

Ballast Water Management Plan
Section 6 – Safety Procedures

6.1 General Precaution

Ballast water exchange has a number of safety considerations these include but are not limited to:-

- a) Avoidance of over and under-pressurization of ballast tanks, including avoiding action for damage to the float arrangement of the tank vent heads due to any pressure during the overflow
- b) Sloshing loads in tanks that may be slack at any one time
- c) Maintain adequate intact stability in accordance with an approved trim and stability booklet taking into account the free surface effects on stability
- d) Permissible seagoing strength limits of shear forces and bending moments in accordance with an approved loading manual
- e) Torsional forces
- f) Forward and aft draughts and trim, with particular reference to bridge visibility
- g) Propeller immersion
- h) Minimum forward draft
- i) Wave-induced hull vibrations when performing ballast water exchange
- j) Watertight closures (e.g. tank entrances, air vent heads, manholes) which may have to be opened during ballast exchange must be re-secured; Crew safety is paramount during this operation. If the manholes are kept open, then provision for discharging pipe head arrangement on the manhole cover will be made
- k) Maximum pumping/flow rates – to ensure the tank is not subjected to a pressure greater than that for which it has been designed
- l) Internal transfers of ballast
- m) Admissible weather conditions
- n) Weather routing in areas seasonably affected by cyclones, typhoons, hurricanes, or heavy icing conditions.

6.2 Exchange at Sea - Precaution

The exchange of ballast water in open sea has to be distinguished from ballast operations carried out in ports or in sheltered waters.

Ballast water operation at sea has the potential to be more hazardous than ballast water operations carried out in port.

The ballast exchange sequences (BEP) indicate sequences for the exchange of ballast water using the method(s) applicable to this ship.

A decision should be made at the completion of each sequence, taking account of factors such as the ship's position, weather forecast, machinery performance, stability, strength, degree of crew fatigue, before proceeding to the next sequence. If any factors are considered unfavourable for the ballast exchange, a decision should be made if exchange operations should be suspended until conditions become more favourable or halted.

Readiness of useful information including, but not limited to, Contingency procedures for situations which may affect ballast water exchange at sea, including deteriorating weather conditions, pump failure and loss of power; time to complete the ballast water exchange for each

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tank or an appropriate sequence thereof; continual monitoring of the ballast water operation; monitoring should include pumps, levels in tanks, line and pump pressures, stability and stresses.

6.3 Sequential Method - Precautions

Hull girder damage due to insufficient longitudinal strength;

Adverse effects on ship's stability due to free surface effects resulting in a reduction of ship's GM while emptying ballast water tanks or holds originally in a filled or partially filled condition in order to achieve exchange;

Structural damage to ship bottom forward caused by insufficient forward draught;

Impairment of manoeuvrability and/or ability to make headway; caused by insufficient after draught, as a result of emptying after ballast water tanks or holds originally in a filled condition or filling partially filled forward water ballast tanks in order to achieve exchange;

Reduction of bridge visibility forward caused by insufficient forward draught, as a result of emptying forward ballast water tanks or holds originally in a filled condition or filling partially filled aft water ballast tanks in order to achieve exchange;

Structural damage to topside and hopper side tanks caused by inertia loading, as a result of a full ballast hold with empty adjacent wing tanks;

Structural damage to partially filled ballast water tanks or holds caused by sloshing as a result of resonance with ship motion.

6.4 Flow Through Method - Precautions

Accumulation of water on decks which can cause a safety hazard to crew working on deck.

All upper deck openings (tank entrances, manholes, air pipes etc) are re-secured after completion (or interruption) of the ballast exchange procedure.

Avoiding action for damage to tank vent head's float arrangement.

Crew are to be briefed as to the dangers to the personnel posed by the water cascading onto the deck. (Effects on the stability may be negligible).

6.5 Precautionary Advice for Exchange Operations

Conditions under which ballast water exchange at sea should not be undertaken

- These circumstances may result from critical situations of an exceptional nature or *force majeure* due to stress of weather, known equipment failures or defects, or any other circumstances in which human life or safety of the ship is threatened.
- Ballast water exchange at sea should be avoided in freezing weather conditions.
- However, when it is deemed absolutely necessary, particular attention should be paid to the hazards associated with the freezing of overboard discharge arrangements, air pipes, ballast system valves together with their means of control, and the build up of ice on deck.
- Consideration must always be given to personnel safety, including precautions, which may be required when personnel are required to work on deck at night, in heavy weather, when ballast water overflows the deck, and in freezing conditions. These concerns may be related to the risks to the personnel of falling and injury, due to the slippery wet surface of the deck

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plate, when water is overflowing on deck, and to the direct contact with the ballast water, in terms of occupational health and safety.

Precautionary Advice to Masters When Undertaking Ballast Water Exchange Operations

- Master should take all necessary precautions when undertaking Ballast Water Exchange sequences that involve periods when the criteria for propeller immersion, minimum forward draft and bridge visibility cannot be met:
- During ballast water exchange sequences there may be times when, for a transitory period, one or more of the following criteria cannot be fully met or are found to be difficult to maintain:
 - a) bridge visibility standards (SOLAS V/22);
 - b) propeller immersion; and
 - c) minimum draft forward.
 - d) Emergency fire pump suction;
- In planning a Ballast Water Exchange operation that includes sequences which involve periods when the criteria for propeller immersion, minimum draft and or trim, the following should be taken into consideration:
 - a) the duration(s) and time(s) during the operation that any of the criteria will not be met;
 - b) the effect(s) on the navigational and manoeuvring capabilities of the ship; and
 - c) the time to complete the operation.
- A decision to proceed with the operation should only be taken when it is anticipated that:
 - a) the ship will be in open water;
 - b) the traffic density will be low;
 - c) an enhanced navigational watch will be maintained including if necessary an additional look out forward with adequate communications with the navigation bridge;
 - d) the manoeuvrability of the vessel will not be unduly impaired by the draft and trim and or propeller immersion during the transitory period; and
 - e) the general weather and sea state conditions will be suitable and unlikely to deteriorate.