Ballast Water Management

The role of Classification Society in the implementation of the BWM Convention - Plan approval, commissioning and testing issues

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2. Selection of treatment system
3. Procurement specification
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All ships and offshore structures off 400 gt and above using BW and engaged in international voyages:

- Ballast Water Management Plan
- Ballast Water Record Book
- International Ballast Water Treatment System Certificate

For ships whose flag administration has not ratified the BWM Convention a certificate or statement of compliance can be issued.
The BWM Convention

Status

Approved treatment systems

Treatment systems must be approved in accordance to IMO Guidelines

Status (May 2016)

1. 65 systems (G8)
2. 40 systems (G9)

EIF (Article 18)
12 months after the ratification by at least 30 States and 35% of world merchant shipping tonnage

Status (April 2016)

- 50 States
- 34.81% of world tonnage
# The BWM Convention timeline

## Resolution A 28/Res. 1088

<table>
<thead>
<tr>
<th>BWM Capacity</th>
<th>Keel Laid</th>
<th>BWMC Regulation</th>
<th>Compliance date from which D-2 is required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,500 or more but less than 5,000</td>
<td>Before 2009</td>
<td>B-3.1.1</td>
<td>By the first renewal survey of the International Oil Pollution Prevention (IOPP) Certificate following the date of entry into force of the Ballast Water Management Convention</td>
</tr>
<tr>
<td>Less than 1,500 or more than 5,000</td>
<td></td>
<td>B-3.1.2</td>
<td></td>
</tr>
<tr>
<td>Less than 5,000</td>
<td>During 2009 to the date of entry into force of the Convention</td>
<td>B-3.1.3</td>
<td></td>
</tr>
<tr>
<td>5,000 or more</td>
<td>During 2009 but before 2012</td>
<td>B-3.1.4</td>
<td></td>
</tr>
<tr>
<td>5,000 or more</td>
<td>During 2012 to the date of entry into force of the Convention</td>
<td>B-3.1.5</td>
<td></td>
</tr>
<tr>
<td>All ships</td>
<td>On or after the date of entry into force of the Convention</td>
<td>B-3.1.3, B-3.1.5</td>
<td>By the completion date of the ship construction</td>
</tr>
</tbody>
</table>
BW Treatment systems
Selection Considerations

- Treatment method
- Ship type
- Life Cycle Costs
- System's footprint
- Power needs
- Supplier's profile
- Ballast system outline
- Structural considerations
- Hazardous space safety
- Onboard location
- Corrosion Considerations
- Stability considerations
## Procurement specification

### Tech Requirements

<table>
<thead>
<tr>
<th>Technical Requirements set by the ship owner/operator</th>
<th>Information provided by the supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Ballast water pump flow rates</td>
<td>▪ <strong>Sufficient capacity</strong>: to meet maximum ballast flow rates</td>
</tr>
<tr>
<td>✓ Ballast system pipework diagrams (with connections, pumping capacities and valves)</td>
<td>▪ <strong>Ballasting rate</strong>: Estimation of system’s effect on ballast pump suction and delivery performance.</td>
</tr>
<tr>
<td>▪ <strong>Retention time</strong>: minimum time the BW has to be retained for safe discharge</td>
<td></td>
</tr>
<tr>
<td>✓ Compartments details for the installation of treatment equipment and storage of consumable materials</td>
<td>▪ <strong>Treatment method(s) employed</strong></td>
</tr>
<tr>
<td>▪ <strong>Chemicals info</strong>: Handling, storage, health &amp; safety, and consumption rates</td>
<td></td>
</tr>
<tr>
<td>▪ <strong>Protection systems</strong>: For normal and emergency operation</td>
<td></td>
</tr>
<tr>
<td>▪ <strong>Restrictions</strong>: Hazardous areas installation?</td>
<td></td>
</tr>
<tr>
<td>✓ Power supply availability</td>
<td>▪ <strong>System’s power needs</strong>: The power consumption (excluding the ship’s fitted ballast pumps) and any other electrical requirements of the system</td>
</tr>
<tr>
<td>✓ Ballast tank coatings</td>
<td>▪ <strong>Statement for the effect on coatings</strong>: A statement of the effect that the treated BW will have on ballast tank coatings (supported by relevant studies)</td>
</tr>
<tr>
<td>✓ Certification details</td>
<td>▪ <strong>Work plan</strong>: For delivery, installation, commissioning and test</td>
</tr>
</tbody>
</table>
After technical data has been received from the suppliers, operators should carry out engineering checks:

- Ensure that existing aux. generators and control systems can cope with the additional power requirements;
- Check that the BWT system can be smoothly integrated into existing ballast systems;
- Check the suitability of control requirements (including alarms and protective devices);
- Review of local versus remote operating systems and ease of integration with machinery controls;
- Assess ease of maintenance, calibration and ballast water sampling;
- Assess the need for venting or other measures for compartments where active substances (chemical or otherwise) are stored or at risk of escape;
- Assess how sediments will be managed;
- Ensure ballast tank gauging will not be affected by the BWT system;
- Ensure that the BWT system arrangements maintain the separation of ballast tanks located within ‘gas safe’ and ‘gas dangerous’ zones
# Plan Approval

**Documentation & Review**

<table>
<thead>
<tr>
<th>Type of Ship Plans and Manuals</th>
<th>Additional Description</th>
<th>For Approval (AP) or Information (I)</th>
<th>Placed Onboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship for Survey (S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General arrangement drawings of the BWMS</td>
<td>Installation arrangement drawings on the ship including location and layout</td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
<tr>
<td>Arrangement and capacity of ballast tanks and pumps</td>
<td></td>
<td><strong>I</strong></td>
<td>--</td>
</tr>
<tr>
<td>Ballast piping system drawings</td>
<td>Layout, filling arrangement, and booklet of construction details of piping system</td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
<tr>
<td>Location of ballast water</td>
<td></td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
<tr>
<td>Sampling facilities</td>
<td></td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
<tr>
<td>Electrical circuit drawings and main power cable drawings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power calculation document</td>
<td>Including electrical load analysis</td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
<tr>
<td>Control, monitoring and safety</td>
<td></td>
<td><strong>I</strong></td>
<td></td>
</tr>
<tr>
<td>System documentation</td>
<td>Especially where the controls and monitoring of the BWMS have been connected to or</td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
<tr>
<td>Local instrumentation arrangement plan</td>
<td>integrated with the ship's control and monitoring system(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural plans</td>
<td>Showing installation details of</td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
<tr>
<td>Attachment, supports and foundations of principal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Components of the BWMS</td>
<td></td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
<tr>
<td>Hazardous area plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List of electrical equipment in hazardous area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage tanks and day tanks containing chemicals and</td>
<td>Include complete piping details of filling, drain system, vents, drip trays, and</td>
<td><strong>AP</strong></td>
<td><strong>S</strong></td>
</tr>
<tr>
<td>preparations used to treat ballast water</td>
<td>safety precautions, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety documentation for hazardous chemicals</td>
<td>In recognized industry format, such as MODS, CHIS Code, Cole-Palmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage detection system and safety features</td>
<td>Safety features include sensor, alarms and shutdown settings, etc., together with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>associated with the generation of toxic or flammable</td>
<td>proper suitable certification. Schematic plans detailing arrangement and location of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gases</td>
<td>sensor are to be provided</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety assessment documentation, where applicable</td>
<td></td>
<td><strong>AP</strong></td>
<td></td>
</tr>
<tr>
<td>Ballast water management plan (BWMP)</td>
<td>BWMP is specific to the ship and in a standard format per G4 Guidelines</td>
<td><strong>AP</strong></td>
<td><strong>S</strong></td>
</tr>
<tr>
<td>BWMS operating and safety manual</td>
<td>Manual specific to the actual installation onboard the ship;</td>
<td><strong>AP</strong></td>
<td><strong>S</strong></td>
</tr>
<tr>
<td>Shipboard function test plan for sea or quay trial</td>
<td>Function test of the installed BWMS at the sea trial or quay trial in the presence of RINA Surveyor, function test plan per paragraph 5.1.9 of G8 Guidelines</td>
<td><strong>AP</strong></td>
<td>--</td>
</tr>
</tbody>
</table>
| Ballast water record book                               | Ballast water record book is specific to the ship                                     | **I**                                | **S**          

Submission of plans, drawings, and manuals

*(specific list may vary subject to ROs requirements)*
### Submission of documents

The BWM system installed onboard shall be type-approved by an IMO Member State.

Specific certificates and documentation of the treatment system are to be provided for record, information or reference.

In accordance with the Convention, specific documents are to be retained onboard the ship for presentation or inspection at appropriate surveys.

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<table>
<thead>
<tr>
<th>Type of Document for BWMS</th>
<th>Additional Description</th>
<th>For Record (R) or Information (I)</th>
<th>Placed Onboard Ship for Survey (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Approval Certificate of BWMS</td>
<td>G8 Guidelines, paragraph 8.1.1: Information for the Certificate is to include main particulars of BWMS, approved application, limiting conditions and others as stipulated in G8 Guidelines, Section 6.</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>Results of test analysis for BWMS</td>
<td>Copy of test results showing the effectiveness and ability to meet IMO discharge standards per G8 Guidelines, paragraph 6.5.4.</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>International Ballast Water Management Certificate (after entry into force)</td>
<td>In accordance with the Convention Regulation E-2.</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>Type Approval Certificate of BWMS</td>
<td>G8 Guidelines, paragraph 8.1.1: Information for the Certificate is to include main particulars of BWMS, approved application, limiting conditions and others as stipulated in G8 Guidelines, Section 6.</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
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<td>Copy of test results showing the effectiveness and ability to meet IMO discharge standards per G8 Guidelines, paragraph 6.5.4.</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>International Ballast Water Management Certificate (after entry into force)</td>
<td>In accordance with the Convention Regulation E-2.</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>Documentation verifying IMO Basic Approval of BWMS to G9 Guidelines, if applicable</td>
<td>In a suitable format: i.e., basic approval application and GESAMP/BWMS review report, etc.</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>Documentation verifying IMO Final Approval of BWMS to G9 Guidelines, if applicable</td>
<td>In a suitable format: i.e., final approval application and GESAMP/BWMS review report, etc.</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>Statement confirming BWMS type tested in accordance with the environmental testing specifications of the Convention. Equipment manuals for major components of BWMS</td>
<td>G8 Guidelines, paragraph 8.1.2; from the BWMS manufacturer</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>Equipment manuals for major components of BWMS</td>
<td>G8 Guidelines, paragraphs 8.1.1 and 8.1.3: manual should include equipment list and specifications from the BWMS manufacturer</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>Operations and technical manual</td>
<td>Manual is specific to the ship and approved by the Administration per G8 Guidelines, paragraphs 8.1.4, 8.1.3-7; from the BWMS manufacturer</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>Installation specifications</td>
<td>G8 Guidelines, paragraphs 8.1.5 and 5.1.8; from the BWMS manufacturer</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>Installation commissioning Procedures</td>
<td>G8 Guidelines, paragraph 8.1.6; from the BWMS manufacturer</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>Initial calibration procedures G8</td>
<td>Guidelines, paragraph 8.1.7; from the BWMS manufacturer</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>Documentation relating to the environmental and public health effects of the BWMS</td>
<td>BWMS/2/Circ.28, paragraph 3.1.13.7 and G8 Guidelines, Part 1, Section 1.6.4; BWMS manufacturer is to provide information to ship owner</td>
<td>I</td>
<td>–</td>
</tr>
<tr>
<td>Documentation relating to the corrosion effects of the BWMS on the ship’s tank coatings, steel plating or ballast water system</td>
<td>BWMS/2/Circ.28, paragraph 3.1.13.2; BWMS manufacturer is to provide information to ship owner</td>
<td>I</td>
<td>–</td>
</tr>
</tbody>
</table>
Regulation D-3
The Administration approves ballast water management systems by taking into account IMO Guidelines

- Guidelines for Approval of Ballast Water Management Systems (**G8 Guidelines**) Res MEPC.174(58)
- Procedure for Approval of Ballast Water Management Systems that make use of Active Substances (**G9 Guidelines**). Res MEPC.169(57)
Plan Approval

Engineering Review

Before installation submit to Class:

- **Hull plans**
  - Foundation and attachments to ship’s structure for each component of the BWMS.
  - Plans to clearly indicate the details of welding;

- **Machinery plans**
  - Location,
  - Piping
  - Electrical details/drawings,
  - GA and layout,
  - Installation and equipment

Plans to include applicable arrangements for hazardous areas according to Class Rules.
Supplementary Class requirements apply when a BWM system is installed onboard a ship (installation criteria).

1. Sufficient treatment rated capacity (TRC) to meet ballast capacity and normal ballast operations rate
2. Efficient operation at the minimum discharge rate of ballast pumps or stripping system
3. Capable of operating effectively with all connected ballast system pumps and eductors
4. Capable to treat all ballast water regardless of tank location, size or structure
5. Provide for ballast flow to the furthermost tank at maximum capacity stated in BWMS
6. Shall not adversely affect any parts, materials, equipment, structures or coatings
7. Shall not exceed the electrical generating capacity of the shipboard power supply under normal in port operating conditions
8. Shall not discharge hazardous vapors or byproducts to the atmosphere, other than as considered in the type approval of the BWMS
9. All parts of the BWMS are to be easily accessible for inspection and maintenance
10. Have suitable bypasses or overrides to protect the safety of the ship and personnel in the event of an emergency
11. Comply with all requirements, restrictions and conditions identified in the type approval certificate issued by the IMO
Installation onboard

**Common criteria**

- **BWTS Location:**
  - Locations of BWMS not involving hazardous areas;
  - Locations of BWMS serving hazardous areas.

- **Ventilation Systems:**
  - BWMS located in non-hazardous areas serving tanks located in non-hazardous areas;
  - BWMS located in hazardous areas serving tanks located in hazardous areas.

- **Structural Considerations:**
  - Not compromise the integrity of the ship hull, framing, decks, bulkheads, tank structures, existing equipment foundations, or additional structural members.
Installation onboard

Common criteria

- **Corrosion effects:**
  BWTS not to deteriorate, degrade, or reduce the functional life expectancy of the ballast tank coatings or means of corrosion prevention.

- **Instrumentation:**
  Local instrumentation and controls of the BWMS are to be fitted so as to enable safe operation, maintenance and effective control in the event of an emergency or failure of any remote controls.

- **Electrical System:**
  The total electrical load of a BWMS is to be such that under the normal in port operating conditions of ballasting or deballasting the electrical generating capacity installed on the ship is adequately demonstrated by an electrical load analysis.
Reasons leading to the revision of G8 guidelines

- Recent cases in which IMO type approved ballast water treatment systems have **failed to meet the D-2 standard** when subject to additional testing and/or evaluation (e.g. U.S. Coast Guard type approval testing protocol);

- **Impossibility to meet the D-2 standards** for IMO type approved BWTS installed on ships operating in certain environmental conditions (salinity, temperature, etc.);

- Need to quarantine vessel owners and operators, that the use of a type approved system will enable the vessel to comply with the standard **wherever the vessel calls**.
Elements included in the review of G8 guidelines (as agreed in MEPC 67):

1. testing being performed using fresh, brackish and marine waters;

2. testing considering the effect of temperature in cold and tropical waters on operational effectiveness and environmental acceptability;

3. specification of standard test organisms for use in testing;

4. challenge levels set with respect to suspended solids in test water;

5. type approval testing discounting test runs in the full-scale testing that do not meet the D-2 standard and the results of test runs being "averaged";

6. type approval testing realistically representing the flow rates the system is approved for;
Current status of work (MEPC 69):

- Guidelines to be finalized likely at MEPC 70 (24-28 October 2016);
- Correspondence group actually working on the remaining issues;
- Intersessional working group to be held the week before MEPC 70 (17-21 October 2016);
- Possible mandatory application of the G8 Guidelines (to be decided at a future MEPC session)
Marine Information Notice:


2. ISSUE NO. 82 - MAY 2014: US Ballast Water Rules: extension request clarifications provided by USCG (Rev)

3. ISSUE NO. 74 - DECEMBER 2013: US Ballast Water Rules: extension request clarifications provided by USCG

4. ISSUE NO. 65 - JUNE 2013: Ballast Water Management: Revised Implementation Scheme of the IMO Convention

5. ISSUE NO. 55 - NOVEMBER 2012: Ballast Water Management (BWM) Convention - Issuance of BWM certificates according to resolution A.868(20)

6. ISSUE NO. 48 - APRIL 2012: New US regulations on ballast water management
Technical bulletin on IMO Convention

- Regulatory background
- Overview on treatment processes
- Compliance with the convention
- RINA authorizations
- Ballast water treatment system: procurement
  - Steps to selecting a treatment system
  - Procurement specifications
  - Engineering checks
- Documentation to be submitted for approval
- System related and installation criteria
- Considerations for oil and chemical carriers
- Operational management
- USCG regulation on ballast water management
RINA experts are ready to assist ship-owners in:

- Identifying the **correct compliance date** both for the IMO Convention and USCG Regulation
- Identifying the **best way to comply** with the applicable rules
- Developing a ship specific **Ballast Water Management Plan**
- Decision Support for selecting the **appropriate treatment system**
- **Interacting with administrations** having implemented national requirements for clarifications, request of extensions/exemptions, etc...
Thank you!

Stefanos Chatzinikolaou
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RINA Hellas