

Draft regulation concerning positioning and anchoring systems on mobile offshore units

Laid down by the Norwegian Directorate on xx. Xxxx 2008 pursuant to the Act of 16 February 2007 No. 9 relating to Ship Safety and Security, Sections 9, 14, 21, 45 and 47, cf. Royal Decree of 16 February 2007 no. 171 and Formal Delegation of 31 May 2007 No. 590 from the Ministry of Trade and Industry. Notified in accordance with Annex II, Chapter XIX point 1 to the EEA Agreement (Directive 98/34/EC).

Chapter 1. General provisions

§ 1. Scope of application

- (1) This Regulation applies to all units which have been registered or will be registered in a Norwegian register of ships.
- (2) 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.

§ 2. Definitions

For the purpose of this Regulation the following definitions shall apply:

- a) *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. Det Norske Veritas (DNV)
 - 4. Germanischer Lloyd (GL)
 - 5. Lloyds Register of Shipping (LRS)
- b) *Extreme weather*: Cf. the definition given in ISO 19901-7 (2005), A.6.4.2.2.
- c) *Unit*: Mobile platforms, including drilling ships, equipped for drilling for subsea petroleum deposits, and mobile platforms for other use than drilling for subsea petroleum deposits.
- d) *Close to*: A unit is close to an other construction when:
 - 1. the gangway between the unit and construction is attached, or
 - 2. the unit is in danger of drifting into the construction after loss of all lines in the worst corner (the loss of all lines in the worst corner gives a safety factor (-s) below 1.0), or
 - 3. the distance between the unit and the construction is less than 10 m when calculating the transient movement, after loss of all lines in the worst corner.
- e) *MOU classification society*: A recognized classification society with which there is an agreement on its carrying out of inspections and surveys, etc. on mobile offshore units. The following societies are MOU classification societies:
 - 1. Det Norske Veritas (DNV)

2. Lloyds Register of Shipping (LRS)

Upon request, the Norwegian Maritime Directorate may in each individual case employ other recognized classification societies to carry out inspections and surveys, etc. on mobile offshore units.

- f) *Vicinity*: A unit is in the vicinity if there is no time to evacuate the unit and other installations/constructions during the time it takes the unit to drift due to the existing weather conditions. A unit is only in the vicinity for the conditions where the weather comes from a critical sector with regard to a collision between the unit and other installations/constructions.
- g) *Company*: Cf. the definition given in Section 4 of the Ship Safety and Security Act.
- h) *Certified*:
 - (1) In respect of equipment and materials: Equipment which satisfies the requirements specified or materials complying with a recognized standard which are certified, approved or type-approved by:
 - 1. a Notified Body,
 - 2. an accredited certifying body,
 - 3. a recognized classification society,
 - 4. other public or private institution recognized by the Norwegian Maritime Directorate, or
 - 5. the administration of a country that has ratified the Safety of Life at Sea (SOLAS) Convention.
 - (2) In respect of workmanship: Personnel who according to regulatory requirements are required to hold special qualifications for performing specific tasks and certified by:
 - 1. a recognized classification society,
 - 2. an accredited certifying body, or
 - 3. other public or private institution recognized by the Norwegian Maritime Directorate.
- i) *Safety Management System*: All systematic measures which the Company is required to make to ensure that activities are planned, organized, performed and maintained in accordance with requirements applicable to areas regulated by the Act of 16 February 2007 No. 9 relating to Ship Safety and Security and the Norwegian Maritime Code of 24 June 1994 No. 39.

§ 3. *Mutual acceptance*

(1) Where this Regulation requires that specific fittings, materials, devices, or types of equipment, etc. shall be acquired or be provided on board an offshore unit or where special construction or design requirements apply, the Norwegian Maritime Directorate shall permit alternative solutions provided they have been documented by testing or otherwise to be at least as effective as those prescribed by this Regulation.

(2) The Norwegian Maritime Directorate shall accept the results of tests performed at recognized testing institutions, including testing institutions in other EEA countries. This acceptance shall be subject to the tests demonstrating appropriate and satisfactory results of a technical, professional and independent nature.

§ 4. *Exemptions*

The Norwegian Maritime Directorate may, in individual cases and upon written application, grant exemption from the requirements of this Regulation. There must be special reasons that make the exemption necessary and it must be justifiable in terms of safety. Exemptions can only be granted where they do not contravene international agreements to which Norway has acceded.

§ 5. Documentation

The company shall be able to document compliance with the requirements of this Regulation. Documentation shall be sent or presented to the Norwegian Maritime Directorate on request. The contents, scope and type of documents and the time of submission shall be decided by the Norwegian Maritime Directorate.

Chapter 2. Technical requirements

§ 6. Design and function requirements

(1) General:

- 1.1. The anchoring/positioning system shall keep the unit at its position.
- 1.2. The selected technical solutions shall, after an individual and joint assessment and need for future maintenance, give the best solutions.
- 1.3. The system shall be dimensioned to withstand the load that the selected solutions cause.
- 1.4. All equipment shall be prepared for easy maintenance and function testing.
- 1.5. No single error, including operator's error, shall lead to an unintentional failure or release of more than one anchor line.
- 1.6. All components of the anchoring/positioning system shall be certified by an MOU classification society.
- 1.7. The components of the anchoring/positioning system shall be delivered with the manufacturer's recommendations for maintenance and possible length of the lifetime of the design.

(2) Anchor winches:

- 2.1. The anchor winch shall be dimensioned for every condition the unit is to be used in (cf. § 8 (11) and (12)), as well have the pulling force needed to test the holding force of the anchor system statically in accordance with § 8 (10), yet not lower than 50% of the breaking strength of the anchor line.
- 2.2. The characteristic tension of the winch or its fundamentals shall not exceed 80% of the of the material yield point when subjected to a load equal to the breaking strength of the anchor line.
- 2.3. For winches without pawl, or where the pawl is not in accordance with subsection 3.1 below, the following shall apply:
The winch, when parked, shall have at least two independent holding brake systems engaged at any time. The total static holding force shall at least correspond to 120% of the breaking strength of the relevant anchor line. The weakest brake shall be able to hold at least 60% of the given breaking strength.
- 2.4. For winches with pawl, and where the pawl is in accordance with subsection 3.1 below, the following shall apply:

The winch, when parked, shall have at least two independent holding brake systems engaged at any time in addition to the pawl. The total static holding force shall at least correspond to 100% of the breaking strength of the relevant anchor line and this capacity shall be divided between two independent holding brake systems where the weakest brake shall be able to hold at least 50% of the given breaking strength.

- 2.5. At least two independent brake systems shall be available at any time when the winch is operating. There shall be a dynamic brake system which is able to conveniently stop possible combined loads from the anchor line and anchor handling vessel during setting of the anchor at maximum speed (cf. subsections 2.6 and 2.8 below). The dimensioning tension in all components that are being exposed to loads during the braking shall at such loads not exceed 85% of the minimum specified yield point of the material or 80% of the breaking strength of the material. The dynamic brake shall have a cooling system if necessary.
- 2.6. The dynamic brake system shall be able to handle a speed of 1.5 m/s and 100 tons of exposed loads. In case of failure in the dynamic brake force, it shall be possible to stop by means of a static brake, cf. subsection 2.10.
- 2.7. The permitted characteristics of speed/load to which the brake system can be exposed to during the setting of the anchor shall be documented and included in the operations manual.
- 2.8. When engaged, the brakes of the anchor winch shall not be affected by any single error in the power supply or control system. If the power supply fails during operation of the winch, a remainder braking force of minimum 50% of the line's maximum braking strength shall instantly and automatically be engaged.
- 2.9. It shall be possible to release the brakes by means of stored energy in the course of 15 seconds in such a way that there is a controlled lowering and release of the entire anchor line during an emergency (emergency release). This shall be possible from a continuously manned control room. There shall be a safety system present to prevent unintentional release of the anchor line. The anchor line shall not be able to puncture the hull in the case of an emergency release or lead to a further escalation of the incident.
- 2.10. During an emergency it shall be possible to apply the static brakes once and release them again in a controlled manner. This at a speed of at least 2.5 m/s and with a load on the anchor line of at least 100 tons.
- 2.11. There shall be a system which efficiently prevents the possibility of sparks resulting from lowering of the anchor line from igniting gas. The system shall also be efficient during emergency release.
- 2.12. It shall be possible to drop the entire anchor line at the most unfavourable angle of heel following damage, cf. Regulation of 20 December 1991 No. 878 § 21 (Stability Regulations).
- 2.13. It shall be possible to pull the anchor line free from its fastening points/equipment without damaging the unit.
- 2.14. The anchoring system shall be arranged in such a way that a minimum of additional loads in the anchor line will occur apart from the pure tensional strains.
- 2.15. The anchor winches shall be delivered with a certificate from an MOU classification society which documents the following:
 - a) Manufacturer, designation of type and date of production.

- b) Type of anchor line and dimension/length which the winch is designed for.
- c) Static brake holding forces.
- d) Braking capacity during setting of the anchor, as specified in subsection 2.6 above.
- e) Remainder braking force (after failure in power supply).
- f) Maximum pulling force of the anchor winch (steep force).
- g) Maximum break-in capacity(-ies) as a function of anchor line tension (should be given in the form of a table or curve).

(3) Chain/steel rope stoppers and pawl mechanism:

- 3.1. The chain/steel rope stoppers and pawl mechanism shall not prevent a possible emergency release in accordance with subsection 2.9 above, and shall have the possibility of being released from a protected area by the winch, and from a continuously manned control room. The total static holding force of the chain/steel rope stoppers and pawl mechanism shall at least correspond to 120% of the breaking strength of the relevant anchor line.

(4) Fairleads:

- 4.1. The characteristic tension in the fairlead as well as the fairlead's attachment to the unit shall not exceed 80% of the minimum specified yield tension when the anchor line is in the most unfavourable direction to the breaking point given in the operations manual. Overload of the fairlead shall not cause damage to the hull.
- 4.2. The fairleads shall have a minimum of 7 pockets and the groove width shall not exceed 1.7 times the chain diameter.
- 4.3. The fairleads shall have a mounting as free of maintenance as possible and have such a design that rubbing between the anchor line and other constructions, and unnecessary breaks in the anchor line are avoided.
- 4.4. The fairleads shall give as little extra strain on the anchor line as possible. The maximum allowable wear and friction shall be specified in the operations manual.
- 4.5. There shall be easy access to the fairleads for testing of functionality at sea. For permanently anchored units it shall also be possible to change the fairleads at sea.

(5) Dynamic positioning:

- 5.1. If the unit is to keep its position by using dynamic positioning, the system shall be certified by a recognized classification society pursuant to MSC/Circ 645 «Guidelines for dynamic positioning» of 6 June 1994 or an equivalent standard. The choice of equipment class shall be based on the consequences that any loss of position may have with regard to the operations the unit is intended to carry out.

(6) Thrusters-assisted anchoring:

- 6.1. The system shall be in accordance with ISO 19901-7 (2005) if the unit is to keep its position by using thrusters-assisted anchoring. The system for thrusters-assisted anchoring shall be certified by a recognized classification society.

(7) Operation, instrumentation, signs and alarms:

- 7.1. It shall be possible to operate the anchor winches from a well protected separate operating house by the winch. From the operating house it shall be possible to survey the anchor handling vessel, anchor line, anchor winch and anchor chain/steel rope stoppers/pawl to ensure that a safe laying out and

heaving in can be performed. The house shall be located so that it will not be hit by the anchor line in case of release of the whole length.

- 7.2. As a minimum there shall be instruments for reading the speed of the anchor line and line tension, as well as the length laid out at the local operating panel for the winch. The instruments shall have the relevant danger limits marked and give the necessary alarms for safe use.
- 7.3. A communications system shall be installed between the continuously manned control room and the operating house by the winch. The sound level in the operating house shall be such that communication can take place without problems. The sound level shall not exceed 75 dBA. It shall not be necessary to let go of operating handles in order to operate the communications system.
- 7.4. The continuously manned control room shall have instruments for reading the length laid out, and continuous reading and logging of line tension. The line tension shall automatically be saved and the information shall be accessible for at least the next 30 days. The minimum frequency for the recording of the line tension shall be twice per second. The instruments shall have the relevant danger limits marked (high and low tension) and give the necessary alarms for safe use (both visual and audible).
- 7.5. Instruments for reading the speed of the anchor line shall be installed at the continuously manned control room if the winches can be operated from this position. A remote monitoring system (in colour and good resolution) shall make it possible to survey the anchor handling vessel, anchor line, anchor winch and anchor chain/steel rope stoppers/pawl to ensure that a safe laying out and heaving in can be performed. The instruments shall have the relevant danger limits marked and give the necessary alarms for safe use.
- 7.6. When the remote operation system or remote release system is in use there shall be a dedicated sound- and light signal at every winch to warn about rotating machinery. At locations where remote operation/release of the winch can be carried out, a sign shall be put up with information that the alarm shall be sounded prior to remote operation of the winch.

(8) Testing of the new anchoring system:

8.1. The following shall be performed and documented before a new anchoring system is taken into use:

- a) Function tests without stress of all anchor winches, chain/steel rope stoppers, pawl and brakes, etc.
- b) Calibration of instruments.
- c) Pressure tests of hydraulic systems.
- d) Lowering of all anchor lines at top speed with tension in the anchor line for testing of the braking capacity of the winch.
- e) Testing of emergency release of all chain/steel rope stoppers, pawl and brakes under stress.
- f) Controlled lowering, stop and further lowering of anchor line by means of stored energy (cf. subsection 2.9 above).
- g) Control of the maximum pulling force of the anchor winch.
- h) Control of the remainder braking force after failure in the power supply.
- i) Functional and redundancy testing of any thruster-assisted system or dynamic positioning system.
- j) Loss of friction in the fairlead shall be measured and documented for each unit and each anchor line.

- k) Control and calibration of measuring systems for anchor line tension.

§ 7. Anchoring analysis

- (1) It shall be documented that the chosen anchoring system gives a secure and safe anchoring where the unit is to be used.
- (2) The premises, calculation methods and natural conditions that are used, including results of calculations, shall be given in the anchoring analysis.
- (3) The data needed in the anchoring analysis shall be available and be quality assured and verified through calibrated data from model experiments. This could be wind, current, wave drift, and mass and damping coefficients and transfer functions. This also applies for alterations which substantially changes the premises for the motion characteristics.
- (4) The calculations shall be prepared pursuant to the methodology given in ISO 19901-7 (2005). The premises and safety factors given in Annex B.2 in the standard shall be used in the analysis of the survival condition. In addition, the following shall apply:

- 4.1. The operation condition shall also be analysed for all units. The safety factors for consequence class 3 shall be met.
- 4.2. All requirements in regard to the safety factors, including the requirement for the intact condition, shall be met if operation is to continue with one anchor line inoperable.
- 4.3. Units with production plants, equipment for storage, carriage or transfer of hydrocarbons to tankers, or is close to another unit, shall use table B.2 in Annex B. The calculation of a two line break can be based on the maximum operation condition if operation in consequence class 3 is to be concluded before the 10-year weather condition is reached. Calculations of motion shall be made for the unit and constructions in the vicinity with regard to drift and collision. The calculations shall be made for extreme weather conditions including the most severe single failure for the unit and the floating construction in the vicinity respectively. After such an event the distance between the unit and the floating construction tanker in the vicinity shall not be less than 10 metres.
- 4.4. A 100-year return period for weather conditions, as described in ISO 19901-7 (2005), A.6.4.2.2, shall be used in all analyses. Characteristics for the season may be used for a non-permanent anchoring. Dynamic analyses shall be carried out.
- 4.5. Table B.3 in Annex B is to be replaced with the following:

	Consequence class 3	Consequence class 2	Consequence class 1
Intact	1.90	1.80	1.50
One-line-break	1.30	1.20	1.10
One-line-break, transient	1.10	1.10	1.05

- 4.6. The worst weather direction for each anchor line shall be analysed. Sectors with a greater extent than 30 degrees shall not be used.
- 4.7. All analyses shall have a summary which indicates any exemptions from the requirements, and operational conditions or premises that are of special signification or help onboard.

- 4.8. Thrusters may be used as an aid for reducing the anchor line forces pursuant to ISO 19901-7 (2005), with the following clarifications:
- a) If the unit has an automated system, 70% of the thruster capacity is accepted when the system is operated manually.
 - b) Thrust with manual remote steering is not accepted for units stationed close to other constructions.
- 4.9. The anchor holding force shall be greater than the maximum tensile force in the anchor line during 100-year weather conditions and with the most unfavourable anchor line out of action, with a safety factor of 1.0. For intact system a safety factor of 1.25 shall be used. Cf. § 8 (10).
- 4.10. Vertical forces shall not work on the drag.
- 4.11. For units with production plants, the maximum excursion of the unit in intact condition and after a possible single failure or double failure shall not exceed the maximum excursion which the riser is designed to withstand. A safety margin of 2.5% of the water depth shall be used.

§ 8. *Operation of the anchoring/positioning system*

(1) The components in the anchoring/positioning system shall be inspected and maintained to ensure that the components can perform their defined functions throughout their lifetime. The components shall be inspected, maintained and re-certified in accordance with the manufacturer's recommendations and pursuant to the rules of a MOU classification society. In addition, the following shall apply:

- a) Anchor chains shall as a minimum be manufactured according to DNV CN 2.6 (1985) or an equivalent standard.
- b) Anchor chains that are 20 years or older shall be re-certified at each intermediate survey (2.5 years) by use of magnetic particle testing (MPT) or equivalent on all available surfaces through the length of the chain.
- c) Chains with a revealed high failure rate shall be re-certified annually by use of magnetic particle testing (MPT) or equivalent on all available surfaces through the length of the chain.
- d) After repeated (more than one) cold pressings of loose poles, an ultrasound control or equivalent control shall be conducted on all relevant accessible surfaces.
- e) The wear and friction of the fairleads shall be tested annually and undergo an extended testing every 5 years, for verification in accordance with § 6 subsections 4.4 and 8.1 (j).

(2) Even if the components of the anchoring system have validated certificates, this shall not exempt the company from its responsibility of examining the systems, and all the components, to ensure that further use is safe, discover possible defects or implement necessary actions.

(3) When inaccurate measuring or defected equipment is suspected, and at least once a year, all instruments/equipment used for monitoring the anchoring/positioning system shall be checked, calibrated and function tested to such extent as to ensure that correct readings are done throughout the whole area of application.

(4) The fastening of equipment to the anchor line shall be performed by personnel with the necessary documented training to perform such work.

(5) The company shall ensure and the platform manager shall participate in ensuring, and be able to document, that those in charge of anchor handling and positioning have been given the required training in function and operation of the anchoring/positioning system.

This requirement also applies to other personnel who inspect or maintain, and monitor or use equipment and instruments related to the anchoring/ positioning system.

(6) Anchor handling shall not commence if the platform manager or the masters of the anchor handling vessels find that the weather conditions are or may become so bad that the safety of the crew, unit or anchor handling vessel can be jeopardized.

(7) The planning of the anchoring operation shall as a minimum include estimates and analyses of the forces which may arise on the unit or anchor handling vessel, including environmental loads such as wind, waves and currents. Risk assessments to identify critical conditions of the anchoring procedure, including interaction with the anchor handling vessel, shall be performed together with the relevant personnel from other participants. Easy-to-follow procedures for the operation shall be prepared and criteria for conclusion shall be defined.

(8) Those responsible for the handling of anchors and positioning shall continuously check if the anchoring is in compliance with the premises given in the analysis. Furthermore, there shall be a system for documentation of the operation being carried out safely and that the operation is in accordance with the conditions laid down in this regulation and the premises given in the anchoring and positioning calculations.

(9) The information necessary for the safe operation of the anchoring/positioning system shall be given in the operations manual. The consequences of failure in the positioning system shall be known. The guidelines necessary for the operation of the systems shall be given so that the safety is ensured and that the requirements in this Regulation are complied with at all times. The anchoring/positioning calculations shall be available and the involved personnel shall be familiar with the contents. Decisions concerning the anchoring/ positioning system shall be based on the analysis.

(10) The holding power is considered verified when the anchor lines have been tension tested to the maximum force that the anchor is exposed to during extreme weather conditions in accordance with the dynamic analysis (survival condition in intact condition). The requirement for test tension can be reduced if the requirements in § 7 can be maintained after the dragging of any one line, and it does not lead to a raised risk for other units in the vicinity. The analyses of the drag anchor shall be performed in accordance with DGIN or equivalent calculation method, and include a safety factor of 1.25. The geotechnical data used in the analyses shall be representative for the current area. The analysis shall use location specific geotechnical data for each anchoring location if the area is not homogeneous. If calculations are made to reduce the test tension, a verification of correct anchor installation on the seabed shall be done.

(11) When operating, the anchor line tension shall during the use of drag anchors and plate anchors never exceed the tested anchor holding power. The operation shall be concluded before the anchor line tension reaches the tested anchor holding power. This shall be reflected in the detachment values given in the operations manual.

(12) When operating close to other structures, the permitted maximum line tension must not exceed 80% of the tested anchor holding power. The unit shall have necessary winch arrangements and adequate winch power on the windside to pull the unit away during the most unfavourable weather conditions the unit can operate under.

(13) In connection with each anchor handling, the anchor winch, chain/steel rope stopper, fairleads, instrumentation etc. shall be checked, and the entire anchor line shall be inspected visually. A visual inspection of the anchor, buoys, sinking elements etc, shall be conducted at each launching. The result shall be entered in the deck log or be documented in another fashion.

- (14) A function test of the positioning system shall be performed at every new anchoring location. The result shall be entered in the deck log or be documented in another fashion.
- (15) The emergency release system for all brakes shall through stored energy and with load be function tested at every new anchoring. The result shall be entered in the deck log or be documented in another fashion.
- (16) The anchor winch sprinkler facility for chain and wildcat shall be tested at every new anchoring. The result shall be entered in the deck log or be documented in another fashion.
- (17) An updated listing of every component of the anchoring system shall be available on the unit and at the land organisation. The listing shall contain the age, quality, breaking strength, manufactures certificate, inspection certificate, possible re-certification date and re-certification agency of the different components of the anchoring system. The different components shall use a traceable identification system to ensure knowledge of where each component is located at any given time. It shall be possible to trace where the component has been used earlier and the history of the component, with regard to replacement, maintenance, inspections and breakage etc.

Chapter 3. Concluding provisions

§ 9. *Entry into force*

- (1) This Regulation enters into force on 1 March 2009.
- (2) For units which are registered in a Norwegian ship register, this Regulation enters into force at the first certificate expiry, cf. § 1.
- (3) Regulations of 4 September 1987 No. 857 concerning anchoring/positioning systems on mobile offshore units are repealed effective from 1 March 2014.

Information on the impact assessment

The impact assessment shows that the draft regulation will have an impact on the maritime business.

The main changes done to the draft regulation are the new requirements to the anchoring winches. The Norwegian Maritime Directorate has estimated that § 6 (2.1) will affect 4-5 Norwegian flagged MOUs. The cost will depend on several factors, such as the age of the winch, manufacturer and number of lines in the system. The cost of the upgrade may vary from NOK 1.500.000 (simple upgrade) to NOK 75.000.000 (for a new anchor line system) per MOU. It is also possible to be exempted from this requirement through the use of anchor handling vessels.

The provisions given in § 6 (2.3 & 2.4) of the draft will also have an economic impact on the maritime companies. The Norwegian Maritime Directorate estimates that 4-5 Norwegian flagged MOUs will be affected by the new requirement. The cost depends on which solution is chosen and is estimated to range up to NOK 9.750.000 for the installation of pawls on the winches (12 line system).

The other proposed changes will clarify the requirements in the regulation and reduce the administrative burden for the maritime companies. The draft regulation will have no impact on the Administration in form of administrative burdens. There will be no extra burden on the Administration regarding surveys according to the new requirements.