

Regulations of 10 February 1994 No. 123 for mobile offshore units with production plants and equipment

Legal basis: Laid down by the Norwegian Maritime Authority on 10 February 1994 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 7, 9, 11, 21, 28a, 32 and 45, cf. Formal Delegation of 16 February 2007 No. 171, Formal Delegation of 31 May 2007 No. 590, Formal Delegation of 29 June 2007 No. 849 and Formal Delegation of 19 August 2013 No. 1002.

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

Amendments: Amended by Regulations of 11 October 1996 No. 977, 18 February 1997 No. 234, 18 February 1997 No. 141, 2 March 1999 No. 410, 11 April 2003 No. 544 (i.a. title), 28 June 2004 No. 1044, 28 June 2004 No. 1046, 29 June 2007 No. 1006 (i.a. legal basis), 14 March 2008 No. 305, 18 January 2011 No. 56, 19 August 2013 No. 1036, 5 July 2016 No. 897.

Chapter I Introductory provisions

Section 1

Applicability

1. These Regulations shall apply to units with production plants, equipment for storage, carriage or transfer of hydrocarbons to tankers which are or will be registered in a Norwegian ship register.
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.
3. These Regulations shall not apply to units carrying out well-stream testing during exploration drilling or production drilling. Such operations are subject to the provisions currently in force on drilling installations and equipment laid down by the Norwegian Maritime Authority.

Amended by Regulations of 11 April 2003 No. 544 (in force on 1 July 2003), 28 June 2004 No. 1044.

Section 2

Definitions

1. *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).
2. *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.
3. *The production plant:* The total plant of production systems and production equipment, including the associated process plant.
4. *Dimensioning fire:* A fire which, in accordance with the defined acceptance criteria, represents an unacceptable risk, and which therefore forms the basis of the design and use of the mobile offshore unit.
5. *Dimensioning explosion:* An explosion which, in accordance with the defined acceptance criteria, represents an unacceptable risk and which therefore forms the basis of the design and use of the mobile offshore unit.
6. *Dimensioning accidental event:* An accidental event which, in accordance with the defined acceptance criteria, represents an unacceptable risk and which therefore forms the basis of the design and use of the mobile offshore unit and its emergency preparedness.
7. *Hazardous areas:* All areas where, due to the possible presence of a flammable atmosphere, the use of unsuitable equipment, machinery or electrical equipment may cause a fire or explosion.
Zones: Hazardous areas are divided into zones 0, 1 and 2.
Zone 0: Areas where an explosive gas/air mixture is continuously present or present for long periods.
Zone 1: Areas where an explosive gas/air mixture is likely to occur in normal operating conditions.
Zone 2: Areas where an explosive gas/air mixture occurs only in exceptional cases and for short periods of time.
8. *Mobile offshore unit:* A mobile platform, including drilling ship, equipped for drilling for subsea petroleum deposits, and mobile platform for other purposes than drilling for subsea petroleum deposits.
9. *MOU classification society:* A recognized classification society with which there is an 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. *Safety Management System*: All systematic efforts which the owner is required to make to ensure that activities are planned, organized, performed and maintained in accordance with requirements laid down in or pursuant to the Act of 16 February 2007 No. 9 relating to ship safety and security.
11. *Loading system*: The system which transfers hydrocarbons from the mobile offshore unit to a reception terminal, e.g. on a tanker.
12. *Operating condition*: Any unit condition when risers are connected and production is in progress (i.e. processing of oil/gas) or when the production systems contain hydrocarbons under pressure.
13. *Survival condition*: Any unit condition when risers have been disconnected due to weather conditions etc.
14. *Company*: The definition of the company of section 4 of the Ship Safety and Security Act shall apply correspondingly.
15. *Risk*: An expression of the hazard represented by an undesirable incident to human beings, the environment or material assets. The risk is expressed as the probability of, and consequences of, the undesirable incident.
16. *Risk analysis*: A systematic procedure to describe and/or calculate the risk. The risk analysis is carried out by identifying undesirable incidents and the causes and consequences hereof.
17. *Environmental load*: The load imposed on the unit by e.g. waves, wind and currents.
18. *NDT*: Non Destructive Testing.
19. *Standby mode*: Any unit condition when risers are connected and the production has been shut down.

Amended by Regulations of 2 March 1999 No. 410 (in force on 1 Sept 1999), 11 April 2003 No. 544 (in force on 1 July 2003), 29 June 2007 No. 1006 (in force on 1 July 2006) 14 March 2008 No. 305, 18 January 2011 No. 56, 5 July 2016 No. 897.

Chapter II General provisions

Section 3

Duties

The owner, employer, 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. 410 (in force on 1 Sept 1999), 11 April 2003 No. 544 (in force on 1 July 2003) 29 June 2007 No. 1006 (in force on 1 July 2007), 19 August 2013 No. 1036 (in force on 20 August 2013).

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. 544 (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. 410 (in force on 1 Sept 1999).

Chapter III Documentation

Heading amended by Regulation of 11 April 2003 No. 544 (in force on 1 July 2003).

Section 5

Documentation

1. The owner shall be able to document that the requirements of these Regulations are complied with. Documentation shall be sent to the Norwegian Maritime Authority on request. The contents, scope and type of documents and the time of submission shall be decided by the Norwegian Maritime Authority.
2. There shall be consultations with the Norwegian Directorate for Civil Protection and the MOU classification society concerned on the nature of the additional documentation to be submitted to those control institutions.

Amended by Regulations of 2 March 1999 No. 410 (in force on 1 Sept 1999), 11 April 2003 No. 544 (in force on 1 July 2003) 28 June 2004 No. 1046, 29 June 2007 No. 1006 (in force on 1 July 2007).

Section 6

Repealed by Regulation of 2 March 1999 No. 410, in force on 1 Sept 1999.

Section 7

Repealed by Regulation of 2 March 1999 No. 410, in force on 1 Sept 1999.

Chapter IV Technical requirements for the production plant

Section 8

General requirements for the production plant

1. Production installations shall conform to a safety level that is not lower than that prescribed by Det Norske Veritas, Hydrocarbon Production Plant or any other internationally recognized standard. Such conformance shall be checked and approved by an MOU classification society or in any other way decided by the authority of the state to which the Continental Shelf belongs.
2. The risks of the operation of the production plant in relation to the other systems of the unit and the risks of the other systems in relation to the operation of the production plant shall be assessed as part of the risk analysis, cf. Regulation of 22 December 1993 No. 1239 on risk analyses for mobile offshore units.

Amended by Regulations of 2 March 1999 No. 410 (in force on 1 Sept 1999), 11 April 2003 No. 544 (in force on 1 July 2003).

Section 9

Repealed by Regulation of 2 March 1999 No. 410, in force on 1 Sept 1999.

Section 10

Repealed by Regulation of 18 Feb 1997 No. 234, in force on 1 July 1997.

Chapter V Technical requirements for the mobile offshore unit

Section 11

General requirements for the mobile offshore unit

– Units with oil storage tanks:

The relevant parts of the Norwegian Maritime Authority's regulations currently in force on oil tankers shall apply to mobile offshore units storing crude oil on board.

– Units with gas storage tanks:

The relevant parts of the Norwegian Maritime Authority's regulations currently in force on the carriage by ship of special or dangerous goods in bulk shall apply to mobile offshore units storing gas in tanks on board. Ref Chapter III.

Section 12

Hull structure

1. A special fatigue calculation shall be made for mobile offshore units which will be located for a long time in the same direction in relation to the wave direction. Reinforcement of the hull may be required on the basis of such calculations.
2. A hull strength calculation shall be made, showing satisfactory safety against the progressive collapse of the mobile offshore unit after design collision and hull damage events. The calculations shall show that semi-submersible units and jack-up units after such damage, and in the most adverse relevant loading condition, will withstand the most adverse environmental loads which may be expected once per year without collapsing. In the analysis the safety factor shall be 1.2 for semi-submersible units and 1.3 for jack-up units. Units of a ship type shall after such damage be capable of withstanding environmental loads which may be expected once every 100 years (level of probability 10⁻²), with a safety factor of 1.0.
3. When production systems and equipment are installed, account shall be taken of the elastic flexing of the hull caused by environmental loads and cargo/ballast distribution.

Section 13

Machinery and piping

1. Boilers, combustion engines etc. shall not be located in hazardous areas. Such equipment may be located in spaces surrounded by a hazardous area, provided the following conditions are fulfilled:
 - the space is kept overpressured
 - ventilation air for overpressure is taken from a safe area
 - an alarm system is provided to warn of any loss of overpressure
 - an air lock system with self-closing doors is arranged between the space and a zone 1 area; self-closing doors are sufficient between the space and a zone 2 area
 - exhaust outlets are located in a safe area
 - surfaces do not have a temperature exceeding the self-ignition temperature of HC gases (approx. 200°C)
 - combustion air intake is from a safe area.
2. Fuel gas supply lines for combustion machinery may be routed through «non-hazardous areas», with the exception of living quarters and control stations, if the supply lines are specially protected by ventilated surrounding pipes (jackets), where ventilation air is monitored by gas detectors. Or fuel supply lines are all-welded, of specially solid construction with regard to materials and dimensions, without flanges, and well labelled and protected against external damage, 100% tested (NDT) of welds and the space is fitted with gas detectors.
3. Efficient spark-arrester equipment shall be fitted in exhaust ducts from all combustion engines and all combustion equipment (except gas turbines). Exhaust from gas turbines shall be sufficiently cooled and led to a safe area. Exhaust shall not obstruct escape or evacuation or be capable of igniting gas in the event of controlled or uncontrolled gas discharges. Water-cooled exhaust pipes shall be fitted with an alarm to warn of any failure of the cooling water supply. All exhaust shall be led in such a way that it will not be a nuisance to personnel or cause dangerous situations for helicopter operations.
4. The surface of machinery or piping which may be exposed to hydrocarbons from leaks or any other uncontrolled discharge shall not, in the normal operating condition, have a temperature exceeding the ignition temperature of the hydrocarbons (i.e. normally not exceeding 200°C).
5. Piping.
Vital piping for steam, cooling water, instrument air, fuel, hydraulic oil etc. forming part of the equipment for the maritime operation of the unit shall not be connected with production systems in such a way that an error in these will also cause a functional failure in vital maritime systems (and vice versa). There shall likewise be segregation between production systems and any drilling systems if both systems are to operate simultaneously. Nor shall there be a connection of systems, e.g. between a gas cooling water system and sanitation system, so that a gas leakage can spread into an area which is basically intended as a safe area.

Section 14

Area classification and ventilation

1. The unit shall be area classified with regard to hazardous areas in accordance with the Norwegian Directorate for Civil Protection's regulations currently in force, «Regulations for electrical plants, maritime installations».
2. Ventilation air intakes and outlets shall be located so that correct pressure differences between non-hazardous areas and hazardous areas, as well as correct flow rates, may be maintained in all wind directions and wind forces for which it is desired to keep up production. Tests may be required.
3. There shall be a distance of at least 4.5 m between the air intake and ventilation outlet. There shall be separate ventilation systems for hazardous and non-hazardous areas.

4. Ventilation air for explosion-proof pressurized electrical equipment (Ex(p)) which shall be maintained after a full emergency shutdown, shall be separated from general ventilation systems.
5. Heating elements in ventilation systems shall not be capable of igniting gas due to high surface temperatures after ventilation shutdown.

Amended by Regulations of 11 April 2003 No. 544 (in force on 1 July 2003), 28 June 2004 No. 1046.

Section 15

Turret system

1. The turret and its bearings shall be dimensioned for simultaneously transferred loads from the anchoring system and risers.
2. The turret with rotation machinery shall be designed so that a single failure in any active component (including bearings) will not cause loss of the possibility of rotating the mobile offshore unit.
3. Turret systems which are not designed to rotate $\pm n \times 360^\circ$ shall have procedures to ensure relevant restrictions as a result of this, e.g. requirements for production shutdown during rotation up into the weather due to rolling motion.
4. Units on which the turret cannot rotate $\pm n \times 360^\circ$ shall have an arrangement for quick disconnection of crossovers for hydrocarbons, electrical cable connections etc. between the turret and the other parts of the unit. Procedures for when to carry out disconnection shall be prepared and included in the operations manual.
5. Any operational restrictions on the turret system will be specified in an annex to the maritime certificates.

Amended by Regulation of 11 Oct 1996 No. 977 (in force on 1 July 1997).

Section 16

Anchoring and positioning systems

1. The anchoring and positioning system shall be in accordance with the Norwegian Maritime Authority's requirements for anchoring/positioning systems.
2. When it is difficult to determine in the calculation analysis the unit's basic forces, such as wind, current, wave drift, and mass and damping coefficients and transfer functions, the uncertainties shall be clarified by model experiments.
3. Calculations of motion shall be made for the unit and the loading tanker – or for the unit against a fixed installation with regard to drift/collision. The calculations shall be made for relevant weather conditions including the most severe single failure for the unit (anchor line breakage, thruster stop or similar), or the most severe single failure for the tanker (main engine or thruster stop).
After such events the distance between the unit and the tanker or other fixed installation shall not become less than 10 metres.
4. The effect of marine growth on the anchor chains shall be included in the anchoring calculations if the unit is planned for operation in areas where anchor chains may be fouled.
5. Consequence classes and safety factors which shall form the basis of the dimensioning of the anchor system are specified in tables I and II.
6. In addition to the requirements of subparagraph 5, the calculations of the positioning system shall be checked and the system dimensioned for double failures based on 10 years of weather conditions. If operation in consequence class 3 is planned to be determined before a ten-year weather condition is reached, the calculation of double failure may be based on the maximum operation condition. If operation in consequence class 3 is planned to be terminated before a ten-year weather condition is reached, the calculation of double failure may be based on the maximum operation condition.
7. Table I contains consequence classes for the various operational phases which shall form the basis for calculations of the safety factor. Table II contains safety factors.

Table 1					
CONSEQUENCE CLASS for anchor chains on units when the unit is anchored:					
Location in relation to other installations	- not in the vicinity	- in the vicinity but greater than X	- in the vicinity but greater than X	- in the vicinity but less than X	- in the vicinity but less than X
Direction of anchor line in relation to other installation	–	facing	facing away	facing	facing away
Condition					
Operation condition	3	3	3	3	3
Standby condition	2	2	2	2	3

Survival condition	1	1	2		
The distance X is given by the distance between the unit and the other installation being so great that the unit, following a possible multiple line failure (3 or more) will turn clear of the other installation with a smallest distance not less than 10 metres in the most adverse phases.					

Table II – Safety factors						
CONSEQUENCE CLASS						
Condition	Class 3		Class 2		Class 1	
	QU	DY	QU	DY	QU	DY
Intact condition	3,0	2,5	2,7	2,3	2,0	1,65
Equilibrium position after single failure	2,0	1,65	1,8	1,5	1,4	1,25
Maximum excursion after single failure	1,4	1,2	1,4	1,2	1,1	1,0
Equilibrium position after double failure*	2,0	1,65	1,8	1,5		
Maximum excursion after double failure*	1,4	1,2	1,4	1,2		
<p>DY = Dynamic method of calculation. QU = Quasistatic method of calculation * For a double failure the 10-year weather condition is used. If maximum operation condition is below the 10-year condition, the maximum operation condition should be used.</p>						

8. A plan shall be drawn up for production control, shipyard control and follow-up control during operation of anchor lines and other components exposed to tension and/or wear, such as fairleads and wildcats in the anchoring system. The extent of the follow-up control will depend on the production and shipyard control carried out and component design and dimensioning and material used. The plan shall cover the lifespan of the components and shall in addition to standard control and maintenance take special account of the following:

- components exposed to repeated high loads and/or load variations (fatigue)
- components exposed to substantial wear, corrosion, erosion, fouling, etc.
- special seabed conditions
- other operational conditions calling for special control.

The plan shall be included in the operations manual/maintenance system.

9. The breaking strength of anchor lines which forms the basis of the mooring calculations shall be adjusted for reductions in strength due to corrosion, wear, etc.

10. Anchors (including pile anchors) shall have a holding force at least 25% greater than the maximum force to which the anchor may be exposed according to the anchoring calculations. The strength of the anchors and their holding force shall be possible to document on the basis of calculations or tests. The calculations shall take seabed conditions and any previous tests into consideration.

11. If it is intended that the length of the anchor lines shall be adjustable depending on weather conditions (active anchoring system), this operation shall be tested and documented for relevant weather conditions. For such systems it shall be possible to plan the adjustment on board by means of simulation. Winches shall normally be capable of being operated without causing shutdown of other critical systems. The owner shall prepare a plan and instructions for such active winch operation, to be included in the operations manual.

12. It shall be possible to carry out a functional test of all winch functions although the winch is in operation.

13. Fairleads for chains shall be constructed with at least 7 pockets.

14. The effect of dynamic forces on the anchoring system shall be taken into consideration when calculating the total tension in the anchor lines for operation in depths of more than 200 metres.

15. The owner shall prepare a plan for control of the embedding of the anchor lines in the seabed in order to check that the line lengths and line profiles on which the mooring calculations are based are maintained.

16. It shall not be possible to release anchor lines while risers are connected to the unit. A special safety system preventing this shall be provided. Emergency release shall nevertheless be possible with risers connected after a manual cancellation of the above safety system. A risk analysis as provided by the regulations of the Norwegian Maritime Authority in force at any time on risk analyses shall determine whether a disconnect mechanism for risers is necessary and which dimensioning accidental events necessitate such disconnection.

17. 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 for rigid risers, whilst a safety margin of 5% of the water depth shall be used for flexible risers.

Amended by Regulations of 11 Oct 1996 No. 977 (in force on 1 July 1997), 18 Feb 1997 (in force on 1 Jan 1998), 2 March 1999 No. 410 (in force on 1 Sept 1999), 11 April 2003 No. 544 (in force on 1 July 2003) 29 June 2007 No. 1006 (in force on 1 July 2007).

Section 17

Stability

1. When the production process is in progress or hydrocarbons are under pressure in the production systems, the requirements for intact and damage stability for operating conditions shall be in accordance with the Norwegian Maritime Authority's currently applicable regulations on stability, watertight subdivision and watertight/weathertight means of closure on mobile offshore units.
2. A collision with a supply vessel of 5000 tonnes displacement with a speed of 2 m/s shall not cause a discharge of crude oil from storage tanks or from process equipment on deck. The production plant shall be capable of withstanding the inclinations occurring without resulting in critical events.
3. The effect on stability of a quick release of risers and/or anchor lines according to emergency procedures shall not result in a dynamic angle of heel in the most adverse case exceeding 17° in any direction.

Chapter VI

General risk-reducing measures

Section 18

Layout

1. Living quarters and main evacuation equipment shall be separated from the production and wellhead areas.
2. The following equipment areas shall be separated and protected from one another:
 - wellhead area
 - production area
 - storage tanks for hydrocarbons
 - auxiliaries which are fired (boilers, incinerators etc.)
 - machinery
 - living quarters and areas containing vital safety equipment, e.g. equipment for positioning, evacuation, etc.
3. The production equipment may be located above storage tanks for crude oil provided that the tanks are equipped with an inert gas system and that vents for gas from the tanks are arranged so that gas is never released to the process area. Such gas releases shall be ventilated to a safe area.
4. Ballast tanks adjacent to storage tanks for oil shall be protected against corrosion and shall be painted inside with a light-coloured paint (coating) in order to be easy to inspect for cracks and resulting leaks.
5. Ventilation intakes shall have the safest location possible with regard to possible gas/smoke emissions from an accidental event, also taking the wind direction into consideration.
6. Equipment which may represent a potential source of ignition shall not be installed in the vicinity of possible sources of leakage of hydrocarbons.
7. There shall be at least two escape routes from every area/space. The escape routes shall be protected to the extent necessary with regard to the design accidental events. Where it may be necessary to pass close to the production plant in an evacuation situation, an enclosed, relief ventilated and insulated escape route shall be arranged past this area.

Chapter VII

Structural fire and explosion safety measures

Section 19

Structural fire safety

1. The production plant shall be surrounded by appropriate fire barriers and the necessary explosion pressure relief structures to prevent the further spread of a fire or explosion that has occurred. On the background of design accidental events and consequence analyses, it shall be considered whether minimum requirements for structural fire safety against adjacent areas are adequate or whether additional requirements are necessary to meet specified acceptance criteria, ref the Norwegian Maritime Authority's regulations currently in force on risk analyses, and regulations on precautionary measures against fire and explosion.

2. The production plant, drilling area and wellhead area shall be separated from each other by class H-O fire barriers as a minimum.
3. The barrier between the production plant and the living quarters shall be a structure that is at least equivalent to fire class H-60.
4. Accesses to non-hazardous areas, and air intakes and other openings shall be located as far away as possible from areas where gas leaks from production equipment may occur.
5. Load-bearing structures, supports, foundations, etc. for the production plant shall be fireprotected to withstand the calculated design fire load for a sufficient period of time with regard to the time needed for pressure relief.
6. Pipes, valves, cables and accumulators, etc. for emergency shutdown valves and for safety and emergency systems in the production area shall be tested with regard to fire resistance. Valves which do not have metal-to-metal sealing shall satisfy the fire safety requirements of API 607 or an equivalent, recognized standard.
7. Processing equipment for the treatment of oil shall be fitted with drip pans or frame sumps of sufficient capacity for the collection of oil spills. The drip pan shall be drained. For the purpose of calculating the drainage capacity a design base leakage (e.g. rupture of the largest pipe) and the normal rolling angle shall be taken into consideration. Oil spills shall be drained through a water lock to an enclosed spill oil tank/collecting tank (if necessary a slop tank). Drainage shall be provided on both sides under separators and similar tanks. The collecting tank shall be capable of holding all oil contained in the largest separator.
8. Drainage systems for spaces and areas classified as hazardous shall be separated from drainage systems for non-hazardous areas. Collecting tanks for drainage from hazardous areas shall be covered by inert gas.
9. Between tank decks and mezzanine decks with drip pans under the production plant there shall be a space which is ventilated and accessible for inspection. Tank decks in relevant areas shall be protected and designed for any jet fires from processing equipment located above, so that the tank deck cannot be exposed to unacceptable heating in the event of ignition of oil or gas leaks.
10. Emergency flaring must not expose escape routes and evacuation stations to excessive heat loads, nor prevent the access to and operation of control stations. Protection against heat loads from flares shall be designed in accordance with the largest hydrocarbon quantity which the flare system will be capable of flaring off. Heat loads from flares shall not exceed 4,7 kw/m² in areas where escape and evacuation by sea may take place.

Amended by Regulations of 2 March 1999 No. 410 (in force on 1 Sept 1999), 11 April 2003 No. 544 (in force on 1 July 2003).

Section 20

Structural explosion protection

1. Load-bearing members, such as decks, roofs and walls shall, if considered to be necessary by the risk analysis, be arranged for explosion relief or designed so that these structural members are not destroyed in a design explosion. Open spaces, blast panels/hatches or lightweight walls collapsing in a controlled manner may be used as explosion relief. In order that depressurisation may be taken into consideration for the purpose of specifying the survival capability of critical equipment in spaces where an explosion has occurred, the opening pressure and opening time of blast panels must be documented.
2. Calculations of explosion pressure based on the area in question, the shape of spaces, blast panels, and the location of equipment may be required in order to determine the design pressure (equivalent static pressure) on structural members such as walls, columns, tanks, pipes etc. and to provide the design basis.
3. Fire protection (including fire insulation) for an area/space shall withstand a specified design pressure without loss of fire integrity.
4. Containers and associated pipes etc. which may hold flammable liquids and gases shall be designed and protected so that leaks will not occur if such equipment is exposed to a specified design pressure from a design explosion.

Amended by Regulation of 2 March 1999 No. 410 (in force on 1 Sept 1999).

Chapter VIII

Gas and fire detection systems

Section 21

Gas detection system

1. The gas detection system and arrangement of gas detectors shall comply with the Norwegian Maritime Authority's currently applicable regulations on precautionary measures against fire, and explosion. In addition gas detectors shall be fitted in areas for:
 - production; in addition to spot detectors the production area shall be covered by infra-red line detectors
 - turret/wellhead with manifolds
 - cargo oil pumps

- machinery/boilers fuelled by gas.
- 2. Gas detectors shall be installed in all ventilation intakes to spaces with mechanical ventilation. If the production area is enclosed in a space with mechanical ventilation, gas detectors shall also be fitted in ventilation outlets.
- 3. Pump rooms with pumps for hydrocarbons shall be equipped with a continuously measuring gas detection system. The gas concentration shall be capable of being read in the cargo control room, and so that an alarm is given at a predetermined gas concentration in pump rooms.
- 4. The owner shall consider installing H₂S gas detectors in the production area for each separate assignment.

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

Section 22

Fire detection system

1. The fire detection system for the production plant shall be based on two different detector principles, e.g. heat and flame detectors. Detectors shall be of an addressable type.
2. The detector system shall function in the event of an error in any detector or a cable breakage between detectors. The loops shall be equipped with monitoring of short-circuits, breakage and earth faults.
3. There shall be a separate processor/logic controller (loop card) for each separate detector loop. In the event that the main processor fails (where there is one single processor) it shall still be possible to have an indication of the loop from which an alarm comes.

Chapter IX

Active fire safety measures

Section 23

Fire pump system for fire water main

1. Capacity of the fire pump system:
The fire water capacity shall be based on the estimated consumption in a dimensioning fire event.
2. For units of a ship design with storage of oil on board and where the production plant is located in the tank deck area, a dimensioning fire in the production area shall require simultaneous fire water for:
 - the deluge system, including remote-operated foam monitors for extinguishing in the production area;
 - the laying of a foam carpet on the tank deck;
 - the number of hose reels which may be used simultaneously for fire-fighting in this area;
 - sprinkler for cooling areas and equipment, such as external bulkheads of adjacent areas and helifuel tanks, depending on the arrangement and degree of passive fire protection.
3. Additional requirements for the number, location and protection of the fire pump systems and their power supply shall be considered and determined on the basis of risk analyses, cf. Risk analyses Regulations¹.

Amended by Regulation of 11 April 2003 No. 544 (in force on 1 July 2003).

¹ Cf. Regulations of 22 December 1993 No. 1239 on risk analyses for mobile offshore units.

Section 24

Fire pump system for deluge systems using water/foam

1. The production plant shall be protected by a foam/water deluge system. The deluge system shall be arranged so that 100% extinguishing and cooling capacity is maintained after a dimensioning accidental event in the production plant destroying one water/foam supply.

There shall be sufficient foam concentrate to maintain foam application for at least 15 minutes. Foam concentrate shall be capable of being supplied from two separate and protected areas on the unit.

2. Using a risk analysis as basis, the owner shall suggest the type and arrangement of the fixed fire protection system for the production plant.
3. Deluge systems¹ shall as a minimum be installed to cover the areas and equipment listed below, and have the following minimum capacities:

<i>Area:</i>	<i>Capacity:</i>
– risers, turret, manifold and wellhead area (foam and water)	20 (l/min m ²)
– production area (foam and water)	10 (l/min m ²)
– surface of pressure vessels and tanks with flammable contents (water)	10 (l/min m ²)

– shipping terminal (foam and water)	10 (l/min m ²)
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On the basis of the result of the risk analysis referred to in subparagraph 2 as basis, the Norwegian Maritime Authority may require sprinkling of other areas such as outer surfaces of the living quarters, as well as a larger capacity than specified above.

4. In addition to local and remote manual release, the deluge system for the process plant shall also be fitted with automatic release in the event of a fire.

5. An automatic deluge system shall be protected against inadvertent release, and any such release shall not result in safety-critical consequences.

6. Where the nozzle type and capacity are concerned these shall in the various areas be suitable for possible gas jet fires, liquid pool fires, running liquid fires and combinations of these, depending on what is relevant in the circumstances.

Amended by Regulations of 11 April 2003 No. 544 (in force on 1 July 2003) 29 June 2007 No. 1006 (in force on 1 July 2007).

1 Systems may be installed in accordance with NFPA 15 «Water spray fixed systems», NFPA 16 «Deluge foam-water sprinkler and foam-water spray systems for equivalent, recognised standards Foam shall be of the film forming type (AFFF, Firestop).

Section 25

Other special fixed extinguishing installations

In areas/spaces which are enclosed or partially enclosed a waterfog system may be used.

Amended by Regulation of 11 April 2003 No. 544 (in force on 1 July 2003).

Section 26

Portable fire extinguishing equipment

In the processing area a sufficient number of portable fire extinguishers shall be located, with an extinguishing agent of the film forming foam type.

Chapter X

Fire and explosion protection of storage tanks in the hull structure

Section 27

Structural requirements

Units which store extracted hydrocarbons on board shall comply with SOLAS-74 Chapter II-2 part D, regulation 56 «Location and separation of spaces» with regard to their arrangement and separation of living quarters, machinery spaces, tanks etc.

Section 28

Active safety measures

Mobile Units which in the production phase store extracted hydrocarbons on board shall be equipped with the following:

1. Foam monitors to cover the tank deck, which shall comply with SOLAS-74 Chapter II-2 part D, Regulation 61, «Fixed deckfoam systems». In addition to manual operation, according to SOLAS-74, the foam monitors shall be capable of remote operation from a location providing a good view.
2. Foam shall be capable of being delivered to the tank deck underneath the production equipment.
3. Tank ventilation shall as a minimum comply with SOLAS-74 Chapter II-2 part D/Reg 59, «Venting, purging, gas-freeing and ventilation».
4. Inert gas systems shall comply with SOLAS-74 Chapter II-2 part D/Reg 62, «Inert gas systems».
5. Fixed fire-extinguishing systems in pump rooms shall satisfy the requirements of SOLAS-74 Chapter II-2 Part D, Reg 63, «Cargo pump-rooms».
6. Cargo oil pumps in pump rooms shall be monitored by instruments for measuring temperatures in shaft bearings, pump casings and shaft penetrations. It shall be possible to read temperatures in cargo control rooms and to give an alarm in the event of temperature increase.

Amended by Regulation of 2 March 1999 No. 410 (in force on 1 Sept 1999).

Chapter XI

Emergency shutdown and emergency release systems

Section 29

Automatic process safety system

Repealed by Regulation of 2 March 1999 No. 410, in force on 1 Sept 1999.

Section 30

Manual emergency shutdown system

1. It shall be possible to carry out manual emergency shutdown in accordance with the Norwegian Maritime Authority's currently applicable Regulations on precautionary measures against fire and explosion.
2. In addition it shall be possible to carry out manual emergency shutdown of:
 - the production plant, including depressurisation
 - cargo oil pumps.
3. It shall be possible to carry out emergency shutdown of the well stream of oil and gas as closely as possible to the location where that stream comes on board the mobile offshore unit, for instance in the immediate vicinity of the point where the riser is suspended.
4. It shall be possible to carry out manual emergency shutdown as a minimum from manned control stations/emergency control stations. It shall also be possible to activate the most comprehensive emergency shutdown from the evacuation stations.

Amended by Regulation of 2 March 1999 No. 410 (in force on 1 Sept 1999).

Section 31

Automatic emergency shutdown system

1. Automatic emergency shutdown shall be in accordance with the Norwegian Maritime Authority's currently applicable regulations on precautionary measures against fire and explosion.
2. Automatic emergency shutdown of the production plant and cargo oil pump system shall be activated by gas and/or fire detection in areas with production systems/equipment. Automatic emergency shutdown of the production plant shall also be activated by abnormal events, such as:
 - loss of flaring («roundflare»)
 - high level in flare knock-out drum
 - loss of instrument air
 - fire in machinery spaces
 - other relevant critical events disclosed in a risk analysis.
3. In the event of fire detection and automatic emergency shutdown of the production plant, pressure relief valves shall open automatically. Depressurisation with depressurisation times shall as a minimum comply with API-RP 520 and 521. It shall be possible to depressurise high-pressure and low-pressure systems simultaneously. Any hydrate formation during such depressurisation shall be taken into consideration.
4. An indication shall be given in the control station/emergency control station of the cause of the emergency shutdown and the equipment which has been automatically shut down. Alarm filtration or a similar arrangement shall be provided so that the first alarm indication may be isolated.
5. In the event of emergency shutdown of the production plant, important machinery using gas from the process shall automatically change over to another source of fuel. Similarly, in the event of loss of fuel gas, the flare system must automatically change over to another gas, e.g. propane. The flare system shall as a minimum be designed in accordance with API-RP/520 and 521.
6. In the event of a system fault the emergency shutdown system shall go to the safest position (fail safe). In the process and wellhead area this involves normally closed circuits for the electrical control system.
7. In the event of emergency shutdown, block valves for the production equipment, e.g. wellhead master valves, emergency shutdown valves in wellheads, manifold valves, must be closed in the correct sequence and with a time delay, so that dangerous pressure conditions do not occur.
8. Ventilation dampers which close in the event of emergency shutdown for living quarters and other spaces where the prevention of gas penetration is required, shall be of a type which is tested for a particularly low leak rate, e.g. lower than 300 m³ gas pr. hour pr. square m. damper area at a differential pressure = 2000 Pa.
9. Hydraulic power systems for closing of emergency shutdown valves etc. shall be arranged with filtration equipment for continuous filtration of the hydraulic oil (pump with off-line filter).

Section 32

Manual emergency release system

1. It shall be possible to carry out manual emergency release of:

- risers, cf. section 15 subparagraph 16, when indicated as relevant by risk analysis anchor lines, cf. section 15 subparagraph 16
- loading system, including mechanical/hawser connection to tanker, cf. section 35.

Amended by Regulation of 2 March 1999 No. 410 (in force on 1 Sept 1999).

Chapter XII

Other special requirements and anti-pollution precautions

Section 33

Emergency power and emergency power consumers

1. The emergency source of power shall be located on the unit in such a way that an accidental event in the production/wellhead area will not make it necessary to shut down both main power and emergency power simultaneously. Account shall be taken of the predominant wind direction in relation to the unit with regard to the location of the emergency source of power. Reference is also made to the Norwegian Maritime Authority's regulations on the construction of mobile offshore units.

2. Exhaust pipes shall not have a temperature exceeding the ignition temperature of the relevant gas produced or stored on the unit.

For testing of temperatures reference is made to IEC standard Publication 79-4 (1975): Electrical apparatus for explosive gas atmospheres, Part 4: Method of test for ignition temperature, and supplement publication 79-4A.

3. It shall be possible to supply the bearing/lifting system of the turret machinery with emergency power. This also applies to equipment on the turret which must be capable of being disconnected due to rotational limitations.

4. It shall be possible to supply ventilation systems in hazardous areas from the emergency source of power.

Section 34

Anti-pollution precautions

The mobile offshore unit shall be designed and arranged so as to prevent acute pollution from the vessel's storage or unloading transfer system¹. Procedures for the operation of arrangements shall be included in the operations manual.

¹ Cf. the IMO «Standard for vapour emission control systems» for emission of oil vapours.

Chapter XIII

Loading and mooring system

Amended by Regulation of 2 March 1999 No. 410 (in force on 1 Sept 1999).

Section 35

Loading and mooring system

1. The loading and mooring system shall be operated within the constructional and operational restrictions of the system. Instructions for cargo transfer and disconnection shall be carried on board the unit and on board the cargo ship.

2. Normal release and emergency release of any mooring hawser shall be possible up to the breaking load of the hawser. Procedures shall be established which ensure that the loading hose is not exposed to unforeseen loads at normal release or emergency release of the hawser connection or in the event of a broken hawser connection.

3. The capacities of the loading and mooring system with regard to permissible tension, pressure and freedom of movement shall be calculated and specified in the operations manual. Recognized standards shall be used for the calculation, taking into consideration the dynamic conditions that may prevail during offshore loading.

4. Release of loading hose shall not be possible before the cargo pumps and the valves of the loading system are shut down.

5. Means of communication shall be provided between all locations from where the loading operation can be influenced. A visual overview shall be provided of all systems requiring control/monitoring.

6. The loading and mooring system shall have instrumentation enabling the measurement of tension in loading hose and mooring hawser, distance between the unit and cargo ship, and pressure in loading hose. In addition, emergency stop shall be provided for cargo oil pumps and loading valves.

7. Miscellaneous safety requirements:

- a) Arrangement for draining of cargo oil pipes shall be provided.
- b) It shall be possible to fill cargo oil pipes with inert gas. Precautions shall be taken to isolate inert gas systems from the cargo oil pipe system.
- c) All ports and intakes in an area within 10 metres of the loading hose's joint part shall be kept closed while loading is in progress.

- d) The loading area shall be capable of being deluged with foam.
- e) The local control station shall be fitted with a deluge system.
- f) The local control station shall be ventilated to over-pressure. Ventilation intakes shall be located in a safe area.

8. A maintenance and testing programme for the loading system shall be established. The maintenance and testing programme shall be included in the operations manual.

Amended by Regulation of 2 March 1999 No. 410 (in force on 1 Sept 1999).

Chapter XIV Maintenance, operation and manning

Section 36

Spare parts and maintenance system

1. The owner shall have a maintenance and spare parts system. The maintenance system shall include hull/tanks and all systems and components referred to in these regulations and shall cover the conditions regarding maintenance, testing and continuous control etc. laid down herein.

2. The owner is responsible for ensuring that spare parts are available in order that repairs and replacements may take place within a reasonable period of time which will not reduce the level of safety on board.

Amended by Regulations of 2 March 1999 No. 410 (in force on 1 Sept 1999), 11 April 2003 No. 544 (in force on 1 July 2003), 29 June 2007 No. 1006 (in force on 1 July 2007).

Section 37

Repealed by Regulation of 2 March 1999 No. 410, in force on 1 Sept 1999.

Section 38

Repealed by Regulation of 2 March 1999 No. 410, in force on 1 Sept 1999.

Chapter XV Concluding provisions

Section 39

Entry into force

These Regulations enter into force on 1 April 1994.

Amended by Regulation of 29 June 2007 No 1006 (in force on 1 July 2007, previously section 40)