

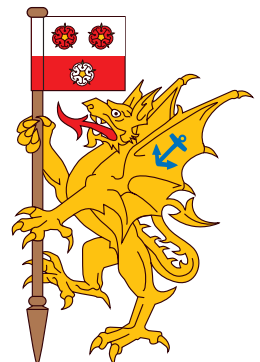
INTERTANKO

Tanker Officer Training Standards (TOTS)

4F Crude Oil Tanker Simulator Verification Course



Poseidon
Challenge



WARSASH
MARITIME ACADEMY



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Tanker Officer Training Standards (TOTS) 4F Crude Oil Tanker Simulator Verification Course

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Tanker Officer Training Standards (TOTS)

4F Crude Oil Tanker Simulator Training Course

Prerequisites

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

Competence Demonstration S Simulated
Q Questioning

TOTS Reference

TOTS 4F

Competence

Verification in crude oil tanker operations

Physical Realism

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
- Crude Oil Washing system
- Overboard discharge and monitoring systems
- Tank content monitoring systems
- Inert / venting control system including, 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
Crude Oil Washing checklist
Cargo Oil 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 the 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'.

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 two grades of crude oil to illustrate how specific physical or chemical properties may influence the handling and carriage of crude oil.

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

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.** Commence Discharge
- Exercise 8.** Crude Oil Wash heavy weather tanks
- Exercise 9.** Start taking heavy weather ballast
- Exercise 10.** Crude Oil Wash 2 P & S
- Exercise 11.** Complete discharge

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.

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

Competence Demonstration

Explain why the cargo system needs inerting at all?	Q
Explain which two properties of the inert gas supply must be constantly recorded during supply?	Q
Demonstrate on the simulator the checks which need to be carried out prior to delivering IG to the deck.	S
Demonstrate the IG start-up procedure by opening the correct components of the system in the correct sequence.	S
Demonstrate calibration and the correct use of the fixed oxygen analyser.	S
Explain your choice of method of inerting. Why did you not choose the alternative method?	Q
Demonstrate how you can utilise the resources at your disposal, in terms of crew and equipment, most efficiently to complete the task.	S
Describe the portable equipment you would need to assist you in this task.	Q
Describe how many changes of tank atmosphere would be required to complete the task, depending on the method of choice.	Q
Describe the permitted maximum oxygen content in: <ul style="list-style-type: none">the inert gas supplythe tank atmosphere	Q
Explain where this information can be found.	Q
Demonstrate correct pump, line and valve management in topping up the ballast in the forepeak 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

Competence Demonstration

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

S

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

Q

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

Q

Demonstrate recorded keeping of readings.

S

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

S

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

S

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

S

EXERCISE 3

Cargo Planning Prior to Loading

Current Status

The vessel's cargo system has been inerted and the vessel is proceeding to the next load port.

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

Maximum cargo incorporating two grades is to be loaded.

1. The following information has been received regarding the cargo to be loaded:

- Grade 1: Note API
 Temperature
 Quantity

To be loaded into tanks 1 P & S, 3 P & S, 4 P & S, 6 P & S and the port slop tank. This is the first grade to be loaded through the aft manifold.

- Grade 2: Note API
 Temperature
 Quantity

To be loaded into tanks 2 P & S, 5 P & S and the starboard slop tank, through the forward two manifolds.

- It is suggested a draft limitation is imposed in this exercise.
- Both grades are to be loaded concurrently though your plan is to start loading with Grade 1.
- Note the maximum loading rate provided by the shore in relation to vessel's own loading capability. Check the individual tank venting capabilities.
- The distribution and quantities of ballast, fresh water, fuel and stores on arrival at the outer anchorage are as in the 'Normal Load Condition'.
- Before berthing, bunkers will be taken in the outer anchorage. Note how this will affect the arrival draft, stresses and stability.

Competence Criteria

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

Explain in your plan which grade 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.

Demonstrate an understanding of safe and effective of cargo vapour emission control within your cargo plan.

Competence Demonstration

S

S

S

Q

S

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 1 crude oil through the aft manifold, will be the first cargo to be loaded. 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

Competence Demonstration

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

S

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

S

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

S

Demonstrate how an appropriate time is chosen up the cargo manifold to start loading. Who will make the request to open the manifold?

S

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

S

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

Q

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

S

Demonstrate the monitoring of stability.

S

EXERCISE 5

Complete Loading

Current Status

The vessel is berthed port side to alongside. De-ballasting is almost completed, though the last two remaining ballast tanks need to be finished.

The vessel is currently loading through the two forward manifold, the Grade 1 crude oil having been loaded through the aft manifold, topped off and manifold closed.

The vessel is currently loading at maximum bulk rate 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 and ability to control the 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.

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.

There is no need to segregate vapour mains, they can be common.

Competence Criteria

Explain the purpose and benefits of vapour emission control.

Monitor the inert gas pressure and, if necessary, top up the inert gas in the cargo tanks.

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

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 the ballast water would be dealt with.

Competence Demonstration

Q

S

Q

S

S

Q

Q

Discharge Pattern

To discharge Grade 2 Crude from 1 P & S, 3 P & S, 4 P & S, 6 P & S and the port slop tank and Grade 1 Crude from 2 P & S, 5 P & S and the starboard slop tank.

Tanks to Crude Oil Wash this voyage are 2 p & s, 4 p & s, 6 p & s. Top washing is to be started when the stage as detailed in the Cargo Operations Manual is reached in these tanks.

Extreme weather conditions prevail outside the discharge port and one pair of cargo tanks will be ballasted.

1. All tanks to be debottomed by 1 metre. Both grades to be debottomed at the same time but kept segregated.
2. Both grades to be kept segregated, to the extent possible, and discharged consecutively, the Grade 2 parcel first.
3. Grade 2 crude to be discharged using both 1 & 2 main cargo pumps.
4. To assist vapour management while taking heavy weather ballast, number 3 p & s cargo tanks will be held at approximately half full until the Grade 1 tanks have been discharged and are ready for COW.

5. During discharge of Grade 2 crude, execute a ballasting plan, keeping a pair of ballast tanks slack to enable the list and trim to be adjusted.
6. When COW of 4 P & S, 6 P & S is completed, heavy weather water ballast is to be pumped into 4 p & s cargo tanks.
7. Grade 1 bulk is to be discharged with both 2 & 3 main cargo pumps.
8. During discharge of Grade 1, continue with your ballast plan.
9. During discharge of Grade 1, COW no. 2 p & s cargo tanks using the starboard slop tank as source of COW and eductor drive liquid.
10. On completion of discharge, all cargo is to be thoroughly drained from the pipelines and pumps and sent ashore.

EXERCISE 7

Commence discharge

Current Status

1. The vessel's discharge plan has been discussed and agreed with the terminal:
 - All tanks except slop tanks are to be debottomed by at least 1 metre
 - All Grade 2 cargo is to be discharged first followed by Grade 1
2. A ship/shore safety checklist has also been completed.
3. The vessel is port side alongside, and has all three manifolds connected.
4. The inert gas plant has been tested before arrival and no defects found. It is currently set for safety. All cargo tanks have been tested for oxygen content and found to be satisfactory.
5. The main cargo pumps have been warming through for the last hour.
6. Debottoming of both grades is to be done simultaneously but the grades must be kept segregated.
7. Start discharge of each grade at a slow rate and obtain the agreement of the Jetty Operator before increasing to maximum rate. Do not start discharge of the second grade bottoms until the first grade is being discharged at maximum rate.
8. As soon as discharge is progressing smoothly, start ballasting and inform the Jetty Operator of the start time.
9. Your cargo discharge plan includes a Crude Oil Washing programme and ballasting. Having made the plan, adhere to it.

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 the circumstances which permit you to increase the discharge rate and associated checks.

Demonstrate your understanding of the need to control suction and discharge pressures.

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 of an appropriate time to commence ballasting.

Demonstrate management of cargo discharge and ballasting as simultaneous operations.

Demonstrates monitoring of trim, list, draft, longitudinal and transverse stability.

Competence Demonstration

S

S

S

S

S

S

S

S

S

EXERCISE 8

Crude Oil Wash 4 P & S the heavy weather ballast tanks

Current Status

1. The vessel is port side alongside, with all three manifolds connected.
2. All cargo tanks have been de-bottomed by a minimum of 1 metre and the port slop tank has been recharged with “dry” crude. The COW top wash was completed as per guidance in the Cargo Operations Manual.
3. Bulk discharge of the Grade 2 cargo in tanks 1 P & S, 4 P & S and 6 P & S has been completed and a few centimetres remain.
4. No. 2 main cargo pump is discharging Grade 2 from 3 P& S cargo tanks.
5. The ballasting plan is being followed.
6. The inert gas distribution system is common on deck and the plant is in operation, with the gas regulating valve set to automatic.

Competence Criteria

Describe the type of washing machine permitted for Crude Oil Washing.

Describe the machine types and wash patterns for:

Single nozzle programmable

Fitted with fixed drive unit
Using portable drive unit

Non-programmable (or pre-programmed) double nozzle

Demonstrate the completion of the appropriate checklist prior to commencing COW.

Demonstrate an understanding of an appropriate time to commence COW.

Demonstrate completion of all precautionary checks and documentation prior to starting COW.

Demonstrate management of pumps, lines and valves during COW, following relevant guides and preventing the over pressurisation of lines.

Demonstrate the use of appropriate channels of communication once COW has started.

Demonstrate an understanding of how and why the various components of the COW system require monitoring during the programme.

Monitor tank pressure to prevent vapour emissions on start of washing and ensure that pressure is always positive.

Competence Demonstration

Q

Q

S

S

S

S

S

S

S

EXERCISE 9

Start taking heavy weather ballast

Current Status

1. Discharge of the Grade 2 parcel of crude is nearing completion and crude oil washing of the heavy weather ballast tanks has been completed.
2. The main cargo pumps are running as follows:
 - The port slop tank is being discharged with No. 1 main cargo pump
 - No. 3 p & s cargo tanks are being discharged with the No. 2 main cargo pump
3. The ballast plan continues to be followed, allowing a slack wing ballast tank to adjust trim and list for cargo stripping purposes.
4. The inert gas system is common on deck, and the gas regulating valve is set to automatic.

Competence Criteria

Demonstrate how you can minimise oil content in the lines and tanks to be used for ballasting.

Demonstrate an understanding of the appropriate pump to utilise for ballasting cargo tanks.

Explain which publication you would consult at the planning stage of this operation.

Demonstrate how to regulate the pressure in the heavy weather tanks whilst taking on ballast. No vapour emissions are permitted whilst the vessel is alongside.

Explain the anti-pollution measures required whilst taking ballast into the cargo system.

Demonstrate in which document you would record this action of putting ballast water into the cargo system.

Competence Demonstration

S

S

Q

S

Q

S

EXERCISE 10

Crude Oil Wash 2 P & S

Current Status

1. The vessel is port side alongside, with all three manifolds connected.
2. The bulk discharge of Grade 1 is almost complete. The starboard slop tank has been recharged with “dry” crude. The COW top wash was completed when the tank sounding was around 6 metres.
3. No. 3 main cargo pump is discharging Grade 1 from 2 P & S cargo tanks, a small amount remains in 5 P & S.
4. No. 4 P & S cargo tanks have been filled to 98% with heavy weather ballast water. The Grade 1 tanks have been shut down and isolated.
5. The ballast plan continues to be followed, allowing a slack wing ballast tank to adjust trim and list for cargo stripping purposes.
6. The inert gas distribution system is common on deck and the plant is in operation, with the gas regulating valve set to automatic.

Competence Criteria

Demonstrate the lining up of the COW line and system to COW 2 P & S.

Demonstrate correct pump, line and valve management and co-ordination of simultaneous operations.

Explain under which circumstances you would abort a COW operation.

Demonstrate effective COW system clearing operation and shut the system down safely.

Demonstrate the same control of COW as demonstrated in Exercise 8.

Competence Demonstration

S

S

Q

S

EXERCISE 11

Complete discharge

Current Status

1. The vessel is port side alongside with all three manifolds connected.
2. The discharge is nearing completion, all bulk Grade 2 cargo has been discharged, and a small amount of Grade 1 remains to be discharged. Cargo pumps and lines must be drained (it has been agreed that at the end of bulk discharge, drainings of both grades will be accepted as a mixture).
3. No. 3 main cargo pump is discharging the starboard slop tank.
4. A ballast pump is filling a selected ballast tank to correct the list.
5. Consider the following advice:

At the appropriate tank sounding the vacuum pump can be started and the auto stripping system activated, depending on the simulator model.

Upon completion of discharge, cargo pipelines must be drained to the shore tanks. This can be achieved in either of two ways:

- a) By dropping the lines to the slop tank and redraining the slop tank to shore via the 'MARPOL Line':
- b) By draining the lines directly to the stripping pump and pumping the drainings ashore via the "MARPOL" Line.

These procedures will depend on the facilities offered by the particular simulator in use.

Competence Criteria

Demonstrate efficient tank draining and line clearing techniques, in accordance with the vessel's Operating Manual.

Demonstrate effective communication with the assistance at your disposal in order to assess the R.O.B. figure upon completion of discharge.

Demonstrate an understanding of an appropriate stage at which to stop delivery of inert gas to the deck.

Competence Demonstration

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