

Calculating cargo load



**ASSIGN
BUSTER**

“ MV STC Bulk Carrier” is a geared handy max bulk carrier with five holds and a DWT of 49500T (summer).

SHIPS GENERAL PARTICULARS

NAME: STC BULK CARRIER

- TYPE: BULK CARRIER
- DWT SUMMER: 49500 T
- DISPALCEMENT SUMMER: 57923TONNES
- DISPLACEMENT WINTER: 56423TONNES
- NUMBER OF HOLDS: 5 (ALL CAN CARRY HEAVY ORE)
- CRANES: 4×30 TONNES
- HEAVY WEATHER HOLD: NO 3
- BALLAST PUMP CAPACITY: 2x2000T/Hr
- CONSUMPTION:
- FO-32TONNES PER DAY
- DO-2TONNES PER DAY IN PORT
- FW-4TONNES PER DAY IN PORT AND AT SEA
- SEA SPEED: 14 KNOTS

The ship has received the voyage orders as follows:

1. Discharge bulk sugar SF 1. 224 m³/tonnes at Jubail using 3 vacuum discharge at a rate of 250t/hr per vacuum discharge
2. Load maximum cargo of sulphur SF 0. 87 m³/tonnes with 4 shore feeders at Sharjah. Maximum draft at Sharjha berth is 15 metres
3. Vessel will receive the required bunkers for the voyage at Sharjah after cargo operation.

DISTANCE FOR THE VOYAGES

- Distance Dar Es Salam to Jubail is 3744 Nm
- Distance Jubail to Sharjah is 373 Nm
- Distance Sharjah to Summer Load Line is 3210 Nm
- Distance Sharjah to Melbourne is 6490 Nm

The vessel is presently in tropical zone and will be entering the summer zone on its way to Melbourne, so cargo should not be loaded keeping in mind that the vessel should be at here summer marks an arrival at summer load line i. e zone allowance should be added to get the correct value of cargo to be loaded.

This assignment covers a detail calculation on how to get the total amount of cargo to load when vessel will be entering from one zone to other and different loadicator conditions.

ANSWER:

Gather information relating to the cargo from the IMSBC, company procedure, flag state requirements.

Check if the cargo is in group A, B, C

Sulphur is in Group B and Group C. The IMSBC states that the group B cargo of sulphur cannot be carried in bulk so we will be carrying group C sulphur cargo.

GENERAL PROCEDURES FOR PREPARATION OF HOLDS

- Tool box meeting to be carried out (MCA, 2016)

- Risk assessment to be carried out (MCA, 2016)
- Communication to be checked between the hold , bridge and cargo control room (MCA, 2016)
- The cargo hold to be properly ventilated , gasses to be checked and a permit of work to be issued (MCA, 2016) (IMO, 2016)
- Dunnages to be removed if any.
- Bilges to be cleaned and dry (P&I, 2002)
- Strum boxes, bilge covers, sounding pipes and thermometer pipes should be cleaned and not be defected
- Bilge suction of each hold to be tried out and bilges in good order (IMO, 2016)
- Bilges to be covered with burlap.
- The ventilation should be tried out
- Any damage in the cargo hold to be repaired (MCA, 2016)
- Hatch covers and entrance to the holds to be tried out for water tightness (P&I, 2002)
- Hatch track ways to be cleaned (P&I, 2002)
- All lighting arrangement in holds to be checked and any damaged or not working ones to be replaced (MCA, 2016)
- Fire detection & extinguishing system should be checked (STC, 2017)
- A thorough hold inspection to be carried out (P&I, 2002)
- Crew should wear helmets, gloves, boiler suits, dust masks and gum boots at all time during cleaning process , safety harness to be used when working aloft in the holds (MCA, 2016)
- DB tanks to be pressed to check if any leaks in the holds.

- Discharging of hold washing water should be carried out in accordance with MARPOL Annex V regulation 4. 1. 3 & 6. 1. 2 (IMO, 2011)
- Test entries to be logged down (STC, 2017)
- Any special requirements by the terminal, owners or flag state for hold preparation should be carried out.

ADDITIONAL PREPARATION FOR SULPHUR CARGO

- Fresh water washing of holds to be carried out. (P&I, 2002) (IMO, 2016)
- Fire line to be rinsed using fresh water from fresh water tanks using a GS pump. Once the line is flushed make sure that the anchor wash and all fire hydrants are shut (P&I, 2002)
- Holds and bilges to be completely dry before loading (IMO, 2016)
- Electric equipments in holds & nearby spaces should be intrinsically safe or if not then they should be isolated (IMO, 2016)
- Ventilators Spark arrestors to be inspected & repaired if required (IMO, 2016)
- Bilge pumping arrangement shall be inspected for satisfactory operation
- lime washing should be done on tank top and lower sections of cargo spaces (IMO, 2016)
- Upper part of the hold shall have a sound coating of paint, if any paint has been pilled off then that area shall be painted (IMO, 2016)
- Any loose corrosion shall be removed (IMO, 2016)
- Machinery and equipments to be covered to protect it from small sulphur dust particles (IMO, 2016)

ANSWER

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HAZARDS OF RAW SUGAR AND SULPHUR

RAW SUGAR

- Sugar dissolve when comes in contact with water, this may result in formation of air pockets in the body of the cargo as the ship moves (IMO, 2016) (P&I, SEPT 2006)
- It has a tendency of self heating/spontaneous combustion. It should be loaded well clear of places having source of ignition or heat
- Sugar has the tendency to absorb order (BMTSURVEYS, NOVEMBER 2013)
- Raw sugar gets contaminated (BMTSURVEYS, NOVEMBER 2013)
- Shrinkage or shortage of cargo due to loss of water vapour (BMTSURVEYS, NOVEMBER 2013)
- Insect may be formed in sugar which can lead to diseases (BMTSURVEYS, NOVEMBER 2013)
- Sugar if melted may form sticky syrup like form (P&I, SEPT 2006)
- Raw sugar has a distinct molasses smell that will spoil other cargoes (Thomas, n. d.)
- Raw sugar has a higher moisture than refined (Thomas, n. d.)

SULPHUR

- Flammable and may have dust explosion during loading and unloading
- If catches fire emits harmful gases
- It reacts with sea water and produces corrosive acids and suffocating gases

- Sometime of granule sulphur behaves like grain which may result in shifting of cargo
- Dry sulphur does not react with bare steel, but wet sulphur (sulphur containing free water) is potentially highly corrosive (P&I, 2002)
- When sulphur is loaded, any retained free water filters to the bottom of the holds during the voyage From there it is pumped out via the bilges (P&I, 2002)
- Person may get a burning sensation in eyes when loading sulphur

PRECAUTIONS WHEN LOADING AND DISCHARGING RAW SUGAR IN BULK

- Should be loaded away from the source of heat. NO SMOKING near the area of loading sugar (P&I, SEPT 2006)
- The ships hold should be cleaned well before loading and should be free from any odour
- Proper PPE to be worn by crew at all the time
- Dust clouds should not be formed during loading
- Temperature and moisture contains of sugar to be monitored during loading and carriage and if required ventilation should be carried out to avoid caking
- Fermentation may result in formation of CO₂ gas. Holds must be ventilated before entry and atmosphere to be checked (BMTSURVEYS, NOVEMBER 2013)
- Loading operation should not be carried out in case of rain
- Care must be taken to make sure that hot sugar is not loaded into a bulk carrier intended to sail through cold waters to its discharging port, as change in temperature establish within a cargo can result in

moisture transfer, and this in turn can cause caking of the cargo
(Thomas, n. d.)

PRECAUTIONS WHEN LOADING AND DISCHARGING SULPHUR IN BULK

- Smoking and hot work shall not be permitted in cargo spaces and nearby area
- All spaces and storerooms adjacent to the cargo area should be properly ventilated and proper precautions should be taken when entering in cargo hold and atmosphere should be monitored
- A fine spray of fresh water is used to keep the dust down
- The loader should be positioned properly to avoid formation of dust clouds
- Loading operation should not be carried out in case of heavy rain
- Proper trimming of cargo to be done
- Surface ventilation must be carried out as required during the voyage
- Face mask and eye protection should be worn at all times
- Lime washing of the tank top to be carried out cargo holds and bilges do be completely dry to prevent corrosion
- The upper part of the hold should be painted and pilled of paint should be repainted to avoid corrosion (IMO, 2016)
- Protect the machinery and equipments from small dust particles of sulphur (IMO, 2016)
- If sulphur catches fire, it should be smothered with more sulphur or with a very fine spray of fresh water – not salt water (Thomas, n. d.)
- There is danger of dust explosion with powdered sulphur during loading and whilst cleaning the holds of sulphur (Thomas, n. d.)

The shipper is required to provide the information regarding the cargo to be loaded as per SOLAS 1974 Chapter VI Reg 2 and the IMSBC Code section 4.

2. Shipper may deliver this declaration by fax or other electronic device. In any electronic device where the signature of the declaring party cannot be transmitted full name of the declarant in capital letters must be provided on the form (STC, 2017)

Cargo information shall be confirmed in written and by suitable shipping document before loading (IMO, 2016)

Document should contain following information.

- The BCSN (IMO, 2016)
- The group of cargo (IMO, 2016)
- IMO class of the cargo (IMO, 2016)
- The UN number if applicable (IMO, 2016)
- The total quantity of cargo to load (IMO, 2016)
- The stowage factor (IMO, 2016)
- If trimming required and the procedures for trimming (IMO, 2016)
- Angle of repose (IMO, 2016)
- If the cargo has a likelihood of shifting (IMO, 2016)
- Moisture content certificate (IMO, 2016)
- Transportable moisture limit value (IMO, 2016)
- If the cargo may form a wet base (IMO, 2016)
- Toxic or flammable gases emitted by the cargo (IMO, 2016)
- Flammability, toxicity, corrosiveness of the cargo (IMO, 2016)
- Self heating properties of the cargo if any (IMO, 2016)

- Gases emitted if in contact with water if applicable (IMO, 2016)
- If the cargo has any radioactive properties (IMO, 2016)
- And other information required by the national authorities (IMO, 2016)
- Whether the cargo is harmful to the marine environment (IMO, 2016)
- Shipper details (STC, 2017)
- Transport document number (STC, 2017)
- Means of transport (STC, 2017)
- Place of loading (STC, 2017)
- Port of discharging (STC, 2017)
- Additional certificate like weathering certificate , exemption certificate if applicable (STC, 2017)
- Human health criteria data (STC, 2017)

To obtain the information require by the section 4 of IMSBC code the shipper need to get the cargo properly sampled and tested (IMO, 2016)

When water is found cargo holds loaded with bulk cargo there are a many reasons and each should be taken into account (P&I, 2017) (Thomas, n. d.)

The water may be given out by the cargo or there is a leak in hatch covers. It may have entered through any access hatch or an open sounding pipe.

Water may have sipped in through a crack in the deck or the hatch coming or through a damaged ventilator (P&I, 2017) (Thomas, n. d.)

Ship staffs should have an accurate idea of the capacity of the hold bilge wells i. e. the greatest value are the sounding of the bilge when full and the approximate tonnage of water contained by the bilge when full (P&I, 2017) (Thomas, n. d.)

Aboard a ship which is well maintained the possible cause for an increased hold bilge sounding is that water has drained from the cargo into the bilge. When water is drain from the cargo there are two key requirements. The water must be pumped out of the bilge and not allowed to flood the hold, and the tonnage of water removed must be logged. It is advisable to keep a record of the tonnage of water discharged from the hold bilges, as recommended by the *UN Draught Survey Code*²⁴ and in some trades it is a charter party requirement (P&I, 2017) (Thomas, n. d.)

When soundings are found to be rising for no reason a problem must be suspected and the hold must be investigated for a leak. The accessibility to the hold will depend upon the quantity of cargo, speed of flooding, shifting cargo and dangerous gases. If the hold can be safely entered, taking all precaution for enclosed space entry it may be possible to find an explanation for the flooding. If the hold cannot be entered, a careful exterior inspection of the compartment in search for any fitting which is improperly closed or damaged. If the sounding is found to increase whenever the vessel ships water on deck, a leak at deck level should be suspected. If the flooding continues at the same rate, or an increasing rate, at all times it suggests that the damage is below water level (P&I, 2017) (Thomas, n. d.)

FOLLOWING ACTIONS TO BE CARRIED OUT

- Firstly find out the amount of water in the hold and the root cause of water ingress
- Carry out a risk assessment of the situation

- Check the sounding of the bilges ballast tanks , fuel oil tanks, void spaces etc
- No cargo operation to be carried out in hold No1 until total assessment of situation carried out
- Stability of the ship to be checked
- If entry in hold is to be done then ventilate the holds and work permit to be issued
- Inform the terminal about the damage
- Calculate the total amount of cargo damaged
- Make a log book entry of all the events
- Make sure all man holds nut bolts full tight and gasket in good condition
- Check comings, booby hatch entrance and deck plaiting for leakage
- Make sure all the bilge valves are properly shut
- Do not allow anyone to take pictures of the hold without permission
- If cargo damage is found, contact P&I correspondents and ask them to arrangement of a survey.

Following information to be given to correspondents:- name of the vessel, date of the incident , place of the incident , cargo particulars, quantity of damaged cargo, amount of the damage, location of cargo, bill of lading no, loading port, loaded quantity , cause of the damage, contact details of the agent – ETA/ETD of the vessel (P&ICLUBJAPAN, n. d.)

- Try to control further damage by taking all possible measures for lessening of damage unless such would involve a risk to the vessel's safety (P&ICLUBJAPAN, n. d.)

- Take photos of the damaged cargo and the suspected causes (P&ICLUBJAPAN, n. d.)
- Log book entries like, sea conditions, weather and wind force (P&ICLUBJAPAN, n. d.)
- Sea protest should be filed at next calling port, if the damage was caused by bad weather (P&ICLUBJAPAN, n. d.)
- Make sure all time delays have been logged

FOLLOWING PERSONS TO BE INFORMED

- Owners
- Charters and sub charters
- Manager
- Local agents
- Vessels insurance club e. g. P&I
- DPA
- Technical superintendent of the ship
- Terminal
- Class of the vessel

OTHER REFERENCES (Swedishclub, 2013) (P&I, 2017) (WEST OF ENGLAND , n. d.)

Q10 PROCEDURE FOR MAINTAINING THE CARGO LIFTING PLAN

Regular maintenance should be carried out in order to keep the equipment in good order (MCA, 2006) (MCA, 2016)

Inspection of the equipments should be carried out by a competent person. It should be carried out as required by the Regulations but in any event at least once annually (MCA, 2006) (MCA, 2016)

Check for defects like cracks, corrosion and wear and tear that could affect SWL (MCA, 2006) (MCA, 2016)

If in doubt about the equipment has , exceeding the Safe Working Load (SWL), or subjected to treatment likely to cause damage, it should be removed of service till a competent person carries out an examination (MCA, 2016) (MCA, 2006)

Regular greasing of equipments to be carried out (MCA, 2006)

The condition of all ropes and chains should be checked regularly and damaged once to be replaced . Shackles, links and rings should be renewed if damaged (MCA, 2006)

Examine the structure for any damages (MCA, 2016)

There should not be any trapped water inside the Gentries (MCA, 2016)

Limit switch, stop botton, controls and brakes to be checked on regular basis (MCA, 2016)

Maker's specific parts to be used if any parts are to be replaced. Once any maintenance is done the equipment should be examined by a competent person before using it (MCA, 2016)

Cranes: The annual inspections and periodical thorough examination shall be carried out. Inspection and maintenance should be carried out as per the Planned Maintenance schedule (P&IUK, n. d.)

- The following things shall be inspected for signs of deformation, corrosion, cracks, etc
- Crane Jibs
- Winch and the foundation of the winch.
- Goose neck, blocks, shackles, hooks, spider bands etc
- Marking on the gear should be checked and clearly visible
- locking arrangements of all shackles and blocks to be inspected
- lubrication of all the parts should be carried out as per the lubrication plan in plan maintenance system
- All wires shall be inspected for any damages
- Hydraulic systems to be inspected for proper functioning

Blocks: Annual inspection of blocks to be carried out. Responsible Ships officer should carry out periodic inspection of the blocks on a periodical basis. Carry out the inspection and maintenance as per the PMS (P&IUK, n. d.)

Following checks to be carried out

- Check for free movement of sheave heads and swivel
- Check grooves on sheave for wear and tear
- Check if any distortion or damage on side plate.
- Check for any play in the axel pin
- Check that the thread of the pin is in good order .

- Check split pin and
- Grease nipples and markings should not be painted .
- Lubrication to be carried out as per the lubrication chart

Slings:(P&IUK, n. d.)

- Slings should be annually inspected
- Responsible Officer should inspect it before use
- Periodic inspection should be carried out a per PMS
- During these inspections the following shall be checked:-
- Check if any broken strands, kinks and corrosion.
- Check rings, thimbles, for damages, deformity and corrosion.
- Slings should not be used if any signs of damage
- Lubrication as per the manufacturer's
- Check the tags on sling and compare it with the certificate. A sling without a tag should not

Wires: Wire ropes should be inspected regularly and replaced if stands broken, kinked, worn, or corroded. They should be lubricated and renewed as per the PMS

Reference(MCA, 2016) (MCA, 2006) (STC, 2017) (P&IUK, n. d.)