

Regulations of dd Month 20yy on cranes and lifting operations on mobile offshore units

Laid down by the Norwegian Maritime Authority on dd Month 2017 under the Act of 16 February 2007 No. 9 on ship safety and security (Ship Safety and Security Act) sections 2, 9, 11, 12, 13, 14, 16, 21, 43 and 45, cf. Formal Delegation of 16 February 2007 No. 171 and Formal Delegation of 31 May 2007 No. 590.

Section 1 Scope of application

- (1) These Regulations apply to Norwegian mobile offshore units.
- (2) These Regulations do not apply to davits used for evacuation and life-saving appliances.

Section 2 Definitions

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

- a) "offshore cranes": cranes used for external and internal lifting on the unit;
- b) "deck cranes": cranes only used for internal lifting on the unit;
- c) "recognised classification society": any classification society with which the Ministry has entered into an agreement, cf. section 41 second paragraph of the Ship Safety and Security Act;
- d) "MOU classification society": a recognised classification society with which there is a supplementary agreement for carrying out surveys on mobile offshore units. These classification societies are:
 - i) American Bureau of Shipping (ABS)
 - ii) DNV GL
 - iii) Lloyd's Register of Shipping (LR).

Section 3 Competent company type A-1 and competent person type B-1

- (1) A competent company type A-1 is required to have:
 - a) adequate expertise in hydraulics, strength and structure, automation and electronics
 - b) a management system
 - c) access to relevant software for strength and structural calculations, and
 - d) updated checklists and procedures for crane examinations.
- (2) A competent person type B-1 is required to have:
 - a) relevant vocational education
 - b) relevant experience, and
 - c) updated checklists and procedures for crane examinations.
- (3) Application for approval pursuant to the first and second paragraphs shall be submitted to the Norwegian Maritime Authority.
- (4) Before an individual can be approved as a competent person type B-1, the person concerned must pass a practical test.

Section 4 The validity of approvals as competent company type A-1 and competent person type B-1

- (1) The approval is valid only when the competent company type A-1 or the competent person type B-1 is listed on the Norwegian Maritime Authority's overview of approved competent companies and persons.
- (2) If, upon request, the competent company type A-1 or the competent person type B-1 does not demonstrate compliance with section 3 first or second paragraph, the Norwegian Maritime Authority may delete the competent company or person from the overview.

Section 5 Documentation

(1) Initial examinations, annual examinations, five-yearly examinations and all tests and examinations after repairs or alterations of the crane or lifting equipment, shall be documented in the control book (ILO Form No. 1).

(2) The control book and certificates shall be filed either in an electronic system or in a paper-based system.

(3) The documentation shall be available on board.

(4) The documentation, including history, in the electronic system shall be protected from overwriting, deletion and changes.

(5) The electronic system shall:

- a) have electronic signature;
- b) clearly identify the person who completed the examination and the document date;
- c) have the data saved in a secure database; and
- d) have a recovery function.

Section 6 *Crane manual*

Cranes shall have a manual with information on:

- a) preparation for operation
- b) start-up
- c) maintenance
- d) repairs
- e) modification and dismantling of equipment and systems
- f) limitations during normal and emergency operations, such as:
 - i) safe working load (SWL)
 - ii) safe working moment under static and dynamic stresses
 - iii) maximum wind force
 - iv) maximum heel
 - v) design temperatures and
 - vi) brakes
- g) safety systems
- h) diagrams for electrical, hydraulic and pneumatic equipment
- i) the most highly stressed components
- j) traceability of material
- k) welding design
- l) scope of NDT and
- m) certification.

Section 7 *Certificates for cranes and loose lifting equipment*

(1) Offshore cranes, deck cranes and loose lifting equipment shall have a certificate.

(2) Certificates for offshore and deck cranes shall be issued on ILO Form No. 2.

(3) Certificates for loose lifting equipment, with the exception of wire rope, shall be issued on ILO Form No. 3.

(4) Certificates for wire rope being used as loose lifting equipment shall be issued on ILO Form No. 4.

Section 8 *Construction of cranes*

(1) Offshore cranes shall be constructed with a level of safety corresponding to:

- a) EN 13852-1:2013 "Part 1: General-purpose offshore cranes" or
- b) DNVGL-ST-0378 "Standard for offshore and platform lifting appliances".

Alternatively, a standard with the corresponding level of safety from another MOU classification society may be used.

(2) Offshore cranes approved for personnel lifts shall have an emergency operation in accordance with NORSOK R-002, Edition 3, March 2017, "Lifting equipment" section 5.15.3. Offshore cranes for which delivery contract was placed before 1 January 2018 are exempt from this requirement.

(3) Deck cranes shall be constructed according to a recognised standard issued by:

a) an MOU classification society; or
b) NS/EN/BS/API/DIN/NFPA/ISO/CEN/IEC. Alternatively, a standard issued by an equivalent standardisation body may be used.

(4) Stairways, ladders, handrails, access openings and gratings on offshore and deck cranes shall comply with the requirements of section 14 of the Regulations of 4 September 1987 No. 856 on the construction of mobile offshore units.

Section 9 *Loose lifting equipment*

(1) Loose lifting equipment for offshore cranes shall comply with NORSOK R-002, Edition 3, March 2017 "Lifting Equipment" Annexes C and F.

(2) Loose lifting equipment for deck cranes shall comply with NORSOK R-002, Edition 3, March 2017 "Lifting Equipment" Annex C.

Section 10 *Fibre rope*

Fibre rope being used in offshore or deck cranes or as loose lifting equipment shall comply with:

a) DNVGL-ST-0378 Chapter 5.2.6 or other standard with the same scope and level of safety; and
b) the recommendations and specifications of the crane supplier.

Section 11 *Lifts*

(1) Personnel and cargo lifts shall be designed, constructed, installed and fitted in accordance with the international standard (ISO) No. 8383 "Lifts on Ships – Specific Requirements".

(2) The safety level of mobile, electric and hydraulic lifts other than the lifts mentioned in the first paragraph must comply with NORSOK R-002, Edition 3, March 2017, "Lifting equipment" Annex E.

Section 12 *Lift trucks and other mobile lifting appliances*

(1) Lift trucks and other mobile lifting appliances shall be fitted with a horn, mirrors, at least one 2 kg powder fire extinguisher and protection against objects falling onto the driver's seat.

(2) Lift trucks and other mobile lifting appliances used in a potentially explosive atmosphere shall be certified for such use.

(3) Around openings flush with decks, ramps, etc., there shall be coamings or other equally efficient arrangements with a height of at least 12 cm. The arrangements shall be attached in such a way that they cannot be lifted or moved by the truck forks.

(4) Lift trucks and other mobile lifting appliances shall have a load chart.

(5) If there are any restrictions regarding where lift trucks and other mobile lifting appliances may operate, information thereon shall be displayed in the lifting appliance. Alternatively, restrictions may be marked on deck.

Section 13 *Certificate of competence for operators of cranes, lift trucks and other mobile lifting appliances*

(1) Crane operators shall have a G5 certificate of competence.

(2) Operators of lift trucks and other mobile lifting appliances shall have a certificate of competence issued on the basis of a curriculum approved by the Norwegian Labour Inspection Authority.

Section 14 *Crane foundation*

The foundations of offshore and deck cranes shall be approved by an MOU classification society.

Section 15 *Scope of initial examination of cranes*

(1) The initial examination shall include a test load with loose scales or water weights. When water weights are used, the density of the water must be verified. The weights shall be hoisted, lowered and swung at full speed. The crane arm radius shall be varied. Braking of the movements shall be tested and the test shall comprise all crane movements that might occur in practice.

(2) The test load of offshore and deck cranes shall comply with table 1.

Safe Working Load (SWL)	Test load
Up to 20 tonnes	1.25 x SWL
From 20 to 50 tonnes	SWL + 5 tonnes
Above 50 tonnes	1.1 x SWL

Table 1

Section 16 *Execution of initial examination of cranes*

(1) The initial examination of offshore cranes shall be conducted by:

- a) a competent company type A-1 when the crane is constructed in accordance with section 8 first paragraph (a); or
- b) the MOU classification society which owns the standard when the crane is constructed in accordance with section 8 first paragraph (b).

(2) The initial examination of deck cranes shall be conducted by:

- a) a competent company type A-1 when the crane is constructed in accordance with section 8 third paragraph (b); or
- b) the MOU classification society which owns the standard when the crane is constructed in accordance with section 8 third paragraph (a).

(3) A competent company type A-1 which conducts the initial examination pursuant to the first and second paragraph (a) cannot be the same company which constructed the crane.

(4) Loose lifting equipment used during the initial examination shall be certified.

(5) The company shall ensure that the competent company type A-1 that conducts the examination pursuant to the first paragraph (a) and second paragraph (a) is listed on the Norwegian Maritime Authority's overview of approved competent companies.

Section 17 *Scope of annual examination of cranes*

The annual examination of offshore and deck cranes shall:

- a) be conducted in accordance with the guidelines of the crane supplier;
- b) at least comprise function testing of the crane and visual control of elongation, wear and tear, corrosion and formation of cracks and fractures.

Section 18 *Scope of five-yearly examination of cranes*

The five-yearly examination of offshore and deck cranes shall:

- a) be conducted in accordance with the guidelines of the crane supplier;

b) at least comprise complete disassembly and dismantling of devices and equipment, so that every component may be inspected for elongation, wear and tear, corrosion and formation of cracks and fractures.

Section 19 *Execution of annual and five-yearly examination of cranes*

- (1) The annual and five-yearly examination of offshore cranes shall be conducted by:
- a) a competent company type A-1 or a competent person type B-1 when the crane is constructed in accordance with section 8 first paragraph (a); or
 - b) the MOU classification society which owns the standard when the crane is constructed in accordance with section 8 first paragraph (b).
- (2) The annual and five-yearly examination of deck cranes shall be conducted by:
- a) a competent company type A-1 or a competent person type B-1 when the crane is constructed in accordance with section 8 third paragraph (b); or
 - b) the MOU classification society which owns the standard when the crane is constructed in accordance with section 8 third paragraph (a).
- (3) The company shall ensure that the competent company type A-1 or the competent person type B-1 that conducts the examination pursuant to the first paragraph (a) and second paragraph (a) is listed on the Norwegian Maritime Authority's overview of approved competent companies and persons.

Section 20 *Examination after overload of or damage to cranes*

- (1) After overload of or damage to offshore and deck cranes, the crane supplier's guidelines for examination after overload or damage shall be followed.
- (2) After overload or damage, offshore cranes shall be examined by:
- a) a competent company type A-1 when the crane is constructed in accordance with section 8 first paragraph (a); or
 - b) the MOU classification society which owns the standard when the crane is constructed in accordance with section 8 first paragraph (b).
- (3) After overload or damage, deck cranes shall be examined by:
- a) a competent company type A-1 when the crane is constructed in accordance with section 8 third paragraph (b); or
 - b) the MOU classification society which owns the standard when the crane is constructed in accordance with section 8 third paragraph (a).
- (4) The company shall ensure that the competent company type A-1 that conducts the examination pursuant to the second paragraph (a) and third paragraph (a) is listed on the Norwegian Maritime Authority's overview of approved competent companies.

Section 21 *Examination and certification of loose lifting equipment*

- (1) The company shall ensure that persons issuing certificates pursuant to section 7 third and fourth paragraphs have sufficient competence. The competence shall as a minimum include a G11 certificate of competence as an authorised lifting equipment inspector, in accordance with a curriculum approved by the Norwegian Labour Inspection Authority.
- (2) Loose lifting equipment shall be tested with test loads in accordance with table 2 before being put into service for the first time, after damage or if damage is suspected:

Item	Safe Working Load (SWL)	Test loads
Single sheave blocks	Up to and including 25 tonnes	4 x SWL
Single sheave blocks with becketts	Up to and including 25 tonnes	6 x SWL

Chains, rings, hooks, shackles, swivels, multiple sheave blocks, etc.	Up to and including 25 tonnes	2 x SWL
Chains, rings, hooks, shackles, swivels, multiple sheave blocks, single sheave blocks, etc.	Up to and including 30 tonnes	55 tonnes
	Up to and including 35 tonnes	65 tonnes
	Up to and including 40 tonnes	70 tonnes
	Up to and including 45 tonnes	75 tonnes
	Up to and including 50 tonnes	85 tonnes
	Up to and including 55 tonnes	90 tonnes
	Up to and including 60 tonnes	95 tonnes
	Up to and including 65 tonnes	100 tonnes
	Up to and including 70 tonnes	110 tonnes
	Up to and including 75 tonnes	115 tonnes
	Up to and including 80 tonnes	120 tonnes
	Up to and including 85 tonnes	125 tonnes
	Up to and including 90 tonnes	130 tonnes
	Up to and including 95 tonnes	135 tonnes
	Up to and including 100 tonnes	145 tonnes
	Up to and including 110 tonnes	155 tonnes
	Up to and including 120 tonnes	165 tonnes
	Up to and including 130 tonnes	175 tonnes
	Up to and including 140 tonnes	190 tonnes
	Up to and including 150 tonnes	200 tonnes
Up to and including 160 tonnes	215 tonnes	
Up to and including 170 tonnes	230 tonnes	

	Up to and including 180 tonnes	240 tonnes
	Above 180 tonnes	1.33 x SWL
Wire rope		Breaking load
Yokes or similar		2.0 x SWL

Table 2

Section 22 *Pad eyes*

(1) Pad eyes shall be constructed with a safety factor relative to the safe working load (SWL) specified in table 3:

SWL	Safety factor
Up to 5 tonnes	2.0
From 5 to 20 tonnes	1.75
Above 20 tonnes	1.5

Table 3

(2) The company shall ensure that the person who examines pad eyes has sufficient qualifications within structure and NDT.

(3) Pad eyes shall be examined before being put into service for the first time and if weakened structure or fastening point of the pad eye is suspected.

(4) Pad eyes with SWL equal to or less than three tonnes shall be examined by:

a) assessing the dimensioning of the pad eye; and

b) visual inspection of the pad eye, structure and fastening point. Random NDT shall be carried out when deemed necessary.

(5) Pad eyes with SWL above three tonnes shall be examined by carrying out:

a) load tests of all pad eyes and random NDT; or

b) NDT of all pad eyes and random load tests.

(6) When a load test of pad eyes is being carried out, table 4 shall be complied with.

SWL	Test weights by load-testing
Up to 20 tonnes	1.25 x SWL
From 20 to 50 tonnes	5 tonnes + SWL
Above 50 tonnes	1.10 x SWL

Table 4

(7) Pad eyes shall have individual or group marking. The marking must include SWL and may e.g. consist of signs in each area with several identical pad eyes or a colour code system that separates between pad eyes with different SWL in the same area.

(8) The location, SWL and loading direction of the pad eyes shall be documented.

Section 23 *Material handling*

Material handling to and from the unit and movement of load internally on the unit shall be carried out in accordance with NORSOK R-002, Edition 3, March 2017 "Lifting equipment" Annex B. The company shall assess the scope of the material handling plan in relation to the need.

Section 24 *Use of wire rope and loose lifting equipment*

(1) Wire ropes used in offshore or deck cranes or as loose lifting equipment shall comply with NS-ISO 4309:2010 "Cranes – Wire ropes – Care and maintenance, inspection and discard".

(2) Loose lifting equipment for offshore or deck cranes shall be used, examined and stored in accordance with NORSOK R-003, Edition 2, July 2004 "Safe use of lifting equipment " Chapter 7.

Section 25 *Use of cranes and other lifting appliances*

(1) Cranes and other lifting appliances shall be used in accordance with the relevant requirements of NORSOK R-003, Edition 2, July 2004 "Safe use of lifting equipment " Chapter 6.

(2) Personnel lifting operations shall only be carried out using cranes and lifting appliances certified for lifting personnel.

(3) Personnel lifting operations shall be carried out in accordance with NORSOK R-003, Edition 2, July 2004, "Safe use of lifting equipment", Chapter 5, with the following addition for transfer of personnel to and from the unit:

- a) The transfer should only take place when warranted by special circumstances;
- b) The offshore installation manager shall approve the transfer in consultation with the safety representative;
- c) The transfer shall be carried out within the weather restrictions imposed by the certificates of the lifting equipment. When weather restrictions are not set out in the certificate(s), the requirements laid down in NS-EN 13852-1:2004 paragraph 7.2.5 shall be met.

Section 26 *Exemptions*

(1) The Norwegian Maritime Authority may exempt a mobile offshore unit from one or more of the requirements of the Regulations if the company applies for an exemption in writing and one of the following conditions is met:

- a) the company establishes that the requirement is not essential and that the exemption is justifiable in terms of safety;
- b) the company establishes that compensating measures will maintain the same level of safety as the requirement of these Regulations;
- c) the company establishes that the requirement hinders the development and use of innovative solutions when such solutions will maintain the same level of safety as required by these Regulations.

(2) A statement from safety representative shall be attached to the application for exemption.

Section 27 *Transitional provision*

(1) As an alternative to the requirements of sections 6 to 24 with the exception of section 13, Appendix I may be complied with until the next certificate issue if the building contract for the unit has been placed before 1 January 2018 or the unit is initially certified before 1 January 2018.

(2) A competent person type A-1 approved by the Norwegian Maritime Authority before 1 January 2018 may carry out examinations pursuant to sections 16, 19, 20 and 21 until 1 January 2020.

Section 28 *Entry into force*

These Regulations enter into force on 1 January 2018. As from the same date, the Regulations of 4 July 2007 No. 854 on deck cranes, etc. on mobile offshore units are repealed.

Appendix I

(With reference to section 27 of the Regulations, Appendix I contains excerpts from the Regulations of 4 July 2007 No. 854 on deck cranes, etc. on mobile offshore units. The Regulations are repealed on dd Month yyyy. The numbering in Appendix I corresponds to the numbering of the sections of the repealed Regulations.)

7. General requirements for deck cranes, etc.

The company shall be able to document that the deck cranes comply with recognised international standards. The security level of the standard should at least correspond to NS-EN-13852-1 (Edition 1, August 2004). On request, compliance documentation shall be sent to the Norwegian Maritime Authority in accordance with the documentation referred to in section 6 of these Regulations.

All cranes must have an installation, operation and maintenance manual (IOM) on board. Particular attention shall be paid to preparation for operation, start-up, maintenance, repairs, modification and dismantling of equipment and systems, as well as all limitations during normal and emergency operations, such as safe working load, safe working moment under static and dynamic stresses, maximum wind force, maximum heel, design temperatures and brakes. All safety devices shall be explained, and there shall be diagrams for electrical, hydraulic and pneumatic equipment as well as procedures for maintenance and inspection. Information on the most highly stressed components, traceability of material, welding design, NDT scope and certification shall also be included. The communication system between crane operator, supply ship and deck shall be explained, and so shall all other items referred to in these Regulations.

10. Methods of calculation, construction requirements and materials

Calculations:

a) In addition to the special requirements laid down in these Regulations, cranes shall be calculated and dimensioned according to a recognised national or international crane standard taking into due account the special conditions (temperature, wind force, dynamic forces, etc.) under which these cranes are to work. In addition, the crane shall be calculated for operation under dynamic conditions, taking into account relative movements that will occur between the crane and the places to and from which the crane lifts and lowers. When, during construction and calculation of cranes, a larger dynamic factor than 1.3 is used, due regard shall be paid to this dynamic load when using standard hooks, blocks, swivels, shackles, wire straps and similar equipment, by calculating the said components for a correspondingly larger safe working load (SWL), but with the crane's SWL stamped on them.

b) The standard according to which the crane has been calculated shall be stated in the IOM Manual. The most highly stressed components of the crane shall be listed in the Crane Manual together with a representative selection of loading conditions. Appropriate inspection and NDT shall be carried out if overload or damage should be suspected.

Structural requirements:

a) Cranes shall be calculated for operation at maximum capacity with a list of at least 5° for units of a ship design, 3° for semi-submersible units and 1° for self-elevating and submersible units in the most adverse directions, and simultaneously for a constant wind speed of at least 25 m/sec. In the wind load calculations, a hanging cargo corresponding to a 10 feet (3 m) standard container shall be assumed. For special cranes, other representative cargo shall be assumed.

b) With the boom in stowed position, cranes on board semi-submersible units shall be calculated for a list of minimum 10° and a single amplitude roll or pitch of 10 seconds. For

self-elevating units, the cranes with the boom in stowed position shall be calculated for a list of 20° and a single amplitude roll or pitch of 10 seconds.

Cranes on board units of a ship design shall, in stowed position, be calculated for a list of minimum 35° and a period in seconds of:

- 1) $T = 0.8 \times B / \text{square root of GM}$
- 2) B = breadth of ship in metres
- 3) GM = metacentric height in metres of the loading conditions in question

Unless more favourable motion characteristics are documented, all cranes which in stowed position are exposed to wind shall, in addition, be calculated for a constant wind speed of 50 m/sec.

c) Cranes used for loading and discharging supply ships shall, as a minimum requirement, in calm weather (significant wave height = 0) be capable of lifting 15 tonnes 32 metres away from the side of the platform or drilling unit, measured along the centre line of the supply ship in moored position. In the case of emergency operations, the crane shall additionally be capable of lifting on board a load of at least 2.5 tonnes from a 25 m radius at a constant wind speed of minimum 30 m/sec and with a list of 10° in the most adverse direction with an appurtenant dynamic load resulting from lifting this load from the deck of a supply ship.

d) The IOM Manual mentioned in section 7 second paragraph shall contain all construction requirements and limitations on the use of the crane as well as a description of normal and emergency operations, confirmed by a competent person (type A-1).

Materials:

a) Only materials certified by a recognised classification society shall be used in important strength components (e.g. crane boom, A-frame, pedestal, etc.). Grades of steel shall be carefully selected, taking into account fatigue, the importance of the construction, the design temperature, the thickness of the material and weldability. For all other constructions, the material shall be adapted to its intended use under marine environmental conditions.

b) The Crane Manual shall contain a general arrangement drawing, giving information on the type of the materials used in all the strength components of the crane. Additionally, it shall contain information on any material with a design temperature limitation below -20 °C. This information shall be confirmed by a competent person (type A-1).

Hydraulic, pneumatic and electrical systems:

a) Each main pressure system shall be equipped with an overpressure safety valve. The valve shall be adjusted and sealed under the supervision of a competent person (type A-1). If, during inspection, the seal is found to be broken, a complete control as described in the first to third paragraphs of section 15 will be required.

b) It shall be possible to install a control manometer for all pressure systems affecting the crane operation.

c) Tubes and hoses shall be so placed as to be protected against heat, pinching, vibrations or any other adverse influences. They shall be readily accessible for inspection and replacement. The hoses shall be used in such a way that the operator would not be injured if a hose should burst.

d) Pneumatic control systems shall be equipped with effective dehumidifying devices to ensure satisfactory operation down to -20 °C. Limitations of the system shall be stated in the IOM Manual.

e) Pressure systems shall be constructed according to a recognised national or international standard. The standard used shall be stated in the IOM Manual and be confirmed by a competent person (type A-1).

f) Electrical systems for the crane and its equipment shall comply with a recognised national or international standard for the zone on board where the crane is positioned with

respect to area classification. The standard used shall be stated in the IOM Manual and be confirmed by a competent person (type A-1).

g) All hydraulic, pneumatic and electrical systems shall be so constructed that failure in any of them will not result in a situation that cannot be controlled.

Workmanship:

a) Welding procedures shall be prepared in accordance with NS-EN-ISO-15614 and welding specifications in accordance with NS-EN-ISO-15609 or equivalent recognised standards for all welding of strength components. The welding procedures shall be approved by a competent person (type A-1) doing the initial certification of the crane. The procedures shall also include preparations for welding and repair of welded parts, and shall be included in the crane documentation. Welding shall be carried out by personnel who are certified for the material grade in question in accordance with EN-287-1, ISO-9606-2 or ASME Section IX. NDT shall be carried out by personnel who are certified in accordance with EN-473 or equivalent recognised standard.

b) NDT of important welds shall be carried out in accordance with the instructions and under the supervision of a competent person (type A-1).

c) Acceptance criteria for welding defects shall be in accordance with recognised standard and be accepted by a competent person (type A-1).

d) A complete test report on the result of such testing shall be confirmed by a competent person (type A-1).

e) Sheaves/fairleads for wire ropes, load hooks and hook blocks, thimbles, etc. shall be in compliance with a recognised standard.

Winches:

a) Cranes with winches capable of lifting considerably more than they are certified for, shall be fitted with a safety device which, at a predetermined overload, prevents the crane from lifting or stops it in such a way that it will only be possible to move the crane to a better position (lower the load or lift the boom).

b) Large cranes shall have an emergency power system which is independent of the main power system.

c) If braking moment and motor moment can be applied simultaneously and in the same direction, this shall be included in the calculations.

Sheaves/fairleads for wire rope:

a) The ratio between the diameter of the sheaves and the diameter of the wire rope shall be the greatest possible and not less than 18:1.

b) All sheaves and blocks shall be so arranged that the wire rope cannot run off the sheave, and shall be secured to avoid that persons may be injured.

Load hooks and hook blocks:

a) The load hook shall be so designed that the load carrying slings cannot fall out, and so as to prevent it from being inadvertently hooked on to any obstructions.

b) The ratio between the diameter of the hook block sheaves and the diameter of the wire rope shall be the greatest possible and not less than 16:1.

c) The crane hook used for loading and unloading supply ships shall be provided with a forerunner of wire or fibre rope of sufficient length and breaking load.

d) Hook blocks shall be fitted with protective plates and be easy to handle from both sides.

Access to and exit from the crane.

a) By fixed means of access it shall be possible to enter or leave the crane in any position. If practicable, fixed access shall be arranged for inspection and control of all important parts such as swing circle bearing, brakes, safety valves, sheaves, wire ropes, etc.

b) An operator's cabin and control positions shall be so located that the operator can make a quick escape if the crane, or part of it, should collapse as a result of unforeseen overloading or any other form of failure.

c) Ladders, railings, etc. shall comply with the requirements of the regulations of the Regulations of 4 September 1987 No. 856 on the construction of mobile offshore units and the Regulations of 4 September 1987 No. 859 on protection, environment and safety measures on mobile offshore units.

d) There shall be a clear passage of at least 600 mm between the fixed and movable parts of the crane regularly frequented by persons. Wherever necessary, guards shall be provided to protect persons against movable parts and hot surfaces.

Securing of the crane in stowed position:

Stowing and securing of the crane shall not take more than 20 minutes. The method shall be described in the IOM Manual.

Control handles:

Provisions shall be made to ensure that no control handle, adjusting button or similar can inadvertently be activated.

11. *Special safety equipment*

Limit switches:

a) Limit switches shall be positioned in such a way that no damage or danger will occur, even if the crane should be stopped by these switches from full speed and with full load,

b) It shall be possible to illuminate the crane and its working area, so that the crane operator, during dark hours, will be able to see when the crane, boom or hook is approaching an area where limit switches will stop the movement.

c) If there is one crane movement that may cause the crane to override a limit switch for another movement (e.g. boom/hook movement), the first switch shall be coupled to both movements.

Load moment indicator:

A crane which has been exposed to a load moment exceeding 110 % of the permitted load moment (including maximum calculated addition for dynamic load), shall be thoroughly examined and approved by a competent person (type A-1) before being taken into use again.

Load indicator:

When the actual load is more than 100 % of the permitted load, an audible alarm outside the operator's cabin shall be automatically activated to warn personnel working on deck.

Emergency stop switches:

a) The emergency stop switch shall switch off the main power supply (all phases).

b) The emergency stop switch shall be protected against inadvertent use.

Fire extinguishers:

There shall be at least one readily accessible fire extinguisher inside or in the immediate vicinity of the crane operator's cabin. For large cranes, additional extinguishers or a fixed extinguishing installation is required.

12. *Loose crane equipment*

Equipment such as rings, shackles, chain and swivels shall be designed, constructed and certified in accordance with a recognised standard.

Loose crane gear shall be of a steel grade not needing heat treatment.

Lifting slings:

a) Forerunners and lifting slings of wire rope used for lifting and lowering of loads of less than 10 tonnes shall have a safety factor of at least 6. For loads of 10 tonnes and upwards

forerunners, lifting slings, rings, hooks and other loose gear shall have at least the same safety factor as appurtenant wire rope.

b) For well-defined loads of 100 tonnes and upwards, the part of the sling that is most highly stressed shall have a safety factor of at least 3.

c) All wire rope slings shall be made of certified wire rope.

d) Rope slings shall be made of certified natural or synthetic fibre rope of the best quality and with the breaking load known. The safety factor against breaking shall be at least 7.

13. *Installation of cranes*

Cranes shall be so erected or positioned that they will not be exposed to extreme heat, or to acid, or to especially corrosive atmospheres.

Cranes shall be positioned in such a way that operations with hanging cargo over high pressure systems will be reduced to a minimum.

The crane foundations shall be approved by an MOU classification society.

14. *Special tools*

Special tools to carry out necessary maintenance work shall be kept on board the unit.

15. *Testing, examination and certification*

Load-testing of cranes:

a) After a crane has been installed on board and before it is taken into use, and later at least every 5 years, it shall be examined and tested by a competent person in accordance with guidelines laid down by the ILO C152 Occupational Safety and Health (Dock Work) Convention, 1979:

<i>Safe Working Load, SWL</i>	<i>Test load</i>
Up to 20 tonnes	1.25 x SWL
From 20 to 50 tonnes	SWL + 5 tonnes
Above 50 tonnes	1.1 x SWL

b) For testing as mentioned above, all loose crane gear such as shackles, chains, hooks, swivels and sheaves, etc. shall be tested and certified in accordance with the fourth and fifth paragraph.

c) The load-testing of a new crane shall always be carried out by means of loose scales. These shall be lifted, lowered and swung at full speed, and the crane arm radius shall be varied. Braking of the mentioned movements shall be tested. The test shall comprise all crane movements that might occur in practice.

d) If it is no possible to use loose scales, a spring weight or a hydraulic jack shall be used. Several tests shall then be carried out, with the crane turned in different directions and at different boom angles. If a spring weight or a hydraulic weight is used, it shall be reliable and accurate.

e) If limitations of pump pressure should make it impossible to lift overload by means of hydraulic cranes as mentioned in subparagraph a, it is sufficient to lift the greatest possible load.

Examinations on cranes:

Before and after the load test, the crane and gear shall be thoroughly examined by a competent person. Dismantling may be required.

Certificates for cranes:

After the crane has been tested and thoroughly examined with a satisfactory result, a Certificate shall be issued by a competent person (ILO Form No. 2). The original Test Certificate (ILO Form No. 2) shall be filed on board together with the control book.

Alterations, etc.:

If the crane has been reconstructed, considerably altered or repaired, it shall be retested and re-examined by a competent person in accordance with the test loads defined in the first paragraph above, and the result of the examination and alterations, if any, shall be entered in the existing Certificate, or a new Certificate shall be issued.

Load-testing of crane gear (fixed and loose gear):

Before it is first taken into use, or after it has been lengthened, deformed, altered or repaired, every item of loose and fixed crane gear shall be tested with the following test loads:

<i>Item</i>	<i>Safe Working Load (SWL)¹</i>	<i>Test loads</i>
Chains, rings,	Up to and including 25 tonnes	2 x SWL
hooks, shackles,	Up to and including 30 tonnes	55 tonnes
swivels, multiple	Up to and including 35 tonnes	65 tonnes
sheave blocks, etc.	Up to and including 40 tonnes	70 tonnes
	Up to and including 45 tonnes	75 tonnes
	Up to and including 50 tonnes	85 tonnes
	Up to and including 55 tonnes	90 tonnes
	Up to and including 60 tonnes	95 tonnes
	Up to and including 65 tonnes	100 tonnes
	Up to and including 70 tonnes	110 tonnes
	Up to and including 75 tonnes	115 tonnes
	Up to and including 80 tonnes	120 tonnes
	Up to and including 85 tonnes	125 tonnes
	Up to and including 90 tonnes	130 tonnes
	Up to and including 95 tonnes	135 tonnes
	Up to and including 100 tonnes	145 tonnes
	Up to and including 110 tonnes	155 tonnes
	Up to and including 120 tonnes	165 tonnes
	Up to and including 130 tonnes	175 tonnes
	Up to and including 140 tonnes	190 tonnes

	Up to and including 150 tonnes	200 tonnes
	Up to and including 160 tonnes	215 tonnes
	Up to and including 170 tonnes	230 tonnes
	Up to and including 180 tonnes	240 tonnes
	Above 180 tonnes	1.33 x SWL
Single sheave block ²		4 x SWL ⁵
Single sheave block with becket ²		6 x SWL ⁵
Steel wire rope ³		Breaking load
Yoke or similar ⁴		2.0 x SWL

¹ For multiple sheave blocks, safe working load (SWL) is equal to resultant load in the head fitting is permitted.

² For single sheave block with or without becket, the test load may be reduced in accordance with the above table when the resultant load in the head fitting exceeds 25 tonnes.

³ Every length and dimension produced shall be tested. If there is no possibility of testing a complete piece, threads or parts may be tested till breakage and the strength be calculated.

⁴ Yokes and similar with a safe working load (SWL) of more than 20 tonnes, may be tested together with the cargo handling-appliances.

⁵ SWL = the maximum permitted load in the wire rope when the sheave is used as single loading block without becket.

Examination of crane gear:

After having been tested, the components shall be thoroughly examined.

Certificates for crane gear:

Loose crane gear and fixed crane equipment shall have a certificate (ILO Forms Nos. 3 and 4). The original Test Certificate (ILO Forms Nos. 3 and 4) shall be filed on board together with the control book.

Annual thorough examinations:

a) Cranes shall undergo a thorough examination at least every 12 months by a competent person, or more frequently if required by the manufacturer or the Norwegian Maritime Authority.

b) The annual thorough inspection shall comprise control and function testing of the crane as well as visual control of elongation, wear and tear, corrosion, cracking and formation of fractures, etc.

Control book and Certificate:

The results of initial testing, tests and examinations every 5 years as well as the annual inspections and all kinds of tests and examinations carried out after repairs or alterations of the crane or lifting equipment, shall be entered in the control book (ILO Form No. 1). The entry shall be written by the competent person who carried out the inspection and the examination. Control book and Certificate shall both be kept on board.

Survey and approval:

In addition, every crane shall undergo a thorough annual inspection by a competent person, cf. eighth paragraph.

16. Marking

All marking shall be carried out in such a way as to be easily legible and durable.

Cranes:

Cranes shall be marked with crane number and maximum permitted safe working load (SWL). Cranes with an adjustable boom shall be marked with maximum permitted safe working load at two or more boom positions, including extreme boom positions.

Blocks:

a) Safe working load (SWL) for a single sheave block is equal to the wire load in (i.e. half the force on the suspension link) when the block is used as a single loading block. For a single sheave block with becket, SWL is also equal to the wire load, which in this case is one third of the force on the suspension link. In both cases the block shall be marked with SWL = the wire load as single loading block without becket.

b) For a multiple sheave block, SWL is equal to the force on the suspension link, and equal to the SWL with which the block shall be marked.

c) In addition, the block shall be marked with an identification number or mark, corresponding to the identification number or mark in the Certificate.

d) The block shall be painted in a clearly visible colour.

Fixed crane gear:

Loose parts such as shackles, swivels, etc. shall be marked with the maximum permitted safe working load, and an identification number corresponding to the identification number in the Certificate.

Lifting equipment:

Lifting equipment shall be marked with maximum permitted safe working load (SWL) in numbers or letters, and with an identification number corresponding to the identification number in the Certificate. This marking shall be done on the lifting equipment itself, or on a plate or ring made of a lasting material and securely fastened to the equipment. Wire slings shall be marked with a label indicating SWL at 0° for single slings and at 90° spread for other slings. Alternatively it is accepted that information on this is posted in readily visible places. The slings shall be easily identified by means of the posted information.

17. Qualification requirements for crane operation

The company is obliged to prepare and carry out documented procedures for safe lifting operations on board. The procedures shall be based on a recognised standard or other safety equivalent solution. Crane drivers are to be trained in unit-specific operating procedures as well as the crane regulations currently in force.