C; (b) oil with a flashpoint not exceeding 60°C; and (c) liquefied gases which require flammable vapour detection in accordance with **chapter 19 of the IGC Code**; (D) toxic products mean: (a) dangerous chemicals to which special requirement **15.12 of the IBC Code** applies; and (b) liquefied gases which require toxic vapour detection in accordance with **chapter 19 of the IGC Code**; and (E) acids mean dangerous chemicals to which special requirement **15.11 of the IBC Code** applies. (F) In order to meet the functional requirements in **102. 9, (2)** when carrying liquefied gases in bulk, for the purpose of the requirements of the **IGC Code**, industrial personnel shall be considered as personnel in the context of training and personnel protection.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	**105. Additional regulations for craft certified in accordance with SOLAS Chapter X** **1. General(IP Code 5.1)** (1) High-speed cargo craft certified in accordance with **SOLAS chapter X** shall not carry more than 60 persons on board. (2) Unless expressly provided otherwise in this part, high-speed craft carrying not more than 60 persons on board shall meet the requirements for cargo craft in the **HSC Code** and the applicable regulations in this part. (3) Craft complying with **(2)** above in addition to the applicable regulations in this part are considered to meet the goals and functional requirements in **102. 3** to **102. 9**. (4) The carriage of IP on high-speed craft is not considered as transit voyage, as specified in **1.9.1.1 of the HSC Code**, and a permit to operate is required. (5) Where the term "passenger" is used in applicable requirements in the **HSC Code**, it shall be read to mean persons on board other than crew. 2. **Subdivision and stability(IP Code 5.2)** In order to meet the functional requirement set out in **102. 3, (2)**, the following applies: (1) **Chapter 2, part B, except 2.13.2 and 2.14, of the HSC Code** shall apply in lieu of **chapter 2, part C of the HSC Code**. (2) When applying the provisions of **chapter 2 of the HSC Code**, the expression "passenger" shall be read as "persons on board other than crew". In addition, the mass of each such person shall be assumed to be 90 kg instead of 75 kg. **3. Machinery installations(IP Code 5.3)** (1) In order to meet the functional requirement set out in **102. 4, (2),** provisions in **chapter 10, part B of the HSC Code** shall apply as applicable to category A passenger craft in lieu of **chapter 10, part C of the HSC Code**.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Present	Amendment	Note
〈Added newly〉	4. Electrical installations(IP Code 5.4) In order to meet the functional requirement set out in 102. 5, (2), 12.7.10 of the HSC Code shall apply. 5. Periodically unattended machinery spaces(IP Code 5.5)-No provisions 6. Fire safety(IP Code 5.6)-No provisions 7. Life-saving appliances and arrangements(IP Code 5.7) In order to meet the functional requirement set out in 102. 8, (2), the following applies: (1) 4.2.3 of the HSC Code shall apply; (2) 8.4.3 of the HSC Code shall apply - the expression "passenger spaces" shall be read as "IP area"; and (3) the required number of infant or child lifejackets shall be calculated solely based on the number of passengers on board. 8. Dangerous goods(IP Code 5.8) (1) General Industrial personnel may only bring dangerous goods on board for the purpose of their role off the craft and with the prior consent of the master of the craft. These dangerous goods shall be considered as cargo and shall be transported in accordance with chapter 7, part D of the HSC Code. (2) In order to meet the functional requirements in 102. 9, (2): (A) for the purpose of carrying IP, the areas and spaces on craft where IP are not permitted to enter shall be clearly marked; (B) the arrangement for personnel transfer shall be located outside the cargo area; (C) the access to the arrangements for personnel transfer shall, as far as practicable, be located outside the cargo area; and (D).4 embarkation or personnel transfer and loading or unloading of cargo shall not take place simultaneously.	- The requirements for ships carrying industrial personnel(IP)(Annex 1) have been supplemented.

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

2026. 2.

HRT, MRT

- Main Amendments -

(1) Background of Amendment

1) The requirements for Offshore Support Vessel (OSV) have been supplemented to include Cable Laying Vessel, and the class notation “Cable Layer” is now assigned accordingly.
2) The requirements for Offshore Support Vessel (OSV) have been supplemented to include Crew Transfer Vessel, and the class notation “CTV” is now assigned accordingly.

(2) Revised content : See the below table

(3) Effective date : ships contracted for construction on or after 1 Mar. 2026.

Present

Ship Types	Special Feature Notations		Remarks
〈omitted〉			
26. Offshore Support Vessel	A	B	
	Supply AH Tow HL WTIMR FFS1 FFS2 FFS3 FF Oil Spill Recovery 〈Added newly〉 〈Added newly〉	HDC(*P*, Locations) HLC(ρ, Tanks)	
〈omitted〉			

〈hereinafter, omitted〉

Amendments

Ship Types	Special Feature Notations		Remarks
〈same as the current Guidance〉			
26. Offshore Support Vessel	A	B	
	Supply AH Tow HL WTIMR FFS1 FFS2 FFS3 FF Oil Spill Recovery Cable Layer(*2026*) CTV(*2026*)	HDC(*P*, Locations) HLC(ρ, Tanks)	
〈same as the current Guidance〉			

〈hereinafter, same as the current Guidance〉

Reason

- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Cable Laying Vessels, and the class notation “Cable Layer” is now assigned accordingly.

- The requirements for Offshore Support Vessels (OSVs) have been supplemented to include Crew Transfer Vessels, and the class notation “CTV” is now assigned accordingly.

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Person in charge :KIM Heesung

No :2026-02-E
Date :2026. 3. 4

To :All Surveyors and whom it may concern

Subject	9.216 Notice for Amendment to the KR Technical Rules
Application	Immediately

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

Amended KR Technical Rules	Effective date	Amendments
Guidances Relating to the Rules for the Classification of Ships Using Low-flashpoint Fuels	Immediately	Requirements for Ships Using Ammonia as Fuel is established

2. Furthermore, please be informed that the establishment will be included in 2026 edition of KR Technical Rules which is provided on the website.

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

Amended Guidances for Classification of Steel Ships

The Classification of Ships Using Low-flashpoint Fuels

2026. 3.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : Immediately

◉ “Annex 7 - Requirements for Ships Using Ammonia as Fuel” is newly established. Therefore,

- “Guidelines for Ships Using Ammonia As Fuel(2023)” is discarded. And,
- “Requirements for Ammonia Fuel Ready” provided in “Annex 1 of Guidelines for Ships Using Ammonia As Fuel(2023)” revised and newly established in “Section 21 of Annex 7 of Requirements for Ships Using Ammonia as Fuel”

〈Section 21 - Newly established〉
Section 21 Requirements for Ammonia Fuel Ready

2101. Application

1. This Annex applies to ships which are prepared for conversion with the design or the partial installation related with ammonia fuel during the new building phase(hereafter referred to as "ammonia fuel ready ships" in this Annex) for the purpose of a conversion from a ship using conventional marine fuels to ammonia fuel after delivery.
2. This Annex contains levels of readiness for use of ammonia as fuel(hereafter referred to as "ammonia fuel ready levels" in this Annex) and requirements applicable thereto, and the scope of preparation is defined by the agreement between the shipowner and the shipbuilder.
3. The design and the installation of ammonia fuel systems of ammonia fuel ready ships are to apply this Annex in force at the time of contract for construction for the new-building. However, where a ammonia fuel ready ship in accordance with this Annex is converted to a ammonia fuelled ship after delivery, the ship shall comply with this Annex in force at the time of the ship conversion.

2102. Class notation

The class notations specified below may be assigned according to the ammonia fuel ready level and the requirement for the class notations are to comply with **2103.**.

1. **Ammonia Ready D(A)**

   Ammonia Ready D(A) as an additional special feature notation may be assigned to ships whose the ammonia fueled ship concept design is prepared for evaluation of the basic suitability. Ammonia Ready D(A) is not to be assign to ships having Ammonia Ready D.

2. **Ammonia Ready D**

   Ammonia Ready D as an additional special feature notation may be assigned to ships for which the generic design is prepared. Ammonia Ready D is not to be assign to ships having Ammonia Ready I.

3. **Ammonia Ready I**

   Ammonia Ready I as an additional special feature notation may be assigned to ships for which parts of the systems are installed with the detailed design in addition to the generic design. In assignment of the Ammonia Ready I, the characters corresponding to the installed items may be assigned in the bracket one or a combination of them in addition to Ammonia Ready I. The characters corresponding to the installed items are as follows:

   (1) Hull structural reinforcement for ammonia fuel tank - SR
   (2) Ammonia fuel tank - FT
   (3) Ammonia fuel tank venting systems - TV
   (4) Ammonia fuel supply systems - FS
   (5) Ammonia fuel bunkering systems - BS
   (6) Ammonia fired main engines - ME
   (7) Ammonia fired auxiliary engines - AE
   (8) Ammonia fired boilers - B
   (9) Main engines that can be converted to Ammonia fuel operation - ME-C
   (10) Auxiliary engines that can be converted to Ammonia fuel operation - AE-C
   (11) Boilers that can be converted to Ammonia fuel operation - B-C
   (12) Ammonia release mitigation systems - AT

   For example, Ammonia Ready I(SR, FT) may be assigned to the ship on which structural reinforcement for ammonia fuel tank and ammonia fuel tank are installed, and Ammonia Ready I(FS, ME) may be assigned to the ship on which ammonia fuel supply systems and ammonia fired main engines are installed.

2103. Requirements for levels of ammonia fuel ready

This Section prescribes plans to be submitted and systems to be installed. The design and installation of structures and systems are to be in accordance with applicable requirements in this Annex. Drawing approval and survey for ammonia fuel ready are not accepted as drawing approval and survey for conversion to ammonia fuel ship. When the ship is converted, drawing approval and survey are to be carried out in accordance with this Annex in force at the time of the ship conversion. Approved Drawings and certifications from new building stage may be used as reference for conversion.

1. General level of preparing concept design (Ammonia Ready D(A))

Ammonia Ready D as an additional special feature notation may be assigned to ships for which the generic design is prepared. Ammonia Ready D is not to be assign to ships having Ammonia Ready I.

(1) Plans and documents required for an Approval in Principle (AIP) are to be submitted for Ammonia Ready D(A). List of plans and documents to be submitted may be mediated after consultation with the Society.

(2) The plans and documents required in this Section is to be marked "Ammonia Ready" to separate them from the normal plans and documents of new building.

2. General level of preparing generic design (Ammonia Ready D)

(1) This Section prescribes plans and documents to be submitted for Ammonia Ready D. The detail requirements for designs are to be in accordance with applicable requirements in this Annex.

(2) The plans and documents required in this Section is to be marked "Ammonia Ready" to separate them from the normal plans and documents of new building. Where parts of plans and documents required in this Section are not available, alternative documents may be accepted by the Society's review.

(3) The following plans and documents are to be submitted to the Society for review

(A) General arrangement plans showing location of:
- (a) Machinery spaces, accommodation, service and control station spaces
- (b) Ammonia fuel containment systems
- (c) Fuel preparation room
- (d) Ammonia fuel piping routing with shore connections
- (e) Tank hatches, ventilation pipes and any other openings to the ammonia fuel tanks
- (f) Ventilating pipes, doors and openings to fuel preparation room and other hazardous areas
- (g) Entrances, air inlets and openings to accommodation, service and control station spaces
- (h) Hazardous areas of zone 0, 1 and 2
- (j) Toxic area/zone
- (k) Ammonia release mitigation system

(B) Following plans and data of the ammonia fuel containment system:
- (a) Ammonia fuel tank type, dimension and volume
- (b) Drawings of support and staying of ammonia fuel tanks
- (c) Ammonia fuel tank arrangement including tank connection space
- (d) Specification of design loads and structural analysis for the ammonia fuel tank supporting structure
- (e) Drawing and specification of ammonia fuel tank thermal insulation with heat transfer calculation

(C) Following plans and data of ammonia fuel supply systems:
- (a) Arrangement of engine room, fuel preparation room and other spaces containing ammonia equipment
- (b) Ammonia fuel supply piping diagram
- (c) Ventilation system arrangement of engine room, fuel preparation room and other spaces containing ammonia equipment

(D) Following plans and data of ammonia fuel bunkering systems:
- (a) Arrangement of ammonia fuel bunkering systems
- (b) Ammonia fuel bunkering piping diagram
- (c) Ventilation system arrangement of ammonia fuel bunkering station

(E) Following plans and particulars for the safety relief valves
- (a) Arrangement for ammonia fuel tank relief valves and associated ventilation piping
- (b) Calculation of required ammonia fuel tank relief valve capacity

(F) Following plans and data for equipment and systems regarding fire protection :
  (a) Arrangement of construction for fire protection in relation to ammonia fuel tank and other spaces containing ammonia equipment
  (b) Arrangement and specification of water spray system
  (c) Arrangement and specification of dry chemical powder installation
(G) Data for a risk analysis according to **302.**
(H) Stability calculations with ammonia fuel tanks included
(I) Longitudinal strength calculations with ammonia fuel tanks included

3. Level that fits the installation of parts of systems (Ammonia Ready I)

(1) This Section prescribes parts of the systems to be installed and plans and documents to be submitted for Ammonia Ready I. The detail requirements for designs and installation of installed systems are to be in accordance with applicable requirements in this Annex.
(2) The plans and documents for generic design required in **2.** are to be submitted and reviewed by the Society. In addition, the plans and documents required in **3.** (4) to (8) are to be submitted when required. If the Society deems it necessary, additional plans and documents may be requested. The parts which are installed on board are to be reflected in the normal plans of new building and "Ammonia Ready" is not to be marked on those plans.
(3) Parts of the systems are categorized in the follows:
  (A) Hull structural reinforcement for ammonia fuel tank
  (B) Ammonia fuel tank
  (C) Ammonia fuel tank venting systems
  (D) Ammonia fuel supply systems
  (F) Ammonia fuel bunkering systems
  (G) Ammonia fired main engines
  (H) Ammonia fired auxiliary engines
  (I) Ammonia fired boilers
  (J) Main engines that can be converted to Ammonia fuel operation
  (K) Auxiliary engines that can be converted to Ammonia fuel operation
  (L) Boilers that can be converted to Ammonia fuel operation
  (M) Ammonia release mitigation systems

(4) Hull structural reinforcement for ammonia fuel tank

(A) The structures below the ammonia fuel tanks are to be reinforced in accordance with **Sec 5** of this Annex.
(B) The following plans and documents are to be submitted to the Society for approval.
  (a) Detail drawing of ammonia fuel tanks and support of ammonia fuel tanks
  (b) Material specification for tank support and steel grade selection for the hull in way of the tank
  (c) Welding procedures, stress relieving procedures and non-destructive testing plans
  (d) Specification of design loads and structural analysis for the ammonia fuel tank supporting structure
  (e) Drawing and specification of ammonia fuel tank thermal insulation with heat transfer calculation

(5) Ammonia fuel tank

(A) Ammonia fuel tanks are to be installed in accordance with **Sec 5** and **6** of this Annex
(B) The plans and documents in **Sec 4, 404. 3** and **4** of this Annex and ammonia fuel tank arrangement including tank connection space are to be submitted to the Society for approval.

(6) Ammonia fuel tank venting systems

(A) Ammonia fuel tank venting systems are to be installed in accordance with **Sec 5** and **6** of this Annex.
(B) The plans and documents in **Sec 4, 404. 3** and **4** of this Annex are to be submitted to the Society for approval.

(7) Ammonia fuel supply systems

(A) Ammonia fuel supply systems are to be installed in accordance with **Sec 7** and **9** of this Annex.
(B) The following plans and documents are to be submitted to the Society for approval.
  (a) Arrangement of engine room, fuel preparation room and other spaces containing ammonia equipment
  (b) Ventilation system arrangement of engine room, fuel preparation room and other spaces

containing ammonia equipment
(c) Drawings and specifications of ammonia supply piping
(d) Drawings and specifications of offsets, loops, bends and mechanical expansion joints, such as bellows, slip joints(only inside tank) or similar means in the ammonia piping
(e) Drawings and specifications of flanges, valves and other fittings in the ammonia piping system. For valves intended for piping systems with a design temperature below − 55 °C, documentation for leak test and functional test at design temperature (type test) is required
(f) Documentation of type tests for expansion components in the ammonia piping system.
(g) Specification of materials, welding, post-weld heat treatment and non-destructive testing of ammonia piping
(h) Specification of pressure tests (structural and tightness tests) of ammonia piping
(i) Program for functional tests of all piping systems including valves, fittings and associated equipment for handling ammonia (liquid or vapour)
(j) Drawings and specifications of insulation for low temperature piping where such insulation is installed
(k) Specification of electrical bonding of piping
(l) Cooling or heating water system in connection with ammonia fuel system, if fitted.

(8) Ammonia fuel bunkering systems

(A) Ammonia fuel bunkering systems are to be installed in accordance with **Sec 7** and **8** of this Annex.
(B) The following plans and documents are to be submitted to the Society for approval.
(a) Arrangement of ammonia fuel bunkering systems
(b) Ventilation system arrangement of ammonia fuel bunkering station
(c) Drawings and specifications of ammonia supply piping
(d) Drawings and specifications of offsets, loops, bends and mechanical expansion joints, such as bellows, slip joints(only inside tank) or similar means in the ammonia piping
(e) Drawings and specifications of flanges, valves and other fittings in the ammonia piping system. For valves intended for piping systems with a design temperature below −55 °C, documentation for leak test and functional test at design temperature (type test) is required
(f) Documentation of type tests for expansion components in the ammonia piping system.
(g) Specification of materials, welding, post-weld heat treatment and non-destructive testing of ammonia piping
(h) Specification of pressure tests (structural and tightness tests) of ammonia piping
(i) Program for functional tests of all piping systems including valves, fittings and associated equipment for handling ammonia (liquid or vapour)
(j) Drawings and specifications of insulation for low temperature piping where such insulation is installed
(k) Specification of electrical bonding of piping
(l) Specification of means for removal of liquid contents from bunkering pipes prior to disconnecting the shore connection

(9) Ammonia fired main engines

Main engines are to be installed in accordance with **Sec 10** of this Annex.

(10) Ammonia fired auxiliary engines

Auxiliary engines are to be installed in accordance with **Sec 10** of this Annex.

(11) Ammonia fired boilers

Boilers are to be installed in accordance with **Sec 10** of this Annex.

(12) Main engines that can be converted to gas fuel operation

(A) Main engines of gas-convertible types are to be installed.
(B) Following plans are to be submitted for reference:
(a) details of the gas conversion
(b) list of the components that need to be replaced
(c) list of new components

(13) Auxiliary engines that can be converted to gas fuel operation

(A) Auxiliary engines of gas-convertible types are to be installed.
(B) Following plans are to be submitted for reference:
(a) details of the gas conversion
(b) list of the components that need to be replaced
(c) list of new components

(14) Boilers that can be converted to gas fuel operation

(A) Boilers of gas-convertible types are to be installed.

(B) Following plans are to be submitted for reference:

(a) details of the gas conversion

(b) list of the components that need to be replaced

(c) list of new components

(15) Ammonia release mitigation systems

(A) Ammonia release mitigation systems are to be installed in accordance with Annex 7 of this Annex.

(B) Following plans are to be submitted for reference:

(a) Arrangement plan including spaces where ammonia release mitigation systems are installed

(b) Specification and capacity calculation of ammonia release mitigation system

2104. Survey

1. Classification survey during construction

Systems are to be tested at the shops of manufacturer and after installation on board in accordance with this Annex.

2. Periodical surveys

In application of this Annex, the general condition of the relevant systems installed on board is to be examined visually at periodical surveys for the vessels having Ammonia Ready I notation. The systems are to be surveyed and evaluated for the condition at time of conversion, and the scope of test will be defined depending on time elapsed from new building and maintenance level of the systems. ⚓