12.01.01.00.06 RESPONSIBILITIES

The purpose of this section is to provide the Shipboard Management with guidelines related to the Navigational matters of the vessel. The procedures in these sections shall be read in conjunction with Bridge Procedures Guide (ICS).

12.01.01.01.06 Responsibilities of Master

a) General:

The Master must understand that nothing contained in this chapter is to be construed in any way to relieve him of his full responsibility for the safe navigation of his ship and the efficient organisation on board.

The Master has overall responsibility for the safe operation of his vessel in accordance with flag state laws and international regulations. Under no circumstances is commercial pressure to justify the taking of an unnecessary risk. The Company will support a decision taken by a Master in good faith and in the interests of safety.

The Master is fully responsible for: -

- The safety of life on board and for the ship, her cargo and the environment;
- Ensuring that before proceeding to sea the ship is fully equipped and in a seaworthy condition in all respects for the entire voyage;
- Ensuring that stability, trim and stress are adequate for all stages of the voyage and that the cargo is properly and safely stowed;
- Ensuring that a berth-to-berth passage plan is prepared;
- Ensuring that all Bridge Personnel are fully familiar with the location and operation of all bridge controls and equipment before they assume responsibility for bridge watch;
- Ensuring that all personnel joining the vessel have sufficient time and opportunity to become familiar with the shipboard equipment, operating procedures, and other arrangements required for the proper performance of their duties;
- Ensuring that the draught of the ship is readily available to the officer of the watch throughout the voyage;
- Ensuring that the bridge is properly manned for the prevailing conditions;
- Ensuring that all Bridge Navigation Officers reporting aboard Company vessels are aware of the requirements of this chapter and of any relevant Fleet Letters, Circular Letters, checklists, etc;
- Ensuring that all navigational equipment is maintained in a satisfactory working condition and that any breakdown or malfunction of navigational equipment is immediately reported to the Fleet Superintendent in order that corrective and remedial action can be immediately instigated;
- Responsible for conducting and recording at the required intervals a navigational procedures audit in order to ensure that all officers are complying with the necessary procedures and requirements;

- Masters may use the service of pilot where ever such non compulsory pilotage services are available.

b) Collision Avoidance:

All traffic is to be given a wide and safe berth as laid down in the International Regulations for the Prevention of Collision at Sea. These regulations are amended from time to time and the Master, along with his navigation officers, must be aware of the latest amendments.

Masters are to also ensure that all watch officers are aware of the handling characteristics of their vessel with special emphasis being made to turning circles and stopping distances. The vessels turning circles and stopping distances are to be prominently displayed on the bridge.

c) Master's Standing Orders:

On taking over command, the Master is to record his own Standing Orders, which are to be written with regard to the contents of this section and shall be a ship specific addition to the company's standing orders.

Standing orders should be written by the Master to reflect his own requirements particular to the vessel, the trade and the experience of the deck officers aboard at the time. The Master's Standing Orders must not conflict with the ship's SMS. The orders, as written, should reference company navigational procedures and identify any circumstances where the Master wishes his instructions to be stricter than the company requirement documented within the SMS.
The content of the Master's Standing Orders SHOULD NOT degrade the company expectations documented anywhere within these procedures.

The Master is entitled to vary responsibilities and duties on board to meet any exceptional circumstances. These Standing Orders are to be kept with the Company Standing Orders in a permanent place on the Bridge.

The Master must include in his standing orders his requirements for the minimum acceptable "Closest Point of Approach (CPA)" and "Time to Closest Point of Approach (TCPA)" acceptable during normal navigational watches. Master may further define the minimum "Bow Crossing Range (BCR)" acceptable during normal navigational watches. "Normal navigational watches" are period of navigation when the Master or his deputy, as defined by the company, are not required to be on the bridge as part of the official bridge team composition. Reference is drawn to "12.01.04.02 Radar and Radar Plotting Aids" and "12.01.12.03. Calling Master" for determination of minimum acceptable CPA.

Standing orders must stipulate action to be taken if the parameters set above cannot be maintained or if in the event of a 'give-way' vessel not complying with the collision regulations that an appropriate action to be taken by own vessel to prevent collision in ample time.

Standing orders must also clearly specify and leave no doubt on:-

- Calling the Master. (Reference shall be made to HSQEEn 12.01.12.03 - Calling the Master)
- Reducing speed in the event of restricted visibility or other circumstances. (Defining restricted visibility and the actions to be taken by the officer of the watch upon encountering it)
- The minimum passing distance to navigational dangers and/or navigational aids during normal* navigational watches and the actions to be taken if these cannot be maintained.
- Posting lookout(s).
- Manning the wheel.
- The use of bridge equipment and navigational aids.
- The provision of additional watch keeping personnel in special circumstances, e.g. heavy traffic, narrow passages or restricted visibility.
- Radio watches keeping and GMDSS procedures.
- Defining how the alarms and layers for use with ECDIS/ECS are required to be set, checked and in what circumstances they may be changed in reference to Appendix 11 of the paperless procedures.
- Display and Alarm settings requited during Passage planning stages and Monitoring stages with reference to Appendix 11 of the paperless procedures.
- The hazards and limitations of reliance on AIS and VHF in collision avoidance situations.
- The process of the Master taking over the con of the vessel

Master's and Company standing orders are to be signed by all watch keeping officers; with names of each officer, as a confirmation of understanding and compliance before undertaking their first navigation duties.

d) Master's Daily Bridge Orders:

The Master shall issue supplementary orders each day in a Bridge Order Book to cover periods when he may be resting or otherwise engaged, addressing the expectations from OOW while ship is engaged in Coastal as well as Ocean passages. The daily orders should also be used to give additional instructions relevant to the operation of the vessel in the short term and prior to the next time the Master expects to be present or to provide further instructions. There may be times when multiple orders may be required within a day due to a change in scenarios and situations.

Information entered must be consistent with the operation and voyage of the vessel such as preparations for approaching critical areas due to piracy concerns, fishing vessel activity, trading area, increased traffic density or expected deteriorations in weather conditions.

Each entry had been dated, timed and signed by the Master.

In order to distinguish between coastal and ocean passage, Master shall consider the following:

- Have extra lookouts, if necessary.
- Navigation in close proximity to navigational hazards, e.g shallow waters, oil fields, etc.
- Strong tidal currents;
- Compliance with TSS, VTS or prohibited zones;
- Identification of land marks and the navigational aids;
- Plotting of position frequently and comparing the same with various methods available
- Obtain weather information including visibility,
- Note time of passing of danger points and arrange for any extra precautions to be taken.
- Arrange for monitoring local/coastal broadcasts.
- Give required notice for use of the engines.
- Due consideration to squat, shallow water effects such as bank effect, smelling the ground etc.
- Ship board safety
- Security levels
- Operations and limitations of ECDIS
- Use of BNWAS

Before going on the watch, each Deck Watch Officer shall read and sign the orders written in the Master's Bridge Order Book. It is highly recommended that watch keeping ratings also read and sign the Orders.

e) Accident, Collision and Salvage:

The Master must appreciate the seriousness of the responsibilities imposed upon him by the existing statutes of the applicable flag state. This requires the Master of each vessel involved in a collision as long as he can do so without danger to own vessel, crew and passengers to:

- Render to the other Vessel, her Master, Crew and Passengers assistance as may be practicable and necessary to save them from danger caused by the collision, and to stay by the other vessel until it has been ascertained that no further assistance is required.
- Provide to the Master of the other vessel the name of own vessel, port of registry and names of ports from which the vessel has come and to which bound.

In the event of a collision or casualty or of salvage or other services being rendered to or by his ship, the Master must immediately after the occurrence inform the Company by the quickest means possible, i.e. Telephone when available. Brief details are to be passed in this way and he must back up this report with a full written report. If a collision occurs the Master must also communicate with the Master of the other ship, by the most practical means available in the circumstances, holding him and his Owners responsible for the accident. He must endeavour to obtain at least an acknowledgement for this.

In the event of an accident or breakdown, the Master's first priority is the preservation of life and the Master has the absolute authority to engage any assistance necessary to protect the vessel, her crew, cargo

and the environment. In situations of danger, where immediate assistance is required, such help should be obtained, where possible, by agreement to Lloyd's Standard Form of Salvage Agreement. A copy of this form must be carried onboard.

In the event that potential Salvers are unwilling to accept this form, the Master has authority to agree any basis of assistance necessary to avert immediate danger.

In some situations contracts may exist with salvage and towing companies. If this is the case appropriate vessels will have been advised in advance. Typical examples are vessels with OPA 90 Vessel Response Plans where a Salver for US waters will be identified or in some port areas where Owners have contracts with towing companies that include a clause for vessels in distress or experiencing difficulties.

If time and circumstances permit, reference shall be made to the Company, providing always that this does not delay the taking of such immediate action. An entry must be recorded in the Official Log Book concerning any such agreement made.

Depositions before any Governmental Official following a casualty or accident need great care to ensure that no material facts are omitted, nor anything incorrectly stated. In these cases lawyers will be appointed and wherever possible statements should not be provided until the lawyer attends. The Company will confirm the name of the firm of the lawyer attending on the Owner’s behalf as soon as known.

In all cases where the ship encounters heavy weather or suffers an accident of any kind, no matter how minor, the Master is to note Protest and submit a detailed report to the Company. Where there is reason to suppose that the ship or cargo has sustained damage, he is to send certified copies of the notation to the Company.

In all cases where damage has occurred (or is thought to have occurred) to the ship's structure or machinery, the Master is to ensure in conjunction with the Chief Engineer Officer and the Chief Officer, that a full assessment is made of the situation, including a diver's survey (if necessary). The incident or damage is to be thoroughly investigated and a full and accurate report submitted to the Company.

f) Assisting with Ships in Distress:

By International Law he is required to give all possible assistance to save life. The Master must not overlook that his prime responsibility is the safety of his own ship and the lives on board and undue risks are not to be taken.

g) Use of Main Engine:

The Master is responsible for advising the Chief Engineer when the main engines are required to be placed on "stand-by" and give adequate notice for same. Such conditions will include restricted visibility, congested traffic areas, adverse weather, approaching pilot pick-up points, pilotage waters, expected fuel oil changeovers and any other time that the Master considers that "stand-by" engines is appropriate. The Chief Engineer is responsible for ensuring that the Engine Room is sufficiently manned for such occasions.

The Master must liaise fully with the Chief Engineer regarding suitable periods for operating the main engine in the unmanned condition and ensuring that the procedures regarding the operation of unmanned machinery spaces contained in Part 6 of the Operations Procedures are correctly implemented. The Master and Chief Engineer must also ensure that all deck and engineer officers are thoroughly familiar with the operation of the main propulsion control systems.

h) Watch keeping to assist the Chief Officer:

Subject to the overriding considerations of safety and STCW requirements and where geographical and weather conditions allow, the Master is encouraged at his own discretion to take over some of the purely Watch keeping duties of the Chief Officer. This will allow the Chief Officer to devote more time to the overall supervision of the crew, particularly during periods of busy hours like arrival and departure ports.

i) Ship's Speed:

At all times the ship's speed is to be controlled by the Master, except in circumstances where the OOW is required to alter speed in order to comply with the collision regulations, contingencies or weather conditions. Setting the vessels voyage speed must be in line with the voyage orders and in full consultation with the Chief Engineer. Reference is also to be made to the Collision Avoidance procedures and guidance contained in these procedures.

j) Charts:

Each vessel shall carry adequate and up-to-date charts, sailing directions, list of lights, Admiralty list of radio signals, nautical almanac, tide tables, notices to mariners and all other nautical publications necessary for the intended voyage; in compliance with SOLAS (as amended) and other relevant applicable rules, regulations, codes, guidelines, standards. Each vessel shall carry appropriate

British Admiralty navigational charts and publications or their equivalent. Where available and appropriate, the British Admiralty navigational charts and publications shall be preferred to other Hydrographic office publications. It is Company policy that all charts and navigational publications on board the vessel are kept up to date with the latest corrections from Notices to Mariners and other relevant publications including Radio Navigational Warnings. Charts and publications needed for current and next voyages shall have first priority. The navigation officer shall ensure that all charts and navigational publications required for the current and intended voyages are on board and corrected up to date.

Company shall ensure that notices to Mariners are supplied to the vessel by external providers appointed by the Company. A Chart Correction Log shall be maintained up-to-date. The Chart Correction Log shall be always maintained ready for examination by Port State Control, Vetting Inspector, or other relevant Authority. Temporary and Preliminary Notices to Mariners shall be kept in file maintained by the navigation officer. A Chart Catalogue (or equivalent) shall be available on board, and shall assist in correctly identifying the paper charts required for an intended voyage (critical areas) and areas not having adequate ENC coverage.

In order to highlight a T&P that has been entered on a BA paper chart we recommend a 'cloud callout' shape is entered in pencil with the T&P number within for quick reference.

The Company shall nominate shore-based Service Provider for auto supply of Charts & Publications and access to services providing chart corrections. Where Hard copies are required, the master is to provide them with ETA in good time so as to enable them to dispatch the new editions and required charts and publications.

The Master must ensure that he has all the charts and publications on board for the intended passage and that all charts are corrected to the latest Notices to Mariners available and Radio Navigational Warnings. Master shall record the serial number of BA charts checked for corrections in a separate log book.

Occasionally voyage orders will change and charts may not be held on board for the new trading area. In such cases, the Master must obtain adequate charts of a large enough scale (i.e. having sufficient detail to navigate the area safely) before entering the area. Note however, that this does not remove any responsibility from the Master for ensuring adequate charts are on board for the passage.

On no account is a vessel to proceed to an area without adequate charts of a suitable scale. If necessary, the vessel will be stopped or deviated to obtain the correct charts before proceeding. The DPA must be contacted in such circumstances and advised of the facts, even if charts have been sourced locally.

In case charts and publications are required at short notice due to a change in the vessel's schedule or due to local requirements, the master is to contact the concerned Marine Superintendent or his backup who shall contact the AOH (24

hrs contact number) of the shore based Service Provider so as to obtain and arrange delivery of required charts and publications. Should it prove impossible to obtain required charts and publications through the service provider, master shall obtain such charts through the local agent or any other available source that is practicable.

k) Ship Handling:

When circumstances permit, the Master is to provide opportunities for the Chief Officer and the other deck officers to gain experience in ship handling. In particular, this is to take place during coastal navigation and port approaches, under the direct supervision of the Master. In addition to this the company conducts situational awareness training courses for all deck officers whilst they are on leave. This course essentially covers ship handling, navigation in congested waters, navigation related emergencies, COLREGs and elements of BTM and BRM.

l) Margin of Safety:

The Master must give clear instructions on the navigation aids to be in use and the required margins of safety on closing land or a navigational danger, which will include clearly marking the information on the charts in use, during any period he expects to be absent from the bridge. He must also indicate the frequency with which the position is to be fixed for each section of the passage. The Master must not be pressurised into making hasty judgements due to commercial pressures from any person. The Master is to ensure that all Navigating Officers are familiar with the limitations, precautions, errors and correction where applicable of the equipment by reading and understanding the relevant sections of the equipment manuals.

m) Navigational and Procedural Audits by Master:

In order to check that navigational practices and bridge procedures are correctly and consistently applied, The Navigation Audit (using checklist HSQEEn 12.01.01.013) should be completed by the Joining Master within 3 weeks of joining the vessel and forwarded to HSQEE, Operations and Training department. During this time Master shall also do the briefings of each navigational watch keeping officer on one to one basis and make his expectations known to each individual for compliance with Company's and his standing orders. Each vessel in the fleet is audited at intervals not exceeding 12 months. The results from such audits will be used to generate audit trends and fleet analysis to improve procedures.

n) Verification Assessments:

In addition to the Master's sailing Navigation Audits the Company will arrange for a Navigational Verification Assessment to be conducted at intervals not exceeding 12 months by a shore based staff. This verification assessment can be conducted either at sea or during ship board visits in port.

The Navigational verification assessments shall be completed using checklist HSQEEn 12.01.01.012. The intent of this audit is to sample check compliance with the company's navigation procedures. As part of the navigational verification assessment the last Master's and shore based staff Navigation Audits shall be reviewed. The results from such audits will be used to generate audit trends and fleet analysis to improve procedures.

o) Navigation Audits:

The comprehensive sailing navigation audit shall be conducted annually by a shore based staff by using checklist HSQEEn 12.01.01.011. As far as possible, such audits shall be planned in areas viz: Arabian Gulf, Malacca Straits, English Channel, and Straits of Gibraltar, where moderate traffic conditions are encountered. The Navigation Audit incorporates a Dynamic Assessment, which entails a comprehensive review conducted through the observation of operational practices during a voyage.

The primary objective of this audit is to assess the overall navigation competence, and the outcomes derived from such assessments will be utilized to ascertain audit trends and conduct fleet analysis, thereby facilitating procedural enhancements.

The Navigation Audits shall be conducted by the Marine Superintendents (experienced senior deck officers preferably a Master Mariner with command experience), who are fully up to date with company navigational practices, the International Regulations for Preventing Collisions at Sea (COLREGS), the ICS Bridge Procedures Guide and industry best practices.

The Navigation Audit supersedes the Navigation Verification Assessments as it encompasses all facets of the Navigation assessment. In circumstances where fulfilling the Annual Sailing Navigation Audit requirement becomes unfeasible, the maximum interval between two consecutive Navigation Audits should not exceed 24 months. Should the practicality of conducting a vessel audit within the timeframe be impeded by its trading pattern, arrangements shall be made for an unannounced remote audit. Such an audit may entail the analysis of Vessel Data Recorder (VDR) downloads from the vessel.

p) External Audits:

The Company will make every effort to engage appropriately qualified specialist contractors to conduct independent Navigational Audits instead of relying solely on company superintendent-led Navigation Audits.

Refer to:
12.01.01.011 – Navigational Audit Checklist
(This checklist shall be used by Internal Auditors only)

12.01.01.012 – Navigational Verification Assessment Checklist

12.01.01.013 - Master's Navigational and Procedural Audit
(This checklist shall be used by Masters only)

12.01.01.02.03 Responsibilities of Officer of the Watch (O.O.W.)

a) General:

The O.O.W. is the Master's representative and his primary responsibility at all times is the safe navigation of the ship. He must at all times comply with the applicable regulations for preventing collisions at sea as well as Company and Masters standing orders. He is to send for the Master if he is in doubt, in ample time, taking such actions in the meantime, as he considers necessary to avoid risks. Should the Officer of the Watch think the ship to be in shallow water, and/or be in doubt as to the position of the ship, he is to stop the ship at once and verify the position.

b) Company and Master's Standing Orders:

In order to confirm their understanding and familiarisation, all deck officers are to sign the Company Standing Orders (HSQEn 12.01.01.021) and Master's Standing Orders. Clarification from the master shall be sought if in any doubt or cases of ambiguity.

c) Familiarisation:

All Watch Officers must fully familiarise themselves with the location and operation of all bridge controls and equipment before assuming responsibility for a bridge watch. This is to be completed wherever possible with the assistance of the outgoing Officer.

d) Unexpected Danger and False Sense of Security:

Danger may arise suddenly and unexpectedly from any quarter at any time. Watch Officers are warned against allowing themselves to be lulled into a false sense of security at any time and especially in pilotage waters, poor visibility and at night.

e) Navigational Watch keeping Duties and Responsibilities:

The O.O.W. is in complete charge of the safe navigation of the ship irrespective of the presence of the Master and is to remain in charge until the Master specifically states that he has taken charge and an appropriate log entry made. A log entry is also to be made when the Master hands the safe navigation of the vessel to the O.O.W. If, at any time, the Officer of the Watch is in any doubt as to the safety of the ship, the Master is to be informed immediately.

If restricted visibility is encountered, the requirements in relevant sections are to be followed. If there is a sudden deterioration in visibility, or in the weather and/or sea conditions, the Master is to be informed immediately.

All traffic is to be given a wide and safe berth as laid down in the International Regulations for the Prevention of Collision at Sea. The Master will, in his

Standing Orders, state his requirements for the minimum acceptable "Closest Point of Approach (CPA)" making due allowance for occasions where the proximity of land, shoal waters or traffic density restrict the available sea room.
All watch keeping officers must be aware of the obligations placed on them when their vessel is the 'stand-on' vessel. If at any time they are in doubt as to the actions or lack of action by the give way vessel, the Master is to be informed immediately.

The O.O.W. must not hesitate in taking avoiding action by turning the vessel away from the danger or by a substantial reduction in speed.

Officers must realise that large vessels take time to manoeuvre. Early and prompt action will also help to minimise the potential for main engine damage that can occur by subjecting a vessel to a hard-over wheel order at full sea speed.

The O.O.W. is to keep his watch on the bridge, which he must in no circumstances leave until properly relieved. He is not to hand over the watch to the relieving officer if he has reason to believe that the latter is not capable of carrying out his duties effectively, in which case he is to notify the Master accordingly.
A proper record is to be kept in the Deck Log Book and Bridge Movement Book of the movements and activities during the watch relating to the navigation of the ship.

f) Bridge and Navigational Equipment:

All aids to navigation are to be used as a check on visually obtained positions having due regard to their limitations and/or errors. Equipment operating manuals give guidance on this and, if in doubt, are to be discussed with the Master. The Master is to be informed of any malfunction or suspected malfunction of that equipment.

At all times the O.O.W. must not hesitate when the need arises to use the helm, engines, navigation equipment and sound signalling apparatus. The O.O.W. must be aware of the handling characteristics of his ship, including stopping distances, and turning circles, and must appreciate that other ships may have different handling characteristics.

g) Watch keeping Personnel:

The O.O.W. is to give watch keeping personnel all appropriate instructions and information, which will ensure the keeping of a safe watch including an appropriate lookout. The Chief Officer is responsible for ensuring that all deck ratings are familiar with their duties prior to commencing duties.

h) UMS - when time limit for dead man alarm is exceeded:

If the UMS alarm has not been acknowledged within a pre-set time, an alarm will be released on the bridge, at Chief Engineer's panel and in public rooms. Bridge OOW must inform Master as soon as possible and prepare for a possible emergency as per Ship Emergency Plan.

i) UMS - Action prior accepting UMS status:

The Bridge OOW on duty must not accept the UMS engine to bridge change over alarm only but await for the Engineer on watch to call the Bridge and confirm all is in order & only then accept the changeover to UMS.

Refer to:
12.01.01.021 - Company Standing Orders
12.01.01.022 - Familiarization with Bridge and GMDSS Equipment

12.01.01.03.02 Responsibilities of Navigating Officer

In addition to keeping a navigational watch at sea and a cargo watch in port, the principle duties of the assigned navigating officer (usually Second Officer) are:-

- Preparation of voyage plans (berth to berth)
- To ensure all charts and publications are properly corrected and kept up to date.
- To ensure that on receipt of new editions of charts, old charts are removed from the chartroom or wheelhouse.
- To monitor the supply of Notices to Mariners and new editions and advise the Master if they are not received on schedule.
- To ensure that Navigation Warnings are received, filed and brought to the Master's attention where required.
- To monitor weather reports and bring to the Master's attention any adverse reports.
- The responsibility for navigation instruments such as sextants, binoculars, chronometers.
- The responsibility for monitoring operation of all bridge equipment.
- Chart and publications outfit, paper as well as electronic are monitored on board and discrepancies (if any) shall be promptly reported to the company.
- Are familiar with the limitations, precautions, errors and correction where applicable of the equipment by reading and understanding the relevant sections of the equipment manuals.

12.01.02.00.01 CHART CORRECTION

The Navigation Officer will ensure that Charts and Publications to be used for navigation are corrected to latest NTM / ENC updates and be guided by NP 294 (How to Keep Your Admiralty Charts Up-To Date) in maintenance of the Chart Folios. Navigating Officer will also ensure that Charts and relevant publications required for the forthcoming Voyage are fully corrected.

Further; upon receipt of NTM in any port or by electronic means at sea, current voyage charts & publications must be corrected immediately on priority; prior to departure; if the ship is in port. Remaining charts correction can follow after voyage charts and publications.

Master shall randomly check voyage paper charts for corrections to NTM's / Nav warnings / EGC warnings / T & P Notices / Ocean Passages / Chart catalogue / Mariners Hand Book, etc. (Refer to Master's responsibilities) as well as ENC updates.

As a confirmation a sheet stowed in NP 133A with the numbers of each BA chart checked (at least 10 charts per month) to be recorded. This can be extended to other publications that need to be corrected as per NTM's as stated above.

Additionally; OOW when using the BA chart during his watch must systematically pick up a previous correction, refer to digital copy of relevant weekly NTM or NP234A and 234B (or any company approved software/ procedure) to sight and verify if it has been carried out diligently. This will act as a double check to ensure that all corrections on that particular chart have been completed, so that the vessel is not penalised during a SIRE / PSC inspections.

12.01.03.00.06 BRIDGE RESOURCE MANAGEMENT

12.01.03.01.00 Bridge Watchkeeping

Bridge watch keeping is the most important activity conducted at sea. Upon the watch keeper's diligence rests the security of the ship, her entire crew, the cargo and the environment.

It is a demanding activity, requires support, encouragement, motivation, self-discipline and a high standard of professionalism.

12.01.03.02.00 Familiarization with Bridge and GMDSS Equipment

Master must ensure that all officers and bridge watch keeping ratings are familiarized in accordance with check list HSQEEn 12.01.01.022.

12.01.03.03.06 Bridge Team Management

Bridge Team Management is not a navigational skill or management act by one person. It should also not be interpreted as navigation by committee. Bridge Team Management is the use of all physical and personnel assets and the creation of an environment to maximise their effectiveness.

The primary goal of Bridge Team Management is the elimination of 'one person errors'. All members of the Bridge Team are to keep themselves aware of all vessel operations. Pilots play a critical role within the Bridge Team. It is the responsibility of the Bridge Team to assist the pilot to work within the Team.

A. Bridge Organisation (33 CFR 157.415 (1)):

The competence and vigilance of the O.O.W. provides the most direct means of avoiding dangerous situations. Analysis of navigational casualties shows that weaknesses in bridge organisation are frequently a contributory cause. Clearly defined procedures understood by all involved are essential. These procedures can only be achieved by each member of the Bridge Team realising that he has a vital part to play in the safe navigation of the ship and that safety depends upon all personnel playing their part to the utmost of their ability.

Junior team members must never hesitate to question a decision if they consider that such a decision is not in the best interests of the ship.

B. Bridge Team (33 CFR 157.415 (1)):

At all times the Master must ensure that the Bridge is properly manned for the prevailing conditions. The Master must be satisfied that the experience of the people is appropriate for the intended passage.

Whilst in restricted waters the Master must ensure that only experienced qualified helmsmen are employed. Wherever possible (i.e. on short passages) the same helmsman is to be used from the time of commencing hand steering to "All Fast" or time of engaging Auto-pilot. On longer passages it will be necessary for the helmsman to be relieved and this must only be undertaken when the vessel is steady on course with no imminent manoeuvres. The Master and Pilot must agree that it is safe to change the helmsman prior to this being carried out.

In case of management of lengthy periods with increased bridge manning the bridge team shall be divided into two teams preferably as follows:

Team 1: Master + 3rd Officer + Lookout + Helmsman
Team 2: Chief Officer + 2nd Officer + Lookout + Helmsman

If an additional officer is provided on board the vessel, then he could be assigned duties at the master's discretion to ensure compliance with the work and rest hours.

a) The Company guidelines for maintaining watches will be taken as following:-

Bridge & Engine Room Watch Levels

Bridge Watch Levels-

Watch Level 1: OOW + Lookout

Watch Level 2: OOW + Lookout + Helmsman

Watch Level 3: OOW + Master OR Chief Officer + Lookout + Helmsman

Watch Level 4: OOW + Master + Pilot + Lookout +Helmsman

Engine Watch Level-

Watch Level 1: UMS

Watch Level 2: Duty Engineer + Oiler

Watch Level 3: Duty Engineer + Oiler + (2nd Engineer or Chief Engineer)

Watch Level 4: Duty Engineer + Oiler + Chief Engineer + (ETO or 2nd Engineer.)

As a minimum, the Company guidelines for maintaining Bridge watches & Engine Room watches while navigating under difficult circumstances & under normal circumstances will be taken as follows:-

Navigation conditions:

Open Waters:	Bridge Watch	Engine watch
Clear weather, little or no traffic (including Daylight),	1	1 or 2
Clear weather, higher density traffic	1 or 2	1 or 2
Restricted visibility, little or no traffic,	2 or 3	2 or 3
Restricted visibility, higher density traffic,	3 or 4	3 or 4

Restricted Waters (Limited Manoeuvring Room):

Clear weather, little or no traffic,	1 or 2	2
Clear weather, higher density traffic	2 or 3	2 or 3
Restricted visibility, little or no traffic,	2 or 3	2 or 3
Restricted visibility, higher density traffic	3 or 4	3 or 4

Entering or Leaving Port:

Clear weather; little or no traffic	3 or 4	4
Clear weather, higher density traffic	3 or 4	4
Restricted visibility, little or no traffic	3 or 4	4
Restricted visibility, higher density traffic	3 or 4	4

At Any Time When the Following Conditions Exist:

Close proximity of navigational & High navigational intensity plus collision avoidance, transiting through High Risk Areas, Ice Navigation / suspected Ice	3 or 4	3 or 4

While vessel is at Anchor, Drifting at Sea or during STS operations:

Kindly refer to the "*Bridge and Engine Room Manning Matrix Poster*" which covers the operations under various scenarios.

The Matrix also covers scenarios such as watch levels required while engaged in receiving store while Underway or during Personnel Transfer Operations.

The passage plan shall identify the anticipated change in bridge team composition and machinery space status and, when manned including the requirement to be on standby for manoeuvring. This shall be discussed in the passage plan meetings.

When determining the bridge team composition, careful consideration should be given to non-navigational activities to ensure that the bridge team is never degraded by duties such as escorting the pilot to the embarkation station or the completion of administrative tasks.

Any change of Watch Level / change of bridge team composition shall be logged in the Log Book. Similarly, records shall be maintained when the machinery space status changes from unattended to attended and when the machinery space is on standby for manoeuvring.

The composition of Engine Room watch levels shall be made by Chief Engineer in consultation with Master. At all times the Master must ensure that the Bridge & Engine Room is properly manned for the prevailing conditions. The Master must be satisfied that the experience of the people is appropriate for the intended passage.

In areas of restricted passage, restricted visibility, adverse weather and extended Pilotage such as river passages, the Bridge Team & Engine Team is to be established to allow for adequate relief and rest, and in this case consideration must be given to the watch Officers being divided into two teams working alternately. While navigating under difficult circumstances, Check list HSQEEn 12.01.12.041 shall be completed in all respects.

Notwithstanding what is stated above, vessel shall have her Engine Room manned in the following areas including but not limited to:

- Arabian Gulf (west of 58°E longitude),
- Malacca / Singapore Straits,
- English Channel,
- Straits of Gibraltar,
- Rounding Cape of Good Hope,
- US Gulf Coast – When navigating in safety fairways
- Any other areas as determined by Master considering the Safety of Navigation.

While navigating in above areas, watch level on bridge and in engine room shall be maintained at watch level 2 or 3.

Port stays or time at anchor are ideal opportunities for the maintenance team to carry out essential and planned maintenance. However, this requires careful planning to avoid degrading the emergency preparedness of the ship, especially when at anchor.

For example, planning ahead with the bridge team on the weather forecast can help to make sure that the engine plant is ready for propulsion duties at the required notice. The decision for the engine room to maintain watch level-1 at anchor shall be taken when the Master and Chief Engineer are in concurrence only after considering the following factors as a minimum:

- Location of the anchorage and proximity to Navigational hazards.
- Traffic density including the density of passing vessels and crafts (barges, small crafts, fishing and sailing vessels).
- Proximity to other vessels at Anchor.
- Weather conditions and forecast.
- State of visibility and long-range scanning practiced.
- Anchorage area (quality of the sea bed including the gradient, nature and holding power of the anchor in use).

- Availability of engines on short notice. Additional measures in place to avail the machinery at short notice. Refence to the UMS checklist section for Additional Checks while at Anchor.
- Emergency preparedness.
- Security risks.
- Communications channels between the OOW and EOOW.

Under the STCW Code, the OOW may, in certain circumstances when the Master has determined that it is safe to do so, be the sole look-out in daylight. Prior to deciding whether to allow a sole look-out, the Master's consideration should include:

- Weather conditions
- Visibility
- Traffic density
- Proximity of dangers to navigation
- Attention necessary when navigating in or near a traffic separation scheme (TSS)
- Defects affecting aids to navigation, propulsion and steering.

The Master should additionally be satisfied that:

- The OOW is fit for duty
- The ability of the OOW to safely navigate the ship is not compromised by the volume of the anticipated workload
- The OOW knows who will provide back-up assistance, in what circumstances
- Back-up personnel are aware of required response times, any limitations on their movements and are able to hear and respond to alarms or communication calls from the bridge.
- The designated look out shall be readily available to respond to a call from the bridge and not tasked with any responsibilities, which may hamper his response time once the call is received.

The OOW shall not be the sole lookout during hours of darkness.

b) Master on the Bridge:

In certain circumstances, the Master or his deputy must be on the bridge. During extended pilotages the Master is not expected to remain continuously on the bridge as part of the watch.

c) Look-Outs:

It is of special importance that at all times the OOW ensures that an efficient lookout is maintained. In a ship with a separate chart room, the OOW may visit the chart room, when essential, for a short period for the necessary performance of his navigational duties, but he must previously satisfy himself that it is safe to do so and ensure that an efficient lookout is maintained.

A continuous visual lookout all round the horizon and listening watch (including both sound signals and radio messages) is to be maintained at all times. A constant watch solely by radar is not acceptable as an efficient lookout.

The lookout must remain on the bridge for the entire duration of his watch and may only leave the bridge having first been relieved of his post. The relieving watch must be able to be called by telephone or call system.

In maintaining a lookout the following shall be observed:-

- The lookout must be able to give full attention to the keeping of a proper lookout and no other duties shall be undertaken or assigned which could interfere with that task;
- The duties of the lookout and helmsman are separate and the helmsman is not to be considered as the lookout whilst steering, except in small ships where an unobstructed all-round view is provided at the steering position and there is no impairment of night vision or other impediment to the keeping of a proper lookout;
- The OOW must ensure that look-outs clearly understand their duties and the system of reporting and that all reports are passed to the OOW and the Master if he has taken charge of the bridge and if a pilot is on board, to the Pilot.

d) Individual Qualifications and Fitness (33 CFR 157.415 (3)):

It is essential that Masters take into account the qualifications and experience of individual watch keepers when planning the bridge team for certain conditions. This applies to all members of the bridge team.

The person in charge of the bridge team at any particular time must be capable of making the necessary navigational and operational decisions.

Watch Officers must be frequently observed by the Master to ensure that they are:

- Proficient in radar operation and plotting.
- Capable of using all of the vessel's navigational instruments and Bridge equipment.
- Thoroughly familiar with the duties to be performed under the different Bridge Watch Conditions.

Similarly the Master and Watch officers must frequently observe and assess the abilities of the other bridge team members such as the helmsman and lookouts to ensure a satisfactory level of competence.

e) Assigning Duties (33 CFR 157.415 (4)):

It is essential that Masters provide clear and unambiguous instructions to members of the bridge team on the duties that they are expected to perform. Each individual must clearly understand what his responsibilities are.

It is the Master's responsibility to ensure that all personnel, including Watch Officers and unlicensed Seamen, who may be assigned to any duty station in any bridge watch, fully understand the duties which they are expected to perform.

f) Prioritising Tasks (33 CFR 157.415 (5)):

The Bridge Team must understand the need to prioritise tasks in the order of importance and the need for the emphasis on safety. It is essential that team members do not get engrossed and totally involved in a minor item such as an unimportant VHF call to the detriment of safe navigation. The need for constantly re-appraising priority must be realised.

g) Assigning Watch Locations (33 CFR 157.415 (6)):

At all times when the vessel is at sea or at anchor, the Bridge Watch must be under the control of a responsible, licensed Watch Officer who is signed on as a Watch Officer. The Watch Officer must not leave the Bridge unless properly relieved.

h) Task Reassignment (33 CFR 157.415 (7)):

Although Masters remain responsible for their vessel at all times, conditions may arise under which Masters must rest or attend to other responsibilities. Masters, therefore, must pre-plan their presence on the bridge and consider delegating their authority to a Watch Officer in order to allow themselves adequate rest.

At the Master's discretion, Watch Officers are to be rotated to ensure cross training and meeting the development needs of the officers. Each Bridge Team member must be conscious of the inherent stress and distractions in Bridge situations.

i) Fitness for Duty (33 CFR 157.415 (2)):

The watch system shall be such that the efficiency of watch keeping officers and watch keeping ratings is not impaired by fatigue. Duties are to be so organised that the first watch at the commencement of a voyage and the subsequent relieving watches are sufficiently rested and otherwise fit for duty.

When any Watch Officer, Deck or Engine, reasonably believes that the Master is under the influence of alcohol or any other dangerous drug, and is incapable of commanding the vessel, then the Senior Deck Officer is to be informed.

j) No Distractions Policy

Effective situational awareness requires a lot of mental immersion in the task and Managers & vessels Masters should ensure that ship's staff tasked with critical activities such as Officer of the Watch (OOW) cannot as far as possible be distracted from their duties by implementing a "no distractions" policy on the bridge while the vessel is underway. Following shall be complied with:

i. Non-essential personnel and activities should be banned from the bridge/navigation area while the vessel is underway.
ii. OOW and other critical Bridge team members should wherever possible refrain from completing routine non-essential paperwork or other tasks that may lead to task distraction during stand-by periods, where navigation is critical, or traffic is heavy. This includes use of computers and approved email access / software.
iii. The use of personal computers (laptops) and personal mobile phones on the bridge irrespective of area of navigation or traffic condition must be prohibited.
iv. The use of company provided mobile and satellite phones on the bridge by key navigation watch-keeping staff during stand-by, in areas when navigation is critical, or traffic is heavy must be prohibited.
v. The use of radios (entertainment), MP3 players or CD players on the bridge/navigation area must be prohibited.
vi. Monthly HSQEEn meeting shall not be conducted on the bridge/ navigation area.
vii. Internal and external communications (including intra-ship) communications shall be restricted to essential work and navigation-related activities.
viii. Internet access to the bridge is restricted and in line with the company's cyber security policy and procedures using approved hardware. Email access to the bridge PC is restricted to the company's approved software and email ids.
ix. The effective management of the bridge space where it was combined with the cargo and/or machinery control and monitoring functions is critical to ensure safe operations and avoidance of alarm fatigue and disturbance. This will include but not limited to:
    a) Restriction of non-navigational activities occurring on the bridge.
    b) Bridge space shall be laid out and divided up such that the operation and monitoring of the cargo and/or machinery systems can be undertaken without distraction to the bridge team.
    c) Adequate number of personnel monitoring the non-navigational activities such as operation and monitoring of the cargo and/or machinery systems without affecting the Bridge team compliment/composition.

Ship Masters and officers on watch are advised to recognize the legitimate utility of mobile phones for pilots during pilotage operations. Should a pilot be observed engaging in potentially hazardous behavior with devices or phones, the captain or officer on watch is empowered to intervene. If such device use is non-essential for safe navigation or poses a distraction, the Master or officer on watch should draw upon their Bridge Resource Management (BRM) training and be prepared to inquire, challenge, or intervene as warranted.

Refer to:
12.01.03.031. - Bridge and Engine Room Manning Matrix Poster.
12.01.03.032. - Consideration for Sole look outs during day light hours while in Ocean passages
12.04.02.031. – UMS checklist

12.01.04.00.11 NAVIGATION EQUIPMENT

The consequences of overreliance on automatic systems for navigation and collision avoidance may be severe and include the risk of collision, grounding, and pollution.
Carriage requirements and performance standards applicable for Navigation equipment installed on board depend upon date of construction, size of vessel, and / or upgradation dates of the equipment.

12.01.04.01.00 General

These procedures are guidance on the use of various navigation equipment. For instructions on functions / trouble shooting / etc, refer to makers manual.

- Master and Navigating Officers should familiarize themselves with all Navigation equipment and must be aware of the limitations, precautions, errors and corrections (where applicable) of the equipment and of the importance of not relying solely on one piece of equipment. Reference shall be made to Technical library including the Bridge Procedures guide, NP 100 (Mariner's Handbook, , NP 231 (Guide to practical use of ENCs).
- All navigation equipment must be always maintained professionally and operational and the efficiency of all navigational equipment is constantly monitored and checked by Second Officer during daily routine operational tests and by the Master during periodic navigational audits.
- Equipment should be serviced as per company and/ or Maker's instructions.
- Any defective equipment should be reported to the company immediately via the defect and damage report and recorded in the logbook. Defects should also be appropriately identified on the Pilot Cards and discussed during the Master- Pilot exchange.
- Any recurring defect in navigation equipment shall be identified across the fleet.
- A record of all navigational equipment listed below shall be maintained by the 2nd officer and entered in the PMS. In addition, the record shall be maintained and must contain information regarding - monthly checks of each piece of equipment, equipment performance, and record of spares including the list of critical spares as per critical equipment stated in HSQEEn 14.07.00.00 (Navigation-related equipment).

A) Firmware and software update:

Company shall regularly follow up with all navigation & GMDSS equipment manufacturers to provide timely access to navigation and communication application software, for any relevant changes, originating from IMO & ITU regulations. Update of operating systems and hardware once available will be arranged and equipment upgraded to meet the changed requirements.

B) Software Anomalies:

Computer systems are widely used to support navigation, communications, and cargo management. For safe and efficient operation, such systems rely on the suitability and stability of their software.

There have been instances when deficiencies in the design or operation of software have led to the system being compromised, with the safety of the ship potentially being at risk. Such deficiencies are widely known as software anomalies.
To detect and appropriately manage software anomalies it is recommended that:

- Shipboard familiarisation should equip the Master and watchkeeping officers with an understanding of the normal operating condition of equipment;
- Any deviation from the normal or anticipated operation of software should be investigated to identify the cause(s) and remedial measures implemented following available guidance;
- New or otherwise previously unknown software anomalies should be reported to the equipment manufacturer; and
- Masters and watchkeeping officers should be familiar with guidance available, including from equipment manufacturers, regarding the identification, mitigation, and reporting channels for anomaly-related issues.
- Masters and watchkeeping officers should be familiar with and practice procedures within the PMS to monitor the performance of shipboard equipment.

C) ECDIS Anomalies:

Several ECDIS operating anomalies have been identified and subsequently addressed through software updates. The International Hydrographic Organization (IHO) has produced an ECDIS Data Presentation and Performance Check in Ships" that is designed to alert watchkeeping officers to the possibility that the installed ECDIS software may require an update from the manufacturer.

The Paperless Navigation Procedures contain procedures to ensure that:

- ECDIS data presentation and performance checks are conducted following a software update,
- ECDIS upgrade or at any time when the Master or watchkeeping officers have concerns over the performance of the ECDIS onboard, and
- Any occurrence of apparently new or known, but insufficiently addressed, anomalies are reported directly to the relevant manufacturer and ECDIS help desk

ECDIS is a complex system and further anomalies may be identified. However, it is also possible that through misinterpretation of information and/or inappropriate system settings, OOWs can also affect the safe and efficient operation of navigation and related systems. The importance of effective generic ECDIS training and familiarisation with ECDIS, as installed on board, to avoid this potential problem is emphasized (see Paperless Navigation Procedures for further details and onboard familiarisation).

Vessel's ECDIS units shall have feeds from various bridge equipment (in excess of the mandatory requirements) to provide an overview of the situation and better situational awareness. Although various feeds and overlays such as NAVTEX and AIO are provided, it does not relive the OOW from his obligation to

manually cross check the effectiveness of the integration and verify the accuracy of the data feed into the ECDIS.

D) Cyber Security:

The exchange of electronic data between ships and shore authorities, service providers, charterers, and owners/operators has increased significantly over recent years. The use of electronic data exchange, including updates to navigational systems and software, exposes users to the possibility of unauthorized or malicious access. This creates a risk to the safety and security of shipboard systems.

To protect commercial interests, as well as to ensure that safety and environmental protection are not compromised, seafarers must comply with Company cyber security procedures.

Company procedures take into account industry guidelines as well as any regulatory requirements addressing cyber security (Refer to Cyber security procedures and the appropriate Risk assessment)

Actions in case of equipment failure: All Bridge team Members must be aware that equipment breakdown can occur at any time and whenever possible information from one source must be checked against data from another piece of equipment.

E) The Shipboard Contingency Plan contains checklists for the failure of key items of equipment.

In the event of failure of any piece of bridge equipment, the Master is to be immediately advised. Master is to liaise with the service providers through the superintendent for troubleshooting and restoration of the failed equipment. In case of urgency, the master may directly contact the service providers for assistance.

The Master must undertake a risk assessment and take additional mitigating measures including the issuance of clear instructions in the Master's Bridge Order Book, on procedures to be followed until the equipment can be restored to operation.

Procedures to be followed could involve the following:

a) OOW's doubled up.
b) Extra lookouts.
c) Hand steering only.
d) Manual plotting of all targets in the event of an ARPA failure.
e) Use of Magnetic compass and the need for additional compass errors being taken, in the event of main gyro failure.
f) Use of any other available standby equipment and resources.

12.01.04.02.01 Radar And Radar Plotting Aids (ARPA)

A) General operation:

Watchkeepers should understand the differences between the X- Band (3cm) and the S-Band (10cm) radars including their characteristics and the impact of different weather conditions on the performance of each.

The OOW should be familiar with the capabilities and limitations of the radar plotting aid integrated with the radar, and any inter-switching arrangements which allow displays to change between X-Band and S-Band transceivers. It is recommended that both radars are operated at different ranges appropriate to the prevailing conditions. All OOW should be aware of the blind sectors and the calculation/diagram should be readily available for reference.

Unless switched off, usually for particular safety reasons (while alongside, STS operations, cargo operations, as deemed necessary), the radar should be kept running and fully operational when the vessel is at sea. Radars and ARPA shall be started before getting underway as part of the Bridge Equipment Tests upon receipt of the permission from the terminal / operational restrictions are lifted.

Radar is the principal electronic collision avoidance tool for bridge watchkeepers and supports effective passage plan monitoring. However, overreliance on the radar to the detriment of maintaining proper look-out by sight and by hearing should be avoided.

When using radar, OOW should keep in mind the following;

- The quality of the radar picture needs to be checked regularly. This may be done automatically using a performance monitor.
- An incorrectly aligned heading marker can give misleading information in potential collision situations. Heading marker alignment should be checked periodically against both the gyro heading and fore and aft line of the ship.
- Small vessels, ice, and other floating objects such as containers, may not be detected by the radar.
- Echoes may be obscured by sea or rain clutter. Careful use of the sensitivity controls will assist in improving detection.
- Masts or other structural features may cause shadow or blind sectors on the display. The OOW and lookout should be aware of the need to check these blind sectors regularly.
- Clear weather provides an opportunity for watchkeepers to verify radar target detection performance and
- Regular practice of parallel indexing techniques should take place, particularly during coastal navigation.

B) Detection of targets:

The choice of radar range will depend upon factors including visibility, traffic density, the proximity of navigation hazards, speed of own vessel, and phase of the passage in progress.

In addition to monitoring targets at the radar range appropriate to the current conditions, regular checks should be made at both shorter and longer ranges to help develop and maintain situational awareness. At shorter ranges, small targets are easily detected. Warning of approaching vessels, particularly high-speed craft, is achieved by regular scanning at loner ranges. This is an important factor for determining safe speed.

OOW should adjust to gain, brilliance, sea clutter, rain clutter, and tuning to be made at regular intervals and especially during critical operations to obtain optimum radar performance.

C) Radar Image overlay:

When a Radar Image overlay (RIO) is applied to an electronic chart using ECDIS, care should be taken to ensure that the orientation, heading alignment, and scale remain correct. The OOW can check these factors by confirming that the radar image correlates with charted features.

The OOW should adjust the colour and transparency of the RIO to ensure that the radar contacts can be viewed clearly on the ECDIS without obscuring the charted features. The use of RIO is not a substitute for maintaining an anti-collision plot on a separate radar/ ARPA display.

D) Radar and collision avoidance:

- a) Accuracy of Heading and speed inputs:

To determine the closest point of approach (CPA) of a target and to determine whether there is a risk of collision, radar requires an accurate input of own ship's heading and speed through the water (STW).

Yawing or inaccuracies in speed or heading inputs will reduce the accuracy of the target vectors. Particularly in the head-on situations where there are strong currents, the vectors may indicate that a target is passing clear when in fact the vessel is passing ahead, or nearly ahead and a risk of collision exists.

- b) Plotting periods:

Multiple observations are required to determine a target course, speed, and CPA. A single observation is not adequate. The accuracy of a target vector will be reduced if there is a change in the ship's own course and speed or the target vessel's course and speed. A change in course or speed of the target during the plotting period may not be immediately detected

The estimation of the course and speed of the target and risk of collision is only valid up to the time of the last observation. The situation should therefore be kept closely under review.

- c) Changing target bearing:

It should not be assumed that, because the relative bearing of the target is changing, there is no risk of collision. Although an alteration of course and /or

speed may alter the relative bearing, the risk of collision can still exist, especially at close quarters.

- d) Radar plotting Aids:

Radars are required to have plotting aids. These shall depend upon the Gross Tonnage (GT) of the vessel, with smaller vessels fitted with an Automatic Tracking Aid (ATA) or Electronic Plotting Aid (EPA) functions. ARPA (Automatic radar plotting aids) is fitted on vessels of 10,000 GT and above. Plotting aids provide an automatic tool for the systematic plotting of detected objects as required by the COLREGS.

ARPA offers several automated collision avoidance features, including the ability to conduct a trial manoeuvre before being committed to it. However, the OOW should be aware of the dangers of being over-reliant on the ARPA and should.

- Understand the types of errors that are possible and recognize the operational warnings that may appear on the display
- Understand the limitations of the ARPA
- Treat the apparent precision on a digital display with caution when anticipated CPA is approaching the minimum considered safe, particularly when approaching at close range or when large vessels are involved
- Regularly test and verify the ARPA functions and accuracy using the built-in self-test facilities
- Understand the importance, use, and effect of the delays in the change of course and or speed when using the trial manoeuvre.

ARPA shall provide audible and visual alarms and warnings for Closest Point of Approach (CPA) and Bow Crossing Range (BCR) where fitted. The determination of values for the CPA & TCPA shall be in line with:

i. The Risk of Collision matrix poster / Calling Master Matrix provided (Reference is drawn to "12.01.12.03. Calling Master" for determination of minimum acceptable CPA.)
ii. Vessel's manoeuvring characteristics
iii. Phase of the passage (open sea, coastal, channels, and fairways)
iv. State of Visibility
v. Limitations imposed by the navigational aids on board
vi. Performance standards of the ARPA installed onboard
vii. Results of the self-test of the ARPA software
viii. Planned speed of the passage
ix. Traffic density (including fishing vessels and other crafts) and presence/ proximity of navigational hazards

Normal navigational watches are when the Master or his deputy, is not required to be on the bridge as part of the official bridge team composition.

On most vessel's the ARPA output may be integrated with the ECDIS, enabling an overview of the situation.

Settings on the ECDIS for CPA/ TCPA should be carried out prudently in line with the master's requirements. The ARPA shall be used for Collision avoidance, irrespective of the data being received at the ECDIS.

- e) Heading and speed inputs:

Correct and reliable speed and heading inputs into the ARPA are essential if the information is to be processed correctly. For collision Avoidance purposes, speed and heading inputs should be sea stabilizes (water track) to provide ARPA with speed and course through the water. It may be hazardous to use ARPA in a ground stabilized (Bottom Tracked) mode for assessing the risk of collision where there are strong currents or tides.

The ground stabilized mode has its advantages while monitoring the vessel's passage, especially during manoeuvring and coming into an anchorage. The user should be aware of the limitations and not use the ARPA for collision avoidance while the ground stabilized. In event of Failure of the STW feed, The STW can be entered into the system Manually.

- f) Automatic Radar Target Acquisition:

Guard zones can be established on ARPA. Targets that enter guard zones will be automatically acquired and then processed by ARPA. The OOW can specify the size and position of guard zones to manage the number of targets acquired

Caution should be exercised when using automated acquisition features as inconspicuous targets may not be detected. An automatic acquisition cannot provide complete situational awareness to the OOW and is not a substitute for maintaining a proper look out and regular inspection of the radar image to manually acquire targets of interest or concern at the earliest opportunity.

- g) AIS Targets on ARPA / ECDIS:

Radar/ARPA systems can display AIS target information alongside or merged with ARPA information if connected to the AIS transponder on board. The ARPA display should indicate whether the target information comes from ARPA or AIS.

Software permitting the priority of display shall be TT (Target tracking- ARPA calculations) over the AIS data. AIS information, particularly CPA and TCPA, should not be relied upon for collision avoidance. This remains true even for the AIS and ARPA feeds received at the ECDIS. O.O.W. should be able to;

- Distinguish between the AIS and ARPA targets
- Association feature if available
- Select the source of data for the target displayed (ARPA OR AIS)
- Understand the errors associated with each source of data for the target information displayed.

E) Radar And Navigation:

Particularly when navigating in or near restricted visibility, radar provides a valuable tool to be used to fix the position of the ship and cross-reference GNSS positions. The OOW should check:

- Overall performance of the radar and adjust settings as appropriate;
- Heading line alignment,
- Accuracy of the Variable Range Marker(s) (VRM), Electronic Bearing Line(s) (EBL), and fixed range rings; and
- If in use, those parallel index lines are correctly set

a) Parallel Indexing:

Parallel indexing is a technique for assessing the distance at which the ship will pass a fixed object (such as a headland) on a particular course. This technique requires an index line to be drawn parallel to the planned ground track that touches the edge of a radar echo of a fixed object, at a range equal to the desired passing distance. This technique can be used in both relative motion and sea-stabilized true motion.

In relative motion, the static object will move along the parallel index line in a direction and at a speed reciprocal to that of the ship's ground track. In sea-stabilized true motion, the VRM will move along the parallel index as the ship moves towards the static object.

For complex passages where multiple sets of parallel indexes are required; if the software permits, the OOW shall pre-program the system to the use of parallel indexes to save time during the monitoring phase of the passage plan.

The company's passage plan form shall be readily available to the OOW as it shall provide the list of parallel indexes required for the passage.

NOTE: the parallel index & Clearing bearings though required to be marked on the ECDIS, it shall be monitored only on the Radar and not the ECDIS.

b) Charts on Radar:

Radars may have the ability to display Electronic Navigational Charts (ENC) which can enhance situational awareness.

c) Electronic Mapping Functions:

Electronic mapping facilities are available on some radars for displaying maps, navigation lines, and routes. Such facilities should be used with caution. Maps can be drawn to include chart features such as buoys, channel limits, separation zones, and anchorages using several different lines and symbols.

Once completed, maps can be stored in the radar's memory. Any map or passage plan should be geographically referenced so that it will appear on the radar correctly orientated and located relative to the ship's position.

Errors in the ship's position used by the radar, any errors in the accuracy of the maps, or poor radar ground stabilization can cause map interpretation problems.

F) Operation onboard Tankers:

As Marine radar systems operate on Radio Frequency (RF) and microwave range, radiation from the scanner fans out in an almost horizontal, narrow beam as the scanner rotates. In port, it will pick up cranes, loading arms, gantries, and other such structures, but will not normally step down to the tanker's deck or jetty.

Radar sets, operating on 3 cm and 10 cm wavelengths, are designed with a peak power output of 30 kW. If they are properly sited, they do not present a radio ignition hazard due to induced currents.
Radar radiation does not penetrate the human body but at short ranges (up to 10 cm) and heats skin or eyes. Assuming sensible precautions are taken, e.g., not looking directly into a scanner at close range, there is no significant health risk from marine radar emissions.

Radar scanner motors are not rated for use in hazardous areas but are usually positioned above terminal hazardous zones apart from small vessels. It is, therefore, safe to test radars when alongside. However, it is a good practice to switch off or place it on standby when alongside a terminal and to consult with the terminal before testing radar equipment during cargo operations.

G) Spares, troubleshooting, and programming:

Masters are to ensure that there are adequate spares as per the vessel's spare parts carriage requirements, including a spare magnetron for each radar onboard. There should be ample Radar Plotting Sheets available for use.

A few radars allow for a few menu functions to be accessed while on Standby modes (No transmission from the scanner), such as heading and speed input and corrections. A few allow for pre-programming the parallel indexing, map generation, and programming. While working on such functions, care needs to be taken to avoid inadvertent transmission/ starting of the radar equipment.

The performance of radars is to be monitored whenever Radars are in use. Radar performance checks by performance monitor to be carried out as per makers manual. Records for the same shall be recorded in the adequate column/ logbook. It is recommended that the Performance is tested on every watch as a good practice. The max duration between two tests, while the vessel is at sea, is 24 Hours i.e. the test shall be carried out at least once a day.

Vessel staff is encouraged to calculate the limits at which the magnetron needs replacement in line with the manufacturer's instructions. This usually entails;

- Duration of running hours as per manufacturer's instructions
- Loss of dB while transmitting/receiving
- Loss of current drawn by the magnetron

Limits calculated shall be posted at the Radars to provide a ready reckoner to the condition/suitability/effectiveness of the magnetron in use, avoiding the need to access the graphs or manuals after every test. The results of the performance test and running hours shall determine the need to renew the magnetrons.

The company shall proactively endeavour to replace the magnetrons on an annual basis. This does not relieve the operator from the need to monitor the performance.

A few radars (especially S-Band) now do not have magnetrons. The manufacturer's instructions need to be reviewed to determine the limits at which further technician attendance would be required.

In Case of Radar / ARPA failure, the vessel must follow the guidelines as per the SEP (Shipboard Emergency Plan). Failure must be logged in the logbook and the defect list, noting the circumstances of the failure and notified to the office for further action/guidance so that repairs can be arranged.

12.01.04.03.00 Automatic Identification System (AIS)

A) AIS Overview:

AIS is a maritime mobile band VHF broadcast system that can automatically exchange static, dynamic, and voyage data on a ship-to-ship and ship-to-shore basis. Information transmitted by AIS includes:

- Static data that is set up during equipment installation and includes information such as MMSI, IMO number, international call sign, length, beam, and ship type;
- Dynamic data that is current navigation information including position, course, speed, and navigational status (at anchor, moored, underway, or special conditions); and
- Voyage data relates to the specific voyage and includes information on draught, destination, ETA, and hazardous cargo

Not all vessels carry AIS and watchkeeping officers should be aware that other ships, in particular leisure craft, fishing boats, and warships, might not be displayed on AIS. In addition, AIS may be switched off based on the Master's professional judgment.

It is important that the AIS is operated correctly and that watchkeepers are familiar with the equipment, including how to check that all information transmitted by AIS is both accurate and updated. Poor quality broadcast data can significantly reduce the potential value of this system.

A) AIS Aids to Navigation:

AIS is increasingly being used to provide additional information to ships such as AIS Aids to Navigation (AtoN). AIS AtoN can provide the following information.

- Type and name of AtoN;
- Position of AtoN;
- AtoN status such as an indication of a buoy light failure or a buoy being out of position, and
- Additional safety-related information, such as tide or wind conditions

a) Physical AIS Aids to Navigation:

Physical AIS AtoN is actual aid to navigation that is fitted with AIS transponders. Examples include navigational buoys and lighthouses.

b) Virtual AIS Aids to Navigation:

Virtual AIS AtoN does not physically exist but is transmitted by a coastal authority and is generally designed for temporary applications such as the immediate marking of a wreck, identifying a hazard to navigation, or defining an area.

There is however the potential for more permanent uses of virtual AtoN such as in areas where it is difficult to establish fixed AtoN. Virtual AIS AtoN is not marked on charts.

B) AIS and Search and Rescue:

There are some Search and Rescue (SAR) devices that can use AIS to send distress alerts. These include AIS-EPIRB, AIS-MOB, and AIS-SART. Watchkeeping officers should be familiar with how these are displayed on AIS or an ECDIS integrated with AIS.

C) AIS Operation:

AIS is to be set up (Dynamic data and Voyage data) by the Watchkeeping Officer before getting underway after checking to confirm it is in proper working condition.

If possible, the AIS may be integrated with radar and/or ECDIS. However, the possibility of confusion between the various targets and their associated information exists if integrated with radar. Under no circumstances is AIS data alone to be used for critical decisions such as collision avoidance. Refer to "AIS Targets on ARPA / ECDIS " section for Radars mentioned above. This may be of particular concern in head-on or crossing situations with close CPAs.

AIS information about other ships needs to be checked regularly, especially in close situations, and self-data is corroborated by checking with other ships when possible.

The unit shall be kept switched ON at all times.

If the master believes that the continual operation of AIS might compromise the safety or security of his/her ship or where security incidents are imminent, the AIS may be switched off. Unless it would further compromise the safety or security, if the ship is operating in a mandatory ship reporting system, the master should report this action and the reason for doing so to the competent authority. Actions of this nature should always be reported with reason to the DPA and CSO and recorded in the ship's logbook together with the reason for doing so. The master should however restart the AIS as soon as the source of danger has passed/disappeared.

D) Operation onboard Tankers:

The Automatic Identification System (AIS) is required to operate while a tanker is underway and at anchor. Some port authorities may ask for the AIS to be

kept on when a tanker is alongside. The AIS operates on a VHF frequency and transmits and receives information automatically, and the output power ranges between 2.0W and 12.5W. Automatic polling by another station, e.g. by port authority equipment or another tanker, could cause equipment to transmit at the higher (12.5W) level, even when it is set to low power.

When alongside a terminal or port where hydrocarbon gases are likely to be present, either the AIS should be switched off or the ariel isolated and the AIS gave a dummy load. Isolating the areal preserves manually input data that may be lost if the AIS is switched off. If necessary, the port authority should be informed and an appropriate logbook entry should be made. When alongside a terminal or port where no hydrocarbon gases are likely to be present, and the unit has the facility, the AIS should be switched to low power.

At a Single Point Mooring (SPM) or Multi Buoy Mooring (MBM) terminal, the AIS may be kept on, if requested by the terminal, at an adequate power level to transmit information to the terminal safety monitoring system. Tanker and terminal representatives should agree on the AIS settings.

If the AIS is switched off or isolated while alongside, it must be reactivated on leaving the berth.

The use of AIS equipment may affect the security of the tanker or the terminal at which it is berthed. The use of AIS may be determined by the port authority, depending on the security level in the port.

E) Troubleshooting:

If the AIS fails or the errors in the same cannot be kept under management, the vessel must follow the guidelines as per the SEP (Shipboard Emergency Plan). Failure must be logged in the logbook and Defect list promulgated, noting the circumstances of the failure and notified to the office so that repairs can be arranged.

12.01.04.04.00 Steering Gear And Automatic Pilot

A) Steering Control:

Steering control of the ship will usually comprise manual steering and an automatic pilot (autopilot) or other track control system. At each steering position, there should be a gyro repeater and rudder angle indicator. If an autopilot is fitted, a steering mode selector switch for changing between automatic and manual steering, and a manual override control to allow immediate manual control of the steering, should be available.

In an emergency, steering control may require the use of alternative power supplies, auxiliary steering gear, or direct control of the steering gear in the steering compartment.

The OOW should be familiar with the operation of all manual, automatic, and backup steering control systems on the bridge, as well as the method of control at the emergency steering position. This will allow the selection of the most appropriate steering control system for a particular situation.

A helmsman should be available at all times and be ready to take over steering control in conditions where automatic systems are inappropriate. Manual steering should be used whenever appropriate including in:

i. Areas of high traffic density;
ii. Large alteration of courses;
iii. Collision avoidance;
iv. Conditions of restricted visibility; and
v. Any other potentially hazardous situations and particularly when an automatic steering system may provide insufficient control such as confined waters transits and navigating in the proximity of navigational hazards.

The changeover between automatic and manual steering should not affect or distract the attention of the Bridge Team from maintaining a proper look-out and should be completed in good time before critical situations arise; and under the supervision of the OOW.

Manual steering should be tested once per watch (see notes below)

B) Changing Steering Mode:

All Navigating Officers must be thoroughly familiar with the proper method of changing over from one steering mode to another. The changeover procedures between each steering mode (automatic steering, track steering, hand steering, remote conning position steering, non-follow up steering, emergency steering/ local control) for each vessel shall be posted close to the helm for ready reference.

The Watchkeeping officer must carry out any change of steering mode. Helmsmen are not to make any steering mode changeover, interfere with, or operate the steering mode controls.

An appropriate entry shall be made when the steering modes are changed from Autopilot to hand and vice versa including the time and position, especially when navigating in confined, shallow, or restricted waters. These entries shall contain the time , details of the changeover, position and heading.

Changes between manual and automatic steering should be verified to confirm the subsequent steering response is satisfactory.

C) Autopilot - Heading Control:

Heading control will steer to maintain the ship's heading but, unlike automatic track-keeping, cannot compensate for the effects of wind and tidal-stream / current on the ship's course over ground (COG). OOW on board vessels

installed with this feature or Track Control System (TCS) should be aware of the sensor feeds and TCS settings including the route properties which shall govern the autopilot.

If the vessel opts to use this feature provided, it should be used only upon receipt of permission from the master. The use of heading control/ TCS shall not relive the OOW from supervision of the system, which may require an immediate departure from the mode to prevent close quarter situations with other vessels.

D) Autopilot - Automatic Track-Keeping:

Automatic track-keeping steers the ship towards a waypoint or to follow a route whilst remaining within a specified cross-track distance (XTD). The ship will steer to maintain a COG which keeps the ship on track and moving towards the next waypoint. An autopilot performing automatic track-keeping functions and its alarm outputs should always be monitored closely, particularly to ensure that the OOW can check that it is safe for the autopilot to alter the course

The ability of the autopilot to follow a planned track closely will depend upon the accuracy of the cross-track error (XTE/ XTD) information sent to the autopilot from the navigation system.

E) Effectiveness of the Autopilot system:

The effectiveness of the autopilot system shall depend upon the restrictions/ limits imposed on any mode of steering. These restrictions include the speed of the vessel, location of the vessel, and PID control governing the Autopilot control.

Some of the values /limits for the autopilot control are set by the manufacturer's basis limitations of the system (min speed required for an autopilot to function), while others can be adjusted by the operators (PID control).

Depending upon the situation including not restricted to; location, manoeuvring characteristics, condition of the vessel (laden/ballast/partially laden), weather conditions, available depth, vicinity to navigation hazards, etc the operator shall set the required parameters for the Autopilot. This will be based on the judgment of the master before engaging the Autopilot function.

The settings of the autopilot shall be tweaked as the vessel progresses on her passage to achieve optimum performance by the system and fuel economy. The safety of navigation/the vessel shall override the energy efficiency aspects of the voyage.

F) Off-Course Alarm:

As part of the steering control system, there is an off-course alarm to warn the OOW when the ship deviates from its heading.

Examples of appropriate independent devices include:

- A magnetic off-course alarm independent from other bridge equipment and inputs; and
- A second gyrocompass or transmitting heading device, as appropriate, with a heading comparison unit connected to both compasses.

The alarm should be in use at all times when the autopilot is in operation, and it is recommended that it should be integrated with the BNWAS.

It should be noted that the off-course alarm may not always sound when the ship deviates from its planned track. The ship may be moved off track by wind and tidal stream/currents even though the heading remains unchanged.

The use of autopilot and the off-course alarm does not relieve the OOW from frequently checking that the planned course is safe and is being maintained.

G) Steering Gear Tests:

Every watch the autopilot shall be disengaged and hand steering tried out. At noon each day, the system should be tested on follow-up and non-follow-up mode from the bridge. An appropriate entry shall be made in the log book.

After Prolonged Use of Autopilot; To check and confirm rudder response to manual steering from all bridge positions using each steering gear power unit singly and together. These tests shall be entered in the Deck Logbook.

The Deck Watch Officer is responsible for and must test the primary and secondary steering gear before arrival and departure including the test required by 33 CFR Part 164.25. These tests are to be carried out per Company's stipulated pre-arrival and pre-departure checklists in line with the "Bridge Procedures Guide". These tests shall be entered in the logbook.

Testing shall include a visual inspection of the steering gear and its connecting linkage and, where applicable, the operation of the following:

- Each remote steering control system;
- Each steering position is located on the navigating bridge;
- The main steering gear from the alternative power supply, if installed;
- Rudder angle indicator in relation to the actual position of the rudder;
- Time is taken for the rudder to travel from max rudder angle Port to max rudder angle Starboard.
- This should be checked with one steering motor on and also with both steering motors on.
- Each remote steering gear control system power failure alarm;
- Each remote steering gear power unit failure alarm; and
- The full movement of the rudder to the required capabilities of the steering gear.

Whenever Auto steering is engaged the "off-course alarm" shall be switched on and set to give timely warning of undesired course variations. The autopilot alarm must be tested at noon each day at sea. This test shall be entered in the Deck Logbook.

For vessels equipped with an independent magnetic off-course alarm, the alarm should be set for appropriate settings taking into account prevailing weather conditions.

12.01.04.05.00 Berthing Systems

There is a range of highly accurate berthing systems available which allow a precise approach to a berth usually for specific ship types or in particular locations. Such systems may use laser, doppler, or GNSS technology to measure accurately the ship's movements relative to the berth or another ship.
The Bridge Team should be aware of the type of systems in use and their capabilities and limitations.

Operator shall ensure that the correct feeds are provided/ selected, and no offsets / accurate offsets are applied if any. Many systems provide predictor functions, which are not to be relied upon as they are governed by sensor feeds and in some cases algorithms which the operator may not be aware of.

12.01.04.06.00 Compass Systems

The care of all basic navigation equipment, including magnetic compasses, gyrocompasses, gyro repeaters, and course recorders, is the responsibility of the 2nd Officer. If any doubt exists as to magnetic compass accuracy, the vessel shall be swung to determine the error(s) and new deviation tables prepared before entering restricted waters.

During the watch, when underway, frequent checks of the compasses must be made. Heading information for each compass is frequently checked through terrestrial, celestial, and/or comparative observation.

Simultaneous checks and comparisons between the vessel’s gyrocompass(s), all repeaters including the course recorders, and magnetic compasses (standard/steering) shall be made at least hourly to ensure that they are all functioning properly. Discrepancies shall be investigated and logged. An up-to-date deviation table shall be maintained and available to the Bridge Watch Officer.

The heading feed is distributed across to various equipment on board including the ARPA, ECDIS, ROT indicator, VDR, etc. the accuracy of this feed shall be verified frequently (also included in the watch take over forms for paperless vessels).
In many cases depending upon the ECDIS unit installed, the feed from more than one heading devices shall be provided to allow for redundancy. Accuracy of such feeds shall be verified every watch and any discrepancy shall be investigated.

A) Magnetic Compass

The magnetic compass is generally fitted above the navigating bridge on the centreline and fitted with a periscope so that the compass is readable from the helmsman's position

Where the magnetic compass is needed to provide heading outputs to other bridge systems, a transmitting magnetic compass (TMC) is fitted. TM outputs should be corrected for compass error and the TMC should be tested once a week.

A compass deviation card should be maintained on the bridge. The deviation will need to be determined and the compass adjusted at intervals (not exceeding two years) during the ship's life, particularly after any major steel conversion work to the ship. Particular caution should be observed when using the magnetic compass on ships that carry or have recently carried magnetic cargoes such as iron ore and steel.

Compass safe distances are specified on all electrical bridge equipment and provide the minimum distances from the magnetic compass that equipment can be installed.

A TMC may have variation automatically applied. However, this correction will not include deviation. When correcting TMC outputs for compass error, care should be taken to ensure that the correct values for variation and deviation are applied.

Electronic systems located close to the compass can greatly influence magnetic compass readings. Spare magnets and spare radar magnetrons should be stored away from the magnetic compasses and spares including the spare correctors.

Magnetic compasses shall be adjusted by a qualified compass adjuster if:

- a period of two years has elapsed since the last adjustment, (Excluding Panama flag vessels where it shall be done annually)
- after a significant repair period,
- becomes unreliable,
- suffers damage,
- when the compass deviation is consistently greater than 5 degrees

B) Gyro Compass

The gyrocompass should be run continuously. Should a gyrocompass stop for any reason, it should be restarted and subsequently regularly checked and only relied on again when it has "settled" and the error is known.

Where the gyro has no direct speed log or position input, manual corrections should be made as required. The gyro will usually support many repeaters, including a required repeater at the emergency steering position. Gyro repeaters on the bridge should be checked against the main gyro at least once

per watch and after significant manoeuvring. Other repeaters should be checked frequently and maintained in sync.

C) GNSS Compass

A Global Navigation Satellite System (GNSS) compass provides an alternative to a gyrocompass is a non-magnetic transmitting heading device able to provide heading data to AIS, radar, and automatic plotting aids. A GNSS compass or equivalent is required on ships navigating in Polar Waters at latitudes above 80 degrees.

D) Compass Errors

As a safeguard against any wandering from the correct heading going undetected, gyro and gyro repeater headings should be frequently checked. Magnetic and gyro compass errors should be checked and recorded on each watch, where possible, using either azimuth or transit bearings. A deviation card for the magnetic compass should be maintained and be available to the Bridge Team. Records of compass error shall be maintained on board over the preceding two years (minimum).

E) RATE OF TURN (ROT)

When ships are manoeuvring, particularly large ships where the distance between the bow and the pivot point of the ship is considerable, the rate of turn indication provides feedback on how quickly the ship is turning. Rate of turn measurement is used by automatic track-keeping systems to perform controlled turns.

F) Servicing and troubleshooting

The compass on board shall be serviced/overhauled and spheres renewed as required in line with the manufacturer's instructions and intervals. There may be instances where the spheres/fluid may require renewal at shorter intervals due to damage or other issues experienced. It is therefore important that in addition to the accuracy check of the compass on board a proper record of the servicing including service records are available for the compass(s). One shall ensure that the servicing is carried out in line with and only by technicians approved by the manufacturers.

Any issue noted with the compass(s) including the spares; which need assistance from ashore shall be recorded in the defect list and office assistance sought immediately.

12.01.04.07.00 Speed Measurement

Speed over the ground (SOG) is the speed of a vessel referenced to the surface of the earth. Speed through the water (STW) is the speed of a vessel referenced to the water in which it is navigating.

In general, STW is used for radar collision avoidance and SOG is used for navigation. Caution should be exercised if SOG is used for collision avoidance as differences can arise in the aspect of a target and its vector particularly due to strong cross tides. Refer to further details in the Radar section.

Speed made good (SMG) can be measured from two fixed points on a chart, and is also calculated and transmitted by electronic position fixing systems (EPFS)

A) Speed And Distance Log

Speed and distance measuring equipment, depending upon type, will provide a measurement of speed and distance travelled through the water or over the ground.

B) Types Of Speed Log

Electromagnetic and doppler type logs can be either single-axis and measure speed in the fore and aft direction (longitudinal) or dual-axis and measure fore and aft (longitudinal) and also athwartships (transverse) movement.

When connected to the rate of turn data, dual-axis logs are also able to calculate the speed and direction of movement of the bow and stern.

C) Recording Of Distance Travelled

Log distances should be recorded in the logbook at the end of each watch. To ensure the accuracy of recorded speed and distance log equipment, it should be installed, maintained, and calibrated per manufacturers' instructions.

D) Servicing and troubleshooting

OOW should be aware that Logs installed onboard may transmit their feeds in formats other than NMEA. Converters are installed to convert the signal formats to the desired output.

Regular comparisons between SOG and STW shall be made every watch to verify the accuracy of the speed logs. SOG shall be cross-checked between the two EPFS.

At the start of the watch; the OOW shall verify the accuracy of the feeds to remote displays and navigational equipment, such as ARPA, AIS, and ECDIS; is

accurate and if applicable ensure that appropriate offsets are applied (part of the watch take over a checklist of paperless navigation). The accuracy of the sensors shall be verified and logged weekly (weekly tests and checks – paperless navigation).

In the event the STW feed to the equipment fails, the OOW should change the feed to "Manual" and input the feed manually.

Servicing, and troubleshooting shall be carried out in line with the manufacturer's instructions. At 5 yearly intervals (dry docks), the transducers shall be inspected and as deemed necessary renewed and calibrated.

Any issue noted with the log(s); which needs assistance from ashore shall be recorded in the defect list and office assistance sought immediately.

12.01.04.08.00 Echo Sounders

The echo sounder must be properly maintained and ready for use at any time. Many modern electronic echo sounders have an inbuilt 24-hour memory that can be recalled. If an electronic memory is not provided, the echo sounder should be provided with a printed record. The echo sounder shall be connected to the VDR.

Kindly note, that "switching on" the echosounder does not mean starting the recording/ printing unit. The equipment shall be kept on detecting a depth while the printing may be switched on or off depending upon the area o navigation. The notes below shall advise the times the printer is required to be recording.

A) Use of Echo sounders at open sea:

Equipment permitting, it is encouraged that the echosounder equipment should be always kept ON while at sea. This shall assist in the determination of uncharted shoals and nav hazards (UKHO- H102 information guide). Printers/ recording devices if fitted, may be switched off.

When unexpected soundings are obtained The Mariner's Handbook (NP100) should where possible be consulted and when deemed necessary an appropriate report to UKHO may be submitted. Reports of shoal soundings, uncharted dangers, and aids to navigation out of order should, at the mariner's discretion, also be made by radio to the nearest coast radio station. The draught of modern tankers is such that any uncharted depth under 30 meters or 15 fathoms may be of sufficient importance to justify a radio message.

B) Use of Echo sounders in shallow waters / making landfall

The echo sounder and its recorder/ printer if fitted should be switched on before each approach to shallow water and port entry and before departure and remain in operation while in shallow waters. The echo sounder recording should always be used when making a landfall (crossing a 100-fathom line- Paper charts / 200 meters contour- ECDIS) and kept switched on in coastal and

pilotage waters. The echo sounder and recorder/ printer if fitted shall be used whenever the vessel is in unfamiliar, restricted, or shallow waters, or at any other time when soundings may assist in establishing the position of the vessel. Care should be taken to check that the units of soundings on the echo sounder are the same as those used on the chart in use. When comparing echo and chart soundings, due allowance should be made for the draught of the ship, any depth reading offset, and the height of the tide.

Caution: Most echo sounders are calibrated for sea water (1.025 SG), any change in density will affect the readings. The manual should be consulted to determine if any correction needs to be applied.

Every time the Echo sounder recorder is used, a notation regarding date/time and position/port/place of switching on and off should be marked on the recorder chart to provide forms of reference. When the Echo Sounder is run continuously such notations should be made at intervals or mark specific areas of the passage such as the date and time of passing significant land/ seamarks or at least once per watch. Range scale chosen should be marked on the recording paper if feature of auto printing the range scale in use is not provided or in use.

If the echo sounder is fitted with a shallow water alarm, the alarm should be set to an appropriate safe depth to warn of approaching shallow water. The alarm settings on the echosounder should be equal to or higher than the minimum required UKC for the phase of the passage. The settings shall be prudent enough to reduce alarm fatigue.

C) Choice of frequency and multiple transducers

A few echosounders operate on dual frequencies. The so-called dual-frequency depth sounder refers to the use of high and low frequency for two different working depth ranges. Dual-frequency echo sounders were originally designed for use by sea-going vessels to give reliable depths in deep water situations (low frequency) and more accurate navigation within shallow areas (high frequency).

Further, low frequency is of little use in shallow hydrographic surveys and the physical accuracy is outside IHO specifications. Therefore, when operating such echosounders, the OOW shall select the appropriate transducer and working frequency suitable for the stage of the voyage and anticipated depth range.

If both Fwd and Aft transducers are available working on same frequency; It is recommended to select the Aft transducer when the vessel is trimmed by stern and Fwd transducer when the vessel is trimmed by head or even keel.

OOW to ensure that all repeaters including equipment feed by the echosounder such as ECDIS are receiving the correct feed once appropriate transducer is selected.

D) Servicing and troubleshooting

The echo sounder should be checked each voyage in each range scale, and compared to depths shown on the chart. Results should be recorded in the logbook. The Echosounder's accuracy shall be verified when compared to water of a known depth using a hand lead line, when possible, but at least once every 6 months. The comparison shall allow for the draught of the ship, any depth reading offset, and the height of the tide.

Servicing, and troubleshooting shall be carried out in line with the manufacturer's instructions. At 5 yearly intervals (dry docks), the transducers shall be inspected and as deemed necessary renewed and calibrated.

Any issue noted with the echosounder; which needs assistance from ashore shall be recorded in the defect list and office assistance sought immediately.

In the event of a vessel accident, the echo sounder record shall be removed, properly identified with the vessel's name and date in ink, signed by the Master and the OOW at the time of the accident, and retained pending instructions from Management.

12.01.04.09.00 Bridge Navigational Watch Alarm System (BNWAS)

The Bridge Navigational Watch Alarm System (BNWAS) monitors bridge activity and OOW awareness and can detect operator disability which could lead to marine accidents. The system uses stages of visual and audible alarms to alert the Bridge Team. If for any reason the OOW does not respond or is incapable of responding, the Master and/or other appropriate personnel will be automatically alerted. Upon Activation of the BNWAS alarm, the appropriate personnel alerted, shall proceed to the bridge to determine/access the situation. The BNWAS additionally can provide the OOW with means of calling immediate assistance to the bridge.

The BNWAS alert period should be sufficient so that alarms do not unnecessarily distract the OOW from watchkeeping duties. Additionally, the BNWAS can provide the OOW with a means of calling immediate assistance to the bridge.

A) Setting of the Operational Status:

To comply with SOLAS, as well as other Industry guidance, it is Company Policy for the BNWAS should be operational whenever the ship is underway, particularly when the autopilot is in operation, and vessel is at anchor. The system should be maintained on "Manual ON".

Master shall further ensure that the AUTOMATIC operation mode is NEVER selected if such an option has been provided for the equipment currently installed onboard. The BNWAS shall remain in use at all times except when the vessel is alongside, in Dry Dock, or at a Repair Facility.

B) Setting the Dormant Period and delay between 2nd & 3rd Stage Alerts.

It is Company Policy that MASTER shall be the sole person on board with the authority and responsibility to

aa) Change the operational status of the BNWAS from Manual 'ON' to Manual 'OFF' mode and vice versa.
bb) Change the DORMANT PERIOD time setting from the default setting.
cc) Set the delay interval between 2nd and 3rd stage Alerts up to 3 minutes.
Security Protection:

Selecting the Operation Mode to ON/OFF, Setting the Dormant Period, or adjusting the delay interval between the 2nd and 3rd stage Alerts are all security-protected actions.

If such protection is provided by way of an unchangeable CODE or a KEY (such as those for Master's SAFE), then these shall be held in Master's close custody. If such security protection is provided by way of a changeable PASSWORD or CODE, the Master shall create and use a unique password/code for the duration of his tenure on board which is known only to him.
It is the responsibility of the Master to ensure the integrity of the security protection so provided. Should he believe that the security protection has been compromised, he should take immediate steps to change the password/code.

C) Onboard Instructions & Records:

Master shall include the BNWAS procedural requirements specific to his vessel in his standing orders. If the backup navigator option is provided in the onboard equipment a schedule for assigning the backup navigator shall be established.

Changes to the operation status of the BNWAS while at Sea or Anchor shall be recorded in the Deck Log along with reasons for the change.

The Master shall make relevant comments on the BNWAS ship-specific operation in his Handing over notes for the benefit of the incoming Master.

Test routines shall be recorded in the Deck Log Book.

OOW shall make an entry once every watch to confirm that the BNWAS is in operation and that the same has been verified.

D) Testing Requirements:
Activation of the BNWAS 1st, 2nd, and 3rd Stage alerts shall be carried out weekly.
Power failure alarm and verification of operation on DC power shall be carried out at least monthly.
Depending upon the date of installation and applicable performance standards; repeater installation and working to be verified.

12.01.04.10.00 Navigation Lights And Signalling Equipment

A) Navigation Lights

The OOW is responsible for ensuring that the navigation lights, emergency navigation lights, and signalling equipment are in working order and are ready for immediate use at all times. The condition of lights, flags, and shapes should be checked at regular intervals. Sound signalling equipment should be checked daily and maintained in an operational condition.

All lamps (Primary and secondary) in all navigation lights shall be tested before getting underway and checked at the beginning of each watch. All appropriate navigation lights should be left "ON" during day and night while underway.

A procedure to check the navigation light failure alarm should be posted in the vicinity of the navigation light panel. The procedure shall be ship specific depending upon the controller/control panel installed. A few designs may require the local activation of the alarm (removal of light from the holder) to activate the necessary alarm.

The checks shall include:

Daily:

- Primary and secondary navigation lights are fully operational (Panel and Visual check of each light)
- Primary and secondary power supplies to the navigational light controller are operational.
- Power supply failure alarm is operational.

Weekly;

- Where LED lamps are fitted, they are within their usable lifespan for luminous intensity. This may be achieved by integrated luminous intensity or usage monitoring systems with alarms or by a manual recording of usage.
- Adequate spare lamps are onboard meeting the navigation light manufacturer's specification for luminosity, or wattage, and focal plane. An inventory of spare navigation light lamps shall be maintained. The Navigating Officer and/or ETO shall verify spares conform to the requirements.
- Portable navigation lights, which were required to be carried, are in good working order and fitted with the necessary lanyards to permit hoisting.
- Navigation lights or their screens are not damaged, relocated, or obscured in such a way that the required spacing and/or arc of visibility of any lights complies with COLREG Annex 1 requirements. (Visual inspection from deck level)
- No water or condensation found in Christmas tree glass holders

Monthly checks;

- Condition of the fittings, housing, and installation of the lights including paint and ant glare protection provided (such as matt black paint where installed)
- Checks for the activation of the alarm on the control panel if deemed necessary as per installation onboard.

In the event of failure, alternate light power to be switched on and the Master to be informed. Immediate action is to be taken to repair the fused light in line with the company's procedures and work permits and prevailing conditions (such as periods of darkness and heavy weather). In the event the vessel is engaged in Cargo transfer, the rectification shall differ to completion of operation but before the vessel sails out.

In event of failure of both Lights (secondary light also fails, prior repairs of the primary light), vessel shall consider broadcasting safety messages and posting additional lookouts in addition to the required immediate actions mentioned above.

In the event LED lights are used:
A record shall be maintained including the date of installation of the bulbs. The manufacturer's instructions and specifications shall be checked to determine the life span of the lights and the time duration after which the luminous intensity shall deteriorate. The Lights need to be renewed well before the luminous intensity deteriorates below acceptable levels as mentioned in the COLREGS 1972, Annex I.

One should also note that the maximum luminous intensity of navigation lights should be limited to avoid undue glare. Therefore, one should ensure that only those Lamps approved for the use of Navigation lights shall be used (eg. Squirrel cage bulbs)

B) Lights And Shapes, Daylight Signalling Mirror and Signalling Equipment.

Third Officer is responsible for the care and maintenance of the vessel's visual signalling equipment, including all flags, signalling lights (Aldis Lamp), distress signals, and flares. He is also responsible for maintaining a current International Code of Signals Book.

The Daylight Signalling Mirror (Aldis lamps), Lights, shapes, bell, gong, ship's whistle and shall be maintained in a state of readiness at all times and used as required by the International Regulations for Preventing Collisions at Sea (COLREGS 1972) in or near an area of restricted visibility, during collision avoidance and while manoeuvring.

The sources of energy (ship's AC/ DC power as provided, portable batteries) for the Aldis lamps, should be tested daily. Batteries shall be maintained and charged at all times. The power supply provided (sockets) shall be adequate and suitable for the equipment provided onboard and equipment. Where supply is provided on the bridge wings, they shall be maintained clear of salt/ calcification and tested to ensure contacts are clear. Adequate spare shades (if required) and a min of 3 spare bulbs shall be maintained on board and always kept along with the equipment.

OOW shall make appropriate entries in the Bridge Log Book or reference to appropriate checklists confirming that sound signalling equipment was used in

compliance with the COLREGs and company procedures during restricted visibility.
The periodic tests are required to be conducted to verify the effectiveness of the sound signalling equipment, including automation, provided to the vessel.

- Sound signalling equipment (Whistles/Air Horns) should be sounded/checked daily, alternating from each activation point to verify operation (manual/ remote/ bridge wings) while at sea and when permitted at anchor.
- The Bridge is responsible for and must test the vessel's whistles prior to getting underway. At noon each day at sea, the vessel's whistles shall be tested. Care should be taken when other vessels are in the vicinity to ensure this test is not mistaken for a signal. These tests shall be logged as completed in the Deck Logbook.
- Auto Fog signal controller/ Time Controllers (if fitted) shall be tested weekly to ensure that they are functioning under the requirements of COLREGS 1972.
- Required navigational shapes are onboard and in good condition. (Three balls, one cylinder & one diamond)
- Weekly tests of bell and gong. Ensure that the condition of the mallet conforms to the requirements of the COLREGs. The bell and Gong/Mallet shall be kept in an easily accessible location.
- sound reception system (If fitted) shall be tested and calibrated/ adjusted as per the manufacturer's instructions monthly to ensure proper operation, signal reception, and reduced static.
- The Flags and national ensigns are also the responsibility of the 3rd Officer. Proper sets are to be on board and ready for use prior to getting underway and entering port.

12.01.04.11.01 BRIDGE CONTROL AND ENGINE ORDER TELEGRAPH

On vessels fitted with bridge control systems, it shall be tested to ensure prompt and effective engine response prior to entering restricted waters, sailing from any berth, mooring or anchorage. These records shall be entered in the Deck and Engine logbooks.

When trying out engines prior to arrival port or entering a port (after a long voyage) ASTERN movement shall not be given until the propeller is completely stopped turning (usually the residual ships speed has fallen below 4-5 knots).
Change over to Engine room and local manoeuvring shall be tested once every 3 months. This may be coupled with the emergency steering gear drill as it can be used as a platform for familiarization and training of the crew on board the vessel.

All OOW and EOOW shall be familiar with the Emergency – Local manoeuvring and procedures to cancel the programs such us load up/ load down and limiters if any.

A few vessels have Berthing systems, ECDIS stations receiving a feed from the Telegraph. If fitted; the accuracy of this feed needs to be verified prior considering the data available on the Docking / ECDIS stations.

For vessels with ~~EDOI~~ SHaPoLi / EPL modifications, all EOOW shall be familiarised with the procedure to engage the power reserve restricted by ~~EDOI~~ SHaPoLi / EPL modification in the event of an emergency or as the situation demands. It must be understood that the use of a power reserve is only allowed for the purpose of securing the safety of a ship or saving life at sea, consistent with regulation 3.1 of MARPOL Annex VI (e.g. operating in adverse weather and ice-infested waters, participation in search and rescue operations, avoidance of pirates and engine maintenance). It is important that the ship's master and OOW are not restricted from exercising judgement to override the SHaPoLi / EPL when required for safety purposes. Any use of a power reserve should be recorded in the Deck and Engine Logbooks.

Additionally, as per MEPC.335(76), any use of reserve power should be recorded in the record page of the Onboard Management Manual (OMM) for SHaPoLi / EPL, signed by the master and should be kept on board. The record should include:

1.Ship type
2.IMO number
3.Ship size in DWT and/or GT, as applicable
4.Ship's limited shaft/engine power and ship's maximum unlimited shaft/engine power
5. Position of the ship and timestamp when the power reserve was used
6. Reason for using the power reserve
7. Beaufort number and wave height or ice condition in case of using the power reserve under adverse weather condition
8. Supporting evidence (e.g. expected weather condition) in case of using the power reserve for avoidance action
9. Records from the SHaPoLi / EPL system for the electronically controlled engine during the power reserve was used
10. Position of the ship and timestamp when the power limit was reactivated or replaced.

Where an EPL / ShaPoLi override is activated but the power reserve is not subsequently used, this event should also be recorded in the deck and engine-room logbooks. The engine-room logbook should record power used during the period when the override was activated. The EPL/ShaPoLi should be reset as soon as possible, and details of the reset should also be recorded in the deck and engine-room logbooks.

In case of having used a power reserve, the ship should without delay notify its Administration or RO responsible for issuing the relevant certificate and the competent authority of the relevant port of destination with the information recorded. Once the risks have been mitigated, the ship should be operated below the certified level of engine power under the SHaPoLi / EPL. The SHaPoLi / EPL system should be reactivated or replaced by the crew immediately after the risks have been prevented and the ship can be safely operated with the limited shaft / engine power. The reactivation or replacement of the SHaPoLi/ EPL system shall be validated by RO or Flag State at the earliest opportunity.

12.01.04.12.00 Engine Telegraph Logger

The Telegraph Logger shall be synchronized, ensuring adequate supply of recording paper and ink supply, and proper printing/marking, as applicable, at noon each day, during pre-arrival testing, and testing prior to getting underway. Appropriate entries shall be made in the Deck Logbook.
If vessel is not equipped with telegraph logger or if telegraph logger is temporarily out of order, then all engine movements must be recorded in the bell book; both on bridge and in ECR.

12.01.04.13.00 Chronometers (where provided)

Vessel chronometers are the responsibility of the 2nd Officer. All Chronometers shall be serviced during each shipyard repair period. A record for its error shall be maintained in the chronometer log provided. Time signal shall be compared by radio signals, A comparison with the GPS may be carried out only as a last resort.

12.01.04.14.00 Clocks

The care and upkeep of all vessel clocks shall be the 3rd Officer's responsibility. OOW shall compare and synchronize clocks prior to getting underway, arrival in port and at noon whilst at sea, and enter in the Deck Logbook.

When it is necessary to advance or retard vessel clocks, all clocks shall be advanced or retarded at the same time, i.e. the Bridge clock, chartroom clock and engine room clock shall always indicate the same time. Time zone changes and any time changes due to Daylight Saving Time shall be logged when made.

If vessel is not fitted with Master & repeater clocks that synchronize automatically – it is important then that Bridge and Engine room clocks as well as other navigation equipment with built in clock such as Telegraph logger, ECDIS, Radar, course recorder, etc. are also synchronised.

12.01.04.15.00 Course Recorder

In the event of a vessel accident, the entire course recorder roll shall be removed from the recorder even if only partly used, properly identified with the vessels name and date in ink, signed by the Master and the OOW at the time of the accident, and retained pending instructions from Management.

If the course recorder fails underway or its error cannot be kept under +/- 2°, management must be notified and repairs arranged. Any course recorder failure must be logged, noting the circumstances of the failure.

Course recorder chart entries must be made and initialled as they occur, if possible, or at the end of each watch. The entries made shall include but not be limited to:

- The vessels course & position at the end of the watch or at noon, whether by fix or dead reckoning.
- The time and date of pre-arrival testing and testing prior to getting underway.
- If there have been any alterations of course or at least once during the watch.
- When hand steering has been used

12.01.04.16.00 Voyage Data Recorder

VDR equipment enables accident investigators to review the circumstances leading up to an incident and helps to identify the cause(s). i.e., this information is not used for active navigation of the vessel, but for use during any subsequent investigation to identify the cause(s) of the incident or accident.

Additionally, VDRs provide the Company with information that can enhance ship operation and management and provide the owner/operator with a comprehensive record of events during a given period. A review of BTM/ BRM principles can be carried out using the VDR recording along with Remote Audits.

A) VDR Requirements

Depending on the size and construction date, SOLAS mandates the fitting of a Voyage Data Recorder (VDR) or Simplified Voyage Data Recorder (S-VDR) as the case may be. The purpose of this equipment is to maintain and store, in a secured and retrievable form, relevant and mandated information concerning the position, movement, physical status, command, and control of a vessel over the period leading up to and following an incident.

Requirements for VDR installations are:
- If installed before 1st July 2014, a minimum of 12 hours before being overwritten.
- If installed after 1st July 2014, a minimum of 720 hours before being overwritten.

A VDR is required to maintain a sequential record of information, for a min of 48 hours, (basis date of installation/upgradation and applicable performance standards) which as a minimum should include:
For SVDR:
- Date and time (UTC)
- Position, heading, and speed
- Bridge Audio
- Communications Audio
- RADAR and ARPA*
- AIS*

For VDR, In addition to those for SVDR:
- ECDIS*
- Echo Sounder*
- Main Alarms

- Rudder Order and Response
- Engine and thruster order and response
- Hull opening, watertight door, and fire door status (if fitted)
- Accelerations and Hull stress*
- Wind speed and direction
- Roll motion*
- Configuration data
- Electronic Log Book information

** Refer to Performance standards*

Any information or data source listed as being required to be recorded by a VDR should be recorded by an S-VDR if the data is available in an appropriate format.

B) Preserving Records

Depending upon the performance standards, records should be retained for at least 30 days/720 hours on the VDR long-term recording element, and at least 48 hours on its fixed and float-free recording element. After these times, older records on each of the recording elements may be overwritten with new data and will be lost. Watchkeeping officers should understand and be familiar with the procedures for preserving records as required by the Shipboard emergency procedures and Manufacturer's instructions.

VDR and S-VDR recordings provide important information for marine accident investigators. All watchkeeping officers should be familiar with the procedures for preventing these records from being overwritten while instructions shall be posted near the VDR / S-VDR controls for preserving data.

C) VDR Testing

The system should include functions to carry out a performance test at any time.

General testing guidelines are:

- -The VDR / S-VDR is subject to an annual performance test by an approved testing or servicing facility. APT test "CoC" results should be received on board within 3 months of the completion of the test issued by the VDR/ SVDR manufacturer.
- The VDR / S-VDR is tested as per the maker's instruction after any upgrade, maintenance, or repair of the VDR / S-VDR itself.
- The VDR / S-VDR is tested as per the maker's instruction after any upgrade, maintenance, or repair of navigational or communications equipment providing data feeds.
- In line with the company's "Drill Schedule"

Any malfunction noted shall be added to the defect list and the office shall be advised/ consulted for further actions/technician attendance.

D) VDR Playback

Playback of VDR data may provide a tool for analysing the performance of the Bridge Team Procedure for downloading VDR information must be available on

the unit and each OOW upon joining a vessel must make himself familiar with the downloading of VDR data which is vital in case of an incident.

Additionally, some ships are nominated by the head office to download and send a CD-ROM to head office for review in line with Industry requirements.

12.01.04.17.01 Electronic Position Fixing Systems (EPFS)

Electronic position fixing systems provide an automatic and continuous position update for ships fitted with a suitable single or multi-system receiver
Global Navigation Satellite System

A Global Navigation Satellite System (GNSS) is a satellite-based system that provides a means of obtaining continuous worldwide position, time, and speed (overground) information.

There are few such systems available to ships that provide near-global coverage:

- Global Positioning System (GPS) operated by the United States; and
- Global Navigation Satellite System (GLONASS) is operated by the Russian Federation.
- Beidou (China) has been recognized as a component of the World-Wide Radio Navigation System
- (WWRNS) and Galileo (Europe) was recognized in 2016. Both systems are expected to be fully functional shortly.

Other satellite systems may in the future also be able to provide GNSS services.

A) Differential GNSS

GNSS generally have a base accuracy in the order of 15-25 meters. Differential GNSS receivers offer greater navigational accuracy by applying corrections received from ground-based reference stations.

B) GNSS Receivers

Whether as stand-alone equipment or as part of an integrated system, GNSS receivers provide:

- Position (including service quality information and geodetic datum corrections);
- Ground referenced course and speed, and
- Route storage and cross-track distance (XTD) monitoring. By entering the passage plan into the GNSS receiver, the OOW has an independent method of monitoring the passage.

C) Geodetic Datum

A GNSS calculates positions referenced to a particular global geodetic datum. This may not be the same as the geodetic datum of the chart in use, with the result that the position when plotted is in the wrong place. Where the difference or datum shift is known, a "satellite-derived positions" note on the chart

provides the offset to apply to the position before it is plotted on Paper charts. While using the ECDIS, refer to procedures mentioned in the Paperless Navigation Procedures for use of non-WGS84 ENC.

Many GNSS receivers have internal facilities to transform positions between different geodetic datums. This eliminates the need to apply datum offsets manually. OOW should be aware of such offsets and ensure that the feed provided is always maintained as WGS84.

D) Chart Accuracy and Precision

ENC, RNC, and paper charts are based on hydrographic surveys which are conducted using the best Position-fixing technology available at the time of survey. Although a ship navigating with GNSS may know its position to an accuracy of better than 10 meters, the positions of hazards and other objects on the seabed may only be known to an accuracy of 20 meters or worse. Refer to CATZOC in Paperless Navigation.

Paper charts show charted objects (including hazards) with a precision of approximately 0.3 mm (15 meters or more at scales of 1:50,000 or smaller). Due to the screen resolution of ECDIS, the precision of charted objects on ECDIS may not be substantially different from that of paper charts.

E) Interfacing

All electronic navigation aids such as gyro, radar, GPS, and chart plotting devices are to be tested and set up by the Watchkeeping Officer before getting underway to ensure that they are accurate and in proper working condition.

The Master and Officers should be completely familiar with the corrections to be applied to these systems and of inherent limitations that affect the accuracy of the individual system. Reliance on any one system alone could lead to a significant navigational error. An integrated approach should be used with at least two systems, to verify the accuracy of the vessel's position.

A list of equipment provided with GNSS / EPFS feeds shall be maintained on board including the process/wiring procedure which may be a direct feed from the GNSS/ EPFS or via a splitter/ amplifier and distribution box. Equipment such as the ECDIS requires a direct feed from the EPFS, while it's the policy of the company to provide a direct EPFS feed from a min of two EPFS units to each ECDIS unit. Most ECDIS units compare the 2 EPFS feeds and monitor the quality of the data received from the sources. OOW should be aware of the difference between the EPFS feeds, the warnings provided on the ECDIS and actions to be taken in event of an EPFS feed failure.

The organization aims to equip its fleet vessels with two different Electronic Position Fixing Systems (EPFS). Alongside the (D)GPS currently installed onboard, an independent EPFS will be installed. Vessels with this alternate EPFS will substitute its data for the secondary (D)GPS feed. This setup allows immediate comparison of both EPFS sources and triggers an alarm if their positions diverge beyond a user-defined threshold.

While a few types of equipment, in line with the GMDSS requirements, may have a feed provided from a splitter/distribution box; whereupon failure of the primary GNSS/ EPFS feed fails, the secondary EPFS/ GNSS feed is provided automatically without the need for the operator to carry out a changeover.

F) Failure

If any of the Electronic Navigation Aids / GPS / DGPS fail or the errors in the same cannot be kept under management, a vessel must follow the guidelines as per the SEP (Shipboard Emergency Plan). Failure must be logged, noting the circumstances of the failure, and notified to the office so that repairs can be arranged.

All OOW shall be aware of the equipment changing over to DR mode in event of an EPFS/ GNSS failure or a situation when the vessel navigates in an area of erratic or GNSS feed loss.

G) Periodic Checks and Performance Tests

The accuracy of the GNSS feed shall be verified by the OOW on every watch at a frequency in line with position fixing intervals while using paper charts and the position verification interval while using ECDIS. The Feeds shall be checked for offsets and correctness while taking over the Navigation watch in line with the watch take-over checklists. Filters and Masks shall be set correctly for the HDOP and SNR limits. SNR values or RMS/ RMS 95 values shall be monitored when available to the OOW depending upon the equipment installed.

Some ECDIS units carry out a constant comparison of both GNSS feeds (thereby a direct feed is required) and provide an Alarm/alert when the difference exceeds the set value.

Performance tests of the GNSS/ EPFS shall be provided by the manufacturers/ carried out by an approved manufacturer’s representative and maintained for records.

12.01.04.18.00 GENERAL ALARM

The Watch keeping Officer is responsible for and must test the vessel's general alarm system prior to getting underway, at noon each day at sea. These tests shall be logged in the Deck Logbook. Should he notice any malfunction, the Master and Chief Engineer shall be informed immediately.

12.01.04.19.00 Charts And Nautical Publications

A) Carriage Of Charts and Nautical Publications

It is required that all ships carry adequate and up-to-date official nautical charts (paper or electronic format), sailing directions, lists of lights and radio signals, Notices to Mariners, tide tables, and all other nautical publications (paper or digital form) necessary to appraise, plan, execute and monitor a passage.

The use of a chart and publication management system will help to ensure that charts and publications are effectively maintained. A management system should record the charts, publications, and licenses/permits carried, and also when the charts and other publications were last corrected.

The company's Paperless Navigation Procedures shall be consulted for detailed procedures concerning the operation of the ECDIS and electronic publications.

B) Official Charts and Nautical Publications

For a nautical chart or publication to be considered official, it must be produced or approved by an authorized hydrographic office or relevant government institution by International Hydrographic Organization (IHO) resolutions and recommendations.

Where a vessel carries paper charts to comply with the carriage of charts and nautical publications regulations, to mitigate gaps in ENC coverage, or for any other reason where paper charts will be used for navigational purposes, the paper charts shall be of the latest edition and fully corrected before use / passage planning.

A Chart Catalogue (or equivalent) shall be available on board, and shall assist in correctly identifying the paper charts required for an intended voyage. The catalogues shall be maintained up to date on a weekly basis to ensure that the operators have an updated list of available resources.

Company shall provide access to or ensure that notices to Mariners are supplied to the vessel by external providers appointed by the Company. All Paper charts including the APCF (in line with the Paperless Navigation Procedures) shall be corrected regularly and their correction status must be reflected in the chart correction log ready for examination by Port State Control, Vetting Inspector, or other relevant Authority.

Temporary and Preliminary Notices to Mariners shall be kept in file maintained by the navigation officer. In order to highlight a T&P that has been entered on a BA paper chart we recommend a 'cloud callout' shape is entered in pencil with the T&P number within for quick reference. The application of T&P notices is a vital part of keeping charts up to date and they must be treated with the same care and attention as permanent notices to mariners.

The vessel shall coordinate with the company's approved service provider and ensure that the vessels' Charts, publications (including Nautical and technical

library) are maintained up to date and latest revisions with their applicable corrections are available on board.

Old edition, damaged, cancelled worn out charts shall be removed and kept away from the bridge after replacements are received. In event of damage and replacements are not available on board, vessel should contact the office for support and include the issue in the defect list.
All Navigation officers shall refer to and familiarize themselves with the contents of the paperless navigation procedures for use, limitations and requirements for ENC and RNC.

Refer to
12.01.30.00. - PAPERLESS NAVIGATION

12.01.04.20.00 Integrated Bridge Systems (IBS) And Integrated Navigation Systems (INS)

An Integrated Bridge System (IBS) is a combination of systems that are interconnected to allow centralized access to sensor information and control of passage planning, execution, and monitoring functions.

An Integrated Navigation System (INS) may be a part of an IBS or maybe a stand-alone system.

An INS is designed to enhance the safety of navigation by integrating route monitoring, collision avoidance, and navigation control. Both IBS and INS use multi-function workstations that integrate some or all of the systems and equipment on board

For INS:
- AIS
- BNWAS
- ECDIS
- GNSS position sources
- Gyrocompass
- Heading and track control system
- Radar and ARPA
- Speed Log

The IBS shall further include in addition to the INS sensors:
- Echosounder/ depth / UKC displays
- GMDSS communications
- Loading, discharging, and cargo control
- Propulsion and steering control and monitoring
- Ship surveillance, safety, and security systems.

IBS and INS should be sufficiently robust that the failure of any one part of the system does not fail the whole system.

Factors that will determine the extent to which the IBS and INS design allow certain bridge functions to be automated include the design of the bridge, the type and compatibility of equipment fitted, and the layout of displays and user interfaces.

12.01.04.21.01 GMDSS Communications

GMDSS equipped ships should be able to:

§ Transmit ship-to-shore distress alerts by two independent means; and
§ Receive shore-to-ship alerts (usually relayed by a Rescue Co-ordination Centre (RCC)).

In addition, GMDSS equipped ships should be able to transmit and receive:

- Ship-to-ship alerts;
- SAR co-ordinating communications;
- On-scene communications,
- Locating signals;
- Maritime Safety Information (MSI);
- Routine or general communications to and from shore; and
- Bridge-to-bridge communications

A) GMDSS Equipment

Carriage requirements for GMDSS equipment by all ships, and ships operating in Sea Areas A1, A2, A3, and A4, are provided in SOLAS. Depending upon date installation and/or upgradation performance standards for the equipment shall vary. All SOLAS ships should have at least the following equipment:

- A VHF radio installation that supports continuous watch and communications via digital selective calling (DSC) on VHF DSC Channel 70, and voice communications on VHF Channels 6, 13, and 16,
- A Search and Rescue Transponder (SART);
- A NAVTEX receiver for the reception of MSI;
- A ship earth station (SES) capable of receiving MSI unless operating exclusively within range of NAVTEX broadcasts or exclusively outside GMDSS satellite service provider coverage,
- An EPIRB (406MHz);
- Two portable VHF radios for use in survival craft; and
- while additionally; Passenger ships should also have the ability to communicate on Airband frequencies with commercial aircraft for SAR purposes.

Ships sailing beyond the range of a VHF DSC coast station (beyond Sea Area A1) should have an MF DSC transmitter and watch receiver. If sailing beyond MF DSC range (beyond Sea Area A2' then a ship should have either an HF DSC or an SES. Digital selective calling (DSC) is used for calling and replying, and for transmitting, acknowledging, and relaying distress alerts. It allows a specific station Maritime Mobile Service identity (MMS) to be contacted and made aware that the calling station wishes to communicate with it and to indicate how to reply, or which station to listen to for subsequent distress traffic. Calls can also be addressed to ALL SHIPS or All STATIONS.

The method chosen to ensure the availability of GMDSS equipment at sea (Details of equipment fitted can be found in the Record of Approved GMDSS Radio Installation.) shall be determined for the vessel.

SOLAS defines three methods to ensure the availability of GMDSS equipment at sea:

- At sea electronic maintenance, requiring the carriage of a qualified radio/electronic officer and adequate spares and manuals.
- Duplication of certain equipment
- Shore-based maintenance

Ships engaged on voyages in sea areas A1 and A2 are required to use at least one of the three maintenance methods outlined above, or a combination as may be approved by their administration. Ships engaged on voyages in sea areas A3 and A4 are required to use at least two of the methods outlined above.

In most cases, A3 ships carry duplicate equipment and use shore-based maintenance, A1 and A2 ships use shore-based maintenance only. The choice of using shore-based maintenance does not infer there should necessarily be a contract and/or agreement, but that maintenance should be carried out annually by a shore-based 'expert' organization.

GMDSS equipment is required to be powered from three sources of supply:

- The ship's normal supply.
- The ship's emergency generator (if fitted)
- A dedicated radio battery supply.

The batteries must be charged by an automatic charger that is powered by the main and emergency generators.

The batteries are required to have the capacity to power the equipment for 1 hour on ships with an emergency generator, and 6 hours on ships not fitted with an emergency generator.

B) Watchkeeping and Record Keeping

For ease of operations and in compliance with GMDSS requirements and recommendations, the following shall be posted at/near the GMDSS station:

- Poster available on who was designated to handle GMDSS duties in an emergency and same info available in GMDSS logbook.
- Ship’s Radio License
- Certificate /Details of Shore-based maintenance provider
- Ship’s Antennae Diagram/ Plan
- GMDSS operating Guidance for Masters of Ships in Distress Situations*
- Actions by ships upon reception of VHF/MF DSC distress alert*
- Actions by ships upon reception of HF DSC distress alert*
- Guidance on Distress alerts*
- Guidance on Cancellation of false alert*

*Latest revision of posters can be downloaded from the GMDSS manual publication or List of Radio Signals publications

Further, it is highly recommended that the brief operating instructions of each piece of equipment provided be readily available on the bridge including procedures for transmission of distress alerts (designated and undesignated)
OOW is familiar with the company procedures for.

- Emergency communications which gave guidance on, and designated responsibility for distress communications in an emergency using the vessel's GMDSS equipment.
- Requirements for GMDSS radio watchkeeping on their vessel.
- Procedures for sending distress, urgency and safety messages are contained in the International Aeronautical and Maritime Search and Rescue Manual Volume III, (IAMSAR Vol III), Section 4.
- Process of preparing and transmitting distress and urgency messages using the GMDSS equipment.
- The process for recording the details of distress, urgency, and safety messages received.
- Obligation to respond to the Distress message under SOLAS chapter V
- Actions/situations when own vessel is not able to respond/ assist another vessel in Distress

Particular care should be taken to ensure that alerts and messages sent by DSC, radio-telephony, and satellite communications are given an appropriate priority

C) GMDSS Logbook

Regulations require vessels to carry a Radio Log. The Radio Log should be kept on the navigating bridge convenient to the radio installation. It must be available for inspection by any person authorized by the authorized representative of the Administration.

A GMDSS radio log should be kept to provide a record of all events connected with the radio communications facilities on board. As a minimum, the following should be recorded:

- A summary of communications relating to Distress, Urgency, and Safety traffic. The summary must include dates and times and details of the Distress Urgency and Safety working.
- A record of important incidents connected with the radio service. For example,
  i. a breakdown or serious malfunction of the equipment.
  ii. a breakdown of communications with coast stations, land earth stations, or satellites.
  iii. adverse propagation conditions, i.e., ionospheric, static, atmospheric noise, general interference.
  iv. serious breaches of radio procedures by other stations.

- Where appropriate, the position of the ship/vessel should be recorded at least once a day and the time at which the vessel was in that position. Position may be given relative to a geographical point, if appropriate, as an alternative to latitude and longitude.
- The details of the tests and checks carried out on the equipment. The Master must nominate one or more crew members, normally the person (qualified for distress and safety radio communications under the

Regulations, to maintain the Log and to carry out the tests and checks of the equipment as required.

- Port arrival and departure times must be noted.
- Distress and Urgency communications received as hard copy via Navtex, Satellite communication (EGC), Telex (NBDP), or DSC should be noted in the Log and filed at the rear of the Log or in a file in date order.
- Daily, weekly, and monthly tests and checks of equipment and reserve power as set out in these notes below. A summary of the operational capability of the equipment together with the names of any station contacted during tests should be recorded.
- Cancellation of any false alerts.

The nominated person must notify the Master of any equipment defects and record details of the defects in the Log.

Watchkeeping officers should verify distress alarms during the watch. Appropriate action should be taken on receiving a message. Records should be maintained in the GMDSS Logbook. All Distress / Urgency / Safety messages (except error messages) must be entered in the GMDSS logbook upon receipt. Distress messages must be entered in full text and Master to be informed. A general statement shall be entered on action taken. The reason for not responding to a Distress message (Unreasonable / Unnecessary) shall be entered by the Master only (In line with the SOLAS chap V regulations).

For Urgency & Safety messages, reference numbers shall be entered with a short note of the contents, while the entire message can be retained in the appropriate file. Notice to be posted on GMDSS Log, 'URGENCY & SAFETY MESSAGE FILED IN FILE.'

D) Sat–C, EGC & NAVTEX Navigation warnings:

To highlight an EGC Navigation warning message that has been entered on a BA chart, it is recommended that a 'cloud callout' shape is entered in pencil with the EGC Nav warning message number to indicate that the Navigation warning has been plotted. On ECDIS WWNWS warnings including EGC need to be incorporated in line with the Paperless Navigation Procedures.

Master to read and inspect/confirm all above entries have been made as necessary and only then sign the GMDSS logbook on each day's entries.

The Log should be kept aboard as a record of the operation of the radio installation, for a minimum period as specified by the administration under which the vessel is registered, provided this period is not less than one year.

Thereafter, the Log should be finally disposed of in the manner directed by the company or the shipowner, noting the recommendation that the records be kept for a total period of seven years, onboard or ashore.

E) Testing Requirements

In addition to Annual radio surveys where GMDSS equipment shall be tested following the Flag requirements by a shore-based maintenance provider.

The vessel shall carry out the following tests and records shall be maintained in the GMDSS log:

Daily

- The proper functioning of the DSC facilities shall be tested at least once each day, without radiation of signals, by use of the equipment's internal test facility.
- Batteries providing a source of energy for any part of the radio installations shall be tested daily and where necessary, brought up to the fully charged condition.
- All printers should be checked for correct operation and to ensure that there is a sufficient supply of paper for that day's operation.

Weekly

- The proper operation of the DSC facilities shall be tested at least once a week utilizing a test call, when within communication range of a coast station fitted with DSC equipment. Where a vessel has been out of communication range of a coast station fitted with MF DSC equipment on a particular band for a period of longer than one week, a test call shall be made at the first opportunity when the vessel is within communication range of such a coast station. If the Vessel shall carry out this test with a ship station instead of a coast station, due to the unavailability of a shore station that provides a test facility, records of tests indicate that the coast station has not responded and therefore a ship station was used shall be included. It is also recommended that the test be carried out occasionally using the DC power of the vessel to check the condition of the battery backup provided.
- It is recommended that a station-to-station test takes place using VHF DSC.
- Where the reserve source of energy is not a battery (for example, a motor-generator or uninterruptible power supply [UPS]), the reserve source of energy shall be tested weekly.

Monthly

a) EPIRB

- Each EPIRB shall be examined to check-
  - i. its capability to operate properly by carrying out a self-test function (see manufacturer's instructions) without using the satellite system,
  - ii. security in its mounting, paying particular attention to its ability to float free (where required to do so) in the event of the vessel sinking,
  - iii. for signs of damage and/or painting

Notes: Most EPIRBs have a self-test facility which is usually a spring-loaded switch. When activated light will indicate that the test circuits are operating correctly and sometimes this will also activate the strobe light. It is recommended that the self-test switch be held for no more than 2 flashes of the strobe light, or no longer than 1 minute after the first self-test mode burst transmission. When the self-test is activated on a 406 MHz EPIRB, the EPIRB is allowed to radiate a single burst which is specially coded so that it is ignored by the COSPAS-SARSAT system. The EPIRB must never be tested by actual operation. However, self-tests will use some of the beacon's limited battery

power and should only be performed following the beacon manufacturer's guidance. Test should be performed during the first 5 minutes of the hour, to minimise disturbance on the emergency channel.

- Inspect the EPIRB and associated fittings. Ensure that the EPIRB is:
  i. Armed and ready for automatic activation.
  ii. Capable of floating-free unimpeded or being easily manually released.
  iii. Marked with the required information and operating instructions. Pictorial instructions for manual operation visible at the location of the beacon
  iv. Free of visible defects, signs of damage, degradation or cracks to the casing, or water ingress.
  v. The EPIRB battery was not expired
  vi. The hydrostatic release is in good order and not past its expiry date.
  vii. The lanyard is not tied to the vessel or the mounting bracket and is in good condition and neatly stowed.
  viii. There is a beacon operating instruction manual available.

b) SART

- Each search and rescue radar transponder (SART) shall be tested in line with the manufacturer's instructions and shall be examined to check the integrity of its mounting and for signs of damage.

Notes: All ships must be provided with at least one search and rescue transmitter (SART). Ships over 500 gross tonnages must carry two SARTs. A SART may operate either in the 9 GHz band or on frequencies dedicated for AIS. SART self-tests will use some of the beacon's limited battery power and should only be performed following the transponder manufacturer's guidance. At least one radar transponder shall be carried on each side of every cargo ship of 500 gross tonnages and upwards. The radar transponders shall be stowed in such locations that they can be rapidly placed in any survival craft (other than the forward life raft). On ships equipped with free-fall lifeboats, one of the transponders shall be stowed in the free-fall lifeboat, and the other located near the navigation bridge so that it can be utilized on board and ready to transfer to any other survival craft.
SARTs packed in life rafts can only be tested when the life raft is serviced. DO NOT interfere with the sealing of any life raft. A Search and Rescue Transponder (SART) is a self-contained emergency device that may be one of two types, a radar-SART, or an AIS-SART. A radar-SART will indicate distress by creating a series of 12 dots changing to arcs (in closer proximity) and then to rings on an X-band radar display. To ensure stable reception of a radar-SART, interference rejection should be switched off. An AIS-SART should be detected by AIS but will not appear on the radar.

- Lifeboat should be marked for the location of SART installation or when required a mounting bracket installed.

c) Portable VHF Equipment

- Each survival craft two-way VHF equipment shall be tested at least once a month on a frequency other than 156.8 MHz (VHF Channel 16) unless the equipment is of a sealed type where such testing is not practical.

(Manufacturer's guidance should be followed.) A test battery should be used where only sealed primary batteries are provided for use with the radios. The survival craft portable two-way VHF radio has provision for attachment to clothing. If the survival craft portable two-way VHF radio has a wrist or neck strap it should be provided with a weak link.

Notes: The survival craft portable two-way VHF radios may be used for routine onboard communications when capable of operating on appropriate frequencies.

- There is no requirement for them to be Ex-rated or of an intrinsically safe type, but if the units are being used for shipboard operations, then there must be effective measures in place to prevent them from being used in the gas hazardous area. At least 3 two-way VHF radiotelephone apparatuses shall be provided on every cargo ship of 500 gross tonnages and upwards. The two-way radiotelephone should be capable of operation on the frequency 156.800 MHz (VHF channel 16) and at least one additional channel. The battery for equipment with a user-replaceable energy source or radio with a non-replaceable energy source shall have a non-replaceable seal to show the unit has not been activated. Primary battery shelf life must be at least 2 years and highly visible yellow/orange colour or marked with a surrounding yellow/orange marking strip. For radios installed on or after 1st July 2005 revised performance standards for survival craft portable two-way VHF radiotelephone apparatus apply.

d) Batteries

- A check shall be made on the state of charge (if applicable), security of mounting, and condition of all batteries providing a source of energy for any part of a radio installation. The battery connections and compartment shall also be checked, and general maintenance carried out if required.

e) Antennae

- It is recommended to visually check all antennas for the security of mounting and visible damage to cabling. All insulators and feedthroughs should be cleaned to remove accumulated salt and dirt. Ensure equipment is switched off and isolated before carrying out work on any antenna.

f) Other tests and checks:

- Daily/ weekly / monthly Tests and checks as per the Manufacturer’s instructions for EGC receivers and other Inmarsat equipment installed in line with the GMDSS requirements.

- The Battery load test for the GMDSS Batteries was installed at a 6 monthly interval to determine the suitability/ efficiency of the batteries. The capacity of the battery or batteries should be checked, using an appropriate method, once every six months, the duration between 2 tests shall not exceed one-year. One method of checking the capacity of an accumulator battery is to fully discharge and recharge the battery, using a normal operating current and period (e.g., 10 hours), when the ship is not at sea. This test shall be carried out while the vessel is in

port (i.e., will not require the GMDSS equipment for watchkeeping purposes until the batteries are fully charged after the test), as the batteries shall be discharged. The test shall be planned to account for hazards involved with cargo operations if any and the requirements to charge the batteries before sailing. If the batteries are deemed not suitable the vessel shall contact the office to arrange for replacement batteries.

- Before departure from the port during the pre-departure checks in addition to the stations coming online and daily checks being carried out, the OOW shall verify;
  i. A visual check of all antennas for the security of mounting and visible damage to cabling. The Radio antenna (if earthed when alongside terminals) is switched on when the vessel is underway.
  ii. The security of mounting and condition of all batteries provide a source of energy for any part of a radio installation. Batteries shall be tested and where necessary, brought up to the fully charged condition.
  iii. All printers should be checked for correct operation and to ensure that there is a sufficient supply of paper for the forthcoming voyage.

- SOLAS training manual and Record of Safety equipment shall be updated with the type and details of the equipment on board.

12.01.04.22.00 Radios

Prior to getting underway, Bridge VHF radios shall be checked to ensure that they are operational on the proper channel(s). Bridge radio equipment use shall be restricted to distress traffic, navigational safety, and official Ship's business. Transmissions shall be kept to a minimum.

All Watch Officers must use the appropriate VHF channel for the purpose assigned (ALRS). Officers must exercise extreme caution when communicating over the VHF with other vessels, about their manoeuvring intentions.

Radiotelephone logs must be kept in accordance with International Telecommunicating Authority regulations. The VHF's to be kept on Low Power while the tankers are in berth for Loading and Discharging.

12.01.04.23.01 Guidelines On The Use Of VHF At Sea

The company makes a reference to the IMO circular (Resolution A.954(23) Adopted on 5 December 2003 and amended thereafter) for a guideline on the use of VHF at sea.
Circular provides guidelines on:

- VHF Communication Technique
- VHF Communication Procedures
- Standard Messages

Circular shall be available onboard and referred to by OOW as necessary
The circular also covers the use of AIS, where AIS is used for the exchange of data in ship-to-ship communications and also in communication with shore-based facilities. The purpose of AIS is to help identify vessels; assist in target tracking; simplify information exchange (e.g., reduce verbal reporting), and provide additional information to assist situation awareness. AIS may be used together with VHF voice communications (note: AIS is ground stabilised).

VHF equipment should be used correctly and following the Radio Regulations. The following should be avoided:

- calling on channel 16 for purposes other than distress, urgency, and very brief safety communications when another channel is available.
- communications not related to safety and navigation on port operation channels.
- Excessive use of VHF for collision Avoidance
- non-essential transmissions, e.g., needless, and superfluous signals and correspondence.
- transmitting without correct identification.
- occupation of one channel under poor conditions; and
- use of offensive language.

On VHF channels allocated to port operations service, the only messages permitted are restricted to those relating to the operational handling, the movement, and the safety of ships and, in an emergency, to the safety of persons as the use of these channels for ship-to-ship communications may cause serious interference to communications related to the movement safety of shipping in port areas.

VHF channel 13 is designated by the Radio Regulations for bridge-to-bridge communications. The ship call may indicate another working channel (for non-emergency communications) on which further transmissions should take place. The calling ship should acknowledge acceptance before changing channels.
Distress calls/messages have absolute priority over all other communications. When receiving them all other transmissions should cease and a listening watch should be kept. Any distress call/message should be recorded in the ship's log and passed to the master. On receipt of a distress message, if in the vicinity, immediately acknowledge receipt.

If not in the vicinity, allow a short interval of time to elapse before acknowledging receipt of the message to permit ships nearer to the distress to do so.

Every ship, while at sea, is required to maintain continuous watchkeeping on VHF DSC channel 70 and when practicable, a continuous listening watch on VHF channel 16.

VDRs installed shall record all VHF communications and the effectiveness of this recording shall be verified during VDR playbacks.
The Collision Regulations do not make any provision for discussion on VHF about the actions to be taken. As far as possible, the use of VHF in collision avoidance should be kept to a minimum. In any case, the vessel should be

positively identified. A reduction of speed should be preferred to communicating the intention on VHF.

While using VHF, the ship should be positively identified. This is done by flashing light at night or by reading the ship's name by day time. Automatic Identification System will also help in avoiding the confusion. Even if the action is agreed on VHF, both vessels have the responsibility of monitoring the actions until they are finally past and clear.

Some identified dangers in the use of VHF leading to a close quarter situation or a collision are:–

- Over reliance on VHF for extended periods proving to be a distraction and resulting in the loss of valuable time that should have been better utilised to take more timely and appropriate action for purposes of collision avoidance.
- English not being the first language where the potential for VHF assisted collision is enhanced through misunderstanding of the message and/or the difficulty or delay in interpretation of VHF communications.
- The risk of collision being further amplified when collision avoidance action agreed over VHF is in contravention of the COLREGS or other local regulations, the VHF communication providing a false sense of security that a developing situation is under control.
- Over reliance on VHF for collision avoidance causing, breakdown in effective bridge team management, the bridge team assuming that the other vessel may take appropriate action, once again providing a false sense of security.
- On occasions, AIS signal / identifiers can jump between vessels, particularly when navigating in close proximity of busy shipping lanes, VHF communication could consequently be based on scanty information and enhance the risk of collision, particularly in the hours of darkness.

All vessels should, at all times, be navigating and taking action to avoid collision in accordance with the COLREGS and VHF must not be relied upon for collision avoidance purposes.

12.01.04.24.00 Telephones (Main And Sound Powered)

The Deck Watch Officer is responsible for and must test the telephones prior to getting underway. Monthly checks of the Telephone system (Main and sound powered) shall be carried out to ensure that the equipment is operational.

12.01.04.25.00 Safe Use Of Radio And Telephone Equipment Including Intrinsically Safe (EX Rated) Equipment.

During cargo and ballast handling operations, in the presence of a hazardous atmosphere and while the vessel is at a terminal, Operators shall ensure.

- No MF/HF radio transmissions are made

- Main transmitting antennae are earthed or isolated during cargo and ballast handling operations and no transmissions were being made for the test or other purposes.
- Fixed VHF and UHF equipment is switched to low power (one watt or less).
- Portable VHF or UHF radios have a power output of one watt or less.
- Sufficient intrinsically safe VHF or UHF portable radios are provided to coordinate cargo, ballast, and bunker handling operations.
- Restricted use of Mobile telephones; Details of restrictions on the use of mobile telephones are prominently displayed at the gangway. Non-intrinsically safe mobile phones, including any provided by the terminal for ship/shore communications, are not used outside of the accommodation block. If the vessel has been provided with an intrinsically safe mobile phone; its use is allowed outside of the accommodation block. They need to be identified, and proper certification is provided/ available.
- Vessel shall have sufficient VHF or UHF portable radios in good working order were available to properly coordinate cargo, ballast, and bunker handling operations. (Min 8 Numbers). The inventory of intrinsically safe portable VHF/UHF radios used for cargo, ballast, and bunker operations along with their condition shall be maintained. Damaged portable VHF or UHF radios are withdrawn from service and marked as such. Maintenance and replacement records shall be maintained on board.
- If MF/HF radio or radar equipment is under repair/service, it needs to be discussed at the pretransfer conference and a safe system of work agreed upon. Ideally, such repairs shall be arranged at a time while no cargo operations are in progress.

12.01.04.26.00 Meteorological Instruments

Thermometers, hygrometers, barometers, anemometers, and barographs are the responsibility of the 2nd Officer. Meteorological Officers visiting/inspecting vessels in port should be encouraged to calibrate Metrological instruments during their visits.

12.01.04.27.00 Weather Facsimile Receiver / Weather Routing System

Weather facsimile Receiver should be set up to receive appropriate weather facsimile for the area in which the vessel is trading. Upon receiving the facsimile, the information should be analysed. It shall be checked by the OOW and if the situation demands immediate attention of the Master, he must be notified accordingly.

For ships fitted with Weather routing System provided by the company, (SPOS, NAVTOR or similar):

- Print outs to be taken every noon – for the day itself and when forecasting adverse weather conditions. 24 / 48 /96 hours prognosis of the weather to be reviewed and Master informed. A copy is to be left on chart table for OOW reference & eventually filed along with other

voyage papers at end of voyage just in case of claims that may arise at a later date.

- When permitted, each Passage plan way points to be fed into Weather routing System on commencement of voyage, which will enable bridge team to have an early warning of weather, vessel will encounter during her passage. Some software require Daily reports (or equivalent) shall be sent to office when at sea to enable input into weather routing system. This will also give Operations Department an indication of the course & past track of each vessel in the fleet.
- Master shall be guided by information/ analysis presented by the weather routing system/organisation and he shall make his own informed decision whether to use the recommended route or not.

12.01.04.28.00 NAVTEX

Verify that the Navtex receiver is set up for the current and next Navtex Area, and to receive all appropriate message types.

All watch keeping Officers should check the in-coming messages. If any messages of significance are received, affecting navigation during the watch, the Master should be informed, appropriate entries made on navigational charts if necessary, and action taken as required. Relevant messages should be retained in the appropriate binder on the bridge.

To highlight a Navigation Warning that has been entered on a BA chart we recommend a 'cloud callout' shape is entered in pencil with the Navigation warning number to indicate that Navigation warning has been plotted. Refer to Paperless Navigation Procedures for Updating the ECDIS with Navtex messages.

12.01.04.29.00 Public Address System

Public Address system should be checked daily at noon and maintained in good operational condition. The OOW shall test the Talk Back System prior mooring stations.

12.01.04.30.00 Recorders

All recorders shall be kept on UTC and shall be operated when underway, at anchor, and while loading or discharging, if applicable. Notations made on recorder charts shall be made in local time with name of port/place and operation. All recording equipment shall be checked for clock alignment, recording paper and ink supply, and proper printing/marking, as applicable.

RPM recorder or Bell Logger tapes/rolls shall be operated on UTC and notations made in local time. When completed, these tapes/rolls must be dated (start and finish), and the voyage number noted. These tapes/rolls and the Bridge Bell Book shall be kept aboard the vessel indefinitely. If removed, a record shall be kept of their removal and return.

12.01.04.31.00 Search Lights

Searchlights, where fitted, are the responsibility of the 3rd Officer and shall be tested periodically. When not in use they are to be kept covered. Prior arrival and departure and also during operations such as pilot embarkation / disembarkation, HRA transit etc they should be uncovered, checked and kept ready for immediate use.

12.01.04.32.00 Sextants, Azimuth Rings, Binoculars

Azimuth rings, Sextants and Binoculars shall be maintained in an operational condition and readily available to the bridge team.

Sextant Index Error to be obtained and marked and periodically checked. The Bridge Watch shall be responsible for the upkeep of the above. The company requires all deck officers to adopt the fair-weather practice of taking sights. As a minimum they should practice taking sights on a weekly basis to ascertain the vessel's dead reckoning position.

12.01.05.00.03 ELECTRONIC CHART SYSTEM (ECDIS)

It is the responsibility of the Master to implement the "Paperless procedures" and to ensure compliance with applicable rules, regulations, codes, guidelines and standards related to ECDIS.

All Navigation officers shall refer to and familiarize themselves with the contents of the paperless navigation procedures for use, limitations and requirements for ENC and RNC.

Refer to
12.01.30.00. - PAPERLESS NAVIGATION

12.01.05.01.02 Transitioning from Paper Chart to ECDIS

The following procedural guidance is provided to assist in the transition from paper chart to ECDIS navigation.

1. As an initial step, the Company will undertake an assessment of the issues involved in changing from paper chart to ECDIS navigation. Ships' crews will participate in such an assessment so as to capture any practical concerns or needs of those who would be required to use ECDIS. Such a process will help facilitate an early understanding of any issues to be addressed and will aid ships' crews to prepare for change.

2. Secondly, the assessment of the issues will be documented, and combined in the development of standard operating procedures; leading to the implementation of a robust Company generated ECDIS navigation practices and procedures document, further leading to a simplification in course material for Company specific training. This will also facilitate smooth handovers between those who are tasked with operating the ECDIS on board the Company vessels. An appropriate Management of Change (MOC) shall be made and approved for the transition.

3. Thirdly, the Company will ensure that the ships' officers are provided with a comprehensive familiarization program and type-specific training for the ECDIS equipment on board their vessel, ensuring that they fully understand the safety considerations in the use of electronic charts for passage planning and monitoring.

Dual ECDIS equipment is being progressively installed on board the Company's managed ships, and training in the use of ECDIS is being imparted both ashore and on board ship. Currently The Paper Chart continues to be the Primary Means of Navigation of the vessel, except for the vessels fitted with TWO ECDIS units, wherein Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E) is endorsed for "Backup arrangement for ECDIS" as "ECDIS".

12.01.05.02.00 Paperless Navigation Procedures

Reference is made towards the Paperless Navigation Procedures "12.01.30.00" which cover the paperless navigation procedures covering

- Introduction
- Legal requirements, application, and installation
- Crew training and awareness
- Onboard implementation and bridge organization
- Passage Planning
- Responsibilities
- Maintenance of ECDIS

Vessels operating with dual ECDIS (Primary and secondary means) and Single ECDIS (Using ECDIS as primary means) as defined in the Record of Safety Equipment certificate or equivalent document, shall adhere to the procedures and comply with the relevant checklists mentioned in "Paperless Navigation" procedures. Most of the checklists (part of the paperless navigation) substitute the corresponding checklists mentioned within these procedures.

Refer to
12.01.30.00. - PAPERLESS NAVIGATION

12.01.06.00.00 DECK LOGBOOK ENTRIES

Deck Logbook entries shall be made to ensure that adequate records are maintained for all navigational activities at sea and under pilotage:

a) All ships engaged on international voyages shall keep a record of navigational activities and incidents which are of importance to safety of navigation and which must contain sufficient detail to restore a complete record of the voyage.

b) Information which should be recorded (as detailed at in the guidance notes at the start of the logbook) includes that concerning position, course and speed, the times and positions when passing waypoints, land or sea marks, weather and sea conditions and incidents and events including pilot embarkation/disembarkation, times of attendance and connection and disconnection of tugs, times of berthing and un-berthing, hazardous occurrences and accidents.

c) Effectiveness of the radar(s) as measured by the performance monitor(s) should be recorded by the OOW at the end of each watch whenever the radar(s) are operational to ensure that optimal efficiency is being maintained. A numeric, percentage, graphical, or other measurement value should be recorded.

d) Records should be maintained whether the vessel is on international voyages or not. Deck/Engine Logbooks and movement (bell) books should be checked to ensure that they are up to date with entries properly made in ink and not in pencil.

e) An electronic chart display system with GPS input (provided the equipment is in good order and the datum used in each case is the same) provides a good record of the navigational activities.

f) Where controllable pitch propellers are fitted, the times of significant changes of pitch should be recorded if this information is not automatically logged

g) Master to read and confirm all above entries have been made as necessary and only then sign the deck logbook on a daily basis.

12.01.07.00.01 VOYAGE INSTRUCTIONS AND VOYAGE PLANNING

This section outlines the general guidelines for planning and executing voyages on receiving of Voyage Instructions.

At the commencement of each voyage, the charterers or commercial operators of the vessel will issue the vessel with voyage instructions. These voyage instructions usually contain all necessary information related to next port of call, cargo instructions, charter party clauses to be observed, appointed agents etc. Master shall ensure that any navigation related instructions in the Charterer's voyage orders are reviewed and documented in the vessel's passage plan.

Master shall provide information to the shore team, consulting with other officers if necessary, so that a voyage plan can be prepared ensuring the vessel's safety and seaworthiness is not compromised during the voyage.

Master shall execute the voyage as per the plan in a cost effective and efficient manner to ensure successful completion of the voyage. Monitor progress of the voyage.

Master shall communicate with shore teams regarding: -

- Vessel's requirements
- Voyage requirements
- Cargo requirements
- Stowage
- routing constraints
- Hazards envisaged
- Any other matter which may be relevant.

Master shall monitor, administer, and adjust details of the plan as the voyage progresses towards a successful completion.

12.01.08.00.00 VOYAGE ROUTING AND SPEED

Every voyage must be undertaken with "due dispatch", in as much as safe navigation and weather conditions permit under the terms and conditions of the relevant contract. Under the Carriage of Goods by Sea Act (COGSA), a vessel may deviate from her contracted passage only to save life at sea. This is incorporated into most charter parties and bills of lading. Deviation of the vessel for other purposes can compromise insurance coverage of the vessel as well as her cargo.

Voyage Routing:

Voyage routing covers the selection of the most efficient and cost-effective route between ports ensuring compliance with all international, national and local laws, conventions, and regulations governing vessel operations.

Speed:

Normally a vessel undertakes her passage at sea at the best possible speed, "Weather and Safe Navigation Permitting" (WSNP), unless otherwise required. Under a voyage charter there is no direct penalty for failing to meet the speed requirements mentioned in the charter party. There may however be incidental claims if the vessel is inordinately delayed.

Before the vessel has entered a Charterer's service under contract, the vessel may be advised on adjusting her speed and routed appropriately to meet the "Lay-Can" requirements for the voyage. Upon entering a Charterer's service, the vessel shall comply with the appropriate charter party (C/P) speed clause or Charterer's voyage instructions. However, an average speed of plus or minus 0.5 knots is acceptable.

However, under a Time Charter Party, a vessel's speed is subject to the relevant C/P requirements and specific penalties result if these requirements aren't met.

Furthermore, there may be specific routing requirements where specific distances have been agreed beforehand.

Master Shall: -

- Select the shortest possible route between two ports, with due consideration for safe navigation and weather.
- If Applicable, advise the Charterers of route selection and reasons for it, including distance and estimated time of arrival (ETA) by shortest route or charter party route. If a longer route is selected, provide the rationale for this choice, for example:
  Composite-GC with limiting latitude Rhumb Line due to Weather routing by installed system Advisement from other parties Local routing, Tanker Exclusion Zones, etc.
- Consider the charter party lift requirements during the route selection process, especially with regards to load line zones traversed.

- Be familiar with all voyage instructions, particularly those pertaining to route and speed. Undertake the voyage so as to meet all charter party commitments.
- Undertake the vessel's passage at sea at the best possible speed, "Weather and Safe Navigation Permitting" (WSNP).
- Monitor vessel speed and consumptions to help optimise the voyage.
- Do not deviate from the contracted passage without consultation with the ship team unless required to save lives at sea.
- Advise the Company and Insurance department in case any deviation from the contracted route is required.
- Use your own discretion for the use of a weather routing service. In case of doubt, use a shore-based routing services.
- Maintain relevant records and documentation to provide adequate reasoning to support route selection or any deviation from C/P requirements.

12.01.09.00.00 VOYAGE PLANNING

When voyage instructions are received, the Master shall advise Department Heads as soon as practicable, regarding the next voyage and instruct them to make the necessary preparation of the vessel.

The voyage shall be planned to take into considerations all relevant information. Such a plan shall be flexible and may be amended by the Master at any time in interest of safety and efficiency. The Master shall establish a detailed plan for the entire voyage and shall ascertain that the vessel is ready for the next voyage, and that there are, with reasonable allowances of safety, sufficient stores, provisions, bunkers, and water on board, for the next voyage and/or up to the intended replenishment port, as applicable. The Master shall also ascertain, prior sailing, that there are updated charts and navigational publications on board for the intended voyages.

The Chief Engineer, shall in consultation with the Master, determine the requirements of fuel, water for machinery operations, lubricants, chemicals, consumable and other spare parts, tools, stores and supplies etc. for the next voyage and/or up to the intended replenishment port, as applicable.

The Chief Officer, shall in consultation with the Master, determine the requirement of Fresh water for domestic consumption, consumables and other spare parts, tools, stores and supplies etc. for the next voyage and/ or up to the intended replenishment port, as applicable.

12.01.10.00.01 PASSAGE PLAN

General:

The navigation officer shall prepare the Passage Plan, under the guidance and instructions of the Master using Passage Plan Checklist Form HSQEEn 12.01.10.001 or 12.01.34.031 as applicable.

Master shall verify and approve the passage plan after it is ensured that it is made to his satisfaction and in accordance with this procedure.

Passage planning includes:

- Appraisal, i.e. gathering all information relevant to the contemplated passage;
- Planning of the whole passage from berth to berth;
- Execution of the plan; and
- Monitoring of the progress of the vessel in the implementation of the plan.

Refer to:
12.01.34.031. - ECDIS Passage Plan Preparation Checklist

12.01.10.01.01 Passage Plan – Appraisal

All information relevant to the intended passage should be considered. The following items should be considered for passage planning:

- The condition and state of the vessel, its stability, and its equipment; any operational limitations; its permissible draft at sea in fairways and in ports; its manoeuvring data, including and restrictions.
- Any special characteristics of the cargo (especially if hazardous), and its distribution, stowage and securing on board the vessel.
- The provision of a competent and well-rested crew to undertake the passage.
- Requirements for up-to-date certificates and documents concerning the vessel, its equipment, crew, passengers or cargo.
- Appropriate scale, accurate and up-to-date charts to be used for the intended passage, as well as any relevant permanent or temporary notices to mariners and existing radio navigational warnings.
- Accurate and up-to-date sailing directions, lists of lights and lists of radio aids to navigation; and any relevant up-to-date additional information, including:
  - Mariners' routeing guides and passage planning charts, published by competent authorities.
  - Current and tidal atlases and tide tables.
  - Climatological, hydrographic, and oceanographic data as well as other appropriate meteorological information.
  - Availability of services for weather routing (such as that contained in Volume D of the World Meteorological Organization's Publication No. 9);

- Existing ships' routing and reporting systems, vessel traffic services, and marine environmental protection measures.
- Volume of traffic likely to be encountered throughout the passage;

- If a pilot is to be used, information relating to pilotage and embarkation and disembarkation including the exchange of information between Master and pilot.
- Available port information, including information pertaining to the availability of shore-based emergency response arrangements and equipment; and
- Any additional items pertinent to the type of the vessel or its cargo, the areas the vessel will traverse, and the type of passage to be undertaken.

Based on the above information, an overall appraisal of the intended passage shall be made. This appraisal shall provide a clear indication of all areas of danger; those areas where it will be possible to navigate safely, including any existing routing or reporting systems and vessel traffic services; and any areas where marine environmental protection considerations apply.

12.01.10.02.02 Passage Plan – Planning

Based on the fullest possible appraisal, a detailed passage plan should be prepared which should cover the entire passage from berth to berth, including those areas where the services of a pilot will be used.

Time permitting; the plan should be completed at least 24 hours prior to departure. A Passage briefing is to be held prior to departure briefing the Watch keepers about the intended voyage and the planned passage and all relevant information passed. The Passage plan to be read understood and signed by all watch keepers after it has been approved by the master.

The detailed Passage Plan shall include the following factors: -

- The plot of the intended route or track of the passage on appropriate scale charts.
- The true direction of the planned route or track should be indicated, as well as all areas of danger, existing ships' routing and reporting systems, vessel traffic services, and any areas where marine environmental protection considerations apply.
- The main elements to ensure safety of life at sea, safety and efficiency of navigation, and protection of the marine environment during the intended passage; such elements should include, but not be limited to safe speed, having regard to the proximity of navigational hazards along the intended route or track, the manoeuvring characteristics of the vessel and its draught in relation to the available water depth.
- Necessary speed alterations en route, e.g., where there may be limitations because of night passage, tidal restrictions, or allowance for the increase of draught due to squat and heel effect when turning.
- Minimum clearance required under the keel in critical areas with restricted water depth, and restrictions caused by bridges and overhead cables (Ref Section HSQEEn 12.01.14.00 for Company guidelines for

Under Keel Clearance (UKC) and Clearance from Bridge and Overhead Cables).
- Positions where a change in machinery status is required.
- Course alteration points, taking into account the vessel's turning circle at the planned speed and any expected effect of tidal streams and currents.
- The method and frequency of position fixing, including primary and secondary options, and the indication of areas where accuracy of position fixing is critical and where maximum reliability must be obtained.
- Use of ships' routeing and reporting systems and vessel traffic services.
- Considerations relating to the protection of the marine environment.

Contingency plans for alternative action to place the vessel in deep water or proceed to a port of refuge or safe anchorage in the event of any emergency necessitating abandonment of the plan, considering existing shore-based emergency response arrangements and equipment and the nature of the cargo and of the emergency itself.

The following should be included In the Passage plan and marked on the relevant charts: -

- No Go Areas
- Parallel Indexing
- NLT & NMT Bearings
- Wheel Over Positions
- Abort Points
- Contingency Anchorage

NO GO areas shall only be marked on the charts where it enhances safe navigation and should not obscure printed details. Marking of NO-GO areas should be reserved for dangers such as shallow water or a wreck close to the course line. NO GO areas will vary with change of draft and tide and vary with time of passage. A vessels transit through a designated and well-defined channel due to her limiting parameters, makes the channel itself a GO area and in such cases it may not be practical to mark NO GO areas for all shallow water around the designated channel even if the shallows are NO GO areas. Extensive use of NO-GO areas to the extent of interfering with other charted information is discouraged.

Particularly Sensitive Sea Areas (PSSA): Due consideration must be given when transiting ""Particularly Sensitive Sea Area"" (PSSA). A PSSA is defined as an area that needs special protection through action by IMO because of its significance for recognized ecological or social-economic or scientific reasons and which may be vulnerable to damage by international maritime activities. Where a ship is to transit a PSSA, then the Master must ensure that any special requirements are strictly followed.

The details of the passage plan should be clearly marked and recorded, as appropriate, on charts and in Passage Plan (HSQEEn 12.01.10.021) & Planning Sheet(s) (HSQEEn 12.01.10.022 or 12.01.34.022). Each passage plan, as well as the details of the plan, should be approved by the Master prior to the commencement of the passage.

Vessel reporting services e.g. AMVER, JASREP etc must be adhered to at the beginning of the voyage and requisite updates sent regularly.

Refer to:
12.01.10.021 – Passage Plan
12.01.10.023 - Contingency Plan
12.01.34.022. - Passage Plan Sheet- Paperless Navigation sheet A & B (Vessels using ECDIS as primary)

12.01.10.03.00 Passage Plan – Execution

Factors which should be taken into account when executing the plan or deciding on any departure from the plan includes: -

- The reliability and condition of the vessel's navigational equipment.
- Estimated times of arrival at critical points for tide heights and flow.
- Meteorological conditions, (particularly in areas known to be affected by frequent periods of low visibility) as well as weather routing information.
- Daytime versus night-time passing of danger points, and any effect this may have on position fixing accuracy.
- Traffic conditions, especially at navigational focal points.

It is important for the Master to consider whether any circumstance, such as the forecast of restricted visibility in an area where position fixing by visual means at a critical point is an essential feature of the passage plan, introduces an unacceptable hazard to the safe conduct of the passage and thus whether that section of the passage should be attempted under the conditions prevailing or likely to prevail.

The Master should also consider at which specific points of the passage there may be a need to utilize additional deck or engine room personnel.

12.01.10.04.00 Passage Plan – Monitoring

The plan should be always available on the bridge to allow the officer in-charge of the navigational watch immediate access and reference to the details of the plan.

When navigating in a narrow channel or fairway, vessel's position shall be monitored constantly. If the vessel inadvertently strays into shallow water, immediately corrective action shall be taken to bring the vessel on track and Master shall be informed immediately.

The progress of the vessel in accordance with the voyage and passage plan should be closely and continuously monitored. Any changes made to the plan should be clearly marked and recorded.

12.01.11.00.01 PORT ENTRY AND DEPARTURE PROCEDURES

The Purpose of this section is to outline the policy for ship staff while approaching/departing and navigating with a pilot on board. For vessels using ECDIS as primary means, shall use these procedures in conjunction with the Paperless Navigation Procedures.

Periodic checks on equipment should be carried out as per the procedures and corresponding checklists stated below for testing the navigational equipment, main propulsion, steering gear and thrusters prior to use and prior to critical phases of a passage or operation.

Steering gear checks and tests shall be carried out at each occasion as deemed necessary unless the vessel has a waiver from the flag administration. In such an event the tests shall be carried out accounting for the waiver received. A copy of the waiver shall be readily available on bridge.

12.01.11.01.00 Port Information and ETA

Prior to arrival into port, the Master and officers in charge of the navigational watch shall fully familiarise themselves with all available port information. ETA shall be sent to pilot station and/or port authority at the appropriate time, including all relevant and required information.

12.01.11.02.01 Preparation for Port Entry

Prior to arrival into port, function tests of bridge equipment shall be performed in accordance with Pre-arrival checklist (HSQEEn 12.01.34.081) and logged.

Refer to:
12.01.34.081.- Pre-Arrival Checklist

12.01.11.03.00 Pre-Arrival Check and Information

Prior to arrival in any port, whether to load or to discharge cargo, a pre-arrival check of the vessel is performed, to ensure that the vessel is in all respects ready to execute the intended operation safely and efficiently, with due consideration to the aspects of avoiding oil pollution.

The checklist shall upon completion be signed by the officer who performed the check, and counter- signed by the Master. Further measures to avoid oil pollution are incorporated in the Vessel's safe work procedures. Engine Room must be in Standby Conditions with Key personnel present.

12.01.11.04.02 Pilot Boarding

Instructions issued by pilot-boats or pilots on board for special arrangements shall be adhered to. Pilot Boarding Checklist (HSQEEn 12.01.11.041) to be completed prior the Pilot (or similar role*) Boarding.

The pilot ladder shall comply with the requirements of regulations in force, i.e. SOLAS 74/78 with Amendments Article 17, Chapter V and the standards NS 6247 and ISO 799.

The ladder shall be securely rigged and secured with correct length. Sufficient light shall be provided and a life buoy with line and light must be ready for immediate use. Reference is made to the poster "Required Boarding Arrangements for Pilots".

In general, the following applies: -

- The transfer of pilots shall be attended by an officer with radio contact to the bridge and a Rating on standby.
- Manoeuvring of the Vessel to be co-ordinated with the pilot.
- If the transfer of pilot(s) is executed by helicopter, refer to OCIMF publication Helicopter/Ship Operation chapter 8.
- Working aloft / overside procedures.
-

*Similar role: Mooring Master, Lightering Master, Marine Advisor, Deep Sea Pilot, etc.

Refer to:
12.01.11.041 - Pilot Boarding Checklist
12.01.11.042 – Helicopter Operation Checklist
12.06.07.001 – Permit to Work Aloft/Over Side

12.01.11.05.01 Navigation with Pilot on Board

On Arrival to the Bridge the Pilot (or similar role) should be presented with an Updated Pilot Card (HSQEEn 12.01.11.051) and Master/Pilot Information exchange Checklist (HSQEEn 12.01.11.052) is to be completed.

The Pilot and the Master should exchange information regarding the Pilot's intentions, the ship's characteristics and operational factors as soon as practicable after the Pilot has boarded the ship. Items discussed shall be recorded in the Master/Pilot Information exchange Checklist The exchange should be audible enough for the entire bridge team and should cover.;

- The pilotage plan and the circumstances when deviation from the plan may be required.
- Any amendments to the plan should be agreed, and any changes in individual Bridge Team responsibilities made, before pilotage commences.

- Ship's dimensions and manoeuvring information should be provided in the form of the Wheelhouse Poster. A manoeuvring booklet containing more detailed information should also be available on the bridge.
- ECDIS unit along with relevant alarm settings, Information on berthing arrangements including the use, characteristics and number of tugs, mooring boats, mooring arrangements and other external facilities.
- All defects that might affect the manoeuvrability of the vessel or the pilotage should be reported to the Pilot.
- To ensure the pilot (or similar role) is integrated into the bridge team and that specific information is documented and discussed prior to any transfer of conn or responsibility takes place. The information should include but not be limited to:
- The vessel particulars and manoeuvring characteristics.
- The planned passage.
- The review of the ECDIS and the status of safety depth alarms and layers in use.
- The use of any navigational aids provided by the pilot.
- Mooring and/or anchoring requirements.
- Towage and/or tug assistance.
- Under keel clearance.
- Relevant defects and/or constraints.
- Pilot to be made familiar with the use of power reserve by un-limiting the shaft / engine power limitation. It is important that the Ship's Master, OOW and Pilot are not restricted from exercising judgement to override the SHaPoLi / EPL when required for safety purposes.
- The Master/Pilot exchange should be documented, discussed and agreed before any transfer of conn or responsibility takes place. The Master/Pilot exchange should be repeated whenever there is a change of pilot.
- The vessel should utilise appropriate checklists which have been adapted to the specific needs of the company and vessel type, and which were aligned with international guidance and best practices covered in (ICS Bridge Procedures Guide)
- The vessel should record the time of completion of the Master/Pilot information exchange, and where different, the time of the transfer of the conn between the Master and Pilot.
- The time of the transfer of the conn between Pilots and, as applicable, between the Pilot and Master on an outbound passage should also be recorded.

Master shall ensure:

A passage plan is prepared as per Passage Planning Procedure.

- The passage plan is discussed in detail with the pilot and that it is updated according to his advice and information where deemed appropriate.
- Making the pilot a part of the Bridge Team (BT).
- Conducting a pre berthing / unberthing meeting with all relevant officers and petty officers explaining the operations.
- That the primary duty of the Bridge Team "the safe navigation of the vessel" is not hampered by any other task. Assign additional personnel to complete required tasks.

- Efficient sea watches are maintained and that watch keeping arrangements are adequate as per Bridge Resource Management (BRM).
- Monitoring performance of the Bridge Team (BT).
- Closely monitoring the execution of the passage plan

All items discussed during the master -Pilot exchange are recorded in the appropriate Master/Pilot Information exchange Checklist along with necessary attachments.

If in doubt as to the ability or actions of the pilot be prepared to take the con and any action deemed necessary to ensure the safety of the crew and vessel.

Officer of the Watch (OOW) shall:

- Navigating diligently, plotting the vessel's positions at regular intervals and monitoring the execution of the passage plan.
- Monitoring the situation with regard to collision avoidance.
- Never neglecting the primary duty of being a responsible member of the Bridge Team. Report to the Master if any additional tasks are assigned that restricts the ability to perform this primary duty.
- Visually identifying navigational marks, buoys, approaches to "Wheel Over" positions / "Points of no Return" positions / and "No Go" areas and advising the Master and /or the pilot.
- Repeating helm orders given by the pilot or Master and ensuring that the helmsman follows such orders exactly.
- Explaining to the lookout the targets to look out for as outlined in the passage plan.
- Making appropriate log book entries to keep detailed records of the execution of the passage plan.

Helmsman shall:

- Repeat helm orders given by the pilot, Master, and watch keeping officer and promptly executing the orders correctly.
- Comparing magnetic and gyro compasses regularly and advising the watch keeping officer if any undue deviations are noticed.
- Notifying the watch keeping officer, Master and pilot if experiencing any sluggishness in the helm response and/or difficulty in steering. Reporting ship's head at 10-degrees intervals when helm order for a large alteration of course is received.

Lookout shall:

- Keep an efficient lookout and reporting all targets in a proper manner.
- Report any other unusual circumstances/targets that may affect the ship's passage, such as oil slick in water, discoloured water, floating objects, fishing nets, etc.

General:

The pilot is there only to advice. Full responsibility of ship safety and passage through pilotage waters remains with the Master and the officer of the watch. Master shall be present on the bridge while in pilotage waters. However, the Chief Officer may relieve the Master in case of an unusually extended period of pilotage. Ensure that forms are prepared, revised as necessary, and followed as appropriate:-

- Passage Plan Form
- Passage Plan Waypoint Summary Form (Including Sheet B for Vessel's with ECDIS)
- Under keel Clearance Calculation Form

Ensure that all bridge equipment is in good operational order and prepare a Pilot Information Card. Read and understand Pilot Transfer/Operation Procedure.

The Master shall discuss the passage plans and flag operations with the pilot in advance and amend manoeuvres as necessary:-

- Turning around in the waterway or basins,
- Berthing /unberthing,
- Tug assistance / escort,
- Transfer of pilots and / or berthing masters,
- Anchoring at specific locations
- Expected UKC for the transit accounting for the transit speeds

The Pilot may be allowed to use Radar/ECDIS only after having sought permission from Master or OOW. Master & OOW must always operate bridge equipment to provide necessary information to the Pilot.
Master should conduct a pre-operations meeting with the Officers proceeding on anchoring/mooring-unmooring operations, explaining all the details.

The OOW shall plot positions intervals of between 5-15 minutes while in pilotage waters depending on critical areas such as underwater obstructions, large alterations, shoals, missing navigational marks, heavy passing showers, underwater pipe lines / cables, bridges, anchorages, etc. PVI intervals in line with the Paperless Navigation Procedures shall be applied while ECDIS is used.

It is the Master's responsibility to monitor the ship's progress closely to safeguard ship's passage. He should be particularly vigilant while approaching "Wheel Over" positions and while passing parallel indexing lines marked on the chart as part of detailed passage planning. If any deviations are noticed, he must draw the pilot's attention immediately. The Master must be ready in all respects to take over the con from the pilot if need be.

The OOW shall monitor the UKC using the Echo Sounder, when within port limits or at any other times deemed necessary. This should be done on a continuous basis.

The OOW closely monitors the ship's progress according to the passage plan and the pilot's advice. If the ship's position and / or intended track is doubtful, or if any deviation is noticed, urgently advise the Master and the pilot. Collect local information about shoaling, currents, missing navigation marks, power of tugs, etc. for future reference.

The OOW shall ensure the deck logbook entries are made including time, distance off, position, and vessel speed when abeam of navigational lights, aids, and prominent points along the track.

The Bridge Team should not be distracted by non-essential personnel (while in pilotage waters). If OOW on watch finds Pilot using his mobile phone excessively whilst on duty, Master shall be informed and remark noted in the bridge movement book.

Note the state of moorings of ships that are tied alongside the berths along the waterway. If the speed of the vessel is considered excessive, advise the pilot and seek to reduce speed.

Monitor the situation with regards to collision avoidance and keep other members of the bridge team advised.

Refer to:
12.01.11.051 - Pilot Card
12.01.11.052 - Master/Pilot Information exchange Checklist

12.01.11.06.01 Use of Tugs

Note that sometimes powerful modern tugs can exert bollard pulls in excess of the SWL of tow line securing arrangements on deck. If an escorting tug applies a towing force at an angle to the ship's heading, the water flow against the hull and the tug's own displacement will generate hydrodynamic forces. When combined with the propulsion forces, these may give a resultant (steering) force far in excess of the static bollard pull of the tug.

Discuss with pilot:

- SWL of the ship's hard points (bollards) and chocks (fairleads) and the maximum bollard pull a tug might exert at escort speeds; This may require restrictions on the forces applied by the tugs;
- SWL of the tug's tow line;
- Maximum planned speed for the transit and the maximum speed of the escort harbour tug.
- Consider reducing own vessel's speed during the transit if the ship's securing arrangement is inadequate to handle tug's bollard pull. Refer to OCIMF publication Recommendations for Ship's Fittings for Use with Tugs.

12.01.11.07.01 Preparation for Departure

When the Master has decided the departure time, he shall notify:-

- Pilot, tugs and linesmen as required directly or through his agent.
- The Chief Engineer is to order the engine room manned and prepare the engines for departure.
- The Duty Officer is to order stand by fore and aft and arrange for manning of the bridge.

The Master or the Duty Officer shall execute function tests of equipment on the bridge following the Departure checklist – HSQEEn 12.01.11.071 or 12.01.34.082 and log it.

Prior to departure from ports, a thorough stowaway search of the ship shall be made using SSP Appendix 08.00 B, and logged.

Sea Worthiness:

Prior to departure, the Vessel shall be in all respects seaworthy and fit for the passage. The Chief Engineer and Chief Officer shall prior to departure verify and report to the Master that their respective departments are ready for sea.
The Pre Departure water tight/ integrity to be checked prior to departure and logged down in the deck log book.

When the Vessel is ready to get under way, in all respects seaworthy and fit for sea, the gangway taken, officers and ratings standing by fore and aft, the engine room manned and ready, the bridge manned and function tests performed.
The Master shall prior to ordering the lines taken and during manoeuvring from the berth ensure that the following items are complied with:-

- Both anchors shall be ready for immediate use.
- Prior to starting the engine or turning the propeller, the officer in charge aft must check that the propeller is clear.
- High tension must be avoided in ropes and wire.
- If tugs are used with lines connected to the Vessel, personnel must be kept at stand by for immediate release as necessary.
- Engine Room must be in Standby Conditions with Key personnel present.

During passage from the pier to the sea buoy, the Vessel's speed must be adjusted as required by local regulations allowing for other conditions affecting safe navigation.

The Vessel's course must be checked against an updated chart of adequate scale. Very frequent Position fixes and / or as per standing instructions, preferably simultaneous optical bearings from at least two fixed points shall be plotted on the chart, to verify/ ascertain vessels position observations obtained by other means.

A sharp lookout must be kept and the engine room shall be manned and put on standby for immediate manoeuvring as required. Checklist (HSQEEn 12.01.12.041 - Navigation under Difficult Conditions should be complied with.

On arrival at the sea buoy, the anchors shall be secured. Ropes and pilot ladder etc. shall be stowed and/or secured, and sea watches are set.

Refer to:
12.01.34.082.- Pre-Departure Checklist (Vessels using ECDIS as primary)

12.01.11.08.00 Go/ No Go Situation

Based on an assessment of the risks (prevailing circumstances and conditions relating to vessel situation, equipment condition and weather), the Master must take a decision on whether, for port departure or entrance, the vessel is in a 'go' or 'no go' situation. The office is to be advised in the event of a 'no go' situation.

Following are the some examples:-

Go Situations:-

Authorisation received from Port Authority
Pre Arrival & Pre Departure checks completed satisfactory
Weather Conditions acceptable
All Equipment operational

No Go Situations:-

No Authorisation
Critical Equipment or Machinery not working
Vessel Un-Seaworthy
Adverse weather conditions where the safety of crew, vessel or cargo would be at risk

12.01.12.00.06 NAVIGATION AT SEA

The Purpose of this section is to outline the policy for ship staff while navigating at Sea.

Navigational Safety:

Navigators must constantly bear in mind that the safety of the crew, the cargo, the safety of other vessels and the environment may be jeopardised by faulty or lack of action.

Danger may arise suddenly and unexpectedly from any quarter at any time. Officers are warned against a false sense of security at any time, and especially during pilotage, in coastal waters, poor visibility or at night.

Master and officers on duty must be fully conversant with the manoeuvring characteristics of the Vessel, including turning circles and stopping distances, and shall take all necessary actions to prevent any potential hazards to the Vessel, its crew or cargo.

12.01.12.01.00 Composition of Bridge Watches

Bridge watch arrangements and routines shall be arranged and practised in compliance with the STCW Convention.

(a) The Master's Responsibilities:

The Master is overall responsible for the navigation. He delegates navigational responsibilities and issues the necessary instructions to the Duty Officers.
The Master shall monitor the navigation, and by personal participation at appropriate intervals verify that his instructions are adhered to.

(b) The Duty Officer's Responsibilities:

The Duty Officer is the Master's representative, responsible for safe navigation until relieved. He shall execute his duties in compliance with regulations, such as the International Regulations for Preventing Collisions at Sea, (with amendments) and the STCW Convention with amendments.

The Duty Officer shall keep his watch on the bridge, which he in no circumstances shall leave until properly relieved. He continues to be responsible for the safe navigation of the ship despite the presence of the Master on the bridge, until the Master informs him specifically that he has assumed command.

(c) The Lookout

The Duty Officer is responsible for the maintenance of an efficient and continuous look out in compliance with STCW Convention. During the hours of darkness or when visibility is reduced or for other reasons such as dense traffic, he shall station the rating of his watch as additional lookout.

The lookout, as an important function to ensure safe navigation, shall be executed as follows:

- An alert all-round visual and aural lookout to ensure a full view of the current situation including the presence of vessels and landmarks in the vicinity.
- Close observation of the movements and compass bearings of approaching vessels.
- Identification of vessels and shore lights.
- Observation of changes in the weather, especially the visibility.

12.01.12.02.02 Changing Over Watch

The relieving Duty Officer shall arrive well in advance prior his watch and ensure that members of his watch are fully capable of performing their duties and at night, in particular that their eyes are adjusted to night vision. He shall not take over the watch until his vision is fully adjusted to the light conditions, and until he has personally satisfied himself regarding:

- Standing orders and other special instructions relating to the navigation of the Vessel.
- The position, course, speed and draught of the Vessel.
- Visibility
- Predicted tides and currents, weather-conditions, visibility and the effect of these factors upon course and speed.
- The navigational situation including:
- The operational condition of all navigational and safety equipment.
- Errors of gyro and magnetic compasses.
- Conditions and hazards likely to be encountered during the watch.
- The possible effects of heel, trim, squat and under keel clearance.
- Complete checklist HSQEEn 12.01.12.021 – Changing over the watch at Sea
- Complete checklist HSQEEn 12.01.35.041 – Changing over the watch (at Sea & Anchor) checklist for vessel's using ECDIS

If at the time of the relief a manoeuvre or other action to avoid any hazard is taking place, the relief should be deferred until such action is completed.

The Duty Officer shall not hand over to the relieving officer if he has any reasons to believe that the latter is under any disability, which would preclude him from carrying out his duties effectively. If in doubt, he shall inform the Master.

Refer to:
12.01.12.021 – Changing over the watch at Sea
and
12.01.35.041 - Changing Over the Watch (At Sea & Anchor) Checklist

A. The officer of the watch is to notify the Master immediately in the following circumstances:

- If restricted visibility is encountered or expected.
- If the traffic conditions or the movements of other ships are causing concern or min CPA/TCPA requirements not achieved.
- If difficulty is experienced in maintaining course.
- If required to exit the safety corridor (XTD) on the ECDIS.
- On failure to sight land, a navigation mark or to obtain soundings by the expected time.
- If, unexpectedly, land or a navigation mark is sighted or change in sounding occurs.
- On the failure of the main engine, generating plant, steering gear or any essential navigational equipment.
- In heavy weather if in any doubt about the possibility of weather damage.
- If the ship meets any hazard to navigation, such as ice or derelicts.
- If oil is seen around the vessel from whatever source.
- In the case of the O.O.W. feeling fatigued or unwell and unable to continue a safe and efficient watch.
- Any other circumstances as dictated by the Master's Standing orders.
- In any other emergency or situation in which he is in any doubt.

O.O.W. IS AUTHORISED AND MUST USE GENERAL ALARM TO ALERT THE MASTER, IF HIS IMMEDIATE PRESENCE IS REQUIRED IN WHEEL HOUSE.

Despite the requirement to notify the Master immediately in the foregoing circumstances, the O.O.W. in addition must not hesitate to take immediate action for the safety of the ship, where circumstances so require.

Until the Master has assumed direct command, the Duty Officer shall not hesitate to take such actions as the circumstances may require, reporting same to the Master, when present.

B. REVIEW OF STANDING ORDERS FOR CALLING MASTER

The standing orders generally included a wording such as "do not hesitate to call Master in case of doubt …"). This has been considered to be subject to interpretation by the Watch Officer. This has been replaced by clear and precise data (times and distances) to ensure that Master will be called in time.

The "Risk of Collision Matrix" has been issued as per the "Managing Collision Avoidance at Sea" (Nautical Institute).

The aim is to:

- Help the Watch Officer to identify when a close situation arises (reduced CPA combined with a short TCPA) and evaluate the level of risk.
- Call the Master in time before entering the limit zone.

This matrix must be posted in wheelhouse.

TCPA 16kts / CPA	10 min	7 Min Limit Zone	5 min Risk Zone	4 min High Risk Zone	3 min Danger Zone	1 min Fatal Zone
≥1 NM						
0.5<CPA<1	CALL MASTER					
< 0.5 NM	CALL MASTER					

(Note: The information is based on vessel of length 340 M, speed – 16 Kts)

Limit Zone: Time to travel 10 ship lengths

Risk Zone: Time to travel 7.5 ship lengths
Own vessel can clear targets with 10° of helm

High Risk Zone: Time to travel 6 ship lengths
With hard over rudder it will only be possible to clear the target by 2 ship lengths

Danger Zone: Time to travel 4 ship lengths
Even with hard over rudder, own ship will only just be clearing the course line

Fatal Zone: Time to travel 2 ship lengths
It is not possible to deviate from the course line

Use of matrix in line with above table:

- In open sea: acceptable CPA ≥ 1 NM.
- In restricted areas, such as Persian Gulf or Malacca Strait, the Master can reduce the acceptable CPA to 0.5 NM.

The Watch Officer must call the Master before entering the matrix red zone and in any case not less than 10 mins TCPA. Depending on the size of the vessel and manoeuvring characteristics, , Master may use his own discretion and increase the CPA and TCPA.

If it is evident to the watch keeping ratings on duty that Officer of Watch (OOW) has not alerted / called the Master when a close-quarters situation is developing and/or risk of collision exists, he too shall make every effort to contact the Master. Master's standing orders shall be amended accordingly to incorporate above.

12.01.12.04.01 Navigation under Difficult Conditions

The purpose of this section is to provide direction when navigation under difficult conditions such as:

- Heavy Traffic and restricted waters
- Restricted Visibility
- Heavy weather

Refer to:
12.01.12.041 - Navigation under Difficult Conditions Checklist

12.01.12.05.02 Heavy Traffic and Restricted Waters

Examples of Hazardous Navigational transit areas are:

- Port approaches and pilotage waters.
- Straits/channels such as Gibraltar Strait, Hormuz Strait, Malacca Strait, Singapore Strait, Sunda Strait, Lombok Strait, Uraga Suido, Kii Suido, English Channel, Skaggen, etc.
- Routes where heavy cross traffic is encountered.
- Areas with fishing fleets.
- Areas with heavy concentration of oil rigs, drilling platforms (such as in Gulf of Mexico), etc.
- Navigation in close proximity to Navigational hazards.

The above examples are only for guidance. Masters are requested to refer to the various navigational publications available on board to determine other hazardous Navigational transit areas.

Master and OOW shall:

- Realize the importance of inclusion of cross traffic-areas or heavy traffic areas in the passage plan. Give special attention to marking the available sea room if evasive action is to be taken.
- Continually revise passage plan when in receipt of navigational warnings, weather reports, reports or incidents of poor visibility, fishing fleets, etc.
- Notify engineers well in advance about time the engine room to be manned and engines to be put on standby.
- As deemed necessary, change over to Hand Steering. Switch on Both Steering Motors. Post-additional lookouts. Consider adopting a dual navigational watch system. Refer to Bridge Resource Management (BRM). Make appropriate logbook/Bridge Note Book entries.
- Ensure that all watch keeping officers are aware of ship's manoeuvring characteristic, in particular, turning circles.
- Be aware of the tidal conditions, wind direction, state of visibility, sea room, draft / UKC and clearing differences, while making evasive action decisions in heavy traffic areas.
- As deemed necessary, ensure that both anchors are cleared and are ready for use in an emergency. Make a suitable log entry.

- Follow local and international regulations regarding display of signals, reporting areas and systems such as vessel traffic systems (VTS), coast guard stations, etc., traffic separation schemes, and collision avoidance regulations.
- If using radar/ARPA for collision avoidance, ensure that speed is set to "log" or "speed in water".
- If encountering a large concentration of fishing vessels, avoid entering the area. If sufficient sea room is available, consider making a large alteration and going around the entire fishing fleet.
- Plot positions at frequent intervals (i.e. 10-minute or at 5-minute intervals if need be). Remain cognisant of the extent of sea room available while contemplating an evasive action. Where ever possible Parallel Indexing shall be used for continuous monitoring of vessel's position.
- It is advisable to identify buoy and navigational mark, including, lighthouse, mountain peak, landmark that are useful for navigation. Such identifications are critical in the event that electronic aids on the vessel fail to function.
- In pilotage waters, the regular assessment of the vessel's position regarding oncoming traffic must be appreciated. Advice the pilot if any vessels are deemed to be on a dangerous approach.
- Adjust speed if necessary to avoid a potentially difficult/dangerous traffic situation from developing.
- Do not hesitate to make use of daylight signal lamp or ship's whistle to attract the attention of traffic in heavy traffic areas. If in close proximity, sound the appropriate whistle signals to indicate whether the vessel is turning to port or starboard.
- Use of VHF is to be made in a professional and responsible manner. Use of standard marine vocabulary is recommended while using VHF communication.
- Use the Echo Sounder as deemed necessary.
- Be aware of the vessel's UKC. Calculate the same, keeping in mind the vessel's squat.

12.01.12.06.01 Restricted Visibility

Master shall:

- Ensure safe navigation by using all available resources, observing good seamanship, and adhering to regulations.
- Ensure watch keeping officers are given guidance in all navigating and watch keeping practices.
- Ensure watch keeping officers regularly practice manual radar plotting. Such practice should be carried out in fair weather and in good visibility to build confidence.
- Where required, adopting a dual navigational watch system and posting double lookouts.
- Always being present or readily available on the Bridge and giving undivided attention to the navigational safety and collision avoidance while in restricted visibility.

- Refer to Navigation Under Difficult Conditions Checklist – HSQEEn 12.01.12.041.

When restricted visibility is encountered or suspected, the OOW shall without delay:

- Advise the Master if the visibility falls below a 5-mile range.
- Ensuring that efficient lookout is maintained and all local and international regulations are adhered to.
- Notifying the Master well in advance when approaching areas of restricted visibility. State of visibility should be monitored frequently using radar distances against visual targets. Following terminology shall be used to describe the visibility at sea.
  - Very Poor : Visibility less than 1000 meters
  - Poor : Visibility between 1000 meters and 2 Nautical Miles
  - Moderate : Visibility between 2 & 5 Nautical Miles
  - Good : Visibility more than 5 Nautical Miles
- Ensure that instructions given during restricted visibility are understood and followed.
- Understand the importance of radar plotting while in restricted visibility. Ensure that ample radar plotting sheets are available for use and for practice. Manual radar plotting is to be practiced in good visibility to gain speed, accuracy and confidence in ascertaining / analyzing situations.
- Notify the duty engineer and as deemed necessary, man the engine control room. Engines should be available for immediate manoeuvring.
- Change over to hand steering. Switch on both steering motors. Post additional lookouts. Consider adopting a dual navigational watch system. Make appropriate logbook entries.
- Commence radar plotting.
- Follow local and international regulations regarding sounding of signals.
- Reduce speed if necessary.
- Plot positions at regular intervals. Be aware of the available manoeuvring room to the vessel if collision avoidance action is necessary.
- If in shallow waters, run echo sounder continuously.
- If transiting anchoring depths, ensure that both anchors are cleared and are ready for use in an emergency, if deemed necessary.
- If transiting rivers or narrow channels where navigation marks or land echoes are not giving clear indications of the ship's positions, consider finding a safe anchorage until visibility improves.
- In pilotage waters, independent assessment of dangerous targets must continue. Advice the Pilot / Master's when necessary.
- Use appropriate sound signals

The above actions shall, time permitting, be executed before the visibility deteriorates.

12.01.12.07.06 Heavy Weather at Sea

A heavy weather condition means weather where prevailing wind force is Beaufort Scale 7 and/or wave height is 13–19 ft (4–5.5 m) and above.

Precautions to be taken before approaching/during heavy weather:

- Inform master, engine room, galley and the crew of approaching weather conditions.
- Consider changing over to Hand steering.
- Raise bridge watch level when deemed necessary.
- Warn crew to avoid exposed deck areas made dangerous by the weather. Needless to say that in heavy weather there would be no crew working on the exposed deck. Should it be required for crew to be on deck to check on status of spaces as well as securing on equipment, Master should turn around on a course which puts the seas and weather in a position that the crew on exposed deck have maximum protection from the sea as well as weather. Any access to exposed deck by the crew must only be undertaken for the shortest possible time, after a thorough risk assessment, toolbox meeting is carried out and explicit permission from the Master.
- Secure all movable objects on deck, accommodation and below deck. Pay particular attention to securing of derricks and cranes.
- Re-check and secure cargo lashings including deck cargo/containers (where applicable).
- Close all WT doors, portholes and deadlights including duct keel opening in engine room, if any.
- Trim all ventilators (where applicable).
- Check that all hatches are securely battened down.
- Secure air pipes, booby hatch covers, ventilator flaps and openings in closed position.
- Check that vessel has adequate GM. Avoid slack tanks.
- Obtain weather reports and check/record barometer readings at regular intervals.
- Transmit weather reports to the appropriate authorities, especially in circumstances required by SOLAS 1974 Chapter V, Reg. 5.
- Inform Company regarding vessel's position and details of weather being experienced, every six hours.
- Adjust speed and course as necessary.
- Rig safety lines, hand ropes where necessary.
- Verify all bilge pumping arrangements, so that in case of accidental flooding of holds, stores, peak tanks, cofferdams, chain lockers, etc. same can be pumped out without difficulty.
- In OBOs and tankers slack cargo tanks shall be avoided in order to avoid damage due to "Sloshing".
- Attention shall be paid to local sources of reliable weather information in order that the best strategy for avoidance of extreme situations can be formulated on board. (e.g. weather information from local authorities in Japan)
- Consider all weather information provided in British Admiralty publication NP 100, Mariner's Handbook. This source can prove to be invaluable in heavy weather conditions.

- During rough weather in very cold climates, seawater may freeze onto a cold superstructure. The addition of the weight of ice on superstructures and deck will adversely affect the stability of the vessel and is likely to cause damage to equipment and injury to the crew. There is danger of a list arises when spray is shipped on only one side of the vessel. Consideration shall be given to the use of de-icing compound/salt crystals to minimize the accretion of ice and facilitate its removal thereafter.
- Engine Room must be in Standby Conditions with Key personnel present.
- Maintain records and make appropriate entries in the log book.
- Vessel to send heavy weather report (existing weather conditions) if wind force is BF7 and higher to the Operations Dept. every 6 hours till weather abates below BF6.

a) Ship Handling in Heavy Weather:

On a modern "all aft" ship, it is virtually impossible to accurately judge the effect of the sea upon the ship by "feel" alone. Master's decisions on handling the ship in heavy weather shall be based on awareness of the forces acting upon the ship, a thorough knowledge of the ship's sea-keeping capabilities and careful observation of the prevailing circumstances. Judgements based purely on the "feel" of the ship shall be avoided.

In particular, careful consideration shall be given to the forces acting upon the ship and their effect on the ship. Although, these forces are complex, and many of them beyond the master's control, one major factor that can be influenced by his action is the kinetic energy of the ship.

In the event of encountering heavy weather, master shall give early consideration to making early and substantial reduction in power, and therefore speed, in order to reduce kinetic energy of their ship. This may be in conjunction with an alteration of course to further reduce the effect of the seas on the ship. Structural damage is most likely to occur when pitching in heavy seas and it is thus even more important to ensure that an early and substantial reduction of speed is made in order to successfully weather heavy seas on the bow.

Whether running before the sea or stemming the sea, masters shall pay particular attention to ensure that synchronous rolling or pitching does not occur as this may expose the ship's structure to an increased risk of damage by breaking seas. Temporary alterations of course and/or speed may be necessary to prevent this situation occurring.

Stability data is readily available on board and masters and chief officers shall be fully conversant with details of their ship's stability and any limitations, at each stage of the voyage.

Masters are advised to utilise the services of weather routeing organisations when it is considered that they could be beneficial. However, masters are reminded that the forecasts and recommendations of these sources are based on historical data and the anticipated movement of weather systems, and

whilst they may provide useful guidance they shall not be used as a substitute for careful observation of prevailing weather conditions.

The first signs of approaching heavy / extreme weather is rapidly falling barometer readings, threatening sky formations and other signs of abnormal meteorological conditions.

A ship navigating in heavy weather conditions is subject to severe hull shocks and stressed, especially when navigating in head seas.
Heavy weather conditions can result in:

- Shipping of seas resulting in heavy weather damage
- Excessive/ parametric rolling, pitching or yaw motion of the vessel. *Refer to Fig 1*
- Propeller racing
- Slamming – Bottom slamming / Bow flare slamming / Bow breaking wave impact. *Refer fig 2*
- Speed reduction and Torque rich effect on main engine (impact of head on sea/ swell can severely affect the speed and result in increase on main engine load). *Refer fig 3*
- Cargo damage (for example container vessels, bulk carriers).

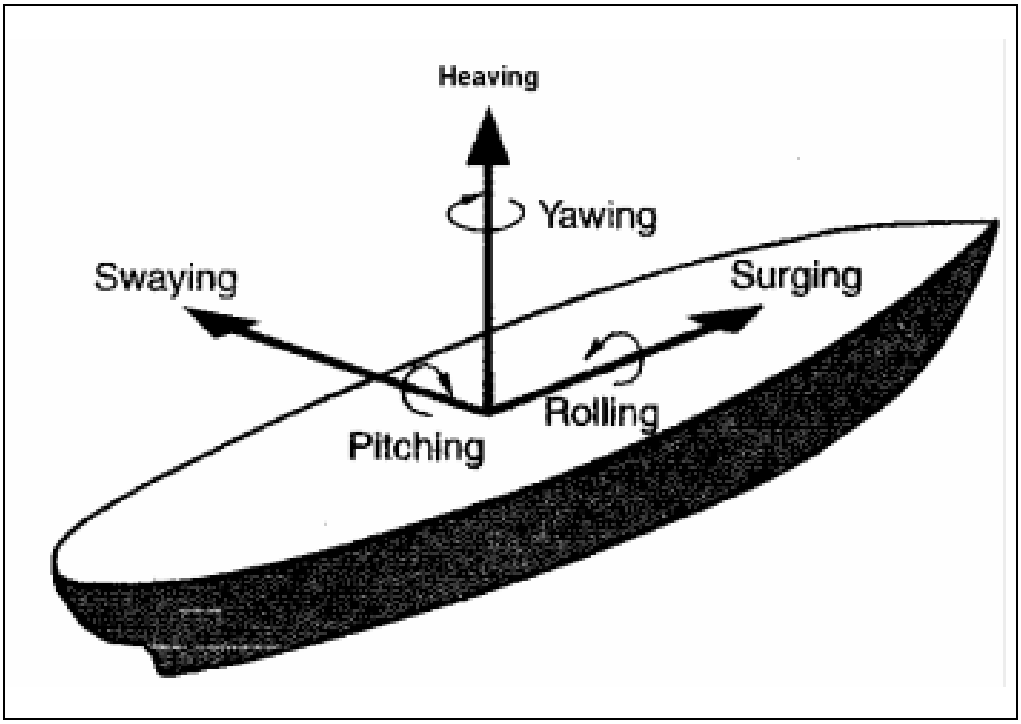

Fig 1: Ship Motion

Bottom Slamming *Bow Slamming* *Breaking Wave Impact*

Fig 2: Point of Impact for Slamming

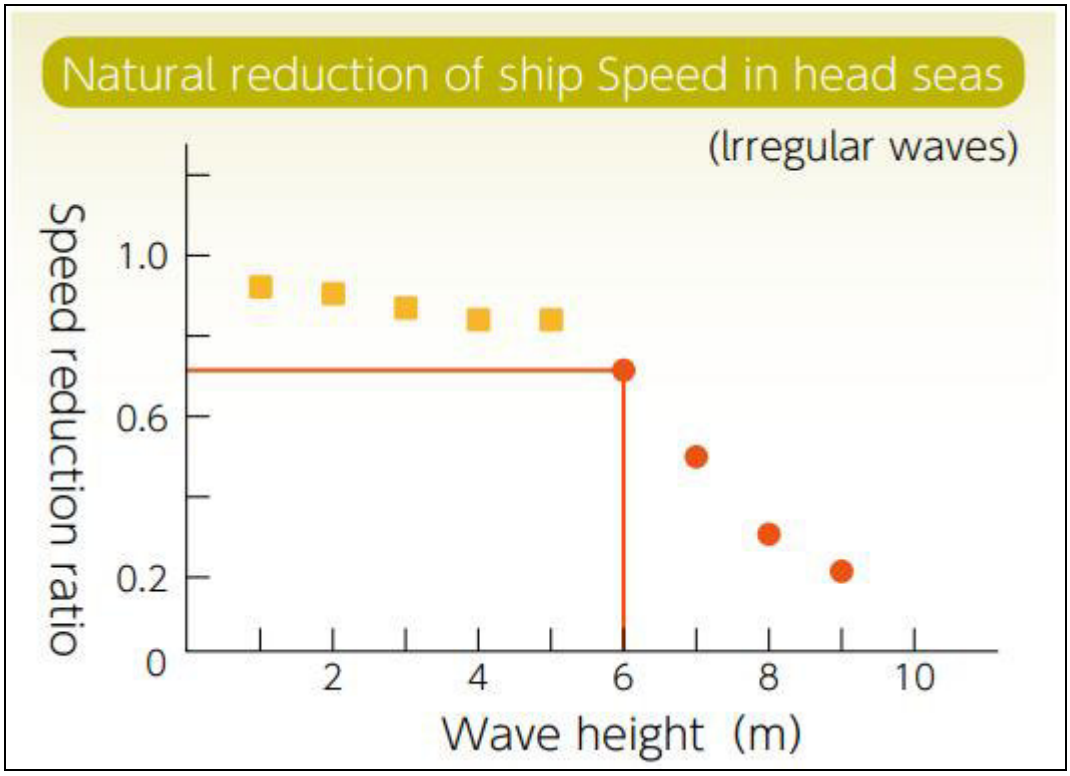

Fig 3: Speed reduction characteristics – Irregular Waves (For guidance only)

While planning precautions and / or avoiding actions, as a minimum the following shall be consider:

- Size of Vessel
- Type of Vessel
- Freeboard
- Effect of ships movement and sea / swell height on the UKC (when navigating in shallow waters)
- Speed of the vessel
- Windage area
- Equipment / cargo on deck
- Type of cargo being carried
- Present weather conditions / Weather forecast
- Advice from weather routing services, if available
- Traffic conditions
- Proximity of hazards, etc

Master as a minimum should consider/ comply with the following actions:

- Take advantage of weather forecast to reduce / increase speed and / or amend route to minimize the impact of heavy weather. Master may send request for weather routing services to office, if same not available.
- After onset of heavy weather, make temporary course alternations / amend planned route to minimize the effect of all external forces such as rolling, pitching, yawing, etc.
- Consider changing the steering to hand steering from auto pilot, especially if the vessel is yawing which will result in excessive hunting of

rudder. If in Master's judgement the auto pilot is capable of safely steering the vessel, check the auto pilot settings to minimize the rudder movement and maintain the heading within a reasonable safety limit.

- If stemming the sea, pay attention to ensure that synchronous rolling or pitching does not occur.
- Based on the vessel type, consider taking heavy weather ballast
- Carry out the 6 hourly weather reporting. The report should be sent to the respective Operations Department and CC to Technical Department and HSQE Department and the CEO. The report shall as a minimum have the following information:
    - Date & Time of Report (LT / UTC)
    - Posn at time of report
    - Heading / COG x SOG
    - Weather (True wind x Sea x Swell)
    - Relative wind x Relative wind speed
      (*Relative direction in deg 0 ~ 360, with 0Deg being right ahead / 90 Deg being stbd beam / 180 Deg being right astern / 270 Deg being port beam*)
    - Barometer – Present / Change in last 6 hours
    - Weather routing available (Yes / No)
    - Action being taken to avoid heavy weather (if any)
    - Present distance of Typhoon centre (if applicable)
    - Closest the Typhoon will pass – Distance / Date and time
    - Expected date when heavy weather will subside
    - Heavy weather damages expected

- Hurricane / Typhoon / Cyclones (*Refer Fig 4 and 5*): If the adverse weather is due to a hurricane / typhoon then Master should additionally consider:
    - Avoid the 34 knots wind field or keep more than 150 NM from the centre, whichever provides greater distance off centre
    - Avoid navigating in the danger semicircle
    - Northern Hemisphere: In case that the wind is veering, the vessel is likely to be in the dangerous semicircle. The vessel should proceed with maximum speed keeping the wind at 10° to 45°, on the starboard bow (depending on the speed). The vessel should turn to starboard as the wind veers. In case that the wind direction is steady or backs, such that the vessel is in the navigable semicircle, the wind must be brought well on the starboard quarter and vessel should proceed with maximum speed. Turn to port as the wind veers.
    - Southern Hemisphere: In case the wind is backing, the vessel is likely to be in the dangerous semicircle. The vessel should proceed with maximum speed keeping the wind 10° to 45°, on the port bow (depending on the speed). The ship should turn to port as the wind backs. In case the wind direction is steady or backs, such that the vessel is in the navigable semicircle, the wind should be brought well on the port quarter and the vessel should proceed with maximum speed. Turn to starboard as the wind backs.

The above is to be regarded as a general guidance. Master should use all available resources to decide on avoiding action.

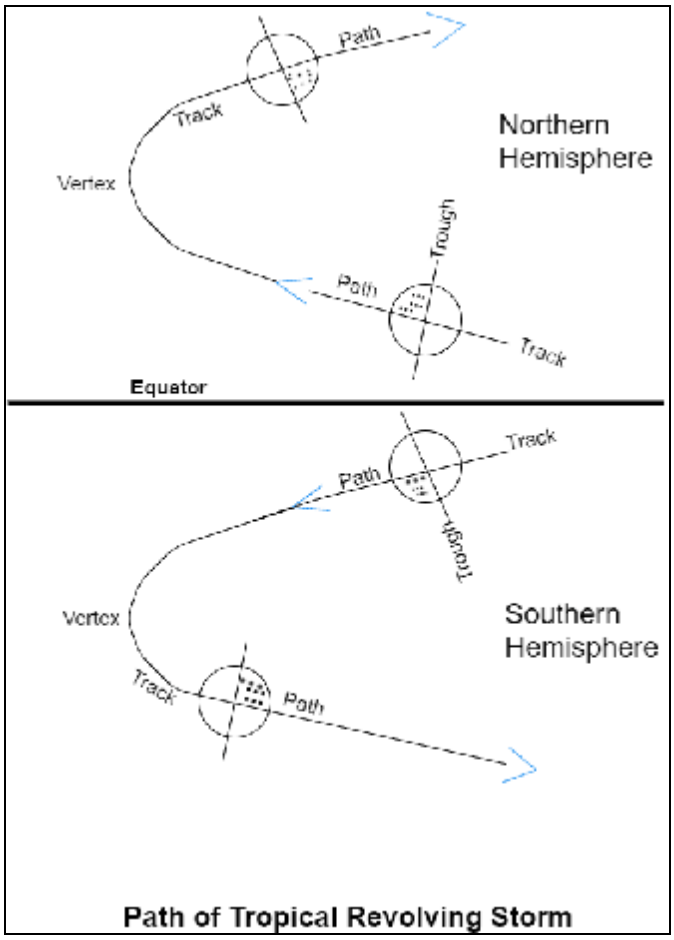

Figure 4: General Path of TRS (this is a general guidance)

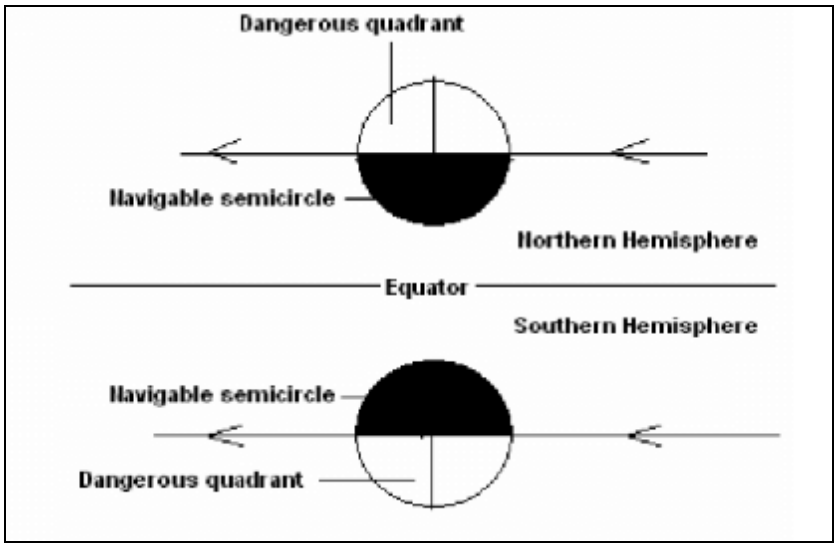

Figure 5: Dangerous Quadrant and Navigable Semicircle

Symbol		TD	TS	STS	T
Classification		Tropical Depression	Tropicl Storm	Severe Tropical Storm	Typhoon
Max Eind (m/sec)	(m/sec)	~ 17.1	17.2 ~ 24.4	24.5 ~ 32.8	32.7 ~
	Knots	~ 33	34 ~ 47	48 ~ 63	64 ~
Beaufort Scale (Wind Speed)		~ 7	8 ~ 9	10 ~ 11	12 ~
East Pacific Ocean and Caribbean Sea		Tropical Depression	Tropicl Storm	Severe Tropical Storm	Hurricane
Japan (Japan Meteorological Agency)		Extra-tropical Cyclone	Taifu * (Typhoon)		
Indian Ocean and South Pacific Ocean		Tropical Depression	Cyclone		

* *Generally Taifu is used in Japan*

Figure 4: Classification of Extra-Tropical Cyclones

It cannot be emphasised too strongly that masters shall never drive their ships too hard in heavy weather in order to meet an ETA.

Safety of the ship shall always take precedence over commercial considerations.

It is vitally important that masters give careful consideration to the handling of their ships in heavy weather conditions. Failure to act prudently can result in damage to the structure, which can endanger the ship, her personnel, cargo and the environment.

b) Manoeuvring In Heavy Weather:

It is of utmost importance to watch the pattern and character of the waves. Large long waves with rounded tops might not be as dangerous as the short high ones with collapsing crests. Trains of waves should be watched carefully as any cross patterns might lead to wrong decisions concerning timing of manoeuvres.

The object of any manoeuvre in heavy weather is to take on as little water on board the vessel as possible. Large amount of water on board causes damage if its energy is not dissipated before encountering resistance of the ship's structure. It also alters the stability of the vessel at a critical period.

c) Manoeuvring towards wind/ sea:

In general, the most favourable conditions can be found when manoeuvring with bare steerageway, with the wind and sea about 15-20 degrees on either bow.

Masters must consider the effect on sea conditions when winds are contrary to the current or swell patterns. Freak wave phenomena may be encountered in the Agulhas current and the Gulf Stream.

d) Manoeuvring with the weather:

When manoeuvring with the weather, adjust the speed so that the ship speed is appreciably different to that of the swell. This will reduce the rolling effect.
The speed should be adjusted to avoid shipping heavy seas over the poop. Pooping can cause serious damage to the accommodation and machinery space structures as their large flat surfaces offer great resistance to waves.

e) Turning:

If it becomes necessary to turn the vessel around on to a reciprocal course, carry out such a turn very carefully. First reduce the speed to the minimum where by one can still maintain steerage.

Ensure that the whole crew is well informed about this critical manoeuvre well in advance and that optimum engine response is absolutely assured.

Observe the wave pattern carefully in order to choose the correct moment to start the manoeuvre. Usually, waves seem to follow each other in groups of three with relatively calmer periods in between two groups. A vessel might pick up the speed during one of these calm periods and slam into the next wave group with too much momentum. Even if the vessel manages to escape the first wave, one or both of the next two may end up causing severe damage. Control of the ship's head with minimum headway, therefore, is of utmost importance. Consider choosing the beginning of the third wave to plan the turn.

The idea is to start the turn when the bow is just rising from a trough and climbing the wave. Use adequate engine power (Thrust required to turn) with wheel hard over, so that the vessel turns parallel to the wave before reaching its top. Once the vessel is almost parallel to the wave, use maximum power with the wheel still hard over, to effect the final part of the turn as quickly as possible. At all costs, avoid waves breaking over the ship while it is parallel to the wave.

f) Disabled in heavy weather:

If a large tanker is disabled in heavy weather, it can drift down wind at a speed in excess of 4 knots. This can have disastrous ramifications if the vessel is close to a lee shore.
A vessel with a stern trim of 5 meters and rudder amidships, if heading east with wind from the north, it can drift in a 150 degree direction. If however, the

tanker is heading west with wind from the north, it drifts in a 210 degree direction. By swinging the ship through 180 degrees before propulsion is lost, her drift direction can be changed by nearly 60 degrees.

Walking back an anchor to about 4 shackles of chain might swing her bows towards the wind and alter her sailing direction yet again. The anchor and chain act as a sea anchor in such situations. Streaming out entire lengths of floating fibre ropes over the bow with one end secured on deck, also serve to give control over the ship's head.

If no options available and the ship is running into lee shore, it is better to lower one anchor to say 9 shackles and secure it by cable stopper. Then stand by to use the second anchor as a backup.

g) Alerting:

If heavy weather conditions are experienced, which have not been forecasted, notify the MRCC.

h) Caution:

Master & Chief Officer or Chief Engineer & 2nd Engineer shall not go on deck together during heavy weather conditions.

12.01.12.08.01 Ice Conditions

When navigating in or near an area of Ice:

- Ensure safe navigation by using all available resources, observing good seamanship, and adhering to regulations.
- Ensure that latest navigational warnings, weather reports, and ice reports are regularly obtained and analyzed. Revising the passage plan as appropriate.
- Be aware of ice routeing recommendations from appropriate authorities.
- Holding a meeting of all crew and officers to discuss the safety and precautionary measures undertaken.
- Reporting to and seeking routing advice from local coast guard, vessel traffic system (VTS) and icebreakers well in advance of entering the area where ice may be encountered.
- Familiarizing all watch keeping officers in ice navigation in advance of entering into such waters. They must be fully aware of preparations, cautions to be observed, and methods to be adopted in dealing with icy conditions.
- Depending on prevailing conditions, set the appropriate watch level.

Master shall:

- Provide direction to all crew and officers well in advance to ensure that everyone is aware of the measures required for safe vessel operation in ice.

- Communicate closely with local traffic services and icebreakers and follow their routing advice.
- Review any recommended ice routing provided by appropriate authority and revise vessel's passage plan routinely as the situation develops and advise all concerned.
- Set up double lookouts and increase the watch suitably. Ensure that the lookout staff understands what to look for and how to detect the proximity of an iceberg or ice. In poor visibility and at night, consider the use of searchlights.
- Man the engine room when navigating in ice.
- DO NOT anchor except in an emergency.
- Change over to hand steering. Switch on both steering motors.
- Be aware of the limitations of radar performance in ice conditions.
- Watch carefully for build up of ice around the berth, ship, propeller, rudder, etc.
- Unless already operating in ice, alert and advise the ship team immediately once ice is encountered and the vessel is carrying out operations in ice or in the vicinity of ice.

Navigating Officers shall:

- Ensure that a vigilant lookout watch by all available means, including visual and radar, is maintained.
- Avoid entering ice as far as possible
- Advise Master when approaching ice.
- Monitor any Ice Reports over GMDSS equipment.
- Reduce speed when encountering ice.

Comply with Ice Navigation Checklist – HSQEEn 12.01.12.081.
In extreme cold climates, the conditions encountered are arduous with rain, snow, frost and low temperatures exacerbated by wind chill factors, up to gale force winds and the added risk of freezing spray. Duties, which are normally easy to perform, become very difficult and time consuming. Following are some of the suggested guidelines that should be followed while operating in cold weather.

General Shipboard Preparations:

- Preparations for operating in cold climates should be carried out well before the vessel arrives in the area. Crew should be properly equipped with appropriate protective clothing.
- View inclement conditions, likelihood of delays must be anticipated and provided for in the reserves of fuel, fresh water, lubricating oil, provisions etc. Sufficient stocks of anti freeze (glycol) should be kept on board.
- All deck fire lines should be drained completely at their lowest point to avoid risk of freezing and possible fracture. Particular attention should be paid to the accommodation section, which may have dead ends. Flexible rubber hoses or fire hoses after use should be drained, blown with compressed air & stowed away.
- The deck air system and lines must be free of humidity. Ensure that the dehumidifier is operational on the deck air system.

- If lifeboats are fitted with permanent water tanks, these should be drained in anticipation, and water supplies provided in portable plastic containers, stored in a nearby, easily accessible, heated area. Lifeboats having water–cooled engines should drain the water from the engine jacket. An ample stock of "cold start" sprays should be kept at all times, for starting life boat engines.
- Bilges should be free of any water.
- Hatch covers, track ways, gangways, accommodation ladders, safety walkways, hold accesses, etc., must be kept clear of snow and ice accumulation. Deck Salt should be at hand to scatter on decks and walkways. The mooring station decks, including fairleads and bitts, should be kept clear.
- Hydraulic machinery should be started up in sufficient time prior to its requirement. In extremely low temperatures, the pumps may need to be started up to 12 hours before use in order to be properly warmed up.
- Storerooms & lockers with exposed bulkheads, which are not properly insulated or heated, are liable to have their contents damaged by frost. All sensitive items should, therefore, be relocated as appropriate.
- The ship's whistle should be checked and blown regularly to ensure it remains clear of snow and ice. The navigation lights should be checked regularly and running lights left on continuously while underway. The anchors must be kept free and ready for use at all times. They should be veered out a few links periodically, in gear, and the re-housed to ensure this.
- Filled Ballast tanks should be closely monitored and if BW freezing is feared recirculation must be commenced. Avoid filling up of ballast tanks to its capacity.
- All air pipes should be covered with canvas until commencing ballast operations, as they are most susceptible to early freezing. Care must be taken to check all air-pipes prior to commencing ballast operations. Pressure sensors for ballast tank soundings can become erratic in freezing temperatures, hence should not be totally relied upon.
- Sea suctions may become blocked with ice; vessels should be able to switch to internal cooling system and have ability to clear choked sea chests.
- Pilot ladders, if lowered too early will gather ice accumulation from spray and become slippery and dangerous.
- Space heaters provided for machineries should be left on.
- Start deck seal heating (tankers fitted with deck seals)

The above guidelines address only some of the more relevant aspects of winter navigation and are to be read in conjunction with other appropriate nautical publications.

The safe, efficient operation and navigation of a vessel under such trying conditions requires extreme care, though many of the difficulties can be overcome by diligent management and good seamanship.

Refer to:
12.01.12.081 - Ice Navigation Checklist

12.01.13.00.03 ANCHORING PROCEDURES & ANCHOR WATCH

The purpose of this section is to provide direction for Anchoring and keeping Watches when at Anchor.

12.01.13.01.02 Anchor Plan

TOOL BOX MEETING SHALL BE CARRIED OUT PRIOR EVERY ANCHORING OPERATION.

The most important part of planning an anchoring operation is ensuring that you have collected all available information on the anchorage and the area around it. The most important factors are mentioned below. These shall be discussed in the tool box meeting:

- Available room at the anchorage and Shelter provided by the topography
- Other vessels at anchor including Traffic/congestion in the area
- Areas to avoid
- Meteorological and hydrological predictions including;
- Prevailing and forecasted weather
- Local tides and currents, their direction and strength
- Evaluation of water depth and bottom conditions such as nature of bottom and gradient of the sea bed.
- Possibility of underwater obstructions
- Degree of shelter afforded
- Proximity of land or other dangers
- Length of stay at the anchorage
- Emergency and contingency situations
- Any vessel constraints
- Approach speeds and direction
- Suitable communication with the anchoring party
- Any caution noted on the charts in use
- Identifying landmarks and fixed navigational marks to be used for position fixing
- Refer to relevant Admiralty Sailing Directions, Guide to Port Entry or other equivalent publications,
- largest scale charts and local information available

Effective communication is vital for safe anchoring and must be established and tested with the anchoring party and the bridge before crew members attend the operation forward.

The following information should be shared before proceeding with anchoring operations:

- Method of approach.
- Which anchor is going to be used.
- Depth of water.
- Final amount of shackles to be deployed.
- Method of anchoring (Let go or Controlled paid out).
- Expected weather conditions including currents.

- Type and condition of holding ground.
- Anchorage expected to be congested or open.
- Own ship's manoeuvring characteristics.

Master shall explain in detail, anchoring method, options, limitations of the equipment, and safety parameters to officers and crew involved.

- Suitable instructions and guidance should be provided to the anchoring party.
- Reference of this pre anchoring meeting should be entered in the logbook.
- Carry out a Job Hazard Analysis (Risk Assessment).
- If a pilot is onboard, discuss the anchoring plan as a part of the overall passage plan. The Master must be in full agreement with the plan.
- Test the main engine in the astern direction, prior to approaching the anchorage.
- Test radio and other communications with the anchor party well in advance. An emergency back up, such as the vessel's talk back system, should also be tested.
- Avoid anchoring in rough seas or heavy swells.
- Avoid anchoring in or near ice.
- As far as possible vessels including VLCC must anchor in a sea water depth less than 82.5 meters as problems could be encountered while heaving the anchor, where the weight of anchor and chain at the time of breaking the ground could exceed windlass hauling load.
- Under normal circumstances, the anchor should be always walked back in LOW SPEED ONLY, to a position just above the water level prior to letting go on the brake.
- Be aware of the varying capacities of the windlass, including hydraulic motors and anchor brakes and control their judicious use.
- In deeper waters, e.g. when depths exceed 40 meters, the anchor should be walked back to a position close to the seabed prior to letting go on the brake.
- Only on occasion and if thought necessary by the Master the anchor may be walked back under power.
- After the required scope of cable has been paid out secure the brake, when possible while the cable is vertical and without any weight on it, and then secure the cable stopper (pawl / guillotine).

Be aware of the equipment limitations / design criteria of the windlass and consider the following additional important pointers, while preparing anchor plan:

i. The windlass is only designed for heaving a free hanging anchor from a depth of around 82.5 m.
ii. The windlass looks robust with a strong brake designed for a holding load equal to 45% of chain MBL (Minimum Braking Load).
iii. The pulling capacity is very limited: Nominal pull represents only 6.5% of chain MBL maximum pull is barely 10% of chain MBL.
iv. In VLCC, Windlass normal hauling pull or speed is approx. 9 meters/minute.

v. Extreme precautions are to be observed while anchoring in water deeper than 40 meters.
vi. The windlass shall not be used to haul the vessel against wind and current or break-out an embedded anchor.
vii. It must be noted that, with the windlass motor engaged, especially when heaving or lowering, the hydraulic motor is the "weak link" in the transmission system.
viii. The most frequent failures for an anchor windlass are due to a lack of maintenance, especially adjustment for wear of the band brake linings and lack of lubrication.

The effective use of an Electronic Chart Display and Information System (ECDIS) can contribute to safe navigation during anchoring. Preparations may include:

- Configuring ECDIS beyond the standard display to display other information such as, but not limited to, nature of sea bed, submarine cables, pipelines, foul area or obstructions and contents of cautionary note.
- Prohibited/restricted anchoring area to be effectively identified on electronic navigational chart (ENC).

The safety swinging circle to be calculated and checked for enough availability of sea room in width and depth. (Safety swinging circle = Length of anchor cable + Length of vessel + Safety margin). Drawing of safety swinging circle on ECDIS and manually checking ENC for navigational hazards.

IACS has unified rules for the design of anchoring equipment. The maximum environmental loads include the following specification unless the vessel has been designed to special requirements:

Sheltered waters:

- Current velocity: max. 2.5m/s
- Wind velocity: max. 25m/s.
- No waves (sheltered waters)

In many cases of anchor losses or anchoring incidents, the environmental conditions exceed those stated above.

Many anchoring locations are outside sheltered waters, and an equivalent safe 'environmental envelope' was found as given by:

Open Water:

- Current velocity: max. 1.5m/s
- Wind velocity: max. 11m/s.
- Significant wave height: max 2m

In order to achieve the necessary anchor holding power, it is essential that the anchor chain and the fore-runner remain horizontal on the seabed and that good holding ground is available. The ratio between water depth and the length of the chain – the scope number – is a key factor in ensuring this, and Class guidance is 6 to 10 scopes. Further factors and guidance can be found in manufacturer's manuals (Anchor and machinery manufacturers), Intertanko

anchoring guidelines and OCIMF publication "Anchoring systems and Procedures"

The officer in charge requires the above information to properly brief the anchor party. He should also ensure that suitable PPE is available and being worn, including eye protection (goggles or face shields).

It is recommended that, prior to entering the anchorage area, the anchoring party are on standby forward to undertake checks and preparations that may include the following:

- Hydraulics/steam on
- windlass operation checked
- brake properly applied
- anchors cleared
- anchor ball prepared
- communications with bridge tested
- anchor walked-out clear of hawse pipe.

It is important that sufficient time is allowed for hydraulic systems to 'warm up' before use, particularly in cold weather. When engaging dog clutches, the pins or other locking arrangements should always be used.

It is essential that good communications are maintained between the bridge and the anchoring party, preferably via radio. A secondary means of communication should be available and tested prior to operations.

Refer to:
12.01.13.011 - Pre Anchoring Check List
12.01.13.012 – Poster 2019 intertanko_anchoring_guidelines_a_risk-based-approach OCIMF publication "Anchoring systems and Procedures"

12.01.13.02.02 Approaches & Anchoring

When the vessel proceeds to the chosen anchor site it should normally head into the wind and/or current at slow speed if navigational restriction, traffic etc. permits, making the following preparations:

- Advice the engine room about the decision to anchor and order the engine stand by for manoeuvring.
- Prepare for anchoring and arrange stand-by on the forecastle.
- Check the communication lines between the bridge and the forecastle.
- Prepare anchor lights/shapes.
- The Master shall inform the Supervising Officer on the forecastle which anchor he will be using.

The anchoring position should be approached in a controlled manner. Main engines and steering gear should be tested well in advance prior to approaching the anchorage area. Speed of approach should be closely monitored and controlled. If the approach speed is too fast, or when approaching with a

following current, it is difficult to control the vessel, especially if the anchorage is congested.

The anchor party team on forward should be adequately organised and Supervised by an experienced officer along with a minimum of 3 crew members (one of which is a responsible senior crew) for good teamwork between the stations.

A) Methods of Anchoring

The anchor shall be lowered to the sea surface by the winch, unless otherwise ordered by the Master, clutch to be disengaged and the anchor is ready to be dropped. The speed shall be regulated by use of the brake.

On large deep draft vessels (e.g. VLCC) the anchor cable shall normally be lowered on gear until the planned length of cable is out.

When the vessel is completely stopped at the anchor site, drifting slowly astern by wind and/or current, the anchor and chain is paid out, allowing it to stretch out on seabed, till the required length is out. Engines may be used judiciously to avoid excessive strain on the cable due to the drift astern.

The Officer in charge of the anchoring team shall order the anchor light/shapes to be displayed, and report to bridge the amount of shackles paid out and the direction of the chain, till it is completely stretched out ahead and has obtained secure holding power in the seabed.

The Master shall order the brake securely fastened, when bearings to fixed points ashore confirms that the vessel maintain the position at the anchor site.

The following points shall be remembered prior to/during anchoring:

1. Speed over ground (SOG) shall be maintained not more than 0.1 knot (3 m/min) astern.
2. The Brake Band Support Adjusting Screw to have a clearance not exceeding 5 mm when the brake is hand tight. This will prevent brake band upper lining wear down when being used in normal lowering mode. Poorly adjusted windlass brakes or lack of maintenance can result in loss of anchor and chain, as the brake no longer will have sufficient holding power.
3. While at anchor, ensure that the windlass is de-clutched from the anchor gear to prevent the load being transferred to the motor if the brake slips.

Following precautions shall be exercised while anchoring in depth greater than 40 meters, but less than 82.5 meters:

1. The Chief Officer must attend Forward Stations for all anchoring operations in deep water and inclement weather conditions.

2. Make sure that the vessel is nearly stopped with a speed over ground (SOG) not higher than 0.1 knot (3 m/min). If required, use the main engine effectively.
3. Lower the chain with windlass in gear at SLOW SPEED till the anchor is at sea bed or just above the sea bed. DO NOT override the system to use HIGH SPEED (if provided).
4. Apply the anchor brake and disengage the clutch from the anchor windlass and engage the locking pin at the clutch lever.
5. Anchor is now on the brakes & ready for letting go using the brake.

(Note: The Total weight of anchor on a VLCC is approx 18 MTs and one shackle of anchor chain is approx 28 MTs. If the anchor is let go by free fall and the veering rate of the anchor chain exceeds 10 m/sec, it becomes difficult to arrest the cable and the brake lining may be damaged.)

6. Bosun to now use the "Half Brake" procedure to limit the veering to about 5~6 m/sec by the timely application of brake. This can be achieved by opening the brake partially to release the chain and tighten again after approx 5-10 secs in order to stop veering completely.
7. When the final required chain length is paid out, apply the windlass brake, close the chain stopper dog/guillotine bar and insert the locking bolt and the securing pin. This is important as if the chain load exceeds the windlass maximum capacity, this can cause severe damage the gears and the hydraulic motor.
8. After laying the cable on the sea bed, use short burst of engine power, no more than dead slow ahead or astern to range the cable to the required length considering depth of water, wind, current, waves and swell.
9. The Officer on forward station shall monitor the cable for at least 15 -20 minutes until the vessel has been finally brought up to and reported to Bridge. Master will eventually give 'Secure & Finished with anchor stations'.

In exceptional circumstances, if the vessel is required to / expected to anchor in depths greater than 82.5 meters (Deep Water), in addition to the measures mentioned above following shall be considered;

1. Deep water anchoring is defined here as anchoring in water depths exceeding 82.5 metres. Such anchoring should be avoided as far as practically possible. However, in some trading areas in the worldwide trade of large tankers it is not possible to avoid deep water anchoring.
2. It must be stressed that anchoring in depths deeper than 82.5 metres goes beyond IACS and most makers' recommendations for windlasses. However, there are now Class notations for deep water anchoring offered from several ROs.
3. When anchoring in deep water anchorages, the depth does not allow for the adequate number of shackles (scope) to be deployed, resulting in the reduction of the holding power of the anchor. Particular attention should be paid to ensure that the vessel does not drag the anchor.

4. Anchoring in deep water should be avoided if the following conditions are forecast:
   a) Strong wind / current effect
   b) High density anchorage or anchorage with restricted area
   c) Indistinct depth of water or sea bottom nature
5. A max anchoring depth calculation shall be readily available on board which accounts for
   a) Weights of the anchor, links and corresponding fore-runner (a half shackle before the first shackle)
   b) Weights of each of the lengths of cable
   c) Pulling power of the anchor windlass
6. Kindly note the max depth calculated is only accounting for the capacity of the windlass to heave the gear up, not accounting for performance loss due to age, wear and tear, temperature, etc. It does not in any way reflect the holding power of the anchor / capacity to maintain the vessel in its position,
7. Master's must be aware of the issues and difficulties which could be expected while heaving the anchor, therefore a close anchor watch especially over the weather is crucial.

B) Details and remarks in the methods of anchoring

There are typically two methods of anchoring ships. Both have merits and the success of either method depends largely on the ability of the windlass to control the rate of cable flow and the capability of the anchor system to absorb the kinetic energy.

Whichever method of anchoring is used, the vessel should be stopped over the ground before anchoring. There are various methods of determining if the vessel is actually stopped over the ground. The most reliable information would be obtained from a ground-tracking dual axis doppler log, but even doppler logs have their limitations, particularly when the engines are operated astern. GPS information is also useful but allowance must be made for a time lag in the speed displayed.

The traditional method of estimating speed through the water by means of 'eye' is still practiced, but this method does not take into account tidal and current influences. Judgement based on visual transits and/or radar ranges of landmarks or adjacent ships at anchor are more reliable.

The two commonly used methods of anchoring are described below.

Method 1: Anchor let go on the brake

1. Approach the anchor position heading into the wind/tide
2. stop the ship over the ground
3. walk-out the anchor and cable until the anchor is about half a shackle off the bottom
4. hold the cable on the brake
5. take the windlass out of gear
6. when in position, drop the anchor by releasing the brake

7. control the speed of cable by the brake, noting the following cautions:
8. If the cable is paid out too fast, it can result in the anchor and cable piling up on the bottom and lead to poor holding
9. If the brake fades or fails there is a risk that the cable will run out to the bitter end, with consequent damage.

Important remarks on Method 1:

With smaller ships, the piling of cable on the bottom may be avoided by allowing the vessel to move astern to stretch the cable as it is paid out. Additionally, after sufficient shackles have been paid out for the anchor to take hold, the brake may be applied and the ship allowed to swing round to the prevailing forces (wind or current) before paying out further cable. If necessary, the main engines may be used to initiate or check the motion over the ground.
On large, loaded ships a disadvantage of this method is that it is difficult to see the lead of the cable and watch it 'grow'. On a loaded ship, particularly one with a flush foredeck, the hawse pipe is very low and the cable attitude is difficult to ascertain. The degree of engine assistance required is also difficult to estimate.

An advantage of using this method of anchoring is that the brake will render before critical stresses are reached.

Method 2: Anchor walked-out

1. Approach the anchor position heading into the wind/tide
2. stop the ship over the ground
3. when in position, walk the anchor and cable out under power until the complete length of cable required is paid out on the seabed, noting the following cautions:
    - This method produces a controlled cable flow, but an accurate estimation of the vessel's movement over the ground is essential to avoid damage to the vessel's windlass
    - Under no circumstances must the windlass be allowed to operate at a rate in excess of the manufacturer's recommendation
    - The design maximum speed for the windlass to walk-out the cable is typically 9 metres/minute, which equates to less than 0.3 knots. (0.1 Kts for Larger vessels)
    - The windlass motor is the weakest link in the system and, if the windlass over-speeds, there is a risk that the motor will be damaged. On some hydraulic systems utilising high speed, highly geared axial motors, damage could result in catastrophic failure and the risk of injury to personnel from flying debris.
    - Where possible, personnel should avoid standing directly in line with the motor and, if fitted, should make use of remote controls.

Important remarks on Method 2:

Under no circumstances should the weight on the cable be such as to cause the windlass to over-speed. If this is suspected, aggressive use of the main engine may be required.

In extreme cases, the windlass brake may be used to assist in controlling the speed of the windlass.

The lead and weight of the cable should be closely monitored as there will be no pre-warning of windlass damage if the system is over-stressed. Damage may not be evident until the windlass is next used to heave up the anchor.

Immediately upon anchoring, a fix on the anchor drop position should be made and the ship's swinging circle ascertained.

Anchor position should be checked at frequent intervals and the distance from other ships or closest danger in the near vicinity should be noted and checked frequently.

C) Securing the Cable at Anchor

There are two methods of securing the cable when lying at anchor and these are described below.

a) Cable secured on the brake with the chain stopper

It is recommended that where a chain stopper is fitted it is used. The stopper is designed to withstand 80% of the MBL of anchor chain, whereas a properly-adjusted windlass brake is designed to render at 45% MBL However, it should be noted that it may not be possible to release the chain stopper without using the windlass to relieve the force on the chain stopper.

In deteriorating environmental conditions, cable tension will increase to the point at which the anchor drags or the weakest point in the anchor system fails.

This could be physical damage to the anchor, failure of cable or damage to the stopper. When subjected to extreme forces, the stopper may deform and jam in place, hampering quick recovery of the anchor.

Some vessels may have a provision of a tension monitoring system, such as a load cell fitted to the stopper, equipped with remote readings and alarms on the bridge

b) Cable secured on the windlass brake.

In deteriorating environmental conditions, cable tension will increase to the point at which the anchor drags, or to the point at which the windlass brake's holding capability is overcome, and the brake slips, whichever is lower.

Detection of the brake slipping by a watchkeeper stationed on the bridge is not easy, particularly on larger vessels. Where no stopper is fitted and the vessel secures the anchor cable using the brake, consideration should be given to the provision of an effective means of monitoring cable movement. A traditional method is to mark the cable so that it is visible from the bridge, for example, by a flag tied to the cable on the cable lifter/gypsy.

Some vessels may be fitted with remote reading cable counters or other devices that detect any movement of the cable lifter/gypsy wheel.

Whichever method is used to secure the cable, it is important to get underway before the tension in the cable increases to the point where it risks a failure of the anchor system. However, this should not be considered the limiting factor. Even before environmental conditions approach a force at which anchor system failure may occur, other undesirable effects may be encountered as a result of waiting too long, including the exposure of personnel to hazardous conditions on the forecastle.

Masters should be aware that anchoring for extended periods of time in some locations may cause anchor chains to foul and form chain balls or knots that will hamper anchor recovery. To avoid this, Masters may need to consider routinely weighing anchor and re-anchoring.

D) Conventional Buoy Moorings

There are a number of tanker berths around the world where vessels berth to a combination of buoys and one or two anchors. Under these circumstances it would not be advisable to walk the anchor out and care should be taken to maintain control of the cable via the brake. For further information, reference should be made to 'Guidelines for the Design, Operation and Maintenance of Multi Buoy Moorings'

12.01.13.03.01 Anchoring in an Emergency

In case the vessel is in anchoring depths and if there is sufficient sea room, consider allowing the vessel's speed to reduce before anchoring.

In most circumstances it is unlikely that the ship's anchors would be capable of stopping a large vessel if the rate of drift at the time of deployment is in excess of about a half a knot. As anchor holding power is not proportional to vessel size, the larger the vessel, the less effective emergency anchoring is likely to be in arresting the vessel's motion. Despite this, in an emergency every available means, including use of the anchors, should be considered for use. The factors likely to impact on the success of emergency anchoring include:

- Size of the vessel
- speed over the ground
- steepness of the seabed and proximity of shoals
- nature of the seabed and anticipated holding power of the anchors
- environmental conditions
- condition of the ship's propulsion and steering systems
- status of the anchoring equipment
- availability and capability of tug support.

In emergency situations it is recommended that anchors are made ready for use at the earliest opportunity.

In case anchoring while there is still way on the vessel, consider paying out only sufficient cable to check the speed of advance and not overcome the effectiveness of the windlass brakes. When possible, only after the speed has reduced sufficiently should more cable be paid out and the vessel brought up. Always keep in mind the safety of the persons on the forecastle deck.

If drifting towards danger and required to anchor in excessive depths, consider lowering both anchors under power to sufficient depths and then securing the brakes, guillotine pawl and other lashings. Once the vessel moves into anchoring depths, the anchors may help reduce the rate of drift to that which can then be controlled by the further use of anchors.

If the water depth is deeper than the length of the available cable, the anchors may be walked-out to about 3 shackles in the water and then the brake and chain stopper applied. The anchors and cable may have the effect of a drogue and may also help to keep the ship's head to the weather.

If the water depth is suitable, it may be possible to slow or stop the vessel's drift by lowering the anchors on the brake until such time as they start to drag along the seabed. The actual length of cable deployed will vary with the depth of water and the vessel's size. For larger vessels, the amount of cable on the bottom should initially be short but can be gradually increased as the ship's speed decreases. This action should bring the ship's head into the weather and slow her speed over the ground. This is unlikely to be successful on a rocky seabed but should still be attempted.

Any attempt to use the anchors to slow or stop a vessel's drift may result in the loss of the anchors and cables and/or significant damage to the vessel's anchor system, including the risk of catastrophic failure of windlass drive motors. While this may be acceptable when considering the wider aim of preventing the vessel from grounding, the potential for injury to the anchor party in such cases should be recognised.

Where possible, main engines should be used in conjunction with the deployment of anchors.

Only in an emergency should the anchor be dropped from its stowed position in the hawse pipe.

12.01.13.04.00 Dragging Anchor

Paying out additional cable should be done in anticipation of anchor dragging, when the anchor is still holding the ground well. If an anchor has dragged, even if the dragging has been controlled or ceased, lift up the anchor and anchor again.

In such circumstances, if deemed necessary, vacate the anchorage. Where there is difficulty in getting underway, consider use of the other anchor to prevent the vessel dragging into danger.

12.01.13.05.02 Deteriorating Weather Conditions

Masters of vessels when approaching anchorage or whilst at anchor shall closely monitor weather forecasts. They must promptly notify Office / Superintendent by email and phone if the vessel is expected to experience weather conditions

of Beaufort scale-7 or more. This notification provides the opportunity for shore side support to Master's decision making in relation to the vessel proceeding to anchor, drifting or getting underway.

If the weather deteriorates while at anchor, to avoid dragging, damage to cable, windlass, possible loss of anchor, and the possibility of running into danger, Masters are urged to depart early from anchorage and proceed to sea until conditions improve sufficiently to enable the ship to return and re-anchor safely. If weather conditions of Beaufort scale-7 or more is forecast, Masters are required to heave up anchor in good time and remain underway until weather subsides.

Effective monitoring of weather conditions is essential to ensure the safety of anchored vessels. The vessel should get underway before excessive tension develops in the cable and before the sea and swell become too high to prevent safe recovery of the anchor.

The vessel should, thereafter, proceed to a safe area and either drift or slow steam until weather conditions abate.

Commercial concerns, such as those associated with increased fuel consumption or losing a place in a berthing queue, should not be allowed to affect the decision about when to get underway.

Note:

1. If vessel is approaching an anchorage and wind is above BF 6 vessel not to anchor, but drift or slow steam.
2. If at anchor in open waters and wind picks up to BF 5 Master to be informed and engines made ready. At BF 6.0 call anchor stations, pick up anchor and slow steam or drift. Vessel not to stay at anchor.

12.01.13.06.01 Avoiding Damage to the Anchor System

Attempting to recover anchors in adverse weather conditions may result in excessive forces being transmitted to the windlass components. In particular, as the bow of the vessel rises and falls in the seaway, the tension in the cable increases and decreases. An increase in tension will cause an increase in torque applied to the gypsy and, through the gearing, to the windlass motor. This may cause a significant increase in internal pressures in hydraulic windlass motors. Explosive failures of hydraulic windlass motor casings have been recorded, resulting in serious injury. Other catastrophic failures of windlass components have also occurred, leaving the affected vessels unable to recover their anchors until repairs have been made.

Class rules require that a windlass is routinely able to lift the weight of the anchor and three shackles of cable hanging free in a straight lift. The windlass will not be sufficiently powerful to recover the cable when environmental forces acting on the vessel increase sufficiently or the depth of water, and thus the length and weight of unsupported cable, is greater than the design limits. Judicious use of the rudder and engine, and bow thruster if fitted, will assist in

reducing tensions in the anchor cable to assist the windlass in recovering the cable. A dual-axis, ground-tracking doppler log is useful for gauging the speed over the ground when manoeuvring. Close cooperation between the anchoring party and the bridge team is required during any anchoring operation, but in this case it is particularly important. The anchoring party should report on changes in the tension, and in the horizontal and vertical direction of the cable, so that the bridge team can accurately manoeuvre the vessel to the appropriate position at a sufficiently low speed. On large loaded vessels it may be difficult to see a sufficient length of cable to judge when it is actually vertical.

Emergency Recovery Of Anchor And Cable And Voluntarily Drag Her Anchor

Occasionally, the power of the windlass may be insufficient to recover the anchor, even in benign weather. This can be due to mechanical inefficiency in the windlass, due to excessive friction in gears for example, or to a reduction in power of the windlass motors, perhaps as a result of overheated hydraulic oil, worn internal components or insufficient steam pressure. Office should be notified
prior considering any of the below mentioned options.

An anchor can also become fast on an obstruction in any depth of water, to the extent that the windlass is unable to free it. A number of methods are available to overcome this problem:

If the vessel is in deep water and the windlass is unable to recover the cable, the vessel may be carefully moved towards shallower water using the engines to drag the anchor and cable along the seabed. The windlass should always be taken out of gear and the chain firmly secured using the chain stopper, if fitted, before attempting this manoeuvre to avoid the windlass being damaged. Personnel should be kept well clear of the chain under tension.

This technique has been used with success, particularly in deep water anchorages used by larger vessels and by vessels who may have to voluntarily drag her anchor/ dredge her anchor.

Consideration should be given to the nature of the seabed, the associated ease of dragging the anchor and the possibility of the anchor fouling on underwater obstructions or installations such as pipelines or cables

If the vessel is in relatively shallow water and a fully operational windlass is unable to recover the cable, it may be assumed that the anchor is fast on an obstruction. The vessel can attempt to pull the anchor free from the obstruction by use of engines. The windlass should be out of gear and the anchor chain firmly secured using the chain stopper, if fitted, while steaming to free the anchor. Personnel should be kept well clear of the chain under tension. The vessel may be steamed over or around the anchor position until it comes free.

Should either of these techniques fail, the vessel should consider alternate means such as

- jury rigging in consultation with the office and makers
- buoy, slip and abandon the cable, and engage the assistance of professional salvors
- or remain at anchor and engage the assistance of professional salvors.

If the vessel is left with only one anchor, do not anchor except in emergencies or in ideal conditions.

12.01.13.07.01 Anchor Watch

Master should ensure that safe and efficient anchor watches are established and maintained and a thorough record of the anchor watch is kept.

Chief Engineer should ensure that a qualified engineer officer is available at all times during an anchor watch.

OOW should ensure that an efficient anchor watch is kept and an anchor watch record is maintained and the ship is safe at all times when at anchor and the correct COLREG signals are exhibited.

While at anchor, the bridge must be manned at all times by a certified navigating officer. The officer on watch must not leave the bridge until properly relieved by another deck officer, or the Master.

The OOW shall establish a swinging circle on the chart. The OOW shall note the ship's head and plot the ship's position as soon the anchor is let go. By making use of the ship's head and the bridge-bow length, further ascertain the position in which the anchor was let go. From this position, draw a circle with a radius of the ship's length plus the length of the cable paid out. This establishes a swing circle at the anchorage position.

The OOW shall monitor the ship's position using all available navigational methods (visual and electronic) at least once every hour, or as deemed necessary under prevailing circumstances. The form also requires entries to be made regarding ship's head, wind (direction & force), current (direction & knots), and extremity of yaw (port & stbd) every time a position is recorded.

Effective use shall be made of bridge equipment such as doppler log which can be used to closely monitor the current strength being experienced by the vessel using speed through water and also monitor the dragging of anchor using speed over ground. This helps in establishing a pattern of ship's behaviour while lying at anchor. Anchor watch record forms should be filed for future reference.

The OOW shall take transit bearings often efficient means of observing whether the vessel is dragging anchor or not. This is especially true in rivers, straits, and narrow waters.

The OOW shall ensure that visual position plotting takes precedence over all other methods. All other available methods of obtaining positions should be used to back up the visual method. Note that there is a separate field in Anchor Watch Record where the initial GPS position should be recorded. The OOW shall monitor VHF communications at all times in accordance with local

requirements. If there are no local requirements, Channels 16 and DSC channels must be monitored.

The OOW shall pay particular attention to vessels attempting to anchor in the vicinity of the ship. If the Master is not satisfied with the distance between the two vessels, or if the prevailing or expected weather conditions indicate a potential problem, the officer on watch must contact the Master, VTS, or the pilot of the incoming vessel to request a safe distance.

Additional lookouts and engine readiness for quick manoeuvres shall be required if the vessel remains at anchor during restricted visibility. Signals to attract attention shall be used with due regard to their limitations (audible range) such as ships' whistle, bell & gong. The effectiveness of signalling lamps in RV shall be considered. In line with COLREGS, one can use the Search light to attract attention (reduced effectiveness in R/V to attract attention); It is recommended in the COLREGS rule 36 to turn it towards the vessel in such a way as not to embarrass any vessel. OOW may use VHF in conjunction with the AIS and appropriate signals on the automatic whistle controller. One should remember that the AIS rate of refresh is slow especially when at anchor.

Effective monitoring of the movement of other vessels and craft in the anchorage, being prepared to take appropriate avoiding action. Although the vessel at anchor has a very limited capability to avoid collision with an approaching craft, there are actions that can be taken that can, possibly, prevent a collision or mitigate its effects should one occur. External warnings, such as use of the VHF, whistle or signalling lamp, should be considered to alert the approaching vessel of the danger. Consideration should also be given to either heaving up the anchor or slip extra cable and/or using the engines and rudder to swing the anchored vessel away from the approaching vessel using the anchor as a pivot to manoeuvre away from the close quarter situation. It is necessary for the personnel onboard the anchored vessel to do all that they can do to prevent a collision, or mitigate its effects, so that their liability for damage incurred can be avoided.

For watch keeping purposes, the status of the equipment and the manning of the engine room will be determined by the circumstances on hand. The Chief Engineer must confirm with the Master the required state of readiness of the main propulsion plant and other essential machinery. This information must be clearly communicated to all Watch keeping Officers.

The Watch Engineer must confirm that it is possible to respond promptly to all communications from the bridge.

The OOW shall advise the Master if weather deteriorates or if an adverse weather forecast is received. It is recommended that when circumstances permit, the vessel should vacate the anchorage during periods of severe weather.

The OOW must inspect the forecastle at the end of each watch. More frequent inspections are required in difficult sea, tide, and wind conditions. In such cases, either the Master or another certified officer should relieve the officer on watch on the bridge. The inspections must ensure that the anchor equipment

and anchor chain strain are within acceptable limits. The OOW must be vigilant at all times and must raise the alarm if suspicious boats are observed around the ship.

The OOW shall increase frequency of obtaining positions if the weather deteriorates, another vessel anchors in close proximity, the vessel yaws excessively, or any other circumstances where there is a doubt about the ship's position or safety. The monitoring of existing and forecasted meteorological conditions, notifying the Master should any changes affect vessel safety (e.g. increasing wind, restricted visibility)

The decision to recover the anchor and get underway must be taken before the point at which the vessel is endangered and the watchkeeper should inform the Master of deteriorating weather conditions in good time. Deteriorating environmental conditions may eventually result in failure of the anchor system, either by the anchor dragging along the sea-bottom or, if the anchor comes fast on an obstruction, by the windlass brake slipping (if the cable is secured on the brake), or by material failure in the weakest point in the anchor system (if the cable is secured on the stopper). An increase in the tension in the anchor cable is the best indicator that the vessel should consider getting underway. OOW shall ensure that rounds of the vessel are made at appropriate intervals and that they include checks forward of the anchor system

Refer to:
12.01.13.071 – Changing Over the Watch at Anchor Check List

12.01.13.08.01 Heaving Up Anchor

Factors to be considered prior to getting underway include the proximity of other vessels and/or the grounding line, the environmental conditions (wind, waves, current, visibility) and the depth of water. These will all affect the decisions to be made regarding bridge and forecastle manning, the engine and rudder movements and the route used to leave the anchorage. The movements of the vessel subsequent to recovery of the anchor should be covered by the passage plan in place.

When Heaving anchor Check and ease the strain on the cable by use of the vessel's engines. Engage the gear, but do not release the windlass brakes till it is apparent that there is no excessive weight on the cable. Use the windlass to heave the cable while keeping a careful check on the strain on the cable.

In case of the possibility of excessive strain coming on to the cable, i.e. if the cable is nipped across the bow, underfoot, or running well astern; or fouled and entangled, cease heaving the cable, secure the windlass brakes and if deemed necessary remove the windlass from gear till such time as the strain has been relieved. Heaving may be resumed once the strain is off the cable. The heaving operations must be carefully monitored at all times. The anchor breaking the ground and sighting at water level must be reported to the bridge.

If the hydraulic motor stalls during heaving of the anchor, immediately move the control lever to the payout direction. Remain aware that moving the control

lever to a neutral position does not relieve high pressure from building up in the hydraulic system.

The following points shall be remembered while heaving up anchor:

- The windlass is not designed for breaking out an embedded anchor or hauling the vessel as the motor is the "weak link" in the anchoring system.

(Remember: To break out the anchor, lock the chain with the chain stopper, disengage the gear and use the vessels main engine. DO NOT use the windlass for this purpose.)

- Officer on forward stations to correctly report status of anchor chain for Master to judge and give engine movements timely.
- Start to haul in the anchor in "Low Speed" mode. Remember the vessel should be maneuvering towards the anchor, and not be hauled by the windlass.
- Keep a close watch & report on how chain is leading and report 'Short or Long Stay'. It is recommended to cease heaving on Long stay so as not to unduly stress the windlass.
- If the chain crosses the bow, cease heaving and inform bridge to take corrective action.
- Reduce the speed before the anchor reaches the hawse pipe.
- When the anchor and flukes are properly stowed, place the hydraulic motor in neutral mode while applying the band brake.
- Close the chain stopper dog/guillotine bar and restore the locking bolt and securing pin if there is one.
- Disengage the windlass clutch and insert the clutch locking pin.
- Switch Hydraulic Power Unit (HPU) to "Stand-By Low" pressure for long waiting periods to avoid overheating the hydraulic oil. Overheating of the oil will stop the HPU automatically; hence stop the pumps when the work is completed.

The Master shall ensure that HSQEEn 12.01.11.071 - Pre-Departure checklist' and HSQEEn 12.01.13.071 – Changing over the Watch at Anchor Check List' are duly completed as applicable.

Completed checklists shall be filed in accordance with the general filing instructions.

Refer to:
12.01.13.071 – Changing Over the Watch at Anchor Check List
12.01.11.071 – Pre-Departure checklist

12.01.13.09.01 Prolonged Anchorage Stay

A. Hull Fouling Avoidance Measures:

If vessel stays idle for more than 15 consecutive days, Master to contact the Commercial Operator in order to get authorization to undertake sea steaming off port, for the purpose of reactivating vessel's antifouling coatings.

B. Anchor and Chain Fouling Avoidance Measures:

a) If vessel is swinging around at anchor in different directions, vessel's Master must consider to re-anchor the vessel every 15 days using a different anchor each time.
b) If the vessel is observed to be swinging around at anchor in the same direction, vessel's Master must consider taking earlier action to re-anchor the vessel using a different anchor.
c) Bridge Watch Keepers shall maintain a check on vessel's swing direction while at anchor and notify the Master if the vessel is observed to be swinging around only in one direction.

12.01.13.10.01 Anchoring equipment inspection and maintenance

The D-shackle was identified as the single technical component which has the highest failure rate causing anchor losses. Typically, the D-shackle bolt comes loose due to a detached securing pin. The conventional way of assembling the D-shackle is to lock the tapered pin in place by hammering in a lead pellet, a small but essential element in the anchoring equipment. This connection is not easily accessible for inspection. However, special attention should be paid to this detail whenever possible – when heaving the anchor or when the ship is in port – and, of course, when the ship is in dry-dock

The following were identified as critical for planned maintenance:

- Inspection of cable markings, both permanent and painted
- Brake band thickness and condition of mating surface, brake functionality, periodically test brake holding capacity and / or adjustments in line with manufacturer's instructions on an annual basis.
- Hoist motors to be maintained in accordance with manufacturer's recommendations
- Inspection of bitter end and availability of tools for quick release
- Gypsy for wear down
- Ranging of cables for inspection at routine dry-docking in line with Class requirements
- "Walking the anchor" – working shackle removed and refitted at the bitter end during dry-dockings
- Check wear down of guillotine bar, hinge and securing pin
- If the devils claw / bar is damaged, replace, do not repair by welding
- Renew wire lashings periodically when damaged/corroded
- Renew associated shackles etc. when damaged/corroded, look out for loose links and distance pieces, do not repair by welding

§ Anchor chain marking and length to be checked. Some vessel have a half shackle before the first shackle, and some don't.
§ Any repairs carried out shall be only upon consultation and approval of the vessel's classification society. Loose studs may be welded (Only on one side) when society approved hot work is carried out in line with company's hot work procedures.

For the effectiveness of the chain stopper arrangements, instructions should be provided for adjustment (where necessary) of the chain stopper's adjusting plates. In order for the chain shackle to have an effective contact with the dog plate, the gap between the "dog" and the anchor chain passing underneath should not be excessive (not more than abt. 40 mm). In case there are no adjusting plates fitted (or due to constructional limitations), an additional plate can be used to minimise and adjust the gap.

On bar-type stoppers, the bar should be arranged, when in the closed position, to prevent the bar from gradually working to the open-position, which would release the chain and allow the cable to pay out. Locking devices shall be easy to operate, the bar should also be properly secured in the open position.

The cable stopper may be fitted with a lashing device for holding the anchor tight in its housed position. This lashing shall hold at least a load equal to twice the anchor weight plus a minimum of 10 meters of chain cable (ideally 1 cable length).

Fatal/serious injuries have occurred over recent years through catastrophic failure ("explosion") of the hydraulic motor specific windlass fitted with high pressure hydraulic system utilising axial motors that had high gearing and high speed. Fatal incidents have occurred during anchor heaving operations in adverse weather conditions when the anchor chain has been tensioned beyond the intended safe loading of the windlass resulting in reversing of the motor rotation due to the anchor chain tension. It is recommended that hydraulic motors are designed to be safe in such circumstances and protection covers should be fitted where necessary.

Pay attention to:
- Pressure relief valves
- Cleanliness of hydraulic oil
- Corrosion on the housing
- Protection cover on motor to be considered to reduce risk for flying debris.
- Adequate provision of a remote control stand in a safe position to avoid injuries where possible.

Windlass brakes is essential to control the pay-out of the chain.

The conventional design is with brake bands but there are also disc brake systems. Corrosion of the drum and wear of the brake band lining reduce the brake capacity. It is essential that the tension of the brakes is adjusted and liners replaced as per maker's instructions. Further recommendations include:
- Alternate use of port and starboard anchors reduce risk for excessive corrosion / wear on one windlass.

- The lack of 'Adjustment screw' for brake band is the most frequent cause of failure in brake system leading to loss of cable and damage to bitter end.
- The ideal gap for the screw adjustment for brake band support, is 1-2mm.

It is recommended that Chain cable tensioners are installed for the purpose of avoiding slamming of the anchor in the hawse pipe.

- Tensioners of whatever type may be damaged and worn and must not be trusted alone to hold a stowed anchor at sea.
- Excessive vibrations of the anchors may cause loosening of securing pins in anchor shackles.
- Broken claws, hooks etc. of cable tensioners should be renewed and not be repaired by welding.

Bitter end arrangements

When fitted, bitter end securing arrangements must be maintained in good order to enable releasing the anchor chain with the minimum of involvement by ship's personnel.

Recommendations:

Ensure that a full spare charge of hydraulic oil for the tank is available at the location of the power pack with pump. This is to ensure fast top up the oil for cooling if the system trips on high temp.

Keep level of oil between low and high. Do not top up to high level. This will ensure space to top up cold oil to bring down the temp of the oil in case of high temp trip.

Refer to
12.01.13.101.00 - Poster "General Guideline – Anchoring Equipment Inspection Chart"

12.01.14.00.03 SQUAT, UKC & BRIDGE CLEARANCES

12.01.14.01.00 Ship Squat (Squat)

Squat is the additional sinkage of a ship, relative to the original hydrostatic draft, caused by its movement at a given speed. It includes the vertical sinkage of the ship as a whole and the change of trim.

When calculating squat, ship-specific squat information, shall be used if available on board. Where ship-specific information is not available Master shall ensure that squat tables/graph is developed for both loaded and ballast passages and displayed in the wheel house for use during Passage Planning.

When a vessel is navigating in waters of depth less than twice the deepest hydrostatic draft of the vessel, anywhere along the planned route of the vessel, squat shall be applied to UKC calculations using form (HSQEEn 12.01.14.021). Speed reduction shall be considered, to reduce the effect of squat on UKC.

12.01.14.02.03 Under Keel Clearance (UKC)

It is the responsibility of Master to implement this procedure and to ensure compliance with applicable rules, regulations, codes, guidelines and standards related to squat, under keel clearance and bridge clearance, such as Mariners Handbook (NP 100), Bridge Team Management (by the Nautical Institute) and Passage Planning Guide-Malacca and Singapore Traits.

(a) The following Minimum UKC must be maintained for each situation:-

Open Sea / Ocean Passages - Where the STATIC UKC exceeds 50% of the vessel's current maximum static draft.

Shallow Waters / Coastal Passages / Confined Waters - Generally closer than 20 NM from the Shallow Contour (Grounding line) OR where the STATIC UKC is less than 50% of the vessel's current maximum static draft.

- Open Sea / Ocean passages:
  - UKC calculation not required.

  (Master shall plan their voyages to avoid, where practical, transiting areas where the UKC is less than 50% of the vessel's Maximum static draft).

- Shallow Waters / Coastal Passages / Confined Waters:
  - Minimum Dynamic UKC ≥ 10% of Vessel's current Maximum Static Draft.

  (Due consideration shall be given to various physical & environment factors listed under item (b) below and Squat).

- In Fairways, River, Channels, Canals, Port Approaches generally within the jurisdiction or direction of a port authority or within port limits:

  - Whilst underway:

  Minimum dynamic UKC ≥ 1.5% of the moulded breadth of the vessel, but not less than 0.60 meters whichever is greater.

  (Due consideration shall be given to various physical & environment factors listed under item (b) below and Squat. When transiting channels or passing over bars, vessels may use the height of tide and time the transits appropriately to maintain the required UKC)

  - Whilst alongside a berth or at SBM/ CBM mooring in sheltered locations:

  Minimum static UKC ≥ 1.5% of the moulded breadth of the vessel, but not less than 0.30 meters whichever is greater. After taking into consideration the depth of water at the lowest state of the tide.

  - Whilst at anchor:

  Minimum static UKC ≥ 20% of the Vessel's current Maximum Static Draft after taking into consideration the depth of water at the lowest state of the tide.

  - At offshore exposed locations when berthed or moored at SBM/ CBM:

  Minimum static UKC ≥ 10% of the vessel's draft, but not less than 0.60 meters, whichever is greater.

  (For discharge operations, vessel shall not rely upon the reduction in draft due to cargo discharge and must be able to maintain the minimum UKC when alongside berth or at SBM/CBM through the next low water period without discharging any cargo)

- Straits of Malacca and Singapore: Deep draught vessels (a vessel having a draught of 15 meters or more) and VLCCs (a tanker of 150,000 dwt and above) shall allow for a static under keel clearance of at least 3.5 meters at all times during the entire passage through the Straits of Malacca and Singapore and shall also take all necessary safety precautions, when navigating through the traffic separation schemes.
  While on the seaward of Horsburgh Lighthouse (i.e. when crossing the plateau at Eastern Bank) the static under keel clearance is recommended to be 4.0 meters, to allow for prevailing swell conditions.

(b) When determining the anticipated UKC in a particular Coastal waters / passages, river, channel Master shall make allowances for variable

factors and local conditions, which include but are not be limited to the following:-

- The effect of squat & effect of current at berth
- The effect of list due to weight distribution and the effect of heel due to ship are turning movement in the water.
- Environmental conditions e.g. the prevailing weather; height of swell; tidal state, height and range during the vessel's transit; atmospheric pressure; and changes in the density of sea and inland waters and the corresponding increase in draught etc; changes in the predicted tidal height, which may be caused by wind speed and direction and/or high or low barometric pressure.
- The nature and stability of the bottom (e.g. sand wave phenomena)
- The vessel's size and movement, handling characteristics, and increase in draught due to heel.
- Wave response allowance, which is the vertical displacement of the hull due to heave, roll and pitch motions.
- The reliability of ship's draught observations and calculations, including estimates of hogging or sagging.
- The accuracy of Hydrographic data including CATZOC (references to reliability are often included on charts or in the form of CATZOC on ENCs) and tidal predictions.
- Reduced depths over pipelines and other obstructions.

(c) Master shall request the local agent prior to arrival port, at least 48 hours before arrival or as soon as port of call information is known, for relevant under keel clearance information regarding intended terminals, anchorage and approaches, as follows:-

- Name of berth or anchorage
- Water density
- Water depths (including the berth and in the channel)
- Maximum allowable draft (including the berth and in the channel)
- Applicable local regulations

(d) 24 hours before entering port/destination or as soon as port of call information is known, and before getting underway from such place, the Master shall ensure that the following is done:-

Calculate the deepest anticipated navigational draft, including considerations based on:

- The mean draft
- Trim & List characteristics
- Intended transit speed and Squat characteristics

Calculate the anticipated controlling depth of the passage, including considerations based on:

- Tide and Current conditions
- Sea state conditions, if applicable
- Past weather impact on water depth

- Depth at the facility, anchorage or place of destination
- Depth of the transit area found in applicable navigational information (Charts, Coast Pilots, Tide Tables, Current Tables)
- Information obtained from the local Pilot, Coast Guard or other authorities

Calculate the anticipated under keel clearance (anticipated controlling depth minus the deepest navigational draft)

(e) Record the following:

- Calculated deepest navigational draft
- Anticipated controlling depth
- Calculated under keel clearance

(f) On embarkation of the pilot discuss with the pilot the under keel clearance calculation, including any relevant information provided by the port agent, and potential impact on the planned transit including the need to update UKC calculations to reflect the new predicted time and transit speed of passing over critical hydrographic features where a passage is delayed.

(g) If a port, pilotage authority or terminal requires the vessel to comply with a stricter UKC policy (with higher margins), then the vessel shall comply with such stricter UKC requirement which provides more safety margin.

Where there is doubt or if during passage planning it becomes apparent that the minimum UKC Policy will be breached, the Master must:

- Immediately inform the Managing Office Marine Superintendent so that a full appraisal and Risk Assessment may be carried out. The infringing section of the passage plan shall not to be carried out until the vessel has received permission from the Managing Office to proceed.
- If within port limits, obtain the latest sounding information, including the nature of the bottom, directly from the local authorities or terminal well before arrival. Should this not be available, the master should request guidance from the Managing office.
- If alongside where risk of grounding exists, inform managing office immediately and vacate the berth if deemed necessary.

While in U.S. water, also be guided by USCG Publication 33 CFR 157.455.

Refer to:
12.01.14.021 – UKC Form

12.01.14.03.01 Bridge & Overhead Clearance (BOC)

When calculating BOC under a particular bridge or overhead obstruction Master shall make allowances for variable factors and local conditions, which include but are not be limited to the following:-

- Location of the highest point of the vessel.
- The effect of squat and trim.
- Environmental conditions e.g. the prevailing weather, height of swell, tidal height and range, atmospheric pressure, and changes in the density of sea and inland waters etc.
- The reliability of ship's draught observations and calculations, including estimates of hogging or sagging.
- The accuracy of Hydrographic data and tidal predictions.

Company recommends that a minimum BOC of two meters is maintained. However, if there are reasonable local regulations, rules or recommendations by relevant authorities, which endorses a reduced BOC, the Master may use his discretion to adhere to such reduced BOC.

In such cases the Master shall:-

- Verify the reliability of such information.
- Navigate below the bridge when the tide situation provides maximum BOC.
- Inform Company of any anticipated reduced BOC at the earliest opportunity.

A record shall be maintained on board of all Squat, UKC and BOC calculations. Along with Passage plan Squat, UKC and BOC calculations shall be filed along with respective Passage Plan.

Verification of this procedure shall be done during Navigational Audit, Master's Review, Internal and External Audits.

Refer to:
12.01.14.031 – BOC Form

12.01.15.00.00 REVIEW & DOCUMENTATION

Regulation V/28 of the 1974 SOLAS Convention, as amended, requires all ships engaged on international voyages to keep on board a record of navigational activities and incidents which are of importance to safety of navigation and which must contain sufficient detail to restore a complete record of the voyage, taking into account the recommendations adopted by the Organization.

Significant information related to the operation of the vessel shall be entered in the Log Book. Copies of all reports and correspondence must be kept on file on board.

Verification of compliance with this procedure shall be carried by the Master during routine Master's on-board verification of the HSQEEn Management system. In addition, this procedure shall be verified by the Superintendent during routine visits to the vessel. Finally, this procedure shall be verified during internal audits of the vessel and the Company.

Record of correction of charts shall be maintained in Admiralty Chart Correction Log, or equivalent, in accordance with the procedure given in NP 100.

Record of correction of other navigational publication shall be maintained within the publication in the space provided for the same. Notices to Mariners for the current calendar year and past two years shall be available on board.

Ships on fixed route (e.g. passenger ferries) do not require to make a completely new passage plan, however the dynamic elements in each passage shall be duly filed in a suitable format for a period of two years, for each completed passage. This file should also contain the original passage plan for the passage.

The vessel's Superintendent shall ensure that prescribed navigational practices and bridge procedures are complied. Appropriate controls shall be implemented if deviations are evidenced.

Draft shall be recorded in the Deck Log Book prior to departure.

All procedures & checklist provided in the system when used should be logged in the log book.

Whenever a pilot is on board or tugs are assisting, their names, arrival- and departure times shall be recorded.

Verification of this procedure shall be done during Master's Review, Internal and External Audits.

The safe navigation of the ship is documented in the Deck Log Book in compliance with the instructions on the inside cover.

All entries pertaining to the navigation of the Vessel shall be entered in ink by the Duty Officer.

All columns in the Logbook shall be completed where applicable. In addition, pertinent comments and times should be made in the "remarks" column on the following subjects (as applicable):

- Weather and visibility
- State of sea and swell
- Emergency steering test
- Occurrence of any navigational accident
- Course alterations
- Clock changes
- Passing of salient points, light buoys etc.
- Principle manoeuvring details
- Anchor positions
- Pilot's name(s)
- Tug name(s)
- Master or other assuming control of navigation
- All other important occurrences e.g. fire fighting and lifeboat drills, etc.