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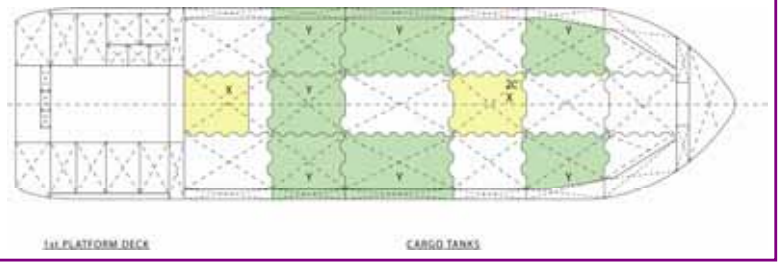
Experience 2 - Cargo stowage arrangements (a)

As indicated in the sections on cargo compatibility and segregation (1.3.2), a substance 'Y' can be stowed with regard to a previously loaded incompatible substance labelled 'X', as shown below.

This cargo stowage arrangement was carried by the author. However, the vessel encountered heavy weather, which resulted in cracks forming at the cruciform weld seam between the 1S and 2C cargo tanks, resulting in the tanks becoming common. So, while the vessel was loaded in accordance with the available guidance, the unforeseen event of a leak at the meeting of diagonally separated tanks resulted in contamination occurring.



The requirements of the IBC and BCH Codes must also be taken into consideration:

Cargoes, residues of cargoes or mixtures containing cargoes, which react in a hazardous manner with other cargoes, residues or mixtures, shall be segregated from such other cargoes by means of a:

- *Cofferdam*
- *void space*
- *cargo pump-room*
- *pump-room*
- *empty tank*
- *a tank containing a mutually compatible cargo*
- *have separate pumping and piping systems which shall not pass through other cargo tanks containing such cargoes, unless encased in a tunnel*
- *have separate tank venting systems.*

Experience 4 - Cargo pipeline passing through other tanks

A vessel was discharging a cargo of paraffin wax from No.4 Tank.

All other tanks had been cleaned for loading soybean oil except for No 2 Tank, which had been cleaned on the previous voyage and inspected before loading commenced. Loading commenced to No 2 Tank and, after 15 mins, the OOW advised that no cargo was being received in the tank.

The deck watchman advised that the manifold pressure was at 5kg/cm² and conducted a check of all cargo lines.

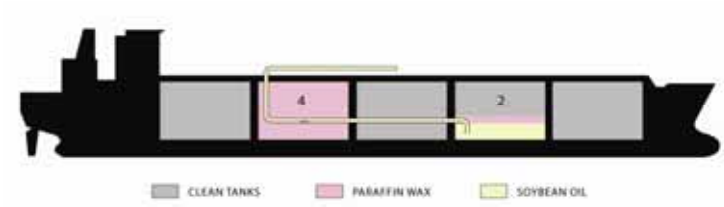
The line check confirmed that the cargo system was only open to No 2 Tank. At this time the hull of the vessel vibrated heavily and a roaring noise of liquid gushing was heard from No 2 Tank.

After loading was suspended, the tank lid was opened and large pieces of paraffin wax were found to be floating on the surface of the soybean oil.

Upon further investigation it was found that the cargo pipeline to No 2 Tank had a needle-hole in the pipeline where it passed through No 4 Tank. This line had subsequently filled and plugged with paraffin wax in No 4 Tank.

This plug was dislodged by a combination of the pressure and temperature of the hot Soybean oil.

This would have been a major incident had both cargoes been incompatible.



Experience 8 - Cleaning tanks with water

After receiving cargo orders to load methanol, a vessel loaded 2,000 tonnes of fresh water from the shore for use while tank cleaning.

Nobody onboard had prior experience of the carriage of methanol, so the fresh water was not tested for its chloride content before all the tanks were rinsed and the wash water subsequently discharged to sea.

On arrival to load methanol, the vessel was not accepted because of chloride contamination in the tanks.

The vessel returned to sea and used the balance of her bunker fuel to run the ship's fresh water generator at full capacity.

When the vessel arrived in port, arrangements were made for the supply of bunkers, fresh water and a copy of The Tank Cleaning Guide.

The instructions in the Tank Cleaning Guide were strictly followed and the vessel's tanks were accepted for loading.

2.3 Cleaning

The most important decision when tank cleaning is which of the following are to be used:

- Cleaning agent
- water and cleaning agent
- ventilation
- water only
    - with fresh or sea water
    - with hot or cold water.

The wrong decision may lead to a serious error and severe financial losses.

A few substances, toluene-di-isocyanate (TDI) for example, will react with water and form insoluble sediments. In such cases, a tank cleaning guide must be referred to for recommendations.

2.3.8 Steaming

Steaming is one of the best methods of cleaning non-flammable substances such as chlorides from the tank, as the steam can reach every corner and under each stringer. Steaming for 45-60 minutes is sufficient to freshen the tank and associated lines. The steam can be applied through a line from the manifold or directly into the tank cleaning hatch. The pump in the tank being steamed must be started (as required) to discharge any condensed water. On completion, carry out one of the following:

- Tank lids opened. The tank will be free of steam in 20 minutes and will be hot with dry surfaces inside
- tank lids left closed. The steam will condense onto the surface of the tank and will make it wet. This will give the best cleaning for chlorides but, in such cases, the vessel will need more time for tank drying.

*The main safety rule is that steam must **NEVER** be introduced into a tank that has flammable vapours*

A tank washing machine or other conductor (whether earthed or unearthed) must NEVER be lowered into a tank containing a mixture of steam and flammable vapour.

In some companies steaming is restricted and de-ionised water is used instead.

Experience 14 - Steaming tanks alongside while loading

A vessel had arrived and all tanks were accepted for loading except No. 4 Port.

No. 4 Port was not accepted due to the chloride content levels.

To avoid any claims from the shipper through the vessel's lack of readiness to load, loading was commenced into the accepted tanks.

No. 4 Port was steamed for 1 hour, with a diaphragm pump being used to discharge the condensed water. A diaphragm pump was used as the vessel could not use the cargo pumps for discharging, as these same lines were being used for loading.

No. 4 Port was then accepted and loading continued and the vessel received no claims or losses.

Note. Many terminals will not allow tank cleaning at the same time as the cargo operations.

3 Loading

3.1 Safety Precautions

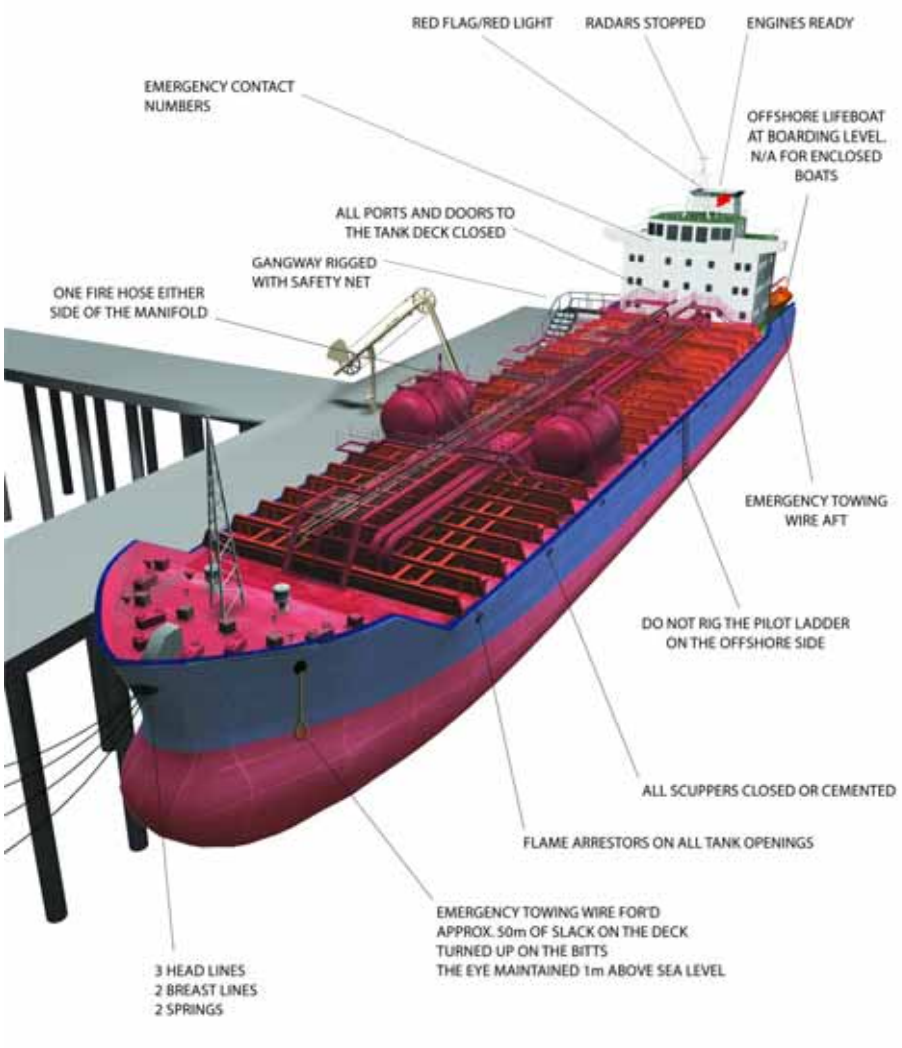


Figure 3.1 - Safety Precautions Alongside Berth

3.2.9 Stretcher

A stretcher should always be available and in a readily accessible location. This should be suitable for hoisting an injured person up from spaces such as the cargo pump-room.

3.2.10 Decontamination Shower and Eyewash

Suitably marked decontamination showers and eyewash stations must be available on-deck in convenient locations. They must be capable of operating in all ambient conditions. Generally decontamination stations are activated by standing on a base plate or pedal that stops the apparatus when you step off.

Photograph 3.3 - Decontamination Shower and Eyewash Station

Photograph 3.4 - Ship's Manifold

3.12 Cargo Discrepancy

3.12.1 Ship’s Figures Less than Shore Figures

The ship’s figures must be rechecked and, if the shortage remains, a Letter of Protest must be issued.

In the case of a shortage exceeding 0.5%, the vessel’s operator or the Ship Management Company should be notified prior to signing the B/L, and wait to receive clear instructions on the next action. This will be one of the following:

- Notification of the P&I club local representative
- signature of a Letter of Authorisation for the Agent, to authorise him to sign the B/L after the vessels departure
- to sign the B/L endorsed with the operators remarks.

Any loss of nitrogen in the tank should be refilled from the vessel's reserve of nitrogen.

5.3 Re-circulation

Some substances, like phosphoric acid, must be re-circulated during the voyage to avoid any sediments or non-dischargeable deposits in the tank. Occasionally, these can reach 1.5 metres from the tank bottom.

Re-circulating, through a diffuser, drop line or heating line is the best method of prevention

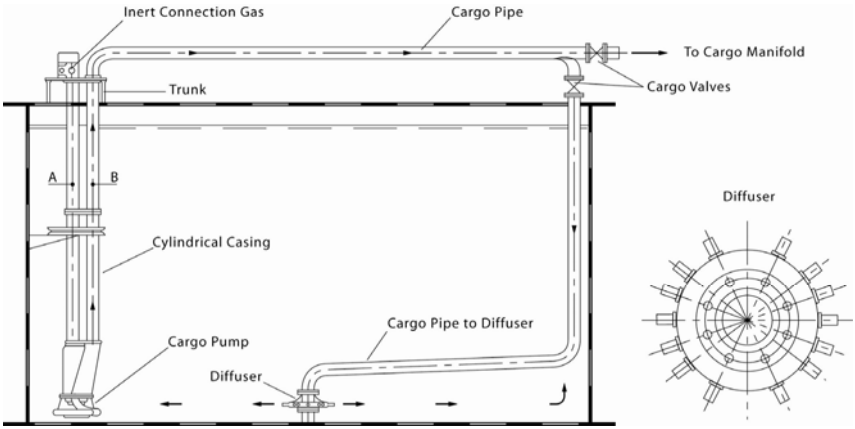


Figure 5.5 - Recirculation Diffuser

5.4 Inhibited Cargoes

In certain circumstances of heat and pressure, some cargo types can become viscous and possibly even solid and dense in nature.

This self reaction can cause some cargoes, in high heat conditions, to begin an exothermic effect, become self heating and rapidly expand with possible disastrous results to the ship.

As a precaution against this, exporters may add a chemical inhibitor additive to prevent the cargo from bonding within itself. However, one aspect of inhibitors is that

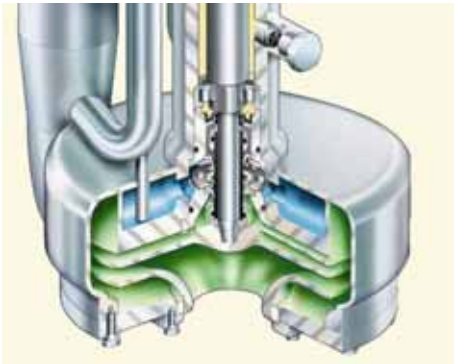


Figure 7.7 - Submerged Pump Pumphead Arrangement

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7.1.3 Portable Submersible (Emergency) Pump

A portable submersible pump is normally supplied for use as an emergency cargo pump in the event of failure of the main cargo pump. This pump is lowered through a tank cleaning hatch directly into the required tank.

7.1.4 Centrifugal Pumps

Kinetic pumps increase the liquid's velocity through the pump. An example is a centrifugal pump where the rotating impeller's propulsive force creates suction and centrifuges the liquid outwards to the discharge line. The absence of critical overpressure is a benefit of centrifugal pumps, but the lack of self-priming capacity and the difficulties when discharging high viscosity liquids can cause problems.

The flow of liquid to and from the pump must be matched exactly and this requires the flow on the suction side to be equal or greater than the discharge rate of the pump. When the flow to the pump suction falls below the pumping rate, cavitations of the pump will occur, with the possibility of a loss in suction and/or pump damage.

Centrifugal pumps do not suck liquids or have poor suction of liquids. Liquid flows to the pump by either pressure acting on the surface of the liquid or because of the relative height of the liquid level in the tank to the pump suction.

As no centrifugal pump can generate a total vacuum at its suction inlet, only a proportion of the atmospheric pressure can be usefully employed. Therefore, before a pump can operate satisfactorily, a certain pressure must exist at the pump suction and this is known as the required Net Positive Suction Head (NPSH).