GENERAL GUIDELINES FOR MOLASSES DISCHARGE

We are pleased to send you following guidelines for loading, heating, and discharging of Molasses. These guidelines are based on experience and should therefore only be regarded as general guidelines.

Molasses is a non-Newtonian fluid, and the pump ability does not only depend on viscosity, but also where the Molasses originate from, the storage time, the fermentation process in the Molasses and brix value etc.

LOADING

1. Before loading take place, all cargo pumps cofferdams must be purged, to confirm that no leakage is present.

2. To avoid crystallization of the molasses in case of leakage, the cofferdam must be filled with fresh water (approx. 5-10 ltrs) prior to loading.

3. Loading should be started carefully via drop line only, if possible. Avoid free fall of molasses through the tank hatch. This due to that molasses might entrap air bubbles (aeration) which again will increase fermentation. The fermentation gases might not escape the cargo and
cause serious problems during discharge.

HEATING

1. Temperature to be kept at a level of 35-38 degrees C during voyage to maintain sufficient pumping condition of the cargo.

2. Too much heating to be avoided, as possible fermentation process tends to increase at high temperature.

3. Max. temperatures increase over the cargo heaters (if installed) during heating operation is 10 degrees C. This is the most important checkpoint to avoid crystallization and blocking of the cargo heater and must be carefully checked at regular intervals during heating. If the temperature increase is too high, increase the cargo pump's capacity by increasing the hydraulic pressure until acceptable temperature increase is obtained.

However, running the cargo pumps at too high speed and high hydraulic pressure over a longer period of time, increases the risk of crystallization of molasses in the pumps' shaft seal area.

4. Maximum recommended temperature of heating medium is 120 degrees C. The heating medium must not be exposed directly to the cargo pump or into cargo pump discharge line or stripping line as this will lead to crystallization and damage of seal arrangement. Max. allowed temperature in cargo pump is 80 degrees C.

5. Running the cargo pump at reduced speed and the hydraulic pressure should be in a range up to approx. 100 bar.

6. The pressure drops over the cargo heater should not exceed 3 bar during normal heating operation.

DISCHARGE

1. In adequate time before discharge, cargo temperature to be increased to recommended temperature for discharging. Maximum discharge temperature not to be exceed 40 degrees C.

2. Stop heating operation by first closing the steam valve upstream to the cargo heater, leaving the pumps running for 10 - 15 minutes and then stop the pumps. Close the cargo valve upstream to cargo heater. Drain the cargo in heater back to tank.

3. Avoid too many pipe bends and pressure loss in the discharge line. Use as big discharge hose as possible.

4. Due to shore arrangement and location of reservoir, booster pumps to be used, if high discharge head.

5. Run the cargo pump at reduced speed and hydraulic pressure.

6. Due to foaming and possibility for cavitation, reduce the pumps' speed further when cargo tank is about ¾ empty.

7. If there is too much foam in the molasses during the last parts of discharging several methods have been tried to decrease the foam quantity
   a) Adding of chemicals (nontoxic)
   b) Re-circulation through drop line
   c) Adding of steam through tank hatch or butterwort openings
   d) Adding of air into molasses through tank hatch to stop fermenting process.

8. After discharge is completed, purge the cofferdam on all cargo pumps. Then pressure test cofferdam in accordance with instructions to confirm condition of cargo seals.

Charter's instructions to be followed if more restricted than above.
Exposure of molasses to higher temperatures than given above, may cause crystallizing with blocked cargo heater as a result. Therefore, we recommend the highest precaution and attention to the heating operation and guidelines provided.

As stated in the beginning of summary, molasses is a complicated cargo and information given above should therefore only be regarded as a guideline.

We hope the above information can be useful and please to not hesitate to contact us if you have any questions related to this matter.

Yours faithfully,

pr Framo Services AS