STANDARD

DNV-ST-0023

Edition December 2018
Amended October 2021

Competence of dynamic positioning operators

DNV AS

FOREWORD

DNV standards contain requirements, principles and acceptance criteria for objects, personnel, organisations and/or operations.

Any comments may be sent by e-mail to *rules@dnv.com*

CHANGES – CURRENT

This document supersedes the April 2014 edition of DNVGL-ST-0023.
The numbering and/or title of items containing changes is highlighted in red.

Amendments October 2021

Topic	*Reference*	*Description*
Rebranding to DNV	All	This document has been revised due to the rebranding of DNV GL to DNV. The following have been updated: the company name, material and certificate designations, and references to other documents in the DNV portfolio. Some of the documents referred to may not yet have been rebranded. If so, please see the relevant DNV GL document. No technical content has been changed.

Changes December 2018

Topic	*Reference*	*Description*
Clarifications on shuttle tanker DP certificate.	Sec.1	Restructured Sec.1, clarified [1.5], and new [1.3] Application and [1.7] Abbreviations.
Competence requirements introduced.	[1.4]	The words "or equivalent" were added to [1.4]. STCW qualified or equivalent also opens up for licenses issued by eg. USCG.
	General	Applicable to the complete document: corrections and improvements have been made to the various tables. Changes to the document have resulted in renumbering of competence statements, mainly in Table 3-1, Table 3-2 and Table 3-8. A detailed list of changes in numbering of competence statements is available for training providers and assessment centres, enabling them to re-tag assessment questions and exercises.
	[3.12]	Reference added to the new Table 3-9 *Competence requirements for vessels with limited DP capability*. Notation codes table was updated, reflecting the changed competence tables in the notations. The new notation code AJ/AutH (Limited) was added.
	[3.4]	The previous version of the standard caused confusion whether a person with a shuttle tanker certificate also should be allowed to operate a ship within the AJ/S category. By restructuring the tables and adding specific elements into the AJ/S category this is now clarified. The previous Table 3-1 has been expanded with some content of [3.5] applying to all operations. Table was renumbered.

Topic	*Reference*	*Description*
	[3.5]	The previous Table 3-2 was called Auto-positioning – Joystick. Generic content was moved to Table 3-1. Table 3-2 now contains stationkeeping specific competencies which would be required for the S notation. Table was renumbered. Table 3-2 stationkeeping as a whole is no longer part of shuttle tanker certification.
	[3.11]	The requirements for position mooring mode Table 3-8 has been completely reworked and expanded.
	[3.12]	An extensive new competence Table 3-9 was introduced, focusing on basic station keeping and heading control for vessels with limited DP capability/DP use such as cruise vessels, mega yachts and fishing vessels.
	Sec.4	The content of Sec.4 is moved to [1.5].

Editorial corrections

In addition to the above stated changes, editorial corrections may have been made.

CONTENTS

SECTION 1 INTRODUCTION

1.1 Objective

The standard aims to cover the tasks performed by a dynamic positioning operator (DPO) on board vessels, using various dynamic positioning (DP) modes and systems and identify a base set of competencies. It intends to capture the most important competencies for DPOs for various types of vessel, trade or activity. The standard aims to provide guidance for establishing a competence foundation, to be supplemented by e.g. operational/supplier manuals and system specific details.

Guidance note:

In situations where the terminology in the standard seems to point to a specific manufacturer of DP systems, different terms indicating similar functionality are considered to be just as valid. The functionality and competence to be demonstrated are the essence of each statement.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

1.2 Scope

The standard identifies a suggested minimum level of knowledge and skills for dynamic positioning operators, responsible for maintaining the vessel's position or keeping it on track while the vessel carries out an assigned operation.

1.3 Application

This standard can be used in the following ways:

- as a reference to familiarise or assess people in the role of dynamic positioning operator
- as a reference for global competence and defining training requirements
- as a guide to training providers, who are to develop courses according to the requirements of the standard and needs of the industry
- as a reference document for e.g. certification of personnel.

1.4 Professional profile

The DPO shall:

- operate the DP control systems of the vessel working in a possibly hostile environment and in changing weather conditions
- judge whether DP operations can commence, continue or should be suspended and take immediate action if required
- demonstrate that he/she is fully competent, using the systems/modes that apply to the applicable notation(s)
- demonstrate a holistic view of the vessel’s management systems and operations and consider the impact of operating under DP on e.g. security vulnerability as well as from a legislative and regulatory point of view.

If the DPO is responsible for the vessel’s integrity and safety when operating under DP as well as manually in case of DP failure, the DPO shall be standards of training, certification and watchkeeping (STCW) qualified deck officer.

DNV-RP-0007 [3.1] recommends that a DPO holds a valid license issued by national/local authorities (STCW or equivalent - e.g. USCG) before a person can be certified as a DPO.

1.5 References

Table 1-1 Reference documents

Document code	*Title*
IMCA M 103	*Guidelines for the design and operation of dynamically positioned offshore vessels*
IMCA M 117	*The training and experience of key DP personnel*
IMCA M 182	*Int. guidelines for the safe operation of dynamically positioned offshore supply vessels*
IMCA M 220	*Guidance on operational activity planning*
	Guidelines for the safe management of offshore supply and anchor handling operations (North West European Area (NWEA))
DNV-RP-0007	*Certification scheme for dynamic positioning operators*

1.6 Required performance standard

Whilst undertaking the duties described in [1.4] the DPO shall demonstrate all competencies in compliance with all relevant international, national and local regulations and requirements, applicable reporting procedures and operational instructions in the relevant operating area and as required by bridging documents.

1.7 Abbreviations

Table 1-2 Abbreviations

Abbreviation	*Description*
ATA	automatic thruster assist
DP	dynamic positioning
DPO	dynamic positioning operator
ECR	engine control room
ESD	emergency shut down
FMEA	failure mode and effects analysis
IMCA	International Marine Contractors Association
IMO	International Maritime Organisation
MODU	mobile offshore drilling unit
MRU	motion reference unit
PRS	position reference system
PSAD	position activated shut down
RAR	remote anchor release
ROV	remotely operated vehicle

Abbreviation	*Description*
STCW	standards of training, certification and watchkeeping
STL	submerged turret loading
TAM	thruster assisted mooring
USCG	United States Coast Guard
VRS	vertical reference system
VTS	vessel traffic system

SECTION 2 TAXONOMY

2.1 General

Taxonomy of the required professional behaviour specifies the level on which the person should be able to operate. It is a hierarchical arrangement, in four (4) levels, of what a person has to master from simple to complex requirements, based on instructional design principles.

For every next level, it is a prerequisite that the preceding level is mastered. The required professional behaviour is expressed by means of a verb.

2.2 Levels of cognition

Each competence requirement can be classed by the level of cognition as defined in Table 2-1.

Table 2-1 Definition of the different levels of cognition

Level number	*Level of cognition*	*Definition*
1	Knowledge (K)	To remember or to reproduce on basis of appropriate, previously learned information.
2	Understanding (U)	To give meaning to new situations and or new material by recollection and using necessary present information. To give evidence of insight in certain activities.
3	Application (A)	To use previously acquired information in new and concrete situations to solve problems that have single or best answers.
4	Integration (I)	To separate information into their component parts, to examine such information to develop divergent conclusions by identifying motives or causes, making inferences, and or finding evidence to support generalizations. To creatively apply prior knowledge and skills to produce a new or original whole. To judge the value of material based on personal values or opinions, resulting in an end product, with a given purpose, without real right or wrong answers.

2.3 Professional behaviour verbs

The lists of verbs in Table 2-2 are not exhaustive and should be used as guidance only.

Table 2-2 List of verbs used for each level of cognition

Level of cognition	*Relevant action verbs*
Knowledge (K)	choose, cite, describe, distinguish, find, give example, group, identify, indicate, know, label, list, listen, locate, match, memorise, name, outline, quote, read, recall, recognise, record, recite, relate, repeat, reproduce, retrieve, review, select, show, sort, state, underline, write
Understanding (U)	account for, annotate, associate, classify, compare, define, describe, discuss, estimate, exemplify, explain, give examples of, give main idea, identify, infer, interpret, observe, outline, paraphrase, recognise, reorganise, report, restate, retell, research, review, summarise, translate

Level of cognition	*Relevant action verbs*
Application (A)	adapt, apply, arrange, calculate, carry out, change, collect, compute, conclude, construct, demonstrate, dramatise, draw, exhibit, execute, extract, illustrate, implement, include, instruct, interpret, interview, make, manipulate, obtain, operate, paint, practice, prepare, sequence, show, sketch, solve, translate, use
Integration (I)	analyse, appraise, argue, arrange, assess, attribute, calculate, categorise, check, choose, combine, compare, contrast, criticise, critique, debate, decide, deconstruct, deduce, defend, design, detect, determine, develop, diagram, differentiate, discriminate, dissect, distinguish, evaluate, examine, experiment, find, formulate, group, hypothesise, infer, investigate, integrate, interpret, inspect, inquire, judge, justify, measure, monitor, order, organise, outline, plan, predict, prioritise, probe, question, rank, rate, recommend, reject, relate, research, revise, score, separate, select, sequence, sift, structure, survey, tell why, test, validate, value

SECTION 3 COMPETENCE REQUIREMENTS

3.1 General

Each competence requirement is derived from a task that shall be performed at some stage in the DP operation. The competence requirement is stated in objective format to clearly define what shall be done to satisfy the requirements of the competence. At the same time it facilitates the derivation of assessment criteria and the assessments to measure individual competencies.

The competence requirements are grouped into functional domains that are further sub-divided into task or subject groups.

Each competence requirement is allocated a level of cognition that can be used to determine the type of assessment required to measure competence.

The competence requirements for DP operations require theoretical knowledge, intellectual and physical skills. Performance shall be assessed and therefore defined throughout the competence tables.

3.2 Structure

The standard contains 9 competence tables:

Table 3-1 *General competence requirements*

Table 3-2 *Additional competence requirements for stationkeeping mode*

Table 3-3 *Additional competence requirements for DP approach mode*

Table 3-4 *Additional competence requirements for weather vane mode*

Table 3-5 *Additional competence requirements follow target mode*

Table 3-6 *Additional competence requirements auto track mode*

Table 3-7 *Additional competence requirements submerged turret modes (STL)*

Table 3-8 *Additional competence requirements position mooring (Posmoor/ATA/TAM)*

Table 3-9 *Competence requirements for vessels with limited DP capability (e.g. cruise vessels, mega yachts and fishing vessels).*

The following table defines which competence tables are applicable for each notation code.

Notation code	*Competent in the use of the following DP systems*	*Applicable competence tables*
AJ/S	autopos, joystick	Table 3-1 and Table 3-2
AJ/DPA-WV	autopos, joystick, DP approach, weather vane	Table 3-1, Table 3-3 and Table 3-4
AJ/S/FT-AT	autopos, joystick, follow target, auto track	Table 3-1, Table 3-2, Table 3-5 and Table 3-6
AJ/DPA/WV/STL	autopos, joystick, DP approach, STL connect, STL loading	Table 3-1, Table 3-3, Table 3-4 and Table 3-7
AJ/S/POS	autopos, joystick, anchorhandling, posmoor, drilling, riser management	Table 3-1, Table 3-2 and Table 3-8
AJ/AutH (Limited)	autopos, joystick, auto track / heading control (limited scope)	Table 3-9

3.3 Brief descriptions of the various DP modes

Auto positioning and joystick

The auto positioning mode is used for the stationkeeping activities, in which a vessel shall remain in a defined position allowing specific operations to be carried out. This is the foundation for dynamic positioning. Operating an independent joystick system is also considered part of the DPO foundation.

Approach

The approach mode is a special mode used in connection with offshore loading of shuttle tankers. When a vessel is at an appropriate position from the loading buoy, the approach mode can be selected.

The approach mode is performed in steps by adjusting the set point radius. The vessel is allowed to rotate on the set point circle in a system selected heading as the wind and wave forces changes. The vessel will maintain a heading towards the loading point. In the approach mode the weather vaning principle is used to control the vessels heading and position.

Weather vane

Weather vane mode is a special mode used in connection with offshore loading of shuttle tankers. When the vessel has reached a specified distance from the loading point weather vane mode is selected. Weather vane mode will keep the vessel at a given distance from the reference point of the loading buoy, and the weather vaning principles are used to control the vessels position and heading.

Follow target

Follow target mode is used on multi- purpose offshore vessels performing special operations such as ROV support, trenching, ploughing and during supply, delivery and ship to ship operations. The follow target mode enables the vessel to automatically follow a moving target and keeps the vessel within a position window relative to the moving target.

Auto track

The auto track mode is e.g. used on multi- purpose offshore vessels equipped to perform special operations such as cable laying, pipe laying or rock dumping and in other operations where there is a need to follow a pre-planned track. The auto track mode makes the vessel follow a specified track defined by a set of waypoints

Submerged turret

STL connect and STL loading are special modes used in connection with offshore loading of shuttle tankers using submerged turrets as connectors. The approach is carried out using DP approach mode.

Position mooring (Posmoor)

Posmoor is a special operational mode used by mobile offshore drilling units (MODUs) generally referred to as automatic thruster assist (ATA) or thruster assisted mooring (TAM).

3.4 General

Table 3-1 General competence requirements

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
DP SYSTEMS, EQUIPMENT AND INSTRUMENTS		
1.1	**Systems / elements / components**	
1.1.1	Describe the environment reference system elements' role in the DP system	U
1.1.2	Describe the power generation elements' role in the DP system	U
1.1.3	Describe the power management systems' role in the DP system	U
1.1.4	Describe the position reference systems' role in the DP system	U
1.1.5	Describe the heading reference systems' role in the DP system	U
1.1.6	Describe the thruster and propulsion systems' role in the DP system	U
1.1.7	Describe the role of control elements in a DP system	U
1.1.8	Recognise DP related vessel systems and technical equipment	U
1.1.9	Describe propulsion, thrusters and rudder types used by DP systems	U
1.1.10	Explain the redundancy requirements for IMO DP Class 1, 2 and 3 (position reference systems (PRS), thrusters, generators, etc.)	U
1.1.11	Describe the different coordinate systems used in DP operations	U
1.1.12	Identify the different systems that control the thrusters (e.g. manual levers, autopilot, independent joystick, main DP, backup DP, emergency steering)	U
1.1.13	Describe when to use the different thruster control systems	U
1.1.14	Explain the DP modes 'autopos', 'joystick' and 'mixed mode' joystick	A
1.2	**Failure modes and effects analyses (FMEA)**	
1.2.1	Explain the implications of identified FMEA	I
1.2.2	Describe tests carried out during annual trials	U
1.2.3	Explain the importance of the vessel's FMEA document and the annual trials report for planning emergency drills	U
1.3	**Sensors (General)**	
1.3.1	Explain the working principle and purpose of heading sensors (gyro)	U
1.3.2	Explain the working principle and purpose of wind sensors	U
1.3.3	Explain the working principle and purpose of vertical reference sensors (VRS) / motion reference unit (MRU)	U
1.3.4	Explain the working principle and purpose of other sensors used (ref. Notations)	U
1.4	**Position reference systems (PRS) - General**	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
1.4.1	Explain the working principle and limitations of the various systems used (e.g. microwave-, laser-, radar-, hydro-acoustic-, GNSS-, INS and tautwire systems)	U
1.4.2	Explain how the DP control system uses PRS inputs	U
1.4.3	Explain how the DP model is weighed towards the PRS in use	U
1.4.4	Explain possible influences when calibrating a PRS	U
1.4.5	Explain the potential risks by using relative and absolute PRS simultaneously when alongside moving objects	U
1.4.6	Explain when to enable additional position reference systems	U
1.5	**DP set-up**	
1.5.1	Explain the expression 'building the model' and its role in dynamic positioning	U
1.5.2	Explain the use and impact of the various gain settings (low, medium, high)	U
1.5.3	Explain the use and impact of the various acceleration and deceleration factors	U
1.5.4	Explain the gain model function (e.g. quick model, fast learn) and when to use it	U
1.5.5	Explain why 'sea current' or 'residual force' indicated on the DP may be remarkably different from real sea current	U
1.6	**DP hardware and software**	
1.6.1	Explain when DP computers should be reset according to vendor and/or procedural recommendations	U
1.6.2	Explain the effect of resetting an OS computer and a controller computer on the vessel's capability	U
1.6.3	Demonstrate how to reset the DP (OS/Controller) computers while remaining in control of the vessel	A
1.6.4	Demonstrate the use of the training functionality in the DP system on board (if applicable)	A
1.6.5	Verify actuality of updates/upgrades of the DP system	I
1.7	**Documentation**	
1.7.1	Interpret relevant information/documentation about DP related systems and technical equipment	I
1.7.2	Interpret vessel's DP operations manual and training manuals	I
1.7.3	Explain the importance of keeping detailed vessel log books documenting all aspects of DP operations	U
1.7.4	Explain the importance of maintaining personal DP experience log books	U
1.7.5	State where to find the up-to-date applicable rules, regulations and recommendations published for the DP industry	K
ORGANISATION AND COMMUNICATION		
1.8	**Bridge watchkeeping**	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
1.8.1	Describe the watchkeeping organisation on board, authority and distribution of tasks amongst the bridge team, when under DP	U
1.8.2	Describe the role, tasks and responsibilities of the DPO, under DP	U
1.8.3	Describe the role, tasks and responsibilities of the responsible person for the bridge watch, under DP	U
1.8.4	Recognise the importance of minimising distractions for the DPO	U
1.8.5	Demonstrate a continuous awareness of the vessel’s status, operation and impact of operating under DP	A
1.8.6	Recognise the importance of an external focus when controlling a vessel close to installations or other objects	U
1.8.7	Recognise situations in which to call the master to the bridge	U
1.8.8	Log DP related incidents	A
1.9	**Change of DP watch**	
1.9.1	Prepare a hand-over checklist	A
1.9.2	Transfer vessel's status and DP details when handing over the watch	U
1.9.3	Provide an update on the ongoing operation and planned operational activities	A
1.9.4	Review a hand-over checklist	A
1.9.5	Verify vessel’s position or movement and status	I
1.9.6	Determine the DP status and recent occurrences which may have an effect on the DP-operation during the watch	I
1.9.7	Check and confirm history log of DP equipment settings	I
1.9.8	Transfer DP watch in a formal and clear manner	A
1.10	**Communication and reporting**	
1.10.1	Obtain information and clearance from e.g. installation, port control, vessel traffic system (VTS) on issues important for the safe operation of the vessel under DP	A
1.10.2	Communicate approach / operational plan with bridge team, crew, work site control, ECR, third parties	A
1.10.3	Inform and update relevant parties of status of the vessel, changes in reference systems or the DP system and any developing emergency situations	A
1.10.4	Determine applicable reporting procedures and operational instructions in the operating area and as required by bridging documents	A
SAFETY AND RISK REDUCTION		
1.11	**Risk assessment**	
1.11.1	Explain the importance of risk assessment	U
1.11.2	Perform a risk assessment	A

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
1.11.3	Review existing risk assessments for a planned DP operation	U
1.11.4	Explain the importance of safe job analyses	U
1.11.5	Review existing safe job analyses reports	U
1.11.6	Explain the importance of toolbox-meetings	U
1.11.7	Conduct a toolbox-meeting	A
1.12	**Incident reporting**	
1.12.1	Report DP incidents in accordance with company policy	A
1.12.2	Describe types of DP incidents that may be reported into the DP incident reporting systems	U
1.13	**Evaluation**	
1.13.1	Evaluate the DP operation, including bridge/engine team and DP system performance	I
1.13.2	Evaluate incidents / accidents / failures of equipment / personnel performance	
OPERATIONS (GENERAL)		
1.14	**Preparation**	
1.14.1	Review the scope of the planned DP operation	K
1.14.2	Use a DP capability plot to determine if DP operation is possible in prevailing conditions	I
1.14.3	Determine applicable procedures with reference to the DP operation	A
1.14.4	Discuss working position with e.g. installation, port control, VTS	U
1.14.5	Explain the complications, specific challenges and difficulties when operating near floating objects as compared to fixed objects	U
1.14.6	Interpret information about the work location (e.g. water-depth, installations, subsea obstructions)	I
1.14.7	Analyse external forces which may reduce the position-keeping capability of the vessel (e.g. pipe tension, ice, tides, current, thrusters)	I
1.14.8	Determine a safe working heading	A
1.14.9	Determine safe separation distances, taking into account combined movement when operating alongside an object	I
1.14.10	Complete all tasks on the DP checklists	A
1.14.11	State applicable go / no go criteria for the DP operation	U
1.15	**DP operations**	
1.15.1	Determine if all DP related vessel systems and technical equipment are up and running	I
1.15.2	Determine the operational ability and accuracy of the DP system	I
1.15.3	Determine the most appropriate PRS for specific DP operations	A

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
1.15.4	Evaluate the availability of various PRS and sensors (gyro, wind, VRS, etc.) and external influences which may introduce errors or disrupt readings	A
1.15.5	Determine if the quality of PRS signals is sufficient for safe DP operations under agreed DP class	A
1.15.6	Assess the risk of losing targets used by a laser- and microwave based PRS, due to rapid movement of a floating installation or movement and position of cranes and deck equipment	A
1.15.7	Evaluate consequences of failures in PRS related to autopos/joystick	A
1.15.8	Set-up the number of position reference systems required in accordance with the DP class	A
1.15.9	Control the vessel under joystick and DP, keeping the vessel in the desired position and heading	A
1.15.10	Determine appropriate incremental steps for changing position, e.g. towards a structure	A
1.15.11	Demonstrate moving towards a structure or object, thereby reducing speed in incremental steps, considering conditions and distance, avoiding overshooting	A
1.15.12	Transfer control between manual levers, independent joystick, DP main system, DP backup system and vice versa without losing position and control	A
1.15.13	Adapt to changes in thruster forces when alongside moving, self-propelled units/vessels	I
1.15.14	Interpret data with reference to mooring arrangements of a floating installation	I
1.15.15	Analyse consequences of moving out of position	I
1.15.16	Identify changes in motion, position and heading of own ship, including relative distance from target	A
1.15.17	Identify changes in the position and heading of the target	U
1.15.18	Determine when to make changes to the position of own ship	I
1.16	**Operating in manual mode**	
1.16.1	Describe advantages/disadvantages of various types of main propulsion, rudders and thrusters with regard to manual manoeuvring	U
1.16.2	Discuss special precautions to be taken due to wind, current, wave height and swell during manual manoeuvring close to installations or other obstructions	U
1.16.3	Manually stop the vessel at a pre-determined position	A
1.16.4	Determine the need to stop the vessel completely before switching to DP control (system specific)	U
1.16.5	Test vessel’s manual manoeuvring capability under prevailing weather conditions in a safe position	I
1.16.6	Demonstrate manual manoeuvring of the vessel under prevailing weather conditions	A
1.16.7	Demonstrate manual station-keeping of the vessel under prevailing weather conditions	A
1.17	**Independent joystick system**	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
1.17.1	Explain the fundamental difference between the integrated DP joystick and the hard wired independent joystick system	U
1.17.2	Explain the benefits of using independent joystick instead of manual control when losing all DP control functions	U
1.17.3	Switch from DP mode to the independent joystick system	A
1.17.4	Operate the independent joystick to maintain position and/or heading in a controlled and safe manner	A
1.17.5	Operate the independent joystick to change position and/or heading in a controlled and safe manner	A
1.18	**Normal completion of a DP operation**	
1.18.1	Identify safe departure route and best vessel heading for departure	U
1.18.2	Recognise external dangers prior to departure	U
1.18.3	Retrieve position reference system equipment from e.g. the installation or seabed (if applicable) and other deployed equipment	A
1.18.4	Demonstrate moving to a 'safe position' under full DP using incremental steps	A
1.19	**Abandoning operation**	
1.19.1	Re-stabilise the DP system, using other available reference systems or by making adjustments	A
1.19.2	Recognise the consequences of losing a reference system in relation to DP class status	U
1.19.3	Determine the need for required changes in power and engines due to changing environmental conditions	I
1.19.4	Identify new escape routes based on changes in the mode, vessel alignment or environmental conditions	U
1.19.5	Determine the ability to continue, reposition the vessel or suspend the operation, taking into account redundancy requirements	I
1.19.6	Determine the need to disconnect hoses or recover equipment	I
1.19.7	Assess the need to change to DP joystick, independent joystick or manual levers for manoeuvring when suspending an operation	I
POWER / THRUSTER MANAGEMENT		
1.20	**Busbar-settings**	
1.20.1	Determine optimum bus-tie breaker-setting and which engines to use during the operation	I
1.20.2	Explain the relationship between the busbar-setting to be used and the vessel's DP class	K
1.20.3	Determine if both closed and open busbar-setting are approved for operating under the relevant DP class	A
1.21	**Thruster allocation mode**	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
1.21.1	Use correct thruster allocation for a specific operation and weather conditions	A
1.21.2	Explain the restrictions of the thruster allocation setups	U
1.21.3	Recognise limitations of vessel movement when having equipment or divers deployed	U
1.21.4	Explain why manual control should be selected after a full blackout, awaiting the power to be restored	U
1.22	**Power management interface**	
1.22.1	Interpret information given by power management systems	I
1.22.2	Give an overview of heavy power consumers	I
1.23	**Power monitoring**	
1.23.1	State the power output and thrust	K
1.23.2	Recognise if the DP operating parameters of continuous operating power are exceeded	U
1.24	**Environmental conditions**	
1.24.1	Recognise changes in environmental conditions	U
1.24.2	Recognise when environmental conditions become critical with reference to station keeping	U
1.24.3	Recognise increased importance of situational awareness when operating close to floating objects	U
1.24.4	Assess if the environmental conditions are suitable for DP operations	I
1.25	**Alarms and indicators**	
1.25.1	Describe the DP status alert levels on board a DP vessel	U
1.25.2	Identify the procedures to follow for DP and non-DP alarms	U
1.25.3	Determine and set alarm and warning limits	I
1.25.4	Recognise alarms related to the incorrect operation of the DP system and maintaining position	U
1.25.5	Acknowledge alarms within time constraints	A
1.25.6	Discuss alarms with engine control room	U
1.25.7	Interpret visual indicators, indicating conditions which may result in malfunction of DP	I
1.25.8	Evaluate the possible consequences of each alarm and possibility to continue the operation	I
1.26	**Consequence analysis**	
1.26.1	Explain 'consequence analysis'	U
1.26.2	Assess the validity of the consequence analysis	A
1.26.3	Analyse the consequence analysis alarm	I
CONTINGENCIES		

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
1.27	**Emergency awareness**	
1.27.1	Describe vessel-related conditions which may result in aborting the operation	U
1.27.2	Describe external conditions which may result in aborting the operation	U
1.27.3	Describe the risks challenges of the various control-modes	U
1.27.4	Explain the course of action in case the vessel's integrity may be breached while under DP	U
1.28	**Emergency performance**	
1.28.1	Demonstrate actions in case of unstable position reference system(s)	A
1.28.2	Demonstrate actions when losing position reference system(s)	A
1.28.3	Demonstrate actions if position reference system(s) suddenly indicate significant changes in position/range/bearing data	A
1.28.4	Demonstrate actions in case of a loss of position (drive-off / drift-off / force off)	A
1.28.5	Demonstrate actions in case of one thruster runoff	A
1.28.6	Demonstrate actions in case of error in wind input	A
1.28.7	Demonstrate actions in case of error in sensor input	A
1.28.8	Demonstrate actions when losing all DP control functions	A
1.28.9	Demonstrate the proper sequence of actions if experiencing an on board emergency which may influence DP control during DP operations	A
1.28.10	Demonstrate the steps as defined in company emergency procedures (blackout, fire, etc.)	A
1.28.11	Move the vessel to a safe position in a safe and controlled manner	A

3.5 Stationkeeping mode

Table 3-2 Additional competence requirements for stationkeeping mode

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
OPERATIONS		
2.1	**Preparation**	
2.1.1	Create a DP approach-plan	A
2.1.2	Verify if a DP approach-plan complies with standing orders	I
2.1.3	Determine a safe approach angle to the destination (e.g. installation)	I
2.1.4	Verify available installed transponders and their location	A
2.1.5	Analyse the effects construction(s) and equipment (e.g. cranes, flare booms etc.) may have on a planned DP operation	I
2.1.6	Confirm heading and position of the object/structure (e.g. floating production storage and offloading unit (FPSO), installation) in case of station keeping alongside	A
2.1.7	Check whether an object/structure is fixed or floating (moving)	A
2.1.8	Assess where the vessel shall be positioned for an operation, considering weather/ leeside.	A
2.1.9	List precautions if vessel shall be positioned on weather side of an object/installation	K
2.1.10	Identify escape routes for each phase of the operation, taking into account changing environmental conditions, vessel movement, anchor chains/wires, operational issues, etc.	U
2.2	**DP setup**	
2.2.1	Describe 'safe position' and the factors affecting it	U
2.2.2	Assess the movement of floating installations when determining a safe distance to carry out location setup checks	A
2.2.3	Determine a 'safe position' and minimum distances to stabilize the vessel under DP	A
2.2.4	Ensure the vessel is on DP in accordance with the vessel's class and the vessel's operation manual	A
2.2.5	Carry out a drift-trial	A
2.2.6	Test vessel's manoeuvring capability during prevailing weather conditions	A
2.2.7	Stabilize the vessel under DP	A
2.2.8	Generate a DP footprint plot for the vessel	A
2.3	**System integrity**	
2.3.1	Monitor position reference systems, sensors and signal quality in anticipation of the possibility of failure causing instant/violent reaction from main engines/thrusters	A
2.3.2	Recognise DP related changes in vessel systems and technical equipment	U

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
2.3.3	Recognise technical issues which may limit or stop DP operations	U
2.4	**Emergency performance**	
2.4.1	Change the control from main station to backup station in case of emergency operation on a DP3 classed vessel	A

3.6 DP approach mode

Table 3-3 Additional competence requirements for DP approach mode

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
OPERATIONS APPROACH MODE		
3.1	**Underpinning knowledge and understanding**	
3.1.1	Describe the status change of pre-defined alarm limits when a loading hose (active/ inactive) is connected	U
3.1.2	State the required speed and size of steps to enter into the DP approach dialogue	K
3.1.3	Explain how to change the speed set point according to the step-by-step procedure	U
3.1.4	Explain possible reasons for discontinuing the approach	U
3.1.5	Explain when and how to change the mode to weather vane mode for different type of loading systems, with or without a hawser connected	U
3.1.6	Explain the importance for following the step-by-step procedure in detail.	U
3.2	**Preparation**	
3.2.1	Describe 'safe position' and the factors affecting it	U
3.2.2	Assess the movement of floating installations when determining a safe distance to carry out location setup checks	A
3.2.3	Determine a 'safe position' and minimum distances to stabilize the vessel under DP	A
3.2.4	Ensure the vessel is on DP in accordance with the vessel's class and the vessel's operation manual	A
3.2.5	Carry out a drift-trial	A
3.2.6	Test vessel's manoeuvring capability during prevailing weather conditions	A
3.2.7	Stabilize the vessel under DP	A
3.2.8	Generate a DP Footprint Plot for the vessel	A
3.2.9	Explain which reference systems are to be used for a specific loading buoy	U
3.2.10	Determine the sequence in which the reference systems are to be used	A
3.2.11	Determine when and how to select the approach mode with reference to the field specific step by step procedure	A
3.2.12	Enter the required speed and size of steps into the DP approach dialogue	A
3.2.13	Enter set point radius input into the DP approach dialogue	A
3.3	**Operations**	
3.3.1	Demonstrate moving a vessel from a distance towards the loading point using approach mode in accordance with the applicable step-by-step field procedure, using the correct steps with the correct speed	A

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
3.3.2	Anticipate the behaviour of the vessel as a result of changes in environmental conditions during the approach to the loading point	U
3.3.3	Demonstrate the correct use of position reference systems selected for the actual loading buoy in question	A
3.3.4	Demonstrate compensating changes in environmental conditions during approach	A
3.3.5	Demonstrate the ability to follow a step by step procedure in detail	I
3.3.6	Demonstrate changing to weather vane mode, with and without a hawser connected	A
3.4	**Abandoning operation**	
3.4.1	Demonstrate the ability to abort the approach in case of a degrading DP system	A

3.7 Weather vane mode

Table 3-4 Additional competence requirements for weather vane mode

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
OPERATIONS WEATHER VANE MODE		
4.1	**Underpinning knowledge and understanding**	
4.1.1	Explain which pre-defined alarm limits are activated when weather vane mode is selected	U
4.1.2	Explain the importance of activating extra fore and aft alarm limits in weather vane mode	U
4.1.3	Explain the need for activating the hawser sensor if the buoy configuration has a mooring hawser as a part of it before selecting weather vane mode	U
4.1.4	Describe the vessel's movement around the loading point while keeping the position at the pre-set limit when the environmental forces change	U
4.1.5	Explain the difference between emergency shut down (ESD)1 and ESD2	U
4.1.6	Explain the difference between position activated shut down (PSAD)1 and PSAD2	U
4.2	**Preparation**	
4.2.1	Recognise if a mooring hawser is part of a buoys' configuration	U
4.2.2	Explain to what extent the actual set point position limits for a specific loading buoy may be adjusted	U
4.3	**Operations**	
4.3.1	Explain which warnings and alarms will appear should the vessel lose position and exceed the pre-defined alarm limits in the DP software	U
4.3.2	Explain which actions to take should the vessel lose position and pass the pre-defined alarm limits in the DP software	U
4.3.3	Determine when to select the weather vane mode with reference to the field-specific step by step procedure	A
4.3.4	Demonstrate the ability to change mode to weather vane when the vessel is in loading position as defined in the step by step procedure for a specific loading buoy	A
4.3.5	Describe actions when the vessel has connected the loading hose (e.g. commencing offloading according to the specific field procedure)	U
4.3.6	Explain what the consequence analysis software monitors during operations	A
4.3.7	Demonstrate how to activate the consequence analysis software for DP class 2 operations	A
4.3.8	Monitor important parameters on the DP view, such as vessel's position, reference systems quality, power monitoring, thruster output etc.	A
4.3.9	Demonstrate the ability to react correctly to any DP warnings and alarms and take appropriate action upon it	A

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
4.3.10	Demonstrate the ability to take the right corrective actions in case the DP system is degraded in any way	A
4.3.11	Demonstrate the actions to take should the vessel lose position and exceed the pre-defined alarm limits in the DP software	A
4.4	**Abandoning operation**	
4.4.1	Explain how a normal termination of loading and disconnection shall be carried out according to the specific step by step procedure	U
4.4.2	Demonstrate the ability to stop the loading operation in a normal manner, disconnect hose and hawser and depart in accordance with the step by step procedure for the actual field	A
4.4.3	Explain possible reasons for discontinuing the loading operation in weather vane mode	U

3.8 Follow target mode

Table 3-5 Additional competence requirements for follow target mode

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
OPERATIONS FOLLOW TARGET MODE		
5.1	**Underpinning knowledge and understanding**	**U**
5.1.1	Explain the different position reference systems used in follow target mode	U
5.1.2	Explain the need for an additional fixed reference system such as DGPS/DGNSS or a fixed sea bed transponder during follow target/auto track operations	U
5.1.3	Describe the equipment required on a moving target, allowing the DP system to monitor its relative position	U
5.1.4	Recognise the effect of size and mass of an object (vessel/ROV) on reaction time under DP	U
5.1.5	Explain how fixed and relative reference systems are used in combination for the follow target mode	U
5.1.6	Explain how the fixed and mobile reference systems will position relative to each other	U
5.1.7	Explain why and how multiple transponders or reflectors are used in a follow position and heading operation	U
5.1.8	Explain how the follow target SW is used in a follow position and heading operation	U
5.1.9	Explain how to set a reaction radius	U
5.1.10	Explain what happens when a target (e.g. ROV) exceeds a defined reaction radius	U
5.1.11	Explain how the cable is used as a sensor during ploughing or trenching	U
5.1.12	Explain how a trim cube is used as a relative PRS during trenching	U
5.1.13	Explain why the speed set point shall have maximum limits, considering differences in size and reaction time between surface vessel and ROV/sub-machine	U
5.1.14	Evaluate the maximum speed set point in follow target operations	I
5.1.15	Explain why follow target mode with ROV or other sub-sea tools, may be dangerous when operating close to surface structures	U
5.1.16	Describe the importance of communication between the bridge/DPO and the control room for the equipment in use during the operations	U
5.1.17	Explain the importance of maintaining a good weather heading of the vessel in relation to the use of power and thrusters	U
5.1.18	Describe the tasks to be carried out prior to entering follow target mode, i.e. launching of the ROV or sub machine	U
5.1.19	Give possible reasons for discontinuing the ROV or sub-machine operation	K
5.2	**Preparation**	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
5.2.1	Establish the reference system for follow target operation	I
5.2.2	Plan a follow target operation	A
5.3	**Operations**	
5.3.1	Demonstrate follow target mode during ship-to-ship operations on the surface	I
5.3.2	Demonstrate actions to minimize the use of thrusters and power output	I
5.3.3	Communicate with the ROV or sub machine control room during the operation in order to optimize the operation	I
5.3.4	Demonstrate the correct use of position reference systems for a follow target operation	I
5.3.5	Enter into follow target mode, setting the correct parameters (e.g. combination of reference systems, reaction radius, set point speed and heading)	I
5.3.6	Anticipate how the vessel will behave during the follow target operation if the environmental forces deteriorate during operation	I
5.4	**Abandoning operation**	
5.4.1	Discontinue the operation in a controlled manner in case of a degrade in the DP system or for other reasons	I

3.9 Auto track mode

Table 3-6 Additional competence requirements for auto track mode

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
OPERATIONS AUTO TRACK MODE		
6.1	**Underpinning knowledge and understanding**	
6.1.1	Explain the DP auto track mode	U
6.1.2	Explain what type of reference systems are used for an auto track operation incl. correct combinations	U
6.1.3	Explain how a track is used in auto track mode	U
6.1.4	Explain the tasks for the DPO prior to switching to auto track mode	U
6.1.5	Explain in which type of operation tension sensors are required	U
6.1.6	Explain how and in which conditions to offset a track	U
6.1.7	Explain how to select different rotation points (ROT's) based on the type of operation to be performed	U
6.1.8	Explain the difference between the various auto track modes (low-speed, move-up and high-speed)	U
6.1.9	Explain the importance of maintaining a good weather heading of the vessel in relation to the use of power and thrusters	U
6.1.10	Describe the importance of communication between the bridge/DPO and the control room for the equipment in use during the operations	U
6.2	**Preparation**	
6.2.1	Enter a pre-planned track into the DP by entering waypoints into a table in the DP software	A
6.2.2	Enter a pre-planned track into the DP directly on the DP view by using the mouse	A
6.2.3	Import a pre-planned track into the DP	A
6.2.4	Demonstrate how to save and store tracks for later use	A
6.2.5	Calibrate reference systems	A
6.3	**Operations**	
6.3.1	Explain the requirements of different operations before entering auto track mode (e.g. having launched equipment to the sea bed)	U
6.3.2	Explain the importance of tension input into the DP model from sensors placed on a stinger or a crane boom	U
6.3.3	Enter tension input into the DP model in operations where this is required	A
6.3.4	Activate sensors for tension measurement	A
6.3.5	Explain the use of the track offset-functionality on the software for special operations	U

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
6.3.6	Demonstrate offsetting a track	A
6.3.7	Change parameters like heading, speed and turning radius for each leg of a track	A
6.3.8	Demonstrate having the vessel follow a predefined track in auto track mode	A
6.3.9	Select the correct rotation point for the operation to be carried out	I
6.3.10	Communicate with the control room for operation of subsea equipment in a clear manner	A
6.4	**Abandoning operation**	
6.4.1	Explain at which limits to discontinue the auto track operation	U

3.10 Submerged turret modes

Table 3-7 Additional competence requirements for submerged turret modes (STL)

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
OPERATIONS STL		
7.1	**Underpinning knowledge and understanding**	
7.1.1	Describe the phases in submerged turret loading operations	U
7.1.2	Explain what is meant by the 'field zero point'	U
7.1.3	Explain why at least one absolute position reference system is required in STL operations	U
7.1.4	Explain the purpose of transponders on the STL buoy when not connected to the vessel	U
7.1.5	Explain how transponders on the buoyancy elements of the turret's mooring lines can be used to determine integrity	U
7.1.6	Explain the importance of pre-set ESD alarm limits	U
7.1.7	Explain the use of HPR/HiPAP transponders both for DP positioning and for monitoring purposes	U
7.1.8	Determine when transponders may be activated for position input into the DP	A
7.1.9	Describe the data transponders are supposed to send back to the vessel	U
7.1.10	Activate the various transponders at the appropriate time	A
7.1.11	Interpret data received from transponders	I
7.1.12	Describe actions if incorrect transponder-data is received	U
7.2	**Preparation**	
7.2.1	Interpret the field manual for a specific STL buoy	I
7.2.2	Determine which reference systems shall be used for a specific STL buoy	I
7.2.3	Determine which transponders shall be used for monitoring defined parameters for a specified STL buoy	I
7.2.4	Explain the wave height limitations for connecting to and for loading at a STL buoy	U
7.2.5	Show where to find the dialogue for 'go to base' and 'go to buoy'	A
7.2.6	Demonstrate how to use the 'go to base' and 'go to buoy' inputs	A
7.3	**Operations**	
	General	
7.3.1	Demonstrate the correct use of position reference systems for the STL buoy in question	A
7.3.2	Determine which system is to be used for DP positioning and which system for monitoring purposes	I

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
	Approach mode	
7.3.3	Explain how to use approach mode to move the vessel towards the field zero point	U
7.3.4	Determine from what distance and to what extent the approach mode may be used for a specific buoy	I
7.3.5	Give possible reasons for discontinuing the approach to an STL	U
7.3.6	Perform a step-by-step approach of an STL buoy in accordance with the applicable field manual	A
	Connect mode	
7.3.7	Determine the distance from the field zero point at which the connect mode shall be activated	I
7.3.8	Change to connect mode	A
7.3.9	Determine when the STL buoy is in position and ready to be hoisted into the mating cone	I
7.3.10	Describe the maximum offset limits allowed for hoisting the STL buoy into the mating cone	U
7.3.11	Explain how the depth of the STL buoy can be monitored and which DP view shall be selected for this	U
7.3.12	State the maximum tension the winch should apply in the final stage when the buoy is ready to be locked in position	K
7.3.13	Maintain the required amount of tension on the hoisting winch during the final connection	A
7.3.14	Connect to a buoy in connect mode in accordance with the applicable field manual	I
	Loading mode	
7.3.15	Explain the criteria for selecting loading mode on the DP	U
7.3.16	Switch to loading mode	A
7.3.17	Explain which alarm will appear if loading mode is not activated within a set time frame	U
7.3.18	Explain the freedom of motion of a vessel in loading mode during the STL operation	U
7.3.19	Explain when the damping functions on the DP are to be used	U
7.3.20	Activate the damping functions on the DP in surge, sway and yaw	A
7.3.21	Explain reasons for selecting a mean offset set point radius	U
7.3.22	Select a mean offset set point radius	A
7.3.23	Explain the criteria for stopping and re-starting main engines and thrusters	U
7.3.24	Perform loading while connected to a buoy in loading mode	A
7.3.25	Select the correct monitoring pages on the DP view	I
7.4	**Abandoning operation**	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
7.4.1	Describe the procedure for disconnection from the STL buoy and how to clear the buoy for departure	U
7.4.2	Disconnect and clear an STL buoy in accordance with the field manual's step by step procedure	I
7.4.3	Explain the dangers when an STL buoy is released in a high sea state	U

3.11 Position mooring mode

Table 3-8 Additional competence requirements for position mooring mode (Posmoor/ATA/TAM)

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
OPERATIONS POSMOOR		
8.1	**Underpinning knowledge and understanding**	
	Rules, guidelines, requirements and documentation	
8.1.1	State regulating bodies, applicable rules, guidelines and requirements related to position mooring	K
8.1.2	List the most important documents related to the position mooring system and operation	K
8.1.3	Interpret the operation manual of the system	I
8.1.4	Explain the difference between equipment classes and consequence classes	U
8.1.5	Relate operations to classes in accordance to rules and guidelines	U
	Position mooring systems	
8.1.6	Explain why a vessel would be moored instead of operating on DP	U
8.1.7	Describe the main functions and components of a position mooring system	U
8.1.8	Describe the need for sensor/PRS redundancy and discuss the problems single sensors/ PRS situation can give	U
8.1.9	Explain different mooring methods, reasons for use, benefits and disadvantages (e.g catenary, taut wire)	U
8.1.10	Describe the principles of symmetry in a mooring system	U
8.1.11	Describe the consequences of using a non-symmetric mooring system	U
8.1.12	Explain the differences between 'ship mooring' and 'position mooring'	U
8.1.13	Explain the differences between 'rig mooring' and 'turret mooring'	U
8.1.14	Explain the differences in design of a short term mooring (MODU) and a long term mooring (production unit)	U
8.1.15	Explain the difference in in design criteria for a position moored rig and a position moored FPSO/FSU	U
8.1.16	Explain 'equilibrium position'	U
8.1.17	Explain the regular way to operate a mooring system	U
8.1.18	Explain the process of connecting to a pre-laid system	U
8.1.19	Demonstrate connecting to a pre-laid system	A
8.1.20	Describe the requirements for mooring system strength	U
8.1.21	Describe the main QA/QC factors used to safeguard a mooring system	U

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
	Anchors, lines and other components	
8.1.22	Explain the advantages and disadvantages of using the following line types : chain - wire - fibre	U
8.1.23	Give the main reasons for line breaks and how they can be avoided	U
8.1.24	Give the main reasons for a line not meeting its stated breaking strength.	K
8.1.25	Describe the different anchor types used for mooring (gravity, drag, fluke, plate, pile, suction) and their advantages/limitations	U
8.1.26	Explain methods for testing the anchor holding power and the required capacity of the mooring winches	U
8.1.27	Explain how vertical forces (uplift) on the anchor can be avoided	U
8.1.28	Explain the importance of slacking before heaving	U
8.1.29	Explain the operation of the RAR (remote anchor release)	U
	Line break detection	
8.1.30	Describe the line break detection function	U
8.1.31	Explain which measurements are used to detect a line break	U
8.1.32	Explain the relationship between the automatic line-break detection and Posmoor/ATA mode and the system's response to a detected or manually set line break status	U
8.1.33	Explain the consequence of no or poor tension and position measurements related to the automatic line break detection function	U
8.1.34	Explain how to correct for a wrongly detected or not detected line break	U
8.1.35	Describe the operational actions to be made following a line break	U
8.1.36	Explain why automatic line-break detection is not active in anchor management mode	U
	Mooring analysis	
8.1.37	Describe 'mooring analysis'	U
8.1.38	Outline what data a mooring analysis will contain, needed to set up the Posmoor/ATA system	U
8.1.39	Interpret a mooring analysis	I
8.1.40	Explain 'safety factor' in relation to a mooring system	U
8.1.41	Find the safety factor for intact operation in accordance to rules and guidelines	K
8.1.42	Explain 'single failure' and its operational consequences	U
8.1.43	Explain 'work tension' and 'tension distribution'	U
8.1.44	Explain the difference between operational limits and survival limits related to work tension level	U
8.1.45	Give examples of normal work tensions	U

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
8.1.46	Describe what generates force/tension on mooring lines	U
8.1.47	Calculate the maximum allowed line tension based on breaking strength and safety factor for an intact situation operation	I
8.1.48	Explain the strength criterion for a mooring system considering extreme weather	U
	Mooring consequence analysis	
8.1.49	Describe 'mooring consequence analysis'	U
8.1.50	Set up the mooring consequence analysis	A
8.1.51	Evaluate the mooring consequence result	I
8.1.52	Discuss how to use the position, heading and tension warning and alarm limits	U
8.1.53	Determine position, heading and tension limits for the mooring consequence analysis	A
8.1.54	Determine which failure modes to use in the mooring consequence analysis	A
8.2	**Preparation**	
	Setup	
8.2.1	Explain the need for updating the mooring model	U
8.2.2	List the data needed to generate a mooring model	K
8.2.3	Update/correct the mooring model	A
8.2.4	Demonstrate operational sequence and setup within predefined parameters	A
8.2.5	Explain the use the position warning and alarm limits	U
8.2.6	Determine and setup the tension limits and position limits for an operation	U
8.2.7	Calibrate the reference systems	A
8.2.8	Select available position reference systems in the correct sequence	I
8.2.9	Select the required sensors	I
8.2.10	Select the required thrusters	A
8.2.11	Perform a thruster test	A
8.2.12	Perform setup of mooring spread	A
8.2.13	Perform setup of pre-laid lines	A
	Heavy weather	
8.2.14	Describe heavy weather preparations when moored	U
8.2.15	Describe heavy weather preparations during deployment	U
8.2.16	Describe actions to hold the vessel in its operational position as environmental conditions deteriorate	U
8.2.17	Describe the need for reducing the tension level in heavy weather	U

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
8.2.18	Perform tension optimisation during heavy weather	A
8.3	**Operations**	
	Position mooring / ATA - operation	
8.3.1	Describe the main functions of the Posmoor ATA system	U
8.3.2	Explain ATA response in unstable conditions	U
8.3.3	Explain which operational controls are available when Posmoor/ATA mode has been activated	U
8.3.4	Describe the differences between anchor management (or anchor handling) mode and position mooring mode	U
8.3.5	Explain which centre of rotation shall be used for the actual Posmoor/ATA operation	U
8.3.6	Explain why measured and calculated tensions differ, its consequences and how to correct it	U
8.3.7	Explain the importance of maintaining optimum tension in the anchor lines to avoid excessive tension / line breakage	U
8.3.8	Demonstrate correct handling of tension sensor and length sensor failures	A
8.3.9	Recognise the need to adjust anchor line tension	A
8.3.10	Demonstrate actions to adjust anchor-line tension when needed	A
8.3.11	Optimize the mooring system in a given weather situation by adjusting the correct anchor-lines	I
8.3.12	Explain the criteria for stopping and re-starting main engines and thrusters	U
8.3.13	Explain the difference between damping and station-keeping in the different axis, i.e. surge, sway and yaw	U
8.3.14	Demonstrate the ability to select either full positioning in surge, sway and yaw and select damping functions for the same axis	A
8.3.15	Explain when the transition between DP and PosMoor/ATA should occur	U
	Position mooring / ATA - thruster control	
8.3.16	Use thrusters for positioning	A
8.3.17	Use thrusters when moving to 'safe position' with the weather, transverse to the weather and against the weather	A
8.3.18	Use thrusters when moving to a new position in the mooring spread	A
8.3.19	Explain the use of thrusters to bring a MODU back to the equilibrium position in case of a line-break	U
8.3.20	Discuss the need for automatic heading control for a rig and a turret moored vessel	U
8.3.21	Discuss the need for power and thruster redundancy in an ATA system.	U
	Anchor management operation	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
8.3.22	Describe the process of deploying anchors from a rig	U
8.3.23	Describe the challenges and the risks in connection with retrieving anchors while positioning the vessel automatically	U
8.3.24	Describe the challenges and the risks in connection with running anchors while positioning the vessel automatically	U
8.3.25	Explain the different ways of holding the vessel in position during anchor management, including pros and cons for the different methods	U
8.4	**Abandoning operation**	
8.4.1	Recognise unstable conditions related to thruster assist	U
8.4.2	Describe actions in case of unstable conditions related to thruster assist	U
8.4.3	Describe the differences between stopping an operation in open water and stopping an operation close to another installation	U
8.4.4	Terminate an operation in a controlled manner, changing to survival condition	I
8.4.5	Terminate an operation in a controlled manner, disconnecting from the moorings and moving away from the work location	I

3.12 Competence requirements for vessels with limited DP capability

Table 3-9 Additional competence requirements for vessels with limited DP capability

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
DP SYSTEMS, EQUIPMENT AND INSTRUMENTS		
9.1	**Underpinning knowledge and understanding**	
9.1.1	Describe the environment reference system elements' role in the DP system	U
9.1.2	Describe the power generation elements' role in the DP system	U
9.1.3	Describe the power management systems' role in the DP system	U
9.1.4	Describe the position reference systems' role in the DP system	U
9.1.5	Describe the heading reference systems' role in the DP system	U
9.1.6	Describe the thruster and propulsion systems' role in the DP system	U
9.1.7	Describe the role of control elements in a DP system	U
9.1.8	Recognise DP related vessel systems and technical equipment	U
9.1.9	Describe propulsion, thrusters and rudder types used by DP systems	U
9.1.10	Explain the redundancy requirements for IMO DP Class 1, 2 and 3 (position reference systems (PRS), thrusters, generators, etc.)	U
9.1.11	Describe the different coordinate systems used in DP operations	U
9.1.12	Identify the different systems that control the thrusters (e.g. manual levers, autopilot, independent joystick, main DP, backup DP, emergency steering)	U
9.1.13	Explain when to use the different thruster control systems	U
9.1.14	Explain the DP modes 'autopos', 'joystick' and 'mixed mode' joystick	A
9.2	**Sensors**	
9.2.1	Explain the working principle and purpose of heading sensors (gyro)	U
9.2.2	Explain the working principle and purpose of wind sensors	U
9.2.3	Explain the working principle and purpose of vertical reference sensors (VRS) / motion reference unit (MRU)	U
9.2.4	Explain the working principle and purpose of other sensors used for the operation	U
9.3	**Position reference systems (PRS)**	
9.3.1	Explain the working principle and limitations of the various systems used (e.g. satellite-based PRS, hydro acoustic systems)	U
9.3.2	Explain how the DP control system uses PRS inputs	U
9.3.3	Explain how the DP model is weighed towards the PRS in use	U

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
9.3.4	Explain possible influences when calibrating a PRS	U
9.3.5	Explain when to enable additional position reference systems	U
9.4	**DP set-up**	
9.4.1	Explain the expression 'building the model' and its role in dynamic positioning	U
9.4.2	Explain the use and impact of the various gain settings (low, medium, high)	U
9.4.3	Explain why 'sea current' or 'residual force' indicated on the DP may be remarkably different from real sea current	U
9.5	**DP hardware and software**	
9.5.1	Explain when DP computers should be reset (ref. vendor and/or procedural recommendations)	U
9.5.2	Explain the effect of resetting hardware/software on the vessel's capability	U
9.5.3	Demonstrate how to reset the hardware/software while remaining in control of the vessel	A
9.6	**Documentation**	
9.6.1	Interpret relevant information/documentation about DP related systems and technical equipment	I
9.6.2	Interpret vessel's DP operations manual and training manuals	I
9.6.3	Explain the importance of keeping detailed vessel log books documenting all aspects of DP operations	U
9.6.4	Explain the importance of maintaining personal DP experience log books	U
9.6.5	Locate applicable rules, regulations and recommendations published for the DP industry related to your role	K
ORGANISATION AND COMMUNICATION		
9.7	**Bridge watchkeeping**	
9.7.1	Describe the watchkeeping organisation on board, authority and distribution of tasks amongst the bridge team, when under DP	U
9.7.2	Describe the role, tasks and responsibilities of the DPO, while under DP	U
9.7.3	Describe the role, tasks and responsibilities of the responsible person for the bridge watch, while under DP	U
9.7.4	Recognise the importance of minimising distractions for the DPO	U
9.7.5	Demonstrate a continuous awareness of the vessel's status, operation and impact of operating under DP	A
9.7.6	Recognise the importance of an external focus when controlling a vessel close to installations or other objects	U
9.7.7	Recognise situations in which to call the master to the bridge	U
9.8	**Change of DP watch**	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
9.8.1	Prepare a hand-over checklist	A
9.8.2	Formulate vessel's status and DP details to be transferred during hand-over	U
9.8.3	Provide a status update on an ongoing operation and planned operational activities at any given time	A
9.8.4	Review a hand-over checklist	A
9.8.5	Verify vessel's position, movement and status	I
9.8.6	Determine the DP status and recent occurrences which may have an effect on the DP operation during the watch	I
9.8.7	Transfer DP watch in a formal and clear manner	A
9.9	**Communication and reporting**	
9.9.1	Obtain information and clearance from e.g. installation, port control, vessel traffic system (VTS) on issues important for the safe operation of the vessel under DP	A
9.9.2	Communicate approach / operational plan with bridge team, work site control, ECR, third parties as applicable	A
9.9.3	Inform and update relevant parties of vessel status, changes in reference systems or DP system and any developing emergency situations	A
9.9.4	Inform involved crew, engine control room and other parties on board as applicable in sufficient time before arriving or departing	A
SAFETY AND RISK REDUCTION		
9.10	**Risk assessment**	
9.10.1	Explain the importance of risk assessment	U
9.10.2	Evaluate the DP operation, including bridge/engine team and DP system performance	I
OPERATIONS		
9.12	**Preparation**	
9.12.1	Review the scope of the planned DP operation	K
9.12.2	Use a DP capability plot to determine feasibility of a DP operation in prevailing conditions	I
9.12.3	Analyse the stop or work location (e.g. water-depth, installations, subsea obstructions)	I
9.12.4	Analyse external forces which may reduce the position-keeping capability of the vessel (e.g. tides, current, ice, pipe tension, thrusters)	I
9.13	**DP operations**	
9.13.1	Determine if all DP related vessel systems and technical equipment are up and running	I
9.13.2	Determine the operational ability and accuracy of the DP system	I
9.13.3	Evaluate the availability of various PRS and sensors (gyro, wind, VRS, etc.) and external influences which may introduce errors or disrupt readings	A

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
9.13.4	Determine if the quality of PRS signals is sufficient for safe DP operations under agreed DP class	I
9.13.5	Evaluate consequences of failures in PRS related to autopos/joystick	A
9.13.6	Control the vessel under joystick and DP, keeping the vessel in the desired position and heading	A
9.13.7	Transfer control between manual control and different modes, including backup systems	A
9.13.8	Analyse consequences of moving out of position	I
9.13.9	Determine the appropriate moment to make changes to the position of own ship	I
9.13.10	Use the DP systems on board, including relevant special functions (see 1.4.1 and Notations)	A
9.14	**Operating in manual mode**	
9.14.1	Describe (dis)advantages of various types of main propulsion, rudders and thrusters with regard to manual manoeuvring	U
9.14.2	Discuss special precautions to deal with wind, current, wave height and swell during manual manoeuvring close to installations or other obstructions	U
9.14.3	Manually stop the vessel at a pre-determined position	A
9.14.4	Determine the need to stop the vessel completely before switching to DP control	U
9.14.5	Test vessel's manual manoeuvring capability under prevailing weather conditions in a safe position	I
9.14.6	Demonstrate manual manoeuvring of the vessel under prevailing weather conditions	A
9.14.7	Demonstrate manual station-keeping of the vessel under prevailing weather conditions	A
9.15	**Normal completion of a DP operation**	
9.15.1	Identify safe departure route and best vessel heading for departure	U
9.15.2	Recognise external dangers prior to departure	U
9.15.3	Move to a 'safe position' under full DP using incremental steps	A
9.15.4	Change to a 'safe heading' in appropriate steps	A
9.16	**Abandoning operation**	
9.16.1	Determine the need for required changes in power and engines due to changing environmental conditions	I
9.16.2	Assess the need to change to DP joystick, independent joystick or manual levers for manoeuvring when suspending an operation	I
POWER / THRUSTER MANAGEMENT		
9.17	**Busbar-settings**	
9.17.1	Determine the correctness of the busbar settings, generators and thruster set up	I
9.18	**Thruster allocation mode**	

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
9.18.1	Determine appropriate thruster allocation for a specific operation and environmental conditions	I
9.18.2	Recognise limitations of vessel movement when having equipment or divers deployed	U
9.18.3	Explain why manual control should be selected after a full blackout, awaiting the power to be restored	U
9.19	**Environmental conditions**	
9.19.1	Recognise changes in environmental conditions	U
9.19.2	Recognise when environmental conditions become critical with reference to station keeping	U
9.19.3	Recognise increased importance of situational awareness when operating close to floating objects	U
9.19.4	Assess if the environmental conditions are suitable for DP operations	I
9.20	**Alarms and indicators**	
9.20.1	Identify the procedures to follow for DP and non-DP alarms	U
9.20.2	Determine and set alarm and warning limits	I
9.20.3	Recognise alarms related to the incorrect operation of the DP system and inability to maintain position	U
9.20.4	Acknowledge alarms within time constraints	A
9.20.5	Discuss alarms with engine control room	U
9.20.6	Interpret visual indicators, indicating conditions which may result in malfunction of DP	I
CONTINGENCIES		
9.21	**Emergency awareness**	
9.21.1	Describe vessel-related conditions which may result in aborting the operation	U
9.21.2	Describe external conditions which may result in aborting the operation	U
9.21.3	Describe the risks/challenges of the various control-modes	U
9.21.4	Explain actions in case the vessel's integrity is breached while under DP	U
9.22	**Emergency performance**	
9.22.1	Demonstrate actions in case of unstable position reference system(s)	I
9.22.2	Demonstrate actions when losing position reference system(s)	I
9.22.3	Demonstrate actions if position reference system(s) suddenly indicate significant changes in position/range/bearing data	I
9.22.4	Demonstrate actions in case of a loss of position (drive-off / drift-off / force off)	I
9.22.5	Demonstrate actions in case of one thruster runoff	I
9.22.6	Demonstrate actions in case of error in wind input	I

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
9.22.7	Demonstrate actions in case of error in sensor input	I
9.22.8	Demonstrate actions when losing all DP control functions	I
9.22.9	Demonstrate the proper sequence of actions if an on board emergency may influence DP control during DP operations	A
9.22.10	Demonstrate the steps as defined in company emergency procedures (blackout, fire, etc.)	A
9.22.11	Move the vessel to a safe position in a safe and controlled manner	A
STATIONKEEPING		
9.23	**Preparation**	
9.23.1	Create a DP approach-plan in compliance with standing orders	A
9.23.2	Identify escape routes for each phase of the operation, taking into account changing environmental conditions, vessel movement, anchor chains/wires, operational issues, etc.	U
9.24	**DP Setup**	
9.24.1	Describe 'safe position' and the factors affecting it	U
9.24.2	Determine a 'safe position' and minimum distances to stabilize the vessel under DP	A
9.24.3	Stabilize the vessel under DP	A
9.25	**Operations**	
9.25.1	Explain advisory function / legal modes	U
9.25.2	Explain the relation between the rotation / pivot point and different speeds	U
9.25.3	Set the rotation / pivot point in auto DP mode	A
9.25.4	Determine appropriate thruster allocation for a given speed and joystick setting (low/ high speed)	A
9.25.5	Demonstrate how to lock axes in joystick mode (yaw, surge and sway)	I
AUTO TRACK		
9.26	**Underpinning knowledge and understanding**	
9.26.1	Explain the auto track mode	U
9.26.2	Explain what type of reference systems are used for an auto track operation incl. correct combinations	U
9.26.3	Explain how a track is used in auto track mode	U
9.26.4	Explain the tasks for the DPO prior to switching to auto track mode	U
9.26.5	Explain in which type of operation tension sensors are required	U
9.26.6	Explain how and in which conditions to offset a track	U

Competence ID	*Competence activity* *The DPO shall be able to:*	*Required level of cognition*
9.26.7	Explain how to select different rotation points (ROT's) based on the type of operation to be performed	U
9.26.8	Explain the difference between the various auto track modes (low-speed, move-up and high-speed)	U
9.26.9	Explain the importance of maintaining a good weather heading of the vessel in relation to the use of power and thrusters	U
9.27	**Preparation**	
9.27.1	Enter a pre-planned track into the DP by entering waypoints into a table in the DP software	A
9.27.2	Enter a pre-planned track directly into the DP, using DP view and mouse	A
9.27.3	Import a pre-planned track into the DP	A
9.27.4	Demonstrate how to save and store tracks for later use	A
9.27.5	Calibrate the reference systems	A
9.28	**Operations**	
9.28.1	Explain the use of the track offset-functionality in the software for special operations	U
9.28.2	Demonstrate offsetting a track	A
9.28.3	Change parameters like heading, speed and turning radius for each leg of a track	A
9.28.4	Demonstrate having the vessel follow a predefined track in auto track mode	A
9.28.5	Select the correct rotation point for the operation to be carried out	I
9.28.6	Communicate with the control room for operation of subsea equipment in a clear manner	A
9.28.7	Explain at which limits to discontinue the auto track operation	U
ANCHOR MODE		
9.29	**Joystick assisted heading keeping**	
9.29.1	Demonstrate taking command in joystick anchor mode	A
9.29.2	Determine pivot point / centre of rotation while in joystick anchor mode	A
9.29.3	Explain 'silent mode'	U
9.29.4	Demonstrate the procedure of anchoring while in anchor mode	A
9.29.5	Determine anchor hold tension while in anchor mode	A
9.29.6	Describe joystick and azipod configuration when joystick is in zero	A
9.29.7	Set anchor watch alarms	A
9.29.8	Perform a heading change while in anchor mode	A

CHANGES – HISTORIC

April 2014 edition

This DNV GL document supersedes and replaces the previous legacy DNV Standard for Certification No. 3.322, October 2013.

On 12 September 2013, DNV and GL merged to form DNV GL Group. On 25 November 2013 Det Norske Veritas AS became the 100% shareholder of Germanischer Lloyd SE, the parent company of the GL Group, and on 27 November 2013 Det Norske Veritas AS, company registration number 945 748 931, changed its name to DNV GL AS. For further information, see www.dnvgl.com. Any reference in this document to "Det Norske Veritas AS", "Det Norske Veritas", "DNV", "GL", "Germanischer Lloyd SE", "GL Group" or any other legal entity name or trading name presently owned by the DNV GL Group shall therefore also be considered a reference to "DNV GL AS".

Main changes

— This standard has been updated to comply with the DNV GL merger and has been updated with cross references to comply with the new numbering system.

About DNV

DNV is the independent expert in risk management and assurance, operating in more than 100 countries. Through its broad experience and deep expertise DNV advances safety and sustainable performance, sets industry benchmarks, and inspires and invents solutions.

Whether assessing a new ship design, optimizing the performance of a wind farm, analyzing sensor data from a gas pipeline or certifying a food company's supply chain, DNV enables its customers and their stakeholders to make critical decisions with confidence.

Driven by its purpose, to safeguard life, property, and the environment, DNV helps tackle the challenges and global transformations facing its customers and the world today and is a trusted voice for many of the world's most successful and forward-thinking companies.

WHEN TRUST MATTERS