

De-ballasting Guide V6¹

1. For ballast water which has to pass through BWTS

- 1.1. Refer to the installed Ballast Water Treatment System operator's manual.
- 1.2. Refer to OJT 62 & 63.
- 1.3. Refer to HSE Procedure Manual section 6.14 Ballast Water Management.
- 1.4. Follow item 2.9² below when stripping the tanks.

2. For ballast water which has undergone exchange and where de-ballasting rate needs to be fast to catch up with the loading rate.

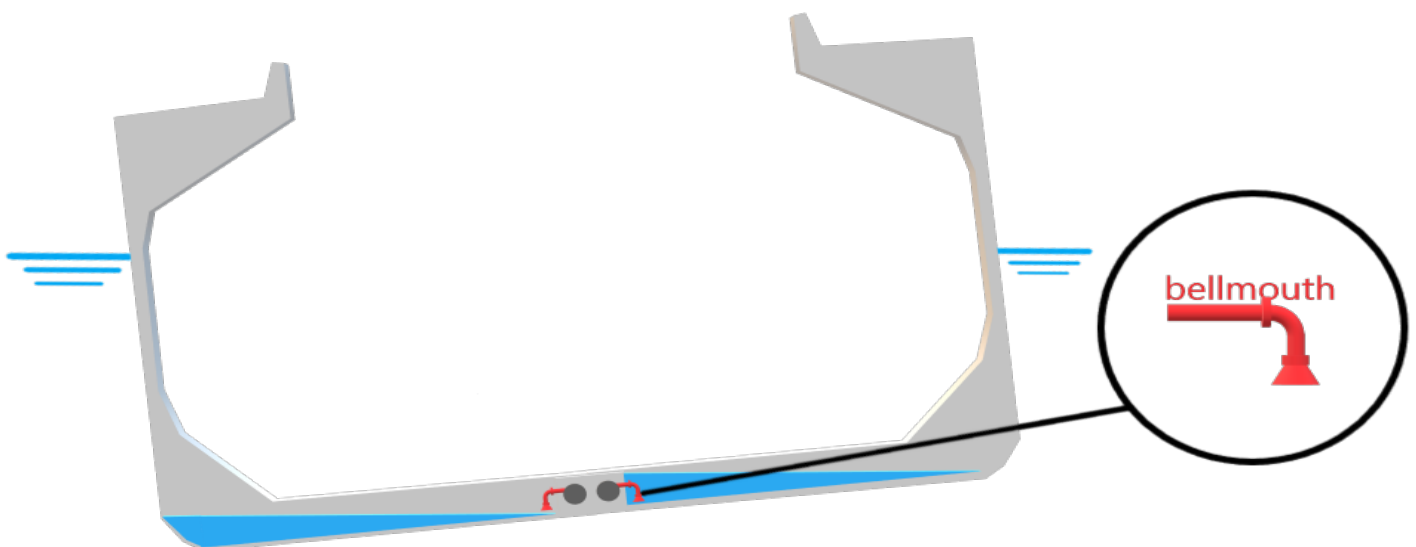
- 2.1. Provided that all Ballast System, Ejector System, and Fire and GS System including pipes, valves and gauges are in good working condition. Lining-up of valves in the engine room must be supervised by duty engineer and double-checked. Planning and coordination between duty engineers and duty deck officers are very vital.
- 2.2. Before berthing, relevant valves in the engine room for gravity out must be lined-up and ready.
- 2.3. Upon berthing, after initial draft survey, do a gravity out of all WBTs/DBTs by opening the valves all of them. In theory with 5 meters freeboard and with a single outlet with a diameter of 450mm pipe, about 7,000m³ will be discharged in about 2 hrs, a much faster than 1800m³/hr (2 pumps). For Supramax vessels, the integrated TSTs should be empty in less than 2 hrs.
- 2.4. After about 2hrs gravity out or when all integrated TSTs are all empty, valves must be lined-up for ballast pump use. At this stage keep all the WBTs/DBTs open and continue pumping out.
- 2.5. Ensure all ballasting operations are in accordance with the vessel's stability criteria, and the vessel is not operated outside the maximum shearing forces and bending moments for the vessel.
- 2.6. On the second run of the 1st poured hold, close other valves except the valves relevant to the 1st & 2nd poured holds. Continue pumping out with always 4 ballast valves open (this is to maintain more supply to the pump as ballast tank pipe diameter is smaller than the ballast pump in/out flange diameter. Continue doing this until no suction is observed and up to the last WBTs/DBTs.
- 2.7. Plan to apply the Venturi effect when pumping out, see Figure 2. The way it works is that aft tank must be half full while forward tank is in stripping condition. First, run the pump on the aft half-full tank, as soon you have got a good discharge pressure open the forward tank valve. This will create a vacuum in a pipe section forward of the aft tank. For the WBTs 4 & 5, the sea suction can be used as priming. The vacuum has a larger capacity than the

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ejector hence, stripping is faster. Constant monitoring is needed on the forward tank by sounding. Discharge pressure and vacuum fluctuations are also good indicators.³

- 2.8. At this stage DO NOT pump out the FPT & APT. Only leave an amount in the FPT and APT equivalent to your pump capacity (m³/hr). Use them to maintain the trim aft for better pumping out and stripping. You can pump out the FPT & APT using 2 pumps during 1hr before departure or even while underway provided that your vessel is not overdraft or overloaded. They must be pumped out last as they are very easy to pump out with very small residual quantity. Just make sure to take them into consideration when trimming the vessel. That when you pump out these tanks you will still achieve the desired draft and trim.
- 2.9. When stripping the tanks, vessel must have at least a trim of 1% of LOA in order to gather the water aft as bellmouths are located aft of the ballast tanks. And as most of the bellmouths are located inboard (near the centreline), if listed to port strip the starboard tank or vice versa (see *Figure 1 Listing*) and start at the forward most tank to increase more trim.
- 2.10. As you can notice on the pipe sizes and CSA respectively below you will need more than 2 tanks open to maintain enough supply to the ballast pump (4 tanks for 2 pumps). And you will need at least 5 tanks open to maintain supply to the overboard pipe when doing gravity out.
 - 2.10.1. Ballast tank pipe: 200mmD; Cross Sectional Area: 0.0314m²
 - 2.10.2. Interconnecting pipe: 350mmD, Cross Sectional Area: 0.0962m²
 - 2.10.3. Ballast pump in/out flange: 300mmD, Cross Sectional Area: 0.0706m²
 - 2.10.4. Overboard pipe: 450mmD, Cross Sectional Area: 0.1590m²



Where possible and accepted by the external draft surveyor, use the final soundings & quantities of the ballast tanks when vessel has a 1-meter aft trim or more as this is more accurate than with

even keel or with trim by head. And try to strip as much as possible and aim less than 100m3 unpumpable.

Figure 1 Listing

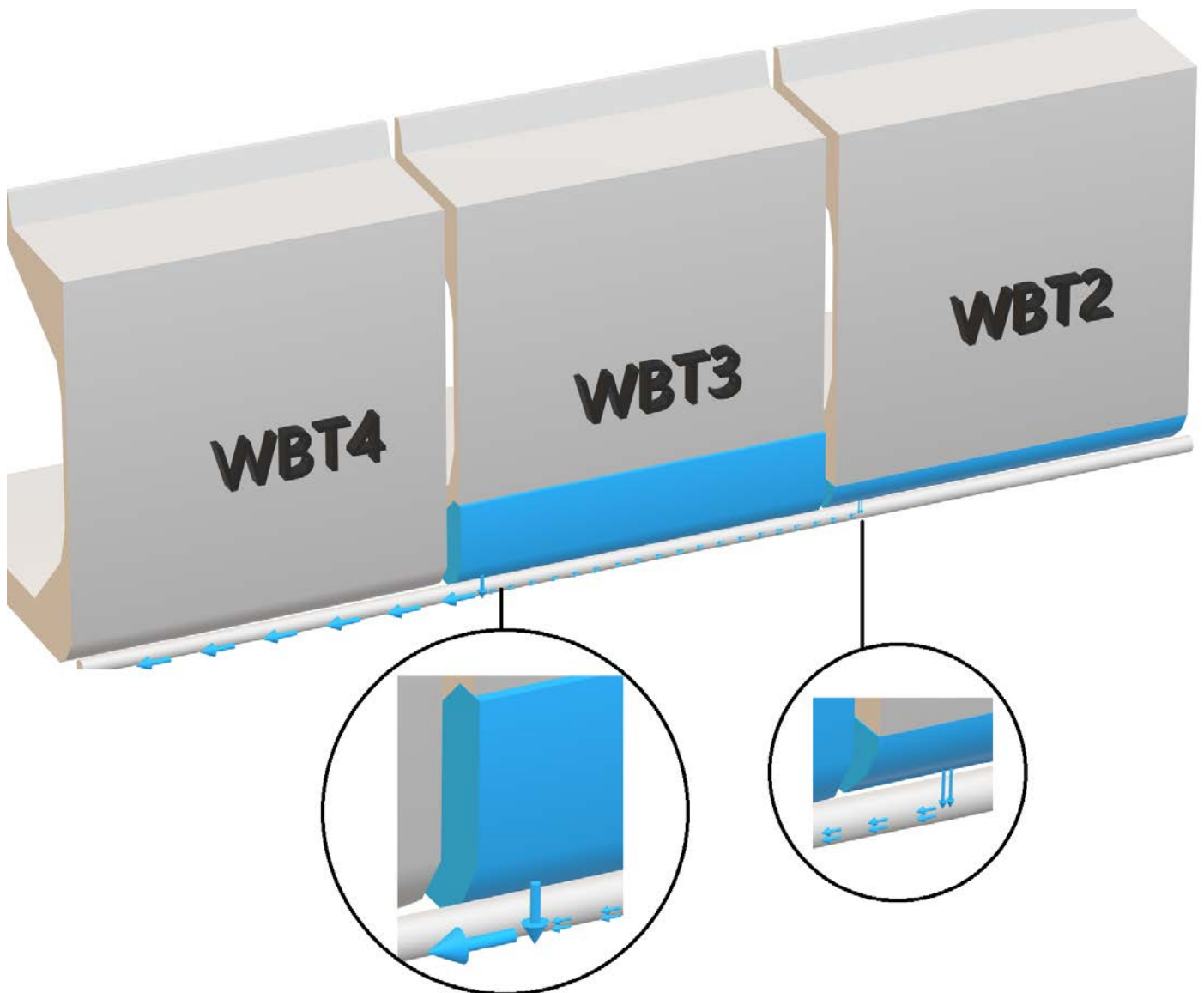


Figure 2 Venturi Effect – Pumping out with trim aft, with aft tank half full while fwd tank is for stripping

MOTOR-DRIVEN CENTRIFUGAL PUMPS-TRANSCRIPTION OF MANUFACTURERS INSTRUCTIONS.

1.0 Operation.

Operation of the pump after installation or reassembly must be carried out as follows.

a. Preparation before operation.

- a. Open the air vent on top of the casing and fill the casing with water until it comes out of the vent.
- b. In the case of reservoir-type self-priming pumps, fill the casing with water after removing the plug on top of the casing. After the pump has been started twice there is no need for further priming if water remains in the casing.
- c. In the case of a self-priming pump provided with a vacuum pump, fill the replenishing water tank.
- d. Open fully the valve on the suction side of the pump (the 'suction valve'), and close completely that on the discharge side (the 'discharge valve').
- e. Make sure that the bearings are lubricated.
- f. Turn the pump shaft by hand to make sure it turns smoothly. Do not use monkey wrenches or force that may damage the pump shaft. You may have to bleed the discharge valve to relieve pressure/vacuum in the pump. Close the valve after the check.

1.1 Operation.

- a. Start the pump motor and stop it after a few seconds. Repeat this several times, to make sure that it is not faulty. When satisfied that it is working properly leave it switched on.
- b. When the pump revolutions and pressure have risen, gradually open the discharge valve until the pressure falls to the specified pressure.
- c. Avoid running the pump when no water is passing through it, particularly when the pump is fitted with a mechanical seal. Even when a vacuum pump is provided stop the pump after five minutes if the pump has not been primed, and is still running dry.

1.2 Stopping

- a. Close the discharge valve.
- b. Stop the motor.
- c. If the pump stops suddenly during operation, switch off first of all, and then close the discharge valve.

1.3 Precautions during operation

- a. Operate the pump as near to design settings as possible.

- b. Watch for vibration and noise. If an abnormal condition is seen stop the pump immediately. In particular, for pumps fitted with a mechanical seal, guard against vibration, which will shorten the life of the seal.
- c. Watch any rise in bearing temperature. If the bearing housing can safely be felt by hand there is no problem. If it is too hot to hold, measure the temperature with a thermometer. The temperature must be kept below ambient temperature plus 40°C, or liquid temperature plus 20°C, and in any case keep it below 75°C.
- d. Adding too much grease will cause overheating so, when replacing grease, add it with the drain plug removed during operation, so that the old grease can be forced out.
- e. Allow a small amount of continuous leakage, in the form of drops, through the gland. If the packing is tightened too much, overheating and premature wear of the shaft sleeve will occur.
- f. When a mechanical seal is used there should be almost no leakage. If continuous leakage is observed the seal should be checked.
- g. Never throttle (close) the valve on the suction side. Adjust the flow by means of the valve on the discharge side.
- h. Never operate the pump for more than 10 minutes with the discharge valve closed, otherwise the temperature rise of the liquid in the casing will cause the pump to seize.
- i. If the pump reverses when on standby the cause will be leakage from the non-return valve.
- j. If the pump has an automatic starting and stopping device such as a hydrophore system check the pressure when the pump starts and stops, as well as when it is operating and, if the interval is too short, adjust the air amount, water level, etc.
- k. If the pump operates automatically under a central control system, monitor the gauge readings on the control panel board.

1.4 Precautions while the pump is stopped

- a. Keep the discharge valve closed.
- b. Keep the suction valve closed if the pump is stopped for a long time.

In cold regions drain the pumps if they remain stopped.

Reference: BULK CARRIER PRACTICE

De-ballasting Technique

Pumping ballast: On bulkers the deck officers are responsible for ballast operations. They tell engine room staff what ballast is to be pumped and the work is carried out by an engineer. Deck officers should have a good understanding of the processes involved.

Ballast pumps are normally centrifugal pumps driven by electric motors. Gauges show the pump discharge pressure in kgs/cm², the pump load in amperes and the pump suction pressure in kgs/cm². The variable setting hydraulic valves can be set open, shut or part way between the two extreme positions. Each valve has a gauge which shows its setting. The manual valves can also be set in any position and have tell-tales to show their settings.

To de-ballast a DB tank proceed as follows:

1. Before starting any ballast pumping operation inform the engineers of the intended pumping, and confirm that sufficient electrical power is available to commence and complete the operation.
2. **Check all valves in the ballast system are closed before operations**
3. Open fully **only** relevant valves. If unchecked valves are open ballast may be moved between tanks without knowledge, causing stability and cargo work issues.
4. Open discharge until it is 15 per cent open.
5. Make the pre-pumping checks in accordance with the manufacturers' recommendations (Appendix 7.2).
6. Press the start button on the relevant ballast pump (a centrifugal pump which takes about six seconds to pick up speed) and when the pump is running open the discharge valve slowly. As the discharge valve is opened the discharge pressure will decrease. Steady the discharge pressure by slowly opening the discharge valve until optimum pumping is achieved.
7. Check that the ammeter shows maximum load, and confirm that the ballast suction pressure reading is steady.
8. Always check by sounding or by detecting air being sucked into the tank airpipes that the level of ballast in the tank is falling. Mistakes are common when people are tired, overworked or inexperienced, and it is impossible to tell from the pump's performance alone the origin or destination of the water it is pumping.
9. The discharge pressure should remain steady and not fluctuate. As the de-ballasting continues the water level in the tank will fall. This means that the head of water feeding the pump is reduced. Continue to adjust the discharge valve by gradually closing it to maintain the maximum rate of pumping. This is indicated by a high-amps reading, and a good, steady discharge pressure.
10. Do not close the discharge valve to below 15 per cent. Below this setting it becomes likely that the pump will overheat and trip out because of the high temperature, or will damage the pump casing.
11. When the discharge valve has been closed to 15 per cent, the amps are low and the discharge pressure is fluctuating, the tank is nearly empty. At this time another full tank should be opened and current double-bottom should be closed, or the ballast pump should be stopped.

Stripping ballast:

Actions in case of difficulty in pumping out due to air in the ballast line:

1. Stop the pump, close all ballast tank valves except FPT valve. Line up valves for pumping in operation. Pump in FPT for about 1-2 minutes. This will push the air into the FPT at the same time creating a seal on the leaking WBT/DBT valve(s).
2. After pumping FPT, resume de-ballasting at the same time sound the empty tanks to determine the leaking valve(s).
3. At stripping ballast stage, strip last the WBT/DBT or FPT that has faulty valve.
4. Investigate the faulty valve after de-ballasting operation is completed.
5. If all valves are correct, investigate for a failed gasket in a flange, or a failed patent expansion coupling, or a hole in the ballast line.

Reference: BULK CARRIER PRACTICE