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## REGULATIONS

Regulations of 4 September 1987 concerning anchoring/  
positioning systems on mobile offshore units

Nr. 857

Laid down by the Norwegian Maritime Directorate pursuant to Act of 9 June 1903 No. 7 relating to Public Control of the Seaworthiness of Ships §§ 1, 9a, 41 first paragraph, and 41a, cf. Royal Decrees of 12 October 1962, 5 April 1963, 1 December 1978, 25 May 1984, and also Formal Delegation of 15 January 1979 and 6 June 1984.

§ denotes Section

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## § 1

## Definitions

For the purpose of the present regulations, the following definitions shall apply:

1. *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.
2. *New unit*: Unit whose construction was begun after the entry into force of these regulations.
3. *Owner*: Whoever contracts and/or is responsible for the operation of a unit.
4. *Internal control*: All systematic measures to be taken by the owner in order to ensure that the activity is planned, organized, run and maintained in accordance with the requirements laid down in, and pursuant to, Acts or regulations, and also requirements and recommendations issued by the control institutions and recognized survey institutions concerned when carrying out control on behalf of the authorities.
5. *System audit*: Planned and systematic review of systems to ensure that these are established, followed and maintained as specified.
6. *System*: Formalized collection of mutually co-ordinated procedures.
7. *Verification*: Investigation/examination to confirm that an activity, product, or service is in accordance with specified requirements.
8. *Approved*: Approved by the Norwegian Maritime Directorate.
9. *Approved survey institution*: Survey institution approved by the Ministry of Trade/Norwegian Maritime Directorate to carry out control and survey of units.

## § 2

## Application

1. These regulations apply to the new units which are or will be registered in a Norwegian register of ships.

158 Kilde: Sjøfartsdirektoratet: "Regler for flyttbare innretninger" 1989-utg. (utkommer aldri)

2. Existing units shall comply with the requirements which were in force prior to the entry into force of the present regulations.

### **§ 3**

#### *Responsibility*

1. It is incumbent on the owner to ensure that the provisions of these regulations are complied with. The owner shall also ensure that whoever works for him, either in person, through employees or through independent contractors or subcontractors, complies with the provisions of these regulations. Furthermore, it rests with the owner to ensure that the anchoring and positioning system is maintained in a safe operational condition and in compliance with the regulations at all times.
2. The owner shall make the necessary arrangements and give the platform manager necessary instructions through the operation manual or by similar means, so that the platform manager as part of the daily operation can ensure that the administrative and operational requirements are complied with.

### **§ 4**

#### *Documentation*

1. The following documentation shall be submitted in one copy to the Norwegian Maritime Directorate:
  - 1.1. Documentation confirming that the individual components in the anchoring and positioning system are in accordance with the requirements in these regulations. Layout drawings, calculations, certificates, etc. showing this, shall be submitted.
  - 1.2. Background information necessary to evaluate restrictions in the operation of the unit and extreme condition, e.g. anchoring calculations, sea test reports, etc.
  - 1.3. Operation manual.
2. Documentation as mentioned under subsection 1 above shall be submitted prior to the keel being laid or prior to the unit having reached a similar stage of construction. For units purchased from abroad for registration under the Norwegian flag, documentation shall be submitted prior to the unit being put into operation under the Norwegian flag.
3. It is incumbent on the owner to ensure that prepared drawings or other documentation is submitted in those instances where alterations have been made during the construction period.
4. Prior to documentation as mentioned in this section being submitted to the Directorate, it shall have been checked by the owner through the internal control system.

### **§ 5**

#### *Approval — system audit — verification*

1. Documentation referred to under § 4 will normally be subject to approval by the Directorate.
2. Furthermore, the documentation will be used in connection with any inquiries from the owner concerning interpretations, evaluation of equivalent solutions, and deviations. The documentation may also be used in connection with system auditing and verification.
3. System auditing may be carried out by the Norwegian Maritime Directorate to check that the owner and any persons carrying out work for him have the necessary system and use this in a way which ensures that the regulations are complied with.
4. Verification may be carried out by the Norwegian Maritime Directorate during the phases of construction and operation to ensure that activities, products, or services which come under these regulations are in accordance with specified requirements.
5. The conditions mentioned in these regulations may be required verified to the extent the Norwegian Maritime Directorate finds necessary prior to the first issue of the unit's certificates and in connection with subsequent renewals of the certificates.

**§ 6**

*The anchoring/positioning system*

1. General

The anchoring/positioning system shall be such that the unit is kept in place with the necessary accuracy and reliability under the weather conditions which may reasonably be expected. The requirements specified below have basically been given for units equipped for drilling for subsea petroleum resources and units operating in the vicinity of permanent installations. For less risky operations the requirements may be reduced.

2. Anchor winch

- 2.1. The anchor winch shall be constructed in such a way that no nominal tension in the structure occurs which exceeds 0.9 times of the material yield point when subjected to a static load equal to the breaking strength of the anchor chain/steel rope.
- 2.2. The anchor winch shall have at least two independent holding brake systems engaged at any time. The total static holding force shall at least correspond to the breaking strength of the relevant anchor chain/steel rope (first steel rope layer). The weaker brake shall be able to hold at least 50% of the said breaking strength. In addition the winch shall have a dynamic brake system. The winch brakes shall be able to stop possible combined loads from anchor, anchor chains/steel rope and anchor handling vessel during setting of the anchor at maximum speed (cf. 2.3 below). Nominal tension in the brake system (i.e. in all parts that are being exposed to loads during the braking) shall during such loads not exceed 0.85 times of the minimum specified yield point of the material though a maximum of 80% of the breaking strength of the material. On winches without chain/steel rope stoppers the holding brakes shall work directly on the wildcat or wildcat axle.
- 2.3. The characteristics of speed/load to which the dynamic brake system can be exposed during setting of the anchor without damaging overheating occurring shall be documented and included in the operation manual.
- 2.4. When engaged, the brakes of the anchor winch shall not be affected by failure in the normal power supply. If the power supply fails during operation of the winch, a remainder braking force of minimum 50% of the winch's maximum braking force shall be instantly and automatically engaged.
- 2.5. It shall be possible to release the brakes in the same way as mentioned in subsection 3.1 below by means of stored energy in the course of 15 seconds, and in such a way that there is a controlled lowering of the entire chain/steel rope in an emergency.
- 2.6. The anchor winch with its associated parts shall be designed so as to permit releasing the entire chain/steel rope in a safe manner at a heeling angle corresponding to the maximum angle after assumed damage as defined in section 8 of the regulations concerning construction of mobile offshore units.
- 2.7. There shall be a system which efficiently prevents the possibility of sparks resulting from lowering of the anchor chain from igniting gas. This may be done by e.g. a permanent sprinkler or a system for slow lowering of the anchor chain.
- 2.8. The anchor winch shall be positioned and arranged in such a way that a minimum of additional loads in the anchor chain/steel rope will occur apart from the pure tensional strains.
- 2.9. The anchor winch shall have a pulling force which after anchoring makes it possible to test the holding force of the anchor system statically up to the maximum load to be expected in accordance with calculations or which experience has proved necessary to secure anchor holding force under extreme weather conditions, nevertheless a minimum of 0.35- 0.4 times the breaking load of the anchor chain/steel rope.
- 2.10. Anchor winches shall be approved. Every winch shall be delivered with a workshop certificate which includes information on:
  - Anchor chain and/or wire dimension and length for which the winch has been designed. (Including tolerance limits).
  - Static brake holding forces (first steel rope layer).

## **§ 7**

### ***Testing and inspection***

1. Anchoring test shall be carried out prior to first-time approval or when the anchoring system is new. At this test the following shall be undertaken under the supervision of the Ship Control:
  - 1.1. Function tests without stress of all anchor windlasses, chain/steel rope stoppers, etc.
  - 1.2. Calibration of instruments. Pressure tests of hydraulic systems.
  - 1.3. Setting of all anchors at top speed and tension in the anchor line for testing of the dynamic and static braking capacity of the winch (cf. section 6 subsection 2.3).
  - 1.4. Testing of emergency release of all chain/steel rope stoppers and brakes under stress (cf. section 6 subsection 3.1).
  - 1.5. Controlled lowering, stopping and lowering of anchor chain/steel rope by means of stored energy (cf. section 6 subsection 2.5).
  - 1.6. Control of the maximum pulling force of the anchor winch.
  - 1.7. Control of the remainder braking force after failure in the power supply (cf. section 6 subsection 2.4).
  - 1.8. Tension measurement in the anchor chain where this runs over wildcat and fairleads, can be required (cf. section 6 subsection 5.7).
  - 1.9. Inspection of possible thruster capacity, power supply and steering systems for such according to a testing programme further agreed upon (cf. guidelines laid down by the Directorate).
2. During the operating phase anchor chain and steel ropes with wildcats shall be controlled in accordance with guidelines laid down by the Directorate.
3. Inspection, calibration, and function tests as mentioned in subsection 1 above shall be carried out annually on the anchor winches and anchor chain/steel rope stoppers, thrusters, instrumentation, etc. to the extent which the Ship Control considers necessary.
4. In the case of break or other conditions which indicate more stringent control, tests shall be carried out on the anchor chain and/or steel rope according to the provisions of the Directorate.

## **§ 8**

### ***Operation of the anchoring/positioning system***

1. The owner shall see to it, 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 and positioning system. Those in charge shall also check whether the regulatory requirements with regard to safety factors etc. have been met in connection with anchoring and positioning.
2. Anchor handling shall not commence if the person in charge of the operation in consultation with the operators of anchor handling vessels finds that the weather conditions are or may become so bad that the safety of crews and unit or anchor handling vessel can be jeopardized.
3. The information necessary for the safe use of the anchoring/positioning system shall be given in the operation manual. The consequence of failure in the positioning system shall be known. The guidelines necessary for operation of the system shall be given so that the requirements in these regulations are complied with at all times. Furthermore, there shall be a system for documentation of the operation being carried out in accordance with the conditions laid down in these regulations and in anchoring and positioning calculations, cf. guidelines for anchoring/positioning systems laid down by the Directorate.
4. Subsequent to every new anchoring the anchor chains/steel ropes shall be test loaded to the maximum point which, according to calculations, information on environmental conditions and previous experience, is necessary to secure anchor holding power under extreme weather conditions (survival conditions). The positioning system shall also be function tested for all functions, including normal and emergency operation. Programme for such testing shall be kept on board.

5. When operating in the vicinity of other structures, the permitted maximum line tension under normal operations must not exceed 80% of the tested anchor holding power (cf. subsection 4 above), nevertheless a maximum of 1/3 of the breaking load of the anchor line. It is assumed that there is the necessary winch arrangement and adequate winch power on the windside to pull the unit away under specified maximum conditions without the loads on the lines increasing more than necessary during such operations. (It must be possible to distribute the load evenly at all times on the loaded lines).
6. Before and during each anchor handling, the anchor winch, chain/steel rope stopper, fairleads, instrumentation and the like shall be checked and the entire chain/steel rope shall be visually inspected by the person in charge by each anchor winch. Furthermore, a visual inspection of the mooring lines, shackles, etc. of the anchor buoys shall be conducted. The result of this control and the function testing of the positioning system shall be entered in the deck log or in a special log for the anchoring system.
7. The mooring steel rope of the anchor buoy shall normally have a length of minimum 50 metres plus the water depth. Possibly longer at great depths.
8. The emergency release system for brakes and for chain/steel rope stoppers shall through stored energy and with load be function tested by the person in charge of the anchor handling at every new anchoring. The result shall be entered in the deck log or in a special log for the anchoring system.
9. 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 in a special log for the anchoring system.
10. In the case of anchor breaks or other significant defects or anchors, anchor winches, stoppers, instrumentation and the like, the Directorate shall be notified.
11. There shall also be a log<sup>1</sup> on board the unit indicating how each anchor line has been used and any incidents during use with regard to replacements, maintenance, inspections, breaks, etc.

<sup>1</sup> Cf. guidelines laid down by the Directorate.

## **§ 9**

### *Deviations*

1. The Norwegian Maritime Directorate may permit deviations from the provisions of these regulations where special reasons make this necessary or reasonable.
2. If the provisions of the coastal state are incompatible with the provisions laid down in these regulations, the Directorate may deviate from the provisions to the extent this is considered safe.

## **§ 10**

### *Penal provisions*

Wilful or negligent violation of these regulations is punishable by fines pursuant to the General Civil Penal Code of 22 May 1902, § 339, No. 2, provided no stricter penalty is applicable pursuant to any other statutory provision.

## **§ 11**

### *Entry into force*

These regulations enter into force on 1 November 1987.

- Braking capacity during setting of the anchor, as specified in subsection 2.3 above. Maximum setting speed(s) as a function of anchor line tension (should be given in the form of a table or curve).
  - Remainder braking force (after failure in power supply).
  - Maximum pulling force of the anchor winch (steep force).
  - «Break-in» capacity. 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
  - 3.1. It shall be possible to release chain/steel rope stoppers and any pawl mechanism individually or in convenient groups from a well protected area by the winch itself, and from a manned control room or bridge. The release operation shall be possible without special preparations and by means of stored energy in the course of 15 seconds and up to a tension corresponding to the breaking strength of the anchor chain/steel rope. During this operation the nominal tension in the structure shall not exceed the minimum specified yield point of the material, nevertheless a maximum of 80% of the breaking strength of the material. No single error, including operator's error, shall lead to the release of more than one anchor line. Release of chain/steel rope stoppers shall be co-ordinated and run in conjunction with the release of the brakes mentioned in subsection 2.5 above.
  - 3.2. The chain/steel rope stopper shall be designed in such a way that the necessary maintenance and associated functional testing of the stopper can be carried out in a simple manner.
  - 3.3. Chain/steel rope stoppers shall be approved. Such equipment shall be delivered with a workshop certificate which includes information on:
    - maximum load in the chain/steel rope which the stopper will be able to release
    - anchor chain/steel rope dimension (tolerances).
- 4. Fairlead, etc.
  - 4.1. The nominal tension in the fairlead as well as the fairlead attachment to the vessel shall not exceed 0.8 times the minimum specified yield tension, nevertheless a maximum of 80% of the breaking strength of the material, with anchor chain and/or steel rope in the most unfavourable direction to the breaking point. By most unfavourable direction is understood unfavourable angle of incidence according to the operating manual 10° in the most unfavourable direction, or in horizontal direction. Attachment of the fairlead shall be designed and dimensioned in such a way that in case of a possible overload of the fairlead no hull damage occurs.
  - 4.2. The fairleads shall have a mounting as free of maintenance as possible and have such a design that unnecessary break in steel rope and wear of chain are avoided.
  - 4.3. Fairleads shall be designed and positioned so that no considerable, additional tension develops in the anchor chain/steel rope. Furthermore, the maximum permitted wear which can be allowed without considerable, additional tension developing in the chain/steel rope, shall be specified in the operation manual.
  - 4.4. The fairleads shall have a minimum of 7 pockets and the groove width shall not exceed 1.7 times the chain diameter. Other constructions which provide similar or better support for the chain may also be accepted.
  - 4.5. Steel rope/fairleads shall have a diameter and groove construction according to the recommendations of the steel rope manufacturer.
- 5. Anchor chain and/or steel rope system
  - 5.1. Anchor chain, steel rope or a combination of these can be used.
  - 5.2. For the selected anchoring system it shall be documented by means of standard<sup>1</sup> calculations that the system will provide a safe and secure anchoring in those areas in which the unit will operate. If not, special calculations must be made for each anchoring. The Directorate may in special cases of anchoring and for special units require additional calculations and/or special anchoring equipment.
  - 5.3. The consequences of a line break in any anchor line during maximum operating conditions and in extreme weather conditions shall be calculated and shown in the form of calculated unit deviation and new tension in the remaining anchor lines.

- 5.4. The calculation methods and environmental loads used, as well as the result of the calculations, shall be approved.
- 5.5. Unless otherwise stipulated, the following safety factors for tension in the anchor lines shall be used for calculation purposes:
- 3 against chain/steel rope breaks under maximum operating conditions
  - 2 against chain/steel rope breaks under maximum operating conditions after break in an anchor line (1.4 in the outermost transient).
  - 2 against chain/steel rope breaks under extreme weather conditions
  - 1.4 against chain/steel rope breaks under extreme weather conditions after break in an anchor line (1.0 in the outermost transient). For units operating in the vicinity of other installations, the safety factor shall be 2.0 in the sector facing away from the installations. The size of the sector is determined in each individual case on the basis of the risk of collision.

These safety factors are based on a quasi-static method of calculation.<sup>1</sup> For other methods of calculation other safety factors can be approved if it can be documented that they will provide equal safety. For units with their own propulsion machinery operating far away from other installations and whose operating experience has been adequately documented, somewhat lower safety factors can be accepted in the extreme condition. It is a condition that consequences of a possible anchor line break are sufficiently clarified and found acceptable.

<sup>1</sup> Cf. the guidelines in force at the time in question concerning anchoring/positioning systems laid down by the Norwegian Maritime Directorate

- 5.6. A combination of anchor and thrusters, or thruster positioning only, shall be specially approved.<sup>1</sup> Generally, the following shall apply:
- 5.6.1. Thrusters are approved as an aid for reducing the anchor line forces under extreme weather conditions, and then according to the following guidelines:
- 70% of the thruster capacity is accepted for units with a single manual remote steering system for the thrusters. For units with an additional, automatically steered thruster system for optimum use of the thruster which also automatically compensates for possible line breaks, 100% of net thruster capacity is accepted. Thrust with manual remote steering is not accepted for units stationed in the vicinity of permanent installations.
- 5.6.2. If the thrusters are to be approved to keep the unit in position during normal operation it must be possible to steer the thrusters automatically as described above, and special precautions must at all times be taken to secure continuous operation.
- 5.7. In addition to the pure tension calculations mentioned in 5.2 and 5.3 above it may for the maximum loaded anchor line be required calculations of tensions in anchor chains in the most unfavourable position of the fairlead. In cases where there are doubts about the calculation methods, measurements will be required as mentioned in section 7, subsection 1.

<sup>1</sup> Cf. the guidelines in force at the time in question concerning anchoring/positioning systems, laid down by the Norwegian Maritime Directorate.

- 5.8. Anchor chain and/or steel rope shall be laid out in such lengths so as to avoid vertical forces on any anchor at the maximum tension under 5.5 above. This shall be documented by calculations.
- 5.9. Attachments in anchor chain lockers shall not have a higher strength than for the anchor winch to be able to pull off the attachment without damaging the unit. The end of the anchor chain shall not be able to puncture the hull in case of emergency release.
- 5.10. Fastening of loops and the like on steel ropes shall be carried out by personnel with the required training or who are licensed by the manufacturer to carry out such work.

It shall be possible to document that the loop hold has at least the same strength as its related steel rope.

- 5.11. The anchor chain/steel rope shall be tested by an approved survey institution according to rules accepted by the Directorate. Minimum criteria of acceptance can be stipulated by the Directorate. Additional requirements may be made for anchor lines particularly exposed to fatigue and use of highly solid materials and the like where the requirements of the survey institution are not considered to be completely adequate.
- 5.12. Steel ropes shall be protected against corrosion by galvanization according to ISO Quality A or better. Lower protection against corrosion may also be accepted in connection with special inspection procedures on board.
6. Anchors
  - 6.1. The anchors shall as far as practicable be shaped and have such weight that they have sufficient holding power in relation to the expected maximum tensile force in the anchor chain/steel rope under extreme weather conditions and with the highly loaded anchor line out of service. The anchor shall in addition be arranged so as to permit hooking of additional anchors. (Cf. also 5.2 above).
  - 6.2. Anchors which are intended to let go under extreme stress shall be specially approved for each individual unit along with the relevant operating procedure. Necessary tests can also be required.
  - 6.3. The anchors shall be tested for strength along the same lines as for ships' anchors by an approved survey institution, though with a minimum load equal to 50% of the breaking load of the related anchor chain/steel rope. The load during testing and related anchor chain/steel rope type shall be stated in the certificate.
7. Operation and instrumentation
  - 7.1. It shall be possible to operate the anchor winches from a well protected separate operating house by the winch itself. From the operating house it shall be possible to survey the anchor handling vessel, chain/steel rope, anchor winch, anchor chain/steel rope stoppers to such an extent 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 end of the anchor line in case of release of the whole length.
  - 7.2. A satisfactory communications system shall be installed between the manned control room or bridge and the operating house by the winch. The sound level in the operating house shall be such that communication can take place without problems. (Recommended sound level not higher than 75dB (A)). It shall not be necessary to let go of operating handles in order to work the communications system (e.g. headphones with microphone).
  - 7.3. Instruments for reading anchor chain/steel rope velocity and of tension in anchor chain/steel rope, as well as the length laid out shall be installed on the operating panel locally for the winch. Control room or bridge where remote release can be performed shall have instruments for continuous reading of tension in anchor chain/steel rope. The instruments shall have the relevant danger limits marked. In addition, the Directorate may require that the unit is equipped for registration of the anchor line tension on magnetic tape.
  - 7.4. In connection with the remote release system from control room of bridge (cf. 3.1 above) or in connection with any other remote operation system, a loudspeaker/bell or other sound signal shall be installed by every winch for alarm purposes. At locations where remote operation/release of the winch can be carried out, a signboard shall be put up with information that the alarm shall be sounded prior to remote operation of the winch.
  - 7.5. In addition, other instruments, alarms and the like which are essential to the safe and correct use of the system shall be installed at all locations from which the anchoring system can be operated.