

NORSOK STANDARD

COMMON REQUIREMENTS
MARINE OPERATIONS

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1. FOREWORD

This standard has been developed by the NORSOK Standardisation Work Group.

2. SCOPE

This Standard specifies requirements to Vessels undertaking Marine Operations and to the planning and execution of all work associated with such Marine Operations.

The Standard forms the basis for contracts or time charter agreements.

More stringent requirements or exceptions from this Standard may be imposed when found relevant, taking into account e.g.: duration of the operation, time of the year the operation is taking place, other operations or Installations in the area and local conditions.

3. NORMATIVE REFERENCES

The latest applicable edition amendments of the following main regulations, codes and standards.

Norwegian Regulations

NMD	Regulations for Mobile Offshore Units, laid down by the Norwegian Maritime Directorate (NMD)
NMD	Norwegian Ship Control Rules, issued by NMD
NVE	FEA-M1990: Regulations for Electrical Installations - Maritime Installations.

International Regulations, Codes and Standards

SOLAS-74/78	International Convention for Safety of Life at Sea (SOLAS) 1974, modified by the protocol of 1978
MODU CODE	Code for the Construction and Equipment of Mobile Offshore Drilling Units. International Maritime Organisation (IMO) Resolutions A.649 (16)
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships 1973, as modified the by Protocol of 1978
IMO A.469 (XII)	Guidelines for the Design and Construction of Offshore Supply Vessels
IBC CODE	Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IMO Res. A.212 (VII))
IGC CODE	Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IMO Res. A.328 (IX))
Load Lines 1966	International Conference on Load Lines, 1966

Tonnage 1969	International Conference on Tonnage Measurement of Ships, 1969
IMO A.536 (13)	Code of Safety for Diving System
COLREG	Convention on the International Regulations for Preventing Collisions at Sea, 1972
IMO A.680 (17)	IMO Guidelines on Management for the Safe Operation of Ships and for Pollution Prevention
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978
IMO A.481 (XII)	Principles of Safe Manning
IMO A.538 (13)	Maritime Safety Training of Personnel on Mobile Offshore Units
TOVALOP	Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution
ISO 9001	Model for Quality Assurance in Design, Production, Installation and Servicing.

Classification Rules, Standards and Guidelines

Below is listed a set of Det norske Veritas' (DnV's) rules. However, rules issued by other Recognized Classification Societies may also be used, after agreement between the parties.

DnV	"Rules for classification of Ships"
DnV	"Rules for classification of Mobile Offshore Units"
DnV	"Rules for certification of Lifting Appliances"
DnV	VMO-standard, "Standard for Insurance Warranty Surveys in Marine Operations"
Oljeindustriens Landsforening (OLF)	Anbefalte retningslinjer for sikkerhet- og beredskapsopplæring (Recommended guidelines for safety and contingency training).

4. DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

Column Stabilised Unit	Unit with the main deck connected to underwater hull by columns or caissons.
Foreign Flag Vessel	Vessel with Flag other than the Norwegian.
Foreign Cont. Shelf	Continental Shelf other than the Norwegian.
Installation	Offshore installation, loading system, pipeline or other permanently installed subsea facility.
LNG tanker	Vessel carrying Liquefied Natural Gas.

LPG tanker	Vessel carrying Liquefied Petroleum Gas.
Marine Operation	Any operation conducted using Vessels offshore, inshore or at terminals ashore.
Mobile Offshore Units	Self elevating and column stabilised units, primarily used for functions such as drilling, accommodation, construction, etc.
Non Routine Operation	Marine Operation other than routine operations, or routine operations carried out for the first time.
Recognized Authority	Flag State, Coastal State or International Organisations with authority to legislate and/or carry out control with Vessels and marine activities.
Recognized Classification Society	Classification Society recognized by International Association of Classification Societies (IACS) to carry out control of a Ship or Mobile Offshore Units' design, construction, outfit, maintenance and operation.
Routine Operation	Marine Operations which are conducted on a regular basis and in a standardised manner, in accordance with procedures, or merely in accordance with sound, professional and seamanlike practice.
Self Elevating Unit	Unit with movable legs capable of raising its hull above the surface of the sea.
Ship	Surface unit with displacement hull, with single or multiple hulls.
Surface Unit	Unit with a ship or barge type displacement hull, of a single or multiple hull construction.
Vessel	Common term including ships, barges, column stabilised units, self elevating units and other floating units with or without own propulsion, which are subject to registration and classification according to national or international maritime regulations.

4.2 Abbreviations

5. FUNCTIONAL REQUIREMENTS

5.1 Quality Assurance (QA)

5.1.1 General

A system for internal control of the work, including the operation of the Vessels shall be established and maintained.

The system shall comply with requirements specified by applicable Recognized Authority, as well as relevant requirements specified in ISO 9000 or an equivalent standard.

The ISO standard is primarily issued for industry other than shipping. The IMO Res. A.680 may therefore be a useful supplement for establishing a system for internal control.

The system shall be practical and useful both in the onshore operating organisation and on board the Vessels.

The QA-system shall incorporate the utilisation of subcontractors and subcontracted Vessels.

5.1.2 Minimum Requirements

The QA-system shall as a minimum include the following:

- Organisation plan for relevant personnel at the onshore operating office, including job descriptions and authority/responsibility. The plan shall also clarify relevant communication lines between Vessels, the onshore operating organisation and other parties during normal operation.
- An emergency preparedness plan for Vessels and onshore operating office.
- A system to ensure that qualified personnel are used on board the Vessels.
- A system to ensure that Vessels and onboard equipment are seaworthy and that the validity of their certificates are maintained.
- A system to ensure that the operation of Vessels are at all times in accordance with the requirements of relevant Recognized Authorities.
- A system to ensure adequate preventive and corrective maintenance of Vessels and equipment.
- A system to deal with non-conformances.

- A system to ensure that adequate safety training and drills are conducted.
- A system to ensure that the all pertinent aspect of the work is covered by applicable procedures, check-lists, etc.
- A system for reporting and handling of accidents and near misses.

5.2 Health, Safety and Environment

5.2.1 General

Marine Operations shall be planned and executed in such a way that acceptable safety is achieved against:

- Loss of human lives or injury to human health.
- Pollution or damage to the environment.
- Loss or damage to property.

A system shall be provided for:

- Identification and follow up all requirements and guidelines pertaining to the work, including those issued by Recognized Authorities and Recognized Classification Society.
- Establishing and follow up own requirements or guidelines where requirements or guidelines provided in this document and by Recognized Authorities and Recognized Classification Society do not cover subject service/product.
- Registration and monitoring of health, safety and working environment problems.
- Analyses of any problems encountered so that their cause and sequence of events are clarified, and necessary corrective action is taken.
- Feed-back of experience for adjustment of existing procedures and practices so that similar problems are prevented in the future.

During evaluation of Vessels for hire and planning and execution of Marine Operations, attention shall be focused on safety for personnel on board, as well as active and passive safe-guard against pollution of the environment.

5.2.2 Health

A documented system for monitoring the health and health development of the personnel shall be established and maintained. The system shall comply with statutory requirements and include:

- Examination and health certification for personnel.
- Surveillance of health condition of personnel.
- Curative care.
- Medical emergency preparedness.
- Goal-oriented programs for personnel who are at special risk in their work.
- Training of first aid and medical personnel.

5.2.3 Safety

A safety program fulfilling the following requirements shall be established and maintained:

- All safety work shall be a line-management responsibility.
- Safety instructions and procedures shall be communicated to and followed by all employees. These instructions shall include the requirement to use personnel protection equipment such as hard hats, safety boots, eye-and ear protection, work vest, safety belt, respiratory protection equipment, etc.
- Necessary safety equipment, including personnel protection equipment, shall be available, meet required standard, and have written instruction for use and maintenance as relevant.
- Personnel shall take part in safety training and drills while on board.
- Safety inspections of the work place shall be conducted on a routine basis.
- Safety meetings for all personnel shall be held on a routine basis.
- New employees on board shall be given an introduction to the Vessel.
- All activities shall be planned and controlled to safe-guard life, health, environment and equipment.

- Reporting, recording, feed-back and follow up of all undesired occurrences and near misses shall be carried out.
- Quality of equipment and tools shall be ensured.
- Updated records of personnel on board shall be available on board and ashore at any one time.

5.2.4 *Working Environment*

A documented system for monitoring of the working environment shall be established , making sure that:

- Strain, stress and exposure, which can cause health problems, are mapped.
- Necessary corrective action is implemented.
- Employees are given general instructions regarding potential health hazards related to their occupation, and how these can be avoided.
- Employees are trained specifically regarding risks and precautions related to special working methods, materials, chemicals and operations, and that such training is given prior to a specific job.
- Hazardous chemicals data sheets are dealt with according to regulations.
- Management carries out inspections of the working environment.

5.2.5 *Accident/Incident Reporting*

An accident and incident reporting system which shall record and report any accidents/incidents or near accidents to personnel, environment, plant or equipment involved with the work shall be established and maintained.

A copy of all reports shall immediately be submitted. In addition, any more serious accidents/incidents shall be reported forthwith through established lines of communication.

Upon completion of the work, and/or on a monthly basis, whichever is more frequent, a summary report of the safety performance, together with accident/incident statistics shall be provided.

5.2.6 *External Environment*

- Environmental protection shall be duly considered in the work.
- Environmental protection is a line organisation responsibility, and it shall be assured that this fact is communicated to responsible personnel in the organisation.

- Leaders are responsible for making known and following up requirements and guidelines on environmental protection.
- All employees have a duty to follow relevant requirements and guidelines, and to report any deviation to their immediate supervisor.
- Incidents causing discharges beyond set limits shall be investigated and analysed with regard to consequences, and be met with corrective action.
- Vessels shall hold a valid International Oil Pollution Prevention Certificate as applicable.

5.3 Emergency Preparedness

- Emergency preparedness analyses shall be carried out, and plans and procedures to prepare for and respond to potential emergency situations which are likely to represent a danger to personnel, environment or equipment shall be developed and implemented.
- The plans and procedures shall include:
 - Precise description of duties, responsibilities and reporting lines for emergency personnel on board and ashore.
 - A program of drills to be undertaken in order to develop and maintain a competent team to cope with any emergencies.
 - Precise description of emergency equipment and systems, placing and use.
 - Notification procedures.
- The emergency action plans shall, as a minimum, cover the following emergency situations as applicable for the particular Vessel:
 - Fire/explosion
 - Abandon vessel
 - Man over board
 - Helicopter crash on deck
 - Helicopter crash close to vessel
 - Collision or structural damage to vessel
 - Violent weather
 - Mooring or DP failure
 - Uncontrolled drift/loss of power
 - Pollution
 - Radiation
 - Escape of gases
 - Medical emergency preparedness
 - Criminal acts or threats.

5.4 Personnel Requirements

- Vessels shall be manned with, as appropriate, certified and/or qualified and medically fit personnel in accordance with relevant national and international requirements.
- Relevant personnel within the organisation performing the work shall have adequate understanding of mandatory rules, regulations, IMO Codes and maritime industry standards and any other requirements pertaining to the work.
- It shall be ensured that:
 - All personnel are aware of their duties.
 - All personnel possess the skills necessary for the proper execution of the task they are to perform.
 - Appropriate records of qualifications are kept on file.
 - Safety training of the personnel meets requirements.
- It shall upon request be possible to document that Vessel crew are employed on condition equal to or better than those stipulated by The International Transport Workers' Federation (ITF).
- Personnel involved in Marine Operations are not allowed to use alcohol or drugs which may influence their work. Any use of narcotics is prohibited.

5.5 Verification of Compliance

5.5.1 Non-Compliance

Before a Vessel enters into service it shall be documented in a report that the requirements outlined in this and other relevant documents are complied with.

Any non-compliance with regard to these requirement shall be identified and reported, and necessary corrective actions, with a schedule, shall be proposed. For major projects/contracts involving several Vessels, a Vessel acceptance program shall be proposed.

5.5.2 *Audit*

To ensure compliance with relevant requirements, audits/inspections of Vessels, equipment, QA-system and documents may at any time be performed by giving due notice

5.5.3 *Corrective Action*

Any non-compliance to Vessels, equipment, QA-system and documents, etc. revealed e.g. during such audit/inspection shall promptly be corrected.

5.5.4 *Feedback of Experience*

A system shall be established and maintained that ensures that experience gained during the performance of the work is reviewed, evaluated and implemented in order to improve safety and quality of performance.

The system shall include the following elements:

- Identification of experience.
- Reporting.
- Evaluation and review:
 - Distribution and filing.
 - Evaluate and decide possible amendments to existing procedures/instructions, or development of new.
- Implementation of improvement.

6. TECHNICAL REQUIREMENTS

6.1 General

The work and all Vessels and equipment shall comply with the technical requirements of this document, including those stipulated by Recognized Authority and Recognized Classification Society.

Vessels shall also comply with requirements issued by respective Flag State Authorities.

The application of the different rules, regulations, codes, standards, etc. is listed in Tables 1 and 2.

NOTE On the Norwegian Continental Shelf, NPD's acts, regulations, etc. cover all activities regarding exploration, drilling, development, exploitation and transport of hydrocarbons.

Such activity is covered by NPD's acts regulations, etc. even though the activity is carried out on Vessels not otherwise covered by NPD's acts, regulations, etc. as specified in Tables 1 and 2.

When Company inspects such vessels, Norwegian regulations may be used as a reference.

When main documents such as, NPD acts, regulations etc., NMD regulations for mobile offshore units, Norwegian Ship Control Rules, etc., are referred to, the applicability of the different regulations within these documents to subject Vessel will be evident from the scope of application of each regulation.

6.2 Maintenance

A Vessel undertaking Marine Operations shall have a documented maintenance program, presented in a maintenance manual or similar. The maintenance program shall cover all systems vital for the safety and operational performance of the Vessel and Marine Operation.

Status reports for any recommendations/requirements given, including those given by Recognized Authorities, Recognized Classification Society, as well as the status of completed maintenance in relation to planned maintenance for a relevant period, shall be easily available and be presented on request.

6.3 Dynamic Positioning (DP)

6.3.1 General

The requirements to dynamic positioning systems depend on which consequence class (Ref. NMD guidelines issued 21.8.86) that has been established for subject Marine Operation:

- DP-vessels shall have DnV class notation DYNPOS AUTS, or equivalent, for consequence class 0 operations.
- DP-vessels shall have DnV class notation DYNPOS AUT, or equivalent, for consequence class 1 operations.
- DP-vessels shall have DnV class notation DYNPOS AUTR, or equivalent, for consequence class 2 operations.
- DP-vessels shall have DnV class notation DYNPOS AUTRO, or equivalent, for consequence class 3 operations.

Ref. also section 8.2.2.

6.3.2 *Surface Reference System*

Temporarily installed surface reference systems, such as beacons or transmitters/receivers used for DP-operations, shall if installed in a classified area on an Installation be of an explosion proof type, and be marked with the name of the Vessel, or the owner of the equipment.

6.4 Anchoring Systems

Anchoring systems on Vessels kept in position by anchors while performing Marine Operations, shall:

- Comply with NMD Regulations for Mobile Offshore Units, or equivalent.
- All winches, anchor wire or chain, anchors, fairleads, stoppers, and other anchoring equipment shall be certified by a Recognized Classification Society. Instruments for reading anchor line tension and length of anchor lines shall be fitted in the operations control room or on the bridge, and also at the winch station.
- Winches which are remotely operated, shall be monitored from the control room or the bridge by means of cameras or equivalent.
- The capacity of the anchoring system shall be verified through a mooring analysis using a NMD- approved computer programme and shall comply with NMD requirements to safety factors and weather criteria. Less severe weather criteria may be accepted taking into consideration; time of the year, duration of the operation, distance to other installations and the possibility to leave the site in an emergency situation.

6.5 Towing Systems

Towing systems and equipment shall comply with the requirements of the VMO standard, or other equivalent standard, and a Recognized Classification Society.

6.6 Cranes and Lifting Equipment

Cranes and lifting equipment including lifting gear, lifting appliances, slings, grommets, shackles and pad eyes, shall comply with requirements issued by Recognized Authority and shall be certified by a competent person, for the operations and conditions under which they will be used.

A certificate issued by such competent person, shall be provided for each crane and lifting equipment. The original of the certificate shall be provided to the owner of such equipment.

Lifting equipment shall be handled, packed and transported such that they are not exposed to mechanical damage, wear and tear. Preservation shall be applied and renewed as necessary for protection.

Lifting equipment for which the certificate is expired, shall be inspected by a competent person, documentation provided and retests carried out as required by such competent person to issue a new certificate.

Due notice shall be given for when and where such testing will take place.

Table 1. Application of main acts, regulations, codes and standards.

Acts, regulations, codes, standards	Self elevating and column stabilised vessels		
	Drilling and Accom. vessels	Diving	Crane, construction and pipelaying vessels
NPD acts, regulations & provisions	X 2	X 2	
NMD, regulations for mobile offshore units	X 5	X 5	X 5
Norwegian Ships Control Rules	X 1	X 1	X 1
NVE	X 5	X 5	X 5
SOLAS 74/78	X 3	X 3	X 3
MODU CODE	X	X	X
MARPOL 73/78	X	X	X
COLREG	X	X	X
IMO Res. A.536 (13) Diving	X 4	X 4	X 4
IMO Res. A.680 (17) QA-system	X	X	X
IMO Res. A.481 (XII) Safe Manning	X	X	X
IMO Res. A.538 (13) Safety Training	X	X	X
OLF Recommended guidelines for safety and contingency training	X 2	X 2	X 2
STCW Training certification, watchkeeping	X	X	X
Classification requirements Mobile Offshore Units	X	X	X

- 1 Norwegian Units.
- 2 Petroleum related activity on the Norwegian Continental Shelf.
- 3 As referred to in the MODU CODE.
- 4 Foreign flag on Foreign Cont. Shelf.
- 5 Norwegian Units. On Norwegian Cont. Shelf, it may be required that Foreign Flag Units document compliance by a Letter of Compliance issued by NMD.

Table 2. Application of main acts, regulations, codes and standards.

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- 1 Norwegian Units.
- 2 Petroleum related activity on the Norwegian Continental Shelf.
- 3 Foreign Flag on Foreign Cont. Shelf.
- 4 Norwegian Units. On Norwegian Cont. Shelf, it may be required that Foreign Flag Units document compliance by a Letter of Compliance issued by NMD.

7. DOCUMENTATION

7.1 General

All Vessels shall have on board valid documentation as applicable and required by coastal - or flag-state authorities and as listed under Tables 3, 4, 5 and 6. Any dispensation certificate shall be regarded as non-conformance, and shall be evaluated accordingly.

It shall be ensured that such documentation is valid, and it shall be made available upon request.

Certificates shall not have recommendations or notifications, restricting the use of the Vessel.

Also any other pertinent documents shall be made available upon request.

Table 3. Main Certificates/Approvals.

List of Certificate		Remarks
1	Certificate of Registry	All vessels
2	International Load Line Certificate	All vessels
3	Safety Construction Certificate	1
4	Safety Equipment Certificate	1
5	Certificate of Tonnage	All vessels
6	Int. Oil Pollution Prevention Certificate , (IOPP-Certificate)	As applicable
7	Safety Radiotelegraphy or Radiotelephony Certificate	2
8	Trading Certificate	As applicable
9	Letter of Compliance	5
10	Classification Certificate for Hull	All vessels
11	Classification Certificate for Machinery	All vessels
12	Certificates for Cranes and Lifting Gear	3
13	Certificates for Lifts	3
14	Certificates for Towing Lines and Equipment	3
15	Certificates for Anchoring Equipment	3
16	Certificates for Lifeboats, Capsules and Liferafts and other lifesaving appl.	3
17	Certificates for Launching Equipment for Lifeboats, Capsules and Liferafts	3
18	Certificate for Rescue Boat (MOB)	3
19	Certificate for Launching Equipment for MOB	3
20	Certificates for Fire Fighting Equipment	3
21	Certificates for Helideck	3
22	Certificates for Diving Equipment	3
23	Certificates for Drilling Equipment	3
24	Deratting Exemption Certificate	All vessels
25	USCG Certificate of Compliance or Tanker Vessel Examination Letter	Tankers as applicable
26	International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk	4
27	Document of Compliance with the Special Requirements for Ships Carrying Dangerous Goods	4
28	International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk	4
29	International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk	4
30	Additional Certificate for Offshore Supply Vessel	
31	Construction and Equipment Certificate for Dynamically Supported Craft	
32	Civil Liability Certificate (CLC)	Tankers
33	Certificate of Financial Responsibility (CFR)	Tankers as applicable
34	Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution (TOVALOP)	Tankers
35	Minimum Safe Manning Document	All vessels
36	Certificates for Master, Officers and Ratings	All vessels
37	Certificates for Navigation Lights	3
38	Certificates for Magnetic Compasses	3
39	Certificates for Chronometers	3
40	Control book for Medicines	3

- 1 Issued for Passenger ships, Cargo Ships and Mobile Offshore Drilling Units respectively.
- 2 All vessels with Radiotelegraphy and/or Radiotelephony equipment.
- 3 All vessels with subject equipment.
- 4 All vessels carrying such substances or goods.
5. May be issued by NMD for foreign flag diving-, drilling-, crane- construction- and pipelaying vessels, to document compliance with requirements similar to those which apply to Norwegian-registered vessels.

Table 4. Drawings/Calculations.

List of Drawings/Calculations		Remarks
1	G.A. Plan	1, 2, 3
2	Tank Capacity Plan	1, 2, 3
3	Safety Plan	1, 2, 3
4	Station Bill	1, 2, 3
5	Launching Arrangements	1, 2
6	Water tight sub. division (doors, hatches etc.)	1, 2
7	Anchor system Arrangement	1, 2,
8	Anchor Patterns	1, 2, 3
9	Accommodation Arrangement	1, 2
10	Towing Arrangement	1, 2, 3
11	Gas Storage System (, Acetylene etc.)	1, 2
12	Ballast System	1, 2
13	Power Plant Arrangement	1, 2
14	Helideck incl. details on Firefighting etc.	1, 2,
15	Diving System Arrangement	1, 2, 3
16	Drilling Systems Arrangement	1, 2, 3
17	Anchor system Analyses	1, 2, 3
18	DP-system Capacities	1, 2, 3
19	Lifting Calculations	1, 2, 3
20	Stability Calculations, Intact/Damage	1, 2

Table 5. Manual/Procedures.

List of Manuals/Procedures		Remarks
1	QA-Manual	1, 2, 3
2	Emergency preparedness Manual	1, 2, 3
3	Operation Manual for Ship or Mobile Offshore Unit	1, 2, 3
4	Operation related Procedures	1, 2, 3
5	Maintenance Manual/Program	1, 2, 3
6	Stability Manual	1, 2

Table 6. Reports/Information.

List of Reports/Information		Remarks
1	Non-Compliance Report	1, 2, 3
2	Inclination Test Report	1, 2
3	Crane Test Report	1, 2
4	Non Destructive Testing (NDT) Report	1, 2
5	Health Certificates/Records	1, 2
6	Inspection Reports from Authorities and Classification Societies	1, 2
7	Accident Reports	1, 2, 3
8	Near Miss Reports	1, 2, 3
9	Equipment Failure Reports	1, 2, 3

Remarks: 1. Available on board.
2. Available at the onshore operating office.
3. Copy to be provided upon request.

8. PLANNING OF OPERATIONS

8.1 General

Marine Operations shall be properly planned at all stages of a project or operation. The Marine Operation shall, as far as feasible, be based on the use of well proven principles, techniques, systems and equipment. The feasibility of extending proven technology shall be thoroughly documented.

As a basis for planning of Non Routine Marine Operations, the VMO standard "Standard for Insurance Warranty Surveys in Marine Operations" issued by DnV, shall be used as applicable. Other equivalent standard issued by a Recognized Authority or Recognized Classification Society may be used if agreed between the parties. Where the VMO standard uses the terms; should, should normally, recommend, etc., it shall be interpreted as a requirement unless otherwise agreed.

Some pure Routine Marine Operations, for which procedures need not be written, shall be conducted in a sound, professional and seamanlike manner.

Marine Operations manuals shall be prepared and shall cover all phases of the work, from start of preparations for the operation to completed demobilisation, and including organisation and communication and a program for familiarisation of personnel, a description of and procedures and acceptance criteria for testing/ commission of all equipment to be used for the operations, description of Vessels and site(s), detailed procedures for all stages of the operation, towing routes with estimated sailing time and possible ports of refuge, definition of decision, hold and approval points and criteria for starting each phase of the operation, acceptable tolerances, monitoring and reporting details, verifications that the operations have been completed in accordance with the design and requirements in this document.

Pertinent design calculations shall be referred to in the manual.

Design criteria shall be stated within the manual.

Marine Operations shall whenever possible be planned such that the operation can be reversed.

Risk evaluations and failure effect analyses shall be carried out when specified or required by Recognized Authority.

The engineering, materials selection, fabrication and testing of systems, equipment and structures including seafastening, grillages, etc. shall comply with requirements stipulated by Recognized Authority, Recognized Classification Society and recognized codes and standard.

The criticality and type and amount of stresses shall be reflected in the materials selection and fabrication and testing requirements.

All pertinent engineering required to verify the suitability and safety of the Vessels, equipment and operations and compliance with relevant requirements shall be carried out and associated documentation prepared.

8.2 Organisation and Communication

The organisation of key personnel (marine-, non marine and third party personnel), involved in Marine Operations, shall be established prior to the execution of an operation. Responsibilities and lines of communication shall be defined. The organisation chart shall be included in the Marine Operation manual. Details shall be given on communication with and contact persons within Company's organisation.

8.2.1 Clearances during Operation Offshore

8.2.1.1 General

When planning Marine Operations in the vicinity of Installations, or other Vessels, due consideration shall be taken to ensure sufficient clearances at all times between adjacent structures, mooring lines and structures, diving bell and structures or mooring lines, crane boom and lifted object, bow loading tanker and loading buoy, etc.

8.2.1.2 Anchoring

Requirements for clearances when anchoring close to Installations or other Vessels, are listed in the VMO standard. However the following additional requirements shall be complied with:

- Horizontal clearance between anchor and pipeline/umbilical;
 - 200 meters in front of the pipeline/umbilical or
 - 300 meters when the anchorline is crossing the pipeline/umbilical.
- Horizontal clearance between platform structure, subsea template or manifold, or similar facility and a passing anchorline: 20 meters.
- Individual clearances between anchorlines in a cross anchoring situation: 20 meters.

8.2.1.3 Adjacent Structures

The minimum clearance between an anchored Vessel and an Installation or another Vessel during the operation shall be planned to be such that a horizontal clearance of at least 10 meters is maintained even during the maximum transient motion after an anchorline breakage, and with the 1st order significant wave motion included.

8.2.2 DP-Operations

For DP-operated Vessels, the consequence class shall be established for the planned operation.

Ref. Table 7.

The class notation (DYNPOS AUTRO etc.) referred to in Table 7. mainly concerns the technical standard of the DP-vessel.

The planned DP-operation shall be subject to a risk analysis taking into account:

- Technical evaluation of vessel and DP-system.
- Evaluation of planned operation, highlighting critical phases.
- Emergency procedures.
- Relevant experience of Vessel and crew.

Based on this analysis, the consequence class for the planned operation shall be established.

For the established consequence class, the estimated limitation for the operation with regard to environmental conditions shall be given.

8.2.3 *Transportation*

Environmental criteria to be adopted for the planning of transportation shall have a return period of 10 years for the pertinent season and area. Less severe criteria may be used for inshore transportation routes where suitable ports of refuge along the route have been identified, provided an equivalent overall safety is maintained.

In order to determine design motions and loads, one of the following methods are acceptable:

- Dynamic analyses in accordance with well proven techniques.
- Standard Criteria in accordance with VMO, or other equivalent standard, provided particulars regarding transportation Vessel and the transported object are known and within the limitations specified in such Standard.
- Simplified Criteria in accordance with the VMO standard, or other equivalent standard, may be used at an early stage before the details of the transportation Vessel are known. For transportation of smaller objects with a weight less than 1500 tonnes on standard North Sea cargo barges, this method will, unless otherwise specified, be acceptable as the final motion and load analyses.

Design of grillages and seafastening shall facilitate load-out and subsequent release, shall provide adequate vertical and horizontal support and shall be such that welding and flame-cutting do not inflict damage to the transported object. The contribution from friction shall be disregarded in the design of seafastening and grillage.

The transportation barge shall be equipped with access ladders, minimum one on each side.

The transportation barge shall have an emergency anchoring system, capable of holding the barge with transported object in the following environmental conditions:

- Wind: 20 m/sec at 10 m altitude acting up to 30 deg. from head direction.
- Wave height: 5 m (significant).
- Current: 1 m/sec.

The anchoring system shall comply with the rules of a Recognized Classification Society and shall be arranged such that it can easily be deployed in emergency situations.

All tanks in transportation barges shall have devices for sounding. For tanks to be sounded regularly, sounding tube and striker plates are recommended.

At least four mooring ropes in good condition shall be provided on the barge.

Prior to sail away, it shall be verified that the Vessels, towing system, transported object, seafastening, navigation aids, voyage protection, etc. as well as preparations for the next phase are completed (e.g. pre-slinging for lifting), all are in every respect seaworthy, in accordance with the design and ready for the voyage, and that all debris is removed.

8.3 Offshore Lifting

Non Routine lifting Operations shall be planned in accordance with the VMO standard, or other equivalent standard. For offshore lifts and the following shall in addition be complied with:

- Dynamic Amplification Factors (DAF) are given in the VMO standard (RP5, section 2.2.2). In detailed design of an operation, actual DAF factors shall be calculated for the actual Vessel, crane hook positions and lifted object.
- For lifts in water, a full dynamic analysis is required, taking account of the complete dynamic system, i.e. lifting vessel + crane + crane wires + slings + lifted object, for all critical phases of the operation. Wave loads on the lifted object shall be calculated by recognized hydrodynamic analysis methods, typically Morison's formula for framed structures and diffraction analysis for large volume structures. The hydrodynamic loads imposed when the lifted objects is lifted through the splash zone and when it approaches and penetrates the sea bottom shall be specially considered.

If the system has a resonant behaviour at periods where there is significant wave energy, a time domain analysis is required.

- The dynamic analyses required above shall be performed with a recognized wave spectrum, e.g. Pierson-Moskowitz or JONSWAP. The most conservative wave mean heading, and the more conservative of two directional wave spreading functions, $\cos^2$

and $\cos^{16}$, shall be used to establish a limiting significant wave height H_s as a function of the spectral peak period T_p .

As an alternative to using a limiting wave height to decide whether the lift can be performed or not, a wave measuring device (radar or buoy) combined with a system that updates the dynamic lift analyses at the site taking the actually measured wave spectrum as input, may be used.

Table 7. Guidelines on Dynamic Positioning Systems for Execution of Listed Operations.

Guidelines on Dynamic Positioning Systems for Execution of Listed Operations			
Operation	Location	Consequence Class (Ref. Nmd)	Class Notation (DnV Or Equal)
Drilling for hydrocarbons	Anywhere	3	DYNPOS AUTRO
Production of hydrocarbons	Anywhere	3	DYNPOS AUTRO
Subsea Well Workover/Subsea Well Stimulation	Anywhere	2	DYNPOS AUTR
Wireline Operations on Subsea Wells	Anywhere	2	DYNPOS AUTR
Critical manned subsea intervention (where a sudden horizontal displacement of the diving support vessel may have fatal consequences for the diving personnel)	Anywhere	3	DYNPOS AUTRO
Flotel operations	Gangway connected	3	DYNPOS AUTRO
Other manned subsea intervention	Anywhere	2	DYNPOS AUTR
Unmanned subsea interventions with ROT	Inside hot subsea template	2	DYNPOS AUTR
Marine Operations such as lifting, piling, pipe- and cable laying, trenching, gravel dumping, well stimulation (platform wells), ROV inspection, flotel operations etc. conducted from a vessel of > 5.000 t. displacement.	< 500 m from an installation	2	DYNPOS AUTR
	> 500 m from an installation	1	DYNPOS AUT
Marine Operations such as lifting, piling, pipe- and cable laying, trenching, gravel dumping, well stimulation (platform wells), ROV inspection etc. conducted from a vessel of < 5.000 t. displacement.	< 500 m from an installation	1	DYNPOS AUT
	> 500 m from an installation	0	DYNPOS AUTS
Bow loading	Offshore loading system	1	DYNPOS AUT
Bow loading	Offshore storage/prod. unit	2	DYNPOS AUTR

9. EXECUTION OF OPERATIONS

9.1 General Requirements

When a Marine Operation has been properly planned, the execution of the operation shall be conducted according to the Marine Operations manual.

Prior to start of an operation, it shall be documented that the requirements outlined in this and other relevant documents are, or will be complied with.

Any non-compliance shall be identified and reported, and necessary corrective actions shall be proposed.

If during an operation it becomes evident that the established manual has to be revised in order to meet the set goals, a revised manual shall be prepared and presented and the consequences for the work shall be highlighted.

Routine Operations, for which procedures have not been written, shall be conducted in a sound, professional and seamanlike manner.

9.2 Field Procedures

9.2.1 General

All Vessels conducting Marine Operations within a field development area shall comply with established procedures and instructions given by the local marine control centre. A bridging document linking the emergency preparedness plan for the work with that for the area, shall be issued for operations in the vicinity of an Installation. Nothing in these procedures shall, however, limit the Master's total responsibility for his Vessel, or his obligation to comply with the international rules for the prevention of collision at sea.

9.2.2 Communication

A Vessel heading for an Installation, shall as soon as practical after leaving harbour or previous location establish radio contact with the Installation, giving estimated time of arrival (ETA). Changes in ETA shall be reported.

When within VHF range the local marine control centre will inform of which communication channels to use.

9.2.3 Arriving the location

The Vessel shall inform the local marine control centre when arriving 10 n.miles off an Installation. Prior to entering closer than 3 n.miles off an Installation, the Vessel shall obtain permission to do so from the local marine control centre. Before permission to approach an

Installation, or permission to anchor within the field area is given, any limitations or working procedures which could impose restrictions on the Vessel or other Vessels in the area, shall be reported to the local marine control centre. Any defects or limitations to the following equipment shall be highlighted:

- Main engines/propellers
- Thrusters
- Aux. engines
- Steering gear
- Anchoring and mooring equipment
- Lifting gear/loading equipment
- Radio or navigation equipment
- DP-equipment
- Safety equipment.

Prior to commencing DP-operations, the DP-system including reference system(s) shall be tested in accordance with pre-established procedures/check lists. Due care must be taken to ensure that interference to radio reference systems does not occur.

9.2.4 *On location*

Any Vessel operating within a field development area shall keep the local marine control centre updated as requested on progress, and on other relevant aspects of the ongoing operation, such as:

- Defects to main equipment.
- Accidents involving personnel, environment or equipment.
- The use of seismic energy sources.
- Divers in the water.

9.2.5 *Leaving location*

Prior to departure from an offshore location, the Vessel shall advise the local marine control centre of her destination and estimated time of arrival.

9.3 Terminal/Base Procedures

9.3.1 General

All Vessels arriving at, staying at or leaving from a terminal or base shall comply with relevant procedures obtained from such terminal and shall follow instructions given by the terminal/base harbour office.

Nothing in these procedures shall however, limit the Master's total responsibility for his Vessel, or his obligation to comply with the international rules for the prevention of collision at sea.

10. REPORTING

Reports shall be prepared and submitted at specified intervals throughout the duration of the work. The reports shall have format and content agreed between the parties.

NORSOK OFFSHORE STANDARD

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