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GUIDELINES FOR TYPE APPROVAL OF SHIP'S BALLAST WATER MANAGEMENT SYSTEMS

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CONTENTS

Chapter 1 General

1.1 Introduction

1.1.1 Approval requirements for ballast water management systems are given in regulation D-3 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (hereinafter referred to as "the Convention"). According to regulation D-3.1, ballast water management systems used to comply with the Convention must be approved in accordance with Guidelines for approval of ballast water management systems(G8) developed by IMO.

1.1.2 According to regulation B-3 of the Convention, discharges of ballast water from ships must meet the regulation D-2 performance standard of the Convention before the prescribed time limit.

1.1.3 The Guidelines have been developed to implement the provisions of regulations D-2 and D-3 of the Convention and carry out type approval of ballast water management systems in accordance with the requirements of G8 of IMO. The Guidelines include requirements of G8 of IMO and relevant requirements of the Society for Type Approval.

1.1.4 Approval of a ballast water management system will screen-out management systems that fail to meet the standards prescribed in regulation D-2 of the Convention. Approval of a ballast water management system, however, does not ensure that a given system will work on all vessels or in all situations. To satisfy the Convention, a discharge of ballast water must comply with the D-2 standard throughout the life of the vessel.

1.1.5 Considering that G8 of IMO will be updated as the state of knowledge and technology may require, attention is to be paid to any update and revision of G8 when applying the Guidelines.

1.1.6 For ships often navigating in sensitive areas, due attention is to be given to port authorities' requirements and standards for the discharge of ballast water in the selection of ballast water management systems.

1.2 Objectives

1.2.1 The approval procedures and requirements for assessing whether ship's ballast water management systems meet the standards as set out in regulation D-2 of the Convention are given in the Guidelines. In addition, the Guidelines can be used as guidance for manufacturers and shipowners on the evaluation procedure that equipment will undergo and requirements placed on ballast water management systems.

1.2.2 The Guidelines include general requirements concerning design and construction, technical procedures for evaluation and the procedure for issuance of the Type Approval Certificate of the ballast water management system. The Guidelines also contain recommendations regarding the design, installation, performance, testing and approval of ballast water management systems. The purposes of the Guidelines are to:

(1) provide interpretation of test and performance requirements for the approval of ballast water management systems;

(2) assist in determining appropriate design, construction and operational parameters necessary for the approval of ballast water management systems;

(3) provide a uniform interpretation and application of the requirements of regulation D-3 of the Convention;

(4) provide guidance to equipment manufacturers and shipowners in determining the suitability of equipment to meet the requirements of the Convention;

(5) assure that approved ballast water management systems are capable of achieving the standard of regulation D-2 of the Convention in land-based and shipboard evaluations;

(6) provide guidance to Type Approval of ballast water management systems.

1.3 Applicability

1.3.1 The Guidelines apply to the approval of ballast water management systems in accordance with the Convention.

1.3.2 The Guidelines apply to ballast water management systems intended for installation on board all ships required to comply with regulation D-2 of the Convention.

1.4 Basis of the Guidelines

The Guidelines are based on the following documents:

(1) International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 of IMO;

(2) Resolution MEPC.174(58)—Guidelines for approval of ballast water management systems(G8);

(3) Resolution MEPC.169(57)—Procedure for approval of ballast water management systems that make use of active substances (G9), as revised;

(4) CCS Rules for Classification of Sea-going Steel Ships.

1.5 Ballast water performance standard

Regulation D-2 of the Convention stipulates that the ballast water performance standard (D-2 Standard) meeting the requirements of the Convention is as follows:

(1) less than 10 viable organisms per cubic metre greater than or equal to 50 micrometres in minimum dimension;

(2) less than 10 viable organisms per millilitre less than 50 micrometres in minimum dimension and greater than or equal to 10 micrometres in minimum dimension; and

(3) less than the following concentrations of indicator microbes, as a human health standard:

.1 Toxicogenic Vibrio cholerae(serotypes O1 and O139) with less than 1 Colony Forming Unit (cfu) per 100 millilitres or less than 1 cfu per 1 gramme (wet weight) of zooplankton samples;

.2 Escherichia coli less than 250 cfu per 100 millilitres; and

.3 Intestinal Enterococci less than 100 cfu per 100 millilitres.

1.6 Definitions

For the purpose of the Guidelines, the following definitions apply:

(1) Active Substance means a substance or organism, including a virus or a fungus that has a general or specific action on or against harmful aquatic organisms and pathogens.

(2) Ballast Water Management System (BWMS) means any system which processes ballast water such that it meets or exceeds the ballast water performance standard in regulation D-2. The BWMS includes ballast water treatment equipment, all associated control equipment, monitoring equipment and sampling facilities.

(3) The Ballast Water Management Plan is the document referred to in regulation B-1 of the Convention describing the ballast water management process and procedures implemented on board individual ships.

(4) Ballast Water Treatment Equipment means equipment which mechanically, physically, chemically, or biologically processes, either singularly or in combination, to remove, render harmless, or avoid the uptake or discharge of harmful aquatic organisms and pathogens within ballast water and sediments. Ballast water treatment equipment may operate at the uptake or discharge of ballast water, during the voyage, or at a combination of these events.

(5) Control Equipment refers to the installed equipment required to operate and control the ballast water treatment equipment.

(6) The Convention means the International Convention for the Control and Management of Ships' Ballast Water and Sediments.

(7) Monitoring Equipment refers to the equipment installed for the assessment of the effective operation of the ballast water treatment equipment.

(8) Sampling Facilities refer to the means provided for sampling treated or untreated ballast water as needed in the Guidelines and in the Guidelines for ballast water sampling developed by IMO.

(9) Shipboard Testing is a full-scale test of a complete BWMS carried out on board a ship according to G8, to confirm that the system meets the standards set by regulation D-2 of the Convention.

(10) Land-based Testing is a test of the BWMS carried out in a laboratory, equipment factory or pilot plant including a moored test barge or test ship, according to the requirements of the Guidelines, to confirm that the BWMS meets the standards set by regulation D-2 of the Convention.

(11) Treatment Rated Capacity (TRC) is the maximum continuous capacity expressed in cubic metres per hour for which the BWMS is type approved. It states the amount of ballast water that can be treated per unit time by the BWMS to meet the standard in regulation D-2 of the Convention.

(12) Viable Organisms are organisms and any life stages thereof that are living.

(13) Basic Approval means the approval of Active Substances or Preparations used in prototype tests or Type Approval tests in accordance with their usage. Basic Approval is to confirm that the available information does not indicate possible unacceptable adverse effects or a potential for unreasonable risk to environment, human health, property or resources. This is to include consideration of potential risks during full-scale tests on commercial ships when possible.

(14) Final Approval means the approval of a ballast water management system using an Active Substance or Preparation to comply with the Convention and includes a review of the Type Approval tests in accordance with Guidelines for approval of ballast water management systems (G8). The Final Approval is to confirm that previous evaluations of risks to ship, crew and the environment including storage, handling and application of Active Substances or Preparations remain valid and the concerns expressed during the Basic Approval process have been addressed, as well as that the residual toxicity of the discharge conforms to the evaluation undertaken for Basic Approval. The risk evaluation at Final Approval is to take qualitatively into account cumulative effects that may occur due to the nature of shipping and port operations. The uncertainties involved in the application for approval is to be considered during the Final Approval process, and advice on how these uncertainties can be dealt with is to be provided as appropriate.

Chapter 2 Requirements For the approval of ballast water management systems

2.1 Overview

2.1.1 In addition to being type approved,a ballast water management system using and/or producing active substances defined in 1.6(1)is to be submitted to IMO in accordance with regulation D-3.2 of the Convention, and to be evaluated and approved by IMO in accordance with Procedure for approval of ballast water management systems that make use of active substances (G9), in order to determine the application of active substances in the system is acceptable to ship safety, human health and the aquatic environment.

2.1.2 For the ballast water management system using and/or producing active substances, the Type Approval Certificate can only be issued after the system has obtained Final Approval of IMO and been type approved.

2.2 Approval procedures for ship's ballast water management systems

2.2.1 Figures 1 and 2 are respectively flowcharts for the approval of ship's ballast water management systems using and not using active substances, including Type Approval and application submitted to IMO or the Administration for approval. Applications submitted to IMO are subject to Basic Approval and Final Approval. Specific application and approval procedures are to be carried out in accordance with Procedure for approval of ballast water management systems that make use of active substances (G9) and provisions of the Administration concerned.

For ballast water management systems not using and/or producing active substances as confirmed by evaluation, and having passed environmental acceptability assessment carried out by the Administration or the authorized organization, applications may not be submitted to IMO.

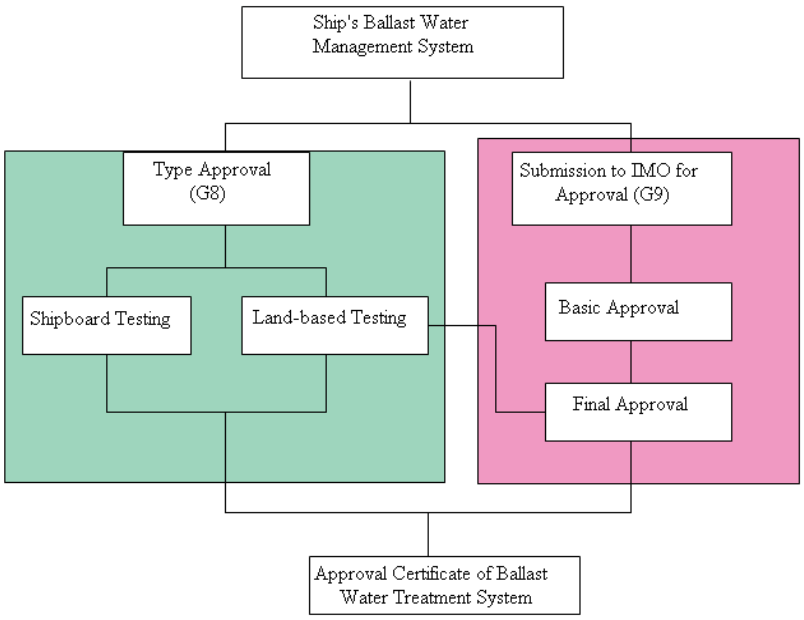


Figure 1 Approval scheme for ballast water management system using active substances

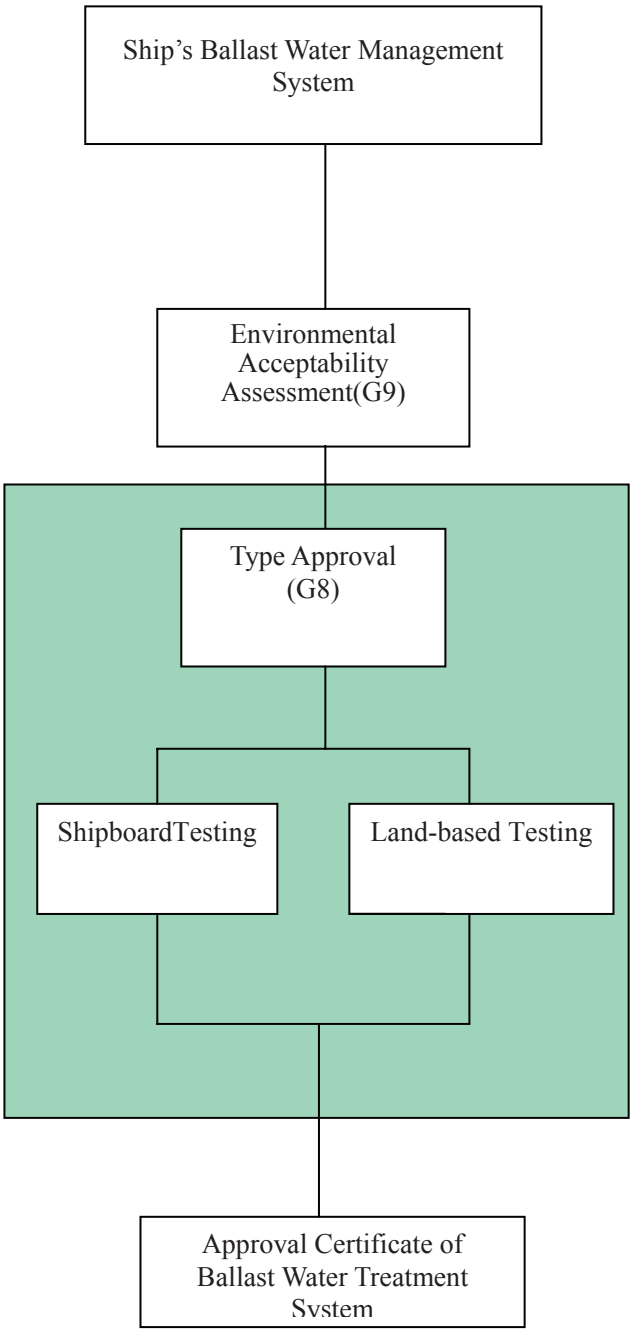


Figure 2 Approval scheme for ballast water management system not using active substances

2.2.2 Manufacturers are to fully understand whether ship's ballast water management systems intended to apply for Type Approval belong to systems using and/or producing active substances as defined by 1.6(1). If there is any uncertainty, manufacturers are to consult the Administration concerned or the Society before applying for Type Approval so as to arrange various tests and the sequence and timetable of Type Approval and submission to IMO for approval (Basic Approval and Final Approval) in a reasonable manner.

2.2.3 Manufacturers may decide the sequence of applying for Type Approval and submitting to IMO proposals for Basic Approval/Final Approval taking into account the preparation. However, attention is to be given to the relation and correlation between Guidelines for approval of ballast water management systems (G8) and Procedure for approval of ballast water management systems that make use of active substances (G9) developed by IMO, in particular:

(1) generally, shipboard testing of Type Approval is to be carried out after obtaining Basic Approval from IMO. Where Type Approval is requested before obtaining Basic Approval from IMO, the results of land-based testing will be invalid in case the ballast water management system fails to obtain Basic Approval from IMO. Manufactures are to be aware of the potential risks due to Type Approval carried out before obtaining Basic Approval from IMO and take the possible consequences;

(2) when applying for IMO's Final Approval, data of toxicity tests of discharged water after being treated by land-based testing equipment in Type Approval are to be submitted.

2.2.4 In the case of ballast water management systems that do not make use of Active Substances or Preparations, but which could reasonably be expected to result in changes to the chemical composition of the treated water such that adverse impacts to receiving waters might occur upon discharge, the documentation concerning results of toxicity tests of treated water as described in 5.5.3 of the Guidelines is to be submitted.

Chapter 3 Procedures of type approval and certification

3.1 Application for Type Approval

3.1.1 Manufacturers of ballast water management systems are to submit applications for Type Approval of ballast water management systems and applications for approval of marine product plans/documents in writing to the Society.

3.1.2 Manufacturers are to submit the following information along with the applications:

(1) particulars of the manufacturer, including the name, address, history, production capacity, technical and inspection personnel, main products, subordinate relationship, trademark, etc.;

(2) details of the products for approval;

(3) main production equipment;

(4) main test equipment;

(5) brief production technology of the products for approval;

(6) quality management documents;

(7) document of entering to the register of enterprise;

(8) qualification certificate and/or production license;

(9) specimen of products quality certificate;

(10) quality control scheme (where applicable).

3.2 Plans and technical documents

3.2.1 Manufacturers are to submit plans and technical documents in triplicate in accordance with 5.1 of Chapter 5 of the Guidelines.

3.2.2 The Society's approval of the submitted plans and technical documents as part of the approval process well in advance of the intended approval testing of a BWMS is to be a pre-requisite for carrying out independent approval tests. Plans revised in the process of prototype testing are to be re-submitted to the Society for approval.

3.3 Approval testing

3.3.1 Approval testing of a BWMS includes land-based testing, shipboard testing, environmental testing of electrical and electronic systems.

3.3.2 Prior to land-based testing and shipboard testing, the Society will carry out pre-test evaluation in accordance with the requirements of Chapter 6 of the Guidelines to confirm the rationality of the manufacturer's proposed test requirements and procedures for the test and check the readiness of the system for testing.

3.3.3 Land-based testing and shipboard testing are to be carried out respectively in accordance with the relevant requirements of Chapters 7 and 9 of the Guidelines.

3.4 Issuance of certificate/document of compliance

3.4.1 A BWMS which in every respect fulfils the requirements of the Guidelines is approved by the Society for fitting on board ships by means of issuing a Type Approval Certificate of BWMS.
With reference to Chapter 2 of the Guidelines for the approval procedures for BWMS,for BMWS not using active substances, if land-based testing, shipboard testing and environmental testing are completed and they are found in compliance with the relevant requirements of the Guidelines, a Type Approval Certificate of BWMS is issued by the Society. For systems using active substances, in addition to completing land-based testing, shipboard testing and environmental testing and being compliant with the relevant requirements of the Guidelines, a Type Approval Certificate of BWMS is issued by the Society after the Final Approval is obtained from IMO.

3.4.2 A Type Approval Certificate of BWMS is issued for the specific application for which the BWMS is approved, e.g., for specific ballast water capacities, flow rates, salinity or temperature regimes, or other limiting conditions or circumstances as appropriate. The Approval Certificate will specify the main particulars of the apparatus and any limiting conditions on its usage necessary to ensure its proper performance. Refer to Appendix 1 for the format of the Certificate. A copy of the Type Approval Certificate of BWMS is to be carried on board ships fitted with such a system at all times.

3.4.3 The Type Approval Certificate of BWMS is to:

(1) identify the type and model of the BWMS to which it applies and identify equipment assembly drawings, duly dated;

(2) identify pertinent drawings bearing model specification numbers or equivalent identification details;

(3) include a reference to the full performance test protocol on which it is based, and be accompanied by a copy of the original test results.

3.4.4 The issued Type Approval Certificate is to include each and every basic unit and scaled system if the scaling is done according to Chapter 8 of the Guidelines.

3.4.5 In order to obtain the approval for the installation on board of approved BWMSs of the same type, the manufacturer is also to submit application for survey of products and operations and technical manuals of the BWMS to the Society. The Society is to carry out product survey in accordance with the approved survey scheme. Upon satisfactory completion of the survey, a Certificate of marine products is to be issued.

Chapter 4 General technical requirements

4.1 Overview

4.1.1 This Chapter details the general technical requirements which a BWMS is to meet in order to obtain Type Approval.

4.1.2 A BWMS is to meet the performance standard specified in 1.5 of the Guidelines.

4.1.3 A BWMS must be safe in terms of the ship, its equipment and the crew.

4.1.4 The Guidelines stipulate the common technical requirements for a BWMS. The manufacturer is to analyze the risks and potential technical requirements of a BWMS in terms of ship and personnel safety, environmental acceptability, feasibility, biological efficacy and economy according to the applied technology.

4.2 Ballast water management systems

4.2.1 The BWMS is not to contain or use any substance of a dangerous nature, unless adequate arrangements for storage, application, mitigation, and safe handling, acceptable to the Society, are provided to mitigate any hazards introduced thereby.

4.2.2 Where dangerous and corrosive substances are used onboard ships, due regard is to be given to the possible consequences of the leakage or accumulation of dangerous substances in failure conditions.

4.2.3 In case of any failure compromising the proper operation of the BWMS, audible and visual alarm signals are to be given in all stations from which ballast water operations are controlled.

4.2.4 All working parts of the BWMS that are liable to wear or to be damaged are to be easily accessible for maintenance. The routine maintenance of the BWMS and troubleshooting procedures are to be clearly defined by the manufacturer in the operating and maintenance manual. All maintenance and repairs are to be recorded.

4.2.5 To avoid interference with the BWMS, attention is to be given to the following items:

(1) every access of the BWMS beyond the essential requirements of 4.2.4, is to require the breaking of a seal;

(2) if applicable, the BWMS is to be so constructed that a visual alarm is always activated whenever the BWMS is in operation for purposes of cleaning, calibration, or repair, and these events are to be recorded by the control equipment;

(3) in the event of an emergency, suitable by-passes or overrides to protect the safety of the ship and personnel are to be installed; and

(4) any bypass of the BWMS is to activate an alarm, and the bypass event is to be recorded by the Control Equipment.

4.2.6 Facilities are to be provided for checking, at the renewal surveys and according to the manufacturer's instructions, the performance of the BWMS components that take measurements. A calibration certificate certifying the date of the last calibration check, is to be retained on board for inspection purposes. Only the manufacturer or persons authorized by the manufacturer are to perform the accuracy checks.

4.3 Ballast water treatment equipment

4.3.1 The ballast water treatment equipment is to be robust and suitable for working in the shipboard environment, is to be of a design and construction adequate for the service for which it is intended and is to be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to hot surfaces and other hazards. The design is to have regard to materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

4.3.2 Ship's general equipment of the BWMS, such as pipes, valves, pumps, pressure vessels, electrical equipment, etc., is to be designed, manufactured and surveyed in accordance with the relevant international conventions and applicable parts in the rules and Guidelines for survey of marine products of the Society.

4.3.3 The design of the BWMS is to be such as to prevent major hazards to the ship, personnel and environment due to a single failure, for example:

(1) Flammable and explosive gases are to be emitted to safe open spaces.

(2) The generation and storage equipment of smothering gases such as inert gases, strong oxidizing gases such as ozone, is to meet the rules of the Society and recognized standards and is to be installed in designated spaces in so far as practicable. Drain pipes such as safety valves are to be led to safe open spaces.

4.3.4 The ballast water treatment equipment is to be provided with simple and effective means for its operation and control. It is to be provided with a control system that is to be such that the services needed for the proper operation of the ballast water treatment equipment are ensured through the necessary automatic arrangements.

4.3.5 The ballast water treatment equipment is, if intended to be fitted in locations where flammable atmospheres may be present, to comply with the relevant safety regulations for such spaces. Any electrical equipment that is part of the BWMS is to be based in a non-hazardous area, or is to comply with the relevant requirements of the rules of the Society for use in a hazardous area. Any moving parts, which are fitted in hazardous areas, is to be arranged so as to avoid the formation of static electricity.

4.4 Control and monitoring equipment

4.4.1 The BWMS is to incorporate control equipment that automatically monitors and adjusts necessary treatment dosages or intensities or other aspects of the BWMS of the vessel, which while not directly effecting treatment, are nonetheless required for proper administration of the necessary treatment. Characteristic parameters affecting ballast water treatment performance are to be identified and recorded, and protective means, such as alarm or stop of the operation, are to be provided.

4.4.2 The control equipment is to incorporate a continuous self-monitoring function during the period in which the BWMS is in operation.

4.4.3 The monitoring equipment is to record the proper functioning or failure of the BWMS.

4.4.4 To facilitate compliance with regulation B-2 of the Convention, the control equipment is also to be able to store data for at least 24 months, and is to be able to display or print a record for official inspections as required. In the event the control equipment is replaced, means are to be provided to ensure the data recorded prior to replacement remains available on board for 24 months.

4.4.5 It is recommended that simple means be provided aboard ship to check on drift by measuring devices that are part of the control equipment, repeatability of the control equipment devices, and the ability to re-zero the control equipment meters.

Chapter 5 Document requirements for approval application

5.1 Drawings and technical documents to be submitted

The following drawings and technical documents are to be submitted at least in triplicate:

(1) a description of the BWMS;

(2) general drawing and drawings of major components;

(3) equipment manuals;

(4) operations and technical manuals.

5.2 Description of the BWMS

5.2.1 The description needs to provide information on the treatment mechanism, system principle, arrangement of installations, etc. Limitations and provision requirements for the design of the ship's ballast system must be specified.

5.2.2 The description is to include a diagrammatic drawing of the typical pumping and piping arrangements, electrical/electronic wiring diagrams as well as a diagrammatic drawing of the sampling facility arrangement. The operational outlets and sampling points for treated ballast water and any waste streams are to be identified as appropriate and necessary. Special considerations may have to be given to installations intended for ships that have unusual pumping and piping arrangements.

5.2.3 The ballast water management plan includes relevant information regarding the characteristics and arrangements in which the system is to be installed as well as the scope of the ships (sizes, types and operation) for which the system is intended. This information can later form the link between the system and the ship's ballast water management plan.

5.2.4 Environmental and public health impacts--Potential hazards for the environment are to be identified and documented based on environmental studies performed to the extent necessary to assure that no harmful effects are to be expected. In the case of ballast water management systems that make use of Active Substances or Preparations containing one or more Active Substances the "Procedure for the approval of ballast water management systems that make use of Active Substances" is to be followed. The system is then to ensure that dosage of the Active Substance and the maximum allowable discharge concentration is kept under the approved criteria at all times. In the case of ballast water management systems that do not make use of Active Substances or Preparations, but which could reasonably be expected to result in changes to the chemical composition of the treated water such that adverse impacts to receiving waters might occur upon discharge, the documentation on the results of toxicity tests of treated water as described in 5.5.3 of the Guidelines is to be submitted.

5.2.5 The design and construction of the BWMS are to be specified to determine whether there are any fundamental problems that might constrain the ability of the BWMS to manage ballast water as proposed by the manufacturer, or to operate safely, on board ships. The latter concern is, in addition to basic issues related to the health and safety of the crew, interactions with the ship's systems and cargo, and potential adverse environmental effects, also to consider the potential for longer-term impacts to the safety of the crew and vessel through effects of the BWMS on corrosion in the ballast system and other spaces.

5.2.6 The manufacturer's/developer's achievements during the research and development phase in the performance and reliability tests of the system under operational shipboard conditions are to be provided and a report of the results of those tests are to be included.

5.3 General drawing and drawings of major components

(1) schematic diagram of the system;

(2) drawing of the pumping and piping arrangements;

(3) electrical/electronic wiring diagrams;

(4) drawing of the sampling facility arrangement;

(5) drawings of key equipment and major components;

(6) other drawings deemed necessary by the Society.

5.4 Equipment manuals

Equipment manuals supplied by manufacturers are to contain details of the major components of the BWMS and their operation and maintenance.

5.5 Operations and technical manuals

A generic operations and technical manual for the complete BWMS. This manual is to cover the arrangements, the operation and maintenance of the BWMS as a whole and is to specifically describe parts of the BWMS which are not covered by the manufacturer's equipment manuals.

5.5.1 The technical manual is to include:

(1) product specification;

(2) process description;

(3) operational instructions;

(4) details (including Certificates where appropriate) of the major components and materials used;

(5) technical installation specifications in accordance with manufacturers' specific installation criteria;

(6) system limitations; and

(7) routine maintenance and trouble-shooting procedures.

5.5.2 The operations section of the manual is to include normal operational procedures and procedures for the discharge of untreated water in the event of malfunction of the ballast water treatment equipment, maintenance procedures, and emergency action necessary for securing the ship.

5.5.3 Methods for the conditioning of treated water prior to discharge are to be provided, and assessment of discharged water is to include a description of the effect of treatment on the ship's ballast water, in particular the nature of any treatment residuals and by-products and the water's suitability for discharge into coastal waters. A description is also to be provided of any actions necessary to monitor,and if necessary "condition", treated water prior to discharge in order that it meets applicable water quality regulations; if it can reasonably be concluded that the treatment process could result in changes to the chemical composition of the treated water such that adverse impacts to receiving waters might occur upon discharge, the documentation submitted is to include results of toxicity tests of treated water. The toxicity tests are to include assessments of the effects of hold time following treatment, and dilution, on the toxicity. Toxicity tests are to be conducted in accordance with the Procedure for approval of ballast water management systems that make use of Active Substances, as revised.

5.5.4 A description of BWMS side streams (e.g., filtered material, centrifugal concentrate, waste or residual chemicals) including a description of the actions planned to properly manage and dispose of such wastes.

5.5.5 A technical section of the manual including adequate information (description and diagrammatic drawings of the monitoring system and electrical/electronic wiring diagrams) to enable faultfinding. This section is also to include instructions for keeping a maintenance record.

5.5.6 A technical installation specification defining, inter alia, requirements for the location and mounting of components, arrangements for maintaining the integrity of the boundary between safe and hazardous spaces and the arrangement of the sample piping.

5.5.7 A recommended test and checkout procedure specific to the BWMS. This procedure is to specify all the checks to be carried out in a functional test by the installation contractor and is to provide guidance for the surveyor when carrying out the on board survey of the BWMS and confirming the installation reflects the manufacturer's specific installation criteria.

Chapter 6 Pre-test Evaluation

6.1 Testing program

6.1.1 Manufacturers are to develop approval testing programs in accordance with the Guidelines and submit the programs to the Society prior to approval testing. The testing program is to include at least the following:

(1) rules and standards that the testing is based on;

(2) selection of the prototype and verification of compliance;

(3) the phyla/divisions intended to be added in the testing;

(4) items of type approval testing and criteria for qualification;

(5) testing methods and procedures;

(6) diagram and specifications of sampling;

(7) testing body, location and equipment;

(8) qualification documentation of the laboratory.

6.1.2 The documentation is to include specific information relevant to the test set-up to be used for land-based testing according to 7.2 of Chapter 7 of the Guidelines. Such information is to include the sampling needed to ensure proper functioning and any other relevant information needed to ensure proper evaluation of the efficacy and effects of the equipment. The information provided is also to address general compliance with applicable environment, health and safety standards during the Type Approval procedure.

6.2 Quality Assurance and Quality Control Procedures

6.2.1 The testing body performing the tests is to have implemented appropriate quality control measures in accordance with recognized international standards acceptable to the Society.

6.2.2 The approval testing process is to contain a rigorous quality control/quality assurance program, consisting of:

(1) Both a Quality Management Plan (QMP) and a Quality Assurance Project Plan (QAPP). Guidance on preparation of these plans, along with other guidance documents and other general quality control information are available from appropriate international organizations (such as ISO 17025).

(2) The QMP addresses the quality control management structure and policies of the testing body (including subcontractors and outside laboratories).

(3) The QAPP is a project specific technical document reflecting the specifics of the BWMS to be tested, the test facility, and other conditions affecting the actual design and implementation of the required experiments.

6.3 Evaluation

6.3.1 The Society evaluates whether test requirements and procedures proposed by the manufacturer are reasonable and whether the BWMS is ready for the tests according to the documents submitted by the applicant.

(1) Readiness evaluation

① The readiness evaluation is to examine the design and construction of the BWMS to determine whether there are any fundamental problems that might constrain the ability of the BWMS to manage ballast water as proposed by the manufacturer, or to operate safely, on board ships. The latter concern is, in addition to basic issues related to the health and safety of the crew, interactions with the ship's systems and cargo, and potential adverse environmental effects, also to consider the potential for longer-term impacts to the safety of the crew and vessel through effects of the BWMS on corrosion in the ballast system and other spaces.

② The evaluation is also to address the degree, if any, to which the manufacturer's/developer's efforts during the research and development phase tested the performance and reliability of the system under operational shipboard conditions and is to include a report of the results of those tests.

(2) Test proposal evaluation

① Evaluation of the test proposal is to examine all of the manufacturer's stated requirements and procedures for installing, calibrating, and operating (including maintenance requirements) the BWMS during a test. This evaluation is to help the test organization to identify any potential health or environmental safety problems, unusual operating requirements (labour or materials), and any issues related to the disposal of treatment by-products or waste streams.

6.3.2 After the completion of the pre-test evaluation, land-based testing and shipboard testing are to be carried out in according with the requirements of Chapters 7 and 8 of the Guidelines.

Chapter 7 LAND-BASED TESTING

7.1 Land-based testing objectives

7.1.1 The land-based testing serves to determine the biological efficacy and environmental acceptability of the BWMS under consideration for Type Approval. The approval testing aims to ensure replicability and comparability to other treatment equipment.

7.1.2 Any limitations imposed by the ballast water management system on the testing procedure described here is to be duly noted and evaluated. Such limitations are not to affect the normal operation of the BWMS or cause constraints. Limitations that cause constraints in operation are to be indicated in the Certificate.

7.2 Requirements for land-based set-up

7.2.1 The test set-up for approval tests is to be representative of the characteristics and arrangements of the types of ships in which the equipment is intended to be installed. The test set-up is therefore to include at least the following:

(1) the complete BWMS to be tested;

(2) piping and pumping arrangements; and

(3) the storage tank that simulates a ballast tank, constructed such that the water in the tank is to be completely shielded from light.

7.2.2 The control and treated simulated ballast tanks are each to include:

(1) a minimum capacity of 200 m^3;

(2) normal internal structures, including lightening and drainage holes;

(3) standard industry practices for design, construction and surface coatings for ships; and

(4) the minimum modifications required for structural integrity on land.

7.2.3 The test set-up are to be pressure-washed with tap water, dried and swept to remove loose debris, organisms and other matter before starting testing procedures, and between test cycles.

7.2.4 The test set-up will include facilities to allow sampling and provisions to supply influents to the system. The installation arrangements are to conform in each case with the following requirements:

(1) Sampling facilities are to be so arranged in order to collect representative samples of the ship's ballast water.

(2) Sampling facilities are in any case to be located on the BWMS intake, before the discharging points, and any other points necessary for sampling to ascertain the proper functioning of the equipment as may be determined by the Society.

7.3 Scaling in land-based testing

7.3.1 In-line treatment equipment may be downsized for land-based testing, but only when the following criteria are taken into account:

(1) equipment with a TRC equal to or smaller than 200 m^3/h is not to be downscaled;

(2) equipment with a TRC larger than 200 m^3/h but smaller than 1,000 m^3/h may be downscaled to a maximum of 1:5 scale, but may not be smaller than 200 m^3/h; and

(3) equipment with a TRC equal to, or larger than 1,000 m^3/h may be downscaled to amaximum of 1:100 scale, but may not be smaller than 200 m^3/h.

7.3.2 The manufacturer of the equipment is to demonstrate by using mathematical modeling and/or calculations, that any downscaling will not affect the ultimate functioning and effectiveness on board a ship of the type and size for which the equipment will be certified.

7.3.3 In-tank treatment equipment is to be tested on a scale that allows verification of full-scale effectiveness. The suitability of the test set-up is to be evaluated by the manufacturer and approved by the Society.

7.3.4 Larger scaling may be applied and lower flow rates used, if the manufacturer can provide evidence from full-scale shipboard testing that scaling and flow rates will not adversely affect the ability of the results to predict full-scale compliance with the standard.

7.4 Test cycles

7.4.1 The test set-up including the ballast water treatment equipment is to operate as described in the provided documentation during at least 5 valid replicate test cycles.

7.4.2 A test cycle is to include:

(1) the uptake of ballast water by pumping;

(2) the storage of ballast water for at least 5 days;

(3) treatment of ballast water within the BWMS, except in control tanks; and

(4) the discharge of ballast water by pumping.

7.4.3 Number and time requirements for test cycles

(1) At least two sets (5 replicates is considered a set) of tests cycles are to be conducted using water conditions sequentially, each with a different salinity range and associated dissolved and particulate content(for details see 7.5).

(2) Each set of test cycles is to complete at least 5 valid replicate test cycles.

(3) Each test cycle is to take place over a period of at least 5 days.

7.4.4 The BWMS is to be tested at its rated capacity or as given in 7.3 of the Guidelines for each test cycle. The equipment is to function to specifications during the test.

7.4.5 The analysis of treated water discharge from each test cycle is to be used to determine that the average of discharge samples does not exceed the concentrations of regulation D-2 of the Convention.

7.5 Test water

7.5.1 For any set of test cycles, a salinity range (including dissolved and particulate content) is to be selected according to the following table. Tests under adjacent salinity ranges are to be separated by at least 10 PSU①.

	Salinity		
	>32 PSU	3-32 PSU	<3 PSU
Dissolved Organic Carbon (DOC)	> 1 mg/l	> 5 mg/l	> 5 mg/l
Particulate Organic Carbon (POC)	> 1 mg/l	> 5 mg/l	> 5 mg/l
Total Suspended Solids (TSS)	> 1 mg/l	> 50 mg/l	> 50 mg/l

7.5.2 Test organisms may be either naturally occurring in the source water, or cultured species that may be added to the test water. The test water is to include:

(1) test organisms of greater than or equal to 50 micrometres or more in minimum dimension are to be present in a total density of preferably 10^6 but not less than 10^5 individuals per cubic metre, and are to consist of at least 5 species from at least 3 different phyla/divisions;

(2) test organisms greater than or equal to 10 micrometres and less than 50 micrometres in minimum dimension are to be present in a total density of preferably 10^4 but not less than 10^3 individuals per millilitre, and are to consist of at least 5 species from at least 3 different phyla/divisions;

(3) heterotrophic bacteria are to be present in a density of at least 10^4 living bacteria per millilitre; and

(4) the variety of organisms in the test water is to be documented according to the size classes mentioned above regardless if natural organism assemblages or cultured organisms were used to meet the density and organism variety requirements.

7.5.3 The following bacteria do not need to be added to the source water, but are to be measured at the influent and at the time of discharge:

(1) Coliform;

① For example, if one set of test cycles is carried out at >32 PSU and a second set at 3-32 PSU, the test cycle in the 3-32 PSU range needs to be at least 10 PSU less than the lowest salinity used in the test cycle in the >32 PSU range.

(2) Enterococcus group;

(3) Vibrio cholerae; and

(4) Heterotrophic bacteria.

7.5.4 If cultured test organisms are used, then it is to be ensured that relevant national law or applicable quarantine regulations are taken into account during culturing and discharge.

7.6 Monitoring and sampling

7.6.1 Species compositions and numbers of viable organisms in treated water and in the simulated ballast tank are to be determined using methods described in 7.7.2 of this Chapter.

7.6.2 The average of treated water discharge samples from each test cycle is to be used to determine that the concentrations of the samples do not exceed those of regulation D-2 of the Convention.

7.6.3 It is to be verified that the treatment equipment performs within its specified parameters, such as power consumption and flow rate, during the test cycle.

7.6.4 The analysis of treated water discharge from the relevant test cycle(s) is also to be used to evaluate the toxicity of the discharged water for BWMS that make use of Active Substances and also for those BWMS that do not make use of Active Substances or Preparations but which could reasonably be expected to result in changes to the chemical composition of the treated water such that adverse impacts to receiving waters might occur upon discharge. Toxicity tests of the treated water discharge are to be conducted in accordance with 5.2.3 to 5.2.7 of the Procedure for approval of ballast water management systems that make use of Active Substances, as revised (resolution MEPC.169(57)).

7.6.5 Environmental parameters such as pH, temperature, salinity, dissolved oxygen, total suspended solids (TSS), particulate organic carbon (POC),dissolved organic carbon (DOC) and turbidity (NTU)are to be measured at the same time that the samples described are taken.

7.6.6 During the test, replicate samples of the test water are to be taken immediately before the treatment equipment, immediately after the treatment equipment and upon discharge in triplicate respectively.

7.6.7 Replicate samples of water for control tanks are to be taken upon influent and discharge in triplicate respectively.

7.6.8 Facilities or arrangements for sampling are to be provided to ensure representative samples of treated and control water can be taken that introduce as little adverse effects as possible on the organisms.

7.6.9 Separate samples are to be collected for:

(1) organisms of greater than or equal to 50 micrometres or more in minimum dimension;

(2) organisms greater than or equal to 10 micrometres and less than 50 micrometres in minimum dimension;

(3) for coliform, enterococcus group, Vibrio cholerae and heterotrophic bacteria; and

(4) toxicity testing of treated water, from the discharge, for BWMS that make use of Active Substances and also for those BWMS that do not make use of Active Substances or Preparations but which could reasonably be expected to result in changes to the chemical composition of the treated water such that adverse impacts to receiving waters might occur upon discharge.

7.6.10 For the comparison of organisms of greater than or equal to 50 micrometres or more in minimum dimension, at least 20 litres of influent water and 1 cubic metre of treated water, in triplicate respectively, are to be collected. If samples are concentrated for enumeration, the samples are to be concentrated using a sieve no greater than 50 micrometres mesh in the diagonal dimension.

7.6.11 For the evaluation of organisms greater than or equal to 10 micrometres and less than 50 micrometres in minimum dimension, at least 1 litre of influent water and at least 10 litres of treated water are to be collected. If samples are concentrated for enumeration, the samples are to be concentrated using a sieve no greater than 10 micrometres mesh in the diagonal dimension.

7.6.12 For the evaluation of bacteria, at least 500 millilitres of influent and treated water are to be collected in sterile bottles.

7.6.13 The samples are to be analysed as soon as possible after sampling, and analysed live within 6 hours or treated in such a way so as to ensure that proper analysis can be performed.

7.6.14 The efficacy of a proposed system is to be tested by means of standard scientific methodology in the form of controlled experimentation, i.e. “experiments”. The experiment is to consist of a comparison between control water and treated water. Multiple samples, but at a minimum of three, of control and treated water within a single test cycle are to be taken to obtain a good statistical estimate of the conditions within the water during that experiment. Multiple samples taken during a single test cycle are not to be treated as independent measures in the statistical evaluation of treatment effect, to avoid “pseudo-replication”.

7.6.15 If in any test cycle the average discharge results from the control water is a concentration less than or equal to 10 times the values in regulation D-2.1, the test cycle is invalid.

7.6.16 Statistical analysis of BWMS performance is to consist of t-tests, or similar statistical tests, comparing control and treated water. The comparison between control and treated water will provide a test of unexpected mortality in the control water, indicating the effect of an uncontrolled source of mortality in the testing arrangement.

7.7 Sample analysis methods for the determination of biological constituents in ballast water

7.7.1 Sample processing and analysis

(1) Samples taken during testing of BWMS are likely to contain a wide taxonomic diversity of organisms, varying greatly in size and susceptibilities to damage from sampling and analysis. When available, widely accepted standard methods for the collection, handling (including concentration), storage, and analysis of samples are to be used. These methods are to be clearly cited and described in test plans and reports. This includes methods for detecting, enumerating, and identifying organisms and for determining viability.

(2) When standard methods are not available for particular organisms or taxonomic groups, methods that are developed for use are to be described in detail in test plans and reports. The descriptive documentation is to include any experiments needed to validate the use of the methods.

7.7.2 Sample analysis

(1) Sample analysis is meant to determine the species composition and the number of viable organisms in the sample. Different samples may be taken for determination of viability and for species composition.

(2) Viability of an organism can be determined through live/dead judgment by appropriate methods including, but not limited to: morphological change, mobility, staining using vital dyes or molecular techniques.

(3) A treatment test cycle is to be deemed successful if:

① it is valid in accordance with 7.6.14;

② the average density of organisms greater than or equal to 50 micrometres in minimum diameter in the replicate samples is less than 10 viable organisms per cubic metre;

③ the average density of organisms less than 50 micrometres and greater than or equal to 10 micrometres in minimum diameter in the replicate samples is less than 10 viable organisms per millilitre;

④ the average density of Vibrio cholerae(serotypes O1 and O139) is less than 1 cfu per 100 millilitres, or less than 1 cfu per 1 gramme (wet weight) zooplankton samples;

⑤ the average density of E. coli in the replicate samples is less than 250 cfu per 100 millilitres; and

⑥ the average density of intestinal Enterococci in the replicate samples is less than 100 cfu per 100 millilitres.

7.8 Toxicity tests of the treated water

Toxicity tests of the treated water discharge are to be conducted in accordance with 5.2.3 to 5.2.7 of the Procedure for approval of ballast water management systems that make use of Active Substances, as revised (resolution MEPC.169(57)).

7.9 Reporting of land-based test results

7.9.1 After land-based tests have been completed, a report is to be submitted to the Society. This report is to include information regarding the test design, methods of analysis and the results of these analyses.

7.9.2 The biological efficacy of the BWMS is acceptable if during the land-based testing all test cycles conducted are in compliance with the requirements of 7.7.2(3) of this Chapter.

CHAPTER 8 SCALING OF PRODUCT SYSTEMS

8.1 Definitions

(1) Base unit is a ballast water treatment equipment as defined in the Guidelines.

(2) Scaled unit is the ballast water treatment equipment that is based on the base unit but has been modified to accommodate a higher or lower treatment rated capacity (TRC).

8.2 Requirements for scaled systems

Scaled systems are to comply with the following requirements:

(1) mathematical modelling and/or calculations demonstrating that any parameters that would affect system performance are equivalent between base and scaled units; and

(2) environmental tests for each configuration of scaled units are to be carried out in accordance with the requirements of Chapter 10 of the Guidelines.

8.3 The assumptions made for the scaling of the base unit are to be verified for each scaled unit by testing to the requirements of Chapter 9 for shipboard tests of the Guidelines. The time required in 9.4.1 of the Guidelines may be reduced from 6 to 3 months.

8.4 The same consideration is to be given for scaled systems that are tested according to the requirements for land-based tests.

8.5 In the case where all discrete models are tested according to the requirements for land-based tests, the most vulnerable model is to be tested according to the requirements for shipboard tests, to demonstrate the ability of the model to operate in normal ships' conditions.

8.6 Combinations of base units and scaled units which have been verified in their performance according to 8.2 to 8.5 are to be regarded as multiple units mounted in parallel and do not fall within the scope of this Chapter.

8.7 Failing to meet the provisions of 8.2 to 8.5, each scaled system is to be tested according to the requirements for land-based tests and shipboard tests.

8.8 If scaling and shipboard testing is intended to be utilized to type-approve a system beyond its currently approved TRC without land-based testing then the following process applies:

(1) The documentation is to identify the key internal and external performance parameters (e.g., dosage concentration,UV intensity, filter flux density, etc.) required to achieve the system's efficacy, and also specify the physical/environmental conditions and design parameters that affect these.

(2) Validated mathematical model and/or calculations are to be used to predict that the key performance parameters will be achieved in the scaled unit design and that the fundamental mechanism of operation is not changed.

(3) It is to be verified through ship board testing that the scaled unit achieves the critical values of the key performance parameters utilizing the design determined by the model and or calculations identified in 8.8.2.

(4) Modelling is to address the efficacy and environmental impact of the system. The actual chemical analysis for by-products is to be performed during shipboard testing, if necessary.

8.9 Notwithstanding the requirements of 8.3, a representative number of scaled systems capacities, taking into account the treatment technology, is to be tested according to the requirements for shipboard tests.

8.10 When scaling from systems that have received Basic Approval and Final Approval from IMO according to the Procedure (G9), the manufacturer is to ensure that any conditions on Final Approval of the base unit are still met for the scaled system or systems.

8.11 For BWMS systems having received a Type Approval Certificate involving scaled units which have not been verified in accordance with the requirements of this Chapter, tests are to be carried out in accordance with relevant requirements of this Chapter after the issuance of the Guidelines.

CHAPTER 9 SHIPBOARD TESTING

9.1 Evaluation prior to shipboard testing

9.1.1 Prior to shipboard testing, the manufacturer is to submit the shipboard testing program, quality assurance plan and quality control procedures in accordance with relevant requirements of Chapter 6 of the Guidelines.

9.1.2 The Society will carry out evaluation in accordance with 6.3 of Chapter 6 of the Guidelines.

9.1.3 Prior to shipboard testing, the installation of the BWMS is completed and complies with relevant requirements of Chapter 11 of the Guidelines upon satisfactory completion of survey by the Society.

9.2 Shipboard testing

9.2.1 A shipboard test cycle includes:

(1) the uptake of ballast water of the ship;

(2) the storage of ballast water on the ship;

(3) treatment of the ballast water by the BWMS, except in control tanks; and

(4) the discharge of ballast water from the ship.

9.2.2 Sampling and sample sizes

9.2.2.1 Control tank

(1) three replicate samples of influent water, collected over the period of uptake (e.g., beginning, middle, end);

(2) three replicate samples of discharge control water, collected over the period of discharge (e.g., beginning, middle, end).

9.2.2.2 Treated ballast water

Three replicate samples of discharge treated water collected over the period of discharge (beginning, middle, end).

9.2.3 Sample sizes

(1) For the enumeration of organisms greater than or equal to 50 micrometres or more in minimum dimension, samples of at least one cubic metre are to be collected. If samples are concentrated for enumeration the samples are to be concentrated using a sieve no greater than 50 micrometres mesh in diagonal dimension.

(2) For the enumeration of organisms greater than or equal to 10 micrometres and less than 50 micrometres in minimum dimension, samples of at least one litre are to be collected. If samples are concentrated for enumeration the samples are to be concentrated using a sieve no greater than 10 micrometres mesh in diagonal dimension.

(3) For the evaluation of bacteria a sample of at least 500 millilitres are to be taken from the influent and treated water.

9.2.4 Methods of sample analysis

See 7.7 of the Guidelines for methods of sample analysis.

9.3 Test reports

Upon the completion of shipboard testing, the applicant is to submit a test report and test record form to the Society. The report is to include information regarding the test design, methods of analysis and the results of these analyses. The report is also to include:

(1) documentation of all ballast water operations including volumes and locations of uptake and discharge, and if heavy weather was encountered and where;

(2) the possible reasons for the occurrence of an unsuccessful test cycle, or a test cycle discharge failing the D-2 standard is to be investigated and reported to the Administration;

(3) documentation of scheduled maintenance performed on the system;

(4) documentation of unscheduled maintenance and repair performed on the system;

(5) documentation of engineering parameters monitored as appropriate to the specific system; and

(6) documentation of functioning of the control and monitoring equipment.

See Table 1 for the test record form.

9.4 Test evaluation

9.4.1 The test cycles including invalid and unsuccessful test cycles are to span a trial period of not less than six months. At least three consecutive valid test cycles that comply with regulation D-2 are to be performed. Any invalid test cycle does not affect the consecutive sequence.

9.4.2 The source water for test cycles is to be characterized by measurement of salinity(PSU), temperature(T), particulate organic carbon (POC) and total suspended solids (TSS).

9.4.3 The amount of ballast water tested in the test cycle on board is to be consistent with the normal ballast operations of the ship and the BWMS is to be operated at the treatment rated capacity for which it is intended to be approved.

9.4.4 Documentation that the BWMS is of a capacity within the range of the treatment rated capacity for which it is intended.

9.4.5 Evaluation of test validity

Valid tests are indicated by uptake water, for both the control tank and ballast water to be treated, with viable organism concentration exceeding 10 times the maximum permitted values in regulation D-2.1 and control tank viable organism concentration exceeding the values of regulation D-2.1 on discharge.

9.4.6 Evaluation of test compliance

Discharge of treated ballast water in three consecutive, valid test cycles is in compliance with regulation D-2 of the Convention.

Records of shipboard testing are to include, but not limited to, the contents in the following table:

Test record form **Table 1**

Item	Content
Sampling date	
Name of ship	
Port of registry	
Gross tonnage	
IMO Number	
Date of construction	
Ballast water capacity	
Type and position of sampled tank	
Capacity of sampled tank	
Type of ballast water treatment	
Construction of ballast water treatment system	
Sample identification code	
Sample type (larger/smaller plankton, microbes)	
Sampling techniques used	
net (including depth of vertical net haul, net opening size, mesh size)	
pumps (including sampling depth, pumping capacity in l/min.)	
bottle (including sampling depth, bottle capacity in l.)	
Other sampling techniques	
Sampling start time	
Sampling end time	
Type of sampling point(access/discharge)	
Location of sampling point(access/ discharge)	
Water volume sampled	
In case sample is concentrated on board, sizes of filter or net, in μ m	
Preservative (if used)	
Cooling container, dark storage(if any)	

CHAPTER 10 ENVIRONMENTAL TESTING

10.1 General

10.1.1 The electrical and electronic sections of BWMS in the standard production configuration are to be subjected to the programme of environmental tests set out in this specification at a laboratory approved for the purpose by the Society or the competent authority of the manufacturer's home country.

10.1.2 Where other specific requirements are given by the Administration or based on the actual operating environment of the BWMS, environmental tests and test items may be carried out in accordance with Guidelines for type approval test of electrical and electronic products of China Classification Society or the relevant requirements of other equivalent standards.

10.2 Basic requirements

Equipment is to operate satisfactorily on completion of each of the operating environment tests listed below.

10.3 Test items and specifications

10.3.1 Vibration tests

10.3.1.1 A resonance search is to be made over the following ranges of oscillation frequency and amplitude:

(1) 2 to 13.3 Hz with a vibration amplitude of 1 mm; and

(2) 13.2 to 80 Hz with an acceleration amplitude of 0.7 g.

This search is to be made in each of the three orthogonal planes at a rate sufficiently low to permit resonance detection.

10.3.1.2 The equipment is to be vibrated in the above-mentioned planes at each major resonant frequency for a period of two hours.

10.3.1.3 In the absence of any resonant frequency, the equipment is to be vibrated in each of the planes at 30 Hz with an acceleration of 0.7 g for a period of two hours.

10.3.1.4 After completion of the tests specified in 10.3.1.2 or 10.3.1.3 a search is again to be made for resonance and there is to be no significant change in the vibration pattern.

10.3.2 Temperature tests

10.3.2.1 Equipment that is installed in exposed areas on the open deck, or in an enclosed space not environmentally controlled is to be subjected, for a period of not less than two hours, to:

(1) a low temperature test at -25°C; and

(2) a high temperature test at 55°C.

10.3.2.2 Equipment that is installed in an enclosed space that is environmentally controlled including an engine-room is to be subjected, for a period of not less than two hours, to:

(1) a low temperature test at 0°C; and

(2) a high temperature test at 55°C.

10.3.2.3 At the end of each of the tests referred to in the subparagraphs above, the equipment is to be switched on and it is to function normally under the test conditions.

10.3.3 Humidity tests

Equipment is to be left switched off for a period of two hours at a temperature of 55°C in an atmosphere with a relative humidity of 90%. At the end of this period, the equipment is to be switched on and is to operate satisfactorily for one hour under the test conditions.

10.3.4 Tests for protection against heavy seas

Equipment that is installed in exposed areas on the open deck is to be subjected to tests for protection against heavy seas in accordance with 1P 56 of publication IEC 529 or its equivalent.

10.3.5 Fluctuation in power supply

Equipment is to operate satisfactorily with:

(1) a voltage variation of +/-10% together with a simultaneous frequency variation of +/- 5%; and

(2) a transient voltage of +/- 20% together with a simultaneous frequency transient of +/- 10%, with a transient recovery time of three seconds.

10.3.6 Inclination test

The BWMS is to be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15° either way under static conditions and 22.5° under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7.5° by bow or stern. The Administration may permit deviation from these angles, taking into consideration the type, size and service conditions of the ship and operational functioning of the equipment. Any deviation permitted is to be documented in the Type Approval Certificate.

10.3.7 Reliability of electrical and electronic equipment

The electrical and electronic components of the equipment are to be of a quality guaranteed by the manufacturer and suitable for their intended purpose.

CHAPTER 11 INSTALLATION SURVEY AND COMMISSIONING

11.1 Verification of documentation

When the approved BWMS is allowed for installation on board, the surveyor of the Society is to verify that the following documentation is on board in a suitable format:

(1) a copy of the Type Approval Certificate of BWMS and the Marine Product Certificate of the BWMS;

(2) a statement from a laboratory accepted by the Society, to confirm that the electrical and electronic components of the BWMS have been type-tested in accordance with the specifications for environmental testing contained in Chapter 10 of the Guidelines;

(3) equipment manuals for major components of the BWMS;

(4) an operations and technical manual for the BWMS specific to the ship and approved by the Society, containing a technical description of the BWMS, operational and maintenance procedures, and backup procedures in case of equipment malfunction;

(5) installation specifications;

(6) installation commissioning procedures; and

(7) initial calibration procedures.

11.2 Installation survey

The surveyor is to confirm that:

(1) the BWMS installation has been carried out in accordance with the technical installation specification;

(2) the BWMS is in conformity with the Type Approval Certificate of BWMS issued by the Society;

(3) any operational inlets and outlets are located in the positions indicated on the drawing of the pumping and piping arrangements;

(4) the workmanship of the installation is satisfactory and, in particular, that any bulkhead penetrations or penetrations of the ballast system piping are to the relevant requirements of rules of the Society.

11.3 Operation tests

The BWMS is subject to operation tests after installation onboard. The tests are to include:

(1) control and monitoring tests;

(2) safety alarms tests;

(3) operation tests; and

(4) other related tests.

APPENDIX 1 TYPE APPROVAL CERTIFICATE OF BALLAST WATER MANAGEMENT SYSTEM

格式
CPXX
Form

中 国 船 级 社
CHINA CLASSIFICATION SOCIETY

编号
No. _____

船舶压载水管理系统型式认可证书
TYPE APPROVAL CERTIFICATE OF
BALLAST WATER MANAGEMENT SYSTEM

This is to certify that the Ballast Water Management System listed below has been examined and tested in accordance with the requirements of the specifications contained in the Guidelines contained in IMO resolution MEPC...(..). This certificate is valid only for the Ballast Water Management System referred to below.

兹证明，已按IMO MEPC…(…) 决议中的指南要求和规定，对下列压载水管理系统进行了检查和试验。本证书仅对下列压载水管理系统有效。

Ballast Water Management System supplied by .....
压载水管理系统供应方
Under type and model designation .....and incorporating:
指定类型和型号并包括
Ballast Water Management System manufactured by .....
压载水管理系统生产商
to equipment/assembly drawing No. .... date .....
设备/组件图号日期
Other equipment manufactured by .....
其他设备生产商
to equipment/assembly drawing No. .... date .....
设备/组件图号 日期…….....……
Treatment Rated Capacity ..... m^3/h
处理额定功率

A copy of this Type Approval Certificate should be carried on board a vessel fitted with this Ballast Water Management System at all times. A reference to the test protocol and a copy of the test results should be available for inspection on board the vessel. If the Type Approval Certificate is issued based on approval by another Administration, reference to that Type Approval Certificate shall be made.

任何时候，安装了压载水管理系统的船上应备有一份型式认可证书的副本。船上检查时，应提供试验协议参考和一份试验结果副本。如果型式认可证书的签发是基于另一国主管机关的认可，则应参照该型式认可证书。

Limiting Conditions
规定的限制条件见本文件的附录。

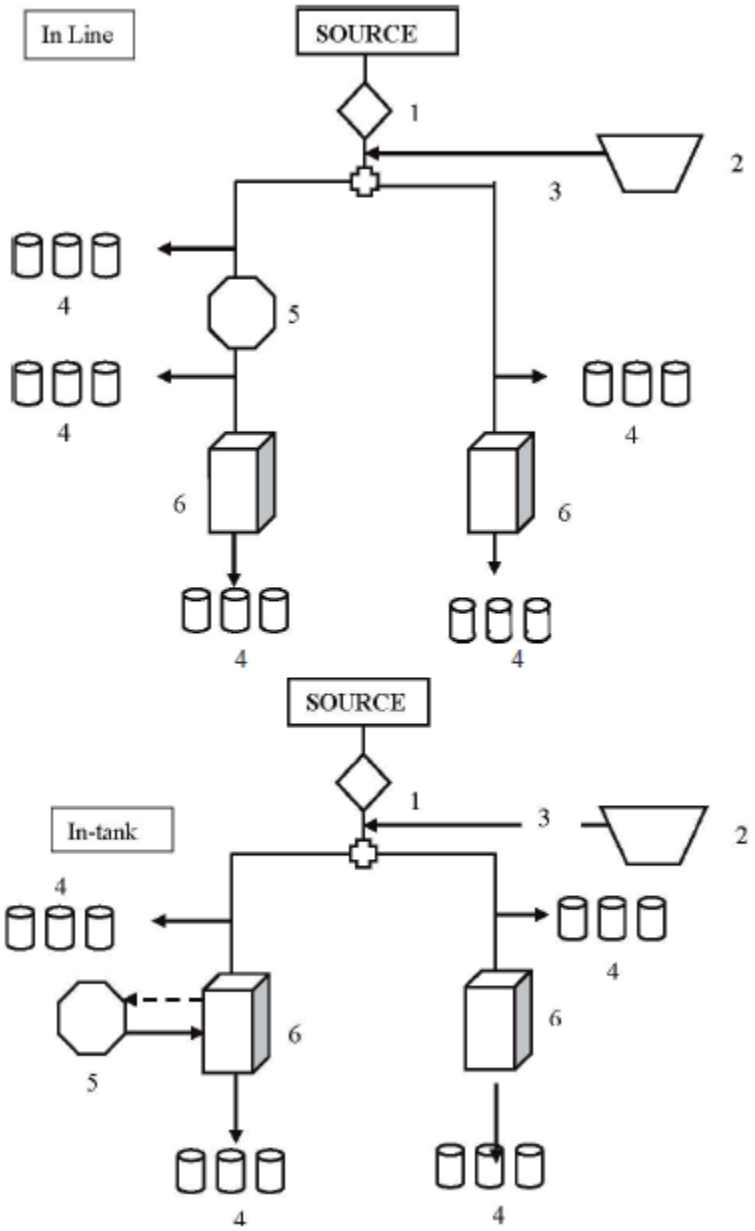
Signed/签署_____

Official stamp ( )
检验标志

China Classification Society/中国船级社
Dated this/发证日期_____ day of _____

Enc. Copy of the original test results.
试验结果正文副本。

Figure 1 Diagrammatic arrangement of possible land-based tests



1 Pump
2 Feed Tank
3 Feed Line
4 Sample tanks
5 Treatment System
6 Simulated Ballast Water Tank

APPENDIX 2 PROCEDURE FOR APPROVAL OF BALLAST WATER MANAGEMENT SYSTEMS THAT MAKE USE OF ACTIVE SUBSTANCES (G9)(MEPC.169(57))

Contents

PROCEDURE FOR APPROVAL OF BALLAST WATER MANAGEMENT SYSTEMS THAT MAKE USE OF ACTIVE SUBSTANCES (G9)

1 INTRODUCTION

1.1 This procedure describes the approval and withdrawal of approval of ballast water management systems that make use of Active Substances to comply with the Convention and their manner of application as set out in regulation D-3 of the "International Convention for the Control and Management of Ships' Ballast Water and Sediments". The Convention requires that at withdrawal of approval, the use of the relevant Active Substance or Substances shall be prohibited within 1 year after the date of such withdrawal.

1.2 To comply with the Convention, ballast water management systems that make use of Active Substances or Preparations containing one or more Active Substances shall be approved by the Organization, based on a procedure developed by the Organization.

1.3 The objective of this procedure is to determine the acceptability of Active Substances and Preparations containing one or more Active Substances and their application in ballast water management systems concerning ship safety, human health and the aquatic environment. This procedure is provided as a safeguard for the sustainable use of Active Substances and Preparations.

1.4 This procedure is not intended for the evaluation of the efficacy of Active Substances. The efficacy of ballast water management systems that make use of Active Substances should be evaluated in accordance with the Guidelines for approval of ballast water management systems (G8).

1.5 The goal of the procedure is to ensure proper application of the provisions contained in the Convention and the safeguards required by it. As such the procedure is to be updated as the state of knowledge and technology may require. New versions of the procedure will be circulated by the Organization following their approval.

2 DEFINITIONS

2.1 For the purposes of this procedure, the definitions in the Convention apply and:

.1 "Active Substance" means a substance or organism, including a virus or a fungus that has a general or specific action on or against harmful aquatic organisms and pathogens.

.2 "Ballast Water Discharge" means the ballast water as would be discharged overboard.

.3 "Preparation" means any commercial formulation containing one or more Active Substances including any additives. This term also includes any Active Substances generated onboard for purposes of ballast water management and any relevant chemicals formed in the ballast water management system that make use of Active Substances to comply with the Convention.

.4 "Relevant Chemicals" means transformation or reaction products that are produced during and after employment of the ballast water management system in the ballast water or in the receiving environment and that may be of concern to the ship's safety, aquatic environment and/or human health.

3 PRINCIPLES

3.1 Active Substances and Preparations may be added to the ballast water or be generated on board ships by technology within the ballast water management system using an Active Substance to comply with the Convention.

3.2 Active Substances and Preparations accomplish their intended purpose through action on harmful aquatic organisms and pathogens in ships' ballast water and sediments. However, if the ballast water is still toxic at the time of discharge into the environment, the organisms in the receiving water may suffer unacceptable harm. Both the Active Substance or Preparation as well as the ballast water discharge should be subjected to toxicity testing in order to protect the receiving environment or human health from toxic effects due to the discharges. Toxicity testing is needed to determine if an Active Substance or Preparation can be used and under which conditions the potential of harming the receiving environment or human health is acceptably low.

3.3 Any system which makes use of, or generates, Active Substances, Relevant Chemicals or free radicals during the treatment process to eliminate organisms in order to comply with the Convention should be subject to this Procedure.

3.4 Ballast water management systems that make use of Active Substances and Preparations must be safe in terms of the ship, its equipment and the personnel to comply with the Convention.

3.5 The approval of Active Substances and Preparations using viruses or fungi for use in ballast water management systems is not addressed in this procedure. The approval of such substances for ballast water management should require an additional consideration by the Organization in compliance with regulation D-3 of the Convention if the use of such substances is proposed.

3.6 Administrations should check the quality and completeness of any Basic Approval or Final Approval submission, against the latest version of the Methodology for information gathering and the conduct work of the Technical Group agreed by the Organization, prior to its submission to the MEPC.

4 GENERAL REQUIREMENTS

4.1 Identification

4.1.1 The proposal for approval of an Active Substance or a Preparation should include a chemical identification and description of the chemical components even if generated on board. A chemical identification should be provided for any Relevant Chemicals.

4.2 Data-set for Active Substances and Preparations

4.2.1 A proposal for approval should include information on the properties or actions of the Preparation including any of its components as follows:

.1 Data on effects on aquatic plants, invertebrates, fish, and other biota, including sensitive and representative organisms:

- acute aquatic toxicity;

- chronic aquatic toxicity;
- endocrine disruption;
- sediment toxicity;
- bioavailability/biomagnification/bioconcentration; and
- food web/population effects.

.2 Data on mammalian toxicity:

- acute toxicity;
- effects on skin and eye;
- chronic and long-term toxicity;
- developmental and reproductive toxicity;
- carcinogenicity; and
- mutagenicity.

.3 Data on environmental fate and effect under aerobic and anaerobic conditions:

- modes of degradation (biotic; abiotic);
- bioaccumulation, partition coefficient, octanol/water coefficient;
- persistence and identification of the main metabolites in the relevant media (ballast water, marine and fresh waters);
- reaction with organic matter;
- potential physical effects on wildlife & benthic habitats;
- potential residues in seafood; and
- any known interactive effects.

.4 Physical and chemical properties for the Active Substances and Preparations and the treated ballast water, if applicable:

- melting point;
- boiling point;
- flammability;
- density (relative density);
- vapour pressure, vapour density;
- water solubility / dissociation constant (pKa);
- oxidation/reduction potential;
- corrosivity to the materials or equipment of normal ship construction;
- autoignition temperature; and
- other known relevant physical or chemical hazards.

.5 Analytical methods at environmentally relevant concentrations.

4.2.2 A proposal for approval should include the above data set either for the Preparation or for each component separately, and a list of the name and relative quantities (in volumetric percentages) of the components should be also attached. As described in section 8.1, all proprietary data should be treated as confidential.

4.2.3 The tests for Active Substances and Preparations should be carried out in accordance with internationally recognized guidelines①.

4.2.4 The testing process should contain a rigorous quality control/quality assurance programme consisting of:

.1 Both a Quality Management Plan (QMP) and a Quality Assurance Project Plan (QAPP). Guidance on preparation of these plans, along with other guidance documents and other general quality control information are available for download from the International Organization for Standardization (ISO) (www.iso.org).

.2 The QMP addresses the quality control management structure and policies of the Test Organization (including subcontractors and outside laboratories).

.3 The QAPP is a project specific technical document reflecting the specifics of the system to be tested, the test facility, and other conditions affecting the actual design and implementation of the required experiments.

4.2.5 Dossiers already used for registration of chemicals can be submitted by the applicant to satisfy the required data needed for the evaluation of Active Substances and Preparations according to this procedure.

4.2.6 The proposal should describe the manner of application of the Preparation for ballast water management, including required dosage and retention time.

4.2.7 A proposal for approval should include (Material) Safety Data Sheets ((M)SDS).

4.3 Assessment report

4.3.1 A proposal for approval should include an assessment report. The assessment report should address the quality of the test reports, the risk characterization and a consideration of the uncertainty associated with the assessment.

5 RISK CHARACTERIZATION

5.1 Screening for persistency, bioaccumulation and toxicity

5.1.1 An assessment on the intrinsic properties of the Active Substance and/or Preparation such as persistency, bioaccumulation and toxicity should be conducted (see Table 1 in section 6).

.1 Persistence tests:

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① Preferably Organization for Economic Co-operation and Development (OECD) Guidelines for Testing of Chemicals (1993) or other equivalent tests.

Persistence should preferably be assessed in simulation test systems that determine the half-life under relevant conditions. Biodegradation screening tests may be used to show that the substances are readily biodegradable. The determination of the half-life should include assessment of relevant chemicals.

.2 Bioaccumulation tests:
The assessment of the (potential for) bioaccumulation should use measured bioconcentration factors in marine (or freshwater) organisms. Where these tests are not applicable, or if logPow<3, Bio Concentration Factor (BCF) values may be estimated using (Quantitative) Structure-Activity Relationship ((Q)SAR) models.

.3 Toxicity tests:
Acute and/or chronic ecotoxicity data, ideally covering the sensitive life stages, should in principle be used for the assessment of the toxicity criterion.

5.2 Toxicity testing of the treated ballast water

5.2.1 Toxicity testing is necessary for the Active Substance, or Preparations (see sections 4.2.1 and 5.3) and the treated ballast water discharge as covered in this section. The advantage of conducting toxicity testing on the ballast water discharge is that it integrates and addresses the potential for interactions of the Active Substances and Preparations with the possible by-products:

.1 For the Basic Approval process, the discharge testing should be performed in a laboratory using techniques and equipment to simulate ballast water discharge following treatment by the Preparation.

.2 For Final Approval, the discharge testing should be performed as part of the land-based type approval process using the treated ballast water discharge.

5.2.2 The applicant should provide both acute and chronic toxicity test data using standardized test procedures to determine the toxicity of the Preparation and Relevant Chemicals as used in conjunction with the ballast water management system. This testing approach should be performed on the treated ballast water discharge, as the ballast water management system could either mitigate or enhance the adverse effects of the Preparation or Relevant Chemicals.

5.2.3 The discharge toxicity tests should be conducted on samples drawn from the land-based test set-up, which would be representative of the discharge from the ballast water management system.

5.2.4 These toxicity tests should include chronic test methods with multiple test species (a fish, an invertebrate and a plant) that address the sensitive life-stage. The preference is to include both a sub-lethal endpoint (growth) and a survival endpoint. Either freshwater or marine test methods should be tested.

5.2.5 The test results to be provided include: acute 24-hour, 48-hour, 72-hour, and 96-hour Lethal Concentration at which x % of the test organisms die (LCx), No Observed Adverse Effect Concentrations (NOAECs), chronic No Observed Effect Concentration (NOEC) and/or Effect Concentration at which x % of test organisms show effect (ECx), as appropriate based on the experimental design.

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① Currently there is no compelling physiological or empirical proof that marine organisms are more sensitive than freshwater organisms or vice versa. Should this however be demonstrated for the substance under consideration, this should be taken into account.

5.2.6 A dilution series including a 100% ballast water discharge would be tested to determine the no adverse effect level using the statistical endpoints (NOEC or ECx). An initial analysis could use a conservative approach where the dilution capacity would not be taken into consideration (no modelling or plumes analysis would be used). The rationale for taking a conservative approach is that there could be multiple discharges into one location (even though this is not necessarily the case).

5.2.7 The acute and chronic toxicity test data in conjunction with the information in section 4.2.1 should be used to determine the holding time necessary to achieve the no adverse effect concentration upon discharge. Knowing the half-life (days), decay rate, dosage rate, volume of system and toxicity tests with time series, then a computational model can be used to determine the amount of time needed to hold the treated ballast water before discharge.

5.2.8 Information on Total Residual Oxidants (TRO) and Total Residual Chlorine (TRC) should be provided as part of the application for evaluation, for both the ballast water treatment process and the ballast water discharge.

5.3 Risk characterization and analysis

5.3.1 For the Basic Approval process, fate and effect testing should be performed in the laboratory with Active Substances and Preparations. This section lists information that could be useful for a preliminary risk characterization.

5.3.2 Both the Active Substance or Preparation as well as the treated ballast water discharge should be subject to toxicity testing in order to protect the receiving environment from toxic effects due to discharges.

5.3.3 The reaction with organic matter of Active Substances and Preparations that produce free radicals, should be addressed qualitatively so as to identify products of concern to the environment.

5.3.4 The rate and route of abiotic and biotic degradation of the Active Substances and Preparations under aerobic and anaerobic conditions should be assessed, resulting in the identification of relevant metabolites in the relevant media (ballast water, marine and fresh waters).

5.3.5 The rate of abiotic and biotic degradation of the Active Substances and Preparations under aerobic and anaerobic conditions should be assessed, resulting in the characterization of the persistence of the Active Substances, Preparations and Relevant Chemicals in terms of degradation rates under specified conditions (e.g., pH, redox, temperature).

5.3.6 The partition coefficients (solids-water partition coefficient (Kd) and/or organic carbon normalized distribution coefficient (Koc)) of the Active Substances, Preparations and Relevant Chemicals should be determined.

5.3.7 For Active Substances and Preparations, the potential for bioaccumulation should be assessed in marine or freshwater organisms (fish or bivalves) if the logarithm octanol/water partition coefficient (logPow) is >3.

5.3.8 Based on the information on fate and behaviour of Active Substances and Preparations, the discharge concentrations at selected time intervals should be predicted.

5.3.9 The effect assessment of the Active Substances, Preparations and Relevant Chemicals is initially based on a dataset of acute and/or chronic ecotoxicity data for aquatic organisms, being primary producers (algae or sea grasses), consumers (crustaceans), predators (fish), and should include secondary poisoning to mammalian and avian top-predators, as well as data for sediment species.

5.3.10 An assessment of secondary poisoning is redundant if the substance of concern demonstrates a lack of bioaccumulation potential (e.g., BCF <500 L/kg wet weight for the whole organism at 6% fat).

5.3.11 An assessment of sediment species is redundant if the potential of the substance of concern to partition into the sediment is low (e.g., Koc<500 L/kg).

5.3.12 The effect assessment of the Active Substances, Preparations and Relevant Chemicals should include a screening on carcinogenic, mutagenic and endocrine disruptive properties. If the screening results give rise to concerns, this should give rise to a further effect assessment.

5.3.13 The effect assessment of the Active Substances, Preparations and Relevant Chemicals, taking the indicated information into account, should be based on internationally recognized guidance①.

5.3.14 The results of the effect assessment are compared to the results of the discharge toxicity testing. Any unpredicted results (e.g., lack of toxicity or unexpected toxicity in the discharge assessment) should give rise to a further elaboration on the effect assessment.

5.3.15 An analytical method suitable for monitoring Active Substances and Preparations in ballast water discharges should be available.

6 EVALUATION CRITERIA

The Organization should evaluate the application for approval based on the criteria in this section.

6.1 The information that has been provided should be complete, of sufficient quality and in accordance with this Procedure.

6.2 That this information does not indicate possible unacceptable adverse effects to environment, human health, property or resources.

6.3 Ship and personnel safety

6.3.1 In order to protect the ship and personnel safety the Technical Group should evaluate the physical and chemical hazards (see paragraph 4.2.1.4) to ensure that potential hazardous properties of the Active Substances, Preparations or Relevant Chemicals formed in the treated ballast water should not create any unreasonable risk to the ship and personnel. Proposed procedures for the use and technical equipment introduced needs to be taken into account.

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① Such as relevant OECD guidelines or equivalent.

6.3.2 For the protection of personnel involved in the handling and storage of the Active Substances and Preparations, the proposal should include relevant ((M)SDS). The Organization should evaluate (M)SDS, mammalian toxicity data and chemical properties hazards (see paragraphs 4.2.1.2 and 4.2.1.4) and ensure that potential hazardous properties of the Active Substances, Preparations or Relevant Chemicals should not create any unreasonable risk to the ship or personnel. This evaluation should take into account the different circumstances that a ship or personnel may face in its trade (e.g., ice, tropical, humidity, etc.).

6.3.3 A Human Exposure Scenario (HES) should be provided by the applicant as part of the Risk Assessment procedure for ballast water management systems.

6.4 Environmental protection

6.4.1 In order to approve the application, the Organization should determine that the Active Substances, Preparations or Relevant Chemicals are not Persistent, Bioaccumulative and Toxic (PBT). Preparations that exceed all these criteria (Persistence, Bioaccumulation and Toxicity) in the table below are considered PBT.

Criteria for identification of PBT substances Table 1

Criterion	PBT criteria
Persistence	Half-life: > 60 days in marine water, or > 40 days in freshwater* , or > 180 days in marine sediment, or > 120 days in freshwater sediment*
Bioaccumulation	BCF > 2,000 or $LogP_{octanol/water} \geqslant 3$
Toxicity	Chronic NOEC < 0.01 mg/l

* For the purpose of marine environmental risk assessment half-life data in freshwater and freshwater sediment can be overruled by data obtained under marine conditions.

6.4.2 The Organization should determine the overall acceptability of the risk the Preparation may pose in its use for ballast water management. It should do so by comparing the information provided and the undertaken assessment of PBT and the discharge with scientific knowledge of the Active Substances, Preparations and Relevant Chemicals concerned. The risk evaluation should qualitatively take into account cumulative effects that may occur due to the nature of shipping and port operations.

6.4.3 The risk evaluation should consider the uncertainties involved in the application for approval, and as appropriate, provide advice on how these uncertainties can be dealt with.

6.4.4 An Emission Scenario Document (ESD) should be provided by the applicant as part of the Risk Assessment procedure for ballast water management systems. The ESD should be based on the worst-case discharge scenario and should be regarded as the first stage of a stepped approach to the development of a full ESD, when more data on potential discharges and technologies becomes available.

7 REGULATION OF THE USE OF ACTIVE SUBSTANCES AND PREPARATIONS

7.1 Handling of Active Substances and Preparations

7.1.1 The proposal for approval of Active Substances and Preparations should include information on their intended use and application. The quantity of Active Substances and Preparations to be added to the ballast water and the maximum allowable concentration of the Active Substances therein should be described in the instructions provided by the manufacturer. The system should ensure that the maximum dosage and maximum allowable discharge concentration are not exceeded at any time.

7.1.2 An assessment should be undertaken to ensure the safe on-board handling and storage of chemicals used to treat ballast water, using the existing IMO Conventions, Codes and guidance as a basis.

7.2 Hazard documentation and labelling

7.2.1 The proposal should include ((M)SDS) as required. The (M)SDS should describe appropriate storage and handling together with the effects of degradation and chemical reactivity during storage and should be included in the instructions provided by the manufacturer.

7.2.2 Documentation of hazards or the (M)SDS should conform to the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and the relevant IMO regulations (e.g., the IMDG Code) and guidelines (e.g., the GESAMP Hazard Evaluation Procedure). Where these regimes are not applicable, relevant national or regional regimes should be followed.

7.3 Procedures and use

7.3.1 Detailed procedures and information for safe application of Active Substances and Preparations on board should be developed and supplied, taking into consideration existing IMO Conventions, Codes and guidance. The procedures should comply with the approval conditions such as maximum allowable concentration and maximum discharge concentration, if any.

8 APPROVAL

8.1 Basic Approval

8.1.1 All proprietary data should be treated as confidential by the Organization and its Technical Group, the Competent Authorities involved, and the evaluating regulatory scientists, if any. However, all information related to safety and environmental protection, including physical/chemical properties, environmental fate and toxicity, should be treated as non-confidential.

8.1.2 Procedure to be followed:

.1 The manufacturer should evaluate the Active Substances or Preparations and the potential discharge in accordance with the approval criteria specified in this procedure.

.2 Upon completion, the manufacturer should prepare an Application on the Active Substances and Preparations and submit it to the Member of the Organization concerned. An application should only be made once the ballast water management system, Active Substance or Preparation has been sufficiently designed, progressed and tested to provide the full data necessary for a Basic Approval.

.3 The Administration having received a satisfactory application should as soon as possible propose an approval to the Organization.

.4 Members of the Organization may propose an approval.

.5 The Organization should announce and set the time frame for the evaluation of Active Substances and Preparations.

.6 Parties, Members of the Organization, the United Nations and its Specialized Agencies, intergovernmental organizations having agreements with the Organization and nongovernmental organizations in consultative status with the Organization may submit information that is relevant to the evaluation.

.7 The Organization should establish a Technical Group in accordance with its rules of procedure ensuring that proprietary data should be treated as confidential.

.8 The Technical Group should review the comprehensive proposal along with any additional data submitted and report to the Organization whether the proposal has demonstrated a potential for unreasonable risk for environment, human health, property or resources in accordance with the criteria specified in this procedure.

.9 The Technical Group's report should be in written form and circulated to the Parties, Members of the Organization, the United Nations and its Specialized Agencies, intergovernmental organizations having agreements with the Organization and nongovernmental organizations in consultative status with the Organization, prior to its consideration by the competent Committee.

.10 The Committee of the Organization should decide whether to approve any proposal, introduce any modifications thereto, if appropriate, taking into account the Technical Group's report.

.11 The Member of the Organization that submitted the application to the Organization should inform in writing the applicant about the decision made with regard to the respective Active Substance or Preparation and their manner of application.

.12 Active Substances or Preparations receiving Basic Approval by the Organization may be used for prototype or type approval testing based on the guidelines developed by the Organization①. Subject to evaluation against the criteria developed by the Organization, an Active Substance or Preparation may be used for Prototype or Type Approval testing for the approval of different BWMS.

.13 An applicant seeking to take advantage of an Active Substance or Preparation's Basic Approval should provide in its application a written agreement from the applicant whose Active Substance or Preparation has been granted the initial Basic Approval.

8.2 Final Approval

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① Guidelines for approval and oversight of prototype ballast water treatment technologies (G10) and Guidelines for approval of Ballast Water Management Systems (G8).

8.2.1 In accordance with regulation D-3.2, a ballast water management system using an Active Substance or Preparation to comply with the Convention (which received Basic Approval) must be approved by the Organization. For this purpose, the Member of the Organization submitting an application should conduct the Type Approval tests in accordance with Guidelines for approval of ballast water management systems (G8). The results should be conveyed to the Organization for confirmation that the residual toxicity of the discharge conforms to the evaluation undertaken for Basic Approval. This would result in Final Approval of the ballast water management system in accordance with regulation D-3.2. Active Substances or Preparations that have received Basic Approval by the Organization may be used for evaluation of ballast water management systems using Active Substances or Preparations for Final Approval.

8.2.2 It is to be noted that from the Guidelines (G8) land-based testing only the results of the residual toxicity tests should be included in the proposal for Final Approval in accordance with Procedure (G9). All other Guidelines (G8) testing remains for the assessment and attention of the Administration. Although Basic Approval under Procedure (G9) should not be a pre-requisite of Type Approval testing, as an Administration can regulate discharges from its own ships in its own jurisdiction. Basic Approval would still be required, and the specific technology could not be used in vessels in another jurisdiction without Basic Approval.

8.2.3 It should be noted that once a system has received Final Approval under this Procedure, then the respective applicant should not have to retrospectively submit new data if there is a change in the Methodology agreed by the Organization.

8.3 Notification of approval

8.3.1 The Organization will record the Basic and Final Approval of Active Substances and Preparations and ballast water management systems that make use of Active Substances and circulate the list once a year including the following information:

- Name of ballast water management system that make use of Active Substances and Preparations;
- Date of approval;
- Name of manufacturer; and
- Any other specifications, if necessary.

8.4 Modification

8.4.1 Manufacturers should report any modifications in names, including trade and technical name, composition or use of the Active Substances and Preparations in the ballast water management systems approved by the Organization, to the Member of the Organization. The Member of the Organization should inform the Organization accordingly.

8.4.2 Manufacturers intending to significantly change any part of a ballast water management System that has been approved by the Organization or the Active Substances and Preparations used in it should submit a new application.

8.5 Withdrawal of approval

8.5.1 The Organization may withdraw any approval in the following circumstances:

.1 If the Active Substances and Preparations or ballast water management system that make use of Active Substances no longer conforms to requirements due to amendments of the Convention.

.2 If any data or test records differ materially from data relied upon at the time of approval and are deemed not to satisfy the approval condition.

.3 If a request for withdrawal of approval is made by the Member of the Organization on behalf of the manufacturer.

.4 If unreasonable harm to environment, human health, property or resources is demonstrated by any Member of the Organization or observer to have been caused by the approved ballast water management system that make use of Active Substances or Preparations.

Appendix

Approval Scheme for Active Substance or Preparation and Ballast Water Management systems that make use of Active Substances