

Regulations of 20 December 1991 No. 878 on stability, watertight subdivision and watertight/weathertight means of closure on mobile offshore units

Legal basis: Laid down by the Norwegian Maritime Authority on 20 December 1991 under the Act of 9 June 1903 No. 7 relating to public control of the seaworthiness of ships etc. Legal basis amended to Act of 16 February 2007 No 9 relating to ship safety and security (Ship Safety and Security Act) sections 9, 11, 12, 13, 21 and 45, cf. Formal Delegation of 16 February 2007 No. 171 and Formal Delegation of 31 May 2007 No. 590.

EEA references: Directive 83/189/EEC. EEA Agreement Annex II Chapter XIX point 1 (Directive 98/34/EC).

Amendments: Amended by Regulations of 2 March 1999 No. 406, 11 April 2003 No. 543, 29 June 2007 No. 1006, 14 March 2008 No. 305, 18 January 2011 No. 56, 5 July 2016 No. 897, 19 December 2017 No. 2322.

Chapter I Introductory provisions

Section 1

Scope of application

These Regulations apply to mobile offshore units which are or will be registered in a Norwegian ship register.

Mobile offshore units which are registered in a Norwegian ship register may, until the next certificate issue, comply with the requirements that applied at the time of the last certificate issue.

Amended by Regulations of 2 March 1999 No. 406 (in force on 1 Sept 1999), 11 April 2003 No. 543 (in force on 1 July 2003).

Section 2

Definitions

For the purpose of these Regulations the following definitions shall apply:

1. *Recognized standard:* Standard issued by NS/BS/API/DIN/NFPA/ISO/CEN/IEC or any other standard or body of rules, as appropriate, which is recognized nationally and/or internationally for a particular sphere of application. The Norwegian Maritime Authority may in each individual case decide which standard is considered to be recognized.
2. *Ballasting and deballasting curve:* A curve which, with a given reference point, shows how a unit's vertical centre of gravity varies as a function of draught, alternatively displacement, when ballast tanks are filled or emptied in the order complying with the unit's ballasting procedures.
3. *Transit condition:* The condition in which the unit changes its position either by towing or by its own means of propulsion, and which is within the operational limitations and preconditions set for the condition.
4. *Recognized classification society:* Any classification society with which the Ministry has entered into an agreement pursuant to section 41 of the Ship Safety and Security Act:
 1. American Bureau of Shipping (ABS)
 2. Bureau Veritas (BV)
 3. DNV GL
 4. Lloyd's Register of Shipping (LR)
 5. Nippon Kaiji Kyoaki (Class NK)
 6. Rina Services S.p.A (RINA)
5. *Unit:* Mobile platform, including drilling ship, equipped for drilling for subsea petroleum deposits, and mobile platform for other use than drilling for subsea petroleum deposits.
6. *KG limit curve:* A curve showing the maximum allowable vertical centre of gravity (max. KG) as a function of draught, alternatively displacement, for the stability requirements to be complied with.
7. *Control station:* Spaces in which equipment for monitoring, remote control and operation of the unit is located. These include:
 - 7.1. spaces in which radio, main navigating equipment, emergency source of power and operations centres for inter-communication, alarm and public address systems are located;
 - 7.2. spaces in which equipment for remote control and operation of anchoring systems, ballast systems, fire-doors, diving systems, dynamic positioning systems, fixed fire-extinguishing systems, emergency sources of power and watertight doors are located.
8. *MODU Code:* IMO's (International Maritime Organization) Code for the Construction and Equipment of Mobile Offshore Drilling Units, 1989.
9. *MOU classification society:* A recognized classification society with which there is an additional agreement on its carrying out inspections and surveys, etc. on mobile offshore units. The following societies are MOU classification societies:
 1. American Bureau of Shipping (ABS)
 2. DNV GL

3. Lloyd's Register of Shipping (LR).
10. *Operating condition*: The condition in which the unit carries out its normal functions, e.g. drilling, and which is within the operational limitations and preconditions set for the condition.
11. *Company*: Cf. the definition given in section 4 of the Ship Safety and Security Act.
12. *Survival condition*: The condition in which the operational limitations (maximum allowable wind velocity) for the relevant operating or transit condition have been exceeded, and/or in which the measures necessary for the condition have been taken.
13. *Safety Management System*: All systematic efforts which the company is required to make to ensure that activities are planned, organized, performed and maintained in accordance with requirements laid down in or pursuant to Act of 16 February 2007 No. 9 relating to ship safety and security.
14. *Temporary condition*: The condition in which a semi-submersible unit changes its draught from one mode of operation to another, e.g. from transit condition to operating condition.
15. *Watertight means of closure*: Means of closure capable of withstanding a specified water pressure (normally from either side) to secure the watertight subdivision of the unit.
16. *Weathertight means of closure*: Means of closure which, under all relevant sea conditions, prevents water from entering the unit.

Amended by Regulations of 2 March 1999 No. 406 (in force on 1 Sept 1999), 11 April 2003 No. 543 (in force on 1 July 2003), 29 June 2007 No. 1006 (in force on 1 July 2007), 29 June 2007 No. 1006 (in force on 1 July 2007), 14 March 2008 No. 305 (in force on 24 March 2008), 18 January 2011 No. 56, 5 July 2016 No. 897.

Chapter II

General provisions

Section 3

Obligations

The company, the offshore installation manager and others who have their work on board shall perform their duties in accordance with the Ship Safety and Security Act and the supplementary provisions laid down in these Regulations.

Amended by Regulations of 2 March 1999 No. 406 (in force 1 Sept 1999), 11 April 2003 No. 543 (in force 1 July 2003), 29 June 2007 No. 1006 (in force on 1 July 2007).

Section 4

Deviations

The Norwegian Maritime Authority may, in individual cases and upon written application, deviate from the requirements of these regulations. There must be special reasons that make the deviations necessary and they must be justifiable in terms of safety. If the requirements of the coastal state and the requirements of these regulations are irreconcilable, the Norwegian Maritime Authority may deviate from the requirements insofar as safety considerations allow. Deviations must not contravene international agreements to which Norway has acceded.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Section 4 A

Mutual recognition

Where the regulations require that particular fittings, materials, equipment or devices or type of equipment etc. be procured or found on a vessel, or that some specific measure be taken or the construction or design safety specific requirements, the Norwegian Maritime Authority shall permit that other appurtenances, materials, devices or types of such are installed or found on the vessel or that other measures are taken on board or that the vessel is built or designed in another way.

The Norwegian Maritime Authority shall accept this provided that it is documented by testing or other means that the appurtenances, materials, equipment or devices or types of such, or the arrangement, construction or design is at least as effective as specified by the requirements of the regulations.

The Norwegian Maritime Authority shall accept the results of tests performed by recognized testing institutions, including testing institutions in other EEA countries. Such acceptance will be given on condition that the tests give an appropriate and satisfactory guarantee of a technical, professional, and independent nature.

Added by Regulation of 2 March 1999 No. 406 (in force on 1 Sept 1999).

Chapter III

Documentation

Section 5

Documentation

The company shall be able to document compliance with the requirements of these regulations. Documentation shall be sent to the Norwegian Maritime Authority on demand. The contents, extent, and type of documentation and the time of its forwarding shall be determined by the Norwegian Maritime Authority.

Added by Regulation of 2 March 1999 No. 406 (in force on 1 Sept 1999). Amended by Regulation of 29 June 2007 No. 1006 (in force on 1 July 2007).

Section 6

Repealed by Regulation of 2 March 1999 No. 406, in force on 1 Sept 1999.

Section 7

Requirements for load line certificate

The unit shall carry a valid international load line certificate (1966), cf. section 29.

Chapter IV

Inclining test and light ship data

Section 8

Inclining test and light ship data

1. When as near to completion as possible, every unit shall undergo an inclining test to determine its light ship data (weight and position of centre of gravity).
2. A record shall be kept of all changes in the weight and location of the equipment included in the light ship weight. Updated light ship data shall always be used when calculating daily loading conditions.
3. After conversions, a new inclining test shall be carried out. For minor alterations where the weights involved are clearly identified and detailed calculations of weight after completion of alterations show consistency with a displacement measurement, cf. subparagraph 4, the requirement for an inclining test may be waived upon application pursuant to section 4.
4. A displacement measurement shall be made at every 5-yearly periodic survey of the unit to discover any change in the light ship weight. If there is a difference between the light ship weight and the updated light ship data kept on board, or if other circumstances may indicate an error in the light ship centre of gravity used, the Norwegian Maritime Authority may require a new inclining test to be conducted.

Amended by Regulations of 2 March 1999 No. 406 (in force on 1 Sept 1999), 11 April 2003 No. 543 (in force on 1 July 2003).

Chapter V

Modes of operation, corresponding stability requirements, KG limit curves

Section 9

Modes of operation, KG limit curves and operational limitations

1. Operation of the unit is divided into four modes of operation:
 - operating condition, cf. section 10,
 - transit condition, cf. section 11,
 - survival condition, cf. section 12
 - temporary condition (ballasting/deballasting), cf. section 13.
2. For each mode of operation a KG limit curve shall be drawn. All KG limit curves shall be presented in one diagram together with any ballasting/deballasting curves and continuous damage stability KG limit curve, cf. sections 13 and 14.
3. Relevant operational limitations alongside with regard to maximum wind velocity, prohibition against vessels alongside the unit, tanks which shall be full etc. shall be indicated in connection with the KG limit curve for each individual mode of operation. The maximum wind velocity permitted for a mode of operation may not exceed the wind

velocity used for the calculation of the maximum KG for intact stability. Wind velocities shall refer to a height of 10 m above the water level and shall be an average of measurements over a period of 10 minutes.

4. If it is desirable to raise the level of operational limitation as regards the maximum wind velocity permitted for a condition, this may be achieved by using higher wind velocities for the calculation of maximum KG than what is indicated as the minimum. The ratio between the wind velocity employed for intact and damage stability shall still be 1.4.

Section 10

Operating condition, stability requirements, curve I-op

1. In the operating condition the unit shall comply with the intact stability requirements laid down in section 20 with a wind velocity of at least 36 metres per second (m/s) (70 knots) and the damage stability requirements laid down in section 21 with a wind velocity of at least 25.8 m/s (50 knots) following assumed damage in accordance with section 23. In addition semi-submersible units shall satisfy the reserve buoyancy requirements laid down in section 22.

2. Maximum KG to comply with the above stability requirements shall be drawn up for all relevant operating draughts and will subsequently be referred to as curve I-op. Relevant operational limitations for the condition shall be indicated in connection with the KG limit curve.

3. The unit shall be capable of attaining the survival condition from any operating condition by deballasting only, or, if necessary by dumping liquid drilling mud, cf. section 12. If the max KG relating to the survival condition or temporary conditions impose limitations with regard to the capability of the unit in attaining the survival condition from the operating condition, these limitations will determine the max. KG for the operating condition, cf. section 13.

4. The above requirements do not apply to submersible and self-elevating units.¹

5. Special conditions for operation.

KG limit curves for special or short-term operations may be based on other criteria or lower wind velocities than those referred to in subparagraph 1. This requires the total safety for the condition to be at least equal to that of ordinary operating conditions, when operational limitations are also taken into account.

Amended by Regulation of 2 March 1999 No. 406 (in force on 1 Sept 1999).

¹ Cf. safety requirements to prevent capsizing in the Regulations of 4 September 1987 on the construction of mobile offshore units, section 6 subparagraph 2.4.

Section 11

Transit condition, stability requirements, curve I-tr

1. In the transit condition the unit shall comply with the intact stability requirements laid down in section 20 with a wind velocity of at least 36 m/s (70 knots) and the damage stability requirements laid down in section 21 with a wind velocity of at least 25.8 m/s (50 knots) following assumed damage in accordance with section 23.

2. Maximum KG to comply with the above stability requirements shall be drawn up for all relevant transit draughts and will subsequently be referred to as KG limit curve I-tr. Relevant operational limitations for the condition shall be indicated in connection with the KG limit curve.

3. The unit shall be capable of attaining the survival condition from any transit condition by ballasting only, or, if necessary, by dumping liquid drilling mud. If the max. KG relating to the survival condition or temporary conditions, cf. sections 12 and 13, impose limitations with regard to the capability of the unit in attaining the survival condition from the transit condition, these limitations will determine the max. KG for the transit condition.

Section 12

Survival condition, stability requirements, curve II

1. In the survival condition the unit shall comply with the intact stability requirements laid down in section 20 with wind velocity of 51.5 m/s (100 knots). For the survival condition no requirements as to damage stability apply, provided no vessel is permitted alongside the unit. Other activities which may represent a danger of damage or flooding shall be restricted to the minimum necessary for the safety of the unit. If the intended function of the unit precludes compliance with the above requirements, the damage stability requirements laid down in section 21 shall be complied with, with the wind velocity of at least 36 m/s (70 knots) following assumed damage in accordance with section 23.

2. Damage stability is not required for accommodation units in survival condition unless necessitated by the above circumstances or other grounds, as e.g. when units connected by gangway do not pull away from other installations in survival condition.

3. Max. KG to comply with the above stability requirements shall be drawn up for all the relevant draughts for survival conditions and will subsequently be referred to as KG limit curve II. Relevant operational limitations in accordance with the above shall be indicated in connection with the KG limit curve for the survival condition. When survival draughts are determined for semi-submersible units account must also be taken of the requirements regarding distance between sea level and deck.¹

4. For submersible and self-elevating units the above requirements are applicable only in connection with transit.

Section 13

Temporary condition for semi-submersible units, stability requirements, curve III, (de-)ballasting curves

1. In the temporary condition the unit shall comply with the intact stability requirements laid down in section 20 with a wind velocity at least equal to the one used for the calculation of intact stability for operating and transit conditions, minimum 36 m/s (70 knots).
2. Damage stability is not required if vessels are not permitted alongside at the unit during this condition. Other activities which may represent a danger of damage or flooding shall be restricted to the minimum necessary to ballast/deballast the unit. If vessels are permitted alongside the unit during temporary conditions, the unit is also required to comply with the damage stability requirements laid down in section 21 with a wind velocity of at least 25.8 m/s (50 knots) following damage assumptions in accordance with section 23, cf. also section 14.
3. Max. KG to comply with the above stability requirements shall be drawn up for all the relevant draughts for temporary conditions and will subsequently be referred to as KG limit curve III. Relevant operational limitations in accordance with the above shall be indicated in connection with the KG limit curve for temporary conditions.
4. For semi-submersible units ballasting and deballasting curves shall be drawn up to show that the unit is capable of attaining the survival condition from both transit condition and operating condition, and that KG is below curve III for temporary conditions.

Section 14

Continuous KG limit curve for damage stability

In addition to the KG limit curves referred to in sections 10 to 13 inclusive, a separate curve for draughts apart from specific operating or transit draughts shall be drawn up to show the max. KG when the unit complies with the damage stability requirements laid down in section 21 with a wind velocity of at least 25.8 m/s (50 knots) following assumed damage in accordance with section 23.

Chapter VI

Daily calculations, loading conditions

Section 15

Calculation of daily loading conditions

1. Daily loading conditions with corresponding survival condition shall be calculated on board on the basis of the relevant quantity of load (deadweight) placed in the most adverse position which may apply. The KG limit curves shall be used as indicated in section 16.
2. The operations manual and the form for calculation of daily loading conditions shall give specific instructions on when the survival condition is required and on the measures to be taken to bring the unit to that condition. Any necessary dumping of liquid drilling mud shall be clearly indicated. Only drilling mud permitted dumped under environmental requirements shall be assumed to be dumped in the calculations.
3. When calculating displacement and vertical centre of gravity (KG), the amount of chains/ wire which has been paid out/remains on board shall be taken into account. Account shall also be taken of other vertical forces which may have an adverse effect on the unit's stability, for example from the rotary table/derrick hook load or the riser tension load.

Section 16

Use of KG limit curve

1. The KG values for all operating and transit conditions, corrected for the effect of free liquid surface, shall be below the values given in curve I-op and curve I-tr respectively.
2. For semi-submersible units account shall also be taken of the increased effect of free liquid surface which may occur in temporary conditions during any ballasting/deballasting in preparation for the survival condition, cf. section 13 subparagraph 4.
3. When the wind velocity exceeds 36 m/s, or any higher verified limit, the unit's KG values, corrected for the effect of free surfaces, shall be below the values given in curve II.
4. The KG values for all temporary conditions, corrected for the effect of free liquid surfaces, shall be below the values given in curve III.

Section 17

Loading conditions

The following conditions shall be calculated and shall be included in the operations manual:

1. Normal operating condition at maximum draught with maximum deck load and equipment in the most adverse position applicable.
2. Survival condition at maximum survival draught, using the same weight distribution as in subparagraph 1, except for necessary adjustments of ballast and any dumping of liquid drilling mud. For drilling units the riser shall be disconnected, and a representative number of drill pipes shall be standing in the derrick set back area.
3. Normal transit condition with maximum deck load. For self-elevating units the transit condition shall be checked with the legs standing at their highest position and if relevant, laid down for ocean tow.
4. Survival condition at maximum survival draught, using the same weight distribution as in subparagraph 3, except for necessary ballast adjustments and any dumping of liquid drilling mud. For the purpose of the calculations the unit's anchors are assumed to be on board.

Chapter VII

Detailed requirements, stability

Section 18

Righting moment curves

1. Righting moment curves, cf. figures 1 and 2, shall be prepared as supporting material for the KG limit curves calculated.
2. Calculations of the righting moment shall be based on the unit being able to trim freely during inclination, and the effects of mooring forces shall be disregarded.
3. Openings into spaces presumed as buoyant when calculation righting moments shall be fitted with the following means of closure:
 - a) watertight means of closure up to the equilibrium waterline in both intact and damage condition, taking wind moments into account, cf. sections 20 subparagraph 1 and 21 subparagraph 1. For semi-submersible units, see also requirements in section 22 subparagraph 2 a).
 - b) weathertight means of closure up to the angle at which the requirement as to area between the curves of the heeling and righting moments has been complied with, at least 30° heel for the intact condition, cf. the requirement for «second intercept» in section 20 subparagraph 1 b) (figs. 1 and 2). For semi-submersible units, see also requirements in section 22 subparagraph 2 b).
4. Means of closure of a lower standard than referred to in subparagraph 3 above shall be considered as resulting in progressive flooding. This shall be shown as steps in righting moment curve. (Cf. section 22 subparagraph 3).

Amended by Regulation of 2 March 1999 No. 406 (in force on 1 Sept 1999).

Section 19

Heeling moment curves (wind moment)

1. Wind heeling moment curves shall be prepared as supporting material for the KG limit curves calculated. Wind heeling moments can be determined either by wind tunnel tests or by calculations. Wind heeling moments may be prepared and presented in accordance with guidelines issued by the Norwegian Maritime Authority or other recognized methods.
2. Wind heeling moments shall be prepared for the wind velocities used for the calculation of max. KG for the various modes of operation. These will normally be 36 and 51.5 m/s for intact stability and 25.8 m/s for damage stability, cf. chapter V. The wind velocity shall refer to a height of 10 metres above the sea level.
3. Wind forces shall be considered from any direction relative to the unit. For the purpose of defining the wind moment curves for the unit's total draught area, the wind moments shall be documented for a sufficient number of inclination axis and angles of heel.
4. The wind moment curves shall take into account maximum deck load and equipment in the most adverse position applicable. The unit shall be assumed to be floating free of mooring restraints so that the arm of the wind overturning force is considered to be equal to the vertical distance from the centre of pressure of all surfaces exposed to the wind to the centre of lateral resistance of the underwater body of the unit.
5. For units with a dynamic positioning system, the wind moment curves shall also be calculated by taking into account the reactive wind force operating at thruster level. The most adverse wind moment shall be used for the calculation of the unit's max. KG in the dynamically positioned condition.
6. Where a unit has undergone alterations which affect the wind heeling moment, new wind heeling moments shall be prepared either by means of wind tunnel tests or by calculation.

Section 20

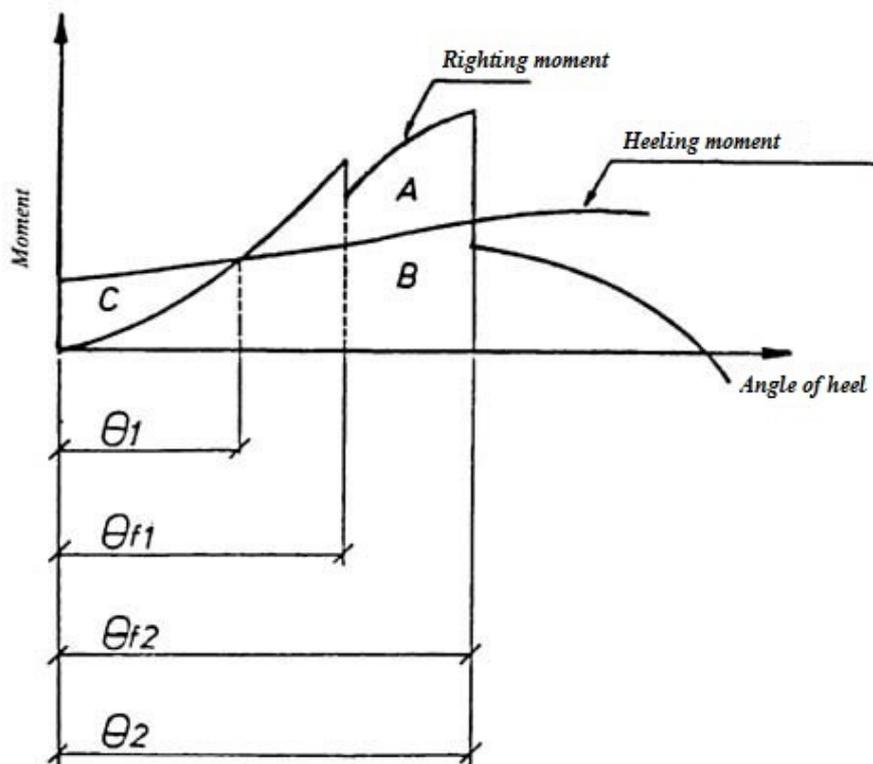
Intact stability requirements

1. General requirements for intact stability (cf. fig. 1):

Requirement: $(A + B) \geq k \cdot (B + C)$

$k = 1.4$ for drilling ships and self-elevating units

$k = 1.3$ for semi-submersible units



$\theta_1 =$ Static angle of heel

$\theta_{f1}, \theta_{f2}, \dots, \theta_{fn} =$ Angles of heel where openings without weathertight means of closure are submerged

$\theta_2 =$ Second intercept between righting moment curve and heeling moment curve

Fig. 1
Intact stability

- a) Static angle of heel due to wind (θ_1) shall not exceed 17° in any condition.
 - b) The «second intercept» between the righting moment curve and the wind heeling moment curve (θ_2) shall occur at an angle of 30° or more. The «second intercept» is defined as the point where the righting moment curve, corrected for any progressive flooding, crosses the wind heeling moment curve for the second time.
 - c) The righting moment curve shall be positive over the entire range of angles from upright to the second intercept.
2. Additional requirements for units of a ship design and self-elevating units:
 - a) The metacentric height shall be 0.5 metres or higher.
 - b) The area under the righting moment curve up to the «second intercept», or alternatively to a smaller angle, shall be not less than 40% in excess of the area under the wind heeling moment curve to the same limiting angle.
 3. Additional requirements for semi-submersible units:
 - a) The metacentric height (GM) shall be at least 1.0 metres for all operating conditions and survival conditions. The metacentric height shall never be less than 0.3 metres in temporary conditions.

b) The area under the righting moment curve up to the «second intercept», or alternatively to a smaller angle, shall be not less than 30% in excess of the area under the wind heeling moment curve to the same limiting angle.

4. Alternative stability requirements may be approved by the Norwegian Maritime Authority, e.g. based on model tests, cf. section 4, provided an equivalent level of safety is maintained.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Section 21

Damage stability requirements

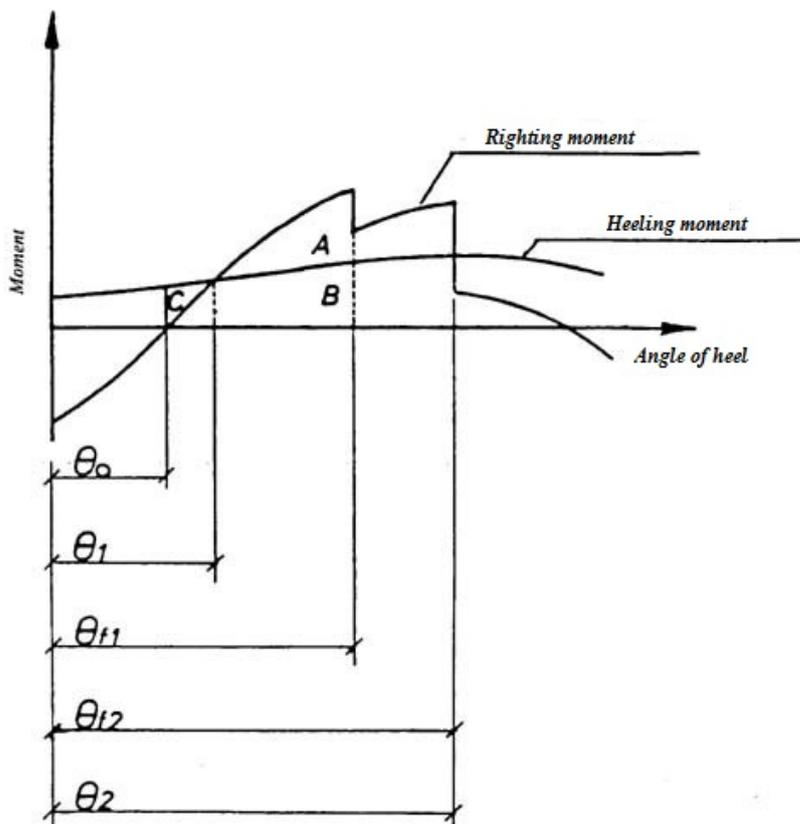
The following stability requirements apply when the unit is assumed to be damaged in accordance with sections 23 to 28:

1. The waterline in the final state of equilibrium after flooding, taking into account the effect of wind, shall be below the lower edge of any opening which might lead to progressive flooding of compartments assumed intact in the calculations. Such openings include air pipes (regardless of means of closure), ventilators, ventilation openings, non-watertight means of closure, cf. chapter X. Openings fitted with remote-controlled watertight doors kept closed during operation of the unit and portholes which cannot be opened are not considered to result in progressive flooding.

2. In the above-mentioned state of equilibrium the angle of heel (Θ_1) shall never exceed 17° in any direction.

3. The area under the righting moment curve shall be at least equal to the area under the heeling moment curve up to the «second intercept» (Θ_2) of the curves. Both areas shall be calculated from the static angle of heel without wind (Θ_0). (See fig. 2).

Requirement: $(A + B) \geq (B + C)$



θ_0 = Static angle of heel without wind

θ_1 = Static angle of heel with wind

$\theta_{f1}, \theta_{f2}, \dots, \theta_{fn}$ = Angles of heel where openings without weathertight means of closure are submerged

θ_2 = Second intercept between righting moment curve and heeling moment curve

Fig. 2
Damage stability

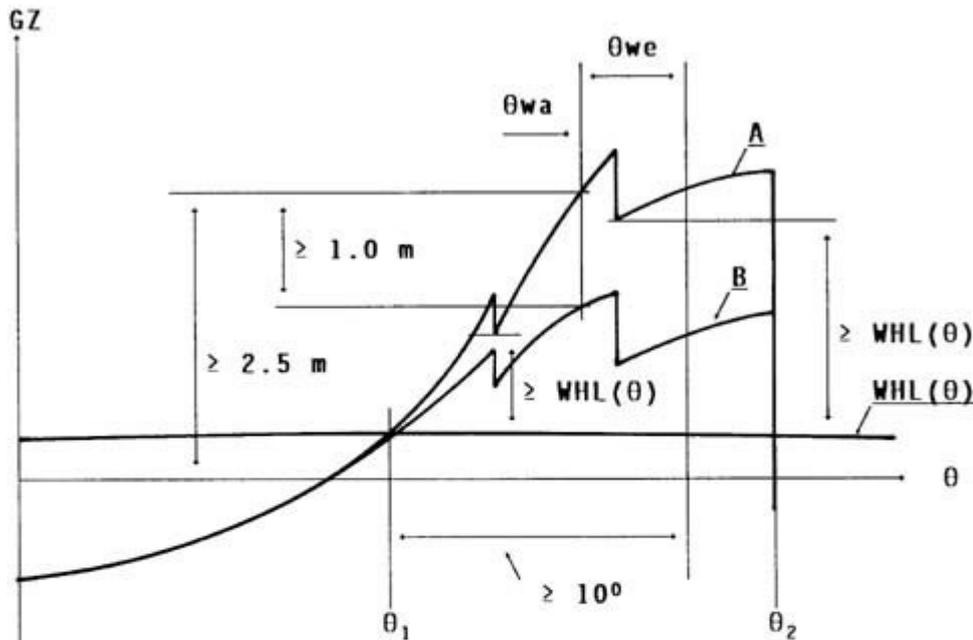
4. The possibility of reducing angles of heel by cross-flooding arrangements, by emptying ballast tanks or other tanks or by taking into account anchoring forces etc. shall not be taken into consideration for the purpose of complying with the requirements laid down in subparagraphs 1 to 3 inclusive.

Amended by Regulation of 19 December 2017 No. 2322 (in force on 1 January 2018).

Section 22

Reserve buoyancy requirements for semi-submersible units

Reserve buoyancy requirements for semi-submersible units are (see fig. 3):



- A = *GZ curve including buoyancy volumes above watertight barriers positioned at or above the lowest continuous deck*
 B = *GZ curve excluding buoyancy volumes above watertight barriers positioned at or above the lowest continuous deck*
 WHL = *Curve for wind heeling lever*
 θ_1 = *First intercept between GZ curve and WHL curve*
 θ_2 = *Second intercept between GZ curve and WHL curve*
 θ_{wa} = *Minimum range for watertight integrity*
 θ_{we} = *Minimum range for weathertight integrity*

Fig. 3

Reserve buoyancy for semi-submersible units

1. The righting arm curve after assumed damage in operating condition (cf. section 10) shall have a positive range of at least 10° between the first and second intercept with the wind moment curve. For one and the same angle (θ_{wa}) within the positive range the following shall apply:
 - a) The righting lever curve after damage (righting moment divided by displacement) shall reach a value of at least 2.5 m.
 - b) At least 1.0 m of this righting lever shall arise from enclosed watertight volumes above watertight barriers positioned at or above the lowest continuous deck (top of column).
2. Requirements for the closing of volumes assumed to provide buoyancy after damage:
 - a) All openings submerged at the angle θ_{wa} , shall be fitted with watertight means of closure, cf. chapter X. Means of closure activated by submersion may be accepted for smaller openings if adequate strength and reliability of function can be documented.
 - b) Openings submerged beyond the angle θ_{wa} , minimum to the range required by subparagraph 1 (angle for first intercept with the wind moment curve plus 10°), shall at least be fitted with weathertight means of closure which can be closed from a dry deck at the angle θ_{wa} , and which have operating facilities as described in chapter XIV. This minimum range for weathertight integrity is shown as θ_{we} in fig. 3.
3. Steps in the righting lever curve:

a) Any opening referred to in subparagraph section 2 (a) and (b) without satisfactory means of closure shall be considered to result in flooding of adjacent spaces from the angle at which the lower edge of the opening is submerged. This shall be shown as steps in the righting lever curve.

b) Loss of buoyancy as referred to above shall not cause the righting lever curve to fall below a value twice the value of the wind heeling lever (wind moment divided by displacement) for the same angle.

Amended by Regulations of 2 March 1999 No. 406 (in force on 1 Sept 1999), 11 April 2003 No. 543 (in force on 1 July 2003).

1 Mobile offshore units registered before 1 January 1992 for which an equivalent safety level concerning reserve buoyancy can be documented are considered to meet the requirements of this section.

Section 23

Damage assumptions and watertight subdivision

1. General provisions.

The unit shall be divided by means of watertight decks and bulkheads to resist flooding as the result of two main categories of damage:

- One-compartment damage in accordance with section 24.
- Collision damage in accordance with the extent of damage for the type of vessel in question, cf. sections 25, 26 and 27 below.

Damage and flooding shall be assumed for the individual modes of operation as specified in the requirements laid down in sections 10 to 13 inclusive.

2. Pipes etc. in the damage area.

All shafts, piping and ventilation ducts which may cause flooding of compartments presumed to be intact shall be placed outside the damage area for the individual type of vessel, cf. sections 25, 26 and 27.

3. Permeability factors.

The following permeability factors shall be used for flooding as referred to in subparagraph 1:

Store rooms 0.60, engine rooms 0.85, accommodation spaces, empty compartments and tanks 0.95. For spaces where there is reason to believe that deviations from the above factors exist, the permeability shall be calculated.

Section 24

One-compartment damage

One-compartment damage shall be assumed for any compartment which is wholly or partially under the waterline in question, and in addition either is limited by the sea or containing piping systems which lead to the sea.

Section 25

Collision damage to units of ship design

1. In assessing collision damage to units of ship design, the following extent of damage shall be assumed to occur anywhere within the length of the ship:

- longitudinal extent: 3.0 m;
- horizontal penetration: 1.5 m;
- vertical extent: from the base line and vertically upwards without limit.

2. The unit's watertight subdivision shall be such that when collision damage is assumed according to subparagraph 1, at least one watertight bulkhead may be assumed to be damaged. Where damage of a lesser extent than that referred to in subparagraph 1 results in a more severe condition, such lesser extent shall be assumed.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Section 26

Collision damage to self-elevating units

1. In assessing collision damage to self-elevating units, the following damage shall be assumed to occur anywhere at the periphery of the unit:

- horizontal extent: 3.0 m;
- horizontal penetration: 1.5 m;
- vertical extent: from the base line and vertically upwards without limit.

2. The unit's watertight subdivision shall be such that when collision damage is assumed according to subparagraph 1, at least one watertight bulkhead may be assumed to be damaged. Where damage of a lesser extent than that referred to in subparagraph 1 results in a more severe condition, such lesser extent shall be assumed.

3. Where a mat is fitted, the Norwegian Maritime Authority may permit deviations from the above requirements, if the distance between the hull and the mat is great, cf. section 4.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Section 27

Collision damage to semi-submersible units

1. In assessing collision damage to semi-submersible units, the following extent of damage shall be assumed:
 - a) Only those columns and pontoons on the periphery of the unit shall be assumed open to damage, and it is assumed that damage will only occur to «exposed parts». «Exposed parts» are those portions of columns and pontoons, or other parts providing buoyancy which are located outside a line drawn through the centres of the peripheral columns (see fig. 4). Vertical limits will be from 5 metres above the maximum operational draught to 3 metres below the minimum transit draught.

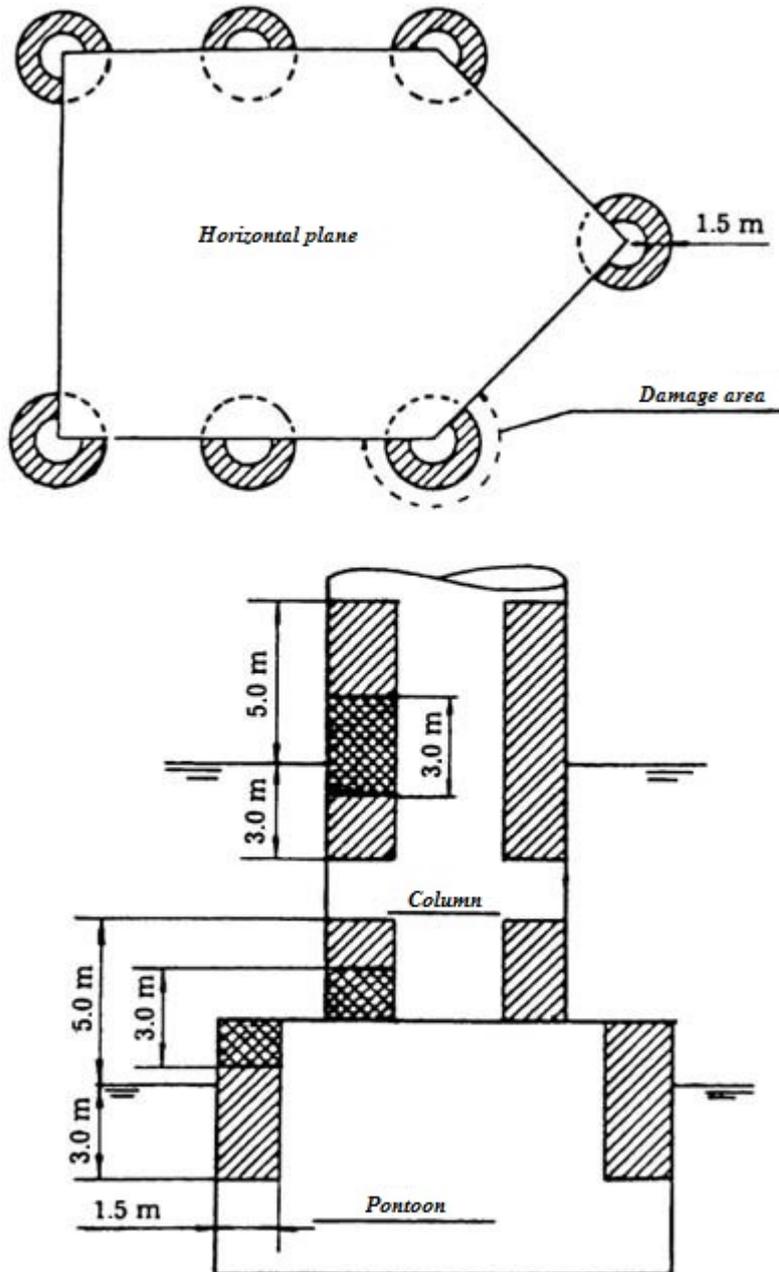


Fig. 4
Damage areas for semi-submersible units

- b) Vertical extent: 3.0 m within 5 metres above and 3 metres below the waterline in question.
- c) Horizontal extent: 3.0 m measured along the periphery of the shell.
- d) Penetration: 1.5 m measured at a right angle to the shell.

2. The unit's watertight subdivision shall be such that when collision damage is assumed according to subparagraph 1, at least one watertight bulkhead may be assumed to be damaged. Where damage of a lesser extent than that referred to in subparagraph 1 results in a more severe condition, such lesser extent shall be assumed.

Section 28

Exceptions from damage assumptions for semi-submersible units

For semi-submersible units the calculations of damage stability after assumed damage according to sections 24 and 27 may disregard the flooding of ballast tanks which are always full at the relevant draughts, provided that:

1. The ballasting procedure in the operations manual clearly states that the tanks in question shall be full at the relevant draughts, irrespective of loading condition.
2. An indication is given on the KG limit curve of the tanks which are required to be full and the draught area to which this applies.

Chapter VIII Freeboard and load lines

Section 29

Freeboard and load lines

1. The unit's load line marks shall indicate the maximum permissible draught, based on the unit's stability and strength and any other provisions of significance to the determination of draught.
2. The draught determined shall not be less than laid down in the requirements and chapter V of these regulations.¹
3. Drilling ships and any other types of unit to which the International Load Line Convention, 1966, applies, shall be subject to the provisions of the said Convention. The maximum draught shall not exceed the load line calculated in accordance with this Convention.
4. Air pipes for tanks and similar with means of closure shall be well protected against the sea and against being struck by deck cargo which has become loose.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

¹ Cf. also requirements for strength and the distance between sea level and deck in the Regulations on the construction of mobile units, sections 6 and 10.

Chapter IX Watertight bulkheads

Section 30

Strength of watertight bulkheads

1. General requirements.
The bulkheads which with reference to the damage stability calculations are expected to be watertight shall be dimensioned for the maximum water pressure that may occur during inclination following damage according to the stability requirements of section 21, with a utilization factor of 0.75 against the material's limit of yield strength. If necessary, a confirmation from a MOU classification society of the strength shall be submitted.
2. Additional requirements for semi-submersible units.
 - a) All submerged bulkheads around volumes providing buoyancy, and watertight barriers at the top of columns shall also be dimensioned to withstand the water pressure which may occur during inclining, in accordance with the stability requirements of section 22 subparagraph 1 a) and b). If necessary, a confirmation from a MOU classification society of the strength shall be submitted.
 - b) Bulkheads and barriers referred to in a) above are permitted with a utilization factor of 0,95 against the material's ultimate strength.
 - c) As a minimum requirement, watertight bulkheads around volumes providing buoyancy located above the top of the column shall be dimensioned according to requirements laid down in rules for external bulkheads exposed to waves, issued by a MOU classification society.

Amended by Regulations of 2 March 1999 No. 406 (in force on 1 Sept 1999), 11 April 2003 No. 543 (in force on 1 July 2003).

Section 31

Openings in watertight bulkheads

The number of openings in bulkheads which with reference to the damage stability calculations are expected to be watertight, shall be limited to the minimum compatible with the design and safe operation of the unit.

Chapter X

General requirements for watertight means of closure

Section 32

Requirements for watertight means of closure

1. Watertight means of closure shall be arranged for all openings or penetrations in watertight bulkheads in order to maintain the unit's watertight subdivision.
2. Access openings for personnel through watertight bulkheads shall be closed by watertight sliding doors equipped in accordance with the requirements of Chapter XII. Other types of watertight doors may be used, provided that the assumptions of section 33 subparagraph 2 is fulfilled.

Amended by regulation 11 April 2003 No. 543 (in force 1 July 2003).

Section 33

Requirements for provide remote-controlled closing systems

1. Means of closure required to be of a watertight type in accordance with the requirements of section 18 subparagraph 3 (a), 21 subparagraph 1, section 22 subparagraph 2 and section 45, shall be arranged with remote-controlled closing systems operated from a control console, cf. section 37.
2. Means of closure may, however, be arranged without a remote-controlled closing system provided that the following conditions are satisfied:
 - a) they are kept closed and instructions are posted at each means of closure, stating that it should be kept closed whenever the unit is at sea
 - b) they are used as access openings to closed rooms that are not in use, or in areas not designed for common traffic,
 - c) the control system otherwise satisfies the requirements of section 37 subparagraphs 1(b), 1(c), 1(d), subparagraph 2 and subparagraph 3, and
 - d) central operated dogs are fitted on means of closure used as access openings or emergency exits.

Amended by Regulations of 2 March 1999 No. 406 (in force on 1 Sept 1999), 11 April 2003 No. 543 (in force on 1 July 2003).

Section 34

Requirements for dimensioning and testing

1. Watertight means of closure shall be dimensioned to withstand pressure, normally from either side. The design pressure shall correspond to the maximum water pressure that may occur during inclination as specified in section 30. Strength calculations shall be carried out according to recognized standards, cf. section 2 subparagraph 1.
2. As a minimum requirement, means of closure located in watertight bulkheads above the top of the column shall dimensioned according to section 30 subparagraph 2 c).
3. A prototype of the means of closure, fitted in the same way as required on board, shall be pressure-tested by the manufacturer according to the following criteria:
 - a) minimum test pressure = relevant water pressure + 5m waterhead, for windows 3 x relevant water pressure minimum 5m waterhead
 - b) pressure testing to be conducted using water from the most critical side c) acceptable leakage of water = 2 litre per minute/m² light area.
4. The means of closure shall not be permanently deformed as a result of the pressure test.
5. Following installation on board, means of closure such as doors, hatches and flaps shall be tested for watertightness using a hose test. If the seal is clearly visible when the means is closed, testing using a detector, chalk-testing, etc. may be accepted.
6. If the means of closure are also to be used as fire division the prototype shall be tested from the most critical side, according to the fire safety requirements in force. For watertight sliding doors, cf. also section 41 subparagraph 5.

Amended by Regulations of 2 March 1999 No. 406 (in force on 1 Sept 1999), 11 April 2003 No. 543 (in force on 1 July 2003).

Section 35¹

Emergency battery lighting

Repealed by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

¹ Cf. Regulations of 4 September 1987 No. 856 on the construction of mobile offshore units section 12.

Section 36

Other types of watertight means of closure

1. Other types of watertight means of closure than those referred to in these Regulations will be evaluated particularly with regard to requirements concerning strength, remote control, and alarm systems.
2. If the means of closure have remote-controlled closing system and personnel may be injured during remote-controlled closing, the system shall satisfy the standard specified in Chapter XII with regard to local alarms and the possibility of stopping the remote-controlled closing locally.

Chapter XI

Remote-controlled closing systems and control systems for watertight means of closure

Section 37

Equipment on, and location of, control console and control station

1. The control console for the means of closure shall be equipped with:
 - a) Remote-controlled closing system with a master switch with two modes of control: «normal operation» and «emergency closing», cf. section 38
 - b) Diagram showing the location of each means of closure.
 - c) Visual indicators showing whether each means of closure are open or closed (indicators on closing mechanism/dogs).
 - d) Sound alarm which indicates within one hour that means of closure which should have been closed, have been left open.
 - e) For means of closure operated by mechanical or hydraulic remote control, an alarm system giving:
 - low-level alarm for the hydraulic oil tank
 - low-level alarm for stored energy (pressure) in the accumulators
 - low-level alarm for the power supply (measured as close as possible to source)
2. The control console shall be located in the same manned control station as the ballast control console¹.
3. The control station shall be located above the most unfavourable waterline for angles of heel as specified in section 30, and shall be sufficiently protected against the weather.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

¹ See equivalent requirements regarding location in Regulations of 20 December 1991 on ballast system, section 16.

Section 38

Master switch for the remote-controlled closing system

1. The master switch shall normally be in the «normal operation» mode. The means of closure shall then only be capable of being opened and closed locally.
2. With the master switch in the «emergency closing» mode, means of closure which are open shall be automatically closed by remote control. After reopened locally, the means of closure shall return to closed position.
3. Instructions for use of the master switch shall be located near the switch.

Section 39

Mechanical/hydraulic remote-controlled closing system

1. The power supply for the mechanical/hydraulic remote-controlled closing system shall be connected to the main and the emergency switchboards.
2. The mechanical/hydraulic system shall be separate from other systems and shall be designed so that a single failure normally only affects the operation of one means of closure and under no circumstances leads to the opening of any means of closure which is closed.
3. The mechanical/hydraulic remote-controlled closing system can either be:
 - a) a centralized system with two independent pumps each connected to accumulators. The total capacity of the accumulators shall be sufficient to operate 50% of all means of closure at least 3 times (closed-open-closed) during inclination as specified in section 30. For watertight sliding doors, see also requirements in Chapter XII; or,
 - b) an independent system for each means of closure, each with its own pump and accumulators. The capacity of the accumulators shall be sufficient to operate each means of closure at least 3 times (closed-open-closed) during inclination as specified in section 30. For watertight sliding doors, see also requirements in Chapter XII; or,
 - c) a combination of alternatives a) and b).

4. When the unit is in the upright position, the system/accumulators shall also have the capacity to close all the means of closure simultaneously by remote control within 60 seconds.
5. The time taken from the means of closure begin to move until it is completely closed shall be between 20 and 40 seconds both for the «normal operation» and for the «emergency closing» modes. Opening the door shall be at least equally quick.

Section 40

Control, indicator and alarm systems

1. The control, indicator and alarm systems for the means of closure shall be connected to the main and the emergency switchboard. In addition they shall have battery connection.
2. The collective capacity of the batteries shall be sufficient to operate 50% of all means of closure at least 3 times (closed-open-closed) during inclination as specified in section 30.
3. The systems and their components shall be separate from any other system and shall be designed in such a way that a single failure in a component or a ruptured pipe/cable will not prevent remote-controlled closing of more than one means of closure, or cause already closed means to open. Similarly, a single failure in the indicator or alarm systems shall not prohibit the closing, either by remote control or locally, of the means of closure.
4. During and after emergency closing the means of closure shall not be capable of being opened or closed unintentionally due to electrical short circuit in the remote-controlled closing systems. Means of closure at access openings shall still be capable of being operated locally.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Chapter XII

Additional requirements for watertight sliding doors

In addition to requirements laid down in Chapters X and XI watertight sliding doors shall satisfy the following requirements:

Section 41

General requirements

1. All doors should be capable of being closed mechanically/hydraulically and by hand-pump during inclination as specified in section 30, when water is flowing through the opening applying a static head equivalent to a water column of 1 m above the sill on the centreline of the door.
2. When the unit is in the upright position, local closure of the doors by hand-pump shall be possible within 90 seconds. A single failure in the remote-controlled closing system shall not prohibit operation of the doors by means of the hand-pump.
3. Local operation of the doors shall be carried out by one handle, i.e. the same handle shall be used for «normal operation», «emergency closing» and for the hand-pump.
4. To guard against incorrect operation of the doors while the unit is at a quay/in a yard or similar, the remote-controlled closing system must be capable of being disconnected manually and locked in this position. The watertight doors will then remain open. Under these conditions no form of remote-controlled closing or local operation of the doors shall make the doors close until the system has been re-activated manually.
5. Watertight sliding doors may also be fire doors provided that:
 - a) the doors have been insulated so that they are equivalent to the fire bulkheads in which they will be fitted
 - b) the mechanical/hydraulic remote-controlled closing system has been designed so that the doors will not open under the influence of heat.

Amended by Regulation of 2 March 1999 No. 406 (in force on 1 Sept 1999).

Section 42

Function in «normal operation» mode

1. When the remote control master switch in the control room is switched to the «normal operation» mode, the doors shall be capable of being opened and closed locally, from both sides, both mechanically/hydraulically and by hand-pump.
2. Doors shall be opened by activating the local control handle. The door shall then open when the handle is held in the open position and stop when it is released. Systems whereby the doors open completely and remain in the open position although the handle is released are also acceptable.
3. To close doors locally, the control handle shall be held in the closed position until the door is closed. If the handle is released before the door is completely closed, the movement of the door shall stop or the door shall automatically return the open position again. After the stop, it shall be possible either to continue closing the door or to reopen the door without completely closing the door first.

Section 43

Function in «emergency closing» mode

1. When the remote control master switch in the control room is switched to the «emergency closing» mode, the doors shall still be capable of being opened and closed locally, from both sides, by using the normal control handles. The location of the handles shall be such that they are capable of being operated simultaneously from both sides of the door when it is open. This is in order to ensure that the door does not close during transit through the door. The doors shall also be capable of being opened and closed by hand-pump.
2. The door shall close automatically when the handles are released. It shall be possible, by using the handles, to stop the door during closure or to reopen the door without waiting for complete closure first.

Section 44

Signals during «emergency closing»

A sound signal shall be activated locally during emergency closing of an open door. The signal shall also be activated during any subsequent local operation of the door if this is still centrally emergency closed. A visual signal shall be arranged in areas where the sound signal is not likely to be heard because of noise.

Chapter XIII

Watertight closing on self-elevating units

Heading amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Section 45

Additional requirements for watertight closing of openings on self-elevating units

If ventilators or similar equipment or devices are located where they may be damaged or torn off by the sea or by equipment or deck cargo which has become loose, and by this lead to flooding of compartments which in the stability calculations are considered to provide buoyancy at angles of heel given in section 21, the ventilators shall have a watertight means of closure located so that it will still be fit for use after such accident.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Chapter XIV

Weathertight integrity

Section 46

Weathertight closure of openings

1. Openings to spaces which according to section 18 subparagraph 3 (b) shall be weathertight when closed, shall be fitted with weathertight means of closure.
2. Each means of closure shall be designed and hinged so that it can be easily closed by one person. The design shall take into account the inclination at which it is necessary to close the appliance, cf. section 30.
3. The design and calculation of the strength of weathertight means of closure shall comply with a recognized standard, cf. section 2 subparagraph 1. Where the means of closure serve as access openings they shall be fitted with central operated dogs.

Amended by Regulation of 2 March 1999 No. 406 (in force on 1 Sept 1999).

Section 47

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Section 48

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Chapter XV

Operations manual, routines and instructions

Section 49

Stability instructions and operations manual

1. Written instructions for the daily follow-up of stability in accordance with these regulations shall be prepared. The instructions shall be incorporated into the unit's operations manual.
2. The follow-up of stability shall be carried out by:
 - calculation of loading conditions and checking of the result against the KG limit curve
 - follow-up of light ship data
 - maintenance of the watertight subdivision and, where applicable, separate routines for:
 - ballasting from operating condition to survival condition and from transit condition to survival condition, cf. sections 17 and 28
 - special operations, cf. section 9 subparagraph 5
 - maintenance of the watertight subdivision for self-elevating units, cf. section 50, or for drilling ships cf. section 51.
3. The operations manual shall also include at least the following information necessary to carry out the above follow-up:
 - short outline of the regulations according to which the unit has been documented and their implications for the operation of the unit
 - KG limit curves with limitations and explanations, cf. sections 9, 16 and 28
 - form for the calculation of daily loading conditions, cf. section 15 subparagraph 2
 - necessary data for the calculation of daily loading conditions, cf. sections 15 and 16
 - examples of loading conditions, cf. section 17
 - light ship data and form for follow-up of light ship data, cf. section 8 subparagraph 2
 - watertight subdivision plan, also showing which watertight means of closure are to be kept closed at all times, and which are to be closed by remote control in an emergency situation or when the unit goes to survival condition
 - plan of the weathertight means of closure, also showing which means of closure are to be kept closed either in an emergency situation or when the unit goes to survival condition.

Amended by Regulation of 2 March 1999 No. 406 (in force on 1 Sept 1999).

Section 50

Special routines for self-elevating units

1. Before the unit is made waterborne an entry shall be made in the official log-book, the shift report or similar reporting system, stating that all watertight and weathertight means of closure that shall be closed in accordance with section 49, have been witnessed closed.
2. As long as the unit is waterborne, all means of closure, unless they have to remain open, shall be kept closed. Instructions stating that it should be kept closed whenever waterborne, shall be posted on these means of closure.
3. As long as the unit is waterborne, inspection and reporting routines shall ensure and document that the means of closure remain closed.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Section 51

Special routines for units of a ship design

1. Before the ship goes to survival condition, cf. section 2 subparagraph 12, all openings in accordance with the plan required by section 49, shall be closed weathertight.
2. As long as the ship is in the survival condition, inspection and reporting routines shall ensure and document that the means of closure remain closed.

Amended by Regulation of 11 April 2003 No. 543 (in force on 1 July 2003).

Chapter XVI

Final provisions

Section 52

Entry into force

These Regulations enter into force on 1 January 1992.

Amended by Regulation of 29 June 2007 No. 1006 (in force on 1 July 2007, previously section 53).