
GUIDANCE NOTES
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**CHINA CLASSIFICATION SOCIETY**

# GUIDELINES FOR IMPLEMENTATION OF MAJOR CONVERSIONS OF SHIPS

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## CONTENTS

# CHAPTER 1 GENERAL

## 1.1 Purpose and scope

1.1.1 These Guidelines are intended to provide guidance on implementation of the requirements for ships which undergo repairs, alterations, modifications and outfitting of a major character (hereinafter referred to as "major conversions").

1.1.2 These Guidelines are applicable to ships classed with CCS and/or applying for assignment of CCS class engaged on international voyages.

1.1.3 These Guidelines are applicable to ships which undergo major conversions on or after the entry-into-force date of these Guidelines. For ships undergoing conversions prior to the entry-into-force date of these Guidelines, the provisions thereof are to be complied with as far as practicable.

## 1.2 Definitions

1.2.1 The relevant definitions given in the following instruments apply to these Guidelines:

(1) CCS Rules for Classification of Sea-Going Steel Ships;

(2) 1974 SOLAS Convention;

(3) MARPOL 73/78;

(4) ILLC.

1.2.2 The definitions referred to in these Guidelines are as follows:

(1) **Ship type**: for the purpose of statutory requirements, ship type is defined in 1974 SOLAS Convention; for the purpose of class requirements, ship type corresponds to the ship type notation given in CCS Rules for Classification of Sea-Going Steel Ships.

(2) **The date of contract for major conversions** is the date on which the contract for major conversions of existing ships is signed between the owner and the shipbuilder. This date is to be declared to CCS by the party applying for the assignment of class to a converted ship. In the absence of a contract for conversion, the date of contract for major conversions is replaced by the date on which the plan approval of the design for conversion is requested.

(3) **Ship's main dimensions** mean dimensions of a ship including length of ship ($L$), moulded breadth ($B$) and moulded depth ($D$). For the purpose of classification requirements for ships, length of ship ($L$), moulded breadth ($B$) and moulded depth ($D$) are to be determined in accordance with the definitions of CCS Rules for Classification of Sea-Going Steel Ships. For the purpose of statutory requirements, length of ship ($L$), moulded breadth ($B$) and moulded depth ($D$) are to be determined in accordance with relevant definitions specified by IMO instruments.

(4) **Particulars of ship** mean ship's main parameters that determine the application of the standards, e.g. ship's main dimensions, gross tonnage, deadweight, draft, number of passengers carried etc.

(5) **Standards** mean the international conventions and codes, the requirements of the flag State Administrations, as well as the rules and guidelines of CCS, which are applicable to ships.

(6) **Present standards** mean the standards applicable to a ship from the date on which the contract for major conversion of the ship is signed.

(7) **Substantial new structures** mean hull structures that are entirely renewed or augmented by new double bottom and/or double side construction (e.g., replacing the entire structure within cargo area or adding a new double bottom and/or double side section to the existing cargo area).

### 1.3 Major conversions of ships

1.3.1 Major conversions of ships are defined as repairs, alterations and modifications which substantially alter one or more major characters of existing ships, including the following categories:

(1) main dimensions of a ship;

(2) ship type;

(3) level of subdivision of a ship;

(4) carrying capacity of a ship;

(5) passenger accommodation spaces;

(6) increasing a ship's service life.

1.3.2 Refer to Table 1.3.2 below for examples relating to categories of major conversions of ships and the relevant standards.

**Table 1.3.2**

| Categories of major conversions | Relevant present standards① / Examples | SOLAS II-1 | SOLAS II-2 | SOLAS III | SOLAS VII / IBC/IGC | SOLAS XII | MARPOL 73/78/I, II | ILLC ⑤ | The rules |
|---|---|---|---|---|---|---|---|---|---|
| 1. A change of ship type | (1) Cargo ship converted to passenger ship/ro-ro passenger ship | X | X | X | - | - | X | X | X |
| | (2) Cargo ship② converted to oil tanker | X | - | - | - | - | X | X | X |
| | (3) Cargo ship② converted to chemical tanker, liquefied gas carrier | X | - | - | X | - | X | X | X |
| | (4) Cargo ship② converted to bulk carrier③ | X | - | - | - | X | X | X | X |
| | (5) A change of ship type notation | See note ④ below | | | | | | | X |
| 2. An alteration of main dimensions of a ship | (6) Addition of a new mid-body portion of same moulded breadth and moulded depth resulting in lengthening to ship | X | X | - | - | X | X | X | X |
| | (7) Addition of a new body resulting in change to the ship's main dimensions *L*, *B* and *D* | X | X | - | - | X | X | X | X |
| 3. Modification of level of subdivision of a ship | (8) $A/R_{\text{after modification}} < A/R_{\text{before modification}}$ and $A/R_{\text{after modification}} < 1$ | X | - | - | - | X | - | X | X |
| 4. Increasing a ship's service life | (9) Single hull oil tanker converted to double hull oil tanker | X | - | - | - | - | - | X | X |
| | (10) Entire replacement of cargo holds and/or cargo areas | X | X | - | - | X(bulk carrier) | X | X | X |
| | (11) Replacement of, or any addition to existing life-saving appliances or arrangements | - | - | X | - | - | - | | - |
| | (12) Replacement and new construction of passenger accommodation spaces | - | X | - | - | - | - | | X |
| 5. Increasing the carrying capacity | (13) Increasing the carrying capacity of cargoes | - | - | - | - | - | X | | - |
| | (14) Increasing the number of passengers | | X | - | - | - | -- | | X |

Note:

① Refer to the appropriate sections for specific scope. See also 1.6.2.

② Cargo ships mean those ships which are different from the ship type after conversion.

③ Refer to Appendix 1 of these Guidelines for specific requirements for converted ore carriers and bulk carriers.

④ The change of ship type notations is only for the purpose of classification requirements for ships. Statutory requirements related to ship type are to be determined in accordance with (1) (2) (3) and (4) respectively.

⑤ The applicable present standards are to be complied with. However, the requirements for strength and tightness of hatchways are only applicable to all newly added or substantially modified hatchway structures. The requirements for cable lockers are only applicable to newly added or substantially modified cable lockers.

## 1.4 General requirements

1.4.1 The application of major conversions of existing ships is given in the appropriate chapters of these Guidelines.

1.4.2 For major conversions of existing ships, the modified parts are to comply with the present standards as far as practicable. Where major conversions lead to a change of particulars of ship, the converted ship (other than parts of major conversions) is to comply with the standards applicable to the ship at original construction date based on new particulars of ship, subject to agreement of the flag State Administration.

1.4.3 Ships which undergo conversions other than major conversions (including repairs, modifications and outfitting) are to comply, as a minimum, with the standards applicable to ships at original construction date.

1.4.4 In addition to the requirements of these Guidelines, newly installed or renewed equipment and/or systems as well as materials used for major conversions, including those for interior decoration, are to comply with the present standards. Exceptional circumstances may be subject to special consideration of CCS.

1.4.5 Any ship converted to a ship carrying dangerous cargoes is to comply with requirements for fitness of the carriage of dangerous cargoes given in the present standards.

1.4.6 Where a new class notation is assigned to a ship, the relevant notation is to comply with requirements of the present standards.

1.4.7 Where any ship is converted to a passenger ship, the converted passenger ship is to comply with the standards applicable to the ship at the date of commencement of conversion.

## 1.5 Application

1.5.1 For ships classed with CCS or intended to be classed with CCS, which undergo major conversions, the application for the survey is to be submitted. Plans and documents of the modified and related parts are to be submitted to CCS for approval.

## 1.6 Assessment of the design and construction technique

1.6.1 The owner and/or the shipbuilder are to develop a conversion scheme and consult with relevant units of CCS within sufficient time prior to the commencement of conversion, in order to initially assess the feasibility of the scheme. The designer undertaking the design for conversion may participate in the discussion as necessary.

1.6.2 Ship standards applicable to major conversions of ships are based on the scope and/or nature of conversion. Refer to the appropriate chapters of these Guidelines for specific requirements.

1.6.3 The scope of conversion is to be identified in the design drawings for ship conversion.

**1.7 Assessment of the shipbuilder**

1.7.1 The shipbuilder undertaking major conversions of ships is to be assessed by CCS prior to carrying out the survey.

**1.8 Survey and testing**

1.8.1 The survey of major conversions of ships is to comply with the classification rules, regulations, guidelines, guidance notes of CCS, the requirements of international conventions, as well as relevant statutory requirements of the Government of the flag State when authorised, and requirements of approved plans(including comments).

1.8.2 Where the class of the ship is transferred from another member society of IACS to CCS, the survey is to be carried out in accordance with TOCA and relevant provisions and special requirements of CCS, in addition to complying with 1.8.1.

1.8.3 In principle the survey of parts of major conversions and relevant parts of ships is to be required as for a newbuilding, taking into account the requirements of other surveys carried out simultaneously with the survey of major conversions, e.g. special survey, intermediate survey and survey of transfer of class.

1.8.4 Where a new ship type notation is intended to be assigned to a converted ship, the initial classification survey required of the new ship type is to be carried out and appropriate survey documents are to be issued.

1.8.5 For ships which undergo major conversions concerning a change of ship type and particulars of ship which determine the application of the standards, the statutory initial survey is to be carried out in accordance with revised Survey Guidelines under the Harmonized System of Survey and Certification and appropriate survey documents are to be issued.

1.8.6 Inclining tests are to be carried out for ships which undergo major conversions.

1.8.7 Sea trials are to be carried out for ships which undergo major conversions, except under the following circumstances:

(1) where the main propulsion system is not altered;

(2) where the steering system is not altered;

(3) where the main dimensions of ships and moulded line, including draft, are not altered.

**1.9 Issuance of certificates**

1.9.1 A new certificate is to be issued to a ship which undergoes major conversions based on the ship's new dimension, type and intended purpose.

1.9.2 For the survey of major conversions of ships, the new certificates(classification certificates and statutory certificates) are in general valid from the completion date of survey. The original survey period may be extended upon owner's request.

# CHAPTER 2 CONSTRUCTION-SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

## 2.1 Application

2.1.1 This Chapter is applicable to ships which undergo major conversions as follows:

(1) a substantial change of ship type;

(2) a substantial alteration of the dimensions of a ship;

(3) a change of the level of subdivision of a ship: for cargo ships of more than 80 m in length after modification to the construction, whatever its nature and extent, the level of subdivision (A/R ratio) calculated for the ship after such modification is less than the A/R ratio calculated for the ship before the modification, and is less than unity as well;

(4) single hull oil tankers converted to double hull oil tankers;

(5) entire replacement of cargo holds and/or cargo areas.

## 2.2 Principles for application of the standards

2.2.1 For major conversion related to a change of ship type of 2.1.1(1), the hull structure, subdivision and stability, any machinery and systems that are added or modified of the converted ship are to comply with the applicable requirements of the present standards. However, the requirements for means of access for inspections and coatings are only applicable to new structures that are added or substantially modified in the course of conversion. The requirements for double bottoms, peak tanks and bulkheads of machinery spaces are only applicable to new integral structures of ships substantially modified.

2.2.2 For major conversion related to an alteration of the dimensions of a ship of 2.1.1(2), the hull structure, subdivision and stability, any machinery and systems that are added or modified of the converted ship are to comply with the applicable requirements of the present standards. However, the requirements for means of access for inspections and coatings are only applicable to newly added body in the course of conversion. The requirements for double bottoms, peak tanks and bulkheads of machinery spaces are only applicable to newly added integral structures of ships. Where the level of subdivision is changed, subdivision and stability of the ship are to comply with 2.2.3.

2.2.3 For major conversion of 2.1.1(3), subdivision and stability of the converted ship are to comply with the requirements of the present standards.

2.2.4 For major conversion of 2.1.1(4), the hull structure, subdivision and stability, any machinery and systems that are added or modified of the converted ship are to comply with the applicable requirements of the present standards. However, the requirements for means of access for inspections and coatings are only applicable to new structures that are added or substantially modified in the course of conversion. The requirements for double bottoms, peak tanks and bulkheads of machinery spaces are only applicable to new integral structures of ships substantially modified. Refer to Appendix 1 for applicable requirements.

2.2.5 For major conversion of 2.1.1(5), the hull structure, subdivision and stability, any machinery and systems that are added or modified of the converted ship are to comply with the applicable requirements of the present standards. However, the requirements for means of access for inspections and coatings are only applicable to entirely replaced parts. The requirements for double bottoms, peak tanks and bulkheads of machinery spaces are only applicable to entirely replaced structures of ships. Where the level of subdivision is changed, subdivision and stability of the ship are to comply with 2.2.3.

## 2.3 Plans and documents

2.3.1 Plans and documents related to major conversions are based on the scope of conversion.

2.3.2 The scope of plan approval and approved documents related to stability are listed in Table 2.3.2.

**Table 2.3.2**

| Scope of conversion / Stability-related documents | T① | I | Applicable ship type | Remarks |
|---|---|---|---|---|
| Intact stability calculations or loading manuals | X | $X_p$ | All ships | Preliminary and final loading condition calculations |
| Coordinates of opening of flooding angles and curves or table of flooding angles | X | $X_p$ | All ships | |
| Damage stability calculations② | X | X | All ships | Preliminary and final loading condition calculations |
| General arrangement and structural plan (internal watertight subdivision and watertight integrity) | $X_p$ | | All ships | |
| Calculations② for permissible length of compartments | $X_p$ | | Passenger ships | Only applicable to ships converted prior to 1 January 2009 |
| Damage control plan | X | X | Passenger ships and cargo ships, including tankers | |
| Damage control booklet | X | X | Passenger ships and cargo ships, including tankers | |
| Subdivision level (A/R ratio) calculations | $X_p$ | X | Cargo ships③ | In accordance with MSC/Circ.1246. However, SOLAS/II-1/1.3.4 is to be complied with on and after 1 January 2009 |
| Grain loading manual② | $X_p$ | $X_p$ | Ships carrying grains | Preliminary and final loading condition calculations |
| Loading instruments | $X_p$ | $X_p$ | Ships with the class notation of loading instruments | revised stored characteristic data, testing loading conditions and testing calculation results |
| Lightweight survey report and/or inclining test report② | X | X | All ships | |

Notes:

① T–a change of ship type; I–a change of level of subdivision of a ship; $X_p$–where applicable.

② It may be included in the loading manual.

③ Cargo ships of more than 80 m in length after conversion.

④ Lightweight gravity center calculations are to be provided as necessary.

# CHAPTER 3 CONSTRUCTION-FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

## 3.1 Application

3.1.1 This Chapter is applicable to the following major conversions relating to statutory requirements for ships:

(1) a substantial alteration of main dimensions of a ship, e.g. attaching one or more bodies or increasing ship's gross tonnage to change the fire safety requirements;

(2) a substantial alteration of passenger accommodation spaces, e.g. weather decks or non-accommodation cabins (e.g. vehicle decks) converted to passenger accommodation;

(3) a substantial increase of service life of a ship, e.g. passenger accommodation on the deck renewed.

3.1.2 A change of ship type (e.g. cargo ships converted to passenger ships and increasing ship's gross tonnage to change the fire safety requirements (e.g. substantially increasing passenger carrying capacity)) is also to be regarded as a major conversion and is to comply with requirements of this Chapter.

## 3.2 Principles for application of the standards

3.2.1 For major conversions as defined in 3.1.1, the requirements for modified parts in terms of fire protection, fire detection and fire extinction are to comply with the present standards as far as practicable.

3.2.2 For a change of ship type of 3.1.2, in case of cargo ships converted to passenger ships or major conversions as defined by the Administration, fire protection, fire detection and fire extinction are to comply with the present standards.

3.2.3 Where the complement of a passenger ship is raised to 36 persons and more from not more than 36 persons due to the increase of passenger carrying capacity, fire protection, fire detection and fire extinction are to comply with the present standards.

## 3.3 Plans and documents

3.3.1 The following plans and documents with regard to major conversions are to be submitted for approval:

(1) fire control plans;

(2) the following plans related to modified parts (where applicable):

① main fire section division plan;
② structural plan of deck covering and insulation of the ship;
③ arrangement plan of fire detection and fire alarm;
④ arrangement plan of fixed fire-extinguishing system;
⑤ arrangement plan of ventilation system.

3.3.2 The plans submitted for approval are to show all fire safety details which are substantially modified.

# CHAPTER 4 LIFE-SAVING APPLIACNES AND ARRANGEMENTS

## 4.1 Application

4.1.1 This Chapter is applicable to the following major conversion relating to statutory requirements for ships:

(1) replacement of, or any addition to existing life-saving appliances or arrangements of the converted ship.

## 4.2 Principles for application of the standards

4.2.1 Replacement of, or any addition to existing life-saving appliances

(1) For ships which undergo repairs, alterations and modifications which involve replacement of, or any addition to, their existing life-saving appliances or arrangements, these life-saving appliances or arrangements are to comply with the present standards.

(2) If a survival craft other than an inflatable liferaft is replaced without replacing its launching appliance, or vice versa, the survival craft or launching appliance may be of the same type as that replaced.

## 4.3 Plans and documents

4.3.1 If life-saving appliances or arrangements are changed due to major conversions of ships, the arrangement plan of new life-saving appliances or arrangements is to be submitted for approval.

# CHAPTER 5 POLLUTION PREVENTION

## 5.1 Application

5.1.1 For the purpose of the requirements for pollution prevention of this Chapter, major conversions mean one or more of the following conversions of a ship:

(1) which substantially alter the main dimensions or carrying capacity of the ship;

(2) which change the type of the ship;

(3) which are substantially to prolong the service life, e.g. entire renewal of cargo areas or cargo holds;

(4) which otherwise so alter the ship that it would become a new ship.

## 5.2 Principles for application of the standards

5.2.1 All ships which undergo major conversions are to comply with the present standards applicable to ships, as defined in regulation 28 of Annex I to MARPOL 73/78, corresponding to the following dates:

(1) the date of contract for major conversions;

(2) in the absence of the contract for major conversions, the date of commencement of major conversions; or

(3) the date of completion of major conversions.

5.2.2 Replaced and newly installed pollution prevention equipment of ships in the course of major conversions is to comply with the present standards.

5.2.3 Where aggregate capacity of oil fuel tanks of the whole ship exceeds 600m3 due to newly installed oil fuel tank in the course of major conversions, oil fuel tanks are to comply with regulation 12A of Annex I to MARPOL 73/78.

## 5.3 Plans and documents

5.3.1 Relevant plans and calculations for conversions related to pollution prevention, including damage stability calculations, where applicable.

# CHAPTER 6 HULL STRUCTURE AND EQUIPMENT

## 6.1 Application

6.1.1 This Chapter is applicable to the following major conversions relating to classification requirements for ships:

(1) increasing length of ship L, breadth of ship B or moulded depth D;

(2) substantially altering the ship type notation.

6.1.2 See Section 1, Chapter 1, PART TWO of CCS Rules for Classification of Sea-Going Steel Ships for definitions of length of ship L, breadth of ship B or moulded depth D referred to in this Chapter.

## 6.2 Principles for application of the rules

6.2.1 The hull structure undergoing major conversions in accordance with 6.1.1(1) is to comply with 6.4 and 6.5 of this Chapter.

6.2.2 The hull structure undergoing major conversions in accordance with 6.1.1(2) is to comply with the requirements for new ships specified in the applicable rules on the date of contract for major conversions.

6.2.3 Major conversions that may increase the equipment number of anchoring equipment are to comply with 6.6 of this Chapter.

6.2.4 With respect to existing hull structures of the ship that undergoes major conversions, minor strength discrepancies may be accepted as reduced corrosion margins as specified by the applicable rules on the date of contract for major conversions if requested by the owner. The corrosion margin is to be determined in accordance with the applicable rules on the date of contract for major conversions. Memo for the owner and the surveyor is to be given in such cases.

## 6.3 Plans and documents

6.3.1 The following plans and documents of the modified and related parts are to be submitted to CCS for approval. In the case of special constructions and arrangement, additional plans and documents may be required if considered necessary by CCS:

(1) principal transverse sections;

(2) construction profile, including longitudinal sections, decks, inner bottom, superstructures and deckhouses;

(3) stem;

(4) stern frame;

(5) shell expansion;

(6) oiltight and watertight bulkheads;

(7) main engine seating and thrust bearing seating;

(8) propeller brackets;

(9) hatch coaming;

(10) cargo hatch covers with strength calculations;

(11) arrangement of anchoring equipment including equipment number calculation;

(12) rudder, rudder stock and tiller together with strength calculations;

(13) masts, derrick posts and crane pedestals, together with their support structures;

(14) longitudinal strength calculations;

(15) ice strengthening with calculations;

(16) welding specifications;

(17) loading manual.

6.3.2 The following plans and documents of the modified and related parts are to be submitted to CCS for information:

(1) general arrangement;

(2) lines or offsets;

(3) body plan (frame lines);

(4) capacity plan;

(5) general specifications for conversion of ships.

**6.4 Increasing length of ship *L***

6.4.1 General requirements

(1) In general longitudinal strength of hull girder and local strength of hull structure with regard to length of ship *L* are to comply with the requirements of the applicable rules on the date of contract for major conversions.

(2) Direct calculations of hull structure including fatigue strength, due to increase of ship length are to be considered in accordance with the requirements of the applicable rules on the date of contract for major conversions.

6.4.2 Longitudinal strength

(1) Increasing length of ship *L* directly increases wave induced loads on the hull girder (e.g. wave bending moment, wave shear force and wave torsional moment) and changes design still water bending moment and shear forces. Longitudinal strength of hull girder is to be re-checked based on the calculation parameter of new length of ship *L*, in accordance with the requirements of the applicable rules on the date of contract for major conversions.

(2) The loading manual and loading instrument, where applicable, are to be re-approved.

6.4.3 Local strength

(1) The local structure strength of the ship related to new length of ship *L* (including scantlings of structural members, structural arrangement) is to be re-approved in accordance with the requirements of the applicable rules on the date of contract for major conversions, e.g. the following structures are to be examined:

① shell plating, including keel, bottom shell, bilge, side shell, sheer strake;
② decks, strength decks;
③ bottom, side framing and deck framing;
④ strengthening at ends of ships;
⑤ superstructures and deckhouses;
⑥ arrangement and distance of watertight bulkheads, including collision bulkheads;
⑦ size and arrangement of cargo tanks of oil tankers;
⑧ container securing arrangement;
⑨ hatch covers;
⑩ stems, stern frames, propeller shaft brackets.

## 6.5 Increasing breadth of ship *B* and/or moulded depth *D*

6.5.1 General requirements

(1) In general, longitudinal strength of hull girder and local strength of hull structure, with regard to breadth of ship *B* and/or moulded depth *D*, are to comply with the present rules.

(2) Direct calculations of hull structures of converted container ships due to increase of breadth of ship *B* may be considered in accordance with the requirements of the applicable rules on the date of contract for major conversions.

6.5.2 Longitudinal strength

(1) Increasing breadth of ship *B* directly increases wave induced loads on the hull girder (e.g. wave bending moment, wave shear force and wave torsional moment) and changes hull girder section characters. In general moulded depth *D* is increased by fitting new continuous deck (which may be strength deck), which changes hull girder section characters. Longitudinal strength of hull girder is to be re-checked based on the calculation parameters of new breadth of ship *B* and/or moulded depth *D*, in accordance with the applicable requirements of the present rules.

(2) The loading manual and loading instrument, where applicable, are to be re-approved.

6.5.3 Local strength

(1) The local structure strength of the ship related to new breadth of ship *B* (including scantlings of structural members, structural arrangement) is to be re-approved in accordance with the requirements of the applicable rules on the date of contract for major conversions. The following structures are to be approved:

① bottom structure;
② deck beams;
③ fore peak strengthening;
④ anchoring and mooring equipment;
⑤ strength requirements for securing of windlasses on fore deck;
⑥ double hull arrangement of double hull oil tankers;
⑦ size and arrangement of cargo tanks of oil tankers;
⑧ bottom shell plating of oil tankers;
⑨ container securing arrangement.

(2) The local structure strength of the ship related to new moulded depth *D* (including scantlings of structural members, structural arrangement) is to be re-approved in accordance with the requirements of the applicable rules on the date of contract for major conversions. The following structures are to be approved:

① side shell and side structure;
② deck beams;
③ fore peak strengthening;
④ size and arrangement of cargo tanks of oil tankers;
⑤ plane oiltight bulkhead structure of oil tankers;
⑥ allowable hold loading of bulk carriers.

## 6.6 Anchoring equipment

6.6.1 General requirements

(1) Anchoring equipment is based on ship's displacement and the wind exposed area above the waterline. The equipment number letter will increase in connection with increased length *L*, breadth *B* or depth *D*, or additional superstructures or other new structures that increase the wind exposed area. In general, re-approval is to be carried out in accordance with the applicable requirements of the present rules, but deficiencies with regard to anchoring equipment may be accepted in accordance with 6.6.2.

6.6.2 Acceptable deficiencies

(1) Chain diameter: A reduction of 12% according to new letter for wear and corrosion is allowed.

(2) Chain length: No reduction is accepted.

(3) Anchor weight: A deficiency of 20% is accepted.

(4) Equipment deficiency is to be according to the new equipment letter at times of possible renewal after the conversion. Wear and tear limits are to be calculated according to the new equipment letter. A reference to this is to be noted in the memo of classification.

6.6.3 In case of increasing chain length, it is to be considered that the chain locker has adequate capacity.

# CHAPTER 7 MACHINERY AND ELECTRICAL INSTALLATIONS AND SYSTEMS

## 7.1 Application

7.1.1 This Chapter is applicable to ships which undergo major conversions as follows:

(1) a change of ship type;

(2) an alteration of main dimensions of a ship;

(3) a substantial increase of service life of a ship;

(4) a substantial alteration of type of main propulsion system, e.g. internal combustion engine altered to steam turbine.

## 7.2 Principles for application of the rules

7.2.1 Any addition or change related to machinery and electrical installations and systems of ships as required by the rules, due to major conversions of ships, is to comply with the present standards.

## 7.3 Plans and documents

7.3.1 For all changes with regard to machinery and electrical installations and systems of ships related to the rules due to major conversions of ships, relevant plans and documents are to be submitted.

# CHAPTER 8 CONTROL OF HULL CONVERSION PROJECT

## 8.1 Control of conversion technique

8.1.1 The shipbuilder is to develop a reasonable scheme of construction technique for structural modification, including removing and replacing sequence, welding sequence etc. The scheme is to be reviewed by the owner, the shipbuilder, the subcontractor, the designer, the representative from CCS and relevant experts. The review of the construction technique in general is to include:

(1) construction sequence of conversion;

(2) construction technique;

(3) welding scheme;

(4) relevant test requirements, including requirements for tightness test and inspection of welds in areas subject to high stress;

(5) result of stress analysis (if any);

(6) the standards and requirements for quality control of conversion.

8.1.2 Possible hazardous condition in the course of conversion of the ship is to be evaluated, which in general includes structural strength, structural stability and ship stability (if necessary). Safety precaution is to be taken as deemed necessary, in order to avoid instability of structure and significant deformation that cannot be restored during construction.

8.1.3 The shipbuilder is to measure and monitor structures liable to deformation in the course of conversion, so as to find abnormal deformation and instability of structure in time and take corrective and remedial measures as necessary. The scheme of construction technique is to include the extent of measurement and the monitoring measures.

8.1.4 The conversion technique is to give consideration to the measures of reducing original internal stress of structure after conversion of ship due to the following factors, so as to avoid damage to structure subject to excessive stress during operation of the ship:

(1) internal stress due to different forces on new and existing structures where substantial assembling and welding of structure are carried out for the ship in stressed condition;

(2) residual stress due to welding of structure, especially greater residual stress due to welding of structural members with greater degree of restraint;

(3) residual stress due to local contraction caused by thermal operation of structure;

(4) internal stress due to improper assembling of structure.

8.1.5 The following projects are to be carried out in dry dock or floating dock and to be specified in the scheme of construction technique, except under special circumstances:

(1) welding projects related to underwater shell plating;

(2) projects having a significant influence on the original internal stress of structure;

(3) corrective and remedial projects carried out in dock with regard to abnormal condition of structure.

**8.2 Requirements for structural construction**

8.2.1 The following surveys are to be carried out for ships undergoing conversion, prior to the commencement of ship conversion.

(1) The surveyor is to carry out a thorough examination of the hull structure. Where the condition of existing structure, which is outside the scope of the conversion project, is found unsatisfactory and the corrosion exceeds limits, a thorough repair is required to be carried out in conjunction with the conversion.

(2) The designer is to carry out a thorough inspection of the structural arrangement and theoretical line direction of the ship in order to revise the design as soon as practicable. The design for conversion is to be in line with the structural arrangement and theoretical line direction of a real ship.

8.2.2 Due attention is to be given to the following structural details during major conversions of ships:

(1) Good continuity is to be maintained between new and existing structures. Improper assembling and excessive gap are to be avoided.

(2) Scallop is to be avoided in way of structural members in areas subject to high stress as far as practicable. Where a temporary scallop is required by the technique or by other reasons, it is to be closed after completion of welding.

(3) For areas subject to high stress where there is a concentration of welding, appropriate measures of reducing residual stress are to be taken as follows:

① welding of lower heat;
② reasonable welding sequence;
③ assembling and fastening with lower degree of restraint, smaller assembling gap;
④ reduced amount of welding of sections on board;
⑤ other means as deemed appropriate.

(4) Where the measure of relieving residual stress is taken during welding, one or more of the following measures may be taken, based on the amount and concentration of welding:

① vibration and hammering of weld metal before cooling down of the bead;
② pre-warming (120℃-180℃);
③ post-weld heat treatment;
④ grinding of the weld;
⑤ ultrasonic percussion weld;
⑥ TIG welding remelting.

(5) In general, the method of distortion correction by flame is to be avoided for high strength steel structure. Where distortion correction by flame is used, the heating temperature is to be strictly controlled and not to exceed 650℃.

(6) The arrangement of piping and bracket is to comply with the accepted standards. The arrangement of bracket is to be such as to avoid affecting hull structure. Especially piping and bracket are not to be welded in way of openings of hull structure and free edges of plates.

8.2.3 Control of nodes in areas subject to high stress

(1) High stress level is to be considered for the accuracy of assembling where stress is transmitted between structural members. Where structural members along two directions intersect, the structural member that terminates at the continuous member is to be strictly aligned on both sides of the continuous member. The deviation $a \leqslant 0.15t_{min}$, $t_{min}$ = min.($t_1$, $t_2$). See Fig. 8.2.3(1).

(2) Deep penetration or full penetration welding is used at fillet welds along the direction of greater force, e.g. toe end of bracket, end of girder etc. See Fig. 8.2.3(2).

(3) Lap joint is to be avoided at connections of structural members subject to high stress.

(4) For structural members subject to high stress, the free edges are to be smooth and to be ground as necessary.

(5) Both sides of the face plate in way of ends of structural members are to be sniped with an angle as smooth as possible. It is to be sniped along the direction of plate thickness as necessary. The reinforcement of web in way of ends of structural members is to be reduced as far as practicable. If deemed necessary, it is to be elongated by electric welding. See Fig.8.2.3(3).

(6) Special consideration is to be given to the shape of opening in way of structural members subject to high stress. The edge of opening is to be ground. The scallop in way of heel of structural member is to be soft heel. See Fig.8.2.3(4).

(7) Special attention is to be given to weld profile in way of areas subject to high stress. Poor weld profile is to be avoided (e.g. grinding the weld smooth).

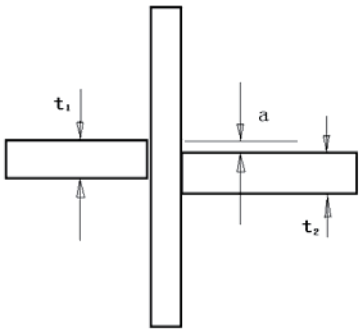


**Fig. 8.2.3(1)**

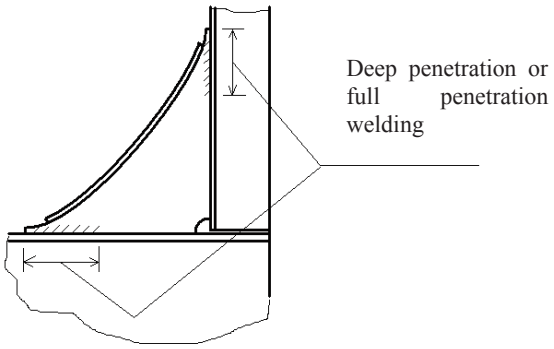


**Fig. 8.2.3(2)**

**Fig. 8.2.3(3)**

**Fig. 8.2.3(4) Scallop of soft heel**

Note: The above figures are for reference only.

### 8.3 Loading plan

8.3.1 For bulk carriers and ore carriers of 150,000 tonnes deadweight and above, or other ships as deemed necessary by CCS, the following loading plan may be taken into consideration:

(1) Appropriate loading plan may be developed after conversion for safe relief of residual stress of structure. Reasonable loading capacity and loading times are to be specified in the plan. The principle of the loading plan is as follows: the loading capacity is increased gradually until reaching full load and loading times are in general not less than 3 times.

(2) The loading plan and follow-up survey plan is to be developed by the owner after consultation with CCS surveyors.

8.3.2 In addition to the provisions of 8.3.1, loading is to be suitably decreased for any other ships after conversion during the first three voyages, and due consideration is to be given to the times of loading, for the purpose of safety.

8.3.3 In any case, the owner is responsible for enhancing inspections of critical components of the ship during at least the first three voyages after conversion of the ship. Any unusual condition is to be reported to CCS as soon as possible.

# Appendix 1

## Provisions of the applicable standards for conversion of oil tankers to ore carriers, bulk carriers and double hull oil tankers

### 1 Application

1.1 This Appendix is only applicable to conversion of single hull oil tankers to ore carriers, bulk carriers and double hull oil tankers.

1.2 This Appendix specifies the rule requirements for conversion of single hull oil tankers to ore carriers, bulk carriers and double hull oil tankers, including corresponding class notations intended to be assigned, applicable requirements of SOLAS, MARPOL and ILLC regulations and other statutory requirements.

### 2 General requirements

2.1 The substantial new structures of the ship are to comply with the requirements of SOLAS Regulation II-1/3-6 for means of access for inspections. PMA is not required for original structure (such as longitudinal bulkheads) moving to a new position, unless required by the flag State Administration.

2.2 Where aggregate capacity of oil fuel tanks of the whole ship exceeds 600m$^3$ due to newly installed oil fuel tank, oil fuel tanks are to comply with requirements for oil fuel tank protection specified in MARPOL.

### 3 Conversion of single hull oil tankers to ore carriers

3.1 Single hull oil tankers converted to ore carriers will be assigned class notation of "Ore Carrier".

3.2 The hull structure is to comply with the requirements for ore carriers in Chapter 16, PART TWO of the present CCS Rules for Classification of Sea-going Steel Ships and the requirements of Plan Approval Principles for Hull Structure of Large Ore Carriers (Fine mesh analysis, fatigue strength assessment and ultimate strength may not be required).

3.3 Refer to Table 1 and Table 2 respectively for relevant provisions of SOLAS, MARPOL, ILLC and applicable requirements of IACS UR.

### 4 Conversion of oil tankers to bulk carriers

4.1 Oil tankers which were constructed before 1 April 2006 converted to bulk carriers will be assigned class notation of "Bulk Carrier".

4.2 For converted bulk carriers, where the hull structure of the modified parts is a full new one, CSR requirements are to be complied with, and the unmodified parts are to comply with the requirements for bulk carriers in Chapter 8, PART TWO of the present CCS Rules for Classification of Sea-going Steel Ships and the requirements of Guidelines for Hull Structure of Double Side Skin Bulk Carriers, as well as SOLAS requirements relating to carriage of cargoes; where the hull structure of the modified parts is a partial modification, both the modified parts and the unmodified parts are to comply with the requirements for bulk carriers in Chapter 8, PART TWO of the present CCS Rules for Classification of Sea-going Steel Ships and the requirements of Guidelines for Hull Structure of Double Side Skin Bulk Carriers, as well as SOLAS requirements relating to carriage of cargoes.

4.3 Refer to Table 1 and Table 2 respectively for applicable requirements of SOLAS Chapter XII and IACS UR.

4.4 Ships complying with the requirements for strengthened for heavy cargoes in Section 22, Chapter 2, PART TWO of CCS Rules for Classification of Sea-going Steel Ships may be assigned class notation of “Strengthened for Heavy Cargoes”.

4.5 Ships complying with the requirements for strengthening for grabs in Section 23, Chapter 2, PART TWO of CCS Rules for Classification of Sea-going Steel Ships may be assigned class notation of “GRAB (X)”.

**Requirements for conversion of single hull oil tankers to ore carriers, bulk carriers and double hull oil tankers**

**Table 1**

| Standards | Applicability | | | Remarks |
|---|---|---|---|---|
| | Ore carriers | Bulk carriers | Double hull oil tankers | |
| SOLAS II-1 | | | | |
| Regulation 3-2.2 and 3-2.4 Corrosion prevention of seawater ballast tanks | Applicable | Applicable | Applicable | MSC.216(82) applies to seawater ballast tanks and double side skin space if constructed with all structural members being entirely new |
| Regulation 3-2.3 Corrosion prevention of seawater ballast tanks | Applicable | Applicable | Applicable | If seawater ballast tanks and double side skin space are not entirely new, MSC.47(66) is to be applied |
| Regulation 3-6 Means of access for inspections | Applicable | Applicable | Applicable | Only applicable to substantial new structures |
| Regulation 3-8 Towing and mooring equipment | Applicable | Applicable | Applicable | See Table 2/IACS UR A2 |
| Regulation 5—Regulation 7-3 Damage stability (Part B-1) | Applicable | Applicable | May be waived | Oil tankers complying with MARPOL may be exempted from this requirement |
| Regulation 9 Double bottoms (Part B-2) | Applicable | Applicable | Not relevant | Only applicable to new integral structures substantially modified |
| Regulation 12 Peak and machinery space bulkheads (Part B-2) | Applicable | Applicable | Applicable | Only applicable to new integral structures substantially modified |
| Regulation 10, 11, 13-1, 15-1, 16 and 16-1 Tightness of openings, bulkhead test (Part B-2) | Applicable | Applicable | Applicable | |
| Regulation 19 and 24 Damage control and control of water ingress (Part B-4) | Applicable | Applicable | Applicable | |
| SOLAS II-2 Fire fighting | Applicable | Applicable | Applicable | Only applicable to newly modified parts |
| SOLAS III | | | | |
| Regulation 31.1.1.8 Free-fall lifeboat | Not applicable | Not applicable | Not relevant | |
| SOLAS V | | | | |
| Regulation 22 | Applicable | Applicable | Applicable | Consideration is needed where any changes are made to the fore end structural arrangement during conversion |

| Standards | Applicability | | | Remarks |
|---|---|---|---|---|
| | Ore carriers | Bulk carriers | Double hull oil tankers | |
| SOLAS XII | | | | |
| Regulation 4 Damage stability requirements applicable to bulk carriers | Not applicable | Applicable when the breadth of wing tank is less than B/5 | Not relevant | ① The wing tank of ore carrier is generally greater than B/5 |
| Regulation 5 Structural strength of bulk carriers | Not applicable | Applicable when the breadth of wing tank is less than B/5 | Not relevant | ① See IACS UR S17, S18 & S20<br>② The wing tank of ore carrier is generally greater than B/5 |
| Regulation 6.1 Structural strength requirements for existing single side skin bulk carriers | Not applicable | Only applicable to ships of single side skin structure | Not relevant | |
| Regulation 6.2.1 Construction of double side skin | Applicable | Applicable | Not relevant | |
| Regulation 6.2.2 Construction of double side skin | Only applicable to new structure | Only applicable to new structure | Not relevant | New structure is newly added integral longitudinal bulkhead structure. Transverse movement of original longitudinal bulkhead is not regarded as new structure |
| Regulation 6.3 Coating requirements | Applicable | | Not relevant | Regulation of Chapter XII of SOLAS 2006. See also Regulation II-1/3-2 of SOLAS |
| Regulation 6.4 No cargo carriage for double side skin spaces | Applicable | | Not relevant | Regulation of Chapter XII of SOLAS 2006 |
| Regulation 6.5.1 Protection of cargo hatch | Applicable | | Not relevant | Regulation of Chapter XII of SOLAS 2006 |
| Regulation 6.5.2 Continuity of shell plating and side structure | Applicable | | Not relevant | Regulation of Chapter XII of SOLAS 2006 |
| Regulation 6.5.3 Requirements for structural redundancy | Only applicable to new structure | | Not relevant | Regulation of Chapter XII of SOLAS 2006 |
| Regulation 7.1 Restrictions for existing single side skin bulk carriers carrying cargoes having a density of 1.78kg/$m^3$ | Not applicable | | Not relevant | |
| Regulation 7.2 Requirements for maintenance | Applicable | | Not relevant | |
| Regulation 8 Information on compliance with requirements for bulk carriers | Applicable | | Not relevant | |

| Standards | Applicability | | | Remarks |
|---|---|---|---|---|
| | Ore carriers | Bulk carriers | Double hull oil tankers | |
| Regulation 9 Requirements for bulk carriers not being capable of complying with regulation 4.3 due to the design configuration of their cargo holds | Not applicable | | Not relevant | |
| Regulation 10 Solid bulk cargo density declaration | Applicable | | Not relevant | |
| Regulation 11 Loading instrument | Applicable | | Not relevant | |
| Regulation 12 Hold, ballast and dry space water ingress alarm | Applicable | | Not relevant | |
| Regulation 13 Availability of pumping systems | Applicable | | Not relevant | |
| Regulation 14 Restrictions from sailing with any hold empty | Not applicable | | Not relevant | |
| MARPOL Annex I | | | | |
| Regulation 12A oil fuel tank protection | Applicable | | Applicable | Where aggregate capacity of oil fuel tanks of the whole ship exceeds 600m$^3$ due to newly installed oil fuel tank, oil fuel tanks are to comply with requirements for oil fuel tank protection specified in MARPOL |
| ILLC Annex I | | | | |
| Regulation 15 and 16 Strength and tightness of hatchways | Applicable | | Not applicable | Only applicable to all newly added or substantially modified hatchway structures |
| Regulation 22-2 Spurling pipes and cable lockers | Applicable | | Applicable | Only applicable to newly added or substantially modified new cable lockers |
| Regulation 25 and 25-1 Protection of the crew | Applicable | | Applicable | |
| Regulation 39 Minimum bow height and reserve buoyancy | Applicable | | Applicable | Oil tankers need not comply with the requirement for bow reserve buoyancy |
| Others | Applicable | | Applicable | |

**Requirements of IACS UR for conversion of single hull oil tankers to ore carriers, bulk carriers or double hull oil tankers**

**Table 2**

| IACS UR | Applicability | | | Corresponding chapters and sections in CCS Rules for Classification of Sea-going Steel Ships | Remarks |
|---|---|---|---|---|---|
| | Ore carriers | Bulk carriers | Double hull oil tankers | | |
| S1 Requirements for loading conditions, loading manuals and loading instruments | Applicable | Applicable | Applicable | Longitudinal strength in Section 2, Chapter 2, PART TWO | |
| S1A Additional requirements for loading conditions, loading manuals and loading instruments for bulk carriers, ore carriers and combination carriers | Applicable | Applicable | Not applicable | Additional requirements for loading manuals and loading instruments in Section 7, Chapter 8, PART TWO | |
| S2 Definition of ship's length $L$ and of block coefficient $C_b$ | Applicable | Applicable | Applicable | General provisions in Section 1, Chapter 1, PART TWO | |
| S3 Strength of end bulkheads of superstructures and deckhouses | Only applicable to new structure | Only applicable to new structure | Only applicable to new structure | Superstructures and deckhouses in Section 17, Chapter 8, PART TWO | |
| S4 Criteria for the use of high tensile steel with minimum yield stress of 315 $N/mm^2$, 355 $N/mm^2$ and 390 $N/mm^2$ | Applicable | Applicable | Applicable | Application of higher tensile steel in Section 5, Chapter 1, PART TWO | |
| S5 Calculation of midship section moduli for conventional ship for ship's scantlings | Applicable | Applicable | Applicable | Longitudinal strength in Section 2, Chapter 2, PART TWO | |
| S6 Use of steel grades for various hull members -ships of 90 m in length and above | Only applicable to new structure | Only applicable to new structure | Only applicable to new structure | Hull structural steel in Section 3, Chapter 1, PART TWO | |
| S7 Minimum longitudinal strength standards | Applicable | Applicable | Applicable | Longitudinal strength in Section 2, Chapter 2, PART TWO | |
| S10 Rudders, sole pieces and rudder horns | Only applicable to new structure | Only applicable to new structure | Only applicable to new structure | Equipment and outfits in Chapter 3, PART TWO | |
| S11 Longitudinal strength standard | Applicable | Applicable | Applicable | Longitudinal strength in Section 2, Chapter 2, PART TWO | |

| IACS UR | Applicability | | | Corresponding chapters and sections in CCS Rules for Classification of Sea-going Steel Ships | Remarks |
|---|---|---|---|---|---|
| | Ore carriers | Bulk carriers | Double hull oil tankers | | |
| S12 Side structures in single side skin bulk carriers | Not applicable | Applicable to single side skin structure | Not applicable | Side framing in Section 3, Chapter 8, PART TWO | |
| S14 Testing procedures of watertight compartments | Only applicable to new structure and compartments where a large amount of steel structure is replaced | Only applicable to new structure and compartments where a large amount of steel structure is replaced | Only applicable to new structure and compartments where a large amount of steel structure is replaced | Tightness testing of compartments in Section 3, Chapter 4, PART ONE | |
| S17 Longitudinal strength of hull girder in flooded condition for bulk carriers | Not applicable | Applicable when the breadth of wing tank is less than B/5 | Not applicable | Longitudinal strength in flooded condition in Section 8, Chapter 8, PART TWO | The wing tank of ore carrier is generally greater than B/5 |
| S18 Evaluation of scantlings of corrugated transverse watertight bulkheads in bulk carriers considering hold flooding | Not applicable | Applicable to corrugated bulkheads when the breadth of wing tank is less than B/5 | Not applicable | Strength of corrugated transverse watertight bulkheads in hold-flooded conditions in Section 9, Chapter 8, PART TWO | The wing tank of ore carrier is generally greater than B/5 |
| S20 Evaluation of allowable hold loading for bulk carriers considering hold flooding | Not applicable | Applicable when the breadth of wing tank is less than B/5 | Not applicable | Allowable hold loading considering hold flooding in Section 10, Chapter 8, PART TWO | The wing tank of ore carrier is generally greater than B/5 |
| S21 Evaluation of scantlings of hatch covers and hatch coamings of cargo holds of bulk carriers, ore carriers and combination carriers | Applicable | Applicable | Not applicable | Evaluation of scantlings of hatch covers of cargo holds in Section 11, Chapter 8, PART TWO | |
| S25 Harmonized notations and corresponding design loading conditions for bulk carriers | Not applicable | Applicable | Not applicable | Harmonized notations and corresponding design loading conditions for bulk carriers in Section 12, Chapter 8, PART TWO | |

| IACS UR | Applicability | | | Corresponding chapters and sections in CCS Rules for Classification of Sea-going Steel Ships | Remarks |
|---|---|---|---|---|---|
| | Ore carriers | Bulk carriers | Double hull oil tankers | | |
| S26 Strength and securing of small hatches on the exposed fore deck | Applicable | Applicable | Applicable | Fore deck fittings in Section 7, Chapter 1, PART TWO | |
| S27 Strength requirements for fore deck fittings and equipment | Applicable | Applicable | Applicable | Fore deck fittings in Section 7, Chapter 1, PART TWO | |
| S28 Requirements for the fitting of a forecastle for bulk carriers, ore carriers and combination carriers | Not applicable provided that provisions of Regulation 39 of ICLL are complied with | Not applicable provided that provisions of Regulation 39 of ICLL are complied with | Not applicable | Requirements for the fitting of a forecastle in Section 13, Chapter 8, PART TWO | |
| S31 Renewal criteria for side shell frames and brackets in single side skin bulk carriers and single side skin OBO carriers not built in accordance with UR S12 Rev.1 or subsequent revisions | Not applicable | Not applicable | Not applicable | Appendix 20 of PART ONE | |
| A1 Equipment | Only applicable to modified equipment, fittings and structure | Only applicable to modified equipment, fittings and structure | Only applicable to modified equipment, fittings and structure | Anchoring and mooring equipment in Section 2, Chapter 3, PART TWO | Modified new equipment number is only applicable to equipment, fittings and supporting structures which are modified or renewed during the conversion. |
| A2 Shipboard fittings and supporting hull structures associated with towing and mooring on conventional vessels | Only applicable to modified equipment, fittings and structure | Only applicable to modified equipment, fittings and structure | Only applicable to modified equipment, fittings and structure | Shipboard equipment, fittings and supporting hull structures associated with towing and mooring in Section 6, Chapter 3, PART TWO | Only when the existing equipment and fittings are rearranged, A2 may only be applicable to supporting structure. Unless towing/ mooring equipment and fittings are fully replaced or modified, no SWL identification and towing /mooring arrangement is needed |
| L2 Intact stability - matter of class | Applicable | Applicable | Applicable | Intact stability in Section 9, Chapter 1, PART TWO | |

| IACS UR | Applicability | | | Corresponding chapters and sections in CCS Rules for Classification of Sea-going Steel Ships | Remarks |
|---|---|---|---|---|---|
| | Ore carriers | Bulk carriers | Double hull oil tankers | | |
| L4 Closure of Chain Lockers | Only applicable to all newly added or substantially modified hatchway structures | Only applicable to all newly added or substantially modified hatchway structures | Only applicable to all newly added or substantially modified hatchway structures | Structural arrangement in Section 12, Chapter 1, PART TWO | |
| L5 Onboard computers for stability calculations | Applicable | Applicable | Applicable | Intact stability in Section 9, Chapter 1, PART TWO and IACS UR L5 onboard computes for stability calculations in Appendix 2 of Chapter 2, PART TWO | |