

Hamburg, January 2011

## Leaflet for Ballast Water Management / Treatment

### 1 Background

In February 2004 the IMO has adopted the INTERNATIONAL CONVENTION FOR THE CONTROL AND MANAGEMENT OF SHIP'S BALLAST WATER AND SEDIMENTS.

The purpose of the Convention is to prevent, minimize and ultimately eliminate the risk of introduction of Harmful Aquatic Organisms and Pathogens which use the ballast water as a hub.

Ballast Water Management includes exchange of ballast water and ballast water treatment. – For the later technical solutions by mechanical, physical, chemical or biological processes are possible, either singularly or in combination.

### 2 Application

The BWM Convention is applicable to new and existing vessels that are designed to carry ballast water.

The Convention will enter into force 12 month after ratification by 30 States, representing 35% of the world merchant shipping tonnage. The status of ratification in December 2010 is 27 States, representing 25.3 % of world GT.

In order to show compliance with the requirements of the Convention each vessel shall have on board a valid Certificate, a Ballast Water Management Plan and a Ballast Water Record Book.

The application date for new and existing vessels is dependent on the construction date and the capacity of ballast water. It is noted that the matrix comprises data from the BWM Convention subject to the ratification of the Convention.

|                    | construction date<br>(keel laying) | BW capacity<br>[m <sup>3</sup> ] | 2006                | 2007 | 2008 | 2009                                      | 2010 | 2011 | 2012 | 2013 | 2014                                 | 2015 | 2016 | 2017 | 2018 | 2019 | ... |
|--------------------|------------------------------------|----------------------------------|---------------------|------|------|---|------|------|------|------|--------------------------------------|------|------|------|------|------|-----|
| existing vessel    | < 2009                             | 1500 - 5000                      | voluntary / nation. |      |      | D1 or D2                                  |      |      |      |      | until intermediate or renewal survey |      | D2   |      |      |      |     |
|                    | < 2009                             | < 1500<br>or<br>> 5000           | voluntary / nation. |      |      | D1 or D2                                  |      |      |      |      | until intermediate or renewal survey |      | D2   |      |      |      |     |
| newbuilding vessel | ≥ 2009                             | < 5000                           |                     |      |      | allowance period<br>(IMO Res. A 1005(25)) |      |      |      |      | D2                                   |      |      |      |      |      |     |
|                    | ≥ 2009<br>and<br>< 2012            | ≥ 5000                           |                     |      |      | D1 or D2                                  |      |      | D2   |      |                                      |      | D2   |      |      |      |     |
|                    | ≥ 2012                             | ≥ 5000                           |                     |      |      | D2  |      |      |      |      | D2                                   |      |      |      |      |      |     |



### 3 Standards for Ballast Water Management

Two standards for the “purity of managed ballast water” are stipulated:

- D-1 Exchange Standard
- efficiency of at least 95 % volumetric exchange (*sequential method*)  
or
  - pumping-through three times the volume of a tank (*flow-through method, dilution method*)
- D-2 Performance Standard
- less than 10 viable organisms per cubic meter greater than 50µm  
and
  - less than 10 viable organisms per millilitre smaller than 50µm and greater than 10µm  
and
  - limited number of indicator microbes (bacteria)

Ballast Water exchange (D1) can be utilised by the sequential method where tanks are first emptied and then filled again, or be the flow-through method or dilution method whereby tanks are overfilled by pumping in additional water. The exchange procedure shall be carried out in an “open ocean condition” at least 200 nautical miles from the nearest land and in waters at least 200 metres in depth.

Due to limited biological efficiency the Exchange Standard (D-1) is to be regarded as an interim measure.

Compliance with the Performance Standard (D-2) seems to be achievable only by use of a BW treatment system. In general treatment systems that comply with the standard D-2 shall be approved by the Administration.

### 4 Ballast Water Treatment

Commonly the following technologies for Ballast Water Treatment are applied, either singularly or in combination

- Filtration
- Sediment and particles removal by disc and screen filters
  - Parallel assembly of many filter units
  - Filtration grade down to 100 / 50 / 20 µm
- Cyclonic separation
- Separation of solid particles due to centrifugal forces
  - Acceleration of the water by internal flow direction inside the facility
- UV radiation
- Inactivation of organisms and pathogens by breaking the cell membrane
  - Low pressure drop in water system
- Cavitation
- Slit plates or venture pipes generate cavitation bubbles
  - High local energy due to implosion of bubbles inactivate organisms
- Electrolysis
- Electronically ionisation by means of electrical current
  - Generation of Chlorine/Chlorine Dioxide as disinfection



- |                      |   |
|----------------------|---|
| Chemical additives   | - Direct adding of chemical additives to the BW having disinfectory actions<br>- Applicable for big volumes |
| De-oxygenation /     | - Removal of dissolved oxygen in BW and replacement by inactive gases                                       |
| Gas super-saturation | - Controlled atmosphere in tanks is needed to avoid re-oxygenation  |

Every treatment system is to be type approved by the Flag State Administration. Further, in case the system makes use of an "active substance", (active substances means any substance or organism that has a general or specific action on or against harmful aquatic organisms or pathogens) an additional approval procedure is to be followed, whereby the approval is granted by IMO exclusively.

In July 2005 IMO agreed on Guidelines stipulating standardised procedures for type approval of BW treatment systems (MEPC Res.125(53) – G8) and approval of active substances (MEPC Res.126(53) – G9). In total 14 Guidelines will accompany the Convention.

Upon December 2010 in total 10 systems have successfully run through the type approval process and have already obtained full certification. For another 30 to 35 systems the approval process is underway.

On request GL provides a comprehensive list of BWT manufacturers which are available for the market.

## 5 National and regional requirements for Ballast Water Management

Several countries and regions have taken a unilateral approach and set into force national requirements for Ballast Water Management. Based on these regulations several countries already now require Ballast Water Exchange with similar or identical requirements to the D-1 standard before discharging water in their ports.

Approximately 25 different requirements exist world wide. Amongst them are the United States (special requirements for California, Washington State and others), Australia, Brazil, New-Zealand and recently Norway and the region of the Persian Gulf.

Vessels trading in those areas are advised to obtain information prior to reaching such regions.

## 6 Being prepared for the future

With a view to the described Ballast Water Management requirement ships should be principally designed having in mind ...

### ... for Ballast Water Exchange:

- piping/pumping system
- sufficient tank structure to compensate additional pressures (as appropriate)
- type, arrangement and location of overflow arrangements with a view to minimize possible pressure components



... for Ballast Water Treatment:

- reserve space (e.g. in the engine room) to arrange the treatment system
- possible additional pressure of the ballast pumps to cover the pressure losses of the ballast water treatment plant
- the capability of the ballast system to enable a monitored and flow controlled by-passing of the treatment plant in case of plant failure
- additional power supply as demanded from the treatment systems

## 7 Essential Class requirements to ballast water treatment systems (BWTS) to be verified at an early stage

Owing to the fact that type approvals of ballast water treatment systems by the Flag State Administrations do not normally include compliance verification with basic GL requirements, **each type of ballast water treatment system** shall be checked and approved in view of compliance with GL Rules for Machinery Installations I-1-2, Section 8 Pressure Vessels, Section 11 Piping Systems and I-1-3 Electrical Installations, Section 9.D.8.

For this, the following documents shall be submitted to GL for approval prior to installation on board:

- drawings and technical specification of piping systems including material specification
- drawings of all pressure vessels and apparatus exposed to pressure including material specification
- details on electrical and electronic systems

If compliance with GL Rules has already been ascertained as part of the Flag State type approval process documents for that BWTS type need not be submitted.

On manufacturer's application, GL may issue an approval certificate confirming compliance with GL Rules referenced above.

## 8 Integration and installation of ballast water treatment systems on board

A ship related arrangement drawing and a piping diagram showing the integration of the BWTS into the ship's ballast piping system as well as the operating and technical manual shall be submitted for approval. If a BWTS uses active substances, additional arrangement drawings for operating compartments and storage rooms of these substances shall be submitted, including details of their equipment.

The rated capacity of BWTS shall not be less than the flow rate of the largest ballast pump. If the treated rated capacity (TRC) of ballast water specified by the manufacturer may be exceeded operationally, e.g. by parallel operation of several ballast pumps, appropriate references and restrictions shall be indicated in the ballast water management plan.



Proper installation and correct functioning of the ballast water management system shall be verified and confirmed by a GL-Surveyor.

## 9 Services from GL

GL offers two options for approval of respective Ballast Water Management documentation. As a basic solution a BWM-Plan approval is possible in accordance to the applicable IMO requirements. In addition, on a voluntary basis, the class notation "BWM" can be granted in case it has been shown that specific class requirements are fulfilled. Commonly the class notation "BWM" is applicable for newbuilding vessels only. With respect to Ballast Water Treatment Systems GL has a brought experience in the technical assessment for the type approval process. We support our customers in consulting during the certification process of treatment systems as well as for shipyards and ship owners during evaluation a system for installation on board a vessel.

## 10 Contact

For detailed support please refer to the following contact persons:

|   |  |                        |
|---|--|------------------------|
| Christoph Peickert<br>(BWM, Stability, Newbuildings)                  | <a href="mailto:christoph.peickert@gl-group.com">christoph.peickert@gl-group.com</a>         | +86 (0)21 23308 - 728  |
| Hanspeter Raschle<br>(BWT, System components)                         | <a href="mailto:hanspeter.raschle@gl-group.com">hanspeter.raschle@gl-group.com</a>           | +49 (0)40 36149 – 569  |
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