# SEAMANSHIP

## *CARGO WORK*

1. Define Gross and Net Tonnage in Detail, their purpose and unit?
   IMO TONNAGE MEASUREMENT
   GROSS TONNAGE:
   - The moulded volume of all enclosed spaces of the entire ship in cubic meter multiplied by a log factor ($0.2 + 0.02 \log_{10} V$) gives Gross Tonnage.
   - It is used in Ship Safety Regulations.

   NET TONNAGE:
   - The volume of cargo spaces, the numbers of passenger carried the moulded depth of ship, and her summer draught put in a formula which gives value more than 30% of gross tonnage.
   - It used as an indication of the ship's earning capacity and for accessing dues and charges in port.

   UNIT:
   There is no any unit of gross and net tonnage.

1. What is length over all, Forward Perpendicular, Aft Perpendicular and Length between perpendiculars, Light ship, Load Displacement and Dead weight?
   LENGTH OVER ALL (L.O.A) Maximum length of the vessel measured from the extreme forward point of the vessel to the extreme after point.
   FORWARD PERPENDICULAR A perpendicular drawn to the point on the summer water line where it intersects the stem part of vessel.
   AFT PERPENDICULAR A perpendicular drawn to the point on the summer water line where it intersects the rudder post. If rudder post is not fitted, then it is drawn from the centre of the rudder stock.
   LENGTH BETWEEN PERPENDICULARS The distance of fore and aft line on summer water line where it intersect stem part and rudder post. If rudder post is not fitted, then it is drawn from the centre of the rudder stock.
   LIGHT SHIP The weight in tones of the completed vessel with boilers, if any filled to working level with lubricating oil and cooling water ,but without cargo ,bunker, stores, dunnage etc.
   LOAD DISPLACEMENT
   The weight of vessel all it contain at her loaded condition.
   The weight of water ship displaces at her load draught
   DEAD WEIGHT The total weight of cargo stores bunkers etc. when the vessel is at her loaded draught.
   Dead Weight = Load Displacement – Light Displacement

2. What are Bale Capacity and Grain Capacity, Stowage Factor and Density?
   BALE CAPACITY
   Internal volume measured to the inside edges of the Spar ceiling (Cargo Battens), beams, tank top ceiling, and bulkhead stiffeners

GRAIN CAPACITY

Total internal volume of the compartment from shell plating either side and from tank top to underdeck with an allowance of beams and frames.

STOWAGE FACTOR The volume occupied by unit weight.

- MEASUREMENT CARGO
  Cargo having stowage factor > 1.2 $m^3$ / tones
  Freight is paid on volume occupied.

- DEADWEIGHT CARGO
  Cargo having stowage factor < 1.2 $m^3$ / tones
  Freight is paid on actual weight

DENSITY The weight occupied by unit volume

1. Which cargo holds have greater Stowage Factor Cargo Hold No 1 or Hold No 3?
   Stowage factor of hold = Stowage factor of cargo + Broken stowage
   Broken stowage of hold no1 is more than hold no 3 there fore stowage factor of cargo hold no 1 is more than hold no 3.

2. One room 100 $m^3$, 30 tonnes cotton to load how find stowage factor?
   S.F = 3.33 $m^3$ / tonnes

3. 4 $m^3$ boxes and 2 $m^3$ boxes .If loading, which has more broken stowage?
   2 $m^3$ boxes

4. How to minimize the broken stowage of bagged grain cargo?
   - Stowed on double dunnage
   - The first layer should be stowed athwartship on vessels equipped with side bilge system
   - When stowing, bag on bag stow is good ventilation, whereas bag on half bag is poor ventilation but good for economical use of space.

1. What are centre of floatation, TPC (Is it constant), stable equilibrium, neutral equilibrium, unstable equilibrium?
   CENTRE OF FLOATATION The point in ship's length about which the vessel will trim by head/by the stern.
   TONNES PER CENTIMETER The mass which must be loaded or discharged to change a ship's mean draft in salt water by 1 cm.

$$TPC = \frac{1.025A}{100}$$

STABLE EQUILIBIRIUM When the body is inclined from its initial position and come back to its original position

NEUTRAL EQUILIBIRIUM When the body is inclined from its initial position don't come back to its original position and acquire another position for oscillation.

UNSTABLE EQUILIBIRIUM When the body is inclined from its initial position and heel over still further.

2. Details of Chain Register?

   Certificates of test, annealing and all reports of inspection and examinations of gears are to be kept in onboard register before they use. The register is designed for 8 year services. When new one is put in use the old one should be preserved for at least 4 years.

   *Part1* 4 yearly examinations, Annual inspections

   *Part2* Annual through examinations of cranes, winches and hoists and gear accessory gear, other than derricks.

   *Part3* Annual through examination of gear exempted from annealing

   *Part4* Recommended minimum factor of safety by parts, SWL and construction

3. Where are the cargo plans located in ship?
   - Cargo Office
   - Bridge
   - Master Cabin
   - Fire wallet

1. On container ship GM is small water barge came what you will do?

***TANKER WORK***

1. What is the purpose of Slop tank, Manifold?

   SLOP TANK:
   - Small tanks built at the after end of cargo tanks to receive the residue from cargo tanks as a result of tank washing operations.
   - Minimum capacity of slop tanks = 3% of total cargo carrying capacity
   - They are served by same piping system as the cargo tanks, these tanks can intend to carry cargo
   - Heating coils are fitted in them to separate oil from water

   MANIFOLD: The points usually near midship on either side of vessel where ships pipe lines connected to shore pipelines

1. Name some of hydrocarbon gasses what are its main hazard

   Propane, Butane, Pentane

2. What are the hydrocarbon gasses and from where they will come?

3. Is Hydrocarbon heavier or lighter than air?
   Hydrocarbon is heavier than air

4. Differentiate between
   - Hydrocarbon gasses and toxic liquids
   - Hydrocarbon gasses and explosive gasses
   - Oxygen analyzer, Tank scope, Explosimeter, Dragger tubes and How to use them?

   Oxygen Analyzer: Use for measuring oxygen contents and may be either fixed type, portable or pocket size

   Tankscope: Use for measuring hydrocarbon gasses (0 – 20% by volume) in inerted or over rich atmosphere.

   Catalytic hot filament combustible gas indicator / Explosimeter: Use for measuring concentration of hydrocarbon gasses below LFL (i.e. below 1% by volume) in non-inerted or to lean atmosphere.

   Dragger tubes: Use for measuring toxic gasses.

1. What are Flash Point, Lower Flammable Limit, Upper Flammable Limit, and Flammable range?

   Flash point The lowest temperature at which a liquid gives off sufficient gas to form a flammable gas mixture near the surface of liquid which is ready to catch fire.

   Flammable range / Explosive Range The range of hydrocarbon gas concentrations in air between the lower and upper flammable limits. Mixtures within this range are capable of being ignited and of burning.

   Lower Flammable Limit (LFL) / Lower Explosive Limit (LEL) The concentration of a hydrocarbon gas in air below which there is insufficient hydrocarbon to support and propagate combustion

   Upper Flammable Limit (UFL) / Upper Explosive Limit (UEL) The concentration of a hydrocarbon gas in air above which there is insufficient oxygen to support and propagate combustion

2. How inert gas system works onboard ship?
   - Open and secure the scrubber and water seal overboard discharge valves.
   - Start the water supply systems to the scrubber and deck seal at least 15 minutes before commencing the operation

- Ensure that the flue gas is of a suitable quantity
- Open the flue gas isolating valves
- Open the blower suction and delivery valves
- Start the blowers
- Ensure that the gas regulating valve is open and open the deck main isolating valve.
- Open the mast riser to allow inert gas to vent to the atmosphere in case it is of poor quality
- Check all monitors and when satisfied open the branch line valves to cargo tanks and close the mast riser valve.

1. How to gas free the tank?

   G*as freeing*: Replacement of hydrocarbon vapours and or the inert gas by air.

   Tank will gas free by

   1. *Purging:* Introduction of inert gas into tank already in the inert condition with the object of reducing the existing hydrocarbon gas content to a level below which combustion can't be supported if air is subsequently introduced into the tank.

      The purging can be done by one of the following

      - *Dilution* Incoming Inert gas mixes with the original tank atmosphere to form a homogeneous mixture similar to the incoming gas

        The inert gas pressure should kept high

        Method use to inert only one tank at a time
      - *Displacement* Inert gas is slightly lighter than hydrocarbon gas, while inert gas enters at the top of the tank, the heavier hydrocarbon gas escapes from the bottom through suitable piping.

        The inert gas pressure should kept low

        Method use to inert several tanks at a time

   1. *Introduction of air*: Using portable fans or a fixed system (i.e. Inert gas system may also be used by isolating the scrubber tower and connecting the fresh air intake to gas blowers. This method is faster than other).

1. What checks taken before discharging/loading commencement on tankers regarding static electricity?

   Grounding of antenna

***SOLID BULK CARGOES***

1. Define angle of repose?

ANGLE OF REPOSE The angle made between a horizontal plane and the cone slop of a cargo.

1. What is differentiate between
    - Main deck and weather deck
    - Cofferdam and void spaces?
    - Tank top ceiling and spar ceiling
    - Sounding pipe and Cowl vents
    - Weather tight doors and water tight doors? Have you seen watertight doors onboard? Where will you find these doors?
    - Double bottom tanks and deep tanks also used for?
    - Capstan and winch

| MAIN DECK | WEATHER DECK |
|---|---|
| The deck of the ship up to which all water tight bulkhead reach | It is a deck, which is completely exposed to the weather from above and from at least two sides. |
| COFFERDAM | VOID SPACES |
| Vacant space left intentionally between two water tight bulkheads, being the width of the ship placed between engine room and oil tanks as a fire precaution or between oil and water tanks to prevent pollution | Vacant space left unintentionally during construction of ship. |
| TANKTOP CEILING | SPARCEILING / CARGO BATTENS |
| A wooden sheathing to protect the tank top of the double bottom. It is at the bottom of hold | Horizontal or vertical planks fixed to the inboard side of the frames, to protect cargo. |
| SOUNDING PIPE | COWL AIR VENTS |
| A pipe from weather deck to down bilges or double bottom tank .we use sounding rod to ascertain the amount of water in the compartment | A pipe from weather deck to tank top use for ventilation. |
| WEATHER TIGHT DOORS | WATER TIGHT DOORS |
| • They situated above water line<br>• They are Weather proof from only outer side<br>• They are | • They are tested under certain pressure for their integrity<br>• They are Water tight from both sides<br>• They are more Stronger |

| less stronger | |
|---|---|
| DOUBLE BOTTOM TANKS | DEEP TANKS |
| Space between bottom of the ship and the tank top .used for carriage of ballast, fresh water and oil bunkers. Subdivided fore and aft by the keelson and by a number of transverse bulkheads. | A ballast tank the width of the ship with a centre fore and aft bulkhead, placed in either the tween-deck or the lower hold. Used for ballast or edible oils and in some cases provided with a large watertight lid enabling the space to be used for dry cargo. |
| CAPSTAN | WINCHES |
| Vertical barrel used for hauling mooring ropes. | Machine having a horizontal barrel operated by either hand or power, to which a rope may be made fast and wound around the barrel. The machine will, by rotating the barrel, cause the rope to haul or hoist an object. |

1. What is gantline why so called?

   A fibre rope used aloft to lower a man in bosun's chair or over side with a stage.

ENCLOSE SPACE ENTRY PRECAUTION

**Any sort of entry into enclosed space should only be carried out when permission has been obtained by master or chief officer and persons entering are experienced and follow company ISM checklist**

1. Adequate ventilation and illumination.
2. Atmosphere tested and found safe.
3. Space secured for entry.
4. S.C.A.B.A. sets available at entry (apparatus tested).
5. Responsible person available at all times at entry point.
6. Communication –person entering, stand by position, bridge.
7. Personnel protective equipment to be used.
8. Where required breathing apparatus to be used.
9. Testing equipment available for regular checks:
   - $O_2$ analyzer- oxygen deficiency
   - Tankscope- measures oxygen in inert atmosphere
   - Explosimeter- HC vapour and explosive limit
   - Dragger tubes- measures oxygen if correct tube fitted.

***DECK EQUIPMENT***

1. What are the marking on lead line?

   **Meters** **Fathoms** **Marks**

| | | |
|---|---|---|
| 1, 11 and 2 | - | 1 tail of leather |
| 2, 12 and 22 | 2 | 2 tail of leather |
| - | 3 | 3 tail of leather |
| 3, 13 and 23 | 13 | a piece of blue surge |
| 4, 14 and 24 | - | Green and white bunting |
| 5, 15 and 25 | 5 & 15 | a piece of white linen |
| 6, 16 and 26 | - | Green bunting |
| 7, 17 and 27 | 7 & 17 | Red bunting |
| 8, 18 and 28 | - | Blue and white bunting |
| 9, 19 and 29 | - | Red and white bunting |
| 10 | 10 | A leather washer |
| - | 20 | Piece of cord with 2 knots |
| 20, 30 and 40 | - | Leather washer with 2, 3 or 4 leather strips |

2. How to measure depth between the marks on hand lead line?
   By the mean of measuring tape

3. How many marks and deeps in hand lead line?
   MARK – 9
   DEEP – 11

4. State the parts of Patent log machine?
   - Clock
   - Governor
   - Log line
   - Fish
   - Rotor

***DERRICK WORK***

1. Define SWL, Proof load, breaking stress?

   SAFE WORKING LOAD (SWL) Safe stress at which every component of a lifting apparatus work safely

$$S.W.L = \frac{B.S}{6}$$

   BREAKING STRESS (B.S) The stress at which a component will fracture

   PROOF LOAD

   - **Chains, rings, hooks, shackles, swivels** proof load = 2 x S.W.L
   - **Single sheave pulley block** proof load = 4 x S.W.L
   - **Multiple blocks up to 20 tonnes S.W.L** proof load = 2 x S.W.L
   - **Multiple blocks 21- 40 tonnes S.W.L** proof load = S.W.L + 20 tonnes
   - **Multiple blocks over 40 tonnes S.W.L** proof load = 1 ½ x S.W.L
   - **Pitched chains, their blocks and all permanently attached gear operated by hand** proof load = 1 ½ x S.W.L
   - **S.W.L up to 20 tonnes-gear** proof load = S.W.L. + 25%

- **S.W.L 20 to 50**

# *EMERGENCIES*
# GENERAL EMERGENCIES

1. What is general emergency alarm?
    - 7 or more short blasts followed by 1 long blast
    - Continuous ringing of bell until head counts completed.

1. What is contingency Plan?
   It contains action plan and duties of every possible emergency on board. It has 5 teams for handling emergencies
    - Bridge team
    - Engine room team
    - Attack team
    - Backup team
    - First Aid team

1. What is SOPEP?

   SHIPBOARD OIL POLLUTION EMERGENCY PLAN:

   Every non-tanker of 400 (Gross Registered Tonnage) GRT or above and every tanker of 150 GRT and above must have SOPEP on board in the form of a manual.

   ELEMENTS OF SOPEP:
    - Procedures for oil pollution incidents.
    - List of authorities to be notified.
    - Detailed action to be taken by crew to reduce and control oil discharge.
    - Coordinate procedures and shipboard activities with national and local authorities.

1. When you call Master?
    - If Restricted Visibility is encountered or expected
    - Traffic conditions or the movements of other ships are causing concern
    - If difficulties are experienced in maintaining course
    - On failure to sight land a navigation mark or obtain soundings by the expected time
    - If ,unexpectedly, land or a navigation mark is sighted or a change in sounding occurs
    - On breakdown of the engines, propulsion machinery remote control, steering gear or any easy essential navigational equipment, alarm or indicator
    - If radio equipment malfunctions
    - In heavy weather, if in any doubt about the possibility of weather damage.

- If ship meets any hazard to navigation, such as ice or a derelict
- In any other emergency or in any doubt.

1. Man over board when you are on watch immediate action and completely describe?
    - Release life buoy with light and smoke signal on the side where the crew member has fallen overboard.
    - Take immediate avoiding action so as not to run over the man over board
    - Sound three prolonged blasts of the ships whistle and repeat as necessary
    - Post a look out with binoculars and instructions to maintain a continuous watch on the man overboard
    - Hoist signal flag 'O'
    - Commence a recovery manoeuvre, such as Williamson turn
    - Engage hand steering, if helmsman available
    - Note ships position, wind speed and direction and time
    - Inform master, if not already on the bridge
    - Inform engine room
    - Place engines on stand-by
    - Muster rescue boat's crew
    - Prepare rescue boat for possible launching
    - Distribute portable VHF radios for communication
    - Rig pilot ladder/nets to assist in the recovery
    - Make ship position available to radio room/GMDSS station
    - Broadcast DISTRESS message to ships in the vicinity.

Derricks

Velle derrick:

The advantages of this type of rig are that cargo-handling speed can be increased, since the derrick can engage in luffing and slewing operations at the same time while under full load. It has also been shown to be a very stable rig in operation, being controlled by a single operator using

a joystick lever control similar to the Hallen derrick.

Hellen

This probably represents one of the most successful advances in lifting gear over the last twenty years. The many advantages of this type of derrick make it a very popular choice with the shipowners (see Figure 5.10).

The derrick is labour saving, as it can be operated by one man. The lifting capacity may be up to 200 tonnes, through a working radius of 170°, being topped up to 85°. It is an extremely stable rig, being supported by either a straight mast or a 'Y' style mast. Stabilising outriggers provide superior leads for the slewing operation over the greater working area. These outriggers, a recent innovation, have almost completely superseded

the ‘D’ frame design of the early 1960s.

CRANES AND DERRICKS – ADVANTAGES AND DISADVANTAGES

Cranes. Advantages in use are:

1. Ability to plumb over the lifting point.
2. Single-man operation, controlling luffing, slewing and hoisting.
3. Straight lift means that SWL is usually adequate.

Disadvantages in use are:

1. Complexity of operation requires lengthy maintenance.
2. SWL decreases with jib radius, because the span becomes less effective as it approaches the horizontal.
3. Large amount of deck space required for installation.

Derricks. Advantages in use are:

1. Simplicity of component parts.
2. Ability to change rig to suit loading/discharging requirements.
3. Maintenance is minimal, provided that winches are good.

Disadvantages in use are:

1. Deck is cluttered with guyropes and preventers.
2. Operation usually requires two winch drivers and a hatchman.
3. Time delays in changing derrick rig for different cargoes.

"confined space" means a fully or partially enclosed space,

1. (a) that is not both designed and constructed for continuous human occupancy, and
2. (b) in which atmospheric hazards may occur because of its construction, location or contents or because of work that is done in it."

# *ANCHORING*

1. What are the types of anchor onboard?

| TYPES OF ANCHOR | HOLDING POWER (H.P.) |
|---|---|
| Admiralty pattern socked or common anchor | (3 to 4 ) x weight of anchor |
| Standard Stockless anchor | (3 to 4) x weight of anchor |
| Admiralty cast anchor Type AC 14 | (7.5 to 12) ) x weight of anchor **or**<br>(2 ½ to 3) x [ H.P. of Standard Stockless anchor ] |
| Mooring anchor | (6 to 16) x weight of anchor **or**<br>(2 to 4) x [H.P. of Standard Stockless anchor]<br>**High holding power anchor** |
| Dan forth anchor | 14.2 x weight of anchor |

2. What is scope of cable, wind rode, Tide Rode, Lee Tide, weather tide, Surge the cable ,Veer the cable, Snub the cable ,walk back, kedging ,cable is nipped ,cat the anchor?

SCOPE OF CABLE = Length of cable from hawse pipe to anchor
Vertical distance from hawse pipe to the sea-bed

WIND RODE: When ship is riding at anchor head to wind.
TIDE RODE: When ship is riding at anchor head to tide.
LEE TIDE: Tidal stream is running in the same direction as wind.
WEATHER TIDE: Tidal stream is flowing in the opposite direction to the wind.
SURGE THE CABLE: To allow the cable or hawser rope to run out under its own weight.
VEER THE CABLE: Pay out cable under power, by walking the gypsy of the windlass.
SNUB THE CABLE: To stop the cable running out by using the break on the windlass.
WALK BACK: Lower the anchor under power
KEDGING: Moving a vessel by means of small anchors and anchor wraps.
CABLE IS NIPPED: Cable goes across the bow .It happened when we do not use weather anchor.
CAT THE ANCHOR: Hanging of an anchor either in hawse pipe (when use panama lead for passing anchor cable for buoy mooring) or fairlead on ship side (when use hawse pipe for passing anchor cable for buoy mooring)

2 Why scope is less in deep water?

Scope is a ratio between length of cable paid from hawse pipe and vertical distance from hawse pipe to the sea-bed. It will decreases if length of the cable paid is same in deep water as in shallow water

3 Is scope is in fraction?

No, scope is always in Natural number

4 Differentiate between

- Kenter lugless joining shackle and D lugged joining shackle/ what are joining shackles and their purpose?
- Spile pin and rod of same diameter of spile pin
- Spurling pipe and hawse pipe

| KENTER LUGLESS JOINING SHACKLE | 'D' LUGGED JOINING SHACKLE |
|---|---|
| Use to join shackle length of anchor cable.<br>It is much larger and stronger than common link | Use to join the cable to the anchor .The rounded crown part of shackle always face forward toward cable. |
| SPILE PIN | ROD OF SAME DIAMETER OF SPILE PIN |
| Tapered pin which holds pin of lugged | |

| | |
|---|---|
| shackle in place or which goes through all parts of lugless shackle. Spile pin is held in place by means of lead pellet hammered in to cavity at thick end of pin. | |
| SPURLING PIPE | HAWSE PIPE |
| The cable passes through these pipes from windlass or cable holder to the cable locker | • Two pipes on the either bow stow the bower anchors<br>• The axis of pipe does not exceed 45 from vertical |

2 What are the parts of shackle?

*Lugged Joining Shackle*

- lugs
- Jaw
- Crown
- Clear
- Bolt

*Kenter Lugless Joining Shackle*

- 2 halves interlock
- Stud
- Spile Pin
- Lead Pellet

2 What is the name of ½ shackle?

Ganger shackle

3 Why lead is use in joining shackle? How to open joining shackle?

- Lead pellet prevent Shackle's Spile Pin from accidentally falling from shackle
- It can remove easily by hammering its end and if it is jammed easily take out by drift pin.

2 How to find diameter of anchor cable?

The size of chain cable is measured by the diameter of the bar from which the links is made. Take the calliper and measured the chain from link horizontally and vertically then take mean.

3 Are all links of same size?

| *LINK* | Size of Cable (mm) |
|---|---|
| Common Link (Intermediate Link) | D |
| Enlarged Link | 1.1D |
| Open Link (End Link) | 1.2D |
| D Lugged Joining Shackle | 1.3D |
| Kenter Lugless Joining Shackle | 1.4D |

4 What is Anchor cable marking? If 2 ships lost their anchor at same place and both sailed then after recovering how port authority confirm the anchor of particular ship?

Mark on anchor and cable

Serial Number of the certificate

Certifying Authority

Identification of cable

*Kenter Lugless Joining Shackle*: To indicate third joining shackle, the third link on each side of the joining shackle is painted white and the stud is bound with seizing wire.

*D-Lugged Joining Shackle:* Open link on each side of the shackle is ignored when marking the cable. The marking is same as 'Kenter Lugless Joining Shackle'.

5 Explain the construction of devils claw?

6 How will you secure spurling pipe and what is its purpose? What are the extra lashings?

7 How to prepare to let go anchor?

PREPARATIONS WHEN GOING TO ANCHOR:

1. Ask engine room for deck and windlass power.
2. Anchor party standby.
3. Checks to be made-
   - Windlass oil, bottle screw, fair lead, capstan, bitter end and chain locker.
   - All moving parts and gears on the windlass are well greased.
   - Before switching on the windlass power ensure that the anchor breaks are tight and bow stopper is well secured and windlass is not in gear.
   - Take windlass is in gear.
   - Anchor lashings at hawse pipe and **break cement pudding at spurling pipe by taking off the brake and walk the cable back a short distance**.
   - Check over side is clear and anchor sighted.

- Anchor lights and shapes available.
- When taking in anchor deck water.

1. Switch on windlass. Put windlass in gear, slacken on break and take slight weight on the bow stopper

2. Clear away the bow stopper.

3. Lower away the anchor under power and leave the anchor hanging about 1m above water level.

4. Tighten breaks and disengage windlass from gear.

5. Inform bridge anchor is ready for letting go.

DEEP WATER ANCHORING:

1. Do not let go anchor.

2. The anchor is then walked back all the way to the seabed.

3. As the vessel drops astern the cable will grow. The officer on watch should be aware of the amount of cable being paid out so that too much cable is not paid out till the bitter end.

4. Officer should be aware of the windlass capacity when picking up the anchor- amount of cable paid out plus the weight of the anchor.

*Letting go is not prohibited because*:

1. Control could be lost due to excessive weight on the cable, thereby resulting in loss of anchor and cable making the vessel unseaworthy.

2. Possibility of serious damage or injury.

2 Master has informed about anchor position, you have to proceed to that position and anchor

| ANCHOR | RUDDER | ENGINE | REMARKS |
|---|---|---|---|
| Head to wind or tide | Accordingly | Slow ahead | Vessel moves ahead |
| Anchor stand by | Midship | Stop Engine | Vessel losses her ahead momentum |
| Walk back anchor | Midship | Slow astern | Vessel stop at anchorage, As propeller wash reaches the ship beam |
| Let go anchor | Midship | Slow astern | Vessel drift astern |
| Render anchor cable | Midship | Stop Engine | Vessel losses her astern momentum |
| Hold anchor cable by their scope | Midship | Stop Engine | Vessel moves toward anchor and riding on her anchor (i.e. Anchor is brought up) |

there?

3 How to decide anchor brought up?

Cable tightens then slacks (twice).

- Vessel is stopped, holding the ground and riding her anchor

- When brake is holding cable rising up from the water surface towards the hawsepipe
- Vessel move towards the anchor, causing the cable to make a catenary (Long Stay).

2 How to find out length of anchor cable?

Length of cable (m) = Number of shackles x 27.5 m

Swinging circle (M) = $\frac{\text{L.O.A(m) + Length of cable - UKC}}{1852.3}$

3 Anchor dragging how you know?

- By taking the visual position, vessel come out of turning circle.
- Check vessel gathers sternway.
- By inspecting the disposition of cloth/Flag tie where chain passes over anchor windlass. At dragging the cable will slacken and tighten
- By 'Feeling the cable' (putting the hand on the cable forward of windlass a vibration may felt or we hear vibration of anchor bouncing over sea bottom)
- In poor visibility and soft bottom dropping a lead line onto bottom and noting whether the line tends to lead ahead.
- By ARPA guard ring alarm

# *SHIP HANDLING*

1. What is Slip wire?

   It is generally first line to cast off at mooring and last line to let go at unmooring It uses to enable the vessel let herself go, at any time, with out being dependent on the port's linesmen to clear lines from bollards.

2. How you secure ship with anchor cable on single buoy?

   - Flake the slip wire (24 mm) on deck to allow free running. Seize the eye of the wire to allow it to pass through the ring of the mooring buoy
   - Hang off stbd anchor by good mooring wire and walk back on the windlass as far as the first joining shackle it is best to stopper off the anchor in the hawse pipe and pass cable over the fairlead rather than risk hanging the anchor off outside where it would be difficult to control.
   - Break the joining shackle and attach a mooring shackle to the open link on the free end of the cable.
   - Bend a manila messenger line (30 mm) to the 3rd studded link of the cable
   - Head to tide and approach slow ahead with the buoy slightly on the starboard bow

- Give a touch astern when coming up to the buoy, ship will swing from head, towards the buoy
- When ship hold position lower the slip wire and messenger down to a mooring boat
- Check the man have life jacket who 'jump the buoy'
- The messenger line should be led through the ring of the buoy
- Allow the mooring boat to clear the buoy area then heave
- Make figure of 8 instead of securing eye over bit. It may difficult to let go again.
- When the cable is fast heave in the slack on the windlass so that the weight is taken off the slip wire on board
- Initial contact with and subsequent control of the buoy may also be established with one mooring rope off each bow

1. What is squat? Its maximum effect is forward Part of vessel or aft part? How to reduce effect?
    - The difference between the vertical positions of a vessel moving and stopped.

      When depth > (7 x draught) [ considered appreciable ]

      When depth < (2 ½ x draught) [ Increasing Significantly ]

      Squat in open water = $\frac{C_b \times V^2}{100}$ , Squat in confined water = $\frac{2 \times C_b \times V^2}{100}$
    - SQUAT BY STERN: If longitudinal centre of buoyancy is aft of centre of floatation

      SQUAT BY HEAD: If longitudinal centre of buoyancy LCB is forward of centre of floatation
    - The effect can reduce by slacken the speed of vessel or take ship in deep waters.

1. Define the following?

TURNING CIRCLE: A roughly circular path when a vessel alters her course under helm through 360° or the path traced out by pivoting point

PIVOTING POINT: It is a point about which a ship rotates. It position vary according to her movement.

| | |
|---|---|
| Engines Ahead | (1/3rd L.O.A) from Forward |
| Engines Astern | Rudder Stock |
| When stopped | Midship |
| Due to wind | Toward greater windage area. |

ADVANCE: Distance travelled by the centre of gravity along the original course

Advance < 5 x Ship's Length

TRANSFER: Distance travelled by the centre of gravity measured from the original track

to the point where the vessel has altered her course by 90°

TACTICAL DIAMETER is the transfer for 180°

Tactical diameter < 4 x Ship's Length

FINAL DIAMETER: The diameter of the turning circle when ship's path has finally become approximately circular.

STOPPING DISTANCE: The minimum distance that a vessel needs to rest over the ground

Stopping Distance < 6 x Ship's Length

2. What is manoeuvring data?

It gives the information about

- Steering particulars
- Propulsion particulars
- Bow Thrusters effect
- Tuning circles at Maximum rudder angle in shallow or deep waters while loaded and ballast passage

Stopping characteristic

Emergency Manoeuvres

Performance may differ from this record due to environmental, hull and loading condition

1. What are Propeller thrusts? Behaviour of vessel full astern having right handed propeller and left handed propeller?

AXIAL THRUST

- The fore and aft thrust, is a force which causes a ship to move ahead or astern through the water. It is most efficient when the ship is moving ahead.

[Full Astern Axial Thrust = Half ahead Axial Thrust]

- The stopping distance of a ship depends upon axial thrust

TRANSVERSE THRUST/ SCREW`S EFFECT

- Sideways thrust of the propeller blades as they rotate which produce turning effect
- The upper blades meet less resistance because it is near the water surface and lower blades experience greater reaction to motion of propeller. The upper blade can't easily cancel out the opposite effect of the lower blades.

*Behaviour of Vessel having Right Handed Propeller*

- When right handed propellers in head movement the resultant thrust tends to cant a vessel's stern to stbd and her head to port. It is apparent when engines are first put

ahead from rest. On gathering headway it counteracted by opposite rudder

- When a right handed propeller in stern movement ,the upper blades of propeller are less effective than lower blades and it result stern cants to port and head cants to stbd .The rudder is in effective when going astern.

  [Opposite in left handed propeller]

*Behaviour of Vessel having Controllable pitch Propeller*

- The canting effect of transverse thrust will always be same direction because shaft always rotate in same direction

1. Shortest turn to port in Twin-screw ship?
   Port engine half astern, stbd engine half ahead and rudder midship to turn a control turn.

2. How would you steer Twin-screw ship if stbd side propeller is lost?
   Port engine full ahead and helm / rudder on port side.

3. How would you steer the ship, which has lost her rudder in mid ocean?
   One engine half ahead, the other various to keep the vessel on course.

4. Turning short turn in narrow channel and consideration while turning?
   SHORTEST TURN IN RIGHT HANDED PROPELLER

| RUDDER | ENGINE | REMARKS |
|---|---|---|
| Hard Stbd | Half Ahead | Vessel turning to stbd, as vessel start to make headway |
| Midship | Stop | Vessel will lose her head momentum |
| Midship | Half Astern | Bow cants to stbd, as vessel start to make sternway |
| Midship | Stop | Vessel will lose her stern momentum |
| Hard Stbd | Half Ahead | Vessel turning to Stbd |

| ANCHOR | RUDDER | ENGINE | REMARKS |
|---|---|---|---|
| Put astern to tidal stream, stbd anchor stand by | Hard Stbd | Stop Engine | Vessel turning to Stbd |
| Let go Stbd anchor at short stay | Midship | Half Astern | Vessel swing around cable |
| Heave up the anchor | Hard Stbd | Half ahead | Vessel come toward the anchor |
| Bring anchor to home | | | Vessel will on reciprocal course |

SNUB AROUND THE CABLE

CONSIDERATION WHILE TURNING

- Length of vessel
- Draught and trim of vessel
- Depth and navigable width of water

- Manoeuvring data (Advance, Transfer, Tactical Diameter)
- Distribution and stowage of cargo
- Traffic density
- Wind
- Tide

1. Why port anchor considered the working anchor in the northern hemisphere?
   When a gale is blowing up, the wind veers and if second anchor is let to ride then there will be no fouling of cable

2. What is standing moor, running moor Mediterranean moor and Baltic moor?
   STANDING (Ordinary, Dropping, Straight) MOOR

| ANCHOR | RUDDER | ENGINE | REMARKS |
|---|---|---|---|
| Head to wind or tide | Accordingly | Slow ahead | Vessel moves ahead about half ship's length ahead of position finally bring up. |
| Weather /off shore anchor stand by | Midship | Stop Engine | Vessel losses her ahead momentum |
| Walk back weather / off shore anchor | Midship | Slow astern | Vessel stop at anchorage, As propeller wash reaches the ship beam |
| Let go weather / off shore anchor | Midship | Stop Engine | Vessel drift astern |
| Render anchor cable | Midship | Stop Engine | Vessel losses her astern momentum |
| Hold anchor cable by sum of two final length of cable to payout along the wind or tide | Midship | Stop Engine | Vessel moves toward anchor and riding on her anchor (i.e. Anchor is brought up) |
| Let go lee / on shore anchor | Midship | Stop Engine | Vessel stop moving |
| Veering or rendering on lee / on shore anchor cable and heaving on riding cable | Accordingly | Dead Slow ahead | Vessel moves ahead |
| Hold anchors cable by their scope | Midship | Stop Engine | Vessel reaches her position |

Wind and Tide from same direction

| ANCHOR | RUDDER | ENGINE | REMARKS |
|---|---|---|---|
| Head to wind or tide | Accordingly | Slow ahead | Vessel moves ahead about half ship's length ahead of position finally bring up. |
| Weather /off shore anchor stand by | Midship | Stop Engine | Vessel losses her ahead momentum |
| Walk back weather / off shore anchor | Midship | Slow astern | Vessel stop at anchorage, As propeller wash reaches the ship beam |
| Let go weather / off shore anchor | Weather helm | Slow astern | Vessel drift astern and bow cant away from weather anchor |

Wind and Tide from different direction

*Same as last above 5 points*

| ANCHOR | RUDDER | ENGINE | REMARKS |
|---|---|---|---|
| Head to wind or tide | Accordingly | Slow ahead | Vessel moves ahead about half ship's length ahead of position finally bring up. |
| Port /off shore anchor stand by | Midship | Stop Engine | Vessel losses her ahead momentum |
| Walk back port / off shore anchor | Midship | Slow astern | Vessel stop at anchorage, As propeller wash reaches the ship beam |
| Let go port / off shore anchor | Midship | Slow astern | Vessel drift astern |
| Render anchor cable | Midship | Stop Engine | Vessel losses her astern momentum |
| Hold anchor cable by sum of two final length of cable to payout along the wind or tide | Midship | Stop Engine | Vessel moves toward anchor and riding on her anchor (i.e. Anchor is brought up) |
| Let go stbd / on shore anchor | Midship | Stop Engine | Vessel stop moving |
| Veering or rendering on stbd / on shore anchor cable and heaving on riding cable | Accordingly | Dead Slow ahead | Vessel moves ahead |
| Hold anchors cable by their scope | Midship | Stop Engine | Vessel reaches her position |

Calm Weather

RUNNING (Flying) MOOR

Wind and Tide from same direction

| ANCHOR | RUDDER | ENGINE | REMARKS |
|---|---|---|---|
| Head to wind or tide | Accordingly | Slow ahead | Vessel moves ahead |
| Lee /on shore anchor stand by | Midship | Slow ahead | Vessel moves ahead |
| Walk back lee / on shore anchor | Midship | Slow ahead | Vessel moves ahead |
| Let go lee / on shore anchor | Midship | Slow ahead | Vessel moves ahead about half ship's length before of position finally bring up |
| Render anchor cable | Midship | Slow ahead | Vessel moves ahead |
| Hold anchor cable by sum of two final length of cable to payout along the wind or tide | Midship | Stop Engine | Vessel loses her head momentum and lee anchor is brought up |
| Let go weather / off shore anchor | Midship | Stop Engine | Vessel stop moving |
| Veering or rendering on weather / off shore anchor cable and heaving on sleeping cable | Midship | Slow astern | Vessel drift astern |
| Hold anchors cable by their scope | Midship | Stop Engine | Vessel reaches her position and riding on her anchor (i.e. Weather anchor is brought up) |

Wind and Tide from different direction

| ANCHOR | RUDDER | ENGINE | REMARKS |
|---|---|---|---|
| Head to wind or tide | Accordingly | Slow ahead | Vessel moves ahead |
| Weather /on shore anchor stand by | Weather helm | Slow ahead | Vessel moves ahead |
| Walk back weather / on shore anchor | Weather helm | Slow ahead | Vessel moves ahead |
| Let go weather / on shore anchor | Weather helm | Slow ahead | Vessel moves ahead about half ship's length before of position finally bring up |
| Render anchor cable | Weather helm | Slow ahead | Vessel moves ahead |
| Hold anchor cable by sum of two final length of cable to payout along the wind or tide | Midship | Stop Engine | Vessel loses her head momentum and weather anchor is brought up |
| Let go lee / off shore anchor | Midship | Stop Engine | Vessel stop moving |
| Veering or rendering on lee / off shore anchor cable and heaving on sleeping cable | Lee helm | Slow astern | Vessel drift astern and bow cant toward weather anchor |
| Hold anchors cable by their scope | Midship | Stop Engine | Vessel reaches her position and riding on her anchor (i.e. Lee anchor is brought up) |

Calm Weather

| ANCHOR | RUDDER | ENGINE | REMARKS |
|---|---|---|---|
| Head to wind or tide | Accordingly | Slow ahead | Vessel moves ahead |
| Stbd /on shore anchor stand by | Midship | Slow ahead | Vessel moves ahead |
| Walk back stbd / on shore anchor | Midship | Slow ahead | Vessel moves ahead |
| Let go stbd / on shore anchor | Midship | Slow ahead | Vessel moves ahead about half ship's length before of position finally bring up |