ΑΕΝ ΜΑΚΕΔΟΝΙΑΣ

THE SHIP-PORT INTERFACE: THE MANAGEMENT OF SAFETY, SECURITY AND EFFICIENCY OF OPERATIONS

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ΘΕΜΑ:*The ship-port interface: the management of safety, security and efficiency of operations*

ΤΩΝ ΣΠΟΥΔΑΣΤΩΝ: ΙΩΑΝΝΙΔΗΣ ΘΕΟΔΩΡΟΣ Α.Γ.Μ:3862

ΝΤΙΝΑΚΗΣ ΧΡΗΣΤΟΣ Α.Γ.Μ:3873

Α/Α	Ονοματεπώνυμο	Ειδικότητα	Αξιολόγηση	Υπογραφή
1				
2				
3				
ΤΕΛΙΚΗ ΑΞΙΟΛΟΓΗΣΗ				

Ημερομηνία ανάληψης της εργασίας: 4/2018 Ημερομηνία παράδοσης της εργασίας:

Ο ΔΙΕΥΘΥΝΤΗΣ ΣΧΟΛΗΣ : Τσούλης Νικόλαος

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Abstract

This research focuses on the ship-port interface and is organized into 6 chapters. Chapter 1 is an introduction to the ship-port interface outlining its importance. Chapter 2 discusses the actions taken prior to the arrival at the port of destination involving safety. Chapter 3 presents a vessel type by type review of the safety procedures at port, as well as emergency procedures for potential accidents at port. Chapter 4 describes the security protocols that are to be followed while the vessel is at port. Chapter 5 is a breakdown of the port's role in shipping concerning efficiency. Finally, chapter 6 is a conclusion to the role of the ship and the port prior to and during operation.

Acknowledgements

We would like to express our gratitude to our supervising professors Dr Papaleonida Paraskevi and Dr Joanna I. Katsikopoulou for their aid in the completion of this research. In addition, we are grateful to the Merchant Marine Academy of Macedonia, Cpt. Tsoulis Nikolaos and our respected professors for their guidance in these years of attendance and the valuable knowledge they have passed on us.

1. Introduction to ship-port interface

Source:https://www.youtube.com/watch?v=RNe9bQ2-au4

The international shipping industry is responsible for the carriage of around 90% of world trade.

Shipping is the life blood of the global economy. Without shipping, intercontinental trade, the bulk transport of raw materials, and the import/export of affordable food and manufactured goods would simply not be possible.

Seaborne trade continues to expand, bringing benefits for consumers across the world through competitive freight costs. Thanks to the growing efficiency of shipping as a mode of transport and increased economic liberalization, the prospects for the industry's further growth continue to be strong.

There are over 50,000 merchant ships trading internationally, transporting every kind of cargo. The world fleet is registered in over 150 nations, and manned by over a million seafarers of virtually every nationality.

Ships are technically sophisticated, high value assets (larger hi-tech vessels can cost over US $200 million to build), and the operation of merchant ships generates an estimated annual income of over half a trillion US Dollars in freight rates.

All of the above-mentioned points lead to the conclusion that the shipping industry, in order to be successful, without delays and to be working for maximum value, the support from the shore operations must be on point. This shows how important it is to have good communication between the two operations (shipping and shore) which can be achieved with good management from the land side.

Source: https://s24288.pcdn.co/wp-content/uploads/2018/01/blog-dockWorkers.jpg

Ship Shore Interface Management

Interface is the term used for coordination between two different departments. When it comes to sea-Shore Interface, one side is counted as the ship staff and the other is the shore facility.

The base of the ship-shore interface management deals with exchange of information and transparent communication before or during different operations carried out together so that the safety of the operation is maintained at all times.

The shore side interface comprises of several departments such as: port authority, bunker supplier, shore workshop, shore firefighting department, service providers for vetting, security officials, surveyors, dry dock personnel and other shore supports.

1.1 Importance of Ship-Shore Interface

It is very important to maintain a clear interface while the two departments are working together, for any gap in communication can lead to inefficient operation, accidents, and even pollution.

Both, ship and shore staff must be adequately trained in the use of interface management so that the operation can be performed safely, efficiently and within the time limit.

Some basic examples of ship shore interfaces:

- Cargo loading and unloading in port
- Berthing and mooring of the ship in port
- Receiving bunker from shore support
- Arranging and setting security level in ship when in port
- Arrangement of survey when required
- Communication with dry dock personals when in dock

Since this industry is so multicultural, a standard training for the ship and shore personnel is required in order to avoid any communication errors which may lead into incidents.

2. Pre-port arrival procedures

Source: https://www.sapkoenchev.com/SPK_StsContFiles/1992131-1-p6hx_ecn0qhzbda3rxy55_2vmca.png

Arrival at port is one of the most important aspects of a ship's voyage. Prior to the arrival the ship's crew has to plan and discuss matters that would be required for safe berthing and cargo operation of the ship at port. All the crew from deck and engine department are assigned duties to carry out during the berthing of the ship.

A general plan involving stations for entering the port would involve:

Deck Department

- Master taking the control of the vessel at the bridge, accompanied by the third officer
- Chief Officer at the ship's bow to command and guide the forward station
- The second officer at the aft to command the aft station (However, this can change if master has other duties for the second officer)
- Deck crew members will be asked by the second or chief officer to assist in the berthing procedure
- Additional deck crew members can be asked to carry out the job of a lookout by the master whenever necessary
- The Bosun would generally assist the chief officer

Engine Department

- Chief engineer taking the control of the engine room
- First/Second engineer can also be asked to be in the engine room and command subordinates for operating machinery systems

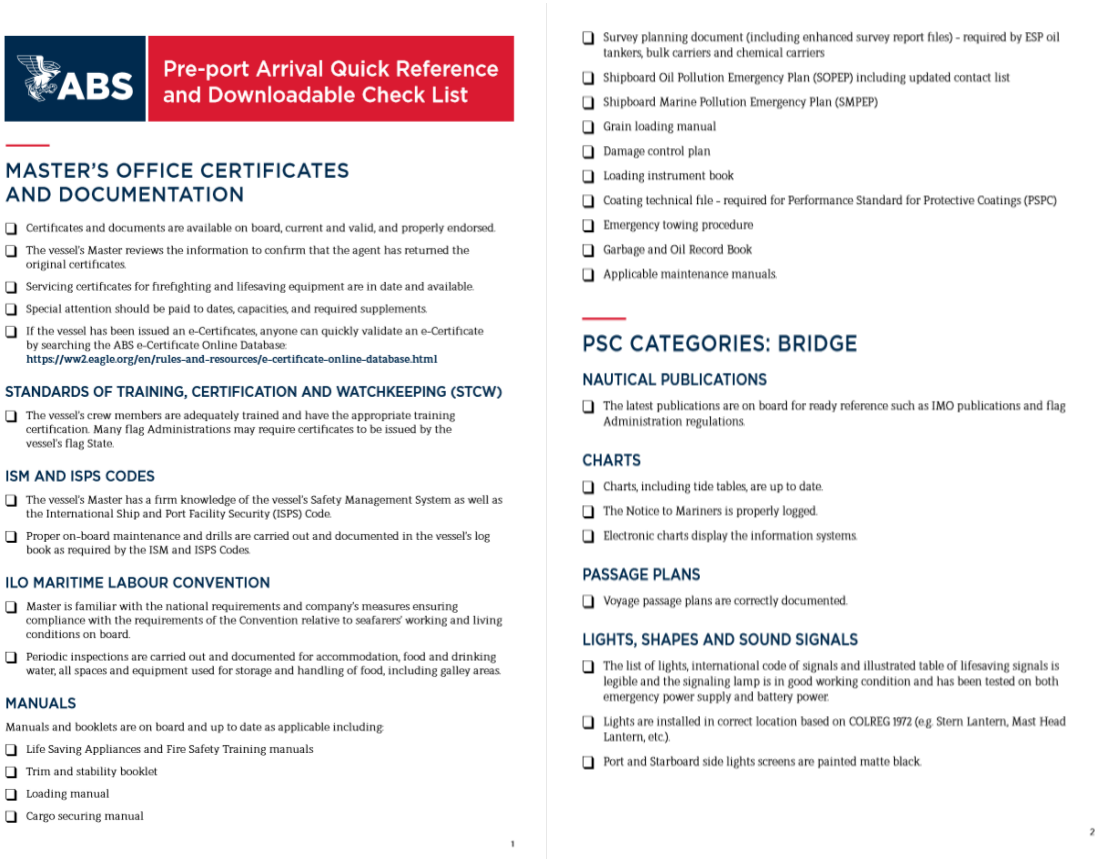
- Third and fourth engineer can be asked to be stationed at particular places in the engine room according to the orders of chief or second engineer
- Junior engineer would assist senior engineers and would take rounds of the engine room according to the orders of second engineer
- Motorman/Pumpman would assist in engine room operations under the supervision of senior engineers
- Other engine room ratings can be assigned duties by the chief engineer if required

In addition to the role and responsibilities of the crew, there are more measures to be taken to ensure safety during arrival. The engine department has to carry out tests on all the essential machinery that will be used during the maneuvering of the vessel as well as the mooring procedure Moreover, the pre-arrival checklist, the master-pilot information exchange as well a detailed mooring arrangement has to be prepared by the deck officers prior to arrival.

The above documents will be further analyzed in the following chapters.

2.1 Pre arrival checklist

The pre arrival checklist is a document that involves both the deck and the engine department and is signed by the Master, CO, CE, 2nd Engineer. The main subject of the checklist is safety checks on all equipment to be used during berthing and unberthing of the vessel as well as cargo operation. Depicted below is a pre-port arrival checklist as per the ABS classification society. This is a very inclusive checklist containing every single item a ship needs to have checked before the arrival to port. Such a checklist not only ensures the safety of the vessel and the smooth operation of its equipment but also the compliance of the vessel with regulations as per the International conventions (MARPOL, MLC, etc). It has to be noted that the checklist in the safety management system of the ship usually involves less items and focuses mainly on safety and equipment checks.



ABS

Pre-port Arrival Quick Reference and Downloadable Check List

MASTER'S OFFICE CERTIFICATES AND DOCUMENTATION

- ❑ Certificates and documents are available on board, current and valid, and properly endorsed.
- ❑ The vessel's Master reviews the information to confirm that the agent has returned the original certificates.
- ❑ Servicing certificates for firefighting and lifesaving equipment are in date and available.
- ❑ Special attention should be paid to dates, capacities, and required supplements.
- ❑ If the vessel has been issued an e-Certificates, anyone can quickly validate an e-Certificate by searching the ABS e-Certificate Online Database: https://ww2.eagle.org/en/rules-and-resources/e-certificate-online-database.html

STANDARDS OF TRAINING, CERTIFICATION AND WATCHKEEPING (STCW)

- ❑ The vessel's crew members are adequately trained and have the appropriate training certification. Many flag Administrations may require certificates to be issued by the vessel's flag State.

ISM AND ISPS CODES

- ❑ The vessel's Master has a firm knowledge of the vessel's Safety Management System as well as the International Ship and Port Facility Security (ISPS) Code.
- ❑ Proper on-board maintenance and drills are carried out and documented in the vessel's log book as required by the ISM and ISPS Codes.

ILO MARITIME LABOUR CONVENTION

- ❑ Master is familiar with the national requirements and company's measures ensuring compliance with the requirements of the Convention relative to seafarers' working and living conditions on board.
- ❑ Periodic inspections are carried out and documented for accommodation, food and drinking water, all spaces and equipment used for storage and handling of food, including galley areas.

MANUALS

Manuals and booklets are on board and up to date as applicable including:

- ❑ Life Saving Appliances and Fire Safety Training manuals
- ❑ Trim and stability booklet
- ❑ Loading manual
- ❑ Cargo securing manual

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- ❑ Survey planning document (including enhanced survey report files) - required by ESP oil tankers, bulk carriers and chemical carriers
- ❑ Shipboard Oil Pollution Emergency Plan (SOPEP) including updated contact list
- ❑ Shipboard Marine Pollution Emergency Plan (SMPEP)
- ❑ Grain loading manual
- ❑ Damage control plan
- ❑ Loading instrument book
- ❑ Coating technical file - required for Performance Standard for Protective Coatings (PSPC)
- ❑ Emergency towing procedure
- ❑ Garbage and Oil Record Book
- ❑ Applicable maintenance manuals.

PSC CATEGORIES: BRIDGE

NAUTICAL PUBLICATIONS

- ❑ The latest publications are on board for ready reference such as IMO publications and flag Administration regulations.

CHARTS

- ❑ Charts, including tide tables, are up to date.
- ❑ The Notice to Mariners is properly logged.
- ❑ Electronic charts display the information systems.

PASSAGE PLANS

- ❑ Voyage passage plans are correctly documented.

LIGHTS, SHAPES AND SOUND SIGNALS

- ❑ The list of lights, international code of signals and illustrated table of lifesaving signals is legible and the signaling lamp is in good working condition and has been tested on both emergency power supply and battery power.
- ❑ Lights are installed in correct location based on COLREG 1972 (e.g. Stern Lantern, Mast Head Lantern, etc.).
- ❑ Port and Starboard side lights screens are painted matte black.

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MAGNETIC AND GYRO COMPASSES

- ❑ The standard magnetic compass is adjusted for proper working condition, and the deviation card has been updated.
- ❑ No excessive deviation errors.
- ❑ The standard magnetic compass is free of air bubbles.
- ❑ The lifeboat/rescue boat magnetic compass is in good working order.
- ❑ The gyro compass is operational, and the error book is maintained.

GMDSS, EPIRB AND AIS

- ❑ Radio equipment is in good working order and is serviced and tested by a recognized radio technician.
- ❑ EPIRB is in proper working condition, programmed correctly and the battery expiration date is displayed within the window.
- ❑ The vessel's automatic identification system (AIS) is properly programmed and operational.
- ❑ VDR annual performance test certificate is on board.
- ❑ LRIT is in working condition, and the test report is available.

RADAR TRANSPONDER

- ❑ The radar transponder is located in the proper location, operationally tested and the expiration date of batteries is confirmed.

RADARS, ECHO SOUNDER AND ECDIS

- ❑ Radars and echo sounder are in proper working condition.
- ❑ ECDIS audible alarms are fully functional.

BRIDGE NAVIGATIONAL WATCH ALARM SYSTEM (BNWAS)

- ❑ BNWAS to be demonstrated that system is protected by security pass code (should be under control of Master).

DOCUMENTATION

- ❑ Service records for life raft and fire extinguishing equipment.
- ❑ Ship records from the Master's Log, primary and secondary steering gear testing, remote steering control, steering positions on the bridge, rudder angle indicator, steering gear failure alarms, control communications and control alarms, proper functioning of the emergency diesel generator, main propulsion ahead and astern testing.

THE BATTERY ROOM

- ❑ Room is to be inspected for cleanliness and proper ventilation.
- ❑ Battery room equipment is present and in good condition (gloves, eye protection, hydrometer, etc.).

PYROTECHNICS

- ❑ Dates on flares are not expired and required amount are to be on board.

PSC CATEGORIES: ACCOMMODATIONS

FIRE DAMPERS AND DOORS

- ❑ The fire dampers are in good working condition, functionally tested and recently examined internally and externally.
- ❑ Damper flaps are structurally sound with no edge wastage.
- ❑ The external ventilation trunk is marked to show damper flap position – OPEN or CLOSE.
- ❑ The location of fire dampers can be found on the fire control plan.
- ❑ Louver type dampers are tested to ensure louver contact and function.
- ❑ Weathertight doors are closing properly and in accordance with load line regulations.
- ❑ Accommodation internal fire doors not tied back with 'hooks.'

FIREFIGHTING EQUIPMENT

- ❑ The fire, smoke and heat detectors have been tested for proper operation.
- ❑ Fire detection panel displays with no faults.
- ❑ Fire stations have the appropriate equipment secured properly.
- ❑ Fire hoses are not leaking and have been checked for dry rot and usability.
- ❑ Fire hoses are of correct length and diameter for location (15m, 20m, etc.).
- ❑ Fire main is in good condition and does not have patches or holes.
- ❑ Isolation and relief valves are working properly.
- ❑ Portable and fixed firefighting systems have been serviced as required, and extinguishers are properly marked with date of servicing.
- ❑ Fixed firefighting systems have been serviced and do not have any loose hoses, and the system has been reactivated.

- ❑ Fire line isolating valve between the engine room (ER) and deck has been tested and is working properly.
- ❑ Foam systems where fit have had analysis samples taken and are operation-ready.
- ❑ Fixed water spray system valves are aligned and ready for immediate use.
- ❑ Access to fixed CO_2 system (key in glass box) to be readily available.

FIRE CONTROL PLANS

- ❑ Fire control plans are up to date with appropriate IMO markings and symbols.
- ❑ Emergency control stations are clean and equipped with applicable safety equipment.
- ❑ Remote and quick closing devices are in good operating order.

LIFE JACKETS WITH LIGHTS AND WHISTLES

- ❑ The correct number and location are clearly shown on the safety plan and are located on board.

CABLE PENETRATIONS

- ❑ Cable penetrations in accommodation bulkheads (wheelhouse/radio room, etc.) are all effectively sealed.

PSC CATEGORIES: CARGO AREA

LIFERAFTS

- ❑ Liferafts have been serviced by an approved servicing company.
- ❑ Liferaft hydrostatic releases are correctly connected and have valid service certificates and/or expiry dates.
- ❑ Liferafts are properly secured.
- ❑ Launching arrangements are in good condition (as applicable) with no obstructions for float-free operation.

LIFESAVING EQUIPMENT

- ❑ Lifebuoys – the correct number is identified by type with line, light or smoke as applicable and with legible vessel markings.
- ❑ Bridge wing Man-Overboard smoke and lights ready for easy release.

HATCH COVERS AND WEATHERTIGHT CLOSING APPLIANCES

- ❑ Hatch covers and weathertight closing appliances are in proper working condition and have been checked for missing or damaged gaskets, cleats, wedges and securing devices.
- ❑ Hatches are tight and properly fitted.
- ❑ Where required, there is safe access to the bow.

CARGO CONTROL ROOM

- ❑ Oil Discharge and Monitoring Equipment is functioning properly and has not been tampered with.

PSC CATEGORIES: MAIN DECK

LIFEBOATS/RESCUE BOAT

- ❑ The lifeboat (rescue) structure (hull integrity, seats/ thwarts, flooring, releasing hook connections to the boat, releasing gear, tiller/gudgeons) has been checked for proper maintenance with no wastage or rot.
- ❑ The engine is in good working condition and has been operationally tested, and fuel tank is full.
- ❑ The lifeboat (rescue) equipment has been checked for proper quantity, expiration date and condition.
- ❑ Lifeboat/rescue boat painter is connected.
- ❑ Lifeboats (rescue) have been lowered as per schedule and released from hooks to confirm release mechanisms.
- ❑ Required interior equipment has been accounted for.
- ❑ Lifeboat seat belts are of contrasting colors.
- ❑ Lifeboat window at helmsman's position has clear visibility.
- ❑ Lifeboat hatches are maintained.
- ❑ Lifeboat nonslip surfaces are maintained.
- ❑ Air supply system is maintained.

LIFEBOAT/RESCUE BOAT AND LIFERAFT DAVITS

- ❑ Davits are in good working condition and have been operationally tested.
- ❑ Davits should be checked for wastage, proper hoisting/lowering and braking function.
- ❑ Sheaves and loose gear are not worn.
- ❑ Wires have been serviced and changed out as necessary.
- ❑ Limit switches and winches have been tested.
- ❑ Launching instructions are clearly posted and located in way of emergency lighting.

DECK

- ❑ Excessive corrosion, cracking, buckling – if found should be immediately reported to the local ABS office.
- ❑ Handrails are intact and in accordance with load line regulation.

AIR PIPES AND VENTILATORS

- ❑ Air pipes and closure devices are checked for wastage.
- ❑ Closure devices have been opened and the flame screen checked.

SHORE CONNECTIONS

- ❑ International shore connection is on board.
- ❑ Electrical shore connections have proper connections and are functioning.
- ❑ MARPOL Annex I and IV standard discharge connections where required have proper fittings, are marked, and have proper intact drip coamings.

ACCOMMODATION LADDER

- ❑ Accommodation ladders are free of any defects (fractured steps, side ropes etc.), and the gangway safety net has been prepared and correctly rigged.

VESSEL ACCESS

- ❑ Gangway log book entries are maintained and up to date.
- ❑ Areas with restricted access are clearly marked and locked.

LOAD LINE – DRAFT MARKS

- ❑ Port and Starboard Load Line marks checked and confirmed to be clearly visible.
- ❑ Draft marks are clear to read.

PSC CATEGORIES: ENGINE ROOM

MAIN AND EMERGENCY FIRE PUMPS

- ❑ The main and emergency fire pumps are to be in proper working condition – gauges operational, priming pump functioning, remote starting is operational (if applicable) and pumps are capable of taking sea suction and maintaining the proper line pressure.
- ❑ Operating instructions are posted in plain view.
- ❑ Visual examination is completed of fixed firefighting system nozzles.

MACHINERY SAFETY SYSTEMS

- ❑ Valves are free from obstruction and are in operational condition.
- ❑ All machinery safety systems are operational without alarms present.
- ❑ All FO Tank sounding pipes are closed, and self-closing devices are working correctly.

ELECTRICAL INSTALLATION

- ❑ 220v main and emergency switchboards, and feeder panels are clear of any low insulation readings.
- ❑ Switchboards are to be provided with insulated matting both in front and behind.

CLEANLINESS

- ❑ Excess oil leaks from engines, bilges, containment areas and FO/LO processing areas have been cleaned.
- ❑ The sources of any excessive oil leaks have been rectified.
- ❑ Repair damaged lighting and/or replace burned bulbs.
- ❑ Fire hydrants and hose stations are clean and in good working order.
- ❑ No thermal insulation is oil soaked.
- ❑ No oil-soaked rags are left in decks or bilge wells.
- ❑ Tools and equipment are stored properly, and emergency exits are clear.

MARPOL ANNEX IV

- ❑ Sewage treatment plant is fully operational, including aeration blowers, sight tube, alarm panel, etc.
- ❑ Sewage treatment system is operational and not leaking.

MARPOL ANNEX V

- ❑ Garbage Management Plan are available on board.
- ❑ Garbage Record Book entries are up to date.
- ❑ Incinerator alarms and safety devices are all fully operational.

MAIN PROPULSION ENGINE

- ❑ Components of the main propulsion engine are working correctly.
- ❑ The emergency control station and engine side station are operating correctly.
- ❑ Validate that emergency procedures can be carried out as applicable.
- ❑ There are no visible engine oil leaks.
- ❑ MARPOL Annex VI, technical files for each engine should be available.
- ❑ The record book of the engine parameters should be updated by the Chief Engineer as applicable.

AUXILIARY ENGINES AND EQUIPMENT

- ❑ Auxiliary engines and attachments have been tested to see that gauges, emergency shut downs, automatic changeovers and quick closing valves are operating properly.
- ❑ Auxiliary engine fuel oil leakage alarms are working and drain valves are in closed position.
- ❑ MARPOL Annex VI, the EIAPP certificates and technical files for each engine should be available.
- ❑ The record book of the engine parameters should be updated by the Chief Engineer as applicable.
- ❑ There are no visible engine oil leaks.

OILY WATER SEPARATOR EQUIPMENT

- ❑ Check to see that oily water separator equipment and 15 ppm alarm have been operationally tested including automatic stopping devices, alarms, piping systems and gauges, and found properly functioning.
- ❑ Confirm that no unauthorized piping or electrical modifications have been made.
- ❑ Verify that the Oil Record Book has been filled out correctly and signed by the Chief Engineer and Master, as per MARPOL Annex I.

HIGH PRESSURE FUEL LINES

- ❑ High pressure fuel lines are jacketed and spray shields in place as required.

PORTABLE AND FIXED FIREFIGHTING SYSTEMS

- ❑ Systems have been serviced as required and extinguishers are properly marked with date of servicing.
- ❑ Machinery space fire hoses are correct length (15m maximum).
- ❑ Boiler burner location is provided with sand box.
- ❑ Fire Doors have proper closing mechanisms and are not purposely open.

MARPOL ANNEX VI (INCINERATORS)

- ❑ Valid IMO Type Approval Certificate is available.
- ❑ Manufacturer's operating manual is available.
- ❑ Incinerator alarms and safety devices are all fully operational.

PSC CATEGORIES: WORK SPACES (PUMP ROOM, STEERING FLAT, ETC.)

MAIN AND EMERGENCY FIRE PUMPS

- ❑ The main and emergency fire pumps are to be in proper working condition – gauges operational, priming pump functioning, remote starting is operational (if applicable) and pumps are capable of taking sea suction and maintaining the proper line pressure.
- ❑ Operating instructions are posted in plain view.

STEERING GEAR

- ❑ The main and emergency steering gear has been tested and is functioning properly with no visible hydraulic leaks.
- ❑ Steering gear gyro compass repeater without deviation error.

EMERGENCY POWER

- ❑ The emergency generator has been operationally tested and is capable of coming online automatically within 45 seconds.
- ❑ Emergency generator fuel oil tank is full, and quick closing valve is operational.
- ❑ Emergency lighting is operationally tested, and any defective lights replaced.
- ❑ A transitional source of power (as applicable) and emergency power batteries have been checked for proper operation.

PORTABLE AND FIXED FIREFIGHTING SYSTEMS

- ❑ Systems have been serviced as required and extinguishers are properly marked with date of servicing.

INSULATION

- ❑ A-60 Insulation is intact in all areas (emergency escape trunks, etc.).

PSC CATEGORIES: PORT ARRIVAL

PRE-ARRIVAL

- ❑ Accidental damage that is suffered while sailing to the port of call must be submitted to the Port State with details on the circumstances of the accident, damage suffered, remedial action and information about notification to the Flag State.

INCREASED CHANCES OF PORT STATE ACTIVITY

- ❑ First time being in the region in the past year.
- ❑ Vessel has not been inspected in the last 6 months.
- ❑ Deficiencies were found at last Port State inspection.
- ❑ Vessel has been detained in the last year.

ISM CODE: PSC ISM-RELATED DEFICIENCIES

ISM ELEMENT 2: SAFETY AND ENVIRONMENTAL PROTECTION POLICY

- ❑ A Safety and Environmental Protection (SEP) policy, understood and supported by the crew, provides strong evidence of an overall effective implementation of the company's SMS.
- ❑ The policy posters are displayed at prominent locations.
- ❑ The policy is properly controlled, and the latest revision is in use.
- ❑ Crew members are able to demonstrate a satisfactory level of awareness of the SEP policy.
- ❑ Safety and environmental objectives and targets established in the SMS are consistent with those contained in the policy statement.
- ❑ On board procedures and practices support and contribute to the successful achievement of objectives and targets established by the company.

ISM ELEMENT 3: COMPANY RESPONSIBILITIES AND AUTHORITY

- ❑ The provision of support, allocation of resources and overall commitment of the company is vital for the effective implementation of the SMS on board the vessel.
- ❑ Responsibility, authority and lines of reporting of key personnel are clearly defined and documented.
- ❑ Crew personnel are able to demonstrate a satisfactory level of awareness of their duties and responsibilities as detailed in the SMS.
- ❑ If day-to-day operations of the vessel have been delegated to a management company, evidence of this delegation is available.
- ❑ Requisitions for supply of stores, spares and requests for repairs are being followed up by the shore-based management in a timely manner.
- ❑ There is evidence of follow up action and monitoring by shore-based management over documented and reported outstanding nonconformities and deficiencies.

ISM ELEMENT 4: DESIGNATED PERSONS

- ❑ As the custodian of the SMS, the ISM Code places a special responsibility on the designated person ashore (DPA). The nominated person must hold the relevant qualification and experience and demonstrate the commitment required by the position.
- ❑ Identity and contact details of the DPA have been reported to the flag Administration, if required.
- ❑ DPA has direct access to the top company management.
- ❑ Qualifications, experience and training of the DPA meets the IMO guidance contained in the Annex to MSC-MEPC.7/Circ.6.
- ❑ Crew are aware of the identity and contact details of the DPA.
- ❑ There is evidence to show that the DPA is engaged in monitoring the safety and pollution prevention aspects of all vessel operations.

ISM ELEMENT 5: MASTER'S RESPONSIBILITY AND AUTHORITY

The Master has the responsibility to ensure that the requirements specified in the company's SMS are being observed. To this end, the Master needs to be completely familiar with the SMS and be given the necessary support and overriding authority to make decisions relating to safety and pollution prevention.

- ❑ Master is able to demonstrate familiarity with his/her role and responsibility under the ISM Code.
- ❑ SMS contains a clear statement giving the Master overriding authority to take decisions relating to safety and pollution prevention and to ask for assistance from the company when needed.

- ❑ Master is aware of where this overriding authority is documented and is able to explain the intent of this provision.
- ❑ Master's review of the SMS has been carried out as specified in the SMS and that it is effective.
- ❑ Master's standing and night orders are current and in accordance with SMS.
- ❑ Master is verifying that crew is observing the procedures and processes specified in the company's SMS.

ISM ELEMENT 6: RESOURCES AND PERSONNEL

- ❑ The SMS must ensure that all personnel including the crew are competent, properly qualified, medically fit and given the proper training and familiarization to safely and efficiently perform their assigned responsibilities.
- ❑ Crew on board meet or exceed the minimum safe manning criteria established by the flag Administration, and the vessel is appropriately manned in order to maintain safe operations on board under all conditions.
- ❑ Officers and ratings hold valid certificates and endorsements as per the International Convention on Standards of Training, Certification and Watchkeeping.

Seafarers (STCW)

- ❑ All crew hold valid medical fitness certificates.
- ❑ The Master is fully conversant with the company's SMS.
- ❑ Safety induction, shipboard familiarization and safety training of crew have been carried out as per the SMS.
- ❑ Crew members are able to effectively communicate as a team in the execution of their duties.
- ❑ Crew members are able to demonstrate their familiarity with the SMS commensurate to their roles and responsibilities.
- ❑ Shipboard officers are familiar with relevant rules and regulations covered by the SMS.
- ❑ Company and ship security officers are qualified and hold valid certificates as required by the Administration.
- ❑ Watchkeeping schedules have been established, and a record of hours of rest is being maintained as per the STCW.

ISM ELEMENT 7: SHIPBOARD OPERATIONS

- ❑ Key shipboard operations that can affect safety and pollution prevention must be backed by documented procedures with responsibilities assigned to qualified personnel.
- ❑ The SMS contains documented procedures for key shipboard operations.
- ❑ Roles and responsibilities have been clearly assigned to qualified personnel who are able to demonstrate their familiarity with assigned tasks.
- ❑ Voyage passage planning is carried out from berth to berth.
- ❑ Navigational charts and publications for the intended passage are available on board and have been updated to the latest notices to mariners.
- ❑ Ship stability and stress calculations for different stages of the voyage are being carried out.
- ❑ Bridge and engine room checklists (arrival, departure, testing controls, watchkeeping, etc.) are being followed.
- ❑ Permit to work (hot work, entry into enclosed spaces, working aloft, lock out-tag out) procedures are being complied with.
- ❑ Suitable personnel protective equipment is being used by the crew.
- ❑ Bunker and fuel transfer procedures are complied with.
- ❑ Procedures for operations with low sulfur fuel oil are being followed – as applicable.
- ❑ The ballast water exchange plan is complied with as per regulations.
- ❑ The waste management plan is properly implemented.
- ❑ A safe means of embarkation and disembarkation is available.
- ❑ An efficient gangway watch is maintained and access to the vessel is controlled.

ISM ELEMENT 8: EMERGENCY PREPAREDNESS

- ❑ The company should identify all potential emergency situations that can affect its fleet; develop contingency plans to mitigate adverse impact of emergencies; periodically test the contingency plans to validate their effectiveness; and train and familiarize the crew.
- ❑ Crew emergency response plans and muster lists are current and up to date.
- ❑ Personnel are familiar with their muster stations and assigned duties.
- ❑ Contingency plans for potential emergency situations are available.
- ❑ Drills as required by SOLAS and as per the company's SMS have been carried out.
- ❑ Emergency exercises with the shore-based emergency response team have been carried out as required by the SMS.
- ❑ Post-drill analysis to identify weaknesses and lessons learned is carried out for continuous improvement.
- ❑ Personnel are able to satisfactorily demonstrate emergency drills.

- ❑ Emergency contact information for the shore-based emergency response team is updated and kept current.
- ❑ All safety equipment is readily available and adequately maintained.
- ❑ Fire control plans are up to date and current.
- ❑ Means of escape and access are not obstructed.

ISM ELEMENT 9: REPORTS AND ANALYSES OF NONCONFORMITIES, ACCIDENTS AND HAZARDOUS OCCURRENCES

- ❑ Accidents, incidents, near misses and nonconformities must be reported and analyzed to determine the root cause. Appropriate timely corrective actions must be taken to prevent recurrence. Data collected is to be used for trending and continuous improvement.
- ❑ All accidents, incidents, injuries and near misses are being reported.
- ❑ Accidents, incidents, injuries and near misses are being recorded and investigated to determine the root cause.
- ❑ Timely corrective and preventive action is being taken and records maintained.
- ❑ Reported accidents and incidents are being closed out in a timely manner after verification of effectiveness of action taken.
- ❑ Follow-up actions and monitoring by shore-based management of reported cases and actions taken are evident.
- ❑ Following a PSC detention, corrective action taken by the ship must not be limited to the PSC deficiencies.
- ❑ Action has been taken to identify and resolve other similar deficiencies existing on board.

ISM ELEMENT 10: MAINTENANCE OF THE SHIP AND EQUIPMENT

This element addresses areas in the SMS where the highest percentage of nonconformities and deficiencies are identified. Nearly 30% of all PSC ISM-related deficiencies relate to inadequate maintenance. A vast majority of detainable PSC ISM deficiencies (Code 30) relate to maintenance of ship and equipment.

- ❑ The vessel is clean, tidy, habitable and well illuminated.
- ❑ There is no evidence of excessive corrosion and/or wastage on exposed decks and fittings.
- ❑ The ship has implemented and is maintaining an effective planned and/or preventive maintenance system (PPMS).
- ❑ PPMS is up to date with minimum overdue maintenance items.
- ❑ Inspection of the vessel is carried out as established in the SMS, and identified defects are being dealt with.
- ❑ All class, statutory and other required trading certificates are valid and up to date.
- ❑ No unauthorized repairs, modifications or alterations have been carried out.

- ❑ Machinery and hull defects including breakdowns have been reported to the company.
- ❑ Reported defects are being monitored by the company, and timely corrective action is being implemented to rectify them.
- ❑ There is no accumulation of oily water residues in the machinery space bilges or on the tank tops.
- ❑ Air pipes, sounding pipes, ventilators and closing appliances are properly maintained and are fully operational.
- ❑ Lifeboat/rescue boat lowering winch/davits are being maintained/serviced and are in good operational condition.
- ❑ Critical and standby equipment and systems have been identified and routine testing is being carried out.
- ❑ A sufficient stock of spares and stores is available on board as required by the SMS.
- ❑ Records of maintenance and test activities are available.

ISM ELEMENT 11: DOCUMENTATION

- ❑ All documentation relating to the SMS must be controlled and available at all relevant locations to ensure safe and pollution-free operations.
- ❑ All class, statutory and other applicable trading certificates relevant to the ship are available.
- ❑ The latest revisions of the SMS manuals, procedures and records are readily available at relevant locations.
- ❑ The latest editions of publications required by the vessel's flag Administration are available.
- ❑ A copy of the company's ISM Document of Compliance with the latest endorsement is available.
- ❑ Deck, engine, GMDSS and other applicable official log books are maintained and up to date.
- ❑ The correct format of the Oil Record Book is in use on board and kept up to date.
- ❑ Latest issue of the Continuous Synopsis Record (CSR) including old revisions of CSR are maintained on board.

ISM ELEMENT 12: COMPANY VERIFICATION, REVIEW AND EVALUATION

- ❑ The company must ensure that the SMS is effectively implemented and fosters continuous improvement through a system of internal audits and management reviews.
- ❑ Internal audits have been carried out at intervals not exceeding 12 months by auditors who are independent of areas audited.
- ❑ External audits have been carried out as required by the ISM Code.
- ❑ Audit reports are available on board.
- ❑ Audit findings are being tracked to closure.
- ❑ Timely corrective action has been taken to close out audit findings.

- ❑ Shore-based management is monitoring and providing the necessary support in implementation of corrective actions.
- ❑ The company has developed and implemented a procedure for risk assessments.
- ❑ Periodic verification has been performed to confirm that individuals undertaking delegated ISM-related tasks are acting in conformity with the company's responsibilities under the Code.
- ❑ Appropriate safeguards have been established against all identified risks to the ship, personnel and the environment.
- ❑ Management reviews to verify the effectiveness of the SMS are being carried out and records are available.

INTERNATIONAL SHIP AND PORT FACILITY SECURITY (ISPS) CODE

- ❑ PSC detentions resulting from ISPS-related deficiencies are on the rise. To prevent these, vessels must implement the security measures as per the approved ship security plan. Access to the ship must be controlled through an efficient system of gangway watchmen, visitor identification and checking of personal belongings.
- ❑ There is an approved Ship Security Plan (SSP) on board, and all security measures are implemented for the applicable security level.
- ❑ Master, Ship Security Officer (SSO) and crew members are aware of all levels of ship security and applicable procedures at each level.
- ❑ SSO and other personnel with security duties are trained and certified in accordance with STCW requirements.
- ❑ Master and SSO are aware of their responsibility of periodically reviewing security measures and recommending changes to the SSP as appropriate.
- ❑ Access to ship is controlled and crew members on watch are familiar with the access control measures at each security level. This includes control measures applied at ladders, gangways, ramps, doors, side scuttles, windows, ports, cranes, hoisting gears, etc. as applicable.
- ❑ Restricted areas have been identified and crew members are aware of access control measures applied to these areas.
- ❑ All security equipment necessary for maintaining the security levels, including all security equipment listed in the SSP, is in working condition.
- ❑ Stores, spares, provisions are searched in accordance with the SSP, and crew members are aware of their responsibilities.
- ❑ Shipboard security training and drills are periodically carried out in accordance with SSP.
- ❑ Security incidents and breaches of security are documented, and timely corrective and preventive actions taken.

Following records of security activities are maintained on board:

- ❑ Training, drills and exercises.
- ❑ Security threats and security incident reports.
- ❑ Changes in security level.
- ❑ Communications relating to the direct security of the ship such as specific threat to the ships or to port facilities the ship is, or so has been.
- ❑ Declaration of Security (DOS) for last 10 port calls.
- ❑ Internal audit report(s).
- ❑ Periodic reviews of Ship Security Assessment and Ship Security Plan.
- ❑ Maintenance, calibration and testing of security equipment identified in the SSP.

ILO MARITIME LABOUR CONVENTION (MLC, 2006)

MINIMUM AGE

- ❑ All seafarers onboard are at least 16 years of age or as required by flag state.
- ❑ Seafarer under the age of 18 is not working at night (except under an approved training program).
- ❑ Seafarer under the age of 18 is not carrying out tasks that are likely to jeopardize their safety or health.

MEDICAL CERTIFICATION

- ❑ Seafarers are not allowed to work if they are not medically fit.
- ❑ Seafarers have been issued a medical examination certificate by a qualified medical practitioner in accordance with the national law.
- ❑ Medical certificate validity should not be more than two years for seafarer 18 years or more and one year for seafarer less than 18 years of age.
- ❑ Seafarers holding color vision certificates does not exceed 6 years of validity or any other time frame impose by flag state.
- ❑ If the medical certificate has any restriction, seafarer do not attend to any task where the restriction applies.
- ❑ Medical certificates are in the English language if the ship is engaged in international voyages.

QUALIFICATIONS OF SEAFARERS

- ❑ Seafarers are trained or certified in accordance with the STCW convention, and minimum requirements of the Safe Manning Document (SMD) are met.
- ❑ All seafarers have completed training for personal safety onboard ship.
- ❑ Seafarers' employment agreements.
- ❑ Copy of seafarer employment agreement (SEA) and collective bargaining agreement (CBA) as applicable are available on board.
- ❑ Each SEA is signed by the seafarer and the ship owner or an authorized representative of the shipowner.
- ❑ All SEA address requirements of the Standard A 2.1 and are consistent with applicable national standard(s).
- ❑ SEA is written in the English language and does not contain any clause that violates seafarers' rights.

USE OF ANY LICENSED OR CERTIFIED OR REGULATED PRIVATE RECRUITMENT AND PLACEMENT SERVICE

- ❑ Documentary evidence indicates that private recruitment and placement service(s) employing seafarers on behalf of the shipowner is (are) operated in accordance with the convention.
- ❑ Private recruitment and placement services are licensed or certified or regulated in accordance with the convention.
- ❑ Seafarers are not charged for recruitment and placement services.

HOURS OF WORK OR REST

- ❑ Work schedule at sea and in port conforms to the requirements of the convention.
- ❑ Work schedule is written in English language and working language of the ship and posted in relevant locations.
- ❑ Records of hours of work or rest are maintained in a format specified/accepted by the flag state.

MANNING LEVELS FOR THE SHIP

- ❑ Ship complies with the Safe Manning Document (SMD) or equivalent issued by the flag state.
- ❑ Sufficient number of seafarers are onboard to ensure safety and security under all conditions, taking into account seafarer fatigue and the particular nature and conditions of voyages undertaken.

ACCOMMODATION AND ONBOARD RECREATIONAL FACILITIES

- ❑ Documentary evidence confirming that accommodation is built to the applicable national standard(s).
- ❑ Heating, lighting, ventilation systems, and other fittings and fixtures are in good working condition.
- ❑ Separate sleeping rooms and sanitary facilities are provided to men and women seafarers.
- ❑ Sanitary facilities are adequate for number of personnel onboard and functional.
- ❑ Hospital is maintained in accordance with the national requirements and used only for taking care of sick seafarers.
- ❑ Laundry facilities are adequate and functioning correctly.
- ❑ Noise and vibration including other ambient factors are controlled and within limits as specified under national requirements.
- ❑ Periodic Inspection records of the accommodation, including mess rooms and recreational facilities are available.

FOOD AND CATERING

- ❑ Food and drinking water of adequate quantity, nutrition and quality are provided.
- ❑ Seafarers are not charged for food and drinking water.
- ❑ Ship's cook is at least 18 years of age and trained and qualified for the position.
- ❑ Periodic inspection records of food, drinking water, food preparation, storage and handling areas are available.
- ❑ Catering facilities are hygienic and fit for the purpose.

HEALTH AND SAFETY AND ACCIDENT PREVENTION

- ❑ Health and Safety Policy is available and understood by all seafarers.
- ❑ Programs for prevention of occupational accidents, injuries, and diseases are implemented.
- ❑ Safety committee meetings are periodically conducted and documented.
- ❑ Personnel Protective Equipment (PPE) is available to seafarers.
- ❑ A risk assessment is taken into consideration for the work assignment.
- ❑ Accidents are investigated and reported.

ON BOARD MEDICAL CARE

- ❑ Seafarers are provided appropriate health protection and medical care, including dental care on board the ship at no cost.
- ❑ Personnel with appropriate STCW qualification are on board to provide medical care or first aid (where medical doctors are not required to be carried on board).
- ❑ Medical chest, medical supplies and equipment meets national requirements.
- ❑ International Medical Guide for Ships and medical report forms are maintained on board.

ON-BOARD COMPLAINT PROCEDURES

- ❑ Seafarers are provided with a copy of on-board complaint procedure in the working language of the ship.
- ❑ Seafarers are familiar with the on-board complaint procedure, including prohibition on victimization for filing a complaint.
- ❑ Seafarers understand that they have a right to file a complaint directly with the ship's Master or external authorities.
- ❑ A complaint log, including disposition of each complaint, is maintained on board.

PAYMENT OF WAGES

- ❑ Seafarers are paid regularly in accordance with SEA (including CBA if any), at least monthly.
- ❑ Monthly wage slips are provided to each seafarer, and no unauthorized deductions are made.
- ❑ Charges for remittances and allotments, including exchange rates, are in accordance with national requirements.

FINANCIAL SECURITY FOR REPATRIATION

- ❑ Evidence of financial security confirms that financial security for repatriation is available onboard and includes an attestation from the financial security provider that the financial security meets the requirements of Stand A2.5.2.
- ❑ Financial security documents include name of the ship, port of registry, call sign, IMO number, name and address of the provider or providers of the financial security, contact details of the persons or entity responsible for handling seafarers' requests for relief, name of the shipowner, and period of validity of the financial security.
- ❑ A copy of the Financial Security is posted in a conspicuous place on board where it is available to the seafarers. Where more than one financial security provider provides cover, the document provided by each provider are carried on board.

FINANCIAL SECURITY RELATING TO SHIPOWNERS' LIABILITY

- ❑ Evidence of financial security confirming that financial security for repatriation is available onboard and includes an attestation from the financial security provider that the financial security meets the requirements of Standard A 4.2.1.
- ❑ Financial security documents include name of the ship, port of registry, call sign, IMO number, name and address of the provider or providers of the financial security, contact details of the persons or entity responsible for handling seafarers' requests for relief, name of the shipowners, and period of validity of the financial security.
- ❑ A copy of the Financial Security is posted in a conspicuous place on board where it is available to the seafarers. Where more than one financial security provider provides cover, the document provided by each provider are carried on board.

RESOURCES

IF YOUR SHIP IS DETAINED

Owners and representatives are to notify ABS when a vessel is being detained by a Port State Authority or flag Administration

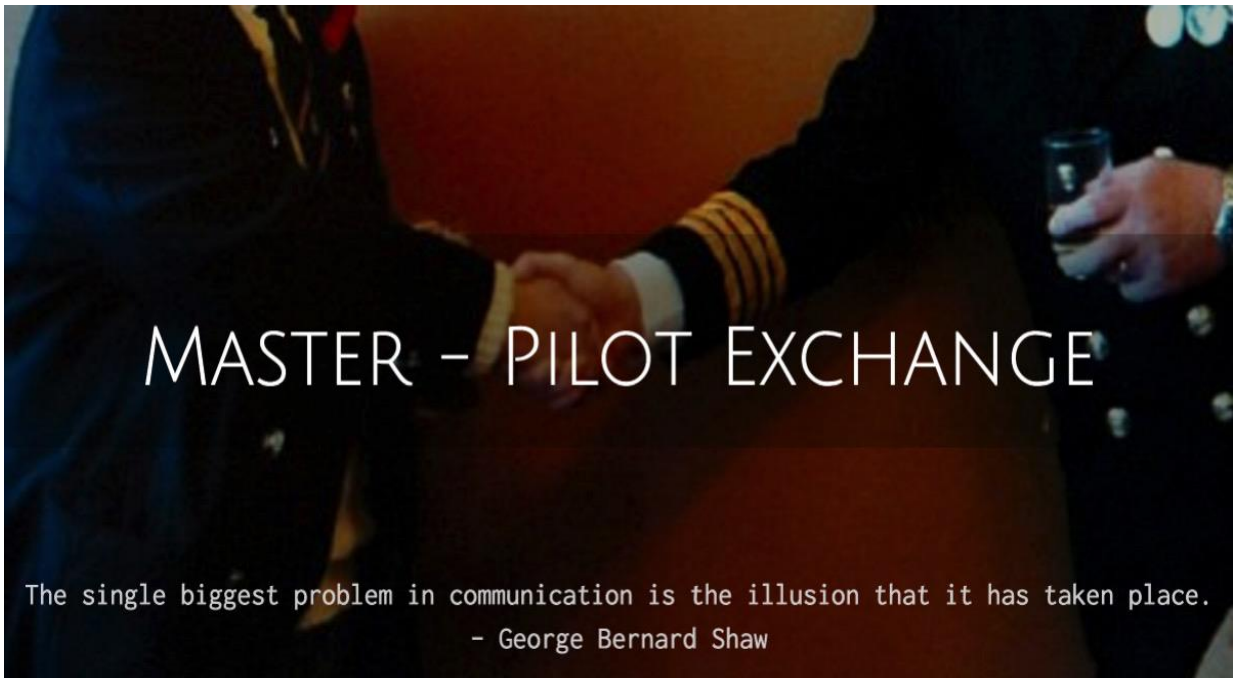
WESTERN HEMISPHERE
Houston, TX USA
P 1-281-877-6000, 6021 or 6027
WHSurveyMarine@eagle.org
WHSurveyOffshore@eagle.org

EASTERN HEMISPHERE
Shanghai, China
P 86-21-2327-0888
EHsurveydept@eagle.org

Source:https://ww2.eagle.org/content/dam/eagle/rules-and-resources/Flag-and-Port-State-Information/pre-port-arrival-quick-reference-and-downloadable-check-list-18270-a4-format.pdf

2.2 Master-Pilot information exchange

The master and the pilot should exchange information regarding navigational procedures, local conditions and rules and the ship's characteristics. This information exchange should be a continuous process that generally continues for the duration of the pilotage. With the pilot onboard it is the opportunity for the master and the bridge team to confirm arrangements and ensure that they are satisfied with the planned transit and berthing/ unberthing maneuver. This is the first and best opportunity to talk to the pilot and to clarify any issues that may have been identified during the preparation of the onboard plan. However, it is important to prioritize this process so that the limited time available at the start of the pilotage can be addressed directly and less urgent matters discussed once on route. The exchange of information between the master and pilot does not shift the responsibility for the safety of the vessel from one to the other. The pilot and the bridge team must confirm the language to be used during pilotage to avoid any communication errors.



Source:https://cultofsea.com/navigation/master-pilot-exchange-duties-responsibilities-and-elements-of-effective-relationship/

Amongst other things, the bridge team will need to know the following:

The transit to and from the berth

- Route agreed with waypoints and courses, adequate charts
- Speed and timing for the transit
- Local weather and tidal conditions expected
- Vessel movements, any congestion off the berth
- Local traffic regulations to be complied with
- Depth limitations duo to tide and/or squat
- Minimum depth on passage
- Local tidal data, heights, slack water and when the direction of flow changes
- Rate and direction of any currents
- Location of turning areas including those required for a berthing manoeuvre
- Abort points
- Emergency or standby anchorage areas

Tugs

- Number of tugs, their type and power
- Time of arrival of the vessel
- Where the tugs will be made fast
- Ship line or tugs line to be used

The berth

- Any limitations such as the maximum/minimum size of vessel, number of bollards, fender capacity
- Turning areas are of sufficient size
- Available depth alongside at low water
- Any air draught restrictions
- Which is the first line ashore
- Will mooring boats assist
- Mooring plan
- Any berthing aids to assist in determining speed when maneuvering
- Any berthing speed limits
- Time required to order pilot / tugs in emergency
- Departure procedures for letting go moorings

2.3 Mooring-unmooring steps to ensure safety prior to operation

Mooring and unmooring are procedures that include a lot of dangers. It is therefore essential that guidelines are in place to ensure the safety of the crew and the equipment. Common causes of accidents are an inadequate understanding of good mooring practices, unattended mooring lines, a lack of mooring line and/or tail retirement criteria, unbalanced mooring arrangements, poor quality of mooring lines, poor maintenance of mooring equipment, insufficient knowledge of local conditions, lack of attention to weather and tidal conditions and passing traffic.

An essential tool to safe mooring is the proper understanding and compliance with the Mooring System Management Plan (MSMP). Every ship is provided with a MSMP and its objective is to ensure that during mooring operations, no harm comes to ship or terminal staff or damage to the ship or the terminal/facility it is interfacing with, and that the mooring system meets applicable regulations, codes and recommended practice.

The MSMP contains details of items that may be ship or operator specific (e.g. parts of the operator's SMS), and guidance on items that should be retained in a Mooring System Management Plan Register (MSMPR) that stays with the ship throughout its life-cycle.

While all new ships should be able to achieve all parts of the proposed MSMP structure, existing ships may experience limitations particularly in accessing original design information. It is recommended that existing ships undertake the necessary due diligence to collate required information or align their operating practices with these fundamental safe mooring principles, so far as it is possible and practicable.

The MSMP will consist of the following:

Part A – General ship particulars

Part B – Mooring equipment design philosophy

Part C – Detailed list of mooring equipment

Part D – Inspection, maintenance and retirement strategies

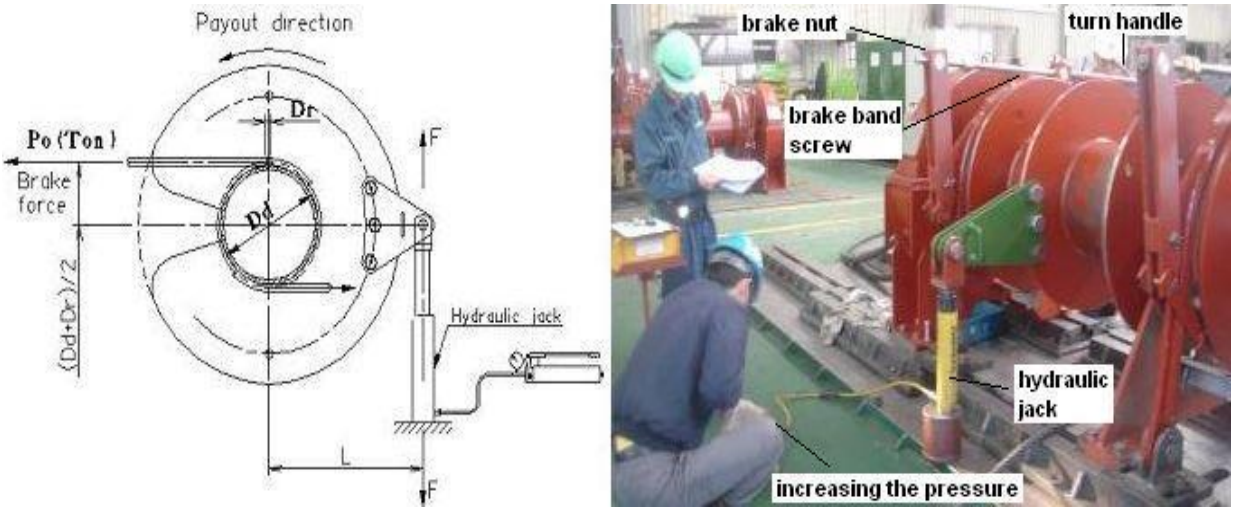
Part E – Risk and change management, safety or personnel and human factors

Part F – Records and documentation

Part G – Mooring System Management Plan Register (MSMPR)

It is recommended that the MSMPR is available to ship's staff and others authorized to review or monitor the equipment status.

Prior to the operation one of the most crucial procedures is the winch brake test which takes place at yearly intervals at each winch separately according to the company SMS. The main purpose of brake testing is to verify that the brake will render at a load less than the ship design Minimum Breaking Load (MBL). Ideally, a brake should hold and render within a very small range and once it renders, should shed only enough load to bring the line tension back to a safe level.



Source:http://www.marinewiki.org/index.php?title=File:Mooring_winch_load_test-brake_test.JPG

It is important that it is clearly communicated to the crew and officers that the winches during and after the mooring operation are in good order. Therefore checks must take place to the condition of cheek plates for wastage and distortion, the hinge pins and their retaining devices and the condition of the brake drum below the lining. If there is significant wear on the brake linings, the brake adjustment screw may be at the limit of its travel and further tightening will not be possible. In addition, all mooring lines should be stowed neatly to minimize tripping hazards and mooring areas should be clear and unobstructed.

3. Ship-shore safety checklist's role in safety and security between ship and shore

The ship to shore safety checklist is a document that is completed as soon as the vessel arrives at the port of destination. It requires both the ship and the port to participate in completing it. Both parties have to collectively go through all the checklist items one by one. For the vessel responsible for the completion of the checklist is the chief officer and for the shore the loading master. The checklist focuses on ensuring that:

- The vessel is safely moored and access between ship and shore is established and safe
- Navigation equipment that can interfere with communication is turned off or on stand by
- Communication between ship and shore is established (This essentially means to agree on which VHF and UHF channel the communication will be taking place as well as backup channel in case there are disruptions)
- Emergency equipment for firefighting and towing-off is ready and available for both ship and shore.
- All cargo operation equipment is ready and in the correct position.
- There is enough crew on the deck and on shore at all times to deal with an emergency
- Emergency shutdown procedures are established and communicated between ship and shore
- Maximum wind and swell are agreed for operation stoppage and ship unberthing
- Security protocols are agreed between the Ship Security Officer and the port facility Security Officer

The ship to shore safety checklist has to be re-checked on every watch switch and a record of these checks should be available.

It is clear that the ship to shore safety checklist is the most important document when the ship is at port. Therefore it is essential that completion of this document is always taken seriously and done with absolute caution by both parties.
Seen below is a ship-shore safety checklist of a tanker vessel.

Original: Dcup
Copy 1: Ship
Copy 2: Jetty Operator
Copy 3: Port of Stockholm

Ship/Shore Safety Check-List

Ship information			
Ship's Name	Berth	Date of Arrival	Time of Arrival

Part A – Bulk Liquid General – Physical Checks

Bulk Liquid - General	Ship	Terminal	Code	Remarks
1. There is safe access between the ship and shore			R	
2. The ship is securely moored.			R	
3. The agreed ship/shore communication system is operative.			A R	System: Backup System:
4. Emergency towing-off pennants are correctly rigged and positioned			R	
5. The ship's fire hoses and fire-fighting equipment are positioned and ready for immediate use.		N/A	R	
6. The terminal's fire-fighting equipment is positioned and ready for immediate use.	N/A		R	
7. The ship's cargo and bunker hoses, pipelines and manifolds are in good condition, properly rigged and appropriate for the service intended.		N/A		
8. The terminal's cargo and bunker hoses or arms are in good condition properly rigged and appropriate for the service intended.	N/A			
9. The cargo transfer system is sufficiently isolated and drained to allow safe removal of blank flanges prior to connection.				
10. Scuppers and save-alls on board are effectively plugged and drip trays are in position and empty.		N/A	R	
11. Temporarily removed scupper plugs will be constantly monitored.		N/A	R	
12. Shore spill containment and sumps are correctly managed.	N/A		R	
13. The ship's unused cargo and bunker connections are properly secured with blank flanges fully bolted.		N/A		
14. The terminal's unused cargo and bunker connections are properly secured with blank flanges fully bolted.	N/A			
15. All cargo, ballast and bunker tank lids are closed.		N/A		
16. Sea and overboard discharge valves, when not in use, are closed and visibly secured.		N/A		

Bulk Liquid - General	Ship	Terminal	Code	Remarks
17. All external doors, ports and windows in the accommodation, stores and machinery spaces are closed. Engine room vents may be open.		N/A	R	
18. The ship's emergency fire control plans are located externally.		N/A		Location:

If the ship is fitted, or is required to be fitted, with an inert gas system (IGS), the following points should be physically checked:

Inert Gas System	Ship	Terminal	Code	Remarks
19. Fixed IGS pressure and oxygen content recorders are working.		N/A	R	
20. All cargo tank atmospheres are at positive pressure with oxygen content of 8% or less by volume.		N/A	P R	

Part B – Bulk Liquid General – Verbal Verification

Bulk Liquid - General	Ship	Terminal	Code	Remarks
21. The ship is ready to move under its own power.		N/A	P R	
22. There is an effective deck watch in attendance on board and adequate supervision of operations on the ship and in the terminal.			R	
23. There are sufficient personnel on board and ashore to deal with an emergency.			R	
24. The procedures for cargo, bunker and ballast handling have been agreed.			A R	
25. The emergency signal and shutdown procedure to be used by the ship and shore have been explained and understood.			A	
26. Material Safety Data Sheets (MSDS) for the cargo transfer have been exchanged where requested.			P R	
27. The hazards associated with toxic substances in the cargo being handled have been identified and understood.				H_2S Content: Benzene Content:
28. An International Shore Fire Connection has been provided.				
29. The agreed tank venting system will be used.			A R	Method:
30. The requirements for closed operations have been agreed			R	

Bulk Liquid – General	Ship	Terminal	Code	Remarks
31. The operation of the P/V system has been verified.		N/A		
32. Where a vapour return line is connected, operating parameters have been agreed.			A R	
33. Independent high level alarms, if fitted, are operational and have been tested.		N/A	A R	
34. Adequate electrical insulating means are in place in the ship/shore connection	N/A		A R	
35. Shore lines are fitted with a non-return valve, or procedures to avoid back filling have been discussed.	N/A		P R	
36. Smoking rooms have been identified and smoking requirements are being observed.		N/A	A R	Nominated smoking rooms:
37. Naked light regulations are being observed.			A R	
38. Ship/shore telephones, mobile phones and pager requirements are being observed.			A R	
39. Hand torches (flashlights) are of an approved type.				
40. Fixed VHF/UHF transceivers and AIS equipment are on the correct power mode or switched off.		N/A		
41. Portable VHF/UHF transceivers are of an approved type.				
42. The ship's main radio transmitter aerials are earthed and radars are switched off.		N/A		
43. Electric cables to portable electrical equipment within the hazardous area are disconnected from power.				
44. Window type air conditioning units are disconnected.		N/A		
45. Positive pressure is being maintained inside the accommodation, and air conditioning intakes, which may permit the entry of cargo vapours, are closed.		N/A		
46. Measures have been taken to ensure sufficient mechanical ventilation in the pump room.		N/A	R	
47. There is provision for an emergency escape.				
48. The maximum wind and swell criteria for operations have been agreed.			A	Stop cargo at: 20 m/s Disconnect at: 25 m/s Unberth at: - N/A

Bulk Liquid – General	Ship	Terminal	Code	Remarks
49. Security protocols have been agreed between the Ship Security Officer and the Port Facility Security Officer, if appropriate.			A	
50. Where appropriate, procedures have been agreed for receiving nitrogen supplied from shore, either for inerting of purging ship's tanks, or for line clearing into ship.			A P	

If the ship is fitted, or is required to be fitted, with an inert gas system (IGS) the following statements should be addressed:

Inert Gas System	Ship	Terminal	Code	Remarks
51. The IGS is fully operational and in good working order.		N/A	P	
52. Deck seals, or equivalent, are in good working order.		N/A	R	
53. Liquid levels in pressure/ vacuum breakers are correct.		N/A	R	
54. The fixed and portable oxygen analysers have been calibrated and are working properly.		N/A	R	
55. All the individual tank IG valves (if fitted) are correctly set and locked.		N/A	R	
56. All personnel in charge of cargo operations are aware that, in the case of failure of the inert gas plant, discharge operations should cease and the terminal be advised.		N/A		

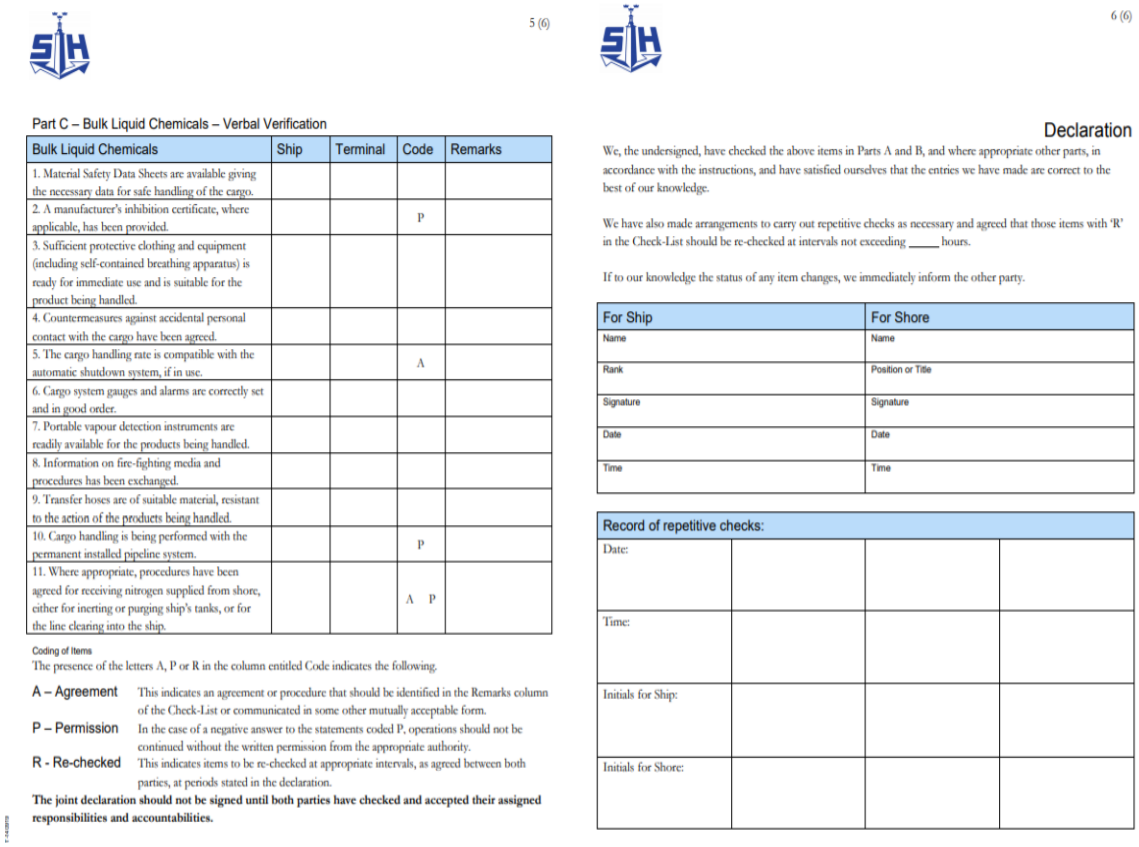
Crude Oil Washing
NOT ALLOWED IN PORT OF STOCKHOLM

TANK CLEANING NOT ALLOWED WITHOUT PERMISSION FROM PORT AUTHORITY

If the ship is planning to tank clean alongside, the following statements should be addressed:

Tank Cleaning	Ship	Terminal	Code	Remarks
59. Tank cleaning operations are planned during the ship's stay alongside the shore installation.	Yes/No*	Yes/No*		
60. If 'yes' the procedures and approvals for tank cleaning have been agreed.				
61. Permission has been granted for gas feeing operations.	Yes/No*	Yes/No*		

* Delete Yes or No appropriate



5 (6)

Part C – Bulk Liquid Chemicals – Verbal Verification

Bulk Liquid Chemicals	Ship	Terminal	Code	Remarks
1. Material Safety Data Sheets are available giving the necessary data for safe handling of the cargo.				
2. A manufacturer's inhibition certificate, where applicable, has been provided.			P	
3. Sufficient protective clothing and equipment (including self-contained breathing apparatus) is ready for immediate use and is suitable for the product being handled.				
4. Countermeasures against accidental personal contact with the cargo have been agreed.				
5. The cargo handling rate is compatible with the automatic shutdown system, if in use.			A	
6. Cargo system gauges and alarms are correctly set and in good order.				
7. Portable vapour detection instruments are readily available for the products being handled.				
8. Information on fire-fighting media and procedures has been exchanged.				
9. Transfer hoses are of suitable material, resistant to the action of the products being handled.				
10. Cargo handling is being performed with the permanent installed pipeline system.			P	
11. Where appropriate, procedures have been agreed for receiving nitrogen supplied from shore, either for inerting or purging ship's tanks, or for the line clearing into the ship.			A P	

Coding of Items

The presence of the letters A, P or R in the column entitled Code indicates the following.

A – Agreement: This indicates an agreement or procedure that should be identified in the Remarks column of the Check-List or communicated in some other mutually acceptable form.

P – Permission: In the case of a negative answer to the statements coded P, operations should not be continued without the written permission from the appropriate authority.

R - Re-checked: This indicates items to be re-checked at appropriate intervals, as agreed between both parties, at periods stated in the declaration.

The joint declaration should not be signed until both parties have checked and accepted their assigned responsibilities and accountabilities.

6 (6)

Declaration

We, the undersigned, have checked the above items in Parts A and B, and where appropriate other parts, in accordance with the instructions, and have satisfied ourselves that the entries we have made are correct to the best of our knowledge.

We have also made arrangements to carry out repetitive checks as necessary and agreed that those items with 'R' in the Check-List should be re-checked at intervals not exceeding ____ hours.

If to our knowledge the status of any item changes, we immediately inform the other party.

For Ship	For Shore
Name	Name
Rank	Position or Title
Signature	Signature
Date	Date
Time	Time

Record of repetitive checks:			
Date:			
Time:			
Initials for Ship:			
Initials for Shore:			

Source:https://www.stockholmshamnar.se/siteassets/om-oss/tilltrade--sakerhet/bilagor-driftforeskrifter/bilaga47_ship_shore_safety_checklist.pdf

3.1 Cargo operations and regulations among different cargo vessels

The fact that there are a lot of different types of vessels engaging in commerce at all times really complicates safety on port. In order to ensure safety for cargo operation for all these vessels, different set of rules and regulations had to be developed taking under consideration each vessel's peculiarities and potential new dangers that emerge. In the following chapters we will look at some of these special rules and regulations for the most common types of vessels at sea. In a nutshell, these are:

- General cargo vessels
- Container vessels
- Tanker vessels
- LNG/LPG vessels
- Passenger vessels

3.1.1 General Cargo Vessels

General cargo vessels have a number of holds that can be filled with either bulk substances like grain or solid cargoes like steel scraps and iron ore. The range of possible cargoes they can hold comes with a lot of different dangers that the crew must identify and deal with in a safe and controlled manner. Some of these dangers are described below:

Ensuring safe atmosphere in cargo hold:

For general cargo vessels loading and discharging might require the access of personnel in the cargo holds. These are enclosed spaces and the danger of a toxic atmosphere is present. It is therefore important that the atmosphere of the holds is checked to ensure that it is safe. An officer should be the one to make the checks and record them in the appropriate form. The toxicity of the hold does not necessarily mean the presence of toxic gases but also the absence of oxygen due to previous cargoes or rust.

Source:https://www.macgregor.com/Products/products/hatch-covers/folding-hatch-covers/

Safe deck areas:

Cargoes like iron ore, quartz and steel scraps are high density cargo. There is a possibility of cargo falling from height during cargo operations. Cargo may either fall from the conveyor belt of the shiploader or from the discharging grab on to the deck of the ship. People working on deck can get injured badly if hit by the sizeable lumps of the bulk cargo. It can be as bad as death. Cargo operation should always be monitored by responsible officers and care should be taken that no unwanted personnel are present on the working area of the deck. Persons who are involved in the cargo operation should wear protective clothing including hard hats, safety shoes and highly visible vests.

Maintaining Structural integrity:

Heavy cargoes place high loads on the structure and structural failure is therefore probable. High density cargoes occupy a small area for a large weight, that is, they have a low stowage

factor. It is therefore important that the tank top has sufficient strength to carry heavy cargoes like iron ore, nickel ore, bauxite etc. It is the job of the chief officer to ensure that the load density of the tank top is never exceeded. Tank top strength is provided in the ship's stability booklet. Exceeding the maximum permissible cargo load in any of the holds of a ship will lead to overstressing of local structure. Overloading will induce greater stresses in the double bottom, transverse bulkheads, hatch coamings, hatch covers, main frames and associated brackets of individual cargo holds. Poor distribution of and/or inadequate trimming of certain cargoes can result in excessive bending and sheer forces.

Source:https://medium.com/@bluewatermisting123/an-introduction-to-bulk-ship-loading-and-unloading-systems-f46fc8623183

Trimming cargo:

During loading of bulk cargo it is probable that the cargo will not be loaded completely evenly in the hold. If this is left unchecked it might result in stability dangers. Therefore a procedure called trimming is needed. Trimming is the partial or total levelling of the cargo within the hold. In addition to improving the ship stability and minimizing the danger of cargo shift, trimming also reduces the air in the hold therefore maximizing the capacity efficiency.

3.1.2 Container Vessels

Container vessels usually follow a tight schedule of ports of call. They presumably follow one fixed route with certain numbers of ports, which are likely to be changed as per the interest of the company.

During the port stay of the vessel, the deck officers are in charge of monitoring the loading and discharging of cargo and numerous other indispensable happenings onboard. Incidentally, this explains why many officers onboard find the port stays more hectic than a normal day at sea.

However, with the right knowledge and plan of action, cargo watches can be a lot easier than they seem. The notes and guidelines below on ten important things that need to be checked during cargo watch will help to plan and make the best out of watches when the ship is at port.

1) Planning and Monitoring Loading and Discharging of Cargo

The most important factor or the ultimate reason of the port stay is loading and discharging of containers, hence the first priority should be the same.

Make sure the loading/discharge plans are ready in hand before officers commence their watch. Like it is always done, when going out on deck for rounds they should mark out which bays the gantry cranes are working on. It is also good to note the gantry number, as it helps track the movement of gantries during the next rounds.

If practical, suggestions for an even discharging or loading of cargo should be done as it avoids listing/heeling of the vessel and continuous running of Auto-Heeling system and heeling pumps. Special attention should be given to underdeck cargo operations inside the cargo hold. Safe keeping and safe removal of hatch covers without damage to ship's superstructure should be ensured.

If any cargo operation is not complying with the cargo plans, it needs to be checked with the foreman or the planner. Any damage to the ship's structure due to rough operation of cranes should also be brought into their attention and a stevedore damage report should be made as well.

2) Having Knowledge of IMDG Containers Loaded Onboard

IMO recognized International Maritime Dangerous Goods (IMDG) are carried in containers onboard the vessels designated to carry them. As the name depicts, IMDG containers should be treated with utmost significance. The paper works and documentation of IMDG cargo including IMDG Spotting Plan is the responsibility of the deck officers, therefore a good familiarization of IMDG Code is strongly recommended.

IMDG are normally loaded as a way as practical from accommodation, as per compliance with the IMDG Code. However, during the cargo watches duty officers need to reassure the position of each and every DG containers loaded onboard are as per the cargo plan. Any change in the same should be brought into the attention of the Chief Officer and the planner. Furthermore, every box containing DG cargo should be having HAZMAT and IMO Class stickers. It is recommended to have the same on all visible sides of the containers.

Discharging DG containers with no stickers is a serious offence and the ship can be fined or arrested for the same. Hence, the presence of the IMO Class stickers during the loading time must be confirmed. Any missing stickers should again be brought into the attention of Chief Officer and the Foreman/Planner should be informed and asked to fix it.

3) Handling Reefer Containers With Care

Reefers or the Refrigerated Containers are very sensitive cargo and hence should be handled with care. Onboard container vessels carrying reefers, there should be an electrical engineer dedicated for handling the reefers. All loading and discharging of reefers should be done with the knowledge and supervision of the electrician. Ensure that while reefers are loaded and discharged the electrician is informed and readily available.

Avoid disconnecting the reefers from the power supply too early prior to discharge. It is recommended to ask the foreman to give a notice of which reefers are about to be discharged and hence to unplug the same just before it goes out from the ship.

One must be aware that the electrician is the responsible and qualified person for connecting and disconnecting reefers but in practical, while handling too many reefers at once, it is a good practice for officers, cadets or deck crew to help him out. However, while doing so, one must make sure there is the basic knowledge to do the same, like switching on the reefers and confirming the given set points. Any troubleshooting of reefers should be brought into the attention of the foreman/planner as early as possible.

4) Checking Lashings Of Out of Gauge Cargo (OOG)

OOG means cargos which are not suitably fitted inside a container. Such cargo can be heavy machinery, spare parts, boats, yachts etc. OOG are usually loaded under deck inside the cargo hold. It can also be loaded on-top of flat rack containers, or by using wooden dunnage.

The lashings in such cargo are different from normal container lashings. In most of the cases, the stevedores working on lashing the OOG cargo are skilled and know what they are doing, but a thorough check and supervision is to be done by the duty officer. One must make sure they have physically checked the lashings and find them satisfactory and good enough to withstand all rough sea going conditions.

It is good to take photographs of the cargo once it is lashed and secured.

5) Having Proper Visual Inspection of Ship’s Draught

It is nothing new that arrival draughts and departure draughts needs to be visually checked and logged down. The significance of draught not only applies during arrival and departure, but also during the whole period of time when the ship is alongside.

In certain ports, where the available depth is less, there should be a close watch on the draught and the under-keel-clearance as it can vary when large numbers of boxes are to be loaded, or a large quantity of ballast water being taken. There should be a visual examination of the draught at least once during every watch as the draught gauges can’t be accurate always. A timely check on draught can help to avoid a lot of dangers while alongside.

6) Checking Ship's Ballast and List

It is normally the Chief Officer who is responsible for the ballast operations and the stability of the vessel. At the same time duty officers are required to have comprehensive knowledge about ballast operations and will be required to do so, as per chief officer's advice. While doing ballast operations, one must keep a close watch on the inclinometer to monitor the vessels list. In cases where ballast water is pumped into the same side where the cargo is being loaded, the vessel can tend to list. One must keep in mind that more than 1 degree of list on any side needs to be corrected in no time.

Also, as practical as possible, it is advisable to try to minimize the intake of ballast water in ports and to use internal transfer of ballast. All ballast operations should be logged down. One must make themselves familiar with the Ballast water management plans.

While deballasting, one must be aware of the restrictions of certain ports where de-ballasting is strictly prohibited. It is advisable to inform the chief officer if any doubts or uncertainties.

7) Checking Lashings Thoroughly

Lashing is another vital factor which needs to be checked during cargo watches. It is the duty officer's responsibility to ensure every lashing is found satisfactory. A good understanding of the vessel's lashing plans and lashing gears is absolutely necessary.

Source:https://www.nnpc.nl/mediadepot/852eb0b07e/NNPCCONTAINERSECURINGDEF5.pdf

The Cargo Securing Manual of the ship should be read and followed. Lashings are good if they are moderately tight. Slack on the lashing bar-turnbuckle unit is not appreciated and such slack should be tightened up with spanners. Excessive force should not be used making the unit too tight and hence immobile and stiff. Any lashings found unsatisfactory or any missing lashings on certain containers should be brought into the attention of the foreman. The lashings are to be re-tightened and checked during the voyage as well, but it is normally done by the deck crew.

The lashing checks are not limited to the lashing bar-turnbuckle units but also the twist locks used in between the containers. The type of twist lock, whether it is semi-automatic or fully-automatic, depends on the ship's lashing plan, but a missing twist lock between any two boxes is not a part of any plan. Therefore, any twist locks found missing should be again brought to the attention of the foreman. It is also advisable to lock the hatch cover cleats /pins too.

It is a good practice to check the lashings as soon as it is finished; it will save the unnecessary rush during the cargo completion time.

8) Carrying Out Change of Watch Procedure Without Missing Anything

Change of watch during port stays is as important as it is at sea. The relieving officer should be officially presented with all the necessary information of the progress on deck, cargo operations, and ballast operations in detail.

It is a good practice to take deck rounds just before the end of the watch so that the correct updated status of the cargo operations can be known. The cargo plans should be updated as well. Any bays completed off lashings are to be checked before handing over. Any out of ordinary information should be exchanged. During the change of watch it is advisable to log down the end of watch along with the necessary update on cargo operations.

9) Ensuring Utmost Level of Security and Safety On board Ship

Another significant element in the port stay is the ISPS policies. Security rounds and gangway watches are kept at all the times during the vessel's port stay. As per ISPS Code, there are different security levels and respective security measures are to be followed. Good knowledge of the security duties and ISPS Code is strictly recommended.

The next important factor is the safety of the ship and its personnel. When the ship is alongside and cargo operations are underway, the risks of accidents on deck are more than at sea. The safety of the ship's crew and shore stevedores is to be ensured and any unsafe working practice should be noticed and stopped.

10) Carrying Out Cargo Completion Without Errors

This final phase of the port stay can be a busy one. During the cargo completion the officer on watch has to be sure of the count of moves left.

During the last rounds, it is advisable to count how many more containers are to be loaded on each bay and total it to find how many moves altogether are remaining.

As prior to departure, the captain is most likely to ask how many moves are left, so one must be ready with the answer, and check on the following points during cargo completion time:

- Visually examine and note down the departure draught.
- Ensure that all lashings have been checked and found satisfactory and the lashing certificate has been signed.
- Make sure that the lashing gear boxes are going to be landed back onboard and note down the position of the same.
- Ensure that good housekeeping was maintained by the stevedores and deck crew.
- Ensure that notices to E/R and other deck crews have been given.
- Make sure the officer in charge to prepare the bridge has been informed.
- Confirm the presence of Agent and Planner of the company is onboard for final paper works prior departure.
- Confirm whether the Pilot has been contacted.

3.1.3 Tanker Vessels

Tanker vessels are considered one of the most dangerous type of ships at sea due to the fact that they carry highly flammable substances. In addition to the danger of fire there is also the hazard of an oil spill which is devastating to the environment and local economy. Therefore it is only natural that the conditions under which a tanker vessel operates are carefully regulated and extremely strict.

Regular deck and pump room checks

During both loading and discharging operations in the deck of a tanker vessel there must be extra seamen in order to instantly assist in the case of an emergency. The crew must make regular patrols to ensure there are no leakages in any of the pipelines or the pump room and that the scruppers are closed. The above of course need to happen in addition to the regular mooring arrangement checks that take place in all vessels.

Pump room safety

In case the tanker vessel is of the conventional type then there is a pump room. The pump room is an enclosed space filled with pipelines and machinery through which oil passes. Due to the presence of that machinery crew must make regular patrols from the pump room to ensure everything works properly. For a person to enter this enclosed space a special checklist must be filled (the pump room entry checklist) that calls for checks for the presence of dangerous gases or extreme temperatures. Only then can the crew member check the pump room safely.

Topping off tanks

During the loading operation the most dangerous part of the procedure is the topping off process. This is the final part of the operation where all the tanks are almost full and need to reach the desired ullages (which means the distance of the oil from the top of the tank). This usually means that the level of the tank is close to maximum capacity and the chance of an overflow and potential pollution is increased. The challenge of this part of the operation is usually increased because of the fact that the initial stages of topping off happen simultaneously with the completion of the deballasting operation. To avoid accidents a call for minimum loading rate should be made to the loading master and the crew should be on high alert in case any abnormalities are observed on deck.

Inert gas system

Source:https://www.wartsila.com/encyclopedia/term/inert-gas-system

During the discharging operation coordination is required between both the engine and the deck department due to the fact that critical discharging equipment requires the expertise of the engineers. Part of that critical equipment is the main discharging pumps, cargo heating system but essential to the safety of the discharging operation is the inert gas system.
This is a system created in order to ensure a closed discharging. This means that during the discharge of oil no air from the atmosphere will enter the tank as a result of the vacuum that is created. What the inert gas system essentially does is pour inert gas (extremely low concentration of oxygen) into the tank and keep the pressure into a level higher than the atmosphere. This dramatically decreases the chances of a fire inside the tank since the air in there is deprived of oxygen which is one of the 3 requirements (heat, fuel and oxygen) for a fire to exist.

Despite the fact that maintenance and repair of the inert system is mostly the responsibility of the engine department, it is important for deck officers to be familiar with and capable of operating the inert gas system. Even more essential is the ability of the officers to pinpoint potential problems in the inert gas system like big fluctuations in the pressure or higher oxygen concentration in the gas which can lead to accidents.

Safe crude oil washing (COW)

During discharging if the port allows it the vessel has to crude oil wash some of its tanks (usually the heavy weather tanks plus more depending on the ship's size). This procedure is considered very dangerous due to the fact that in order to wash a tank with crude oil, very high pressures must be maintained into the pipelines for a relatively long period of time. This increases the chance of pollution tenfold in case of a leakage in the pipes under pressure. The safety of this procedure is ensured by completing the crude oil washing checklist.

This checklist consists of five parts and includes the following items:

I. Check items before arrival:

1. Has Terminal/port permission been obtained?
2. Is the cargo intended to be used for carrying out Crude oil washing (COW), in reference with IMO's guidelines on Crude Oil washing Systems and suitable and precautions exercised?
3. Is the COW plan and discharge plan drawn out above basis of such past history and performance, in accordance with the ship's "Operation and Equipment Manual / COW manual" and other instructions?
4. "Has information exchange carried out well in advance with terminal regarding vessel's discharge plan and / or Crude Oil Washing Plan carried out? Any particular terminal requirement of 'Dirty Crude' discharge at completion, etc"
5. Is oxygen analyzing equipment (portable and fixed type) tested, calibrated and working satisfactorily?
6. Have I.G equipment and its alarm system been tested and working properly?
7. Have the tank cleaning heater and line been isolated by the line blinder from the Crude Oil Washing System?
8. Have main and stripper overboard discharge lines been isolated by line blinders?
9. "Is Blind Plate fitted on the sea chest? Has sea chest been tested for integrity? Has short piece between sea chest blank and valve been proved efficiently drained?"
10. Have all seals of sea valves in pump room been checked in position?
11. Have all branch lines' valves for portable tank cleaning machine been isolated by line blinders?
12. Have all valves of tank cleaning machines and drain lines to tank been closed?
13. Has pressure test of tank cleaning line been carried out? Is there no leakage?
14. Are pressure gauges (remote and local) for tank cleaning main line in good working order?
15. Has the stripping system, monitoring equipment been checked?
16. Are pressure gauges of cargo, ballast pumps and eductors in good working order?
17. "Are level gauges and high-level alarm systems in good working order? Is the Control (COC) side and Local (Float) side testing and verifying for Alarms (Audible and Visual) been carried out and verified?"

18. Have the ship's internal communication systems used for cargo operation been tested and kept ready (Battery Charged)?
19. Is cargo watch schedule posted with contact details, duties and responsibilities, including Record of Person In charge of Oil Transfer?
20. Have discharging and crude oil washing procedures been planned as per guidance as laid out in the Ship's Crude Oil Washing Manual and the crew members properly instructed?
21. Have you confirmed there is no leakage from tank hatches (domes), vent-lines and I.G. lines?
22. Have cargo tanks pressure been adjusted in proper range?
23. "Have results of checks and tests been informed to terminal/agent? Where terminal has a standard radio checklist, has this been completed and transmitted?"

II. Check items after arrival:

1. Are all pre-arrival checking items and condition in good order?
2. Has safety check before start of discharging been carried out by discharging check list and Ship Shore Safety Checklist / Ship to Ship Transfer checklist as required?
3. Has the discharge / crude oil wash operation details been discussed with both ship and attending shore staff and is agreed plan readily available for easy reference?
4. Have conditions for suspending COW been discussed with terminal? Are officers briefed on the actions to take in case of failure of I.G.S?
5. Have all valves of COW line been re-confirmed closed?
6. Do all cargo tanks have positive pressure?
7. Is oxygen content of each tank below 8% by volume?
8. Have I.G. delivery valves of discharging tanks been opened?
9. For heated crude, is temperature of COW supplying oil suitably slightly higher than discharge temperature, but within the limits as per terminal's limitation?
10. Are the programmable COW machines correctly set as per desired wash pattern? (Considering the nature of cargo and surrounding temperature)

III. Check items before crude oil washing operation:

1. Are the caution marks posted in prescribed locations?
2. Is the Inert Gas System working properly and is the content of inert gas being delivered below 5% by volume?
3. Is oxygen content of the tanks to be crude oil washed below 8% by volume and has been confirmed before washing operations commences?
4. Do the cleaning tanks have positive pressure? (more than 200mmAq)
5. Are I.G. system and cargo tanks and openings tightly closed for avoiding gas leakage to the atmosphere?
6. Has the terminal been notified of start of COW and the possibility of discharge rate reduction?

7. Has the ship's crew been informed of start of washing?
8. Has assignment of operation for each responsible person and person in charge been confirmed?
9. Is communication system between cargo and crude oil washing operations in good order?
10. "Has reasonable crew been posted to check leakage of cleaning lines? Has personnel been posted as per COW plan?"
11. Has the float gauge of tanks to be cleaned been raised? (if applicable)
12. Have precautions been exercised to gradually fill the COW line, taking care to avoid liquid hammer / air entrapment?
13. Has the stripping (educting)system for the planned tank(s) to be COWed been started prior to the washing commencing?
14. Have valves of tank cleaning line to the tank for cleaning been opened?
15. Is the water level of deck water seal tank proper?

IV. Check items during crude oil washing operation:

1. Are all COW lines, flanges, valves, expansion joints, etc are being monitored closely and confirmed in good order on deck, as well as in pump room?
2. Are pumps in use being checked for any potential source of leakage, during the gradual rise in pressure?
3. Are cleaning machines in good working order? (Proper movement verified by visual movement of indicators on drive units, machine sound pattern and washing time cycle, as programmed)
4. Is the trim during bottom washing adequate as per crude oil washing operation and equipment manual?
5. Is the pressure in the tank wash line as specified in the manual?
6. Is Crude oil washing in progress in designated cargo tanks only?
7. Is oxygen content of delivered inert gas below 5% by volume and is it being recorded?
8. Is cleaning tank pressure proper (more than 200mmAq)?
9. Is surrounding sea surface regularly monitored?
10. Is the level of collecting tank normal and being monitored?
11. For the heated cargoes, is the temperature being controlled? (if applicable)
12. Is the operation of stripping system during bottom washing in good order?

V. Check items after completion of crude oil washing operation:

1. Are all interconnecting valves between discharging lines and tank cleaning lines closed?
2. Has residual oil in tank cleaning lines been well drained? (urgency to be considered for heated cargoes, as required)
3. Are all valves of tank cleaning machine and drain line to tank closed?
4. For heated crude all part of crude oil line physically verified for complete draining by line tracing on deck?
5. Has remaining oil in tanks, pumps and pipe lines been well stripped after completion of discharging?

3.1.4 LNG/LPG Vessels

LNG and LPG vessels fall in a similar category as the tanker vessels. They are potentially very dangerous ships which increases the amount and the stringency of measures to be taken for safe operations.

Source:https://www.maritime-executive.com/blog/lng-to-become-the-fuel-of-choice-for-shipping

Deck safety

While the usual rules as for other vessels apply on LNG and LPG vessels involving seamen on deck doing their regular rounds apply, the response to an emergency is different. In the case of a leak of liquified gas there is the added danger of a frostbite if it comes in contact with the skin. Crew must be educated in the action to be taken in an emergency and equipment to be used.
More specifically in the case of any contact with liquified gas the cloths should be immediately removed and the area washed with large quantities of water

LNG pump practices

During the discharging operation in an LNG vessel the pumps are used. These pumps use the liquified gas as both lubricant and cooling agent. This means that in the case the pump runs dry even for a small period of time the dmg to it will be a lot more serious than normal. It is therefore the responsibility of the chief officer to ensure this never happens and cargo always flows in the pump.

Good practice and preparedness

Just like with all the vessel types, achieving a safe operation stems from a well-informed crew and completing all requirements for an operation, so does for the LNG and LPG carriers. The main difference is that LNG and LPG require a lot more attention to detail and precision when it comes to maintenance and equipment tests. This is where the difficulty of working in an LNG or LPG vessel really shows. If there is any damage or any essential equipment failure, it is usually impossible for the crew to do anything about it. This means a shore crew member must come onboard to fix the issue and if the vessel has not detected the problem in time, it results in extreme delays or accidents.

3.2 Passenger Vessels role to ensure safe passenger embarkation and disembarkation

Source:https://www.alamy.com/egypt-nile-cruise-pleasure-steamer-passengers-embarkation-image5613762.html

Humans are the main cargo of a passenger vessel. Their safe embarkation and disembarkation is the equivalent of a loading and discharging operation on cargo vessels.This is the reason why certain procedures must be followed during arrival and departure from piers.

Arriving at a Pier

When arriving at the pier and before disembarking any passengers, a safety announcement should be made in English. Ideally vessel operators should supply either a written text of the message or a pre-recording to be used over the public address system. The master or person navigating the vessel should not be distracted by simultaneously attempting to conduct passenger safety briefings and/or public commentaries. An example of a typical pre-arrival announcement:

“We will shortly be arriving at [location]. Please remain seated while we come alongside the pier as the boat may move unexpectedly. When securely alongside, I will invite you to disembark from the vessel. Please use the handrails at all times.”

On arrival at a pier the master and crew should ensure that the vessel is secured alongside with at least two mooring lines (unless otherwise agreed by the Harbourmaster) and that the gap between pier and vessel is as small as possible. Only once the vessel is safely moored alongside should disembarkation or embarkation commence.

Embarkation

During embarkation a member of crew should be designated to count all passengers that board the vessel (this is mandatory on Class V vessels). A counting device should be used to ensure an accurate count. Crew members should aid all passengers during the boarding process to ensure that trips, slips and falls are prevented and to guide passengers to the correct location on board. Once all passengers are embarked the number of passengers and crew members must be entered into the AIS before the vessel departs the pier.

Departing from a Pier

Before Departure, a safety announcement should be made, in English, briefing passengers about safety and emergency procedures. Ideally vessel operators should supply either a written text of the message or a pre-recording to be used over the public address system. The master or person navigating the vessel should not be distracted by simultaneously attempting to conduct passenger safety briefings and/or public commentaries. Pre-departure safety briefings should be relevant to the particular vessel and include:

- fire prevention
- protection of limbs
- effect of passenger movement on boat stability

The briefing should also contain verbal instructions and demonstrations, providing passengers with specific information to prepare and guide them in the event of an emergency. Passengers must be made aware of the location of life jackets closest to their position on the vessel and the survival craft they should board if the vessel has to be abandoned.

An example of a typical pre-departure announcement:

“Welcome on board. I am Captain [name] of [vessel name]. This vessel is shortly due to leave the pier for [location]. In the event of an emergency please follow instructions from the crew. There are enough life jackets on board for all passengers which are located [where]. Please familiarize yourself with the safety information located around the vessel.”

Additionally, instruction on the location and use of personal protection equipment, vessel safety equipment, and distress equipment is also mandatory. Information cards or posters may be used to supplement the briefing, but should not replace the announcement. The public address system should cover all areas where passengers and crew have access, escape routes and places of evacuation into survival craft. Emergency instructions including a general diagram of the craft showing exit locations, evacuation routes and emergency and life-saving

equipment should be available to passengers. Keep passengers safe by keeping them informed:

• Signs showing Muster Stations and directions to the Muster Stations

• Exit and Emergency escape signs

• Passenger emergency instruction notices

• Public Address systems

3.3 Vessel response plan

A vessel response plan (VRP) is a document that outlines what the vessel will do in the case of an offshore spill. VRPs are required by the United States Coast Guard for maritime operators that are carrying certain quantities of chemicals and/or refined petroleum products.

The VRP includes information about the vessel, (such as its name, country of registry, call sign, and more), contact information for the vessel's owner or operator, a list of zones that the vessel intends to operate in, and the clear identification of the incident management team – the people or group to be notified in the event of a spill. The identification contact will include the identity of who is to be notified, how to most efficiently reach them, and secondary communication effort instructions that should be used if the first contact is unreachable. Additionally, the VRP will contain information about the vessel's chosen insurance company.

A recent article from The United States Coast Guard also points out that VRPs are not limited to oil spills: "It is important to understand that although hazardous conditions, such as an engine casualty, grounding, fire, or flooding, may not directly result in a discharge, plan activation is still required because, if left unresolved, they could result in a discharge."

Not all vessels are required to have a VRP, but regardless of requirements, it is a useful document to have onboard in the chance a spill occurs. In That way, the crew has a step-by-step guide that will help them handle the emergency safely and efficiently. The contents of the VRP will differ depending on what type of vessel is operated, the size of the vessel, and how much oil is on board.

The United States Coast Guard identifies ships that need VRPs as tank vessels "carrying groups I through IV petroleum oil as a primary cargo," and non-tank vessels that are "carrying groups I through IV petroleum oil as fuel or cargo." The Coast Guard has to review and approve your VRP before you can legally operate.

It is noteworthy that one VRP for a company's operation may not be sufficient. VRPs are contingent on the specific location a vessel is operating in. These documents are Coast Guard approved, so deviating from what OSRO/Salvors are listed is not an option, even if closer resources are nearby. If the vessel is operating in different areas/regions, separate VRPs may be beneficial.

3.3.1 Fire on board

In case of a fire onboard while the vessel is alongside the ship's master must instantly take action. Several actions should be taken to ensure the safety of the vessel and the personnel.

- General alarm should be sounded
- Bridge team should be informed
- Fire party should muster
- The fire should be isolated, by closing ventilation system, skylights, doors, boundary cooling, etc
- Before entering the fire space, crew should wear the appropriate PPE and use the proper fire extinguishing system, regarding the type of fire
- Interested parties should be notified

The vessel's master and the harbour master must coordinate their actions. The Harbour Master will assess the situation and allocate appropriate resources to assist the Master and crew in the response. Firefighting support vessels will be provided to assist the vessel where necessary. The primary use will be for boundary cooling but can assist with fighting a fire on the deck. Where possible, a DFES volunteer firefighter will be placed on the tug to direct the fire monitors. If the fire on board the vessel results in loss of power or the mooring arrangements rendered inoperable, tugs will be used to hold the vessel alongside if it is considered safe to do so. Once the fire is extinguished, the damage and condition of the vessel will be assessed and a plan to remove the vessel to a safe location will be implemented.

Source:https://gcaptain.com/containerships-catch-fire-after-collision-at-malaysias-port-klang/

3.3.2 Grounding

Where a vessel grounds a careful assessment of the damage condition of the vessel will be made. The Harbour Master and Duty Pilot will assess the height of tide at the time of grounding and subsequent tides to determine if the vessel is likely to be refloated. Where there is sufficient tidal height and the condition of the vessel allows so, the vessel will be refloated as soon as possible and shifted to an anchorage until an assessment of the vessel's damage condition can be made. Where the vessel cannot be refloated or the damage condition is such that the vessel cannot be safely refloated and moved to open water, the Harbour Master will assess the situation and determine what services are required. This may include tugs to hold the vessel in place and work boats to transfer personnel and equipment to the vessel. If a vessel grounds in the berth pocket the vessel's steering gear and propellers condition will be carefully assessed. If safe to do so, the vessel will be shifted to the anchorage so an assessment of the vessel's condition can be made.

Also, the ship's crew must follow these emergency procedures:

- All stakeholders should be notified
- Inform the port authority for the incident
- Immediate stop of engines
- Instant checking in order to ascertain any internal damage, water intakes or leakages and watertight doors to be closed
- Light/shapes and sound signals
- Take control of a possible pollution
- Record of vessel's position, date and time of the incident
- Keep the company informed

Source:https://www.fleetmon.com/maritime-news/2016/15299/cement-carrier-cemstar-grounding/

3.3.3 Mooring line parting

Mooring lines parting is a risk that can be caused by extreme weather. All mooring failures shall be reported to the VTS. A Pilot will board the vessel and tug assistance will be provided until the line/s can be rerun or the vessel taken to the anchorage. Where necessary a lines boat will be used.

Additional actions must be taken by the vessel's side:

- Ensure testing of winch brake holding forces with suitable approved equipment and application of marking at the brake adjustment spindle to indicate the correct brake setting corresponding to holding forces well below the lines' MBL. As winch brake lining is subject to wear and tear, ensure frequent repetition of the test and adjustment of the marking accordingly.
- Ensure that mooring lines on winch drums are correctly reeled and on split-type drums with one layer on the tension side only. Ensure that mooring lines of same material and construction are used and that those deployed into the same direction are of approximately the same length.
- Prior to each mooring operation, ensure careful inspection of the mooring lines to ensure that they are in satisfactory condition. Ensure that at all times sufficient spare mooring lines are available for replacement when needed.
- When planning cargo operations, carefully consider expected drafts and tides at all stages and inform the deck watch keepers. Ensure that clear instructions are provided to them when and how to check mooring lines to avoid both excessive tension and slacking.
- Ensure that mooring stations are clearly marked as dangerous areas and withhold any unauthorized person from entering and staying in areas where parting lines could snap back.

3.4 Example of Incident concerning safety procedures

This is an example of a vessel that had a fire onboard with an injury as a result of a minor negligence in safety procedures:

- On the 17/1/2001 the Emilia Theresa a 3,335 Gross Ton Chemical tanker was berthed alongside in Santa Clara, Brazil loading Benzene.
- The loading was proceeding normally and by 12.52 the vessel had completed loading of cargo tanks No 2 P&S, No 3 P&S, No 4 P&S, No 5 P&S and No 6 P&S. The loading of cargo tanks No1 P&S then commenced.
- By 16.30 the loading of No1 S cargo tank had been completed and the Chief Officer was at the closed gauging port of No1 P cargo tank to complete the final topping off of that tank. To obtain the final ullage reading the Chief Officer was using a MMC gauge. (This is the correct equipment to use for this type of cargo.) The Pumpman was on centre line walkway in a position to close the inlet valve to No1 P cargo tank when the required ullage was obtained. During the topping off procedure the Chief Officer was approached by the Cargo Surveyor and a conversation took place. There is no independent record of what was said as the Pumpman was out of ear shot and did not hear the conversation.
- At 16.35 the loading of No1 P cargo tank was completed and the Chief Officer disconnected the MMC gauge and moved it to No 6 P cargo tank in order to take the final tank ullage readings needed to calculate the total amount of cargo on board. The MMC gauge was again connected in the correct manner. The Chief Officer then returned to the cargo control room to contact the terminal to confirm that the ship was ready to receive the residue in the loading pipe work from ashore ("blowing through of the lines"). He remained in the cargo control room and did not see the cargo surveyor again until after the accident. The Pumpman remained on deck by the valve manifold located amidships. From this position he saw the cargo surveyor taking samples from the cargo tanks starting from the after most tanks and progressing forward. He did not see the equipment that the cargo surveyor was using.
- At 16.50 an explosion was heard by the Master who was in his cabin and also by the Chief Officer in the cargo control room. The Pumpman was still on deck by the manifold at starboard side. The Chief Officer looked out of the cargo control room window and saw flames coming from the forward part of the cargo area. He immediately sounded the general alarm.
- The crew had already assembled at the muster station starboard side aft by the time the Master arrived there.
- The Master upon reaching the muster station ordered the Chief Engineer to supply foam to the deck monitor system. The Master together with one sailor made their way forward. Together using the forward foam monitors they extinguished the fire by approximately 16.53.
- Although not called by anyone on board the local fire brigade arrived at 16.57 but were not required. The cargo surveyor was injured by the explosion. After receiving first aid on board he was then taken away by ambulance. No members of the crew or other persons were injured. The lid from No1 port Cargo tank was blown off by the explosion which caused superficial damage to the structures and pipework on deck. There was some structural deformation of the tank structure but no breach.

- The tank was allowed to cool until 18.10 at which time a canvas cover was used to seal the tank lid opening. The tank was then inerted with Nitrogen from ashore.

After an investigation took place the following concussion were reached:

- Since there were no other possible sources of ignition in way of cargo tank No1 port. The explosion of the vapour in the ullage space of the tank was undoubtedly caused by the spark produced by the electrostatic dissipation of the accumulated charge when the cargo surveyor introduced the metallic sample can into the tank. (The process of static electricity generation and the mechanisms for spark generation are given in Appendix 3.) By starting from the after most tanks which had been allowed to settle for over 3 hours and therefore all the static charges had dissipated naturally. The surveyor may have become convinced that his equipment was safe to use. It is clear that the time elapsed (approx. 20 minutes) from completion of loading of No 1 port cargo tank to the time the sample can was introduced was insufficient for the static charges to disperse.
- Whether or not the cargo surveyor was told to wait before starting to take samples, he was left unsupervised on the vessel and this is not in accordance with the company ISM system.
- Apart from the oversight cargo operations were conducted in a safe and proper manner by the ship's staff.
- The crew are to be commended for their prompt and thoroughly professional response to the explosion and subsequent fire.
- Their actions certainly prevented a far more serious incident developing.

The above incident is a great example of how a minor negligence can lead to a serious accident where lives were in danger. This crisis could have easily been averted if the cargo surveyor had an escort as he should have had and been instructed to start his procedure from the tanks that were completed first.

The damaged tank entry after the fire

Source:https://www.iomshipregistry.com/media/1624/cr-emilia-theresa-cargo-tank-explosion.pdf

4. Declaration of security

The Declaration of Security (DoC) is a document that is required to visit a port. Different ports have different regulations and security requirements, that is why it is important that these criteria are met when a ship enters a port. Also, vessels have security regulations too, which should be respected from the port side. With the DoC it is made clear that both sides understand the levels of security of each other respectively. The document mentioned above may not be required all the times though. This is determined by the government. A vessel can request a DoC when:

SOLAS/CONF.5/34

ANNEX 1

APPENDIX TO PART B

APPENDIX 1

Form of a Declaration of Security between a ship and a port facility[#]

DECLARATION OF SECURITY

Name of Ship :	
Port of Registry :	
IMO Number:	
Name of Port Facility :	

This Declaration of Security is valid from ..... until …….. , for the following activities .....

(list the activities with relevant details)

under the following security levels

Security level(s) for the ship :	
Security level(s) for the port facility :	

The port facility and ship agree to the following security measures and responsibilities to ensure compliance with the requirements of Part A of the International Code for the Security of Ships and of Port Facilities.

	The affixing of the initials of the SSO of PFSO under these columns indicates that the activity will be done, in accordance with relevant approved plan by	
Activity	**The port facility:**	**The ship:**
Ensuring the performance of all security duties		
Monitoring restricted areas to ensure that only authorized personnel have access		
Controlling access to the port facility		
Controlling access to the ship		
Monitoring of the port facility, including berthing areas and areas surrounding the ship		
Monitoring of the ship, including berthing areas and areas surrounding the ship		
Handling of cargo		
Delivery of ship's stores		

[#]This form of Declaration of Security is for use between a ship and a port facility. If the Declaration of Security is to cover two ships this model should be appropriately modified.

Source:https://www.pdffiller.com/100065325-fillable-filled-declaration-of-security-form

- The ship is operating at a higher security level than the port facility or another ship it is interfacing with
- There is an agreement on a Declaration of Security between Contracting Governments covering certain international voyages or specific ships on those voyages
- There has been a security threat or a security incident involving the ship or involving the port facility
- The ship is at a port which is not required to have and implement an approved port facility security plan
- The ship is conducting ship to ship activities with another ship not required to have and implement an approved ship security plan

The DoC is filled from the master of the vessel or the ship's security officer on behalf of the ship and from the port's side, it is completed from the port facility's security officer or by another declared responsible person from the government.

In the Declaration of Security, the following are included:

Ship and port facilities:

- Name of Ship
- Port of Registry
- IMO Number
- Name of Port Facility

Summary of activities:

- Validity dates
- List of activities covered
- Security level(s) for the ship
- Security level(s) for the port facility

Security measures agreed between Ship and Port:

- Monitoring restricted areas to ensure that only authorized personnel have access
- Controlling access to the port facility
- Controlling access to the ship
- Monitoring of the port facility including berthing areas and areas surrounding the ship
- Monitoring of the ship, including berthing areas and areas surrounding the ship
- Handling of cargo
- Delivery of ship's stores
- Handling unaccompanied baggage
- Controlling the embarkation of persons and their effects
- Ensuring that security communication is readily available between the ship and port facility

4.1 MARSEC levels applying to ports

MARSEC (MARitime SECurity) is the three-tiered United States Coast Guard Maritime Security system (alert state) designed to easily communicate to the Coast Guard and the maritime industry pre-planned scalable responses for credible threats. Its objective is to provide an assessment of possible terrorist activity within the maritime sectors of transportation, including threats to nautical facilities and vessels falling within the jurisdiction of the United States that could be targets of attack.

The Coast Guard originally created MARSEC to be compatible with, and respond in unison to the Department of Homeland Security's (DHS) Homeland Security Advisory System (HSAS).

MARSEC Levels are set to reflect the prevailing threat environment to the marine elements of the national transportation system, including ports, vessels, facilities, and critical assets and infrastructure located on or adjacent to waters subject to the jurisdiction of the U.S. MARSEC Levels apply to vessels, Coast Guard-regulated facilities inside the U.S., and to the Coast Guard.

Source:https://www.marinelite.gr/index.php?dispatch=products.view&product_id=510

- **MARSEC Level 1** means the level for which minimum appropriate security measures shall be maintained at all times.
- **MARSEC Level 2** means the level for which appropriate additional protective security measures shall be maintained for a period of time as a result of heightened risk of a transportation security incident.
- **MARSEC Level 3** means the level for which further specific protective security measures shall be maintained for a limited period of time when a transportation security incident is probable, imminent, or has occurred, although it may not be possible to identify the specific target.

4.2 Security incidents

Although security levels and regulations exist, incidents can always occur in times of which the crew may be irresponsible or a chain or errors might happen.The above can be completed corrected with constant patrols (especially in ports that are considered to be of high risk) from the ship's crew, to identify the incident and take action in time. An example of this took place on Danaos, a greek shipping company. In particular, aboard the company's vessel, Dimitris C, the crew found illegal substances hidden in a ship's void space on deck between two holds, after conducting patrols at the time of arrival to the port of Peru,which is considered to be a suspicious drug trafficking port.The master immediately informed the authorities who boarded the vessel with a search party, escorted by the safety committee of the vessel , a representative from Danaos office and a representative from the local P&I club. No other drugs were found. After these events, the crew was interrogated from a local prosecutor for 3 days but all found to be innocent and the vessel sailed afterwards. The above incident occured on September 14th, 2017 and lasted until 15:00, September 17th.

From the above incident, the conclusion that can be reached is that because of the increased MARSEC level that was in force on the vessel, the crew was able to quickly discover the smuggled drugs, by patroling the less used areas, which are prone to attract the attention of the perpetrators. If this was not the case, the ship's master and chief engineer would be the first ones to be arrested in the probability of the drugs being found from the port authorities, during the vessel's next port call.

5. The importance of efficiency of ship-port oparations

The shipping industry has been quadrupled since the 1970. Nowadays 90% of the world's trade is conducted through vessels.That means that the ports and the vessels must use the most efficient ways in their operations to reduce the port stay by completing their loading and unloading quickly, in order to keep transferring the goods that they are carrying 24/7. Additionally, the decrease of the tariffs has increased the number of the imported items.

One of the most controversial components of international trade today is the lower production costs of "developing" nations. There is currently a great deal of concern over jobs being taken away from the United States, member countries of the European Union and other "developed" nations as countries such as China, Korea, India, Indonesia and others produce goods and services at much lower costs. Both the United States and the European Union have imposed severe restrictions on imports from Asian nations to try to stem this tide. Clearly, a company that can pay its workers the equivalent of dollars a day, as compared to dollars an hour, has a distinct selling advantage. Nevertheless, American and European consumers are only too happy to lower their costs of living by taking advantage of cheaper, imported goods.

Despite complaints about trade imbalances, effects on domestic economies, currency upheavals, and loss of jobs, the reality of goods and services continually crossing borders will not go away. International trade will continue to be the engine that runs most nations. All goverments with sea access, give a lot of their attention to port operations, to ensure that they run in the most optional way. Also, the decrease of the data cost has opened the way for the ports to use statistics to calculate the most efficient ways to run them.This is the reason why ports in Europe are already in the path to automatic container operations. Even though the ship-port operations must be as efficient as possible, currently there is not any efficiency indicator to calculate each port's perfomance. Instead, there are used financial and operational indicators. Below are presented the indicators, as proposed originally by the United Nations:

Table 1. **Original performance indicators proposed by UNCTAD (1976)**

Financial indicators	Operational indicators
Tonnage worked	Arrival date
Berth occupancy revenue per ton of cargo	Waiting time
Cargo handling revenue per ton of cargo	Service time
Labour expenditure	***Turn-around time***
Capital equipment expenditure per ton of cargo	Tonnage per ship
Contribution per ton of cargo	Fraction of time berthed ships worked
Total contribution	Number of gangs employed per ship per shift
	Tons per ship-hour in port
	Tons per ship hour at berth
	Tons per gang hours
	Fraction of time gangs idle

Source:https://www.itf-oecd.org/sites/default/files/docs/dp201408.pdf

5.1 Time efficiency

The average turnaround time illustrates the capability of the port to efficiently handle cargo flows at the terminals and beyond. It can be defined as the average time a vessel needs to stay in a port (difference between time of entrance and time of departure). In the same category, the dwell time is "the number of days a container can remain at a container terminal once it has been unloaded from a ship before incurring a storage fee" (Le-Griffin and Murphy, 2006). Port and terminal authorities can modify the container dwell time in order to gain space and increase the capacity of storage yards.

There are inherent challenges to international comparison. First, different ports have different regulations in terms of hours of operation (i.e. number of hours and shifts that terminal gates are open). Again, authorities may extend such hours in order to increase their productivity without expanding existing infrastructure. However, there is a risk that stacking costs increase as the land utilisation rate increases. Transit time thus also relates with the other indicator of the number and frequency of ships visits. Second, official port statistics are not always clear about the exact meaning of turnaround time, i.e. whether it applies to the time spent inside the port or to the whole trip of the vessel including also the entrance channel and queuing time outside to/from the port. Thus, so-called productivity indicators are usually preferred such as by dividing port traffic volume per total length of quay.

Le-Griffin and Murphy (2006) proposed various productivity indicators at crane, berth, yard, gate, and gang levels, while acknowledging the limited availability of such precise data internationally, except from berth length utilisation rate (TEUs per foot of container quay), crane utilisation rate (TEUs per container gantry crane), crane productivity (TEUs per container gantry crane-hour), and land area utilisation rate (TEUs per acre of terminal area). These indicators closely resemble the various performance metrics that can be acquired via specialised port consultancies, such as Drewry, and which include comparative information on utilisation rates (such as TEUs/year per crane, vessels/year per berth, TEUs per year per hectare and containers/hours per lane) as well as productivity (moves per crane-hour, vessel service time, truck time in terminal and number of gang moves per man-hour). These databases suggest that on average large port terminals handle 110,000 TEU per crane, reach 25-40 crane moves per hour, and have an average dwell time of import boxes of 5-7 days and export boxes of 3-5 days (Merk, 2013).

Transit time has, however, increasingly been integrated in studies of port performance, based on the fact "that customers are concerned not only with transport costs in selecting which carriers they will use and the routing undertaken, but also with a range of other factors including safety, traceability, reliability and transit times" as mentioned by Slack and Comtois (2013) in their study of ocean transit times.

Besides more general discussions on such topics (Hummels, 2001; Slack, 1985; Djankov et al., 2005; Nordas et al., 2006; Tongzon and Savant 2007), some authors have proposed specific studies of container flows in liner shipping looking at congestion issues in ports (Notteboom, 2006; Verminen et al., 2007; Yan et al., 2009; Jones et al., 2011; Leachman and Payman, 2011, 2012) but also advanced methodological frameworks including all aspects of port and vessel operations of which total voyage time, voyage time at sea, voyage time in port, average port time, and vessel speed (Moon and Woo, 2013). The latter work is rooted in

earlier studies of transit time performance of ocean carriers (Saldanha et al., 2006), notably those looking at time uncertainty in shipping and port operations (Wang and Meng, 2012; Qi and Song, 2012) and measurements of the time factor in liner shipping network design through mathematical modelling (Alvarez, 2012). Suarez-Aleman et al. (2013) rightly argued that very few empirical studies have been made about time efficiency, although such aspect is known to be crucial and despite the possibility for inefficient ports to remain attractive for other reasons (Wilmsmeier et al., 2003).

One early exception is the study by Edmond and Maggs (1976) of five United Kingdom ports, concluding that no simple linear relationship existed between ship size, handling rate and ship berth time, but one may argue that the study sample might have been too small for such a statistical approach. In the same vein, Heaver and Studer (1972) concluded that, for instance, many factors may blur the relationship between ship size and loading time, such as weather, labour, and market conditions, the importance of time to vessel operations, and the number of berth changes, but overall, their study of Vancouver demonstrated a solid correspondence between the two variables.

Indeed and as suggested by Goss (1967) in his study of turnaround times, a vast literature had already addressed such issues back in the 1950s with the objective to finds ways to reduce excessive port time and overall sea transport costs. More recent studies include the search for factors influencing time efficiency in Latin American ports, such as container loading rate, containers loaded per vessel, and waiting times (Sanchez et al., 2003), the analysis of the relationship between port characteristics (of which cargo delay during customs procedures) and maritime transport costs (Wilmsmeier et al., 2006), and the detailed analysis of the components of vessel time in ports and the determinants of port inefficiency, such as customs clearance, container handling charges, cargo handling restrictions, mandatory port services as well as a crime index (Clark et al., 2001). What becomes clear in such works is the multifaceted character of time efficiency.

As defined by Suarez-Aleman et al. (2013), "port time" is the combination of several components such as port access time, loading and unloading times of cargo, ship waiting time and time for customs and other administrative procedures. The authors have particularly shown that among African ports, overall efficiency may not be always affected by time factors, especially for some ports where competition with other modes and other ports is limited.

The lack of empirical and comparative academic studies on time-related port performance indicators is surprising. It is first of all surprising considering the focus of the port and maritime industry on such metrics. As mentioned above, specialised port consultancies collect time-related port terminal performance metrics, which include average container handling time, crane productivity and gang productivity. Similar productivity metrics are collected by some shipping lines, e.g. Maersk with its Daily Maersk Efficiency Ranking. Moreover, various ports systematically collect the vessel turnaround times in their ports. Examples are the ports of Durban and Shanghai, as illustrated by the OECD Port-City studies on these places (Rodrigue et al. forthcoming; Hong et al. 2013). What is more, some ports have formulated targets on the average vessel turnaround times in their port: one of the maritime operations targets for the Port of Durban by the Transnet National Port Authority in South Africa is an average container ship turnaround time of 59 hours for the year 2013/2014.

5.2 Potential delays in cargo operations hindering efficiency

Technical faults

Technical faults in ports is a very common cause of delay, which is not so often written by the media. This is especially actual for developing countries: outdated equipment, lack of certification and scheduled inspections, non-compliance with safety standards - all this leads to an emergency situation one day. And sometimes it happens because of negligence of employees of the terminal. One should bear in mind that this can happen in relation to cargo, so never neglect the possibility of insurance. Also.some insurance companies also insure the risks of untimely cargo delivery associated with certain events.

Source:https://www.searates.com/blog/post/25-most-common-reasons-of-cargo-delays

Customs

The identification of violations that may lead to the apprehension of containers or even a vessel, is not the only phenomenon that may affect the time of delivery of cargo. Between the two countries there are at least 2 customs posts that container will pass, and in the case of transshipment ports, there are even more of them. At the same time, customs authorities at the port of transshipment can also assign control actions to cargo, and even in this case it will be delayed.Additionally, attention must be paid to this point if business is done with countries with a high level of corruption.

Pollution of port waters

Violation of the ecology by the fault of the vessel or crew, and as a consequence, arrest and loss of time is a frequent case The vessel does not have to be a tanker to harm the ecology and the sea port waters. Even the smallest vessel has a stock of bunker fuel, measured by hundreds of tons, and also a certain volume of lubricants. In case of non-compliance with the

safety precautions, negligence of the crew, or failure to perform routine maintenance and repairs of the vessel, the release of these substances may occur with a high probability - and the first thing thereafter the vessel will be arrested at least until damage is removed (about a month). With a considerable number of these incidents in history, they unfortunately continue to occur.

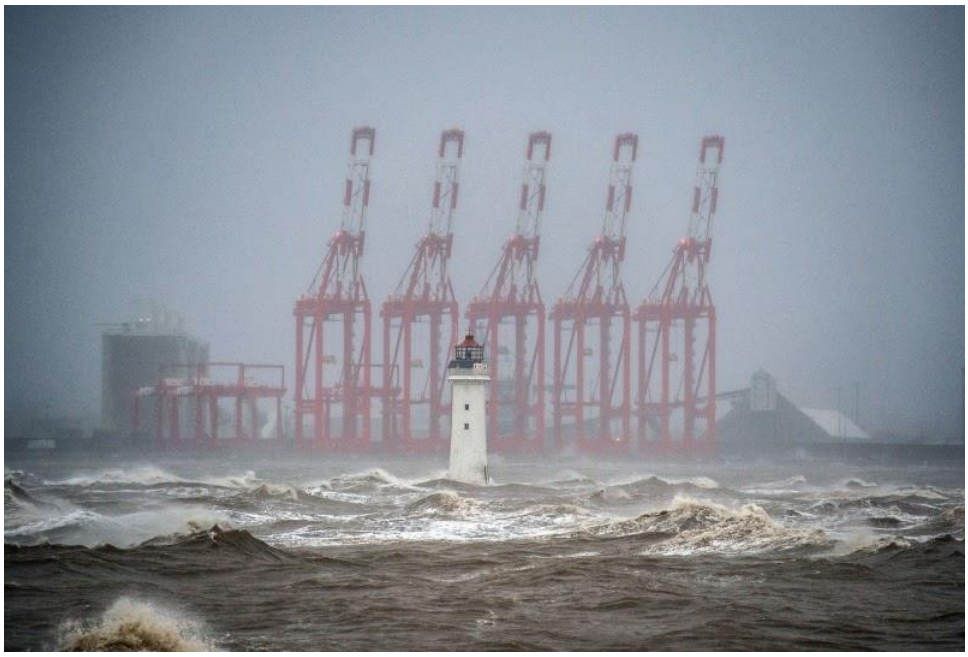
Source:https://nrcc.com/case-study/port-of-los-angeles-oil-spill/

Holidays and weekends

In today's world about 60% of all world terminals work without holidays and weekends, because the planning of work of ships and freight companies becomes more efficient and the profit of all parties involved increases. However, there is still a considerable number of ports where stops for the weekend take place, and this surely affects the speed of goods delivery. In ships chartering, there is even the concept of Sshex/Sshinc (Saturdays, Sundays, Holidays excluded/included) at which the days off and holidays are not taken into account of the laytime (no freight works) or taken (freight works are produced). Here we are discussing the technical work of the terminal, and not mentioning the work of customs and other port structures, which in almost 100% of cases do not work.

Weather conditions at a time of loading

Not only the events during the voyage described in the Technical Faults may cause delays in delivery of goods. Strong wind, tropical storm, which exceeds the standards provided by the loading equipment of the terminal, can cause serious problems at the transshipment complex, which can affect the total time of delivery. Often, typhoons occur in Asia.



Source:https://www.searates.com/blog/post/25-most-common-reasons-of-cargo-delays

No free space on feeder

In this case, even a division of the bill of lading is possible. Containers are waiting for a new vessel in the port of transshipment, because the dispatch service of the line could not allocate space on the planned feeder. The reasons can be different, but as a rule it is connected with one certain reason which has caused an offset in a chart, and all consignors, whose bookings have been declared earlier, should be sent on a feeder in a priority. Today, shipping lines try to fight such tendencies to avoid complaints from clients and not to cause additional expenses on storage/demurrage of containers.

Source: https://gcaptain.com/u-s-federal-maritime-commission-says-port-congestion-top-priority-2015/

Congestion at port or terminal

This usually happens when the number of containers which arrives at the port is huge (exceeding the norm with a reserve). In particular, this applies to transshipment ports, where the turnover of transit cargoes is much higher than import-export. Due to this phenomenon, the vessel is compelled to wait longer for the commencement of cargo operations until the work on the previous cargoes is completed.

Source:http://www.miq.co.uk/resources/news/article/systemic-china-port-congestion-to-spread/

6. Conclusion

We have discussed herein the management of safety, security and efficiency of operations. Based on our research, the role of the ship involves the successful familiarization of the crew members with the safety procedures before and during the operation at port. In addition, safety depends on the effective usage of the equipment involved in the cargo operation as well as the competency of the crew in dealing fast and effectively with emergency situations. The role of the shore concerning safety involves establishing clear and effective communication with the ship and providing support in case of emergency in fast and effective manner. Security demands strict compliance with the regulations by both ship and shore facilities. Finally, time efficient operations, same as security, depend on both the vessel and the shore resulting in benefits to all involved parties.

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