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| **Ballast Water Management (BWM) Plan** |
|  |
| **In accordance with Resolution MEPC.127(53)**  **Profile view of the ship** |
|  |
| **COMPANY NAME**  Address line 1  Address line 2  Telephone Number  Fax Number  E-Mail |
|  |

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# REVISION HISTORY

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| Rev.No. | Date | Reason for Issue | Prepared by (Name and Company Name) | Verified by | Approved by |
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# PREAMBLE

Each ship shall have on board and implement a Ballast Water Management plan. The Ballast Water Management plan shall be specific to each ship and shall at least:

1. detail safety procedures for the ship and the crew associated with Ballast Water Management as required by Convention;

2. provide a detailed description of the actions to be taken to implement the Ballast Water Management requirements and supplemental Ballast Water Management practices as set forth in the Convention;

3. detail the procedures for the disposal of Sediments:

.1. at sea; and

.2. to shore;

4. include the procedures for coordinating shipboard Ballast Water Management that involves discharge to the sea with the authorities of the State into whose waters such discharge will take place;

5. designate the officer on board in charge of ensuring that the plan is properly implemented;

6. contain the reporting requirements for ships provided for under the Convention; and

7. be written in the working language of the ship. If the language used is not English, French or Spanish, a translation into one of these languages shall be included.

# INTRODUCTION

1. This Plan is written in accordance with the requirements of [Regulation B-1](mk:@MSITStore:C:\Program%20Files\Lloyd's%20Register\Rulefinder\9.10\Rulefinder_STAT.chm::/l31.1.3.2.2.3.3.3.2.html) of the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 2004 (the Convention) and the associated Guidelines.

2. The purpose of the Plan is to meet the requirements for the control and management of ship’s ballast water and sediments in accordance with the Guidelines for Ballast Water Management and the Development of Ballast Water Management Plans resolution MEPC 127(53) (G4). It provides standard operational guidance for the planning and management of ships’ ballast water and sediments and describes safe procedures to be followed.

3. This Plan has been approved by TL and no alteration or revision shall be made to any part of it without the prior approval of TL.

4. This Plan may be inspected on request by an authorized authority.

# SHIP PARTICULARS

|  |  |  |  |
| --- | --- | --- | --- |
| Ship’s name | |  | |
| Flag | |  | |
| Port of registry | |  | |
| Gross tonnage | |  | |
| IMO number | |  | |
| Length (LBP) | |  | |
| Beam | |  | |
| International call sign | |  | |
| Deepest ballast drafts (normal/heavy weather) | |  | |
| Total ballast capacity of the ship in cubic  meters and other units if applicable to the ship | |  | |
| A brief description of the main ballast  water management method(s) used on  the ship | |  | |
| APPOINTED BALLAST WATER MANAGEMENT OFFICER | | Appointed Ballast Water Management Officer is Chf Officer. (If Chf. Officer is not on board,2nd officer will be responsible) | |
| BALLAST TANKS  NAME of TANKS | Frame | CAPACITY | |
| M3 | 100%~=1.025 |
|  |  |  |  |
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This plan should be kept available for inspection on request by a port state control officer or by a port state quarantine officer.

# SECTION 1 - PURPOSE

Studies carried out in several countries have shown that many species of bacteria, plants and animals can survive in a viable form in ballast water and sediment carried in ships, even after journeys of several weeks duration. Subsequent discharge of ballast water or sediment into the waters of port states may result in the establishment of colonies of harmful species and pathogens which can seriously upset the existing ecological balance. Although other methods have been identified by which organisms are transferred between geographically separated sea areas, ballast water discharge from ship appears to have been prominent among those identified.

The potential for ballast water discharge to cause harm has been recognised not only by the International Maritime Organization (IMO), but also by the World Health Organization which is concerned about the role of ballast water as a medium for the spreading of epidemic disease bacteria.

**Requirements**

Some states have established controls on the discharge of ships’ ballast water that will minimise the potential for colonisation of their rivers and estuaries by non-native species. The preferred option is mid-ocean ballast water exchange prior to arrival. Accordingly, the countries most concerned have promulgated advice to ships for ballast management, together with a request for their co-operation in applying the techniques voluntarily. Standard procedures have been developed that will be accepted by quarantine authorities as achieving the level of acceptability desired by the port state.

**Conflict with safety**

Unless applied carefully some of the measures being urged for ballast management can affect a ship’s safety, either by creating forces within the hull that are greater than the design parameters or by compromising the stability of the ship. It is because of concern about this that the IMO became involved in what would otherwise be a purely quarantine matter. It has been recognised by governments and the shipping industry that individual countries’ needs should be harmonised with the greater need to ensure the safety of ships, their crews and passengers.

IMO recommends that each ship should be provided with a ballast water management plan, detailing the way that the ship can comply with any measures demanded by a port state. Once it has been established that the management of ballast is necessary to meet the quarantine requirements of a port state, preparation for it should be treated with the same seriousness as preparation of a cargo plan. All concerned with the operation and safe passage of the ship can thereby be assured that they are both protecting the marine environment and ensuring the safety of the ship and crew.

**Summary of records required**

To be able to demonstrate at the arrival port that the correct measures have been completed, it will be necessary to maintain a full and accurate ballast log. Even if a ship is not trading in an area where ballast water information is required, it may later prove worth while to have a history of what water has been carried.

**Reporting to port states**

Several countries have become aware of the potential, through discharge of ships’ ballast water, for the transfer into their coastal areas of what are found to be harmful aquatic organisms. Governments have recognised that, before devising mandatory controls on ships it is necessary to know the scale of what has, until very recently been an unrecorded procedure.

Concerned countries have therefore introduced a requirement which though often differing in detail generally calls for ships to report in advance to the national monitoring authority, how much ballast water will be on board on arrival where it was taken on board and whether a ballast management procedure has been followed. In most cases it is mandatory to make the report, even though the actual ballast exchange in mid-ocean (or other management procedure) remains voluntary.

# SECTION 2 - PLANS/DRAWINGS OF THE BALLAST SYSTEM

Plans or drawings of the ballast system for example:

1). ballast tank arrangement;

2). ballast capacity plan;

3). a ballast water piping and pumping arrangement, including air pipes and sounding arrangements;

4). ballast water pump capacities;

5). the ballast water management system used onboard, with references to detailed operational and maintenance manuals held on board;

6). installed ballast water treatment systems;

7). a plan and profile of the ship, or a schematic drawing of the ballast arrangement; and.

8). details of each step in the sequential exchange, if applicable.

**All drawings and plans which are defined above of ballast system are in the appendix 1.**

# SECTION 3 – DESCRIPTION OF THE BALLAST SYSTEM

**Ballast pumps**

Company name :

Type :

Pressure :

RPM :

Capacity :

Location :

Company name :

Type :

Pressure :

RPM :

Capacity :

Location :

**Ballast pumping capacity**

Name of tanks Tank cap. (cbm) Pumping time Pumping cap.(cbm/h)

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|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| **TOTAL** |  |  |  |

**Ballast suction capacity**

Name of tanks Tank cap. (cbm) Pumping time Pumping cap.(cbm/h)

----------------- ----------- ----------------- --------------

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| --- | --- | --- | --- |
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|  |  |  |  |
| **TOTAL** |  |  |  |

Which was used for operations of final draining of tanks are not included in above mentioned times.

# SECTION 4 - BALLAST WATER SAMPLING POINTS

This section is confined to identifying sampling points.

All overflows, sounding pipes and ballast tanks manholes shall be marked by the crew member. So that crew members can quickly assist if the quarantine officer request to take sample of ballast water. Chief Officer shall be responsible on this marking. And also first engineer will take sample of ballast water from any location or near the pumps if the quarantine officer request to take sample from pipe line.

If quarantine officer want to take sediment on the ballast tanks, quarantine officers must be advised of all safety procedures to be observed when entering enclosed spaces.

Pumping and sounding plans will be ready if the quarantine officer request to inspection of this plan.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tank | Water sampling points | | | Type (overflow, sounding pipe, manhole) |
| Frame | Distance from CL | Location |
|  |  |  |  |  |
|  |  |  |  |  |

# SECTION 5 - OPERATION OF THE BALLAST WATER MANAGEMENT SYSTEM

## 5.1 Precautionary practices

### 5.1.1 Minimising uptake of harmful aquatic organisms, pathogens and sediments

When loading ballast, every effort should be made to avoid the uptake of potentially harmful aquatic organisms, pathogens and sediment that may contain such organisms. The uptake of ballast water should be minimised or, where practicable, avoided in areas and situations such as:

* Areas identified by the Port State in connection with advice relating to 12.1.2 below
* In darkness when bottom dwelling organisms may rise up in the water column.
* In very shallow water or
* Where propellers may stir up sediment.
* Nearby sewage outfalls
* When a current with turbulence
* Nearby dredging area

### 5.1.2 Removing Ballast Sediment on a Timely Basis

Where practicable routine cleaning of the ballast tank to remove sediments, should be carried out in mid-ocean or under controlled arrangements in port or dry dock, in accordance with the provisions of the ship’s ballast water management plan.

### 5.1.3 Avoiding Unnecessary Discharge of Ballast Water

If it is necessary to take on and discharge ballast water in the same port to facilitate safe cargo operations, care should be taken to avoid unnecessary discharge of ballast water that has been taken up in another port.

## 5.2 Ballast Water Management Options

### 5.2.1 Ballast Water Exchange

Near-coastal (including port and estuarine) organisms released in mid-ocean and oceanic organisms released in coastal waters do not generally survive. When exchanging ballast at sea, safety procedures for the ship and the crew as set out in section 6 should be taken into account. Furthermore, the following practices are recommended:

* Where practicable, ships should conduct ballast exchange in deep water, in Open Ocean and as far as possible from shore. Whenever possible, conduct such Ballast Water exchange at least 200 nautical miles from the nearest land and in water at least 200 metres in depth, taking into account the Guidelines developed by the Organization.
* In cases where the ship is unable to conduct Ballast Water exchange in accordance with above paragraph, such Ballast Water exchange shall be conducted taking into account the Guidelines described in above paragraph and as far from the nearest land as possible, and all in cases at least 50

nautical miles from the nearest land in water at least 200 metres in depth. Consistent with 9.1.2 below, all of the ballast water should be discharged until suction is lost, and stripping pumps or educators should be used if possible;

* Where the flow-through method is employed in open ocean by pumping ballast water into the tank or hold and allowing the water to overflow, at least three times the tank volume should be pumped through the tank;
* Where neither form of open ocean exchange is practicable, ballast exchange may be accepted by the Port State in designated areas; and
* Other ballast exchange options approved by the Port State.

### 5.2.2. Non-release or Minimal Release of Ballast Water

In cases where ballast exchange or other treatment options are not possible, ballast water may be retained in tanks or holds. If this not be possible, the ship should only discharge the minimum essential amount of ballast water in accordance with Port States’ contingency strategies.

### 5.2.3 Discharge to Reception Facilities

If reception facilities for ballast water and/or sediments are provided by a Port State, they should, where appropriate, be utilised.

### 5.2.4 Emergent and New Technologies and Treatments

If suitable new and emergent treatments and technologies prove viable, these may substitute for, or be used in conjunction with, current options. Such treatments could include thermal methods, filtration, disinfecting including ultraviolet light, and other such means acceptable to the Port State.

Results concerning the application and effectiveness of new ballast water management technologies and associated control equipment should be notified to the Organisation with a view to evaluation and incorporation, as appropriate, into these Guidelines.

# SECTION 6 - SAFETY PROCEDURES FOR THE SHIP AND THE CREW

The safety points outlined below are intended to emphasise that the consequences of an inadvertent error at sea can be more significant than the same error made in port. Ballast water exchange at sea is a comparatively new development and a sense of familiarity with the mechanics of ballasting should not be allowed to induce complacency in this new procedure.

Ship engaged in ballast water exchange at sea should be provided with procedures which account for the following, as applicable:

1. avoidance of over and under-pressurization of ballast tanks,
2. free surface effects on stability and sloshing loads in tanks that may be slack at any one time
3. admissible weather conditions
4. weather routeing in areas seasonably affected by cyclones, typhoons, hurricanes or heavy icing conditions
5. maintenance of adequate intact stability in accordance with an approved trim and stability booklet.
6. permissible seagoing strength limits of shear forces and bending moments in accordance with an approved loading manual
7. torsional forces, where relevant
8. forward and aft draughts and trim, with particular reference to bridge visibility, slamming, propeller immersion and minimum forward draft
9. wave-induced hull vibrations when carrying out/performing ballast water exchange
10. documented records of ballasting and / or de-ballasting and/or internal transfers of ballast
11. contingency procedures for situations which may affect the ballast water exchange at sea, including deteriorating weather conditions, pump failure, loss of power, etc.
12. time to complete the ballast water exchange or an appropriate sequence thereof, taking into account that the ballast water may represent %50 of the total cargo capacity for same ships, and
13. continual monitoring of the ballast water operation; monitoring should include pumps, levels in tanks, line and pump pressures, stability and stresses;
14. additional work loads on the master and crew

## 6.1 Long-term evaluation of safety aspects in relation to ballast water exchange

Recognizing the need to evaluate the hazards and potential consequences for various types of ships and operations, interested parties should carry out detailed studies and provide information relevant:

* Experience gained from carrying out ballast water exchange at sea, including any samples/model procedures;
* Operational precautions and procedures implemented to avoid potential hazards and consequences that may arise during the ballast water exchange at sea;
* An evaluation of the safety margins between actual metacentric height and stress versus the allowable seagoing limits specified in the approved trim and stability booklet and loading manual, relevant to different types of ships and loading conditions;
* Any hazards which may arise due to human element issues relative to the responsible execution of ballast water exchange at sea in a manner which may not be fully prudent;
* Operational procedures carried out prior to initiating the ballast water exchange at sea and check points during the exchange;
* The extent of training and management necessary to ensure that the process of ballast water exchange at sea is effectively monitored and controlled on board;
* Plan of action to incorporate any unique procedures should an emergency occur which may affect the exchange of ballast water at sea; and the decision making process, taking into account relevant safety matters, including ship’s position, weather conditions, machinery performance, ballast system inspection and maintenance, crew safety and availability.

# SECTION 7 - OPERATIONAL OR SAFETY RESTRICTIONS

7.1. If the flow through method is used, caution should be exercised, since:

.1. air pipes are not designed for continuous ballast water overflow;

.2. current research indicates that pumping of at least three full volumes of the tank capacity could be needed to be effective, when filling clean water from the bottom and overflowing from the top; and

.3. certain watertight and weathertight closures (e.g. manholes) which may be opened during ballast exchange, should be re-secured;

7.2. 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 accretion of ice on deck.

7.3. Some ships may need the fitting of a loading instrument to perform calculations of shear forces and bending moments induced by ballast water exchange at sea and to compare with the permissible strength limits.

7.4. An evaluation should be made of the safety margins for stability and strength contained in allowable seagoing conditions specified in the approved trim and stability booklet and the loading manual. Relevant to individual types of ships and loading conditions. In this regard particular account should be taken of the following requirements:

.1. stability to be maintained at all times to values not less than those recommended by the Organization (or required by the Administration);

.2. longitudinal stress values not to exceed those permitted by the ship’s classification society with regard to prevailing sea conditions; and

.3. exchange of ballast in tanks or holds where significant structural loads may be generated by sloshing action in the partially filled tank or hold to be carried out in favourable sea and swell conditions such that the risk of structural damage is minimized.

7.5. ballast water exchange should not be undertaken in circumstances may threat human life and safety of ship . These circumstances may result from critical situations of an exceptional nature or force majeure due to stress of weather or any other circumstances in which human life or safety of the ship is threatened.

* 1. maximum pumping/flow rates – to ensure the tank is not subjected to a pressure greater than that for which it has been designed;
  2. 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 plate, when water is overflowing on deck, and to the direct contact with the ballast water, in terms of occupational health and safety.

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:

* bridge visibility standards ([SOLAS V/22](mk:@MSITStore:C:\\Marine_Related_Softwares\\Rule%20Finder%209.27\\RuleFinder%20Files\\Rulefinder%209.27%20(January%202017).chm::/GUID-95B39DFD-3930-4FDF-89B6-1F7FFBCF7B1D.html));
* propeller immersion; and
* minimum draft forward.

As the choice of acceptable ballast water exchange sequences is limited for most ships, it is not always practicable to dismiss from consideration those sequences where transitory noncompliance may occur. The practical alternative would be to accept such sequences provided an appropriate note is placed in the Ballast Water Management Plan to alert the ship's master. The note would advise the master of the nature of the transitory non-compliance, that additional planning may be required and that adequate precautions need to be taken when using such sequences.

In planning a ballast water exchange operation that includes sequences which involve periods when the criteria for propeller immersion, minimum draft and / or trim and bridge visibility cannot be met, the Master should assess:

* the duration(s) and time(s) during the operation that any of the criteria will not be met;
* the effect(s) on the navigational and manoeuvring capabilities of the ship; and
* the time to complete the operation.

A decision to proceed with the operation should only be taken when it is anticipated that:

* the ship will be in open water;
* the traffic density will be low;
* an enhanced navigational watch will be maintained including if necessary an additional look out forward with adequate communications with the navigation bridge;
* the manoeuvrability of the vessel will not be unduly impaired by the draft and trim and or propeller immersion during the transitory period; and
* the general weather and sea state conditions will be suitable and unlikely to deteriorate.

On oil tankers, segregated ballast and clean ballast may be discharged below the water line at sea by pumps if the ballast water exchange is performed under the provisions of [Regulation D-1.1](mk:@MSITStore:C:\\Marine_Related_Softwares\\Rule%20Finder%209.27\\RuleFinder%20Files\\Rulefinder%209.27%20(January%202017).chm::/GUID-7D4CB8C2-1CC3-461F-8336-DA6FD6E1E9D9.html) of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, provided that the surface of the ballast water has been examined either visually or by other means immediately before the discharge to ensure that no contamination with oil has taken place.

# SECTION 8 - DESCRIPTION OF THE METHOD(s) USED ON BOARD FOR BALLAST WATER MANAGEMENT AND SEDIMENT CONTROL

**PROCEDURES FOR MANAGING BALLAST WATER**

A ballast handling plan for a ballast voyage should be prepared in advance in a similar manner to the preparation of a cargo plan for a loaded voyage and with the same degree of thoroughness. This pre-planning is necessary in order to maintain safety in case compliance with ballast exchange or other ballast water treatment or control options is required.

The safety information in section 6 should be taken into account when preparing the voyage plan.

This section gives guidance on ballast handling procedures to be followed at sea.

If there are no safe options, either under all circumstances or in certain conditions, the restrictions should be stated here. Such a statement will assist a master when responding to enquires from a quarantine officer.

**SEDIMENT REMOVAL OR REDUCTION**

Flushing by using water movement within a tank to bring sediment into suspension will only remove a part of the mud, depending on the configuration of the individual tank and its piping arrangement. Removal may be more appropriate on routine basis during scheduled dry dockings.

Sediment removal may be necessary on some occasions such as when ship changes its trading area.

Flushing and sediment removal must be recorded to narrative pages in ballast water handling log.

**RETENTION OF BALLAST ON BOARD**

Where practical, ballasting and de-ballasting must be minimising in the port.

**WATER TREATMENT**

Although water treatment method are being investigated, including heat treatment, exposure to ultra violet light. Filtering and chemical treatment, non as yet seems to be practical or cost effective for general use by cargo ship and tankers, expect for sophisticated systems on some passenger ships to date no quarantine authority has approved any.

**EXCHANGE AT SEA**

There are three methods of Ballast Water exchange which have been evaluated and accepted by the Organization. The three methods are the sequential method, the flow-through method and the dilution method. The flow-through method and the dilution method are considered as "pump through" methods.

When identifying the ballast water exchange method(s) for the first time for a particular ship, an evaluation should be made which should include:

* the safety margins for stability and strength contained in allowable seagoing conditions, as specified in the approved trim and stability booklet and the loading manual relevant to individual types of ships. Account should also be taken of the loading conditions and the envisaged ballast water exchange method or methods to be used;
* the ballast pumping and piping system taking account of the number of ballast pumps and their capacities, size and arrangements of ballast water tanks; and
* the availability and capacity of tank vents and overflow arrangements, for the flow through method, the availability and capacity of tank overflow points, prevention of under and over pressurization of the ballast tanks.

NOTE: ONLY .................... METHOD IS USED. OTHER METHODS ARE GIVEN FOR ONLY INFORMATION.

**Sequential method**

The following table describes a safe sequence for the exchange of ballast water using the empty-then-refill procedure, known as the sequential method. The process requires the removal of very large weights from the ship in a dynamic situation and their replacement. This is a new procedure and sense of familiarity with the mechanics of ballasting in port should not be allowed to induce complacency.

The table indicates the status of the ballast water in every tank at the start of each step and indicates an assumed weight of fuel and domestic drinking water (aft of the engine room bulkhead), estimated draughts, bending moments and shear forces. The action to be taken and tanks involved in each step are then specified.

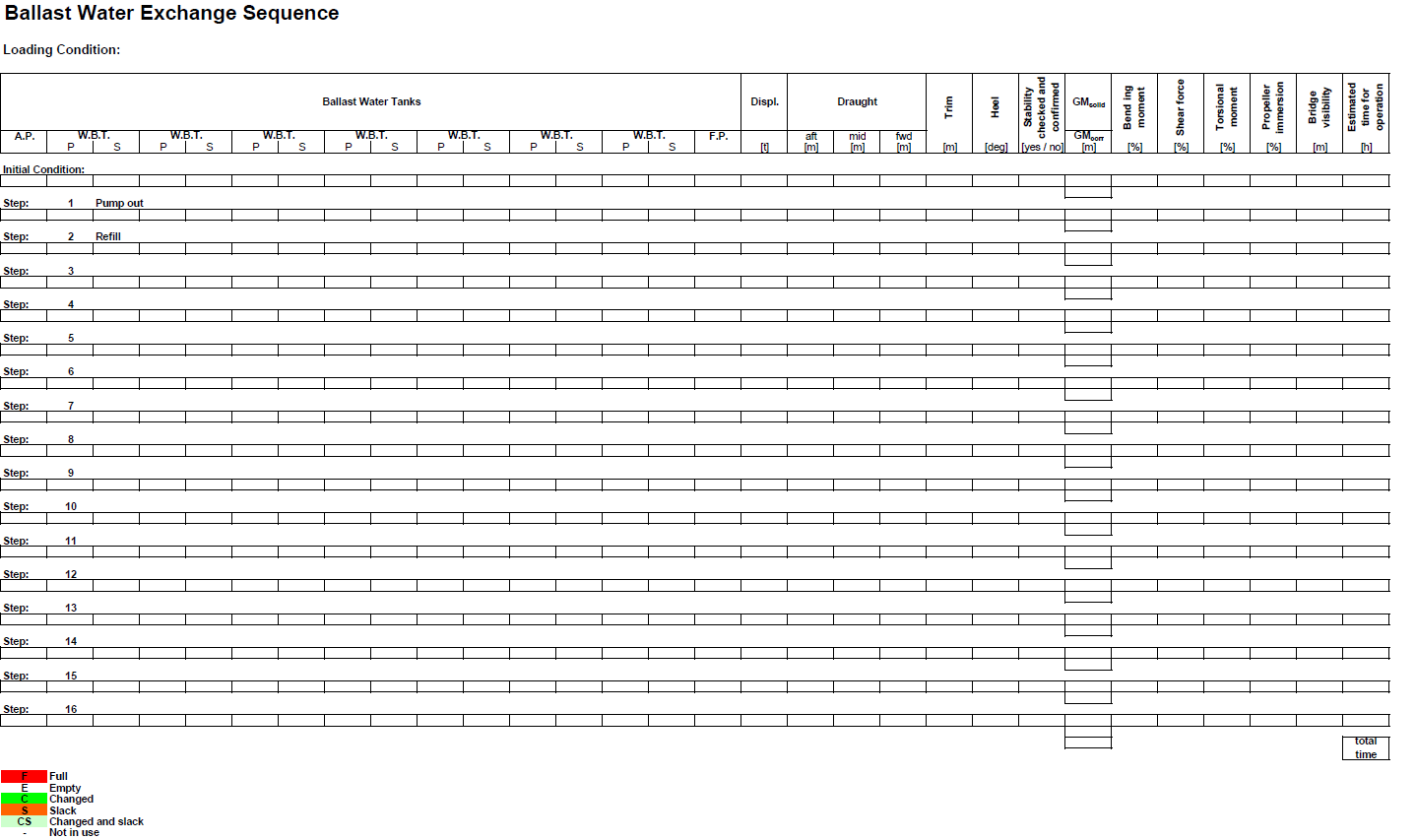
It will be noted that the original condition is restored after each pair of steps. A positive decision should be made at that time, taking account of the ship’s position, weather forecast, machinery performance and degree of crew fatigue, before proceeding to the next pair of steps. If any factors are considered unfavourable the ballast exchange should be suspended or halted.

Heeling effects due to asymmetrical emptying or filling have been taken into account so that all steps represent upright conditions. Actual operations must be managed so that lists do not develop during pumping.

The steps in the table meet trim and draught requirements of propeller and rudder immersion, to avoid any possibility of slamming while changing ballast, and to maintain the bridge visibility within tolerable limits.

It is as important to avoid under pressure in a tank due to emptying, as it is to avoid over pressure when filling. The consequences of bulkhead damage, or even tank collapse, at sea will be even more significant than in port.

Each step has been checked for conformity with strength and stress limitations. Checks have been made that the minimum intact stability requirements of the ship are met at every stage, and that the allowable limits for bending and twisting moments are not exceeded. Each step is therefore safe for the ship at sea in fair weather. The figure given under bending moments is the percentage of the maximum allowable at the end of each step, before commencing the next step.



**Flow-through method**

The flow-through method, whereby tanks are overfilled by pumping in additional water, has the advantage that it can be used in weather conditions which would be marginal for use of the sequential method, since there is little change to the condition of the ship. However, the flow-through method introduces certain other risks and problems which must be considered before using this procedure. Refer also to (section 6), “safety procedures for the ship and the crew”.

The parameters used when the ship is designed always take account of storm conditions and the water on deck which results. Therefore, even at maximum pumping rates, any accumulation of water on deck will be insufficient to affect stability.

Research has established that it is necessary to pump in three times the volume of the tank to achieve a %95 change of water. For the record, pumping in only once the volume of the tank produces a %63 exchange; twice the volume produces % 85 exchanges, while four times the volume produces a %98 water exchange.

A step by step procedure follows, listing the order in which tanks are to be processed.

After each step, a positive decision should be made, taking account of the ship’s position, weather forecast, machinery performance and degree of crew fatigue, before proceeding to the next step. If any factors are considered unfavourable the ballast exchange should be suspended or halted.

**Safety Notes:**

* Only one ballast pump may be used on any single tank.
* All openings used as outflow for the water should be inspected prior to start to check that the

water may flow freely out.

* The flow-through method, with water flowing over the deck, is not recommended for ships in

sub-zero temperature conditions. The use of collecting pipes, internal overflow pipes or

interconnecting pipe/trunk arrangements between tanks, may be used to avoid water flowing

over the deck.

* It is necessary prior to this operation to remove the vent heads from the overflow pipes OR to

open by-pass blind flanges in the air vent lines of the corresponding tanks in order to avoid

increasing the pressure to values higher than what the tank is structurally verified for. It is the

responsibility of the Ballast Water Management Officer to ensure that these are re-secured after

completion of the operation.

* Since using the flow through method by overflowing ballast water through airpipes with detached

vent head or by bypass flanges may lead to more extensive wear and tear to air vent pipes than

during normal operation, the condition of such air vent pipes should be checked regularly.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name of tanks** | **Capacity of tank** | **3xVolume** | **Time for 3 exchanges (**...hours ...minutes**)** | **Pump** |
|  |  |  |  |  |
|  |  |  |  |  |

**Dilution method**

Dilution method is a process by which replacement ballast water is filled through the top of the ballast tank intended for the carriage of ballast water with simultaneous discharge from the bottom at the same flow rate and maintaining a constant level in the tank throughout the ballast exchange operation.

Where the dilution method is to be used adequate provision should be made for appropriate piping arrangements to facilitate the ballast water pumping into the previously ballasted tanks through the top of the ballast tank and, simultaneously, discharging the ballast water through the bottom of the tank at the same flow rate while maintaining a constant ballast water level in the tank throughout the exchange operation. Adequate provision should also be made to avoid the risk of over pressurization of ballast tanks or ballast piping. The hydrodynamic performance of the ballast tank is crucial to ensure full water exchange and sediment scouring.

# SECTION 9 - PROCEDURES FOR THE DISPOSAL OF SEDIMENTS

## 9.1 Sediment Management

9.1.1. All ships shall remove and dispose of sediments from spaces designated to carry ballast water in accordance with the ballast water management plan.

9.1.2. All practical steps should be taken during ballast uptake to avoid sediment accumulation, however, it is recognized that sediment will be taken on board and will settle on tank surfaces. When sediment has accumulated, consideration should be given to flushing tank bottoms and other surfaces when in suitable areas, i.e. areas complying with the minimum depth and distance whenever possible, conduct such Ballast Water exchange at least 200 nautical miles from the nearest land and in water at least 200 meters in depth, taking into account the Guidelines developed by the Organization.

9.1.3. Where the ship is unable to conduct Ballast Water exchange in accordance with paragraph 9.1.2, such Ballast Water exchange shall be conducted taking into account the Guidelines described in paragraph 9.1.2 and as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 meters in depth.

9.1.4. The volume of sediment in a ballast tank should be monitored on a regular basis.

9.1.5. Sediment in ballast tanks should be removed in a timely basis in accordance with the Ballast Water Management Plan and as found necessary. The frequency and timing of removal will depend on factors such as sediment build up, ship’s trading pattern, availability of reception facilities, work load of the ship’s personnel and safety considerations.

9.1.6. Removal of sediment from ballast tanks should preferably be undertaken under controlled conditions in port, at a repair facility or in dry dock. The removed sediment should preferably be disposed of in a sediment reception facility if available, reasonable and practicable.

9.1.7. When sediment is removed from the ship’s ballast tanks and is to be disposed of by that ship at sea, such disposal should only take place in areas outside 200 nm from land and in water depths of over 200 m.

9.1.8. [Regulation B-5](mk:@MSITStore:C:\Program%20Files\Lloyd's%20Register\Rulefinder\9.10\Rulefinder_STAT.chm::/l31.1.3.2.2.3.3.3.6.html) requires that ships constructed in or after 2009 should, without compromising safety or operational efficiency, be designed and constructed with a view to minimize the uptake and undesirable entrapment of sediments, facilitate removal of sediments, and provide safe access to allow for sediment removal and sampling, taking into account the Guidelines for sediment control on ships (G12). This also applies to ships constructed prior to 2009, to the extent practicable.

## 9.2 Procedure for safe tank entry

If it should be necessary sending a person into a tank for cleaning or taking water samples or for other purposes, the following should be noted:

* Due to the possibility that an enclosed space may have an oxygen deficient, flammable or toxic atmosphere, which will not support life, or involves risk of explosion, it is important establish that the risk and hazards have been eliminated and that the enclosed space is safe for entry.
* The procedures for Safe Tank Entry should be contained in the companies controlled Safety Management System (SMS) Manuals.

IACS recommendation No. 72 regarding confined space safe practice should be observed:

Only enter a confined space when a permit to enter has been issued and if you consider it is safe to do so, and then only remain in the inside for as long as it is necessary to carry out the work. It is the full responsibility of the owner of the confined space (i.e. ship, shipyard) to make and ensure that the confined space is safe to enter.

NOTE: Please be advised that until the BWM Convention will be amended with specific requirements on sediment handling the following procedures may be considered as sufficient: Manual cleaning of Ballast Water tanks at dry-docking.

# SECTION 10 – METHODS OF COMMUNICATION

Member States have the right to manage ballast water by national legislation. However, any ballast discharge restrictions should be notified to the Organization.

Coastal states have rights to define ballast water exchange areas and areas that exchanges are prohibited in their waters according to their national legislation. Any instructions or requirements of a ship should be provided in a timely manner and be clear and concise.

Also communication with Port State authority is important for implementation. Port State authority should consider the overall effect of ballast water and sediment discharge procedures on the safety of ships and those on board. Guidelines will be ineffective if compliance is dependent upon the acceptance of operational measures that put a ship or its crew at risk. Port States should not require any action of the master which imperils the lives of seafarers or the safety of the ship.

It is essential that ballast water and sediment management procedures be effective as well as environmentally safe, practicable, designed to minimise costs and delays to ship, and based upon these Guidelines whenever possible.

Port States should on request provide a visiting ship with any requested information relative to ballast water management and its potential effects with respect to harmful aquatic organisms and pathogens.

Any enforcement or monitoring activities should be undertaken in a fair, uniform and nationally consistent manner at all ports within the Port State. Where there are compelling reasons whereby nationally consistent procedures cannot be followed then deviations should be reported to the Organization.

Compliance monitoring should be undertaken by Port State authorities by, for example, taking and analysing ballast water and sediment samples to test for the continued survival of harmful aquatic organisms and pathogens.

Where ballast water or sediment sampling for compliance or effectiveness monitoring is being undertaken, Port State authorities should minimise delays to ships when taking such samples.

When sampling for research or compliance monitoring, the Port State authority should give as much notice as possible to the ship that sampling will occur, to assist in planning staffing and operational resources.

The master has a general obligation to provide reasonable assistance for the above monitoring which may include provision of officers or crew, provision of the ship’s plans, records pertaining to ballast arrangements and details concerning the location of sampling points.

Sampling methods for research and monitoring is the responsibility of the individual Port State. The Organisation welcomes information on new or innovative methods of sampling and/or analysis, and any relevant information should be provided to it.

Port States authorities should indicate to the master or responsible officer the purpose for which a sample is taken (i.e. monitoring, research or enforcement). In the event that harmful aquatic organisms or pathogens are found to be present in the samples, a Port State’s contingency strategy may be applied.

# SECTION 11 - DUTIES OF THE BALLAST WATER MANAGEMENT OFFICER

# Duties of the appointed officer in charge of ballast water management

Previously mentioned, chief officer is responsible in ballast management. The second officer will take over the place of the chief officer by proxy. He/She will be executed this operation with supervision of master.

1. Ensure the safety of the vessel and crew
2. Ensure that the ballast water treatment or exchange procedures in ballast water management plan are followed and recorded.
3. Ensure suitable personnel and equipment are available for the fulfilment of the planned ballast water management operations
4. Prepare exchange sequence if the current condition is different then sample condition
5. Check all over flow and sounding pipes are open during exchange of ballast water
6. Prepare the ballast water declaration form prior to arrival in port
7. Be available to assist the port state control or quarantine officers for any sampling that may need to be undertaken
8. Maintain the ballast water handling log.

# SECTION 12 – RECORDING REQUIREMENTS

## 12.1 Recording and Reporting Procedures

### 12.1.1 Procedures for ships

Where a Port State authority requires that specific ballast water procedures and/or treatment option(s) be undertaken and, due to weather, sea conditions or operational impracticability such action can not be taken, the master should report this fact to the Port State authority as soon as possible and, where appropriate, prior to entering seas under its jurisdiction.

To facilitate the administration of ballast water management and treatment procedures on board each ship, a responsible officer should be appointed to maintain appropriate records and to ensure that ballast water management and/or treatment procedures are followed and recorded.

Each operation concerning Ballast Water shall be fully recorded without delay in the Ballast Water record book. Each entry shall be signed by the officer in charge of operation concerned and each completed page shall be signed by the master.

When taking on or discharging ballast water, as a minimum, the dates, geographical locations, ship’s tank(s) and cargo holds, ballast water temperature and salinity as well as the amount of ballast water loaded or discharged should be recorded. The record should be made available to the Port State authority.

Information of the location and suitable access for sampling ballast or sediment should be provided to officers of the Port State authority by crew for maximum assistance when they require a sample of the ballast water or sediment.

### 12.1.2 Procedures for Port States

Port State should provide ships with the following information:

* Details of their requirements concerning ballast water management
* Location and terms of use of alternative exchange zones
* Any other port contingency arrangements; and
* The availability, location, capacities of and applicable fees relevant to reception facilities that are being provided for the environmentally safe disposal of ballast water and associated sediment.

To assist ships in applying the precautionary practices described in 5.1.1 above, Port States should inform local agents and/or the ship of areas and situations where the uptake of ballast water should be minimised, such as:

* Areas with outbreaks, infestations or known populations of harmful organisms and pathogens.
* Areas with current phytoplankton blooms (algal blooms, such as red tides)
* Nearby sewage outfalls
* Nearby dredging operations
* When a tidal stream is known to be the more turbid
* Areas where tidal flushing is known to be poor.

# SECTION 13 - CREW TRAINING AND FAMILIARIZATION

Appropriate members of the crew must be aware of what is expected of them and why. If crew members understand the reasons for the exchange or treatment of ballast water and associated sediments, they are more likely to ensure that is carried out effectively and efficiently. Bearing in mind the purpose of this plan, as explained earlier, it may be sufficient hare to provide an indication of where to search for relevant material. If further reading is available on board, it will be appropriate to refer to it here.

Crew members must be educated in the following topics by chief officers.

1. The reason for exchange of ballast at sea.
2. Ballast water exchange methods, and the related safety considerations.
3. The means of carrying out ballast water management on board.
4. The reasons why other methods of ballast water management should not be used on board.
5. The location of sampling point.
6. The methods of sediment removal to be employed, and how frequently it should be carried out
7. Records.

# APPENDIX 1

PLANS