



Tentative Rules for Structural Assessment of Steel Ships

NR646

ADDENDUM

July 2020

These sheets contain additional requirements to September 2019 issue of the *Tentative Rules for Structural Assessment of Steel Ships*. The following Chapter 11 is added to NR646, Part D:

Part D, Chapter 11

Passenger Ships

This document covers ships, intended for the carriage of passenger, with the service notation passenger ship, as defined in NR467, Pt A, Ch 1, Sec 2. This document may however be used for exploratory assessment of other kinds of ships, after agreement with the Society in order to settle the general principles and possible specificities for the concerned ship.

This document is to be read in conjunction with the above mentioned Tentative Rules, as amended, and with Chapter 11 of NR467, Part D, for Sections and Appendices which are not currently detailed in the Tentative Rules.

This document being a Tentative Rules, it is to be applied for Classification purpose on a voluntary basis in lieu of the applicable edition of NR467, only for the covered service notations as mentioned above and after agreement with the Society.



GENERAL CONDITIONS

1. INDEPENDENCE OF THE SOCIETY AND APPLICABLE TERMS

- 1.1 The Society shall remain at all times an independent contractor and neither the Society nor any of its officers, employees, servants, agents or subcontractors shall be or act as an employee, servant or agent of any other party hereto in the performance of the Services.
- 1.2 The operations of the Society in providing its Services are exclusively conducted by way of random inspections and do not, in any circumstances, involve monitoring or exhaustive verification.
- 1.3 The Society acts as a services provider. This cannot be construed as an obligation bearing on the Society to obtain a result or as a warranty. The Society is not and may not be considered as an underwriter, broker in Unit's sale or chartering, expert in Unit's valuation, consulting engineer, controller, naval architect, designer, manufacturer, shipbuilder, repair or conversion yard, charterer or shipowner; none of them above listed being relieved of any of their expressed or implied obligations as a result of the interventions of the Society.
- 1.4 The Society only is qualified to apply and interpret its Rules.
- 1.5 The Client acknowledges the latest versions of the Conditions and of the applicable Rules applying to the Services' performance.
- 1.6 Unless an express written agreement is made between the Parties on the applicable Rules, the applicable Rules shall be the Rules applicable at the time of entering into the relevant contract for the performance of the Services.
- 1.7 The Services' performance is solely based on the Conditions. No other terms shall apply whether express or implied.

2. DEFINITIONS

- 2.1 "Certificate(s)" means classification or statutory certificates, attestations and reports following the Society's intervention.
- 2.2 "Certification" means the activity of certification in application of national and international regulations or standards, in particular by delegation from different governments that can result in the issuance of a Certificate.
- 2.3 "Classification" means the classification of a Unit that can result or not in the issuance of a classification Certificate with reference to the Rules. Classification is an appraisal given by the Society to the Client, at a certain date, following surveys by its surveyors on the level of compliance of the Unit to the Society's Rules or to the documents of reference for the Services provided. They cannot be construed as an implied or express warranty of safety, fitness for the purpose, seaworthiness of the Unit or of its value for sale, insurance or chartering.
- 2.4 "Client" means the Party and/or its representative requesting the Services.
- 2.5 "Conditions" means the terms and conditions set out in the present document.
- 2.6 "Industry Practice" means international maritime and/or offshore industry practices.
- 2.7 "Intellectual Property" means all patents, rights to inventions, utility models, copyright and related rights, trade marks, logos, service marks, trade dress, business and domain names, rights in trade dress or get-up, rights in goodwill or to sue for passing off, unfair competition rights, rights in designs, rights in computer software, database rights, topography rights, moral rights, rights in confidential information (including know-how and trade secrets), methods and protocols for Services, and any other intellectual property rights, in each case whether capable of registration, registered or unregistered and including all applications for and renewals, reversions or extensions of such rights, and all similar or equivalent rights or forms of protection in any part of the world.
- 2.8 "Parties" means the Society and Client together.
- 2.9 "Party" means the Society or the Client.
- 2.10 "Register" means the public electronic register of ships updated regularly by the Society.
- 2.11 "Rules" means the Society's classification rules and other documents. The Society's Rules take into account at the date of their preparation the state of currently available and proven technical minimum requirements but are not a standard or a code of construction neither a guide for maintenance, a safety handbook or a guide of professional practices, all of which are assumed to be known in detail and carefully followed at all times by the Client.
- 2.12 "Services" means the services set out in clauses 2.2 and 2.3 but also other services related to Classification and Certification such as, but not limited to: ship and company safety management certification, ship and port security certification, maritime labour certification, training activities, all activities and duties incidental thereto such as documentation on any supporting means, software, instrumentation, measurements, tests and trials on board. The Services are carried out by the Society according to the applicable referential and to the Bureau Veritas' Code of Ethics. The Society shall perform the Services according to the applicable national and international standards and Industry Practice and always on the assumption that the Client is aware of such standards and Industry Practice.
- 2.13 "Society" means the classification society 'Bureau Veritas Marine & Offshore SAS', a company organized and existing under the laws of France, registered in Nanterre under number 821 131 844, or any other legal entity of Bureau Veritas Group as may be specified in the relevant contract, and whose main activities are Classification and Certification of ships or offshore units.
- 2.14 "Unit" means any ship or vessel or offshore unit or structure of any type or part of it or system whether linked to shore, river bed or sea bed or not, whether operated or located at sea or in inland waters or partly on land, including submarines, hovercrafts, drilling rigs, offshore installations of any type and of any purpose, their related and ancillary equipment, subsea or not, such as well head and pipelines, mooring legs and mooring points or otherwise as decided by the Society.

3. SCOPE AND PERFORMANCE

- 3.1 Subject to the Services requested and always by reference to the Rules, the Society shall:
 - review the construction arrangements of the Unit as shown on the documents provided by the Client;
 - conduct the Unit surveys at the place of the Unit construction;
 - class the Unit and enter the Unit's class in the Society's Register;
 - survey the Unit periodically in service to note whether the requirements for the maintenance of class are met.The Client shall inform the Society without delay of any circumstances which may cause any changes on the conducted surveys or Services.
- 3.2 The Society will not:
 - declare the acceptance or commissioning of a Unit, nor its construction in conformity with its design, such activities remaining under the exclusive responsibility of the Unit's owner or builder;
 - engage in any work relating to the design, construction, production or repair checks, neither in the operation of the Unit or the Unit's trade, neither in any advisory services, and cannot be held liable on those accounts.

4. RESERVATION CLAUSE

- 4.1 The Client shall always: (i) maintain the Unit in good condition after surveys; (ii) present the Unit for surveys; and (iii) inform the Society in due time of any circumstances that may affect the given appraisal of the Unit or cause to modify the scope of the Services.
- 4.2 Certificates are only valid if issued by the Society.
- 4.3 The Society has entire control over the Certificates issued and may at any time withdraw a Certificate at its entire discretion including, but not limited to, in the following situations: where the Client fails to comply in due time with instructions of the Society or where the Client fails to pay in accordance with clause 6.2 hereunder.
- 4.4 The Society may at times and at its sole discretion give an opinion on a design or any technical element that would 'in principle' be acceptable to the Society. This opinion shall not presume on the final issuance of any Certificate or on its content in the event of the actual issuance of a Certificate. This opinion shall only be an appraisal made by the Society which shall not be held liable for it.

5. ACCESS AND SAFETY

- 5.1 The Client shall give to the Society all access and information necessary for the efficient performance of the requested Services. The Client shall be the sole responsible for the conditions of presentation of the Unit for tests, trials and surveys and the conditions under which tests and trials are carried out. Any information, drawing, etc. required for the performance of the Services must be made available in due time.
- 5.2 The Client shall notify the Society of any relevant safety issue and shall take all necessary safety-related measures to ensure a safe work environment for the Society or any of its officers, employees, servants, agents or subcontractors and shall comply with all applicable safety regulations.

6. PAYMENT OF INVOICES

- 6.1 The provision of the Services by the Society, whether complete or not, involve, for the part carried out, the payment of fees thirty (30) days upon issuance of the invoice.

6.2 Without prejudice to any other rights hereunder, in case of Client's payment default, the Society shall be entitled to charge, in addition to the amount not properly paid, interests equal to twelve (12) months LIBOR plus two (2) per cent as of due date calculated on the number of days such payment is delinquent. The Society shall also have the right to withhold Certificates and other documents and/or to suspend or revoke the validity of Certificates.

6.3 In case of dispute on the invoice amount, the undisputed portion of the invoice shall be paid and an explanation on the dispute shall accompany payment so that action can be taken to solve the dispute.

7. LIABILITY

- 7.1 The Society bears no liability for consequential loss. For the purpose of this clause consequential loss shall include, without limitation:
 - Indirect or consequential loss;
 - Any loss and/or deferral of production, loss of product, loss of use, loss of bargain, loss of revenue, loss of profit or anticipated profit, loss of business and business interruption, in each case whether direct or indirect.The Client shall defend, release, save, indemnify, defend and hold harmless the Society from the Client's own consequential loss regardless of cause.
- 7.2 Except in case of wilful misconduct of the Society, death or bodily injury caused by the Society's negligence and any other liability that could not be, by law, limited, the Society's maximum liability towards the Client is limited to one hundred and fifty per-cents (150%) of the price paid by the Client to the Society for the Services having caused the damage. This limit applies to any liability of whatsoever nature and howsoever arising, including fault by the Society, breach of contract, breach of warranty, tort, strict liability, breach of statute.
- 7.3 All claims shall be presented to the Society in writing within three (3) months of the completion of Services' performance or (if later) the date when the events which are relied on were first discovered by the Client. Any claim not so presented as defined above shall be deemed waived and absolutely time barred.

8. INDEMNITY CLAUSE

8.1 The Client shall defend, release, save, indemnify and hold harmless the Society from and against any and all claims, demands, lawsuits or actions for damages, including legal fees, for harm or loss to persons and/or property tangible, intangible or otherwise which may be brought against the Society, incidental to, arising out of or in connection with the performance of the Services (including for damages arising out of or in connection with opinions delivered according to clause 4.4 above) except for those claims caused solely and completely by the gross negligence of the Society, its officers, employees, servants, agents or subcontractors.

9. TERMINATION

- 9.1 The Parties shall have the right to terminate the Services (and the relevant contract) for convenience after giving the other Party thirty (30) days' written notice, and without prejudice to clause 6 above.
- 9.2 In such a case, the Classification granted to the concerned Unit and the previously issued Certificates shall remain valid until the date of effect of the termination notice issued, subject to compliance with clause 4.1 and 6 above.
- 9.3 In the event where, in the reasonable opinion of the Society, the Client is in breach, or is suspected to be in breach of clause 16 of the Conditions, the Society shall have the right to terminate the Services (and the relevant contracts associated) with immediate effect.

10. FORCE MAJEURE

- 10.1 Neither Party shall be responsible or liable for any failure to fulfil any term or provision of the Conditions if and to the extent that fulfilment has been delayed or temporarily prevented by a force majeure occurrence without the fault or negligence of the Party affected and which, by the exercise of reasonable diligence, the said Party is unable to provide against.
- 10.2 For the purpose of this clause, force majeure shall mean any circumstance not being within a Party's reasonable control including, but not limited to: acts of God, natural disasters, epidemics or pandemics, wars, terrorist attacks, riots, sabotages, impositions of sanctions, embargoes, nuclear, chemical or biological contaminations, laws or action taken by a government or public authority, quotas or prohibition, expropriations, destructions of the worksite, explosions, fires, accidents, any labour or trade disputes, strikes or lockouts.

11. CONFIDENTIALITY

- 11.1 The documents and data provided to or prepared by the Society in performing the Services, and the information made available to the Society, are treated as confidential except where the information:
 - is properly and lawfully in the possession of the Society;
 - is already in possession of the public or has entered the public domain, otherwise than through a breach of this obligation;
 - is acquired or received independently from a third party that has the right to disseminate such information;
 - is required to be disclosed under applicable law or by a governmental order, decree, regulation or rule or by a stock exchange authority (provided that the receiving Party shall make all reasonable efforts to give prompt written notice to the disclosing Party prior to such disclosure).
- 11.2 The Parties shall use the confidential information exclusively within the framework of their activity underlying these Conditions.
- 11.3 Confidential information shall only be provided to third parties with the prior written consent of the other Party. However, such prior consent shall not be required when the Society provides the confidential information to a subsidiary.
- 11.4 Without prejudice to sub-clause 11.1, the Society shall have the right to disclose the confidential information if required to do so under regulations of the International Association of Classifications Societies (IACS) or any statutory obligations.

12. INTELLECTUAL PROPERTY

- 12.1 Each Party exclusively owns all rights to its Intellectual Property created before or after the commencement date of the Conditions and whether or not associated with any contract between the Parties.
- 12.2 The Intellectual Property developed by the Society for the performance of the Services including, but not limited to drawings, calculations, and reports shall remain the exclusive property of the Society.

13. ASSIGNMENT

- 13.1 The contract resulting from these Conditions cannot be assigned or transferred by any means by a Party to any third party without the prior written consent of the other Party.
- 13.2 The Society shall however have the right to assign or transfer by any means the said contract to a subsidiary of the Bureau Veritas Group.

14. SEVERABILITY

- 14.1 Invalidity of one or more provisions does not affect the remaining provisions.
- 14.2 Definitions herein take precedence over other definitions which may appear in other documents issued by the Society.
- 14.3 In case of doubt as to the interpretation of the Conditions, the English text shall prevail.

15. GOVERNING LAW AND DISPUTE RESOLUTION

- 15.1 These Conditions shall be construed and governed by the laws of England and Wales.
- 15.2 The Parties shall make every effort to settle any dispute amicably and in good faith by way of negotiation within thirty (30) days from the date of receipt by either one of the Parties of a written notice of such a dispute.
- 15.3 Failing that, the dispute shall finally be settled under the Rules of Arbitration of the Maritime Arbitration Chamber of Paris ("CAMP"), which rules are deemed to be incorporated by reference into this clause. The number of arbitrators shall be three (3). The place of arbitration shall be Paris (France). The Parties agree to keep the arbitration proceedings confidential.

16. PROFESSIONAL ETHICS

- 16.1 Each Party shall conduct all activities in compliance with all laws, statutes, rules, economic and trade sanctions (including but not limited to UN sanctions and EU sanctions) and regulations applicable to such Party including but not limited to: child labour, forced labour, collective bargaining, discrimination, abuse, working hours and minimum wages, anti-bribery, anti-corruption, copyright and trademark protection, personal data protection (<https://personaldataprotection.bureauveritas.com/privacypolicy>).
- Each of the Parties warrants that neither it, nor its affiliates, has made or will make, with respect to the matters provided for hereunder, any offer, payment, gift or authorization of the payment of any money directly or indirectly, to or for the use or benefit of any official or employee of the government, political party, official, or candidate.
- 16.2 In addition, the Client shall act consistently with the Bureau Veritas' Code of Ethics. <https://group.bureauveritas.com/group/corporate-social-responsibility>

Part D
Service Notations

Chapter 11

PASSENGER SHIPS

SECTION 2 PASSENGER SHIPS - SHIP ARRANGEMENT

SECTION 3 PASSENGER SHIPS - HULL AND STABILITY

PART D, CHAPTER 11

PASSENGER SHIPS

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SECTION 2

PASSENGER SHIPS - SHIP ARRANGEMENT

1 General

1.1 Definitions

1.1.1 Deepest subdivision load line

Deepest subdivision load line is the waterline which corresponds to the summer load line of the ship.

1.1.2 Passenger spaces

Passenger spaces are those spaces which are provided for the accommodation and use of passengers, excluding baggage, store, provision and mail rooms.

In all cases volumes and areas are to be calculated to moulded lines.

2 General arrangement design

2.1 Openings in watertight bulkheads below the bulkhead deck

2.1.1 Openings in machinery spaces

Not more than one door apart from the doors to shaft tunnels may be fitted in each watertight bulkhead within spaces containing the main and auxiliary propulsion machinery including boilers serving the needs of propulsion. Where two or more shafts are fitted the tunnels are to be connected by an inter-communicating passage. Only one door is to be provided between the machinery space and the tunnel spaces where two shafts are fitted and only two doors where there are more than two shafts. All these doors are to be of the sliding type and are to be so located as to have their sills as high as practicable. The hand gear for operating these doors from above the bulkhead deck is to be situated outside the spaces containing the machinery. Portable plates on bulkheads are not permitted except in machinery spaces. Such plates are always to be in place before the voyage commences, and are not to be removed during navigation except in the case of urgent necessity at the discretion of the Master. The necessary precautions are to be taken in replacing them to ensure that the joints are watertight. The Society may permit not more than one power-operated sliding watertight door in each watertight bulkhead larger than 1,20 m to be substituted for these portable plates, provided these doors are intended to remain closed during navigation except in the case of urgent necessity at the discretion of the Master. These doors need not meet the requirements of complete closure by hand-operated gear in 90 seconds (see [2.3.3] e).

2.1.2 Openings in cargo spaces

Watertight doors complying with the requirements of [2.3.1] may be fitted in watertight bulkheads dividing cargo between deck spaces. Such doors may be hinged, rolling or sliding doors but are not to be remotely controlled. They are

to be fitted at the highest level and as far from the shell plating as practicable, but in no case are the outboard vertical edges to be situated at a distance from the shell plating which is less than one fifth of the breadth of the ship, such distance being measured at right angles to the centreline at the level of the deepest subdivision load line.

The doors accessible during the voyage are to be fitted with a device which prevents unauthorised opening. When it is proposed to fit such doors, the number and arrangements are to receive the special consideration of the Society.

2.1.3 Openings in passenger ships carrying goods vehicles and accompanying personnel

This requirement applies to passenger ships designed or adapted for the carriage of goods vehicles and accompanying personnel where the total number of persons on board, other than passengers as defined in NR467, Pt A, Ch 1, Sec 2, [4.5.2], exceeds 12.

If in such a ship the total number of passengers which include personnel accompanying vehicles does not exceed:

$$N = 12 + \frac{A}{25}$$

where:

N : Maximum number of passengers for which the ship is certified

A : Total deck area, in m², of spaces available for the stowage of goods vehicles,

and where the clear height at the stowage position and at the entrance to such spaces is not less than 4 m, the provisions of [2.1.2] in respect of watertight doors apply except that the doors may be fitted at any level in watertight bulkheads dividing cargo spaces.

Additionally, indicators are required on the navigating bridge to show automatically when each door is closed and all door fastenings are secured.

2.1.4 Trunks and tunnels

Where trunkways or tunnels for access from crew accommodation to the stokehold, for piping, or for any other purpose are carried through watertight bulkheads, they are to be watertight and in accordance with the requirements of Pt B, Ch 4, Sec 5, [10.5]. The access to at least one end of each such tunnel or trunkway, if used as a passage at sea, is to be through a trunk extending watertight to a height sufficient to permit access above the bulkhead deck. The access to the other end of the trunkway or tunnel may be through a watertight door of the type required by its location in the ship. Such trunkways or tunnels are not to extend through the first subdivision bulkhead abaft the collision bulkhead.

Where trunkways in connection with refrigerated cargo and ventilation or forced draught trunks are carried through more than one watertight bulkhead, the means of closure at such openings are to be operated by power and be capable

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of being closed from a central position situated above the bulkhead deck.

Where a ventilation trunk passing through a structure penetrates a watertight area of the bulkhead deck, the trunk is to be capable of withstanding the water pressure that may be present within the trunk, after having taken into account the maximum heel angle during flooding, in accordance with NR467, Pt D, Ch 12, Sec 3, [2.3.5].

2.1.5 Additional requirements

In addition to [2.1.1], [2.1.2], [2.1.3], and [2.1.4], the requirements reported in [2.3.3] are to be complied with.

2.2 Openings in bulkheads above the bulkhead deck

2.2.1 General

Measures such as the fitting of partial bulkheads or webs are to be taken to limit the entry and spread of water above the bulkhead deck. When partial watertight bulkheads and webs are fitted on the bulkhead deck, above or in the immediate vicinity of watertight bulkheads, their connections with the shell and bulkhead deck are to be watertight so as to restrict the flow of water along the deck when the ship is in a heeled damaged condition. Where the partial watertight bulkhead does not line up with the bulkhead below, the bulkhead deck between is to be made effectively watertight. Where openings, pipes, scuppers, electric cables etc. are carried through the partial watertight bulkheads or

decks within the immersed part of the bulkhead deck, arrangements are to be made to ensure the watertight integrity of the structure above the bulkhead deck.

The coamings of all openings in the exposed weather deck are to be of ample height and strength and are to be provided with efficient means for expeditiously closing them weathertight. Freeing ports, open rails and scuppers are to be fitted as necessary for rapidly cleaning the weather deck of water under all weather conditions.

Sidescuttles, gangway, cargo and fuelling ports and other means for closing openings in the shell plating above the bulkhead deck are to be of efficient design and construction and of sufficient strength (see Pt B, Ch 11, Sec 12) having regard to the spaces in which they are fitted and their positions relative to the deepest subdivision load line.

Efficient inside deadlights, so arranged that they can be easily and effectively closed and secured watertight, are to be provided for all sidescuttles to spaces below the first deck above the bulkhead deck.

2.2.2 Open end of air pipes

Air pipes terminating within a superstructure which are not fitted with watertight means of closure are to be considered as unprotected openings when applying NR467, Pt B, Ch 3, App 3, [1.6.11].

2.2.3 Additional requirements

In addition to [2.2.1] and [2.2.2], the requirements reported in [2.3.4] are to be complied with.

Table 1 : Doors in internal watertight bulkheads of passenger ships

Position relative to bulkhead deck	Frequency of use while at sea	Type (1)	Remote closure	Remote indication	Audible or visual alarm	Notice
Below	Normally closed (2)	POS	X	X	X (local)	
	Permanently closed (3) (4)	S, H				X
At or above	Normally closed	POS, POH	X	X	X (local)	
	Normally closed (5)	S, H		X		X
	Normally closed (Doors giving access to below ro-ro deck)	S, H		X	X (remote)	X
	Permanently closed (3) (5)	S, H		X	X (remote)	X

- (1) POS : Power operated, sliding or rolling
- POH : Power operated, hinged
- S : Sliding or rolling
- H : Hinged
- (2) Certain doors may be left open (see SOLAS II-1/22.3 and IMO MSC.1/Circ.1564)
- (3) Doors are to be fitted with a device which prevents unauthorized opening.
- (4) Passenger ships which have to comply with [2.1.3] require an indicator on the navigation bridge to show automatically when each door is closed and all doors fastenings are secured.
- (5) If hinged, this door is to be of quick acting or single action type.

Table 2 : Doors in external watertight boundaries below equilibrium or intermediate waterplane

Position relative to bulkhead deck	Frequency of use while at sea	Type (1)	Remote closure	Remote indication	Audible or visual alarm	Notice
Below	Permanently closed (2)	S, H				X
At or above	Normally closed (3)	S, H		X		X
	Normally closed (Doors giving access to below ro-ro deck)	S, H		X	X (remote)	X
	Permanently closed (2)	S, H		X	X (remote)	X

(1) S : Sliding or rolling
H : Hinged
(2) Doors are to be fitted with a device which prevents unauthorized opening.
(3) If hinged, this door is to be of quick acting or single action type.

2.3 Doors

2.3.1 Requirements for doors

The requirements relevant to the operating systems for doors complying with the prescriptions in [2.3.2] and [2.3.3] are specified in Tab 1 for doors of internal watertight bulkheads and Tab 2 for doors of external watertight boundaries below equilibrium or intermediate waterplane.

2.3.2 Construction of watertight doors

The design, materials and construction of all watertight doors are to be to the satisfaction of the Society.

Such doors are to be suitably marked to ensure that they may be properly used to provide maximum safety.

The frames of vertical watertight doors are to have no groove at the bottom in which dirt might lodge and prevent the door closing properly.

2.3.3 Doors in watertight bulkheads below the bulkhead deck

- Watertight doors, except as provided in [2.1.2] paragraph 1 and [2.1.3], are to be capable of being closed simultaneously from the central operating console at the navigation bridge in not more than 60 s with the ship in the upright position.
- The means of operation whether by power or by hand of any power-operated sliding watertight door are to be capable of closing the door with the ship listed to 15° either way. Consideration is to also be given to the forces which may act on either side of the door as may be experienced when water is flowing through the opening applying a static head equivalent to a water height of at least 1 m above the sill on the centreline of the door.
- Watertight door controls, including hydraulic piping and electrical cables, are to be kept as close as practicable to the bulkhead in which the doors are fitted, in order to minimise the likelihood of them being involved in any damage which the ship may sustain. The positioning of watertight doors and their controls are to be such that if the ship sustains damage within one fifth of the breadth of the ship, such distance being measured at right angles to the centreline at the level of the deepest subdivision

load line, the operation of the watertight doors clear of the damaged portion of the ship is not impaired.

- All power-operated sliding watertight doors are to be provided with means of indication which show at all remote operating positions whether the doors are open or closed. Remote operating positions are only to be located at the navigating bridge and at the location where hand operation above the bulkhead deck is required by e).
 - is to move vertically or horizontally;
 - is to be normally limited to a maximum clear opening width of 1,20 m. The Society may permit larger doors only to the extent considered necessary for the effective operation of the ship provided that other safety measures, including the following, are taken into consideration:
 - special consideration is to be given to the strength of the door and its closing appliances in order to prevent leakages;
 - the door is to be located outside the damage zone B/5.
 - is to be fitted with the necessary equipment to open and close the door using electrical power, hydraulic power, or any other form of power that is acceptable to the Society;
 - is to be provided with an individual hand-operated mechanism. It is to be possible to open and close the door by hand at the door itself from either side and, in addition, close the door from an accessible position above the bulkhead deck with an all round crank motion or some other movement providing the same degree of safety acceptable to the Society. Direction of rotation or other movement is to be clearly indicated at all operating positions. The time necessary for the complete closure of the door, when operating by hand gear, may not exceed 90 s with the ship in the upright position;
 - is to be provided with controls for opening and closing the door by power from both sides of the door
- Each power-operated sliding watertight door:
 - is to move vertically or horizontally;
 - is to be normally limited to a maximum clear opening width of 1,20 m. The Society may permit larger doors only to the extent considered necessary for the effective operation of the ship provided that other safety measures, including the following, are taken into consideration:
 - special consideration is to be given to the strength of the door and its closing appliances in order to prevent leakages;
 - the door is to be located outside the damage zone B/5.
 - is to be fitted with the necessary equipment to open and close the door using electrical power, hydraulic power, or any other form of power that is acceptable to the Society;
 - is to be provided with an individual hand-operated mechanism. It is to be possible to open and close the door by hand at the door itself from either side and, in addition, close the door from an accessible position above the bulkhead deck with an all round crank motion or some other movement providing the same degree of safety acceptable to the Society. Direction of rotation or other movement is to be clearly indicated at all operating positions. The time necessary for the complete closure of the door, when operating by hand gear, may not exceed 90 s with the ship in the upright position;
 - is to be provided with controls for opening and closing the door by power from both sides of the door

and also for closing the door by power from the central operating console at the navigation bridge;

- is to be provided with an audible alarm, distinct from any other alarm in the area, which is to sound whenever the door is closed remotely by power and which is to sound for at least 5 s but no more than 10 s before the door begins to move and is to continue sounding until the door is completely closed. In the case of remote hand operation it is sufficient for the audible alarm to sound only when the door is moving. Additionally, in passenger areas and areas of high ambient noise, the Society may require the audible alarm to be supplemented by an intermittent visual signal at the door;
 - is to have an approximately uniform rate of closure under power. The closure time, from the time the door begins to move to the time it reaches the completely closed position, is to in no case be less than 20 s or more than 40 s with the ship in the upright position.
- f) The electrical power required for power-operated sliding watertight doors is to be supplied from the emergency switchboard either directly or by a dedicated distribution board situated above the bulkhead deck. The associated control, indication and alarm circuits are to be supplied from the emergency switchboard either directly or by a dedicated distribution board situated above the bulkhead deck and be capable of being automatically supplied by a transitional source of emergency electrical power in the event of failure of either the main or emergency source of electrical power.

The transitional source of emergency electrical power is to consist of an accumulator battery suitably located for use in an emergency which is to operate without recharging while maintaining the voltage of the battery throughout the discharge period within 12% above or below its nominal voltage and be of sufficient capacity and so arranged as to supply power automatically, in the event of failure of either the main or emergency source of electrical power, to control, indication and alarm circuits at least for half an hour.

- g) Power-operated sliding watertight doors are to have either:
- a centralised hydraulic system with two independent power sources each consisting of a motor and pump capable of simultaneously closing all doors. In addition, there are to be for the whole installation hydraulic accumulators of sufficient capacity to operate all the doors at least three times, i.e. closed-open-closed, against an adverse list of 15°. This operating cycle is to be capable of being carried out when the accumulator is at the pump cut-in pressure. The fluid used is to be chosen considering the temperatures liable to be encountered by the installation during its service. The power operating system is to be designed to minimise the possibility of having a single failure in the hydraulic piping adversely affect the operation of more than one door. The hydraulic system is to be provided with a low-level alarm for hydraulic fluid reservoirs serving the

power-operated system and a low gas pressure group alarm or other effective means of monitoring loss of stored energy in hydraulic accumulators. These alarms are to be audible and visual and are to be situated on the central operating console at the navigating bridge; or

- an independent hydraulic system for each door with each power source consisting of a motor or pump capable of opening and closing the door. In addition, there is to be a hydraulic accumulator of sufficient capacity to operate the door at least three times, i.e. closed-open-closed, against an adverse list of 15°. This operating cycle is to be capable of being carried out when the accumulator is at the pump cut-in pressure. The fluid used is to be chosen considering the temperatures liable to be encountered by the installation during its service. A low gas pressure group alarm or other effective means of monitoring loss of stored energy in hydraulic accumulators is to be provided at the central operating console on the navigation bridge. Loss of stored energy indication at each local operating position is to also be provided; or
- an independent electrical system and motor for each door with each power source consisting of a motor capable of opening and closing the door. The power source is to be capable of being automatically supplied by the transitional source of emergency electrical power in the event of failure of either the main or emergency source of electrical power and with sufficient capacity to operate the door at least three times, i.e. closed-open-closed, against an adverse list of 15°.

The transitional source of emergency electrical power is to consist of an accumulator battery suitably located for use in an emergency which is to operate without recharging while maintaining the voltage of the battery throughout the discharge period within 12% above or below its nominal voltage and be of sufficient capacity and so arranged as to supply power automatically, in the event of failure of either the main or emergency source of electrical power, to watertight doors, but not necessarily all of them simultaneously, unless an independent source of stored energy is provided.

For the systems specified above, provision is to be made as follows:

Power systems for power-operated watertight sliding doors are to be separate from any other power system. A single failure in the electrical or hydraulic power-operated systems excluding the hydraulic actuator is not to prevent the hand operation of any door.

- h) Control handles are to be provided at each side of the bulkhead at a minimum height of 1,6 m above the floor and are to be so arranged as to enable persons passing through the doorway to hold both handles in the open position without being able to set the power closing mechanism in operation accidentally. The direction of movement of the handles in opening and closing the door is to be in the direction of door movement and is to be clearly indicated.

- i) As far as practicable, electrical equipment and components for watertight doors are to be situated above the bulkhead deck and outside hazardous areas and spaces.
- j) The enclosures of electrical components necessarily situated below the bulkhead deck are to provide suitable protection against the ingress of water.
- k) Electric power, control, indication and alarm circuits are to be protected against faults in such a way that a failure in one door circuit is not to cause a failure in any other door circuit. Short-circuits or other faults in the alarm or indicator circuits of a door are not to result in a loss of power operation of that door. Arrangements are to be such that leakage of water into the electrical equipment located below the bulkhead deck is not to cause the door to open.
- l) A single electrical failure in the power operating or control system of a power-operated sliding watertight door is not to result in a closed door opening. Availability of the power supply is to be continuously monitored at a point in the electric circuit as near as practicable to each of the motors required in g). Loss of any such power supply is to activate an audible and visual alarm at the central operating console at the navigation bridge.
- m) Failure of the normal power supply of the required alarms are to be indicated by an audible and visual alarm.
- n) The central operating console at the navigation bridge is to have a "master mode" switch with two modes of control:
 - a "local control" mode which is to allow any door to be locally opened and locally closed after use without automatic closure, and
 - a "doors closed" mode which is to automatically close any door that is open. The "doors closed" mode is to permit doors to be opened locally and is to automatically reclose the doors upon release of the local control mechanism.

The "master mode" switch is to normally be in the "local control" mode. The "doors closed" mode is to only be used in an emergency or for testing purposes. Special consideration is to be given to the reliability of the "master mode" switch.
- o) The central operating console at the navigation bridge is to be provided with a diagram showing the location of each door, with visual indicators to show whether each door is open or closed. A red light is to indicate a door is fully open and a green light is to indicate a door is fully closed. When the door is closed remotely the red light is to indicate the intermediate position by flashing. The indicating circuit is to be independent of the control circuit for each door.
- p) It is not to be possible to remotely open any door from the central operating console.
- q) All watertight doors are to be kept closed during navigation. Certain watertight doors may be permitted to remain open during navigation only if considered absolutely necessary; that is, being open is determined

essential to the safe and effective operation of the ship's machinery or to permit passengers normally unrestricted access throughout the passenger area. Such determination is to be made by the Society only after careful consideration of the impact on ship operations and survivability. A watertight door permitted to remain thus open is to be clearly indicated in the ship's stability information and the damage control documentation and is always to be ready for immediate closure.

2.3.4 Doors in bulkheads above the bulkhead deck

a) General

Doors are to be capable of being opened and closed by hand locally from both sides of the doors with the ship listed to 15° to either side, or the maximum angle of heel during intermediate stages of flooding, whichever is the greater.

Position indicators are to be provided on the bridge to show that the doors are open or closed and that the dogs are fully and properly engaged.

Where the doors also serve as fire doors they are to be provided with position indicators at the fire control station and audible alarms as required for fire doors, as well as for weathertight doors. Where two doors are fitted they must be capable of independent operation remotely and from both sides of each door.

b) Doors normally closed at sea

In addition to a), doors not required for frequent access while at sea are to be kept normally closed and may be of either hinged or sliding type.

Doors kept normally closed are to have local operation from both sides of the doors and are to be labelled on both sides: "to be kept closed at sea".

c) Doors normally open at sea

Where fitted in public spaces for the passage of passengers and crew, the doors may be kept normally open at sea and may be either hinged or sliding type.

In addition to a), doors kept normally open at sea are to have local power operation from both sides of the door and remote closing from the bridge. Operation of these doors is to be similar to that specified in NR467, Pt C, Ch 4, Sec 5 where, using a "master mode" switch on the bridge, local control can override the remote closing feature after which the door is automatically remotely reclosed upon release of the local control mechanism.

Doors kept normally open at sea are to have audible alarms, distinct from any other alarm in the area, which sound whenever the doors are closed remotely. The alarms are to sound for at least 5 s but not more than 10 s before the doors begins to move and continue sounding until the doors are completely closed. In passenger areas and areas of high ambient noise, the audible alarms are to be supplemented by visual signals at both sides of the doors.

d) Failure of the normal power supply of the required alarms are to be indicated by an audible and visual alarm.

2.4 Ballast compartment arrangement

2.4.1 Water ballast is not to be, in general, carried in tanks intended for fuel oil. In ships in which it is not practicable to avoid putting water in fuel oil tanks, oily-water separating equipment to the satisfaction of the Society is to be fitted, or other alternative means, such as discharge to shore facilities, acceptable to the Society is to be provided for disposing of the oily-water ballast (see NR467, Pt C, Ch 1, Sec 10, [7]).

2.5 Double bottom arrangement

2.5.1 A double bottom is to be fitted extending from the collision bulkhead to the after peak bulkhead, as far as this is practicable and compatible with the design and proper working of the ship.

2.5.2 Where a double bottom is required to be fitted, the inner bottom is to be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge. Such protection is to be deemed satisfactory if the inner bottom is not lower at any part than a plane parallel with the keel line and which is located not less than a vertical distance h measured from the keel line, as calculated by the formula:

$$h = B/20$$

However, in no case is the value of h to be less than 760 mm, and need not to be taken as more than 2 m.

2.5.3 Small wells constructed in the double bottom in connection with drainage arrangement are not to extend downward more than necessary. The vertical distance from the bottom of such a well to a plane coinciding with the keel line is not to be less than $h/2$ or 500 mm, whichever is greater, or compliance with requirement defined in NR467, Pt B, Ch 3, Sec 3, [3.4.3] is to be shown for that part of the ship.

Other wells (e.g. for lubricating oil under main engines) may be permitted by the Society if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation.

Proof of equivalent protection is to be shown by demonstrating that the ship is capable of withstanding bottom

damages as specified in NR467, Pt B, Ch 3, Sec 3, [3.4.3]. Alternatively, wells for lubricating oil below main engines may protrude into the double bottom below the boundary line defined by the distance h provided that the vertical distance between the well bottom and a plane coinciding with the keel line is not less than $h/2$ or 500 mm, whichever is the greater.

2.5.4 A double bottom need not be fitted in way of watertight tanks, including dry tanks of moderate size, provided the safety of the ship is not impaired in the event of bottom or side damage as defined in NR467, Pt B, Ch 3, Sec 3, [3.4].

2.5.5 Any part of a ship that is not fitted with a double bottom in accordance with [2.5.1] or [2.5.4] is to be capable of withstanding bottom damages, as specified in NR467, Pt B, Ch 3, Sec 3, [3.4] in that part of the ship.

2.5.6 In the case of unusual bottom arrangements, it is to be demonstrated that the ship is capable of withstanding bottom damages, as specified in NR467, Pt B, Ch 3, Sec 3, [3.4].

2.5.7 In case of large lower holds in passenger ships, the Society may require an increased double bottom height of not more than $B/10$ or 3 m, whichever is less, measured from the keel line. Alternatively, bottom damages may be calculated for these areas, in accordance with NR467, Pt B, Ch 3, Sec 3, [3.4], but assuming an increased vertical extent.

2.6 Machinery compartment arrangement

2.6.1 When longitudinal bulkheads are fitted in the machinery space, adequate self-operating arrangements are to be provided in order to avoid excessive heel after damage.

Where such arrangements are cross-flooding systems, their area is to be calculated in accordance with the requirements in NR467, Pt D, Ch 11, App 1. In addition, such systems are to comply with the criteria for the maximum time necessary to cross flood according to NR467, Pt D, Ch 11, Sec 3, [2.3.5] c).

SECTION 3

PASSENGER SHIPS - HULL AND STABILITY

1 General

1.1 Documents to be submitted

1.1.1 In addition to the documentation requested in Pt B, Ch 1, Sec 4, the following documents are to be submitted:

- Plan of design loads on deck as specified in [4.1]
- Stability documentation as specified in [2].

2 Stability

2.1

2.1.1 See NR467, Pt D, Ch 11, Sec 3, [2].

3 Structure design principles

3.1 Hull structure

3.1.1 Framing

In general, the strength deck and the bottom of passenger ships of more than 100 m in length are to be longitudinally framed.

Where a transverse framing system is adopted for such ships, it is to be considered by the Society on a case-by-case basis.

4 Design loads

4.1 Loads on deck

4.1.1 Plan of design loads on deck

A plan of design static loads on deck, including fork lift areas, axle loads and tyre print areas of wheeled loads, is to be provided for information.

All values displayed on this plan are to be at least equivalent to the values given by the present Rules for each kind of load.

4.2 Sea pressures

4.2.1 Bow impact pressure

The bow impact pressure p_{Fl} , in kN/m², is to be taken as obtained in Pt B, Ch 5, Sec 5, [4.3.1] considering the coefficient C_z calculated from the following formulae:

- for $z \geq 21,5 H + T_{LC} - 11$:

$$C_z = [10,75H - 0,5(z - T_{LC})] \left[0,82 - 0,09 \left(\frac{z - T_{LC}}{T_{LC}} \right) \right]$$

- for $z < 21,5 H + T_{LC} - 11$:

$$C_z = \left[4,5 - 0,5 \left(\frac{z - T_{LC}}{T_{LC}} \right) \right]$$

where:

H : Wave parameter defined in Pt B, Ch 5, Sec 3, for a reference length calculated with:

$$\alpha = 0,65 C_{W-LC}^{-1,3}$$

$$f_\alpha = 1,0$$

z : z co-ordinate, in m, of the calculation point, with respect to the reference co-ordinate system defined in Pt B, Ch 1, Sec 3, [2.5]

Other values of bow impact pressure may be considered by the Society on a case-by-case basis, provided that they are documented through model tests or full scale measurements.

5 Hull girder strength

5.1 Basic criteria

5.1.1 Strength deck

In addition to the requirements in Pt B, Ch 6, Sec 1, [1.3], the contribution of the hull structures up to the strength deck to the longitudinal strength is to be assessed through a finite element analysis of the whole ship in the following cases:

- when the size of openings in the side shell and/or longitudinal bulkheads located below the deck assumed by the Designer as the strength deck decrease significantly the capability of the plating to transmit shear forces to the strength deck.
- when the ends of superstructures which are required to contribute to longitudinal strength may be considered not effectively connected to the hull structures in way.

6 Hull scantlings

6.1 Balcony doors

6.1.1 General

Glazed sliding doors fitted on sides of superstructures are to comply with the following requirements:

- Pt B, Ch 11, Sec 12, [3.3] for the assessment of glass panes
- [6.1.2] for the structural testing of supporting frames.

6.1.2 Supporting frame structural testing

Strength test of balcony doors supporting frames is to be carried out according to the following procedure:

- the structural testing is to be carried out at twice the design pressure defined in Pt B, Ch 5, Sec 5, [5]
- the door assembly, its supporting frame and supporting structure are to be same as, or deemed representative of the ship actual arrangement
- the pressure is to be applied uniformly on the door entire external area
- the glass panel may be alternatively replaced by a steel plate, of reduced thickness in order to represent equivalent flexural stiffness of the glass
- the pressure is to be maintained for not less than 5 minutes
- visual inspection is to be carried out after testing, without damage nor deformation.



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