Pilotage pre-planning guide

PART 3 - SHIP TO SHIP OPERATIONS

DanPilot



Your Time, Your Safety – Our Commitment

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001
DNV GL BUSINESS ASSURANCE DENMARK A/S

DanPilot
Pilotage pre-planning guide
Part 3 - Ship to Ship operations

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Foreword by our Chief Pilot

Dear Reader

Firstly, I wish to thank you for selecting DanPilot as your service provider, we are honored by the confidence vested in us.

By working with DanPilot for your transit pilotage through Danish waters, I wish to assure you that you are in the most capable hands at all times, and that the Pilot boarding your vessel is a highly skilled and experienced master mariner, with an in-depth knowledge of the areas you will be navigating together.

Danish waters can be tricky to navigate, and are subject to intense traffic, crossing ferries, low and variable draughts and strong currents. This is why the IMO officially recommends making use of a Pilot when navigating through Great Belt for any vessel with a draft of 11.0 m or more, or through Sound for tankers with a draft of 7.0 m or more. Fortunately, many vessels make use of a Pilot even with less draft than the IMO Recommendation, in order to ensure themselves and their cargo a safe and smooth transit through the Danish waters.

When boarding, the Pilot will bring along a "PPU" – Portable Pilot Unit – which is a state-of-the-art navigation solution, ensuring that your vessel will navigate through the optimal routing during transit. All our pilotages (more than 20.000 per year) are stored, and the data is used for further education of our Pilots and optimization of the routings through Danish waters.

To ensure that we are capable of meeting the ever rising demands, DanPilot are continuously investing in upgrading of our fully-owned fleet of pilot boats, and the coming years from 2017-2019 will see delivery of a large number of new pilot boats, designed with the purpose of delivering maximum performance year round, regardless of weather and location.

As a Not For Profit organization, owned fully by the Danish State, our mission is to safeguard the environment, and all vessels and crews passing through Danish waters.

Being the only pilotage provider in Denmark having obtained ISO 9001 certification for quality, DanPilot is your guarantee for the highest level of professional services, and strict adherence to regulations regarding training, certification and resting hours – all with the sole purpose of giving our customers the optimal safety.

It is my hope that you will be fully satisfied with the services rendered onboard your vessel by our Pilot, and I invite any comments at any time as well as any suggestions on how DanPilot can continue to improve our services towards you – our customer. Please feel free to contact me anytime.

Thanking you again for choosing DanPilot, and I remain,

Yours Sincerely

Brian Schmidt Nielsen
Chief Pilot, DanPilot
bsn@danpilot.dk



About DanPilot

Established more than 450 years ago, pilotage is an ancient profession in Danish waters. In the beginning, many small providers were present in the market, which were later merged to 3 separate companies.

In 2006, the remaining 3 companies were merged into one; DanPilot, and in June 2013 DanPilot assumed the responsibilities of the Danish State Pilotage Service as directed by the Act on DanPilot (Parliament Act no. 600 of 12 June 2013), DanPilot is an independent state-owned company, responsible for pilotage in all Danish waters and ports.

With the primary mission of safeguarding the environment, and ensuring safe passage for all vessels operating in Danish waters, DanPilot conducts more than 20.000 pilotages each year and is highly regarded by our customers for our expertise and service.

Currently serving more than 60 ports and transit pilotage through all Danish straits and waters, DanPilot is a dedicated full service provider, capable of delivering Pilot anywhere in Denmark on a short notice and at a competitive cost.

Our 170+ highly skilled and experienced marine Pilots are all master mariners with extensive experience from the international merchant fleet, backed with a solid knowledge of the local waters and ports, delivering the optimal safety and efficient

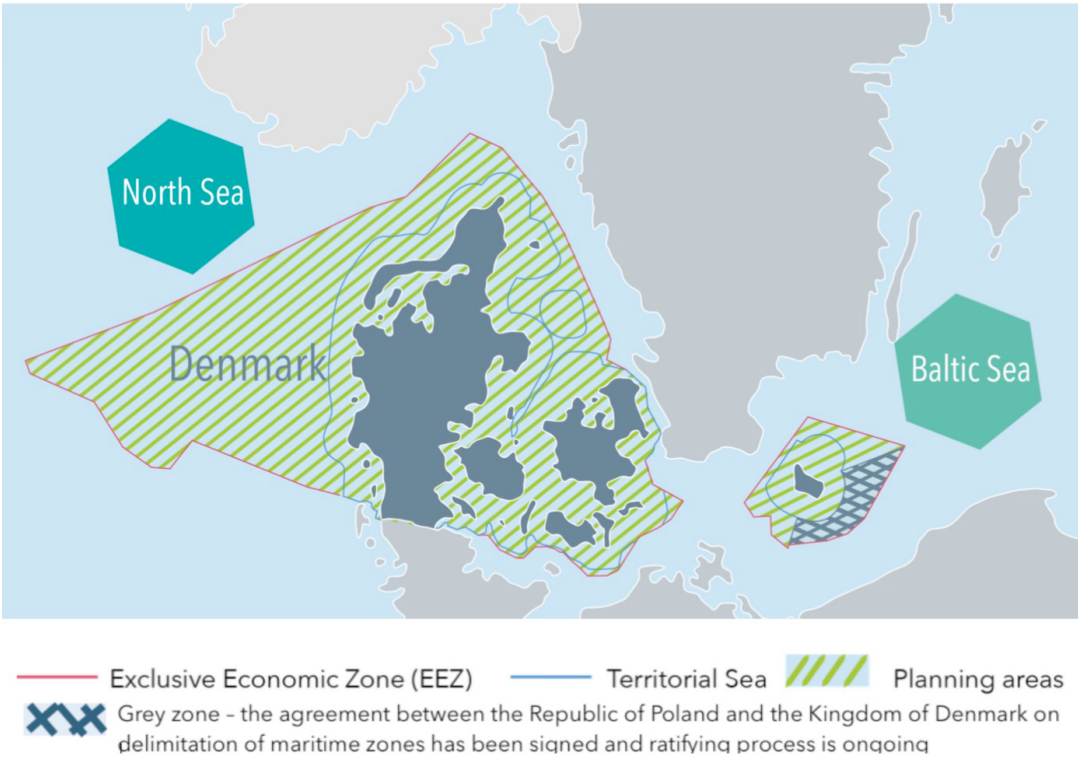
operation of your vessel. Our Pilots are continuously subjected to extensive training and knowledge sharing to ensure that we are always up-to-date on the latest information. In addition, we operate our own fleet of capable pilot vessels, making certain that we can deliver a Pilot anywhere at any time, regardless of weather and sea.

Always available 24/7/365, we are always at the ready to assist your vessel, whether for port pilotage or transit pilotage.

Due to the above, we are confident in our vision to be the most reliable pilot service in Europe, and to promise to you that

Your TIME, Your SAFETY – is Our COMMITMENT.

We look forward to serve you.



Danish maritime zones
Source: The European Maritime Spatial Planning Platform



1. Introduction

Ship to ship operations became increasingly common in Danish waters around 1997. At this time, these operations took place mainly in the areas around Kalundborg.
In recent years, most operations have moved northwards and are carried out off Frederikshavn. The size of the units is mainly aframax and suezmax tankers but VLCCs (Very Large Crude Carriers) are also operated in Danish waters.

This guide is intended for STS pilots and STS pilot trainees but other stakeholders may also benefit from the guide. OCIMF's ship to ship guide is the most detailed guide, but it does not include much about ship to ship operations performed at anchor (the maneuvering part) since the majority of international STS operations are performed 'underway'. STS operations at anchor are described on only half a page in clause 6.3 of OCIMF.

STS operations are part of a vessel's operation. Until 2009, there were no international regulations that explicitly stipulated how these operations should take place. These operations are carried out in accordance with guidelines set out by the latest guide from Oil Companies International Marine Forum and the International Chamber of Shipping (ICS), with the strictest adherence to safety regulations. These are the industry guidelines that are part of the contractual commitment between the ship owner and the STS organizer (charterer, cargo owner, oil major etc.).

According to International Maritime Organization regulations, vessels transferring OIL CARGO must have an approved STS operational manual that describes the procedure.

IMO - For compliance with MARPOL Annex I, Chapter 8
The STS operations plan must be prepared taking into account the information contained in the best practice guidelines for STS operations identified by the Organization. The STS operations plan may be incorporated into an existing Safety Management System required under chapter IX of the International Convention for the Safety of Life at Sea, as amended, if that requirement is applicable to the oil tanker in question. Any oil tanker subject to the provisions of this chapter and engaged in STS operations must comply with its STS operations plan.

1.1. STS operations (Danish Maritime Authorities)

1.1.1 Regulation/legislation

Denmark is one of the countries that has regulation/legislation governing ship to ship operations. The main features of STS operations and reference to legislation on these are included in a memo from SFS (DMA) and inserted hee:
STS operations are not a new concept ”Ship To Ship” (STS) operations are not a new concept – STS operations have taken place for long. Earlier, these operations were mainly carried out by large oil tankers from the Persian Gulf which unloaded to smaller ships with a view to distributing the oil to ports at which the large tankers were not able to call. The increasing number of STS operations in Danish waters is primarily caused by exportation of Russian oil, since the water depth of the Danish straits is not sufficient for large tankers to pass the straits when fully loaded. If the following transportation is to take place by large tankers, they can for example be partially loaded in a Baltic port and subsequently be filled in an STS operation or be loaded entirely in such an operation. The increased demand for liquefied gas is also expected to result in similar operations at sea.

1.1.2 STS in connection with grounding

STS operations are also extremely useful in connection with pollution prevention. If a tanker has grounded, has a collision or another accident and there is a risk of the cargo leaking, it is important that the oil cargo is transferred to another ship as quickly as possible. This would also be in the form of an STS operation.

1.1.3 STS operations in Danish waters

Today, the majority of the STS operations in Danish waters take place off Frederikshavn and in the Kalundborg Fjord. Both areas have favourable conditions for these operations due to the water depth and because they are "sheltered" areas.

The distribution of responsibility between the Danish authorities is ready
The Danish Maritime Authority is responsible for monitoring STS operations.
The Danish Maritime Accident Investigation Board is responsible for the investigation of any accidents. The Ministry of Defence is responsible for combating any oil pollution at sea and in coastal areas. This work is carried out by the defence under the coordination of Defence Command Denmark, the Naval Staff.
The Naval Staff is also responsible for any criminal prosecution in case of pollution. If oil sampling is to take place at sea in order to procure evidence of which ship has leaked oil, this task is carried out by the defence.
Legislation Order on the transfer of liquid cargoes between ships in Danish and Greenland territorial waters (STS operations) STS operations in Danish waters are regulated by order no. 570 of 5 June 2014 on the transfer of liquid cargoes between ships in Danish and Greenland territorial waters (STS operations). The order has been issued by the Danish Maritime Authority with its legal basis in the act on safety at sea. The order applies to ships, irrespective of flag, in Danish and Greenland territorial waters. Oil transfers outside territorial waters are regulated by Notice B from the Danish Maritime Authority, chapter XXI, part VIII (which is a eproduction of MARPOL, Annex I, chapter 8). Order no. 570 stipulates that:
STS operations must performed under the guidance and monitoring of an operator approved by the Danish Maritime Authority, and

- STS operations must be performed in accordance with the industry's own extensive guidelines, which are thus turned into to current Danish law. In addition to the industry's own guidelines, the following requirements also apply:

- Prior to the STS operation, a risk assessment must be made of whether it can be performed safely. In this connection, account must, inter alia, be taken of any limitations to the area chosen, the participating ships, the equipment to be used, the involved support vessels as well as the expected conditions of wind, weather and/or ice.

- STS operations must not be performed under conditions of ice where the concentration of ice exceeds 1/10.
- 1 of the ships must be at anchor.
- Tug boats must be used when the ships meet and are disconnected again.
- STS operations are permitted only in areas and under weather conditions that are suitable for the purpose. This must be evaluated on an ongoing basis just as the authorities must be informed if there is disagreement about the propriety of continuing the operation. • There are special requirements for the control of the hoses used for STS operations.
- STS operations must not take place under conditions of ice.
- The Admiral Danish Fleet must be informed about the transfer at least 48 hours before the transfer takes place. In addition, the legal basis has been introduced for the Danish Maritime Authority's control of STS operations and STS operators with a view to securing that the provisions of the order are complied with. Violations of the provisions are punishable by fine or imprisonment for up to 1 year. It is also possible to punish legal persons, i.e. companies.

1.2. Approved operators (Danish Maritime Authorities)

The Danish Maritime Authority approves STS operators upon application. Approvals are granted only to persons who meet the qualification requirements stipulated in the order as well as to companies that have employed such persons and use a quality management system that secures that the operations are performed in accordance with the order. The STS operator must pay the costs incurred in connection with the approval.

1.2.1 Control of STS operations

The Danish Maritime Authority controls the operations carried out through random checks. In the view of the Danish Maritime Authority, operations in Danish waters are performed completely appropriately by competent and professional players who are very attentive of the need for a high level of safety.

1.2.2 Regulations on STS operations – adopted by the IMO

In 2009, the IMO adopted internationally binding and mandatory regulations on STS operations. These regulations have been incorporated into the MARPOL Convention, Annex I, chapter 8, regulations 40-42, and became effective on 1 January 2011, and apply to all STS operations performed after 1 April 2012. These regulations have been incorporated into Notice B from the Danish Maritime Authority, chapter XXI, part 8. The provisions are very much similar to the Danish provisions on STS operations previously in force and stipulate that oil tankers above 150 GT that perform STS operations must do this in accordance with a plan approved by the flag State. The plan must comply with current industry standards or similarly. Furthermore, a qualified person must be on board the ship who has the relevant competences for performing the STS operation. Finally, the coast State is required to be notified no later than 48 hours in advance when an STS operation is performed in the territorial waters or in the exclusive economic zone (EEZ) of a member State. This means that all STS operations, including STS operations in the EEZ, must be handled very much like previously under the regulations in force for Danish territorial waters. This means that, as of 1 April 2012, it has also been an obligation to report operations that take place in the exclusive economic zone (EEZ). However, there is no legal basis for controlling STS operations outside territorial waters.

1.2.3 General considerations related to STS operations

In the view of the Danish Maritime Authority, responsible players show an interest in STS operations being performed under organised and appropriate conditions. When a location for an STS operation is to be chosen, it follows from section 9 of the STS order that the operation can take place only in an area and under weather conditions suitable for the purpose and that the authorities attach great importance to the transfer of oil at sea taking place where it can be done completely appropriate in terms of safety and where it causes as little inconvenience as possible to other passing ships. General conditions of navigational safety such as a safe distance to established ship and ferry routes as well as the choice of areas that are protected from the weather are considered important criteria when it comes to STS operation safety. Requirements for double hull The general regulations on double hulls also apply to ships taking part in STS operations. All tankers with a deadweight tonnage above 500 carrying heavy oil must be double-hull tankers. In addition, single-hull ships are generally being phased out. The phasing out was initiated in 2003, and the

last single-hull tankers will have been taken out of operation in 2010. Furthermore, the Russian Government has stated that only double-hull tankers are permitted to load in Primorsk.

1.2.4 Other structural requirements and oil spill plans

Current international regulations contain a number of requirements for the construction of tankers that are intended to prevent oil spill over the ship's side. The requirements are supplemented by requirements emanating from the rules of the international classification societies. According to current international regulations, all tankers above 150 tonnes must also carry a Shipboard Oil Pollution Emergency Plan. The plan must contain instructions about whom to contact in connection with oil pollution, what to do to reduce the oil pollution and procedures for cooperation with the national authorities.

1.2.5 Mandatory pilotage

Oil tankers that reload oil cargoes in Danish territorial waters are covered by mandatory pilotage according to the pilotage act. Thus loaded oil tankers (with a deadweight of more than 1500 tonnes) are subject to mandatory pilotage in Danish territorial waters, cf. section 4(1).
If the pilots become aware of defects and non-conformities, they are obliged to report this to the relevant authority, such as the Danish Maritime Authority.
This has been impressed on the pilots after the loss of the oil tanker PRESTIGE off the Spanish coast in November 2002. The industry's own guidelines: OCIMF & ICS' Ship to Ship Transfer Guide (for Petroleum, Chemicals and Liquefied Gases).
As described above, the order on STS operations stipulates that they must also be performed in accordance with the industry's own guidelines, which are thus turned into Danish law.
The most recent version of the industry guidelines, "Ship to Ship Transfer Guide (for Petroleum, Chemicals and Liquefied Gases)", which has been issued by the Chemical Distribution Institute (CDI), the International Chamber of Shipping (ICS), the Oil Companies International Marine Forum (OCIMF) and the Society of International Gas Tanker and Terminal Operators (SIGTTO), was published on 29 November 2013. The guide covers a wide number of practical conditions in connection with the performance of STS operations, which are the following:

- The local conditions must be examined, including whether it is necessary to acquire permits.

- In connection with the choice of area, account must inter alia be taken of the wind, weather and navigational conditions, etc.

- The weather conditions must be favourable. This is a specific assessment. However, especially conditions related to wave heights are stressed since the impact of waves may be of importance to the load on moorings and fenders. STS operations must not take place in thunderstorms.

- Before performing an operation, a risk analysis and an emergency preparedness drill must be made where the specific conditions are gone over.

- A wide number of safety provisions must be complied with, inter alia to eliminate the risk of an impact on the electrical systems, etc. of the system.

- A wide number of requirements for the communication between the ships must be complied with.

- Unless the crew is very experienced, the ships should be maneuvered and moored only at daylight.

- There are requirements for the quality, location, etc. of the mooring.

- As regards the transfer, the transfer speed, capacity, emergency procedures, etc. should be planned. here must always be a person at the manifold in order to, inter alia, detect any leaks, just as there must be a person at the pump stop.

- Fenders and hoses must comply with industry and international standards, with special focus on age, storage, wear and tear, etc.

- Emergency plans must be drawn up and take account of the possible consequences of an accident. Equipment for containing an oil spill must, inter alia, be available on board both ships and ready for use.

In addition, the guide contains a number of checklists to secure that all the procedures are gone through. Who is responsible in connection with oil pollution by tankers during STS operations and who must pay? According to chapter 10 of the merchant shipping act, the owner of a ship carrying oil in bulk as cargo is objectively liable for pollution damage. As regards ships carrying more than 2,000 tonnes of oil in bulk, the shipowner's liability is covered by a mandatory insurance.

Danish ships carrying more than 2,000 tonnes of oil in bulk must not be used without a certificate confirming that the insurance requirement is met.
Foreign ships carrying more than 2,000 tonnes of oil in bulk must not call at or depart from a Danish port or any other place of loading or unloading in Denmark or in the Danish continental shelf area without an insurance that covers the objective liability for pollution damage.
The owner of a Danish or foreign ship can limit his liability to certain maximum amounts depending on the size of the ship.
The shipowner's liability is supplemented by the international oil pollution compensation fund which, inter alia, covers the cleaning up in case of pollution incidents involving leakages of heavily biodegradable oil. If the damage exceeds the shipowner's liability, the fund goes in. The same applies if the ship is not insured.

Denmark has acceded to the supplementary oil pollution compensation fund, which was adopted internationally in 2003. This means that Denmark can have damage up to a total of approx. DKK 6.5 billion covered in connection with one single incident.
The preparedness of the Naval Staff in connection with pollution prevention The Naval Staff is responsible for the Danish pollution prevention preparedness at sea. The emergency preparedness is dimensioned according to the overall assessment of the risk of pollution of the marine environment in Danish waters and is, therefore, not especially dimensioned or located according to the STS operations.

An overall and updated description of the emergency preparedness is available from the webpage of the Naval Staff on the above-mentioned address (in Danish):
https://www2.forsvaret.dk/eng/Pages/English.aspx

Beach cleaning

If the combatting of the oil pollution at sea is not fully successful, and the oil gets ashore, the municipality is responsible for the cleaning of the coast. If it is not possible to find the oil sinner, the Government (the Environmental Protection Agency) will refund the municipalities' documented expenses for the cleaning of the beaches if a number of detailed conditions are met, including that it was reported before the municipality starts cleaning the coast, cf. order no. 1630 of 13 December 2006 on refunds of the expenses for emergency preparedness, combating and clearance measures as well as removal of waste in connection with oil and chemical pollution (the order on beach cleaning).
Cooperation between the authorities on STS operations The Maritime Cooperation Body that has been established between the authorities with responsibilities in the maritime field, including the Ministry of Defence, the Environmental Protection Agency and the Danish Maritime Authority, have in 2006 considered the safety related to oil transfers at sea. On that occasion, the cooperation body agreed to follow developments.

Renewed emergency preparedness

With the renewed interest in STS operations in Danish waters in the early summer of 2013, the Maritime Cooperation Body therefore met on 3 July 2013 with a view to revising the authorities' emergency preparedness in connection with STS operations in Danish waters. Since the regulation was laid down in 2007, oil spills had not been observed as a consequence of STS operations.

1 The cooperation body remarked that already today the ships must establish the expected weather conditions prior to the performance of an STS operation and, on the basis of this, ensure that it can be performed safely.
The Danish Maritime Authority was in the process of revising the order on STS operations with a view to laying down similar regulations on the transfer of liquefied gas and chemicals. The intermediate gaining of experiences from STS operations and any subsequent comments would form part of this work.

2 Thus, the conditions mentioned during the meeting did not make the members of the Cooperation Body change the conditions of STS operations.

1 A minor spill was included in the statistics, but it had been caused by the bunkering of oil in connection with an STS operation.

2 Currently, order no. 570 of 4 June 2014 on the transfer of liquid cargoes between ships in Danish and Greenland territorial waters.

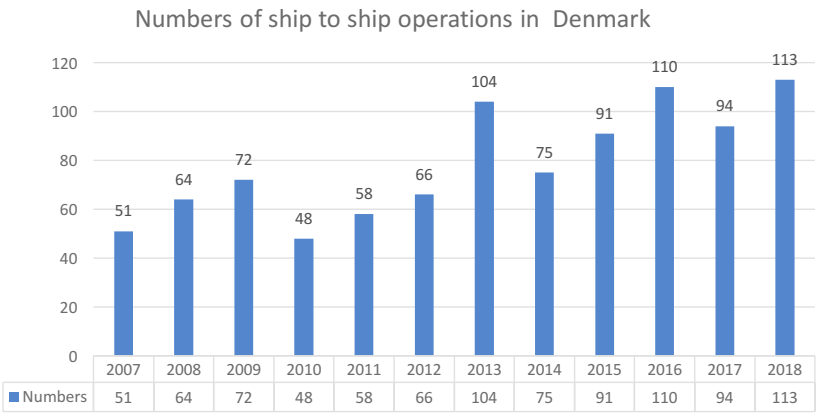


Figure 1 - Source: Danish Maritime Authority

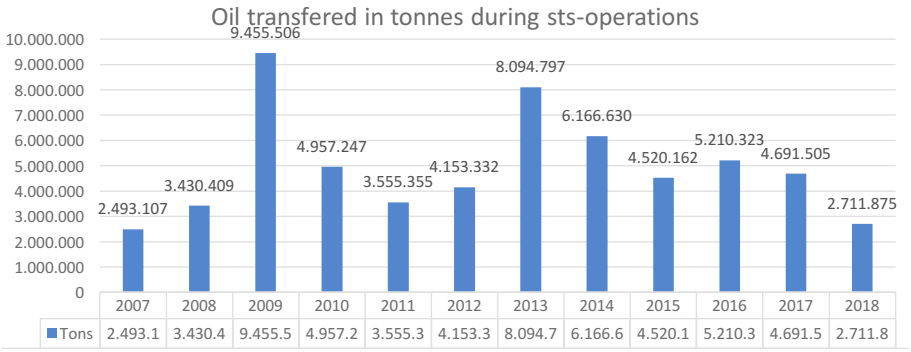


Figure 2 - Source: Danish Maritime Authority

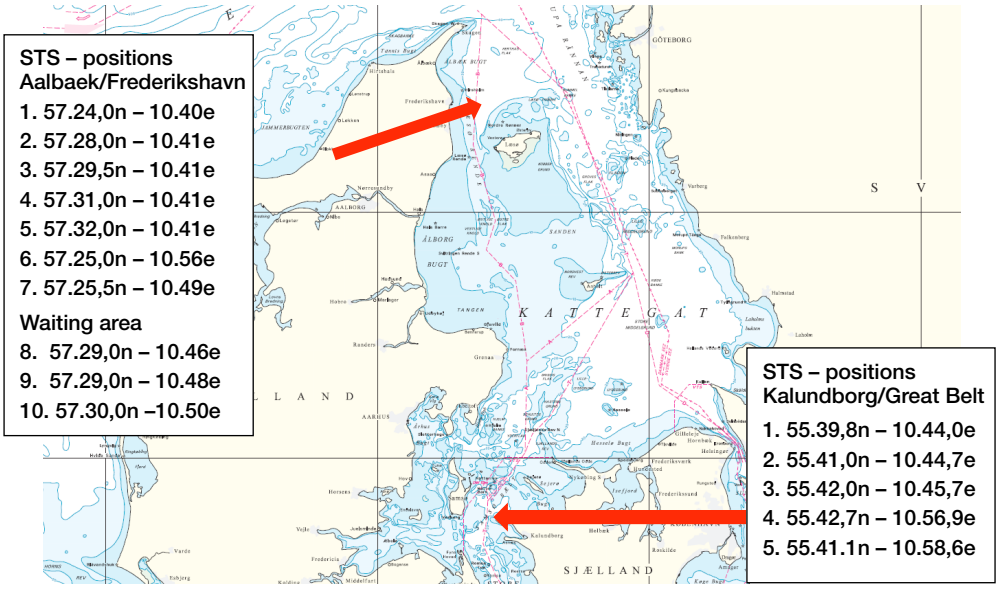


Figure 3 - Areas in Denmark where STS operations are performed

2. Ordering of the task

– information on the STS task – data on ships etc.

The following information should be provided to Danpilot in connection with participation in an STS operation in order to prepare the pilot performing the operation in the best possible way from the start.
The following information is required before the operation begins:

- Date
- Time
- Safeseanet Report no

STS INFORMATION

- Status
- Location
- STS position
- STS provider
- Mooring master
- STS coordinator
- Surveyor
- Cargo
- Anchoring vessel
- Maneuvering vessel

Cargo quantities

Loading/Discharging schedule

- M/T xxx anchored offshore the Skaw 03rd Mar 13:12
- Arrived in part laden condition
- Vessel anchored at STS position 57 31 N - 010 46 E ("STS 4 HH")
- M/T xxxxx arrived offshore the Skaw at STS location 09th Mar 22:30
- Arrived in laden condition
- Vessel anchored at STS position 57 29'5 N - 010 46 E ("STS 3 HH")
- ** Prospects to be re-confirmed / subject to suitable conditions **
- Discharging stopped due to the weather

STS Operation – Schedule

- STS pilot and tugs booked for M/T XXXXX
- Vessels all fast
- Commenced cargo transfer
- Stopped transfer
- Tugs & pilot booked for M/T XXXXX to cast off
- Expect to re-commence berthing/transfer
- Expect to complete cargo transfer
- Expect M/T XXXXXX to cast off

Vessels details

- M/T XXXXXXX- Anchoring vessel - and Discharging vessel
- Dwt
- IMO
- MMSI
- Call sign
- Flag
- Double hull
- Propellers
- LOA
- BEAM
- Bollard max work load
- Last port
- Sea pilotage arrival

- Sea pilotage departure
- Arrival draft
- Departure draft
- Bunkering
- **Next Port**

Fender Provider/STS Equipment

- Fendering vessel
- Primary fenders 4 x 6.5 mtrs x 3.3 mtrs
- Secondary fenders 2 x 1.2 mtrs x 2.0 mtrs
- Cargo hoses 12" Yokohama hoses
- Crew basket Yes
- ZZZZZZZ- Fender handling
- STS Operation – Tugs
- Tug(s) for berthing: 2 x ASD Tugs
  Date/time:
- Tug(s) for unberthing: 2 x ASD Tugs
  Date/time:
- Tug(s) for re-berthing: 2 x ASD Tugs
  Date/time:
- Tug(s) for unberthing: 2 x ASD Tugs
  Date/time
- ZZZZZZ - Fender handling
- Mobilisation
- Demobilisation

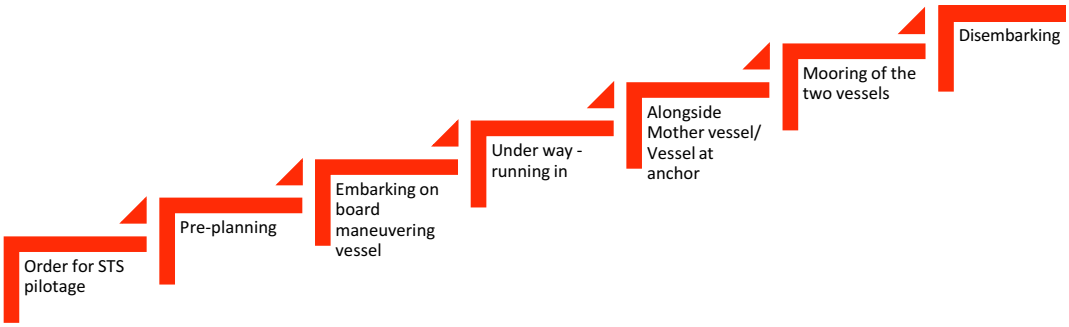


Figure 4 - STS procedure from the pilot's perspective

The following outline illustrates the complete operation procedure - text marked in red indicates phases where the "pilot" participates physically in the operation.

Mooring - Master (POAC) Person in overall advisory control

Go through the entire sts-Plan
Weather situation – forecast for the period of the operation.
Drawine of the location of fenders.

Visual inspection of entire sts-gear.
Certificates of fenders and hoses must be in order and be presented to the ships in question.

Sailing out with sts-gear.
Keep recommended speed with fenders - info ship re arrival. Keep the ships updated on arrival with gear.
Surveyors for the operation.

Mooring master and surveyor on board the 'fender' ship. Location of fenders starts. 1) discharge gear
2) locate baby fenders 3) main fenders.

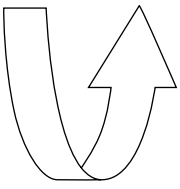
Pilot on board - tug(s) arrive.
Start approach Mother vessel/Vessel at anchor.

Checklist 2 - Before operation
Checklist 3 - Before run in
Master/pilot/mooring master meeting.
The ship at anchor to be kept updated at all times.

All fast between the two ships.
The pilot disembarks.

Meeting regarding entire cargo operation.
Mother ship to be kept updated.
Signature on papers for cargo operations.

ISGOTT - checklist



Checklist 4 - Before cargo operation

Commence discharging/loading

Discharging/loading

Check mooring – fenders – hoses –
Keep agent updated with relevant statement of facts.
Check weather forecast

Complete Discharging/Loading

All statements from discharge operation to be signed ship/ship.

Meeting (safely) concerning cast off and how fenders/hoses are to be discharged from vessel.

Pilot on board
Tug(s) arrive.
Checklist 5 - Before unmooring
Timesheet update.
Pilot disembarks

Fender/hoses dismounted.
Sailing to port with gear.
Timesheet update.

Discharge of sts-gear.
Checklist regarding gear is updated.
Final time statement of times.

3. Sailing to maneuvering vessel. On board the maneuvering vessel

3.1 Sailing to the ship that is going to maneuvere

Before sailing to an STS, the weather situation must be under control. It is especially important that the current forecast for the next 3 hours has been checked so that it is known whether the current increases, slows down and, even more importantly, whether it turns. Furthermore, the wind force and direction must be known so far ahead that it can be determined whether the transfer can take place according to plan or whether it is necessary to schedule certain periods where the ships are separated, a pilot must be taken on board and be on standby. In this connection, it is also important to make a note of the wave height, and if it approaches the critical point with respect to the capacity of the tugs it is also important to take this into consideration during the decision-making process.
(see chapter 10, Appendix – Tugboat matrix for STS off Kalundborg and STS off Frederikshavn)

3.2 Contact/communication

Contact the maneuvering ship and agree on a work channel - the same channel that will be used between the pilot and the tugs on arrival. (see chapter
If the fender work is completed, the maneuvering ship is asked to prepare the engine, pull the anchor and rig the pilot ladder on the starboard side. (It is assumed that fenders are placed on the port side). A tug may be asked to be ready to make a lee during embarkation.

Are the fenders on the right ship and mounted on the right side? Already on the way to the anchoring ship, the heading of this should be observed to get an impression as to whether this is just in operation or perhaps about to turn around.

3.3 On board the ship that is going to maneuvere

Perform a visual inspection to check that the correct number of fenders have been brought and are positioned as expected. (The outermost fenders on the corners of the parallel hull – also called secondary fenders).
Observe the heading of the anchoring ship continuously in order to identify any changes as early as possible.
Contact the anchoring ship (the mother ship) and agree the following: that the same VHF channel is used as that used by the tugs, that the ship is anchored with starboard anchor using the right number of shackles and that the ship has prepared checklist 2 and 3.
Check that there is a mooring plan - if not, this must be prepared as one of the first tasks by the mooring master, the master and the pilot and coordinated with the anchoring ship (the mother ship) - determine if 2 lines may be used at a time and if both ships have messenger lines and heaving lines are ready at both ends.

3.4 Notify MAS (Maritime Assistance Service) / VTS (in the Great Belt)

Before the start of the operation, MAS is notified by telephone - they have been notified in advance but must receive a final call before start of operation.
It is agreed with the mooring master that he will be at the manifold during positioning and at the forecastle during mooring. Not all mooring masters find this natural, but since we act both as pilot and mooring master during STS operations in Denmark both persons should act where it creates the highest degree of safety and quality in the execution of the task.

3.5 Mooring master

If the mooring master is on board the anchoring ship it must be ensured that the first officer of the maneuvering ship has prepared checklist 2 and 3 - if not, the master will request him to do so.

3.6 The tugboats

Positioning of tugs must be agreed with the master, and in this connection the maximum load (Swl) on bollards must be determined. Furthermore, the master must be informed of the tugs' power (it may perhaps be agreed that the ring of the tug is placed around the bollard closest to the hawsehole if the tug power exceeds the maximum load on the bollard). See section 5 – Attachment of tug to bollard.
The tugs are contacted and informed of when they are to be attached, the maximum load on bollards and the timing of attachment. Ask the tug in front of the accommodation if he wants the pilot ladder to be taken in. The masters on the tugs are also informed of the expected strategy for coming alongside and mooring.

3.7 The master

Inform the master that radars must be put on standby when he and the pilot go to the bridge wing at a suitable distance from the mother ship.
When all has been clarified the pilot completes his own checklist, which is a summary of all subjects and confirmation that "standard checklists" have been prepared and are in order. Pictures are perhaps taken of the mooring plan and the physical position of fenders. All relevant subjects are discussed with the master and the mooring master. The tugs are notified of the overall plan.

4. Going alongside the mother ship and leaving the mother ship

4.1 Mooring master and checklists

Before starting the final coming alongside procedure, it must be ensured that the mooring master completes checklist 2 and 3. If the fenders are positioned on the anchoring ship the mooring master is also on board this ship. In this situation, the pilot assists the ship's first officer/master in completing the checklists. Danpilot's own checklist must also be completed at this time.

4.2 Ship's heading (mother ship)

The heading of the anchoring ship must be observed continuously, and compensation must be made by heading more starboard when it turns to port. Furthermore, compensation must be made for turning port by having own ship drift more to the port side. (Using a tug, thruster and/or main engine).
It may be a good idea to have the mother ship turn on AIS underway when coming alongside since, for example, heading will be updated continuously whereas this update only takes place every 3 minutes vs 10 seconds with AIS at anchor.

4.3 Night navigation/maneuvering

When arriving when dark, the anchoring ship is asked to direct the floodlight in the bridge wing at the fenders if they are attached there. If it is possible for the tug it is also asked to direct its floodlight at the side of the anchoring ship. (the more light the easier it is to get an impression of distance and movement).

4.4 Lead at anchor

If the ship is at anchor with an anchor chain that is not tight the crew on the ship's forecastle are asked to observe during arrival whether the chain at one point begins to go under the bow since this is a sign of reversal of the current. If this happens the coming alongside procedure must be interrupted immediately as it is impossible to predict the reaction of the anchoring ship when the chain is pulled again.

4.5 Agreement on the individual stages

The master is informed of the distance from the anchoring ship at which the master and the pilot are expected to “move” onto the bridge wing.

4.6 Weather conditions – planning of mooring sequence

In case of heavy current, 2 bow lines and 2 stern springs must be the first lines - otherwise, both springs are attached first, and when the ship in in position the mooring operation continues at the ends. (short lines first in order to obtain control of the ends).
There is usually no reason to come alongside the fenders until the springs are tight - otherwise they will only get trapped.
All lines from the maneuvering ship first and then the lines from the anchoring ship (as a main rule)
Make sure that the 2 first stern lines are positioned so that there is still room for the rest of the lines without any conflict between them.
It is important to note that if lines are positioned from the starboard side on the forecastle of the maneuvering ship they may easily catch the anchor. If there is a risk of this, it should be cast off a couple of metres under the mooring.

4.7 Fenders

When coming alongside the fenders it is important that they are subject to approximately the same pressure. Even though the tugs apply the same pressure in terms of tons there is commonly a big difference between the strain on the individual fenders.
It is especially important that there is not excessive pressure on the sternmost fenders compared to the foremost fenders since this is the way most unintended gaps start in front.
If the fenders are positioned on the anchoring ship it must particularly be ensured that the angle between the ships is not too big as the chine frame fore and aft may come in between the fenders and may therefore not have the same shielding as when the fenders are positioned on the corners of the maneuvering ship.

4.8 The ships' movements and vectors

Remember that the heading and visual observations are the only things that can be trusted. All speed information is provided either in relation to the water flow or the bottom, and the only thing that really matters is the movement between the 2 ships. It is therefore easier to be misguided than guided when paying too much attention to speed indications - especially sideways movements.
It happens occasionally that the anchoring ship begins to drift/gear when pressure is applied to the fenders, especially when there is a combination of heavy current and heavily loaded ships of the same size. The slowing down of the current from the transversely positioned tugs as well as their screw current in combination with the additional force vector from their pressure is, together with an anchor that even has to withstand the weight of approx. double of what it is constructed for (2 ships), too much for it to stay in the sea bottom. As soon as the tugs slack off the anchor takes effect once more.
In situations such as those mentioned above, it may be tempting to continue to move forward on the engine – this is also true for other situations with heavy current. This can be done, but there must be someone on the forecastle of the anchoring ship to constantly keep an eye on the position of the chain since once you move ahead with both ships so that the chain slacks off – or, even worse, tightens - in an angle under the ship the situation may quickly get out of control.

4.9 The pivot point at anchor

It should be noted that when the vessel goes to anchor the pivot point moves right forward and effectively holds the bow in one position. Any forces acting on the hull, such as from wind or currents, would cause the vessel to move about the hawse pipe position.
In connection with both arrival at and departure from the mother ship, it should be remembered that when the mother ship is still "joined together with" the anchoring ship the pivot point of the two units will be at the anchoring ship's hawse pipe position.
When a ship to ship operation is carried out underway it is absolutely forbidden to enter the area behind the ship that is being approached from the rear/the side.

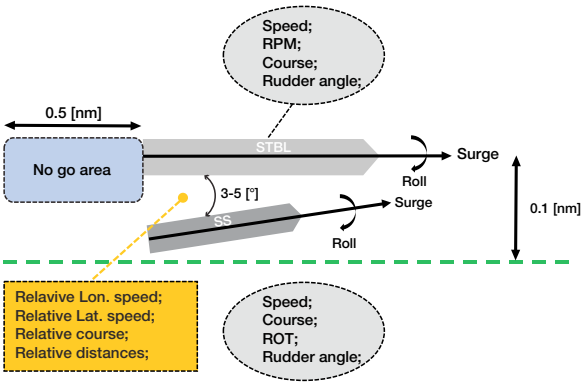


Figure 5 - pivot point at anchor
https://www.cambridge.orgtem-in-ship-ship

When the operations are carried out with one ship at anchor, both the below approaches may be used when coming alongside - i.e. astern of the mother ship and up alongside the mothership.

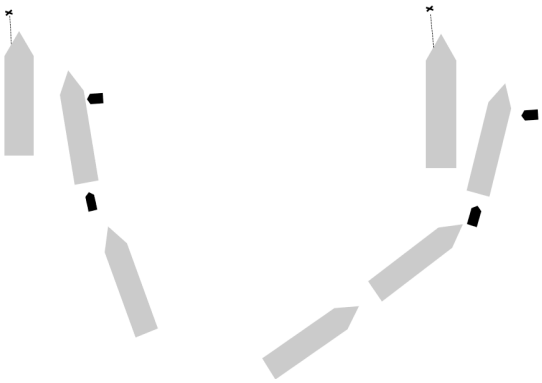


Figure 6 - approaches at anchor

4.10 Leaving the anchoring ship

Departure in connection with a ship to ship operation involves many of the same elements as during arrival. Of course, focus is now on checklist no. 5 – unmooring. The same approach is used as during arrival - first, a visual overview is obtained of the mooring structure of the two ships and the position of the fenders.

4.11 If the anchor has been changed during the operation

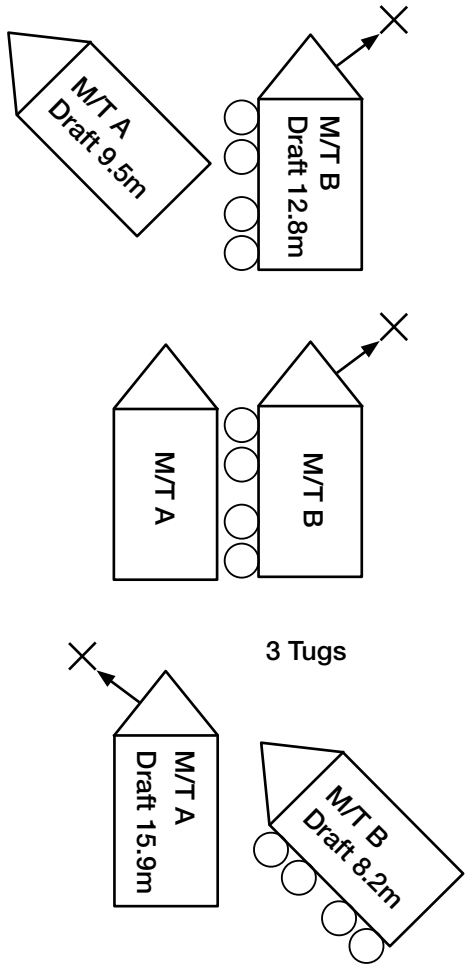
This would mean that the former maneuvering vessel is now the anchoring vessel, i.e. the mother ship. If the anchor has been changed it should be remembered that the ship is no longer attached to the sternmost spring but rather the foremost spring.

4.12 Possibility of catching fenders when letting go of spring lines

In connection with departure, it should be kept in mind that the springs both fore and aft may easily get caught between the fenders if the crew are not careful when casting off these mooring lines.

Change of anchor

Sts Drawing - shift anchors Anchor to be changed from M/T A to M/T B after M/T B all fast or prior M/T A off - subject to pilot's decision taking into consideration weather and current.



4.13 Heading and change of this before departure

The tugs must normally not be made to push harder than needed since it brings the ships and the anchoring ship out of balance. Exceptions may be, for example, when tugs push hard temporarily in order to obtain more protection from swells.
A dangerous situation could particularly arise if, under conditions of hard wind/heavy current, a loaded ship is removed from an empty ship and the ships are pushed against the wind/current since the anchoring ship, at departure, may turn back to its original position so quickly that it may be difficult for that maneuvering ship to get away.

If it is necessary to push so hard to create shielding for the tugs it is recommended to stay on the fenders when the lines have been let go and the tugs have slackened until the ships have once more swung against the wind/current and only then start to separate the maneuvering ship.

If the maneuvering ship does not rest on the foremost fenders but is suspended in the lines it is a good idea to ask the front tug to push a bit, at first 10 or 20 %, and if it does not come in, then slowly increase the pressure in order to have an idea of the force with which the bow will come loose. In situations where the ships are not resting on the fenders but are suspended in the lines it is a good idea to have the tug forward of the accommodation ready to lift before doing the same with the front tug. When the last stern lines have been let go, and only the springs are left (possibly stern springs and breast lines) the rudder is turned to hard starboard so that it is ready for separation or to lift the stern if the bow separates quickly.

4.14 Leaving the anchoring ship

It is good practice not to cross in front of the anchoring ship - at least not at a distance of less than 1 nautical mile unless it is warranted by other conditions.

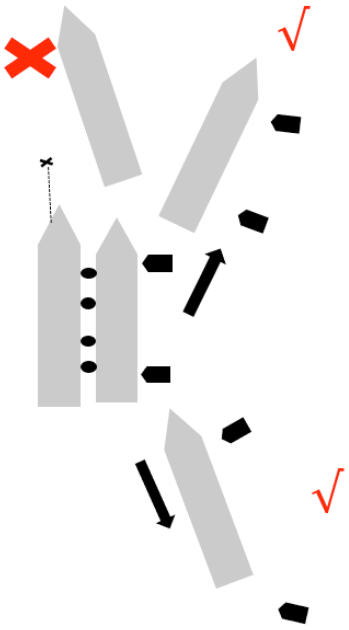


Figure 7 - Leaving the anchored ship

When separating especially loaded ships the tugs must be allowed extra long tow lines since they cannot operate at their full force if they are too close to the object they are separating from.

4.15 On which ship are the fenders positioned?

Figure below. For STS operations with parent ship at anchor, both approaches are used - fenders on the maneuvering ship or the mother ship

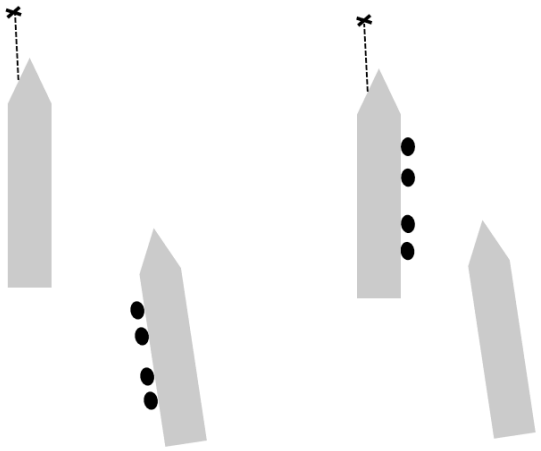


Figure 8 - Placement of fenders

5. Mooring of ships for ship to ship operations

5.1 Safety during mooring and unmooring

Mooring is a high-risk task which should be conducted in a calm and controlled manner. Prior to commencement of mooring, the master and the pilot should agree on the procedures to be employed to ensure a smooth and safe operation.
Please refer to Seahealth Denmark (2013), Mooring – Do it safely, a guide to prevent accidents while mooring.
To the extent possible, mooring operations must be conducted in accordance with the guidelines set forth in "Mooring Equipment Guidelines, OCIMF Understanding mooring incident".
Adapted from UK P&I Club's Loss Prevention Bulletin January 2009.

5.2 Incidents during mooring

Statistical evidence shows that in 53 per cent of all cases of personal injuries arising from mooring incidents, ropes (wire or fibre) have parted under load and personnel within 'snap-back zones' have been hit. In 42 per cent of cases, ropes/wires have not parted, but injuries have resulted from ropes jumping/slipping off drum ends or bitts, or personnel being caught or 'dragged' by ropes, fixtures coming off mountings and from other causes.

5.3 Danpilot's mooring guide

Reference is made to Danpilot's guide on mooring/unmooring. Preplanning IV – mooring and unmooring http://www.trykteamepub.dk/epub/DanPilot_Mooring_and_Unmooring/

5.4 Risks during mooring and unmooring

Mooring work when coming alongside and departing with the two ships may be very risky since both ships are able to move and may thus expose the mooring lines to great impact. Particular caution should be displayed in the winter and when the decks on the ships may be slippery. The pilot must immediately issue a warning if he observes that individual mooring lines are suddenly exposed to great impact and ensure that the master notifies the deck crew immediately.

5.5 Drawings of mooring

Outlines/drawings of frequently used mooring approaches are shown below.

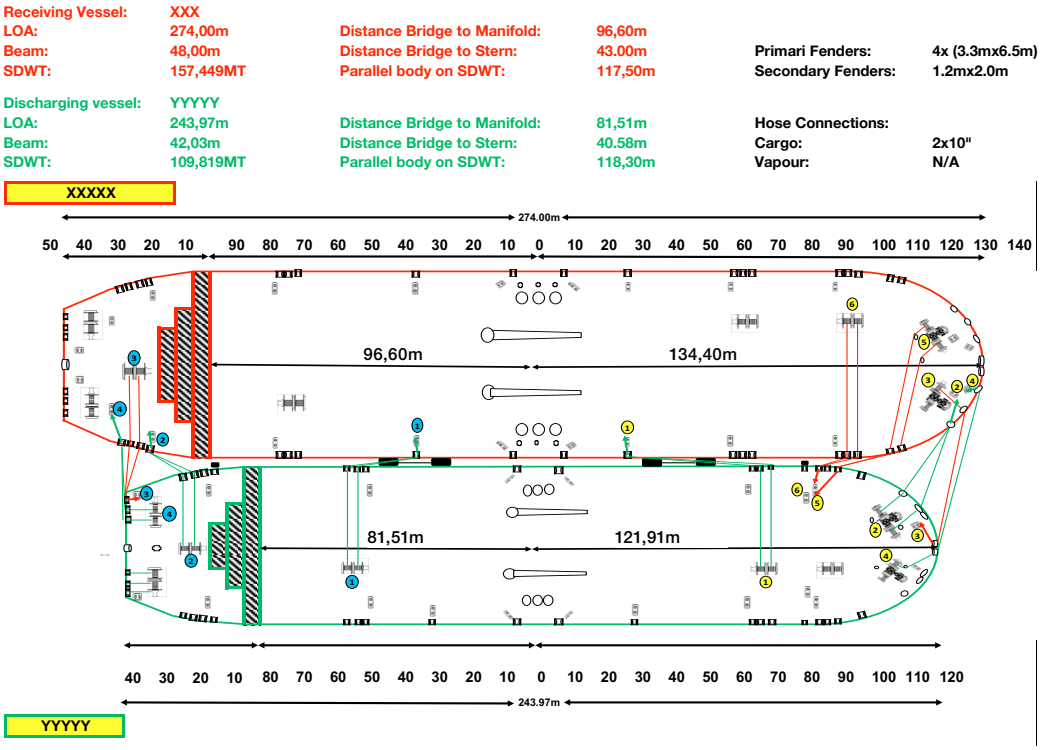


Figure 9 - Drawing of mooring during STS operation

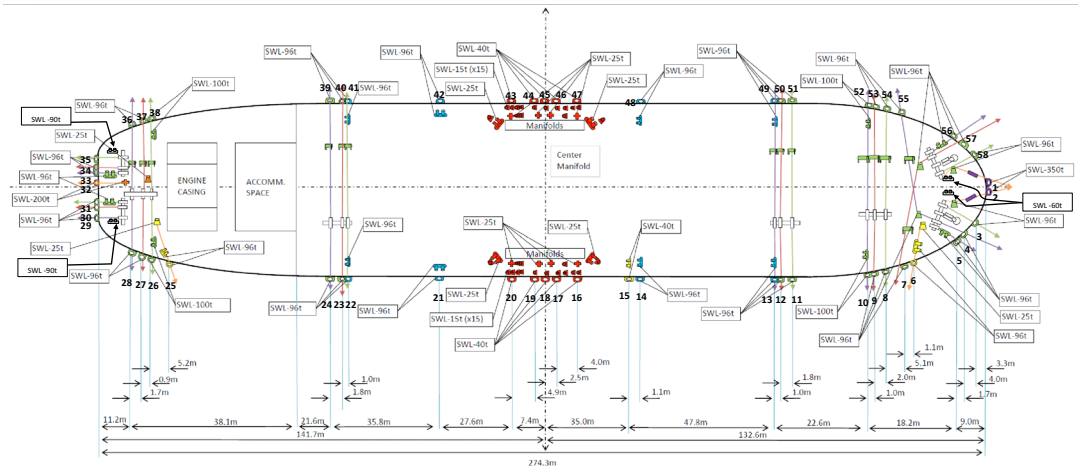
5.6 Mooring plan

The mooring master receives the mooring plan before commencement of the operation – this is the best solution.

5.7 Bridge wings offset with ships at same length

It should be noted that if two ships have the same length with similar position of the bridge wings, the two bridge wings will be close to each other, and it must be ensured that searchlights protruding over the wings are swung inwards. The angle between the ships does not have to be very big before the two wings are very close to each other. Another approach to position may be agreed to avoid these situations.

MOORING ARRANGEMENT
M/T SUEZ RAJAN



Parallel Body (Normal Ballast)	118.25 m
Parallel Body at Loaded Summer Deadweight (SDWT)	135.68 m

	DESCRIPTION	Q'TY	SWL TONS	REMARK
	EYE PLATE	30	15	
	CHOCK	10	40	FOR CARGO HOSE HANDLING
	CROSS BIT	8	25	
	BOLLARD	4	25	
	CHOCK	8	96	COMMON USE WITH MOORING AND HARBOUR TOWING
	BOLLARD	8	96	
	CHOCK	3	96	
		1	40	FOR EXXON
	BOLLARD	3	96	
		1	40	
	DECK STAND ROLLER	2	25	

	DESCRIPTION	Q'TY	SWL TONS	REMARK
	CHOCK	30	96	
		4	100	
	BOLLARD	4	96	FOR MOORING
	DECK STAND ROLLER	4	96	
	FAIRLEAD	1	200	
	STRONG POINT	1	200	ETS & ESCORT TUG USE
	DECK STAND ROLLER	1	25	
	BOW CHOCK	2	350	ETS & SPM COMMON USE
	CHAIN STOPPER	2	350	
	HORIZONTAL ROLLER	10		

LAST UPDATE: JULY 2016

Figure 10 - Outline of vessel

As a main rule, the approach 4+2+(2 from the mother ship) is used, and the same astern 4+2+(2 from the mother ship)

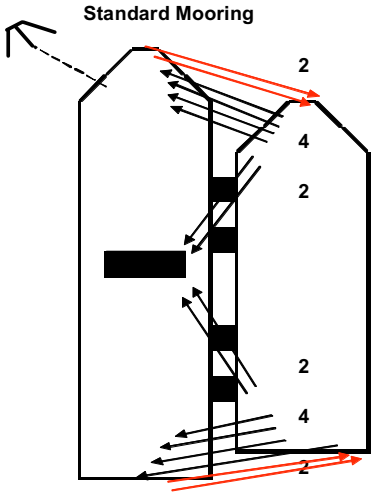


Figure 11 – Standard mooring during STS operation

5.8 Strengths and elasticity of various mooring lines

It is important to remember that when two STS ships are moored together using mooring lines from both ships the mooring equipment is likely to differ, and it is common for wires and lines to be mixed, which is known to be a poor combination. In Danpilot's mooring guide, this issue is described in more detail. This document only describes the major differences between the elasticity and strength of wires and lines.

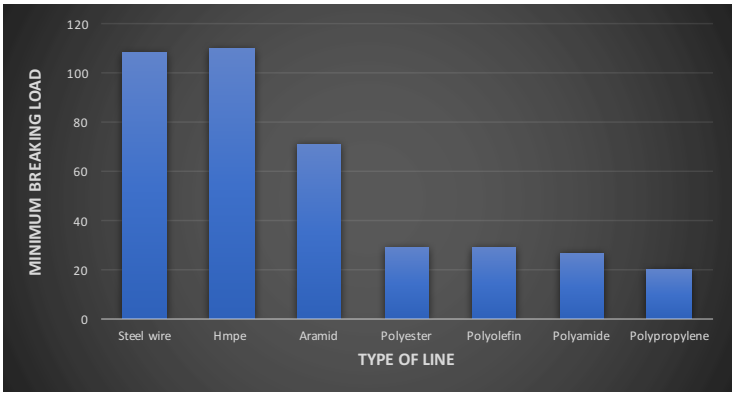


Figure 12 – Different mooring materials compared to steel wires – Source: Seahealth, Denmark

Characteristics of each kind of synthetic line, compared to steel wire with the same diameter

HMPE	High Modulus Polyethylene, Dynema, Spectra. Similar to steel for strength and stretch. Light, floats on water
Aramid Kevlar	75% as strong as steel wire. Heavier than HMPE and does not float
Polyester, Dacron, Terylene	30% as strong as steel wire. Heavier than HMPE and does not float but is flexible and durable
Polyolefin	30% as strong as steel wire. Light, floats on water
Polyamide, Nylon	30% as strong as steel wire. Does not float, stretches more readily than other fibres
Polypropylene	60% as strong as polyester. Floats, reasonably durable and cheap

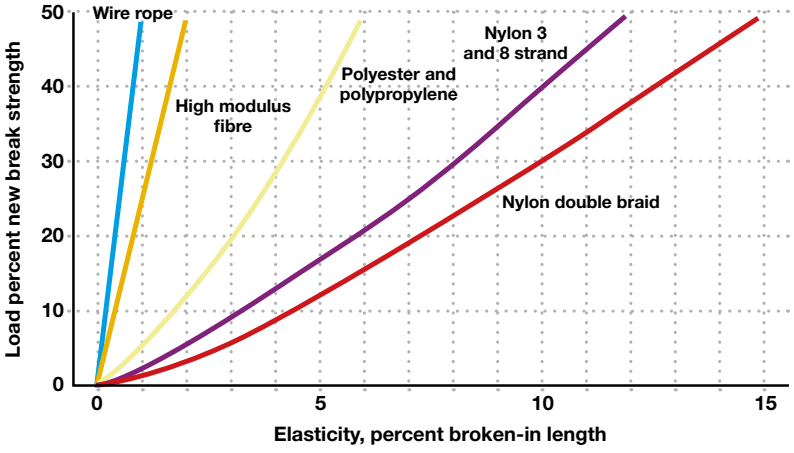


Figure 13 - Elasticity of mooring materials, Source: Seahealth, Denmark

Chafing protection. Is quick release hooks used

6. Tugs – operation of these

6.1 Number of tugs

Ensure that the necessary number of tugs are available, that they are the correct type and have the necessary power for the task.

6.2 Wave height

In case of waves of approx. 1.5 m, it should be confirmed that they are able to operate and whether there will be an area in which they cannot operate - for example from minimum to 40 % pressure as it would otherwise damage their fenders.
It should also be considered to position the maneuvering ship a bit more transverse to the direction of the waves so as to create more lee from the waves but also to allow them to push more and thus have better contact during arrival.

6.3 Types of tugs – where they should be used

Tugs with tension on the starboard shoulder have a high priority as they enable quick lifting if required - if 3 tugs are used on the arrived ship it is preferable for tugs in front of the accommodation to have tension and to let the tug with a permanent brake on the winch be in the centre hawsehole astern.
If a tug is delayed arrival may be slowly commenced with a tug on the starboard shoulder.
When operating AFRA max, tugs are positioned in front of the accommodation and on the shoulder.
When operating handy size, there is a tug astern and one on the starboard shoulder.
Small tankers will have a tug on the starboard shoulder.
Under normal circumstances, tugs should not push more than necessary during

mooring. Aframax tankers may in particular be difficult to keep alongside for example an empty Suezmax.
When arriving with Aframax and 2 tugs on the side the speed is normally reduced relatively quickly when they start to push. (Due to the blocking effect of their transverse position and the transverse direction of the screw current).

6.4 Angle of arrival / work with tugs

It is tempting to arrive at a small angle where the bows are closest to each other, but once the speed is so low that you can see that you will not need to go astern and the current is not too strong the safest approach is to arrive at a small angle where the sterns are closest to each other since you obtain full control of the stern with a tug pushing astern, the rudder on hard starboard and a forward maneuver. The bow then just needs to be pushed in so that the ship ends up 0.5 - 1.0 m from the fenders while the springs are attached. If the ship makes the final approach on its own and rests on the fenders it is okay. However, there is no reason to attempt this until the ship is in position, and the springs have be tightened.
If the front tug has to constantly push too much on arrival - more than 50 % - it is better to change the mooring so that the first lines to be attached are 2 stern springs and 2 breast lines (short headfasts) to be certain that the bow can be held when mooring is started. (otherwise, start with springs at both ends).
One major advantage of this form of arrival is that it is virtually never necessary to have tugs perform lifting.
On arrival with only one tug on the starboard side (shoulder), the tug is asked to slacken and be ready to push on the front edge of the manifold when the ships are parallel and close to position.

6.5 Freeboard and tugs

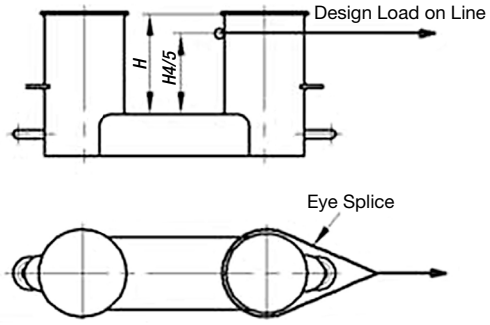
Freeboard on the maneuvering ship will sometimes be so modest and the tug so high that it may damage the gunwale if it pushes with the bow. In these cases, the tug may normally push with the stern when it is alongside and has slackened the tow line further. (However, cannot push with its full force in this position, which is normally not necessary since low freeboard is usually associated with a smaller ship). Alternatively, the tug may push with the entire length of its stern, which will create a more powerful push than when it is alongside.

6.6. Best use of tugs

On departure, especially with a deep draught, the best approach is to attach the tug on the shoulder to the centre hawsehole on the forecastle since this creates the largest torque for the bow while at the same time obtaining a better utilization of the force since the screw current from the tug is not directed towards the ship, which would reduce the overall lifting capacity.
On departure with ships in ballast with a tug in front of the accommodation, it must be taken into account that this is under pressure from being so close to the forefoot, and especially when the tug has to move at a very low speed and also preferably stop the engine as the suction from the screw drags it towards the forefoot.
When the tug is to receive the line the master is informed that the crew must be ready to let go and not to let go until the tug gives the instruction. The tug is notified that it must be ready to receive the line and to give notification when it is ready

6.7 Attachment of tug on bollard

The towing safe working load = 2 x the mooring safe working load.
By force of habit, you want to attach the eye from the tug with a figure-of-eight round the first part and then attach the eye to the part facing the ship's centre line - this is actually wrong. There are often 2 swl figures on bollards, for example 46T/92T with the 92T referring to the drawing below where you just place the eye on the outer bollard arm. When using this method, the bollard provides the maximum swl resistance.



However, if fins are fitted to the bollard tubes to keep the towing line as low as possible, the attachment point og the towing line may be taken at the location of the fins, see figure below.

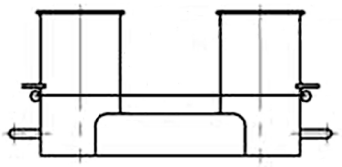


Fig 14

http://www.ics-shipping.org/guidelines-for-safe-mooring-operations

Danpilot's Pre-planning guide II – Harbour includes subjects on the use of tugs.
Pre planning II – Harbour
http://trykteamepub.dk/epub/DanPilot_Habour_Plan/

6.8 Communication Pilot-Tug

During towage operations it is very important that pilots communicate all their intentions and requests/instructions to the assigned tugs in an unambiguous, clear and easily understandable manner.
In most ports, pilots will instruct the tugs by requesting a percentage of tug power (i.e. Full – 50% - 25%- Stop) and direction of pull (i.e. Ahead, Astern, Starboard, Port). Others prefer to use of the "Clock" system where the heading of the assisted vessel is 12 o' clock and stern is 6 o' clock, to indicate the direction of pull.
Pilots should only refer to the tug's name when conveying instructions to the tug and refrain from using the tug master's name. This will also help the vessel's bridge team understand what is going on.

6.9 DO NOT Actions of pilot, ship's master and mooring parties when working with tugboats.

Do not send the crew to the mooring stations (too) late
Do not maintain the speed of the vessel too high whilst securing tugs
Do not use DANGEROUSLY HEAVILY WEIGHTED HEAVING LINES
Do not execute course changes whilst the tugs are securing their towlines
Do not use tug master's name when communicating orders to the tugs
Do not engage the vessel's engine(s) during maneuvers without first informing the respective tug masters
Do not throw the heaving line (at the bow) from the centre line but from the ship's shoulder
Do not make rapid and excessive steering changes without informing the tugs
Do not build up speed in excess of 6 knots through the water with the bow tug (still) connected
Do not use full engine power particularly on a large vessel when a tug is secured aft
Do not keep floodlights shining into the tug master's eyes; this will impair his night vision and will seriously hamper his ability to estimate distances and to assess the operations
Do not keep floodlights shining towards the tug in case of restricted visibility

Do not make headway on own power in very dense fog with a bow tug secured without prior agreement between tug and pilot. Consider letting the tug(s) tow the vessel rather than using the vessel's propulsive power

Do not build up speed over 6 knots through the water starting from a "dead ship" with a bow tug secured

Do not drop the towline at the stern when disconnecting the tug (unless instructed otherwise by the tug)

Do not delay dropping the towline at the bow when disconnecting the tug once instructed to do so by the tug

Do not wait for something to happen to start preparing the heaving line(s) again.

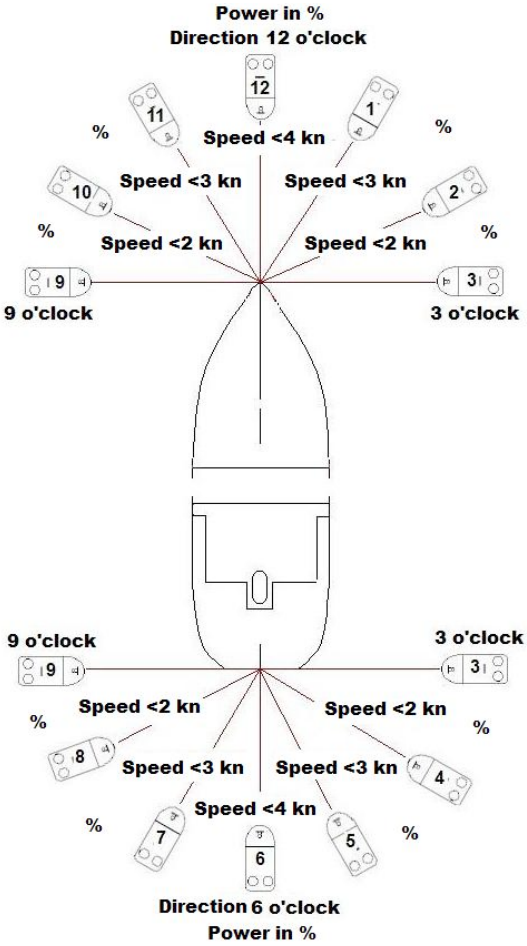
6.10 Danpilot's standard communication method

Information to Tug
Before arrival

1. **VHF channels**
2. **Communication Language**
3. **Positioning of harbour tugs**
4. **SWL bollards**
5. **Berthing position**
6. **Which side alongside**
7. **Planned approach**

Before departure

1. **VHF channels**
2. **Communication language**
3. **Positioning of harbour tugs**
4. **SWL bollards**
5. **Planned departure**
6. **Sign off the tug**



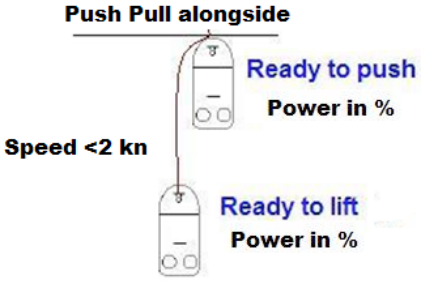


Figure 15 - Positioning of tugs

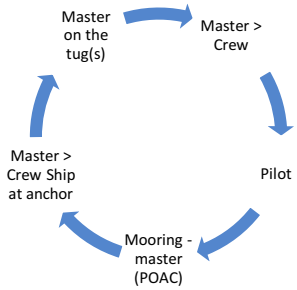


Figure 16 - Chain of communication

7. Risk assessment STS pilotage

In case of incidents, reference is made to Danpilot's PEB, which includes a checklist for specific incidents.
PEB (Pilot emergency booklet)
http://trykteamepub.dk/epub/Danpilot_PEB/
See section 9 – Checklist OCIMF and Danpilot's own checklist and communication

7.1 Training of pilots

See section 9 on training of STS pilots. In addition to the statutory training programs within STS, Danpilot has its own ship simulator for additional training. Danpilot also has a system named P-Knox (Pilot Knowledge Exchange) where real live navigation is performed on a regular basis with two pilots discussing and evaluating the performance. The STS pilots also make sure to continuously share knowledge from the operations in the form of both good and bad experiences so that any mistakes are not repeated.

7.2 Fatigue

Fatigue is both a physical and a mental condition and an important subject during risk management. At Danpilot, the pilots are subject to a collective working hours and resting time agreement which is in accordance with the rules in force within this area and of course also, for example, EU's requirements and rules.

Danpilot's logistics department (Disponeringen) assigns tasks to the pilots, and in this process it is ensured that the respective rules and requirements are fulfilled with respect to working hours and resting time. The individual pilot may also himself/herself keep up to date on whether he/she fulfils the requirements regarding minimums resting time and maximum working hours as well as other factors such as night work, compensating rest etc. The individual person's possibility for keeping up to date is dynamic and is updated in case of changes.
The system should guarantee that the individual pilot is always properly rested and qualified for the task assigned to him/her.

7.3 Checklists

See section 9 – Checklist OCIMF and Danpilot's own checklist and communication.

Checklists are a fundamental part of risk assessment, and if the lists are used as intended they should capture the things that could go wrong if they are not agreed and discussed with the stakeholders.

7.4 Visibility on arrival

We recommend that visibility on arrival should be at least 3 x the ship's length.
In practice, it rarely happens that our requirement is not fulfilled since one of the two masters will typically have visibility of 0.5 or 1.0 to commence arrival.
There are no visibility requirements on departure.

7.5 Work with tugs – Risk assessment

See section 6 - DO NOT Actions of pilot, ship's master and mooring parties when working with tugboats.

7.6 Communication

It is important always to agree on VHF channels to be used during the operations. Default should always be that if something goes wrong with respect to the work channels everyone will change to VHF channel 16 and then agree on the new work channel.
Communication discipline: Always use closed loop communication and shot clear messages.

7.7 VHF channels

Some mooring masters prefer to have all communication with the other ship on a separate channel. This is okay but not optimal, and we therefore recommend that everyone stays on the same working channel. A common problem with a working channel is when "others in the vicinity" use the same channel or interrupt. In this case, it must be quickly arranged with the others to find a different channel.

7.8 Deciding which ship should be at anchor

As a main rule, the small ship comes alongside the large ship, but there may be situations where it is the other way around - for example if there is a large difference in draught and/or if the large ship is easier to maneuvere. This decision should be based on a thorough review of Q88 and all other relevant information on the ships to obtain the best solution from the start.

7.9 Embarking and disembarking

It can be problematic to embark and disembark a ship at anchor. It may be a good idea to use one of the tugs which are already at the site to make a lee for the pilot boat.
The other ship may be embarked using a basket if this is allowed.

7.10 Under keel clearance and pull on chain

See figure 14. As a main rule, we recommend that the anchored ship uses 10 shackles in the water. The ship must, as we know, hold both itself and the other ship when this is alongside.

7.11 Tugs and swl

See our matrix with respect to the number of tugs to be used for the specific task. The tugs' names and the maximum number of tons that they work with must be recorded on the ordinary master/pilot exchange. Depending on where they are attached and how much the ships' respective bollards can withstand, it may be agreed with the tug that they must only use bollard pull xx tonnes.

7.12 Weather conditions

Weather window. Sufficiently large window to complete the operation.

7.13 Night and day operation

The best solution is of course to perform maneuvering during daylight hours, but it is in fact performed 24/7. However, it should be noted that more and more customers request that arrival takes place during daylight hours but accept night navigation on departure. During night maneuvering, it must be remembered to illuminate fenders on arrival of the mother ship.

7.14 Mooring – safety during mooring

Mooring/unmooring is described in part 4 as well as reference to Danpilot's mooring guide and other relevant literature on the subject.
N.B.
Could it be a good idea to use quick release or portable hawseholes.
Can the spring capture the fender.
Is it possible to handle several lines at the same time.

7.15 Snap back zones

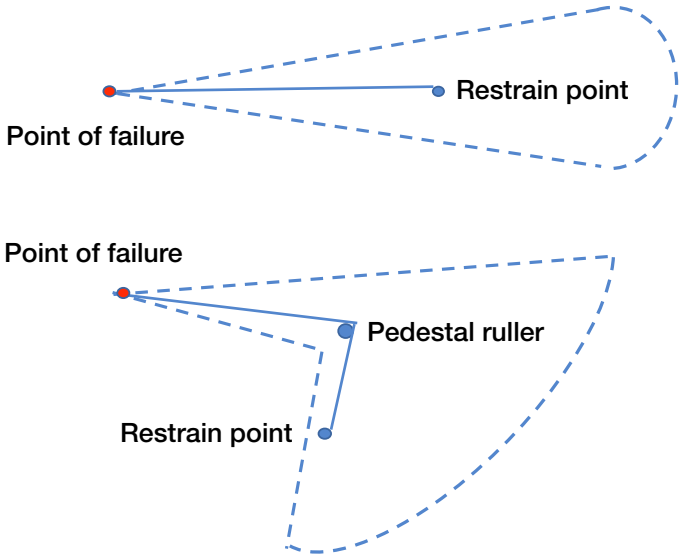


Fig 16 - Snap back zones

One of the most common causes of personal injuries is mooring lines that break or slip. During STS mooring where there are mooring lines from own ship and mooring lines from the other ship there are snap back zones within a large area both fore and aft on the ship and at the spring arrangement on the main deck.

7.16 Size of the ships

Particular caution must be displayed in connection with ships of the same length and bridge wings opposite each other, and it must be ensured that any swinging floodlights in the wings on the ships are positioned before the bridge wings so that they do not protrude beyond these.

7.17 Change of anchor

See chapter 3 – Coming alongside the mother ship and leaving the mother ship.
There are advantages and disadvantages to changing anchor underway.
It must be remembered on departure that in case of change the mode of operation/ direction of the springs change at the place of retention.

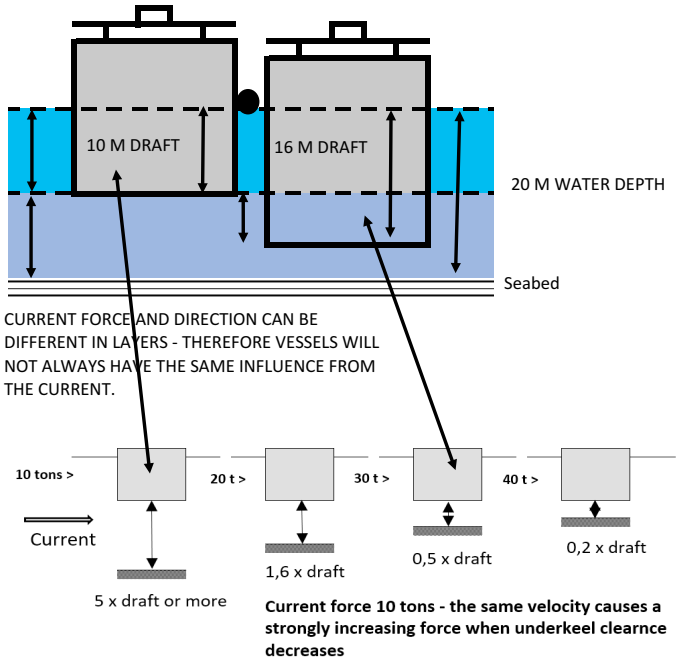


Figure 17 - Showing how different drafts will affect vessels of different sizes

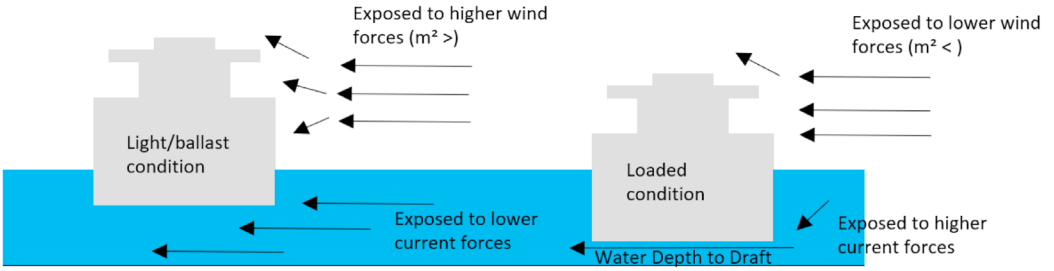


Figure 18 - Showing how wind will affect vessels of different sizes

The ships are impacted in different ways by external factors, and in connection with loading/discharging this condition will change underway.

8. Fender and hoses

8.1 Fender types and sizes

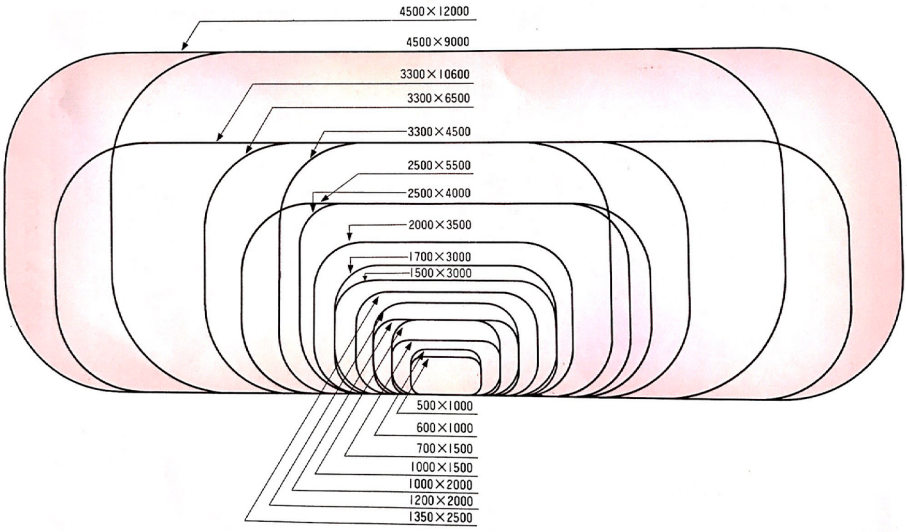


Figure 19 - Fender sizes
Source: Yokohama

Pneumatic rubber fender
Cylindrical fenders with air, typically 0.5 bar, and pressure release valve triggered at 1.8 bar (50 kPa – 180 kPa, kilopascal (kPa) or 0.8 bar and pressure release valve triggered at 2.3 bar (80 kPa – 230 kPa, kilopascal (kPa) are the most common.

Foam cylinders are also used, but they are more suitable for, for example, ship to ship operations in port and are not suited for STS operations in open sea.



8.2 Calculation of fender size and type/number

Example:
Ship 1 displacement 55000 tons
Ship 2 displacement 200000 tons

It has been established that a suitable factor of 1.8 is used on the displacements to compensate for the impact from waves and current on the ships. The factor applies during the STS operation itself but may be used for STS operations with one of the ships at anchor. As soon as there is current this will be the same as making headway in the water - thus this interpretation.

55000x1.8=99000
200000 x 1.8 = 360000

We assume that the approach speed towards the fenders is 0.2 m/sec.

$$\frac{99000 \times 360000}{99000 + 360000} = 77.647$$

A factor 0.025 is used when calculating the energy/force that will be produced upon

contact between the ships (fenders)

$0.025 \times 77647 \times 0.2^2 = 77.6$ tons

If you 'land' or plan to land parallel on all fenders 0,051 is used and the calculation is now:

$0.051 \times 77647 \times 0.2^2 = 282.6$ tons / 4 = 70.5

The above calculations are based on ordinary calculation of E with modifications regarding water currents etc. The starting point is $E = 1/2M \times V^2 \times C$. C, which the OCIMF guide calls a constant, is actually an applied coefficient for hydrodynamic mass where, in respect of a ship, 1.1 is used for fore-and-aft and 1.8 for athwart-ships.

You can then check the table below to see which fender is able to withstand or rather absorb this pressure.

Pneumatic Fenders Initial Internal Pressure 50kPa and 80kPa				Foam Fenders		
Nominal Size Diameter X length		Energy Absorption 60% Compression tonne.m		Nominal Size Diameter X length		Energy Absorption 60% Compression tonne.m
mm	mm	50kPa	80kPa	mm	mm	
1500	3000	15.6	21.8	1350	2500	14
1700	3000	19.5	27.2	1500	3000	21
2000	3500	31.4	43.9	1700	3000	27
2500	4000	67.6	94.3	2000	3500	44
2500	5500	96.2	134.3	2500	4000	75
3300	4500	119.8	167.2	2500	5500	110
3300	6500	185	258.2	3300	4500	139
3300	10600	312.8	436.6	3300	6500	219
4500	9000	484.6	676.4	3300	10600	384
4500	12000	660.2	921.5	4200	8400	459

Figure 20 - Table showing fender capabilities

The approach speed is very important for the amount of pressure that the fenders are able to absorb expressed in tons. The normal speed range used is 0.1 - 0.3 m/sec, i.e. around 0.2 - 0.6 knots.
An increase within this range of just 0.02 m/sec (0.04 knots) will result in an increase of up to 30% in the pressure that the fenders have to be able to absorb.

Below is an example of tables where you can see the same values as when you perform calculation.
Ship 1 displacement 55000 tons
Ship 2 displacement 200000 tons

Ship A (DWT) / Virtual Weight (T) / Approaching Velocity (m/sec)		20,000			25,000			30,000		
		38,623			45,946			56,093		
Ship B (DWT)	Virtual Weight (T)	0.25	0.325	0.4	0.25	0.325	0.4	0.25	0.325	0.4
20,000	38,623	30.8	52.0	78.8						
25,000	45,946	33.4	56.5	85.6	36.6	61.9	93.7			
30,000	56,093	36.5	61.6	93.3	40.3	68.0	103.1	44.7	75.5	114.4
35,000	63,084	38.2	64 5	97.7	42.4	71.6	108.5	47.3	80.0	121.1
40,000	72,771	40.2	68.0	102.9	44.9	75.9	114.9	50.5	85.3	129.2
45,000	77,986	41.2	69.6	105.4	46.1	77.9	118.0	52.0	87.9	133.1
50,000	89,818	43.0	72.7	110.2	48.4	81.9	124.0	55.0	93.0	140.9
60,000	104,300	44.9	75.9	115.0	50.8	85.9	130.1	58.1	98.2	148.8
65,000	114,637	46.0	77.8	117.9	52.3	88.3	133.8	60.0	101.4	153.7
70,000	122,108	46.8	79.0	119.7	53.2	89.9	136.2	61.3	103.5	156.8
80,000	136,972	48.0	81.1	122.9	54.8	92.7	140.4	63.4	107.2	162.4
85,000	143,359	48.5	82.0	124.1	55.5	93.7	142.0	64.3	108.6	164.5
100,000	166,004	49.9	84.4	127.8	57.4	96.9	146.8	66.8	112.9	171.1
120,000	200,083	51.6	87.2	132.1	59.6	100.6	152.5	69.8	118.0	178.7
150,000	251,896	53.4	90.2	136.6	61.9	104.7	158.5	73.1	123.6	187.2
200,000	327,735	55.1	93.1	141.0	64.2	108.5	164.4	76.3	129.0	195.4
250,000	401,268	56.2	94.9	143.7	65.7	111.0	168.2	78.4	132.6	200.8
330,000	548,670	57.5	97.2	147.2	67.6	114.2	173.0	81.1	137.1	207.6
370,000	627,016	58.0	98.0	148.4	68.2	115.3	174.7	82.1	138.7	210.1
480,000	795,540	58.7	99.2	150.3	69.2	117.0	177.2	83.5	141.1	213.8

Figure 21 - Table to calculation
Source: Yokohama

Virtual weight = Added mass = Virtual mass

In fluid mechanics, added mass or virtual mass is the inertia added to a system because an accelerating or decelerating body must move (or deflect) some volume of surrounding fluid as it moves through it. Added mass is a common issue because the object and surrounding fluid cannot occupy the same physical space simultaneously. For simplicity this can be modelled as some volume of fluid moving with the object, though in reality "all" the fluid will be accelerated, to various degrees.
Source: Wikipedia

8.2 Fender positioning

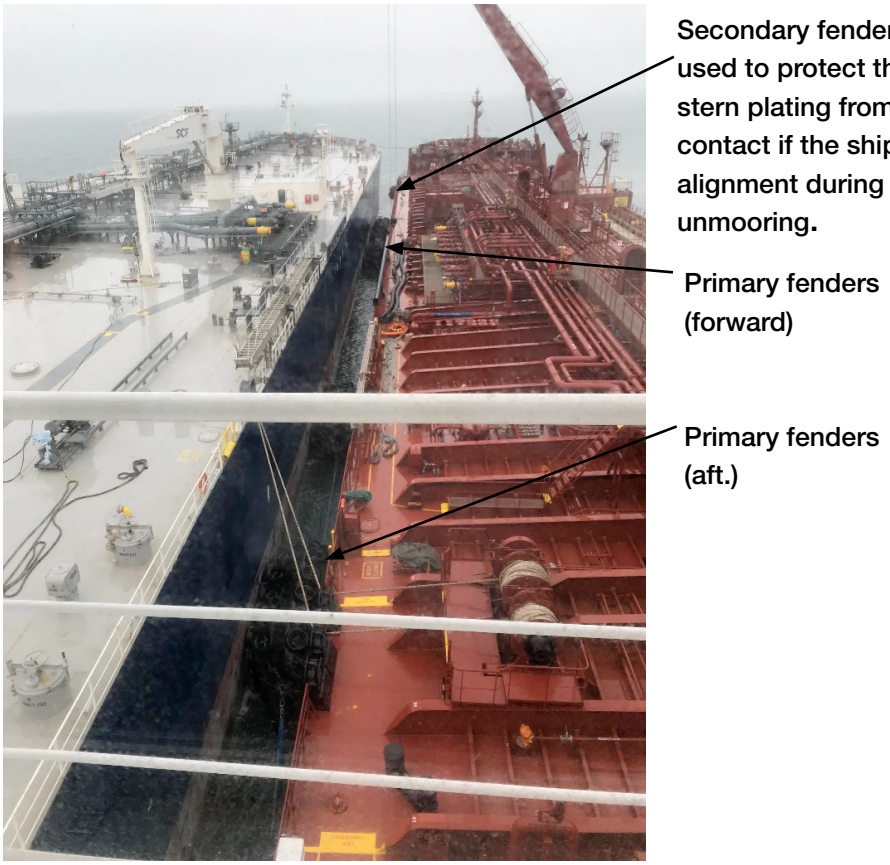


Figure 22 - Picture showing positioning of fenders

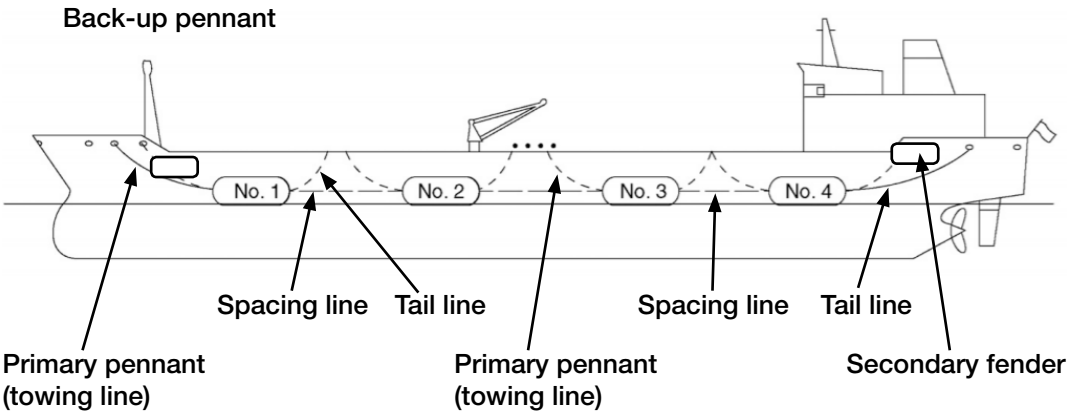


Fig 23 - Example of a method for mounting fenders

8.3 Secondary fenders

Secondary fenders are often mounted incorrectly and do not function as intended. The reason for this is often that there are no hawseholes in the most suitable places. This is, however, no excuse since portable hawseholes should be used instead if necessary.

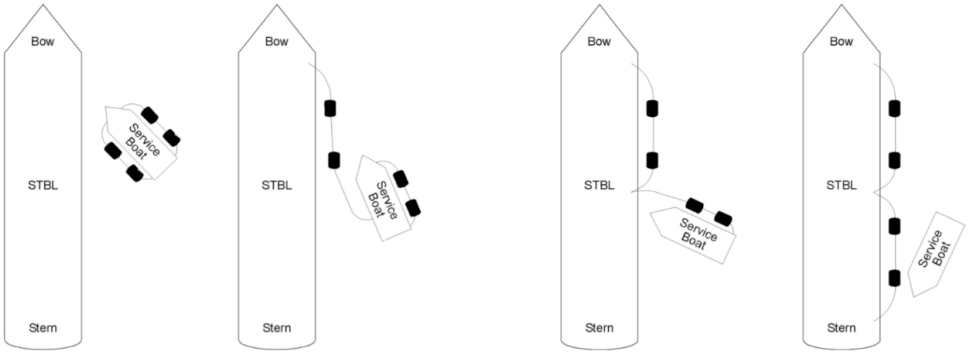


Figure 24 - Placement of secondary fenders

8.4 Procedure for mounting of fenders (there are several methods)

It is a good idea for the crew on the ship on which the fenders will be mounted to have a plan as that shown above. It should also be remembered that the fenders must be attached to the ship in a way that permits continuous adjustment during the operation. You often see crews use the same bollard for the mooring lines, which will create a problem subsequently when they need to be adjusted along the way. In case of limited possibility for bollards, a good method is to use the bollard as 2 units - i.e. a mooring line on each 'leg'.

8.5 Navigation with fenders along the side



Figure 25 - Picture showing a tug with fenders

Max 6 knots during navigation to avoid damage to equipment

8.6 Cargo Hoses

Often 12 m long per unit – must be tested every 12 months.



Figure 26 - Picture of cargo hoses

8.7 What should be the length of the hoses to be used?

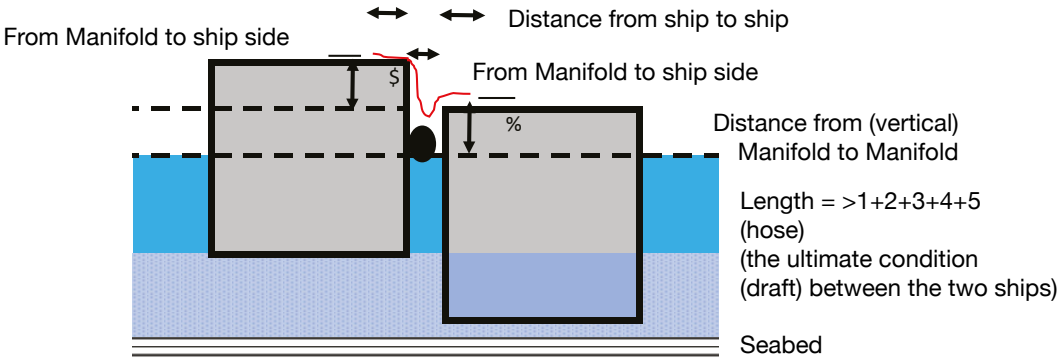


Figure 27 - Drawing showing how to calculate the length of the cargo hose

9. Checklists / OCIMF and Danpilot's own communication

9.1 Checklist (OCIMF – Ship to Ship Transfer Guide)

CHECKLIST 1 – PRE-FIXTURE INFORMATION (FOR EACH SHIP)

CHECKLIST 2 – BEFORE OPERATIONS COMMENCE

CHECKLIST 3 FOR DISCHARGING SHIP/ RECEIVING SHIP
CHECKLIST 3 – BEFORE RUN-IN AND MOORING

CHECKLIST 4 – BEFORE CARGO TRANSFER

CHECKLIST 5 – BEFORE UNMOORING

Explanations to each checklist may be found here:
Ship-to-ship transfer / Operational guideline and check item for oil tankers
http://shipsbusiness.com/ship-to-ship-transfer.html

9.2 STS operation plan

Example of an STS operation Plan
https://issuu.com/dynamarine/docs/sample_sts_plan
The STS operation plan should be approved by administration.
The STS operation plan must be in the working language and must be approved not later than the date of first annual survey (intermediate or renewal under MARPOL annex I).

Ship-to-ship transfer / Operational guideline and check item for oil tankers
http://shipsbusiness.com/ship-to-ship-transfer.html

9.3 Danpilot's own checklists

Danpilot has its own checklist (app), which includes other checklists and other relevant subjects that are part of the operation from the pilot's perspective. It is also possible to insert relevant photos and copies of various drawings and other documentation. Each STS task will be saved in a database. On request, they may be forwarded in pdf format to the ship/shipowner/mooring master.

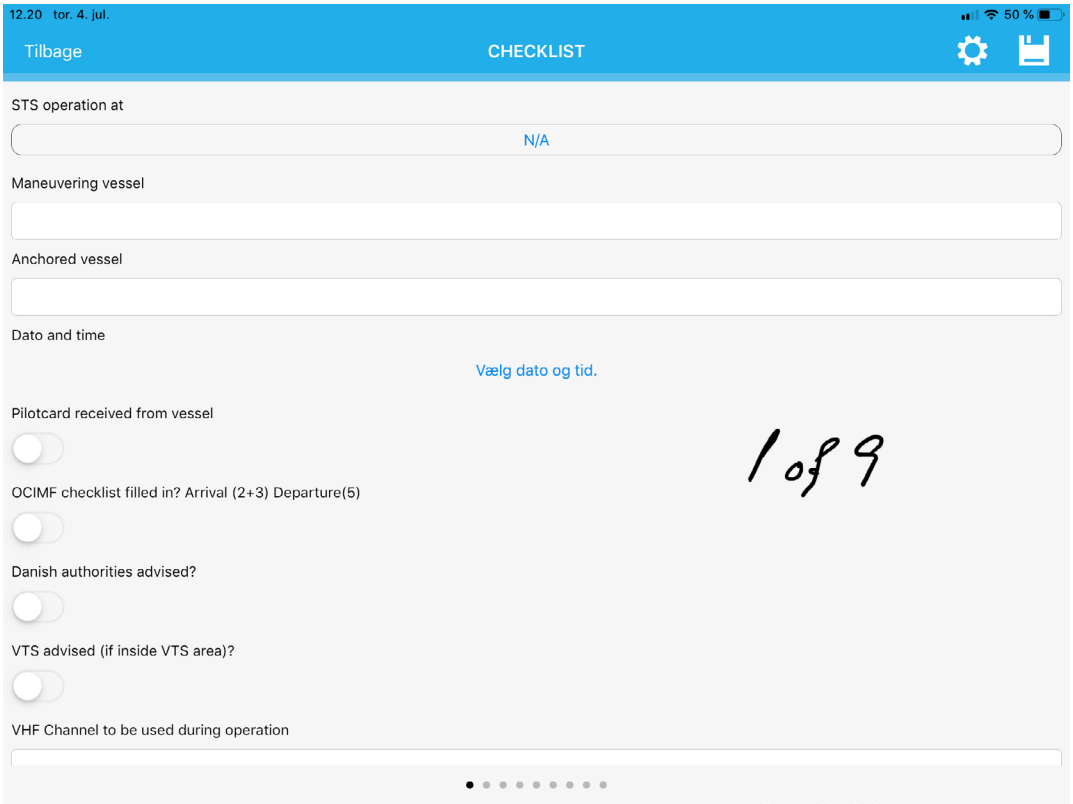


Figure 28 - DanPilot checklist 1/2

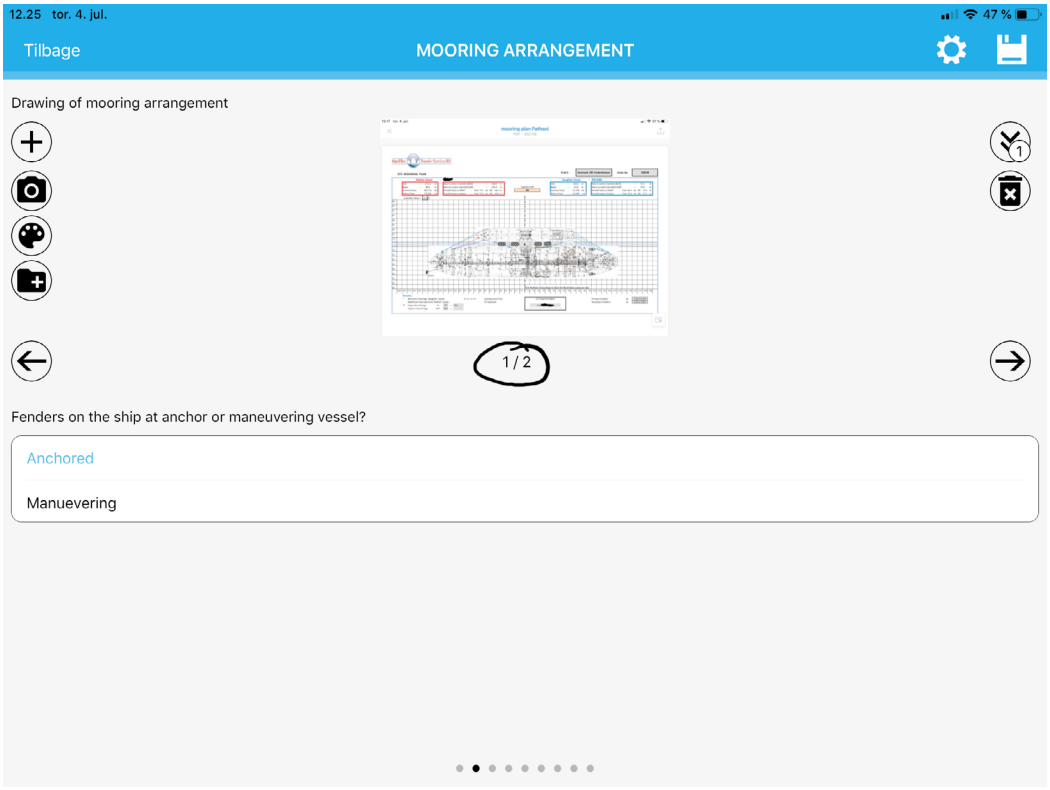


Figure 29 - DanPilot checklist 2/2

9.4 Communication

Communication is a very significant part of the operation, and as previously mentioned it is important to use closed loop communication in order to eliminate faults and misunderstandings.
In addition, we refer to and recommend using SMCP
IMO Standard Marine Communication phrases (SMCP)

https://www.segeln.co.at/media/pdf/smcp.pdf

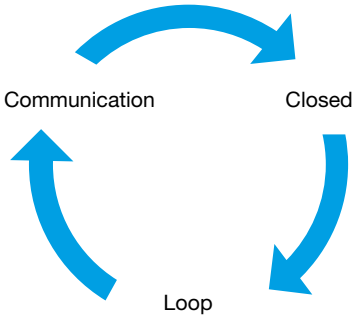


Figure 30 - Communication loop

9.5 Co-operation

In addition to good communication, it is important to have a good co-operation and mutual understanding since we culturally perceive things differently but need to work towards/strive for a common understanding and to have the same perception of the respective tasks to be carried out during an STS operation.

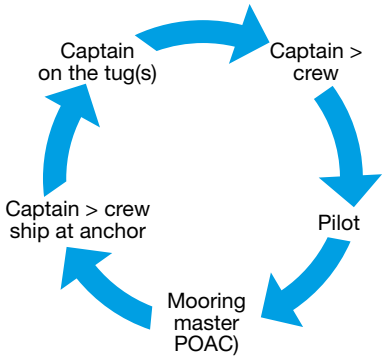


Figure 31 - Co-operation loop

9.6 Task solution methods

We try to use the below method for task solution - i.e. good planning - check the task with the stakeholders - carry out the task and so on

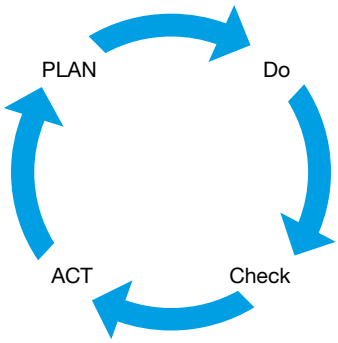


Figure 32 - Task solution loop

10 Training of STS pilots

10.1 Danpilot trains pilots in accordance with international requirements:

Recommendations on training and certification and on operational procedures for maritime pilots other than deep-sea pilots
http://www.imo.org/en/Documents/A.960(23).pdf

10.1.1 Furthermore, pilots are trained in accordance with national requirements

Order no. 1077 of 21 November 2012 Executive order on a transit pilotage authorisation scheme, Danish Maritime Authority
(see Ship to ship page 13)
https://STS_education

10.1.2 Danpilot's own training requirements

Danpilot's STS pilots do not begin training within STS as new pilot trainee. Recruitment takes place within own group of existing pilots, preferably pilots with several years' experience in port maneuvers. The training is conducted primarily as peer-to-peer training together with an experienced STS pilot. When the new STS trainee has completed the required navigation Danpilot performs an assessment of the trained pilot's practical and theoretical skills. When this is in place, the pilot trainee is recommended for examination with DMA. After passing of the examination and when the pilot has participated in STS course module I and module II the STS

pilot may work independently in accordance with matrix limitations established by DMA. When the pilot has the required number of STS pilotage operations within the first limit, module III course must be taken before the pilot changes matrix for size of ships for which the pilot is allowed to carry out pilotage operations.

Danpilot has its own ship simulator for practicing maneuvers and work with tugs.

10.2 P-KNOX

Danpilot also has a system named P-Knox (Pilot Knowledge Exchange) where real live navigation is performed on a regular basis with two pilots discussing and evaluating the performance in order to optimize approaches and minimize faults.

10.3 Internal knowledge sharing

The STS pilots also make sure to continuously share knowledge from the operations in the form of both good and bad experiences so that any mistakes are not repeated. Port information / transit information / STS information is continuously updated on Danpilot's intranet so that the pilot may access this media and the most recent information on the subjects at any time.

Ship to Ship Operations (STS)
The purpose of the course is:
To train the pilot in more advanced ship handling techniques, and at the same to practise good communication between the master and the pilot in actual ship handling exercises.

The course is divided into 3 stages of education:
Stage 1, STS part 1 (Tug handling course for pilots)
Stage 2, STS part II (Ships up to 65,000 GT)
Stage 3, STS part III (Ships larger than 65,000 GT)

The course includes the following subjects:

- Ship to ship operations
- Ship handling in connection with ship to ship operations
- Connection between the effect of rudders and propulsion
- Use of bow thrusters
- Use of various kinds of tugboats and how to use them
- Ship to ship operations without use of tugboat
- Navigation and ship handling in narrow waters and in port
- Ship handling under various wind and current conditions
- Tide effect
- Banking effect
- Anchoring ships
- Emergency response
- Navigation with fenders
- Fender location, their strength and limitations and their mooring
- Mooring procedures according to varying conditions
- Moorings and force effects
- Mooring arrangement, contact and agreement with another ship
- Briefing and exchange of experience between the master, the pilot and the mooring master
- Debriefing after ship to ship operation.

Stage 2 (STS part II) includes training in:

- Ship handling under various wind and current conditions
- Anchoring of mother ship
- Fender location, their strength and limitations and their mooring
- Connection between the effect of rudders and propulsion
- Mooring procedures according to varying conditions and under force effects on moorings and fenders, including the order of moorings at arrival and departure
- Use of various types of tugboats, including advantages and disadvantages of the tugboats' position and place of use
- Use of bow thruster
- Emergency response
- A review of current national regulation and international guidelines
- Navigation exercises in a full mission simulator that increases in difficulty and include:

a. Anchoring in connection with STS operations
b. STS operations during navigation (suction/pressure effects)
c. Ship handling with large draught to obtain 'tide effect', including the effect of difference in the ships' draughts for ship to ship operations.

Participation in STS part II requires completion of the STS I course or the Tug Handling course for pilots.

Stage 3 (STS part III) includes training in:
- Repetition of the training in theory, principles etc. from STS part I
- Intensive and comprehensive simulator training in all types of STS operations, including emergency response
- Briefing before and debriefing after all simulator exercises.
  Participation in STS part III requires completion of the STS part II course, and at a minimum ten STS operations over the past five years.

Completion:
This course is for pilots and pilot trainees only and must be completed at a minimum every five years, cf. section 7(3). A certificate must be issued to the course attendant for satisfactory completion of the theoretical and practical part of the course.

References:
IMO Resolution A.960(23), section 5.5.6.
OCIMF Ship to Ship Transfer Guide
The Danish Maritime Authority's order no. 734 of 25 June 2007 on transfer of oil cargo between ships in Danish territorial waters
Tug handling course for pilots

The purpose of the course is:
To increase the pilot's understanding of tugboat operations, their possibilities and limitations, and to ensure good communication between master and pilot in the actual maneuvering exercises.

The course includes the following subjects:

- Theoretical examination of:
- Hydrodynamic elements
- The pivot point's influence under towing
- Dangerous situations under towing
- Towlines
- Direct and indirect towing – Transverse Arrest
- Escort towing
- Use of various types of tug boats, including conventional, Azimuth Stern Drive, Voith Schneider, Rotor Tug and escort
- Emergency response with tug boats
- Human factors, including communication exercises and orders to the tug boat
- Navigational training that supports and illustrates the above-mentioned theoretical elements, including
  a. Use of various types of tug boats, including Azimuth Stern Drive tug boat(s)
  b. Escort towing
  c. Emergency response.

Completion

This course is for pilots and pilot trainees only and must, as a minimum, be completed every 5 years, cf. section 8(3). A certificate must be issued to the course attendant for satisfactory completion of the theoretical and practical part of the course. The tug handling course for pilots is equated with the completion of Ship to Ship Operations, part 1.

References:

IMO Resolution A.960(23), section 5.5.6

11 Appendix – Tugboat matrix for STS off Kalundborg and STS off Frederikshavn

11.1 Tugboat matrix for STS operations off Kalundborg

Arrival		Departure	
1000-20,000 DW	1 ASD/Tractor Tug	1000-20,000 DW	1 ASD/Tractor Tug
20,000-55,000 DW	2 ASD/Tractor Tug	20,000-55,000 DW	2 ASD/Tractor Tug#
55,000-130,000 DW	3 ASD/Tractor Tug	55,000-130,000 DW draught <14m	2 ASD/Tractor Tug#
		55,000-130,000 DW draught >14m	3 ASD/Tractor Tug#
130,000-170,000 DW draught <14m	3 ASD/Tractor Tug	130,000-170,000 DW draught <10,5m	2 ASD/Tractor Tug#
130,000-170,000 DW draught >14m	4 ASD/Tractor Tug	130,000-200,000 DW draught >10.5m	3 ASD/Tractor Tug#
170,000-320,000 DW	5 ASD/Tractor Tug	170,000-320,000 DW	4 ASD/Tractor Tug#

Fig 33

Tugboats in STS operations
When wind forces of 0-11 m/s are predicted and current of maximum 1 knot, the following is recommended:
According to section 7 (2) 6) in the Danish Maritime Authority's Order on the Transfer of liquid cargo between ships in Danish and Greenland territorial waters, a tugboat must always be available.

Only except is if at least one of the ships is approved as a bunker vessel and this vessel has a gross tonnage of less than 8000.

ONLY DEPARTURE. The following applies:
#: If the ship has a good bow thruster 1 tugboat may be omitted. Minimum definition of good bow thruster:
If the ship is in ballast: 3 % of DW – for example 20,000 DW x 0.03 = 600 BHP
If the ship is loaded: 5 % of DW – for example 20,000 DW x 0.05= 1000 BHP
However, always at least one tug.
Shuttle tankers: 2 tugs may be omitted if there is a stern thruster that is just as good. However, always 1 tug on arrival and departure.

Operational limits:

STS position 1-2-3 West of route "T"	North-eastern winds over 13 – 15 m/s
	Remaining wind directions over 15 m/s
On STS position 4-5 Kalundborg Fjord	Westerly winds over 17 m/s

Fig 34

Wave heights: Over 1.5 – 2.0 metres, in consultation with tugboat
Visibility: At least 3 times the length of the approaching ship
If the predicted wind/current speeds exceed the limited in the table but are within the operational limits the duty pilot must be contacted in order to determine the number of tugboats to be used. This must be done 12 hours before start of pilotage.

Tugboat matrix for STS operations off Frederikshavn / the Skaw.

Arrival	Departure		
Arriving ship's DW	Number of tugboats	Departing ship's DW	Number of tugboats
1,000-30,000 DW	1 ASD/Tractor Tug	1,000-30,000 DW	1 ASD/Tractor Tug
30,000-55,000 DW Ballast	2 ASD/Tractor Tug	30,000-55,000 DW Ballast	1 ASD/Tractor Tug
30,000-55,000 DW loaded	2 ASD/Tractor Tug	30,000-55,000 DW loaded	2 ASD/Tractor Tug
55,000-100,000 DW	2 ASD/Tractor Tug *	55,000-100,000 DW	2 ASD/Tractor Tug
100,000-130,000 DW	2 ASD/Tractor Tug with min. 60 mt *	100,000 - 130,000 DW	2 ASD/Tractor Tug
DW > 130,000	According to agreement	DW > 130,000	According to agreement

Fig 35

Operational limits on approach:

Wind direction:	Wind force:
NNV – SSV	15 m/s
Other	11 m/s

Fig 36

Wave heights: Maximum 1.5 metres, in consultation with tugboat
Visibility: At least 3 times the length of the approaching ship
When the ships are almost the same size and the approaching ship is in ballast the anchor is changed or an additional tug is ordered for departure - but only if the majority of the cargo needs to be moved.
*(AFRA MAX)
12 hours before an STS pilotage operation with an AFRA Max tanker, the pilot who is expected to perform this contacts the agent if he assesses that arrival can only be carried out safely with assistance from a third tug. The size and type of a third tug are also agreed with the agent on this occasion.

12 References

Order on the transfer of liquid cargo between ships in Danish and Greenland territorial waters (STS operations)
https://www.dma.dk/Vaekst/Rammevilkaar/Legislation/.pdf

STS operations are not a new concept
https://www.dma.dk/Documents/Safety_sea/.pdf

Order on the issuing of pilot certificates and pilot exemption certificates
https://www.dma.dk/Vaekst/Rammevilkaar.pdf

(IMO)Addition of a new chapter 8 to MARPOL Annex I and consequential amendments to the Supplement to the IOPP Certificate, Form B
http://www.imo.org/en/KnowledgeCentre/Index.pdf

Baltic Marine Environment Protection Commission
https://portal.helcom.fi/meetings/MARITIME.pdf

Ship to Ship transfer Plan
https://issuu.com/dynamarine/docs/sample_sts_plan

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http://www.imsf.info/media/1286/imsf-presentation-11may2016.pdf

Dynamic modeling of underway ship to ship operations
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STS transfers- a risky business
https://www.onlinests.net/app/images/articles.pdf

Ship-to-ship cargo transfer – Wikipedia
https://en.wikipedia.org/wiki/Ship-to-ship_cargo_transfer

Prevention of pollution during transfere of oil cargo between oil tankers at sea
http://www.imo.org/en/KnowledgeCentre/Index.pdf

Example of STS-Plan
http://www.mavroudis.com.cy/media/cms/stsoperation_594A6B428D834.pdf

Oil Spill Risks From Tank Vessel Lightering
https://www.nap.edu/read/6312/chapter/3

North of England P&I Association
http://www.nepia.com/media/869603/Ship-to-Ship-Transfer-LP-Briefing.PDF

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http://www.mavroudis.com.cy/media/cms/stsoperation_594A6B428D834.pdf

Procedures: Step-by-step stages of a proper STS transfer
https://safety4sea.com/cm-procedures-step-by-step-stages-of-a-proper-sts-transfer/

The legal framework for STS operations needs updating
https://www.tankershipping.com/news.htm

Ships EN number
http://www.ics-shipping.org/docs/default-source/Submissions/

Fenders:
Yokohama Fender
http://www.yokohama-fenders.gr/yokohama-fenders/

China Good Quality Pneumatic Rubber Fender Supplier
http://www.pneumaticrubberfenders.com

Qingdao Jier Engineering Rubber Co., Ltd
http://www.finerfender.com/fenders-used-in-sts-transfer-operations/

Lion Rubber Industries Pvt. Ltd
http://www.lionrubber.com/index.php

Performance fenders
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Approved STS operators by DMA, Denmark
Fendercare
https://www.fendercare.com/ship-ship-transfers/

E & Q Sts
http://eq-sts.blogspot.com/

Mariflex
https://www.mariflex.net/

Teekay Marine solotion
https://www.teekay.com/blog/2015/12/11/teekay-ship-to-ship-innovation/

STS transfer is most frequent for liquid cargoes, but also applies for dry cargo
https://safety4sea.com/cm-procedures-step-by-step-stages-of-a-proper-sts-transfer/

INTERTANKO'S STANDARD TANKER CHARTERING QUESTIONNAIRE 88 (Q88)
http://www.q88.com/Questionnaire88.pdf

Maritime Assistance Service
24 timers kontaktpunkt:
Forsvarets Operationscenter
Maritime Assistance Service
Tlf: 72 85 03 70 (MAS vagten)
E-mail: mas@sok.dk
https://www2.forsvaret.dk/eng/Pages/English.aspx

Other relevant documents which is also is a part off the STS operation
Shipboard oil pollution Emergency plan (SOPEC)
Integrated Contingency Plan
OCIMF ship to Ship Transfere guide (OCIMF STS Guide)
International Safety Guide for oil tankers and terminals (ISGOTT)
International Regulation for preventing Collisions at Sea (COLREGS)
International Code of Signals
International Ship and Port Facilities Security (ISPS) code
International Convention on Standards of training, Certification and watch keeping for Seafarers (STCW)
International Chamber of shipping Bridge Procedures guide
International Chamber of shipping "peril at sea and salvage- A guide for masters
International Maritime organization, "Manual on oil pollution, Section I, Prevention", revised 1983
Ship and port Facility Security (ISPS)
OCIMF "Mooring Equipment Guidelines"
The code of Safe Working Practices for Merchant Seaman (CSWP)



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