

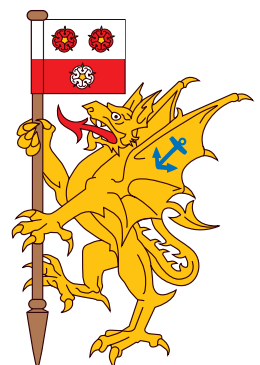
INTERTANKO

Tanker Officer Training Standards (TOTS)

4D Product Tanker Simulator Verification Course



Poseidon
Challenge



WARSASH
MARITIME ACADEMY



INTERTANKO

Tanker Officer Training Standards (TOTS)

4D Product Tanker Simulator Verification Course

CONTENTS

Prerequisites.....	1
TOTS Reference.....	1
Simulator Exercises.....	1
Exercise Descriptions.....	1
Simulator Facility.....	2
Physical Realism.....	2
Behavioural Realism.....	2
Operating Environment.....	2
Simulator Exercises	
Exercise 1. Start Inert Gas Plant and Commence Primary Inerting.....	3
Exercise 2. Complete Primary Inerting.....	4
Exercise 3. Cargo Planning Prior to Loading.....	5
Exercise 4. Commence Loading.....	7
Exercise 5. Complete Loading.....	8
Exercise 6. Loaded Passage.....	9
Exercise 7. Plan Discharge.....	10
Exercise 8. Commence Discharge.....	11
Exercise 9. Complete Discharge and Ballasting.....	12
Exercise 10. Water Wash Cargo Tanks.....	13
Exercise 11. Decant Slops.....	14

All rights reserved. No part of this publication may be reproduced in any material form (including photocopying or storing it in any medium by electronic means and whether or not transiently or incidentally to some other use of this publication) without the written permission of the copyright owner. Applications for the copyright owner's written permission to reproduce any part of this publication should be addressed to the publisher.

© **INTERTANKO** 2008

Disclaimer

Whilst every effort has been made to ensure that the information contained in this publication is correct, neither the authors nor INTERTANKO can accept any responsibility for any errors or omissions or any consequences resulting there from.

No reliance should be placed on the information contained in this publication without independent verification.

Tanker Officer Training Standards (TOTS)

4D Product Tanker

Simulator Verification Course

Prerequisites

These simulator assessments have been designed to take place at the end of the entire Tanker Officer Training Scheme. Therefore it is expected that candidates will have considerable experience of the operations simulated here. They will need this experience in order to be prepared for the following assessments:

Competence Demonstration S Simulated
Q Questioning

TOTS Reference

TOTS 4D

Competence

Verification in product tanker operations

Simulator Exercises

- Exercise 1.** Start Inert Gas Plant and Commence Primary Inerting
- Exercise 2.** Complete Primary Inerting
- Exercise 3.** Cargo Planning Prior to Loading
- Exercise 4.** Commence Loading
- Exercise 5.** Complete Loading
- Exercise 6.** Loaded Passage
- Exercise 7.** Plan Discharge
- Exercise 8.** Commence Discharge
- Exercise 9.** Complete Discharge and Ballasting
- Exercise 10.** Water Wash Cargo Tanks
- Exercise 11.** Decant Slops

Exercise Descriptions

What follows by way of exercise descriptions has been written in the form of students' objectives. In order to prevent multiple duplication, the notes may also form guidance for instructors.

For instructor, supervisor and assessor qualifications see STCW'95 Regulation I/6, Section A-I/6 paragraph 3 and A-I/12 paragraphs 6 to 9.

Simulator Facility

These exercises have been written taking into account the variety of simulators which may be used to facilitate them. As few specific features as possible have been featured, so as to increase the adaptability of the exercises to the various simulators available.

The tanker in this package is double hulled, has 6 pairs of wing tanks and a pair of slop tanks. There are 3 manifolds, 4 cargo pumps and 2 ballast pumps. The ballast tank arrangement has not been specified, and neither has the venting system. It is assumed the tanker has a cargo pump room and associated network of lines.

It is suggested that the individual training facilities select three grades of cargo to illustrate how specific physical or chemical properties may influence the handling and carriage of petroleum products.

However, the simulator should have its own Cargo Operations Manual which will be used during the training.

Physical Realism

IMO Model Course 1.04 Part D Appendix 9

The simulator used should fulfil the following minimum requirements:

- It will simulate a typical cargo handling system found on a chemical tanker based on real operational vessels.
- The equipment is arranged in a ship like manner.

The simulator includes the following components and subsystems:

- Cargo control system
- Ballast control system
- Tank cleaning system
- Overboard discharge and monitoring systems
- Tank content monitoring systems
- Inert / venting control system including sparging, gas freeing, purging and aerating.
- Tank atmosphere control system
- Alarm system
- Communication system
- Cargo pumping system
- A system for communicating with 'the outside world'
- A stability and stress calculator.

Additional resources: Ship/shore check list
Tank washing checklist
Cargo record book extracts
Log sheets

Behavioural Realism

IMO Model Course 1.04 Part D Appendix 9

The simulator model replicates the dynamic behaviour of the cargo handling system and its parameters. Furthermore, the simulator model simulates the components, their processes and control systems. It will be possible to introduce failures, breakdowns and wear to all equipment simulated.

Operating Environment

IMO Model Course 1.04 Part D Appendix 9

The simulator will simulate restrictions and failures in the cargo transfer, for instance, introduced by the simulated shore terminal. Alarms will be announced by flashing alarm lamps and sound in the 'cargo control room'.

EXERCISE 1

Start Inert Gas Plant and Commence Primary Inerting

Current Status

The vessel has just departed from drydock, so the cargo system is gas free and will need inerting. All bunkers, fresh water and ballast are as per the normal ballast condition, other than the forepeak ballast tank, which needs topping up. You have an estimated passage of five days to the load port.

You must decide which method to use for inerting the cargo tanks, dilution or displacement. Either is workable, so you must set up the deck, lines and supply in line with the relevant procedures.

Carefully note the P/V pressure and vacuum settings as well as the inert gas delivery rating, that is, the capacity of the blowers.

Note the sea and air temperature and be conscious of how a vast difference between these temperatures and the temperatures inside the cargo tanks could lead to condensation.

Consider which equipment will be required to complete the set task, including fixed and portable gas detection and analysing equipment. They should be checked, calibrated and ready to use.

Consider also, the status of the Inert Gas Plant.

Competence Criteria

- Explain why the cargo system needs inerting at all.
- Describe on what basis could a case could be made for not inerting certain cargo tanks.
- Explain which publications would support this case.
- Explain which two properties of the inert gas supply must be constantly recorded during supply.
- Demonstrate on the simulator the checks which need to be carried out prior to delivering IG to the deck.
- Demonstrate the IG start up procedure by opening the correct components of the system in the correct sequence.
- Demonstrate calibration and the correct use of the fixed oxygen analyser.
- Explain your choice of method of inerting. Why did you not choose the alternative method?
- Demonstrate how you can utilise the resources at your disposal, in terms of crew and equipment, most efficiently to complete the task.
- Describe the portable equipment you would need to assist you in this task.
- Describe how many changes of tank atmosphere would be required to complete the task, depending on the method of choice.

Competence Demonstration

- Q
- Q
- Q
- Q
- S
- S
- S
- Q
- S
- Q
- Q

Describe the permitted maximum oxygen content in:	Q
<ul style="list-style-type: none"> the inert gas supply the tank atmosphere 	
Describe where this information can be found.	Q
Demonstrate correct pump, line and valve management in topping up the ballast in a selected tank.	S

EXERCISE 2

Complete Primary Inerting

Current Status

The IG system is in operation with one blower and the Gas Regulating Valve in 'manual' mode.

The last set of cargo tanks, 6P and 6S are currently being inerted, in via the deck distribution system and out via the stand pipes. All other tanks except the slop tanks have been completed but not checked or pressurised and are currently isolated from the IG system.

All portable gas detecting and analysing instruments have been checked and calibrated.

The vessel is now within 72 hours of the load port.

Competence Criteria

Demonstrate familiarity with your company's Inert Gas Operating Manual;

Explain what the maximum oxygen content is that is permitted in the cargo tanks prior to loading the cargo?

Explain which other source of Information may provide such a requirement?

Demonstrate recorded keeping of readings.

Demonstrate an understanding of such parameters as the minimum permitted pressure on the inerted system under all conditions of operation.

Demonstrate the correct method of the completion of primary inerting, including the shutting down of the Inert Gas Plant.

Demonstrate final checks on the cargo and Inert Gas System after the plant has been shut down.

Competence Demonstration

S

Q

Q

S

S

S

S

EXERCISE 3

Cargo Planning Prior to Loading

Current Status

The vessel has inerted the cargo system and is proceeding towards the next load port.

Cargo orders have been received so a loading plan needs to be drawn up.

Maximum cargo incorporating three grades are to be loaded.

The three grades are;

Grade 1	Note	Density Temperature Quantity
Grade 2	Note	Density Temperature Quantity
Grade 3	Note	Density Temperature Quantity

The cargo system can load the three grades simultaneously, though the Grade 2 is to be the grade with which loading is commenced and the grade to be topped off and completed first.

Grade 1 is to be loaded into 1 P & S, 4 P & S, 6 P & S and the port slop tank, through the forward most manifold.

Grade 2 is to be loaded into 2 P & S and 5 P & S and the starboard slop tank, through the aft most manifold.

Grade 3 is to be loaded into 3 P & S, through the middle manifold.

The terminal has explained that the loading of the cargo will be completed at the request of the vessel, that is, a 'ship stop'. It has also explained that any excess cargo taken, over the nomination, will be pumped back to the terminal at the expense of the ship.

In terms of venting arrangements, Grade 2 and Grade 1 may share venting lines but the Grade 3 vapour must be vented through separate lines.

Competence Criteria

Demonstrate an understanding of cargo planning incorporating the sequence of cargo parcels to be loaded.

Explain in your plan which parcel will be last to be topped off and exactly why you have chosen that cargo and pair of tanks.

Demonstrate an understanding of the need to plan for de-ballasting at the load port.

Describe the maximum loading rate pressure each tank can accept and the maximum back pressure permitted at each manifold.

Explain where this information has come from and include it in your cargo orders.

Competence Demonstration

S

S

S

Q

S

Demonstrate an understanding of safe and effective cargo vapour emission control within your cargo plan.	S
Demonstrate in your plan the need to monitor stresses and stability during the loading. How will you counteract free-surface effect if necessary?	S
Demonstrate a readiness to complete a pre-arrival checklist and a ship/shore checklist upon arrival.	S
Describe the checks you will plan to carry out to the deck and cargo system prior to arrival at the load port.	Q
Explain if and why you would choose to utilise vapour return arrangements at the load port.	Q
Explain how you propose to promulgate the cargo plan to the vessel's staff, incorporating all of the above.	Q

EXERCISE 4

Commence Loading

Current Status

The vessel is berthed port side to alongside and all three manifolds have been connected.

All local and terminal regulations are being complied with and the ship/shore checklist has been completed and signed by the required staff.

The oxygen content in each tank has been tested and been found to be less than 8% by volume in each case. The inert gas plant is shut down and set for safety.

You have already drawn up your cargo plan and agreed the sequence of cargoes to be loaded with the loading terminal.

The Grade 2 parcel, to be loaded into 2 P & S, 5 P & S and the starboard slop tank through the aft manifold, will be the first cargo to be started. The sequence of the remaining cargoes has been planned by yourself and agreed by the terminal. Having created the cargo plan it is up to you to adhere to the plan.

Competence Criteria

Demonstrate the correct lining up of lines and valves in the cargo system, in readiness to load cargo.

Demonstrate the correct lining up of the venting system, including the vapour return manifold, if you have chosen to utilise it.

Demonstrate the use of the various channels of communication at your disposal, in preparation for the commencement of loading.

Demonstrate how would you choose an appropriate time to open up the cargo manifold to start loading. Who will make the request to open the manifold?

Demonstrate an understanding of the need to commence loading at a slow rate.

Explain why a slow start is necessary, including implications of static electricity.

Demonstrate an understanding of an appropriate time to increase to the maximum loading rate.

Demonstrate the start of the de-ballasting.

Competence Demonstration

S

S

S

S

Q

S

S

EXERCISE 5

Complete Loading

Current Status

The vessel is berthed port side to alongside. De-ballasting is almost completed, though ballast tanks 5 and 6 need to be finished.

The vessel is currently loading through the two forward manifold, the Grade 2 having been loaded through aft manifold, topped off and the manifold closed.

The vessel is currently loading at the maximum rate the shore can supply and the loading rate can be adjusted up to the maximum manifold loading rate, if required.

Remember the agreed cargo completion procedure incorporates a 'ship stop'.

Competence Criteria

Competence Demonstration

Demonstrate an understanding of and ability to control loading rates of the tanks, in order to create a 'stagger' to facilitate the safe and efficient 'topping off' procedure.

S

Explain how you will ensure that the vessel will not load in excess of its cargo nomination.

Q

Explain how you propose to deal with the de-ballasting requirements.

Q

Demonstrate the completion of the de-ballasting at a time most expedient to the objectives of topping off the cargo.

S

Demonstrate an understanding of the need to ensure clear channels of communication prior to, during and upon completion of the topping off procedure.

S

Demonstrate correct vapour emission control during this exercise.

S

Explain which legislation applies to atmospheric emissions from ships.

Q

Demonstrate an understanding of the need to monitor all other tanks, whether loaded or not, to ensure their contents do not change.

S

EXERCISE 6

Loaded Passage

Current Status

The vessel is at sea on a loaded passage and loaded as per your own cargo plan. There is no ballast on board. During this exercise you are concerned with monitoring tank pressures in order to minimise losses due to evaporation.

Remember the venting requirements in exercise 3, that the Grade 3 parcel requires venting segregated from the remaining parcels.

Competence Criteria

Explain the purpose and benefits of vapour emission control.

Explain the criteria you would take into account in determining whether a cargo required heating on passage.

Explain why it is necessary to segregate the Grade 3 venting from the other cargo vapours.

Demonstrate a methodical regime of cargo tank ullage and pressure monitoring during the loaded passage.

Demonstrate a methodical regime of ballast space content and atmosphere monitoring during the loaded passage.

Explain the steps you would take should a hydrocarbon gas concentration be detected on the loaded passage, for example, in a ballast space.

If, under such circumstances, the contaminated space had to be ballasted for operational purposes, explain how would that ballast water would be dealt with.

Competence Demonstration

Q

Q

Q

S

S

Q

Q

EXERCISE 7

Plan Discharge

Current Status

The vessel is approaching the discharge port. Discharge of the entire cargo is to be planned but it has been agreed that the discharge will commence with the Grade 2 parcel.

Pump No. 1 can discharge the Grade 1.

Pump No. 2 can discharge the Grade 3.

Pump No. 3 can discharge the Grade 2.

Each grade can be discharged simultaneously but can also be kept segregated during the discharge. Initially, the discharge of one grade (the Grade 2) will start, followed by the remainder.

It is up to you to draw up a discharge plan associating parcels with pump lines and cargo tanks. The plan should include ballasting of all wing ballast tanks.

In order to expedite the draining and stripping of the cargo tanks, one pair of ballast tanks may be left slack until discharge is completed.

Do not forget IG requirements, which should also be included in your plan.

Competence Criteria

Competence Demonstration

Demonstrate the planning of a discharge operation incorporating the details mentioned above. S

Demonstrate an understanding of the requirements of inert gas supply during this discharge operation. S

Describe your actions in the event of an inert gas supply failure. Q

Demonstrate an understanding of the appropriate actions to be taken in your cargo plan. S

Demonstrate an understanding of how to apply operational parameters in your plan, e.g., maximum back pressure, anticipated timings etc. S

EXERCISE 8

Commence Discharge

Current Status

The vessel is port side to alongside and has all three manifolds connected.

The inert gas plant has been tested before arrival and no defects found. All cargo tanks have been tested for oxygen concentration and each found to have less than 8% by volume. The inert gas supply fixed oxygen analyser has been calibrated and tested and found to be in order.

A ship/shore safety checklist has been completed.

The main cargo pumps have been warming through for the last hour.

The sequence of parcel discharge has been discussed and agreed with the terminal. They have requested that Grade 2 is the parcel with which to commence discharge but the remaining parcels may be discharged as you have planned.

Competence Criteria

Demonstrate an understanding of the circumstances under which you may start the discharge.

Demonstrate the correct way to start a cargo pump, incorporating correct line and valve management.

Demonstrate, by means of communication with the terminal, the rate at which discharge will commence.

Demonstrate your understanding of circumstances which permit you to increase the discharge rate and associated checks.

Demonstrate an understanding of the need to adhere to atmospheric emission restrictions, by monitoring the IG main and tank pressures.

Demonstrate an understanding of an appropriate time to commence ballasting.

Demonstrate management of cargo discharge and ballasting as simultaneous operations.

Competence Demonstration

S

S

S

S

S

S

S

EXERCISE 9

Complete Discharge and Ballasting

Current Status

The vessel is alongside port side to with three manifolds connected. The Grade 2 cargo has been discharged completely and the tanks and lines for that parcel stripped. Inert gas is still being delivered to the cargo system.

Continue to follow the cargo discharge plan you drew up earlier. The draining and stripping facilities provided in the pump room are ready to use. The Grade 1 and Grade 3 parcels will be drained and stripped as per your plan.

Also, as per your plan, one pair of ballast wing tanks may be employed to adjust the trim and list of the vessel to expedite the stripping of the cargo tanks.

Competence Criteria

Demonstrate how to avoid a vortex forming on the cargo surface as it reaches the final stage of discharge.

Demonstrate an efficient method of stripping the tanks of cargo.

Explain how any remaining cargo in the tanks can be detected and quantified.

Demonstrate effective line clearing prior to completion of the discharge operation.

Demonstrate at which point the inert gas supply to the deck will be stopped.

Demonstrate efficient completion of the ballasting after completion of the cargo discharge.

Describe what actions and precautions are required before the vessel leaves port and proceeds to sea.

Demonstrate an understanding of effective stability monitoring during the cargo transfer operation and ballasting.

Before exercise 10 is started a tank washing plan needs to be made.

Competence Demonstration

S

S

Q

S

S

S

S

S

EXERCISE 10

Water Wash Cargo Tanks

Current Status

Having sailed from the discharge port, the cargo system requires a routine wash. Cargo orders have already been received for the next loading pattern but the cargoes nominated are not high specification parcels. A routine water wash is all that will be required, cold water for the Grade 3 and Grade 1 tanks but hot water for the Grade 2 tanks. At this stage, the slop tanks will not be washed since they will need to contain the residues of tank washings.

As per routine safety procedures, the inert gas system must be run during the tank washing programme.

Remember to monitor the inert gas quality being delivered to the deck as well as the IG main pressure, to ensure that safety requirements are fulfilled.

Competence Criteria

Demonstrate, through forward planning, awareness of relevant channels of communication to provide inert gas and heating facilities for wash water, when required.

Demonstrate an ability to set up and commence the tank washing system, exercising correct pump, line and valve management.

Demonstrate correct operation of steam supply in order to heat the wash water, for tank cleaning.

Demonstrate a familiarity with the vessel's tank washing manual, in the planning of the operation.

Demonstrate an understanding of, and adherence to, MARPOL requirements, whilst executing this tank washing operation.

Explain how the tank washing residues will be dealt with once they have been drained from the cargo tanks.

Competence Demonstration

S

S

S

S

S

S

EXERCISE 11

Decant Slops

Current Status

The vessel is now two days from the next load port. Earlier in the ballast passage, weather conditions deteriorated to the extent that the Master decided to take on heavy weather ballast for safety reasons. Conditions have since improved considerably and the heavy weather ballast has been discharged, with the oil residues contained in the starboard slop tank. 3 P & S cargo tanks have been washed and inerted.

In order to minimise slops on arrival, the remaining residues in the starboard slop tank have to be decanted.

Ensure the required components of the line system are in place to enable the starboard slop tank to be discharged, via the Oil Discharge Monitoring Equipment, into the sea.

Upon completion of this operation, such components (eg, spool piece) should be removed as required prior to working the next cargo.

Competence Criteria

Demonstrate an understanding of both MARPOL requirements and vessel / company operation manuals, with regard to this disposal procedure.

Explain what may reduce the quantity of emulsion at the interface of oil and water in the slop tank, depending on the nature of the slops.

Explain the factors to be taken into account when deciding where to dispose of these slops.

Demonstrate an understanding of the function and operation of the Oil Discharge Monitoring Equipment.

Explain the possible destination of the slops retained on board at the end of this decanting operation.

Competence Demonstration

S

Q

Q

S

Q



INTERTANKO

INTERTANKO London

St Clare House
30-33 Minories
London EC3N 1DD
United Kingdom

Tel: +44 20 7977 7010
Fax: +44 20 7977 7011
london@intertanko.com

INTERTANKO Oslo

Nedre Vollgate 4
5th floor
PO Box 761 Sentrum
N-0106 Oslo
Norway

Tel: +47 22 12 26 40
Fax: +47 22 12 26 41
oslo@intertanko.com

INTERTANKO Asia

5 Temasek Boulevard,
#12-07 Suntec City Tower
Singapore 038985

Tel: +65 6333 4007
Fax: +65 6333 5004
singapore@intertanko.com

INTERTANKO North America

801 North Quincy Street
Suite 200
Arlington, VA 22203
USA

Tel: +1 703 373 2269
Fax: +1 703 841 0389
washington@intertanko.com