STATUTORY INSTRUMENTS.

S.I. No. 188 of 2023

SEA POLLUTION (BALLAST WATER MANAGEMENT CONVENTION) REGULATIONS 2023

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I, EAMON RYAN, Minister for Transport, in exercise of the powers conferred on me by sections 10, 12, 14, 15 and 17 of the Sea Pollution Act 1991 (No. 27 of 1991) and the Maritime Transport, Safety and Security (Transfer of Departmental Administration and Ministerial Functions) Order 2005 (S.I. No. 842 of 2005), as adapted by the Transport, Tourism and Sport (Alteration of Name of Department and Title of Minister) Order 2020 (S.I. No. 351 of 2020), hereby make the following regulations:

Citation

1. These Regulations may be cited as the Sea Pollution (Ballast Water Management Convention) Regulations 2023.

Definitions

2. (1) In these Regulations –

"Act of 1991" means the Sea Pollution Act 1991 (No. 27 of 1991);

"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;

"Ballast Water Management Plan" means the plan referred to in Regulation 10;

"Ballast Water Record Book" means a book, electronic or otherwise, used to record the operations of a ship's ballast water;

"BWM Certificate" means the International Ballast Water Management Certificate referred to in Regulation 7(14);

"cfu" means colony forming unit commonly used to estimate the concentration of microorganisms in a test sample;

"Code" means the document entitled Code for Approval of Ballast Water Management Systems, attached as Annex 5 to the Convention and included in Schedule 1 to these Regulations;

"Convention" means the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004;

"Guidelines" means IMO guidelines specifically related to the Convention;

"harbour authority" has the same meaning as it does in section 3 of the Sea Pollution (Miscellaneous Provisions) Act 2006 (No. 29 of 2006);

"IEC 60079-29-1" means the international standard specifying general requirements for construction, testing, performance and test methods that apply to portable, transportable and fixed apparatus for the detection and measurement of flammable gas or vapour concentrations with air;

Notice of the making of this Statutory Instrument was published in "Iris Oifigiúil" of 21*st April,* 2023.

"IMO" means the International Maritime Organization;

"inspector" has the same meaning as it has in section 3 of the Act of 1991;

"International Oil Pollution Prevention Certificate" means the certificate issued pursuant to Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978;

"Irish ship" has the same meaning as it has in section 9 of the Mercantile Marine Act 1955 (No. 29 of 1955);

"master" in relation to a ship, means the person having, for the time being, the command or charge of the ship;

"MSO" means the Marine Survey Office of the Department of Transport;

"Party" means a party to the Convention other than the State;

"recognised organisation" has the meaning it has in Regulation (EC) No. 391/2009 of the European Parliament and of the Council of 23 April 2009 on common rules and standards for ship inspection and survey organisations;

"renewal survey" means the survey referred to in Regulation 15(2)(b);

"Type Approval Certificate" means a certificate issued in accordance with Regulation 7.

(2) A word or expression that is used in these Regulations has the same meaning that it has in the Convention.

Application

3. (1) Subject to paragraph (2), these Regulations apply to –

(a) Irish ships;

(b) ships, although not entitled to fly the flag of the State, operate under the authority of the State, and

(c) ships, other than those referred to in paragraphs (a) and (b), that enter a port, harbour or repair yard in the State.

(2) These Regulations shall not apply to –

(a) a ship that is neither designed nor constructed to carry ballast water, or

(b) a ship that carries all its ballast water in sealed tanks, so that its ballast water is never discharged into the sea.

(3) An inspector shall apply the requirements of these Regulations to ships of non-Parties in a non-discriminatory manner.

Compliance

4. Unless otherwise specified, the owner of a ship (in these Regulations referred to as "ship owner") is responsible for ensuring compliance with the requirements set out in these Regulations.

Design and construction of ballast water management systems

5. (1) Ballast water management systems shall be designed and constructed –

(a) so as not to impair the health and safety of the ship or personnel, nor to present any unacceptable harm to the environment or to public health,

(b) so as not to interact negatively with the ship's systems and cargo,

(c) so as not to create long-term impacts on the safety of the ship or the crew through corrosive effects in the ballast system or other spaces,

(d) for robust and suitable operation in the shipboard environment,

(e) for the service for which it is intended,

(f) to mitigate any danger to persons on board when installed,

(g) so as to ensure that equipment that could emit dangerous gases or liquids shall have at least two independent means of detection and shutdown of the system, and

(h) with materials compatible with –

(i) the substances used within the ballast water management system,

(ii) the purposes for which they are intended,

(iii) the operational and environmental parameters to which they will be subjected.

(2) The ballast water management system shall be effective in meeting the standards described in Regulation 14 with respect to both short voyages and long voyages, so as to allow for both short and long intervals between treatment and discharge regardless of temperature of the ballast water, unless the system is intentionally constructed for use in specific waters.

(3) Any ballast water discharged following treatment shall be safe for the environment with respect to both short voyages and long voyages, so as to allow for both short and long intervals between treatment and discharge regardless of temperature of the ballast water.

(4) The ballast water management system shall be designed to allow for any viable organisms that remain after treatment to reproduce in the interval between treatment and discharge, regardless of the technology employed.

(5) Where, for the purposes of complying with these Regulations, active substances, or preparations containing one or more active substances, are used by the ballast water management system, the ship owner shall ensure that only those substances or preparations that are approved by the IMO on the basis of procedures adopted by the IMO are used.

(6) The ballast water management system shall not contain or use any substance of a dangerous nature, unless adequate risk mitigation measures

which are deemed acceptable by an inspector are incorporated for storage, application, installation and safe handling.

(7) In the case of any failure that would compromise the proper operation of the ballast water management system, audible and visual alarm signals shall be given in all stations from which ballast water operations are controlled.

(8) (a) All working parts of the ballast water management system that are liable to wear or damage shall be easily accessible for maintenance.

(b) The routine maintenance of the ballast water management system along with troubleshooting procedures shall be clearly defined by the manufacturer in the operation, maintenance and safety manual.

(9) The ballast water management system shall include the following requirements:

(a) the breaking of a seal for every access of the system outside of the working parts referred to in paragraph (8);

(b) a visual indication that is activated for the duration of any cleaning, calibration or repair of the system;

(c) control and monitoring equipment which records the matters referred to in subparagraph (b);

(d) necessary connections to ensure that any bypass of the system will activate an alarm and any such bypass event is recorded by the control and monitoring equipment.

(10) (a) Facilities shall be provided for checking, at the renewal surveys and according to the manufacturer's instructions, the performance of the components of the ballast water management system that take measurements.

(b) A calibration certificate certifying the date of the last calibration check shall be retained on board for inspection purposes.

(c) Only the manufacturer or persons authorised by the manufacturer shall perform the accuracy checks.

(11) The ballast water management system shall be provided with simple and effective means for its operation and control, including a control system allowing for the services needed for the proper operation of the system through necessary arrangements.

(12) (a) If the ballast water management system is fitted in a hazardous area location, the system shall comply with relevant safety regulations under Irish law and any relevant ISO standards for such spaces.

(b) Any electrical equipment that is part of the ballast water management system is required to be certified by an inspector as safe for use in hazardous areas.

(c) Any moving parts, which are fitted in a hazardous area shall be arranged so as to avoid the formation of static electricity.

(13) The ship owner shall ensure that the manufacturer demonstrates, through mathematical modelling or calculations, that any up or down scaling of the ballast water management system will not affect the functioning and effectiveness on board the ship of the type and size for which the equipment will be certified and shall ensure that the manufacturer takes into account the relevant guidance developed by the IMO.

(14) At a minimum, the shipboard test unit shall be of a capacity that allows for further validation of the mathematical modelling or calculations for scaling and should be selected at the upper limit of the rated capacity of the ballast water management system unless otherwise approved by the inspector.

(15) The ballast water management system shall be accompanied by sampling facilities installed taking into account the Guidelines and so arranged in order to collect representative samples of the ship's ballast water discharge.

(16) (a) Suitable bypasses or overrides shall be installed and used for the purposes of protecting the safety of the ship and personnel and these shall be connected to the ballast water management system so that any bypass of the system shall activate an alarm.

(b) A bypass event shall be recorded by the control and monitoring equipment and the master shall ensure it is recorded within the Ballast Water Record Book.

(17) (a) The requirement in paragraph (16) does not apply to internal transfer of ballast water within the ship.

(b) Where the ballast water management system transfers water internally that may affect the ship in complying with the requirements of Regulation 14, the recording referred to in paragraph (16)(b) shall identify such internal transfer operations.

(18) The master shall ensure that a record is kept of all maintenance and repairs of the ballast water management system.

(19) The ship owner shall ensure that the manufacturer of the equipment submits information to the MSO regarding the design, construction, operation and functioning of the ballast water management system in accordance with Part 1 of the Annex to the Code and shall include information regarding the water quality and operational parameters that are important to the operation of the system.

Control and monitoring of equipment

6. (1)(a) The ballast water management system shall have a suitable control and monitoring system that will automatically monitor and record sufficient data to verify the correct operation of the system.

(b) The system for control and monitoring referred to in subparagraph (a) shall record the proper functioning or failure of the system and, where practical, the system design limitations shall be monitored and recorded by the system to ensure proper operation.

(2) The ballast water management system shall incorporate control equipment that automatically monitors and adjusts necessary treatment dosages or intensities or other aspects of the system.

(3) The equipment referred to in paragraph (2) shall be capable of producing a report, either electronically or in print, of the applicable self-monitoring parameters in accordance with part 5 of the Annex to the Code for the purpose of inspections or maintenance, as required.

(4) (a) For the purposes of compliance with Regulation 12, the equipment referred to in paragraph (2) shall be capable of storing data for at least two years.

(b) Where this equipment is replaced, the ship owner shall ensure that data recorded prior to replacement remains available on board for two years.

(5) (a) Where a ballast water management system may emit dangerous gases, a means of gas detection by redundant safety systems shall be fitted in the space of the system and an audible and visual alarm shall be activated at a local area and at a manned ballast water management system control station in case of leakage.

(b) The means for gas detection referred to in subparagraph (a) shall be designed and tested in accordance with IEC 60079-29-1 or other recognised standards acceptable to the MSO.

(c) Gas detection devices with independent shutdown shall be provided on the ballast water management system.

(6) All software changes introduced to the ballast water management system after the pre-test evaluation shall be done according to a change handling procedure as set out in section 1.3.6 of Part 1 of the Annex to the Code.

Type approval process and certification

7. (1) Paragraphs (2) to (17) apply where a person is applying for type approval.

(2) Ballast water management systems that are installed on or after 28 October 2020 shall be approved in accordance with the Code.

(3) A manufacturer seeking type approval from the State for a ballast water management system shall apply in writing or electronically to the MSO in the form specified in Schedule 2.

(4) An application under paragraph (3) shall be accompanied by, at a minimum, the following documentation:

(a) a description and diagrammatic drawings of the ballast water management system;

(b) the operation, maintenance and safety manual;

(c) hazard identification;

(d) environmental and public health impacts;

(e) system design limitations.

(5) Following the receipt of an application under paragraph (3), the MSO may request such additional information as it deems necessary and shall carry out a pre-test evaluation in accordance with Part 1 of the Annex to the Code.

(6) The MSO, following a pre-test evaluation referred to in paragraph (5), shall engage the services of a testing facility approved by the Minister and shall submit the application received in accordance with this Regulation, along with the results of the evaluation to the testing facility.

(7) The approved testing facility shall undertake land based, shipboard and other tests in accordance with the procedures set out in Parts 2 and 3 of the Annex to the Code.

(8) Where the approved testing facility notifies the MSO that a ballast water management system fulfils the requirements and procedures set out in Parts 1, 2, 3 and 4 of the Annex to the Code, in addition to those of Regulations 5 and 6, the MSO shall, taking account of guidance developed by the IMO, issue to the manufacturer who made the application a Type Approval Certificate, in accordance with Part 7 of the Annex to the Code and its Appendix, for the specific application for which the ballast water management system is approved.

(9) Limitations of a ballast water management system, in addition to the required type approval testing parameters identified in paragraphs 2.29 and 2.46 of the Annex to the Code, as submitted by the manufacturer and validated by the approved testing facility, shall be documented on the Type Approval Certificate.

(10) The Type Approval Certificate shall specify the main particulars of the ballast water management system and validated system design limitations and shall be issued in accordance with Part 7 of the Annex to the Code and its Appendix.

(11) A Ballast Water Management System that fulfils the requirements of the Code except that it has not been tested at all the temperatures and salinities set out in Part 2 of the Annex to the Code shall only be approved by the MSO if corresponding limiting operating conditions are clearly stated on the Type Approval Certificate that is issued.

(12) The system design limitations shall be specified on the Type Approval Certificate in a table that identifies each water quality and operational parameter together with the validated low and high parameter values for which the system is designed in order to achieve the ballast water performance standards provided for in Regulation 14.

(13) Where an active substance is used in the ballast water management system, the MSO shall issue a Type Approval Certificate only where the ship owner has complied with Regulation 5(5).

(14) The MSO may issue a BWM Certificate, which shall be in the form specified in Schedule 3, on the basis of testing carried out by a competent

authority of another Party, which other Party has issued a Type Approval Certificate.

(15) Where an inspector issues a Type Approval Certificate to the manufacturer, he or she shall provide a type approval report to the IMO in accordance with Part 6 of the Annex to the Code.

(16) Where a ship owner that has type approval from the competent authority of another Party, which was given by taking account of revised Guidelines adopted by resolution MEPC.174(58), and he or she seeks type approval from the State, he or she shall submit such additional test reports and documentation set out in the Code as may be requested by the MSO.

(17) Ballast Water Management Systems installed before 28 October 2020 and approved taking account of the 2016 Guidelines referred to in paragraph 1.13 of the Code shall be deemed to be approved in accordance with the Code and these Regulations.

Sediment management for ships

8. (1) The master shall ensure that the removal and disposal of a ship's sediments from those spaces designated to carry ballast water is carried out in accordance with the ship's Ballast Water Management Plan.

(2) Taking account of Guidelines, along with safety and operational efficiency considerations, ships referred to in Regulation 11(4), (5) and (6) shall be designed and constructed with a view to –

(a) minimising the uptake and undesirable entrapment of sediments,

(b) facilitating removal of sediments, and

(c) providing safe access to personnel to allow for sediment removal and sampling.

Sediment reception facilities

9. (1) A harbour authority having control over a harbour, port, terminal, shipyard or ship repair facility shall ensure that if cleaning or repair of ships' ballast tanks occurs at such harbour, port, terminal, shipyard or ship repair facility, adequate facilities are provided for the reception of sediments.

(2) When deciding on whether reception facilities for sediments are adequate, a harbour authority shall take into account Guidelines for sediment reception facilities.

(3) Such reception facilities shall operate without causing undue delay to ships and shall provide for the safe disposal of such sediments in a manner that does not impair or damage the environment, human health, property or resources in the State or in another state.

Ballast Water Management Plan

10. (1) Each ship shall have on board a Ballast Water Management Plan along with a designated officer charged with ensuring that the plan is properly implemented.

(2) In the case of an Irish ship, the plan shall be approved by the MSO, taking into account Guidelines.

(3) The Ballast Water Management Plan shall be specific to each ship and shall, at a minimum, contain the following:

(a) safety procedures, as set out in Guidelines, for the ship and the crew associated with ballast water management;

(b) detailed description of the actions to be taken to implement the plan, including the ballast water management requirements set out in Regulations 8(1), 11, 13(1), (5), (6) and (7), and 14 along with the required supplemental ballast water management practices provided for in Regulations 12 and 15(2);

(c) procedures for the disposal of sediments at sea and to shore;

(d) procedures for coordinating with authorities of a state in a situation where ballast water management involves discharge into the territorial seas of that state;

(e) details of the designated officer referred to in paragraph (1);

(f) processes for ensuring that the requirements provided for in Regulations 5(16)(b), 5(17)(b), 5(18), 12(3), 12(6), 13(4), 15(4)(a) and 15(4)(c) are met.

(4) The Ballast Water Management Plan shall be written in the working language of the ship and if that language is not English, French or Spanish, a translation into one of those languages shall be included.

(5) The master shall ensure that officers and crew are familiar with their duties in the implementation of ballast water management particular to the ship on which they serve and shall, commensurate with their duties, be familiar with the ship's Ballast Water Management Plan.

Conducting ballast water management

11. (1) The master shall ensure that discharge of ballast water shall be carried out only as part of a Ballast Water Management Plan and is in accordance with these Regulations.

(2) Where a ship was constructed prior to 2009, its ballast water management plan shall meet the standards described in Regulation 13(5), (6) and (7) or Regulation 14 until the survey to renew its International Oil Pollution Prevention Certificate is carried out and thereafter shall meet the standards described in Regulation 14.

(3) Where a ship was constructed in or after 2009 and before 8 September 2017 with a ballast water capacity of less than 5,000 cubic meters, its ballast water management shall be conducted in a manner that at least meets the

standards described in Regulation 13(5), (6) and (7) or Regulation 14 until the survey to renew its International Oil Pollution Prevention Certificate is carried out and thereafter shall meet the standards described in Regulation 14.

(4) Where a ship was constructed in or after 2009 and before 2012 with a ballast water capacity of 5,000 cubic metres or more, its ballast water management shall be conducted in a manner that meets the standards described in Regulation 13(5), (6) and (7) or Regulation 14 until the survey to renew its International Oil Pollution Prevention Certificate is carried out and thereafter shall meet the standards described in Regulation 14.

(5) Where a ship was constructed in or after 2012 and before 8 September 2017 with a ballast water capacity of 5,000 cubic meters or more, its ballast water management shall be conducted in a manner that at least meets the standards described in Regulation 13(5), (6) and (7) or Regulation 14 until the survey to renew its International Oil Pollution Prevention Certificate is carried out and thereafter shall meet the standards described in Regulation 14.

(6) Where a ship was constructed on or after 8 September 2017, its ballast water management shall be conducted in a manner that at least meets the standards described in Regulation 14.

(7) The MSO may, where acceptable to the Marine Environment Protection Committee of the IMO, accept alternative methods of ballast water management other than the requirements described in paragraphs (2) to (6), provided that such methods ensure at least the same level of protection to the environment, human health, property and resources.

(8) The requirements of this Regulation do not apply to ships that –

(a) undertake ballast water management –

(i) for the purpose of ensuring the safety of a ship in emergency situations or saving a life at sea;

(ii) for the purpose of avoiding or minimising pollution incidents from the ship, and

(b) discharge ballast water to a reception facility which has been designed in a manner that takes account of Guidelines for such facilities.

Ballast Water Record Book

12. (1) Each ship shall have on board a Ballast Water Record Book in which shall be entered at a minimum the information specified in Schedule 4 and which may be in the form of –

(a) an electronic record which is self-contained or integrated into another electronic record system, or

(b) a physical record book which is self-contained or part of another physical record book.

(2) Entries in the ballast water record book shall be retained on board the ship for a minimum period of two years after the last entry has been made and

thereafter shall be retained within the control of the ship owner for at least a further three years.

(3) In the event of the discharge of ballast water pursuant to Regulation 11(8), or in the event of other accidental or exceptional discharge of ballast water, the master shall ensure that an entry be made in the ballast water record book describing the circumstances of, and the reason for, the discharge.

(4) The master shall ensure that the ballast water record book is readily available for inspection at all reasonable times.

(5) In the case of an unmanned ship which is under tow, the ballast water record book of that ship may be kept on the towing ship.

(6) (a) The master shall ensure that each operation concerning ballast water is fully recorded without delay in the ballast water record book.

(b) Each entry shall be signed by the officer in charge of the operation concerned and each completed page shall be signed by the master.

(7) The entries in the ballast water record book shall be in a working language of the ship. If that language is not English, French or Spanish, the entries shall contain a translation into one of those languages. When an entry is also made in an official national language of the state whose flag the ship is entitled to fly, that language shall prevail in the case of a dispute or discrepancy.

Ballast Water Exchange

13. (1) Where a ship is conducting ballast water exchange to meet the standards set out in paragraphs (5), (6) and (7), the master shall ensure –

(a) whenever possible, that ballast water exchange is conducted at least 200 nautical miles from the nearest land and in water at least 200 metres in depth, taking into account the Guidelines, and

(b) in cases where the ship is unable to conduct ballast water exchange in accordance with paragraph (a), that the exchange takes place taking the Guidelines into account and as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 metres in depth.

(2) A ship shall not be required to deviate from its intended voyage, or delay the voyage, in order to comply with any particular requirement of paragraph (1).

(3) A ship conducting ballast water exchange shall not be required to comply with paragraph (1) if the master reasonably decides that such exchange would threaten the safety or stability of the ship, its crew, or its passengers because of adverse weather, ship design or stress, equipment failure, or any other extraordinary conditions.

(4) When a ship is required to conduct ballast water exchange and does not do so in accordance with this Regulation, the reason for not so doing shall be entered in the Ballast Water Record Book.

(5) The master shall ensure that ballast water exchange is performed with an efficiency of at least 95 per cent volumetric exchange of ballast water.

(6) Where a ship is exchanging ballast water by the pumping-through method, pumping through three times the volume of each ballast water tank shall be considered to meet the standard described in paragraph (5).

(7) Notwithstanding paragraph (6), pumping through less than three times the volume may be accepted provided that the master can demonstrate that at least 95 per cent volumetric exchange is met.

Ballast Water Performance Standards

14. (1) Where a ship is conducting ballast water management in accordance with these Regulations, the master shall ensure that discharge –

(a) contains less than 10 viable organisms per cubic metre which are greater than or equal to 50 micrometres in minimum dimension,

(b) contains less than 10 viable organisms per millilitre which are less than 50 micrometres in minimum dimension and greater than or equal to 10 micrometers in minimum dimension, and

(c) with respect to indicator microbes, shall not exceed the specified concentrations in paragraph (2).

(2) The concentration levels for indicator microbes are as follows:

(a) toxicogenic Vibrio cholerae (O1 and O139) with less than 1 colony forming unit (cfu) per 100 millilitres or less than 1 cfu per 1 gram (wet weight) zooplankton samples;

(b) escherichia coli less than 250 cfu per 100 millilitres;

(c) intestinal Enterococci less than 100 cfu per 100 millilitres.

Survey and Certification

15. (1) The MSO shall ensure that ships of 400 gross tonnage and above, excluding floating platforms, floating storage units (FSOs) and floating production storage and offloading units (FPSOs) are surveyed for compliance with the Regulations in accordance with paragraph (2) and certified in accordance with paragraph (6)(a).

(2) A ship to which paragraph (1) applies shall be presented to the MSO for a survey as follows:

(a) an initial survey to be carried out –

(i) before the ship is put into service, or

(ii) before a BWM Certificate is issued for the first time,

for the purposes of certifying that the Ballast Water Management Plan and any associated structure, equipment, systems, fitting, arrangements and material or processes comply fully with the requirements of these Regulations and that a commissioning test has been conducted to validate the installation of any ballast water management system by demonstrating that its mechanical, physical, chemical and biological processes are working properly, taking account of Guidelines;

(b) subject to paragraphs (2), (5), (6), (7), (8) and (9) of Regulation 16, a renewal survey every five years from the date of issue of the BWM Certificate for the purposes of certifying that the Ballast Water Management Plan required by Regulation 10 and any associated structure, equipment, systems, fitting, arrangements and material or processes comply fully with the applicable requirements of these Regulations;

(c) an intermediate survey –

(i) within three months before or after the second anniversary date, or

(ii) within three months before or after the third anniversary date,

of the date of issue of the BWM Certificate, which shall take the place of one of the annual surveys specified in paragraph (d), and the intermediate survey shall include a general inspection of the structure, equipment, systems, fittings, arrangements and material or processes associated with the Ballast Water Management Plan and that they fully comply with the requirements of these Regulations, are in good working order and remain satisfactory for the service for which the ship is intended to be used;

(d) an annual survey made within three months before or after each anniversary date of the BWM Certificate, including a general inspection of the structure, equipment, systems, fittings, arrangements and material or processes associated with the Ballast Water Management Plan required under Regulation 10, and the annual survey shall ensure that they have been maintained in accordance with paragraph (5) and remain satisfactory for the service for which the ship is intended to be used;

(e) an additional survey, either general or partial, according to the circumstances, where a change, replacement or significant repair of the structure, equipment, systems, fittings, arrangements and material necessary to achieve full compliance with these Regulations is made, which survey shall ensure that any such change, replacement, or significant repair has been effectively made, so that the ship complies with the requirements of these Regulations and that a commissioning test has been conducted

to validate the installation of the system by demonstrating that its mechanical, physical, chemical and biological processes are working properly, taking into account Guidelines.

(3) An inspector shall certify that he or she has inspected the following:

(a) a copy of the Type Approval Certificate of the Ballast Water Management System;

(b) the operation, maintenance and safety manual of the Ballast Water Management System;

(c) the Ballast Water Management Plan;

(d) installation specifications;

(e) installation commissioning procedures.

(4) (a) Whenever an accident occurs to a ship or a defect is discovered which substantially affects the ability of the ship to conduct ballast water management in accordance with these Regulations, the master shall report it at the earliest opportunity to the MSO.

(b) The MSO shall conduct a preliminary investigation to ascertain whether a survey of a type described in Regulation 15(2)(c) is required in the circumstances described in paragraph (a).

(c) If the ship is in a port of another state, the owner shall also report immediately to the appropriate authorities of the port state and the MSO shall ascertain that such report has been made.

(5) The condition of the ship and its equipment, systems and processes shall be maintained to conform with these Regulations, so as to ensure that the ship in all respects will remain fit to proceed to sea without presenting a threat of harm to the environment, human health, property or resources.

(6) (a) On completion of an initial survey or a renewal survey in accordance with paragraph (2)(a) or (b), as the case may be, and verification of the matters provided for in paragraph (3) and subparagraph (b), the MSO shall issue a BWM Certificate.

(b) Prior to issuing a BWM Certificate, the MSO shall verify that –

(i) the ballast water management system installation has been carried out in accordance with the technical installation specification referred to in paragraph (3)(d),

(ii) the ballast water management system is in conformity with the relevant Type Approval Certificate,

(iii) the installation of the complete ballast water management system has been carried out in accordance with the manufacturer’s equipment specification,

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

(v) 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 approved standards, and

(vi) the installation commissioning procedures have been completed.

(7) Where a survey is carried out under paragraph (2) and the inspector is not satisfied that the ship complies with the provisions of these Regulations, the MSO shall refuse to issue, or may withdraw, as the case may be, a BWM Certificate, until such time as corrective action has been taken to satisfy the inspector that the ship complies with the Regulations.

(8) A BWM Certificate issued under paragraph (6)(a) shall cease to be valid where –

(a) the ship transfers to the flag of another State,

(b) a survey under paragraph (2) is not completed within the appropriate period specified in that paragraph, or

(c) the BWM Certificate is not endorsed in accordance with paragraph (11).

(9) Where a vessel transfers to the Irish flag, a BWM Certificate shall only be issued when the MSO is fully satisfied that the ship is in compliance with the requirements of this Regulation.

(10) In the case of a transfer of an Irish ship to the flag of another State, the MSO shall, if requested within three months after the transfer has taken place, transmit to the authorities of the new flag state, copies of the BWM Certificate, the Type Approval Certificate, the Ballast Water Record Book and other relevant documentation carried by the ship before the transfer and, if available, copies of the surveys referred to in paragraph (2).

(11) A survey carried out pursuant to paragraph (2)(c), (d) or (e) shall be noted in the form of an endorsement and signed, dated and stamped by the inspector on the BWM Certificate.

Duration and Validity of BWM Certificate

16. (1) Subject to paragraph (2), a BWM Certificate issued under Regulation 15(6)(a) shall be valid for a period not exceeding five years.

(2) Where a renewal survey referred to in Regulation 15(2)(b) is completed with the appropriate certification provided –

(a) within 3 months before the expiry date of the current BWM Certificate, a newly issued BWM Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing BWM Certificate,

(b) after the expiry of the current BWM Certificate, a newly issued BWM Certificate shall be valid from the date of completion of

the renewal survey to a date not exceeding 5 years from the date of expiry of the existing BWM Certificate,

(c) more than 3 months before the expiry of the current BWM Certificate, a newly issued BWM Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of completion of the renewal survey.

(3) Where a BWM Certificate is issued for a period that is less than 5 years, the MSO may extend the validity of the certificate beyond its expiry date to the maximum period referred to in paragraph (1), provided that the surveys under Regulation 15(2)(c) and (d) are carried out.

(4) Where a renewal survey referred to in Regulation 15(2)(b) is completed but a new BWM Certificate has not been issued pursuant to the survey, or where it has issued but cannot be placed on board the ship, the MSO may endorse the existing BWM Certificate, which shall be valid for a further period not exceeding 5 months from the date of expiry of the BWM Certificate.

(5) Where, at the time of expiry of a BWM Certificate, a ship is not in a port in which it may be surveyed, the MSO may, where it is proper and reasonable to do so, extend the period of validity of the certificate for the purposes of allowing the ship to complete its voyage to a port in which it may be surveyed.

(6) An extension under paragraph (5) shall not exceed 3 months.

(7) A ship which has received an extension pursuant to paragraph (5) shall, on arrival at the port in which it is to be surveyed, undergo the survey and shall not, regardless of the period of extension received, depart that port without the renewal survey having been carried out with respect to it and a new BWM Certificate having been issued to it.

(8) A BWM Certificate issued in the circumstances outlined in paragraph (7) shall be valid for a period not exceeding 5 years from the date of expiry of the existing certificate.

(9) (a) A BWM Certificate issued to a ship engaged on short voyages which has not been extended under other provisions of this Regulation may be extended by the MSO for a period of up to 1 month from the date of expiry of the certificate.

(b) A new BWM Certificate issued following a renewal survey in relation to a ship to which paragraph (a) applies shall be valid for a period not exceeding 5 years from the date of expiry of the certificate before the extension was granted.

(10) In special circumstances, as may be determined by the MSO, a newly issued BWM Certificate may not be required to be dated from the date of expiry of the existing BWM Certificate and in such circumstances the newly issued BWM Certificate shall be valid for a period that does not exceed 5 years from the date of completion of the renewal survey.

(11) Where an intermediate survey or an annual survey is completed before the period specified in Regulation 15(2)(c) or (d), as the case may be, then the

anniversary date referred to in those provisions shall be amended by an inspector to a date which shall not be more than 3 months later than the anniversary of the date on which the survey was completed and the intervals by which subsequent surveys under those provisions are required to be carried out shall be modified accordingly.

(12) Where paragraph (11) applies, the expiry date in respect of a BWM Certificate shall remain unchanged provided that the surveys referred to in that paragraph are carried out within the maximum interval permitted under those paragraphs.

Inspection

17. (1) Subject to paragraph (2), sampling by the MSO of a ship's ballast water shall be carried out in accordance with Guidelines.

(2) The time required to analyse samples shall not be used as a basis for unduly delaying the operation, movement or departure of a ship.

(3) Subject to paragraph (4), where a ship is a foreign registered ship, an inspector shall limit checks to –

(a) taking samples of the ship's ballast water,

(b) inspecting the ship's BWM Certificate to verify that it is valid, and

(c) inspecting the ship's Ballast Water Record Book.

(4) Where a foreign registered ship does not carry a valid BWM Certificate or an inspector has clear grounds to believe that –

(a) the condition of the ship or its equipment does not correspond substantially with the particulars of the BWM Certificate, or

(b) the master or the crew are not familiar with the essential shipboard procedures relating to ballast water management or have not implemented such procedures,

then a detailed inspection may be carried out.

(5) Where a detailed inspection is being carried out under paragraph (4), an inspector shall notify the master and take necessary steps to ensure that the ship does not discharge ballast water until it can do so without presenting a threat of harm to the environment, human health, property or resources.

(6) An inspector shall investigate any complaints alleging a breach of these Regulations and may request the complainant to provide additional evidence of the alleged breach.

(7) The identity of any person making a complaint to an inspector shall not be revealed to the master or the ship owner in respect of the ship concerned and an inspector shall take all appropriate steps to safeguard the confidentiality of the complainant during an inspection.

(8) Where a complaint relates to a foreign registered ship, the MSO shall notify the appropriate authority of the flag state, the Party that made the

complaint in the event that it is a different state, the Party that issued the BWM Certificate in respect of the vessel and the IMO that –

(a) a complaint has been made,

(b) the outcome of an inspection under paragraph (3) or (4), and

(c) any action it proposes to take, including a prosecution under the Act of 1991.

(9) Where no action has been taken by the MSO within a year of receiving a complaint referred to in paragraph (8), it shall notify the appropriate authority of the flag state in that regard.

(10) Where sampling in the course of an investigation under this Regulation indicates a breach of these Regulations or leads to a result indicating that a ship poses a threat to the environment, human health, property or resources, the MSO shall notify the master and prohibit the ship from discharging ballast water until the threat is removed.

(11) The MSO shall notify the next port of call of any relevant information relating to a breach of these Regulations in circumstances where –

(a) it has not been possible to warn, detain or exclude a ship for breach of these Regulations or where it has not been possible to prohibit a ship from discharging ballast water in the circumstances provided for in paragraph (10),

(b) a ship has been allowed to proceed to the next port of call.

SCHEDULE 1

Regulation 2(1)

Code for Approval of Ballast Water Management Systems

1 INTRODUCTION

General

1.1 The Code for Approval of Ballast Water Management Systems (BWMS Code) is aimed primarily at Administrations, or their designated bodies, in order to assess whether ballast water management systems (BWMS) meet the standard set out in regulation D-2 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the Convention). In addition, the Code is intended for manufacturers and shipowners as a reference on the evaluation procedure that equipment will undergo and the requirements placed on BWMS. The Code should be applied in an objective, consistent and transparent way and its application should be evaluated periodically by the Organization.

1.2 Articles and regulations referred to in this Code are those contained in the Convention.

1.3 The Code includes general requirements concerning the design, installation, performance, testing, environmental acceptability, technical procedures for evaluation and procedures for issuance of Type Approval Certificates of BWMS and reporting to the Organization.

1.4 The Code is intended to fit within an overall framework for evaluating the performance of systems that includes the experimental shipboard evaluation of prototype systems under the provisions of regulation D-4, approval of BWMS and associated systems that comply fully with the requirements of the Convention, and port State control sampling for compliance under the provisions of article 9 of the Convention.

1.5 The approval requirements of regulation D-3 stipulate that BWMS used to comply with the Convention must be approved by the Administration, in accordance with this Code. In addition to such BWMS approval, as set forth in regulation A-2 and regulation B-3, the Convention requires that discharges of ballast water from ships must meet the regulation D-2 performance standard on an on-going basis. Approval of a system is intended to screen out BWMS that would fail to meet the standards prescribed in regulation D-2 of the Convention. Approval of a system, however, does not ensure that a given system will work on all ships or in all situations. To satisfy the Convention, a discharge must comply with the D-2 standard throughout the life of the ship.

1.6 BWMS shall be designed to not impair the health and safety of the ship or personnel, nor to present any unacceptable harm to the environment or to public health.

1.7 BWMS shall meet the standards of regulation D-2 and the conditions established in regulation D-3 of the Convention. The Code serves to evaluate the safety, environmental acceptability, practicability and biological effectiveness of the systems designed to meet these standards and conditions. The cost effectiveness of type-approved equipment will be used in determining the need for revisions of the Code.

1.8 To achieve consistency in its application, the approval procedure requires that a uniform manner of testing, analysis of samples, and evaluation of results is developed and applied. Amendments to this Code shall be duly circulated by the Secretary-General. Due consideration shall be given to the practicability of the BWMS.

Goal and purpose

1.9 The goal of the Code is to ensure uniform and proper application of the standards contained in the Convention. As such the Code should be updated as the state of knowledge and technology may require.

1.10 The purpose of the Code is to provide a uniform interpretation and application of the requirements of regulation D-3 and to:

1 define test and performance requirements for the approval of BWMS;

2 set out appropriate design, construction and operational parameters necessary for the approval of BWMS;

3 provide direction to Administrations, equipment manufacturers and shipowners in determining the suitability of equipment to meet the requirements of the Convention and of the environmental acceptability of treated water; and

4 ensure that BWMS approved by Administrations are capable of achieving the standard of regulation D-2 in land-based and shipboard evaluations and do not cause unacceptable harm to the ship, the crew, the environment or public health.

Applicability

1.11 This Code applies to the approval of BWMS in accordance with the Convention.

1.12 This Code applies to BWMS intended for installation on board all ships required to comply with regulation D-2.

1.13 BWMS approved taking into account the 2016 Guidelines (G8) adopted by resolution MEPC.279(70) shall be deemed to be in accordance with the BWMS Code.

2 BACKGROUND

2.1 The requirements of the Convention relating to approval of BWMS used by ships are set out in regulation D-3.

2.2 Regulation D-2 stipulates that ships conducting ballast water management in accordance with the ballast water performance standard of the Convention shall discharge:

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

2 less than 10 viable organisms per millilitre less than 50 μm in minimum dimension and greater than or equal to 10 μm 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 mL or less than 1 cfu per 1 g (wet weight) of zooplankton samples;

2 *Escherichia coli* less than 250 cfu per 100 mL; and

3 Intestinal Enterococci less than 100 cfu per 100 mL.

3 DEFINITIONS

For the purpose of this Code:

3.1 *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.

3.2 *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, piping arrangements as specified by the manufacturer, control and monitoring equipment and sampling facilities. For the purpose of this Code, BWMS does not include the ship's ballast water fittings, which may include piping, valves, pumps, etc., that would be required if the BWMS was not fitted.

3.3 *Ballast water management plan* means the plan referred to in regulation B-1 of the Convention describing the ballast water management process and procedures implemented on board individual ships.

3.4 *Control and monitoring equipment* means the equipment installed for the effective operation and control of the BWMS and the assessment of its effective operation.

3.5 *Convention* means the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004.

3.6 *Failed test cycle* is a valid test cycle in which the performance of the BWMS resulted in treated water that is determined to be non-compliant with the standard set within regulation D-2. A failed test cycle interrupts the required consecutive test cycles and terminates the test.

3.7 *Invalid test cycle* is a test cycle in which, due to circumstances outside the control of the BWMS, the requirements for a valid test cycle are not met. When a test cycle is invalid, it does not count as one of the required consecutive test cycles in a test and the test can be continued.

3.8 *Land-based testing* means 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 Parts 2 and 3 of the annex to this Code, to confirm that the BWMS meets the ballast water performance standard described in regulation D-2 of the Convention.

3.9 *Major components* means those components that directly affect the ability of the system to meet the ballast water performance standard described in regulation D-2.

3.10 *Representative sampling* means sampling that reflects the relative concentrations (chemicals) and numbers and composition of the populations (organisms) in the volume of interest. Samples shall be taken in a time-integrated manner and the sampling facility shall be installed, taking into account guidelines developed by the Organization.[1]

3.11 *Sampling facilities* refers to the means provided for sampling treated or untreated ballast water as needed in this Code and in the guidelines developed by the Organization.[1]

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[1] Refer to the *Guidelines for ballast water sampling (G2)* resolution MEPC.173(58)

3.12 *Shipboard testing* means a full-scale test of a complete BWMS carried out on board a ship according to part 2 of the annex to this Code, to confirm that the system meets the standards set by regulation D-2 of the Convention.

3.13 *Successful test cycle* means a valid test cycle where the BWMS functions to its specifications and treated water is determined to meet the ballast water performance standard described in regulation D-2.

3.14 *System Design Limitations* (SDL) of a BWMS means the water quality and operational parameters, determined in addition to the required type approval testing parameters, that are important to its operation, and, for each such parameter, a low and/or a high value for which the BWMS is designed to achieve the performance standard of regulation D-2. The SDL should be specific to the processes being employed by the BWMS and should not be limited to parameters otherwise assessed as part of the type approval process. The SDL should be identified by the manufacturer and validated under the supervision of the Administration, taking into account Guidance developed by the Organization, and in accordance with this Code.

3.15 *Test cycle* refers to one testing iteration (to include uptake, treatment, holding and discharge as appropriate) under a given set of requirements used to establish the ability of a BWMS to meet the set standards.

3.16 *Test* means the set of required test cycles.

3.17 *Treatment Rated Capacity* (TRC) means 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 ballast water performance standard in regulation D-2. The TRC is measured at the inlet of the BWMS.

3.18 *Valid test cycle* means a test cycle in which all the required test conditions and arrangements, including challenge conditions, test control, and monitoring arrangements (including piping, mechanical and electrical provisions) and test analytical procedures were achieved by the test organization.

3.19 *Viable organisms* means organisms that have the ability to successfully generate new individuals in order to reproduce the species.

4 TECHNICAL SPECIFICATIONS

4.1 This section details the general technical requirements which a BWMS shall meet in order to obtain type approval.

General principles for operation

4.2 A BWMS shall be effective in meeting the D-2 standard on short voyages and long voyages (i.e. short and long intervals between treatment and discharge), regardless of temperature, unless the system is intentionally constructed for use in specific waters.

4.3 Ballast water discharged following treatment shall be safe for the environment on short voyages and long voyages (i.e. short and long intervals between treatment and discharge), regardless of temperature.

4.4 The design of the BWMS shall account for the fact that, regardless of the BWMS technology employed, viable organisms remaining after treatment may reproduce in the interval between treatment and discharge.

Ballast water management systems

4.5 The BWMS shall be designed and constructed:

1 for robust and suitable operation in the shipboard environment;

2 for the service for which it is intended;

3 to mitigate any danger to persons on board when installed. Equipment that could emit dangerous gases/liquids shall have at least two independent means of detection and shutdown of the BWMS (i.e. hazardous gas level reaching lower explosive limits (LEL) or level of toxic concentrations that can result in severe effects on human health); and

4 with materials compatible with: the substances used; the purpose for which it is intended; the working conditions to which it will be subjected; and the environmental conditions on board.

4.6 The BWMS shall not contain or use any substance of a dangerous nature, unless adequate risk mitigation measures are incorporated for storage, application, installation and safe handling, acceptable to the Administration.

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

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

4.9 To avoid interference with the BWMS, the following items shall be included:

1 every access of the BWMS beyond the essential requirements of paragraph 4.8 shall require the breaking of a seal;

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

3 the BWMS shall be provided with the necessary connections to ensure that any bypass of the BWMS will activate an alarm, and that the bypass event is recorded by the control and monitoring equipment.

4.10 Facilities shall 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 shall be retained on board for inspection purposes. Only the manufacturer or persons authorized by the manufacturer shall perform the accuracy checks.

4.11 The BWMS shall be provided with simple and effective means for its operation and control. It shall be provided with a control system that shall be such that the services needed for the proper operation of the BWMS are ensured through the necessary arrangements.

4.12 The BWMS shall, if intended to be fitted in hazardous area locations, comply with the relevant safety regulations for such spaces. Any electrical equipment that is part of the BWMS shall be based in a non-hazardous area, or shall be certified by the Administration as safe for use in a hazardous area. Any moving parts, which are fitted in hazardous areas, shall be arranged so as to avoid the formation of static electricity.

4.13 The BWMS shall be designed so as not to endanger the health and safety of the crew, interact negatively with the ship's systems and cargo or produce any adverse environmental effects. The BWMS shall not create long-term impacts on the safety of the ship and crew through corrosive effects in the ballast system and other spaces.

4.14 It shall be demonstrated, by using mathematical modelling and/or calculations, that any up or down scaling of the BWMS will not affect the functioning and effectiveness on board a ship of the type and size for which the equipment will be certified. In doing so, the manufacturer of the equipment shall take into account the relevant guidance developed by the Organization.

4.15 Scaling information shall allow the Administration to verify that any scaled model is at least as robust as the land-based-tested model. It is the responsibility of the Administration to verify that the scaling used is appropriate for the operational design of the BWMS.

4.16 At a minimum, the shipboard test unit shall be of a capacity that allows for further validation of the mathematical modelling and/or calculations for scaling, and preferably selected at the upper limit of the rated capacity of the BWMS, unless otherwise approved by the Administration.

Control and monitoring equipment

4.17 Administrations shall ensure that type-approved BWMS have a suitable control and monitoring system that will automatically monitor and record sufficient data to verify correct operation of the system. The control and monitoring equipment shall record the proper functioning or failure of the BWMS. Where practical, SDL parameters should be monitored and recorded by the BWMS to ensure proper operation.

4.18 The BWMS shall incorporate control equipment that automatically monitors and adjusts necessary treatment dosages or intensities or other aspects of the BWMS of the ship, which while not directly affecting treatment, are nonetheless required for proper administration of the necessary treatment.

4.19 The equipment shall be able to produce (e.g. display, print or export) a report of the applicable self-monitoring parameters in accordance with part 5 of the annex for official inspections or maintenance, as required.

4.20 To facilitate compliance with regulation B-2, the control and monitoring equipment shall also be able to store data for at least 24 months. In the event that the control and monitoring equipment is replaced, means shall be provided to ensure the data recorded prior to replacement remains available on board for 24 months.

4.21 For BWMS that could emit dangerous gases, a means of gas detection by redundant safety systems shall be fitted in the space of the BWMS, and an audible and visual alarm shall be activated at a local area and at a manned BWMS control station in case of leakage. The gas detection device shall be designed and tested in accordance with IEC 60079-29-1 or other recognized standards acceptable to the Administration. Monitoring measures for dangerous gases with independent shutdown shall be provided on the BWMS.

4.22 All software changes introduced to the system after the pre-test evaluation shall be done according to a change handling procedure ensuring traceability.

5 TYPE APPROVAL PROCESS

5.1 The type approval requirements for BWMS are as described below.

5.2 The manufacturer of the equipment shall submit information regarding the design, construction, operation and functioning of the BWMS in accordance with Part 1 of the annex, including information regarding the water quality and operational parameters that are important to the operation of the system. This information shall be the basis for a first evaluation of suitability by the Administration.

5.3 Following the Administration's pre-test evaluation, the BWMS shall undergo land-based, shipboard and other tests in accordance with the procedures described in Parts 2 and 3 of the annex. The BWMS tested for type approval shall be a final and complete product that meets the requirements of section 4 and it shall be constructed using the same materials and procedures that will be used to construct production units.

5.4 Successful fulfilment of the requirements and procedures outlined in Parts 2 and 3 of the annex, as well as all other requirements of this Code, shall lead to the issuance of a Type Approval Certificate by the Administration in accordance with section 6.

5.5 The limitations of the BWMS, in addition to the required type approval testing parameters identified in paragraphs 2.29 and 2.46 of the annex, as submitted by its manufacturer and validated by the Administration, shall be documented on the Type Approval Certificate. These design limitations do not determine if the equipment may be type-approved or not, but provide information on the conditions beyond the type approval testing parameters under which proper functioning of the equipment can be expected.

5.6 When a type-approved BWMS is installed on board, an installation survey according to section 8 shall be carried out.

5.7 The documentation submitted for approval shall include at least the following:

1 a description and diagrammatic drawings of the BWMS;

2 the operation, maintenance and safety manual;

3 hazard identification;

4 environmental and public health impacts; and

5 System Design Limitations.

6 APPROVAL AND CERTIFICATION PROCEDURES

6.1 A BWMS which in every respect fulfils the requirements of this Code may be approved by the Administration for fitting on board ships. The approval shall take the form of a Type Approval Certificate of BWMS, specifying the main particulars of the BWMS and validated SDL. Such certificates shall be issued in accordance with Part 7 of the annex in the format shown in the appendix.

6.2 A BWMS that in every respect fulfils the requirements of this Code except that it has not been tested at all the temperatures and salinities set out in Part 2 of the annex shall only be approved by the Administration if corresponding limiting operating conditions are clearly stated on the issued Type Approval Certificate with the description "Limiting Operating Conditions". For the limiting values, the SDL shall be consulted.

6.3 A Type Approval Certificate of a BWMS shall be 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 operating conditions or circumstances as appropriate.

6.4 A Type Approval Certificate of a BWMS shall be issued by the Administration based on satisfactory compliance with all the requirements described in Parts 1, 2, 3 and 4 of the annex.

6.5 The SDL shall be specified on the Type Approval Certificate in a table that identifies each water quality and operational parameter together with the validated low and/or high parameter values for which the BWMS is designed to achieve the ballast water performance standard described in regulation D-2.

6.6 An Administration may issue a Type Approval Certificate of a BWMS based on testing already carried out under supervision by another Administration. In cases where the approval of a BWMS by an Administration for installation on a ship operating under its authority is to be granted on the basis of testing carried out by another Administration, the approval may be conveyed through the issuance of the International Ballast Water Management Certificate.

6.7 A Type Approval Certificate shall only be issued to a BWMS that has been determined by the Administration to make use of an Active Substance after it has been approved by the Organization in accordance with regulation D-3.2. In addition, the Administration shall ensure that any recommendations that accompanied the Organization's approval have been taken into account before issuing the Type Approval Certificate.

6.8 The Type Approval Certificate shall be issued taking into account guidance developed by the Organization.[2]

6.9 An approved BWMS may be type approved by other Administrations for use on their ships. Should a BWMS approved by one country fail type approval in another country, then the two countries concerned shall consult one another with a view to reaching a mutually acceptable agreement.

6.10 An Administration approving a BWMS shall promptly provide a type-approval report to the Organization in accordance with part 6 of the annex. Upon receipt of a type-approval report, the Organization shall promptly make it available to the public and Member States by appropriate means.

6.11 In the case of a type approval based entirely on testing already carried out under supervision by another Administration, the type-approval report shall be prepared and kept on file and the Organization shall be informed of the approval.

6.12 In the case of a BWMS that was previously type-approved by an Administration taking into account the revised Guidelines (G8) adopted by resolution MEPC.174(58), the manufacturer, in seeking a new type approval under this Code, shall only be requested to submit to the Administration the additional test reports and documentation set out in this Code.

7 INSTALLATION REQUIREMENTS FOLLOWING TYPE APPROVAL

7.1 The BWMS shall be accompanied by sampling facilities installed taking into account guidelines developed by the Organization,[3] so arranged in order to collect representative samples of the ship's ballast water discharge.

7.2 Suitable bypasses or overrides to protect the safety of the ship and personnel shall be installed and used in the event of an emergency and these shall be connected to the BWMS so that any bypass of the BWMS shall activate an alarm. The bypass event shall be recorded by the control and monitoring equipment and within the ballast water record book.

7.3 The requirement in paragraph 7.2 does not apply to internal transfer of ballast water within the ship (e.g. anti-heeling operations). For BWMS that transfer water internally which may affect compliance by the ship with the

[2] Refer to validity of type approval certification for marine products (MSC.1/Circ.1221)
[3] Refer to the guidelines for ballast water sampling (G2) (resolution MEPC.173(58))

standard described in regulation D-2 (i.e. circulation or in-tank treatment) the recording in paragraph 7.2 shall identify such internal transfer operations.

8 INSTALLATION SURVEY AND COMMISSIONING PROCEDURES FOLLOWING TYPE APPROVAL

8.1 The additional information outlined in the paragraphs below is intended to facilitate ship operations and inspections and assist ships and Administrations in preparing for the procedures set out in the *Survey Guidelines for the purpose of the International Convention for the Control and Management of Ships' Ballast Water and Sediments under the Harmonized System of Survey and Certification*,[4] developed by the Organization, which describe the examination of plans and designs and the various surveys required under regulation E-1.

8.2 The Administration issuing the International Ballast Water Management Certificate shall verify that the following documentation is on board in a suitable format:

1 for the purpose of information, a copy of the Type Approval Certificate of the BWMS;

2 the operation, maintenance and safety manual of the BWMS;

3 the ballast water management plan of the ship;

4 installation specifications, e.g. installation drawing, piping and instrumentation diagrams, etc; and

5 installation commissioning procedures.

8.3 Prior to the issuance of the International Ballast Water Management Certificate, following the installation of a BWMS, the Administration should verify that:

1 the BWMS installation has been carried out in accordance with the technical installation specification referred to in paragraph 8.2.4;

2 the BWMS is in conformity with the relevant Type Approval Certificate BWMS;

3 the installation of the complete BWMS has been carried out in accordance with the manufacturer's equipment specification;

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

[4] Refer to the Survey Guidelines under the Harmonized System of Survey and Certification (HSSC), 2017 (resolution A.1120(30))

5 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 approved standards; and

6 the installation commissioning procedures have been completed.

ANNEX

PART 1 – SPECIFICATIONS FOR PRE-TEST EVALUATION OF SYSTEM DOCUMENTATION

1.1 Adequate documentation shall be prepared and submitted to the Administration and be shared with the test organization as part of the approval process well in advance of the intended approval testing of a BWMS. Approval of the submitted documentation shall be a prerequisite for carrying out independent approval tests.

1.2 Documentation shall be provided by the manufacturer/developer for two primary purposes: evaluating the readiness of the BWMS for undergoing approval testing and evaluating the manufacturer's proposed SDL and validation procedures.

Documentation

1.3 The documentation to be submitted as a part of the readiness evaluation shall include at least the following:

1 a BWMS technical specification, including at least:

1 a description of the BWMS, treatment processes it employs and details of any required permits;

2 adequate information including descriptions and diagrammatic drawings of the pumping and piping arrangements, electrical/electronic wiring, monitoring system, waste streams and sampling points. Such information should enable fault finding;

3 details of major components and materials used (including certificates where appropriate);

4 an equipment list showing all components subject to testing including specifications, materials and serial numbers;

5 an installation specification in accordance with manufacturers installation criteria 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;

6 information regarding the characteristics and arrangements in which the system is to be installed,

including scope of the ships (sizes, types and operation) for which the system is intended. This information may form the link between the system and the ship's ballast water management plan; and

7 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;

2 the operation, maintenance and safety manual, including at least:

1 instructions for the correct operation of the BWMS, including procedures for the discharge of untreated water in the event of malfunction of the ballast water treatment equipment;

2 instructions for the correct arrangement of the BWMS;

3 maintenance and safety instructions and the need to keep records;

4 troubleshooting procedures;

5 emergency procedures necessary for securing the ship;

6 any supplementary information considered necessary for the safe and efficient operation of the BWMS, e.g. documentation provided for approval under the ***Procedure for approval of ballast water management systems that make use of Active Substances*** (G9 (resolution MEPC.169(57)); and

7 calibration procedures;

3 information on any hazard identification conducted to identify potential hazards and define appropriate control measures, if the BWMS or the storage tanks for processing chemicals could emit dangerous gases or liquids;

4 information regarding environmental and public health impacts including:

1 identification of potential hazards to the environment based on environmental studies performed to the extent necessary to assure that no harmful effects are to be expected;

2 in the case of BWMS that make use of Active Substances or Preparations containing one or more Active Substances, the dosage of any Active Substances used and the maximum allowable discharge concentrations;

3 in the case of 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, the documentation shall include results of toxicity tests of treated water as described in paragraph 2.19 of this annex; and

4 sufficient information to enable 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;

5 information regarding SDL including:

1 the identification of all known parameters to which the design of the BWMS is sensitive;

2 for each parameter the manufacturer shall claim a low and/or a high value for which the BWMS is capable of achieving the Performance Standard of regulation D-2; and

3 the proposed method for validating each claimed SDL shall be set out, together with information on the source, suitability and reliability of the method;

6 a software change handling and revision control document including all software changes introduced to the system after the pre-test evaluation. These shall be done according to a change handling procedure ensuring traceability. Therefore, the manufacturer shall present a procedure describing how changes are to be handled and how revision control is maintained. As a minimum for a modification request, the following types of information shall be produced and logged:

1 reason for modification;

2 specification of the proposed change;

3 authorization of modification; and

4 test record;

7 functional description including a textual description with necessary supporting drawings, diagrams and figures to cover:

1 system configuration and arrangement;

2 scope of supply;

3 system functionality covering control, monitoring, alarm and safety functions;

4 self-diagnostics and alarming functionalities; and

5 safe states for each function implemented.

1.4 The documentation may include specific information relevant to the test set-up to be used for land-based testing according to this Code. Such information should 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 should also address general compliance with applicable environment, health and safety standards during the type-approval procedure.

Readiness evaluation

1.5 During the readiness evaluation, the Administration shall ensure that each technical specification set out in section 4 of this Code has been met, other than those that will be assessed during later testing.

1.6 The readiness evaluation shall 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.

1.7 Administrations shall ensure adequate risk assessments including the implementation of preventative actions have been undertaken relating to the safe operation of BWMS.

1.8 As a first step the manufacturer shall provide information regarding the requirements and procedures for installing, calibrating and operating (including maintenance requirements) the BWMS during a test. This evaluation should 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.

1.9 The test facility shall have a procedure to deal with deviations that occur prior to testing and an evaluation process which includes an assessment and validation process to address any unforeseen deviations that may occur during testing. Deviations from the testing procedure shall be fully reported.

1.10 During the readiness evaluation the major components of the BWMS shall be identified. Major components are considered to be those components that directly affect the ability of the system to meet the performance standard described in regulation D-2. Upgrades or changes to major components shall not take place during type approval testing. A change to a major component requires a new submission of the test proposal and shall involve a new evaluation and repeating of the land-based and shipboard tests.

1.11 The Administration may allow replacements of non-major components of equivalent specification (independently approved to a recognized and equal operational standard) during type approval. Replacements of non-major components during testing shall be reported.

1.12 Upgrades of the BWMS that relate to the safe operation of that system may be allowed during and after type approval and shall be reported. If such safety upgrades directly affect the ability of the system to meet the standard described in regulation D-2, it shall be treated as a change of a major component, as per paragraph 1.10 above.

1.13 The evaluation shall identify consumable components in the BWMS. The Administration may allow replacement of like-for-like consumable components during type approval testing and all replacements shall be reported.

System Design Limitation evaluation

1.14 The SDL evaluation shall be undertaken by the Administration. It shall assess the basis for the manufacturer's claim that the SDL include all known water quality and operational parameters to which the design of the BWMS is sensitive and that are important to its ability to achieve the performance standard described in regulation D-2.

1.15 The Administration shall also evaluate the suitability and reliability of the methods proposed for validating the claimed low and/or high values for each SDL. These methods may include tests to be undertaken during land-based, shipboard or bench-scale testing and/or the use of appropriate existing data and/or models.

PART 2 –TEST AND PERFORMANCE SPECIFICATIONS FOR APPROVAL OF BALLAST WATER MANAGEMENT SYSTEMS

2.1 The Administration decides the sequence of land-based and shipboard testing. The BWMS used for testing must be verified by the Administration to be the same as the BWMS described under Part 1 of the annex with major components as described in the documentation submitted in accordance with paragraphs 1.3.1.3 and 1.3.1.4 of this annex.

Quality assurance and quality control procedures

2.2 The test facility shall demonstrate its competency in conducting valid type approval tests in two ways:

1 by having implemented a rigorous quality control/quality assurance programme, approved, certified and audited by an independent accreditation body, or to the satisfaction of the Administration; and

2 by demonstrating its ability to conduct valid test cycles with appropriate challenge water, sample collection, sample analysis and method detection limits.

It is the responsibility of the Administration, or its authorized delegate, to determine the acceptability of the test facility.

2.3 The test facility's quality control/quality assurance programme shall consist of:

1 a Quality Management Plan (QMP), which addresses the quality control management structure and policies of the testing body (including subcontractors and outside laboratories);

2 a Quality Assurance Project Plan (QAPP), which defines the methods, procedures, and quality assurance and quality control (QA/QC) protocols used by the test facility for testing BWMS in general. It identifies the test team members, and it includes all relevant standard operating procedures (SOPs), typically as appendices; and

3 a Test/Quality Assurance Plan (TQAP), that provides specific details for conducting a test of a given BWMS at a given site and time. The TQAP includes detailed plans for commissioning the BWMS, the experimental plan, decommissioning, and reporting the results. The TQAP identifies all organizations involved in the test and includes the BWMS manufacturer's documentation and performance claims. The TQAP also identifies the data to be recorded, operational and challenge parameters that define a valid test cycle, data analyses to be presented in the verification report and a schedule for testing. Appropriate statistical distributions shall be considered and used to analyse data.

2.4 The test facility performing the BWMS tests shall be independent. It shall not be owned by or affiliated with the manufacturer or vendor of any BWMS, or by the manufacturer or supplier of the major components of that equipment.

Avoiding sampling bias

2.5 The sampling protocol must ensure organism mortality is minimized, e.g. by using appropriate valves and flow rates for flow control in the sampling facility, submerging nets during sampling collection, using appropriate sampling duration and handling times, and appropriate concentrating methodology. All methods to avoid sampling bias shall be validated to the satisfaction of the Administration.

Shipboard tests

2.6 A shipboard test cycle includes:

1 the uptake of ballast water of the ship;

2 treatment of the ballast water in accordance with paragraph 2.8.4 of this annex by the BWMS;

3 the storage of ballast water on the ship during a voyage; and

4 the discharge of ballast water from the ship.

2.7 Shipboard testing of BWMS shall be conducted by the test facility, independent of the BWMS manufacturer, with the system being operated and maintained by the ships' crew as per the operation, maintenance and safety manual.

Success criteria for shipboard testing

2.8 In evaluating the performance of BWMS installation(s) on a ship or ships, the following information and results shall be supplied to the satisfaction of the Administration:

1 test plan to be provided prior to testing;

2 documentation that an in-line BWMS is of a capacity to reflect the flow rate of the ballast water pump for the TRC of the BWMS;

3 documentation that an in-tank BWMS is of a capacity to reflect the ballast water volume that it is intended to treat within a specified period of time;

4 the amount of ballast water tested in the test cycle on board shall be consistent with the normal ballast operations of the ship and the BWMS shall be operated at the TRC for which it is intended to be approved;

5 documentation showing that the discharge of each valid test cycle was in compliance with regulation D-2. For a test to be valid, the uptake water for the ballast water to be treated shall contain a density of viable organisms exceeding 10 times the maximum permitted values in regulation D-2.1;

6 sampling regime and volumes for analysis:

1 for the enumeration of viable organisms greater than or equal to 50 μm or more in minimum dimension:

1 influent water shall be collected over the duration of uptake as one time-integrated sample. The sample shall be collected as a single, continuous sample or a composite of sequential samples, e.g. collected at intervals during the beginning, middle and end of the operation. The total sample volume shall be at least 1 m^3. If a smaller volume is validated to ensure representative sampling of organisms, it may be used;

2 treated discharged water shall be collected as one time-integrated sample over the duration of discharge from the tank(s). The sample may be collected as a single, continuous sample or a composite of sequential samples, e.g. collected throughout the beginning, middle and end the operation. The total sample volume shall be at least 3 m^3;

3 if samples are concentrated for enumeration, the organisms shall be concentrated using a mesh with holes no greater than 50 μm in the diagonal dimension. Only organisms greater than 50 μm in minimum dimension shall be enumerated; and

4 the full volume of the sample shall be analysed unless the total number of organisms is high, e.g. 100. In this case, the average density may be extrapolated based on a well-mixed subsample using a validated method;

2 for the enumeration of viable organisms greater than or equal to 10 μm and less than 50 μm in minimum dimension:

1 influent water shall be collected over the duration of uptake as one, time-integrated sample. The sample shall be collected as a single, continuous sample or a composite of sequential samples, e.g. collected at intervals during the beginning, middle and end of the operation. A sample of at least 10 L shall be collected, and a fraction may be subsampled for transport to the laboratory, provided it is representative of the sample and is a minimum of 1 L. A minimum of three 1 mL subsamples shall be analysed in full to enumerate organisms;

2 treated discharged water shall be collected as one time-integrated sample over the duration of discharge from the tank(s). The sample may be collected as a single, continuous sample or a composite of sequential samples, e.g. collected throughout the beginning, middle and end of the operation. A sample of at least 10 L shall be collected, and a fraction may be subsampled for transport to the laboratory, provided it is representative of the sample and is a minimum of 1 L. A minimum of six 1 mL subsamples shall be analysed in full to enumerate organisms;

3 the sample may not be concentrated for analysis unless the procedure is validated. Only

organisms greater than 10 μm and less than 50 μm in minimum dimension shall be enumerated; and

4 the full volume of the sample shall be analysed unless the total number of organisms is high, e.g. 100. In this case, the average density may be extrapolated based on a well-mixed subsample using a validated method;

3 for the evaluation of bacteria:

1 for the influent and discharge samples, the minimum 10 L sample referred to in paragraphs 2.8.6.2.1 and 2.8.6.2.2, or another sample at least 10 L in volume and collected in a similar manner should be used, a subsample of minimum 1 L may be transferred to a sterile container for analysis;

2 a minimum of three subsamples of appropriate volume taken from the 1 L subsample described above shall be analysed for colony forming units of bacteria listed in regulation D-2; and

3 the toxicogenic test requirements shall be conducted in an appropriately approved laboratory. If no approved laboratory is available, the analysis method may be validated to the satisfaction of the Administration.

7 the test cycles including invalid test cycles shall span a period of not less than six months;

8 three consecutive test cycles in compliance with regulation D-2 are to be performed. Any invalid test cycle does not affect the consecutive sequence;

9 the six-month shipboard test period starts and ends with the completion of a successful test cycle or invalid test cycle that meets the D-2 standard. The three consecutive and valid test cycles that are required in paragraph 2.8.8 above must be suitably separated across the six-month period;

10 the source water for test cycles shall be characterized by measurement of salinity, temperature, particulate organic carbon, total suspended solids and dissolved organic carbon; and

11 for system operation throughout the test period, the following information shall also be provided:

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

2 documentation that the BWMS was operated continuously throughout the test period for all ballasting and deballasting of the ship;

3 documentation detailing water quality parameters identified by the test organization that should be provided as appropriate and practicable;

4 the possible reasons for an invalid test cycle, or a test cycle discharge failing the D-2 standard, which shall be investigated and reported to the Administration;

5 documentation of scheduled maintenance performed on the system during the test period;

6 documentation of unscheduled maintenance and repair performed on the system during the test period;

7 documentation of engineering parameters, monitored as appropriate to the specific system; and

8 a report detailing the functioning of the control and monitoring equipment.

Land-based testing

2.9 The land-based testing provides data 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.

2.10 Any limitations imposed by the BWMS on the testing procedure described here shall be duly noted and evaluated by the Administration.

2.11 The test set-up including the BWMS shall operate as described in the provided operation, maintenance and safety manual during at least five consecutive successful test cycles in each salinity.

2.12 A land-based test cycle shall include the uptake of ballast water by pumping, the storage of ballast water, treatment of ballast water within the BWMS (except in control tanks), and the discharge of ballast water by pumping. The order will be dependent on the BWMS.

2.13 At least two test cycles in each salinity tested shall be conducted in order to evaluate compliance with the D-2 standard at the minimum holding time specified by the BWMS manufacturer.

2.14 Test facilities carrying out identification of Relevant Chemicals and toxicity testing of the treated ballast water from test cycles with a storage time

which is shorter or longer than five days shall ensure that sufficient volumes of treated water are collected after five days or are reserved after the efficacy testing to permit the requirements of guidelines[5] developed by the Organization, for approval of BWMS making use of Active Substances, to be assessed for at least one test cycle per salinity.

2.15 Land-based testing of BWMS shall be independent of the system manufacturer.

2.16 Testing shall occur using different water conditions sequentially as provided for in paragraphs 2.29 and 2.31 of this annex.

2.17 The BWMS shall be tested at its TRC or as given in paragraphs 2.25 to 2.28 of this annex for each test cycle. The equipment shall function to specifications during this test.

2.18 The analysis of treated water discharge from each test cycle shall determine if the treated discharge meets regulation D-2.

2.19 The analysis of treated water discharge from the relevant test cycle(s) shall also be used to evaluate the formation of Relevant Chemicals as well as the toxicity of the discharged water for BWMS that make use of Active Substances. The same evaluation shall be conducted 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 shall be conducted, taking into account guidelines developed by the Organization.[6]

Land-based testing set-up

2.20 The test set-up for approval tests shall 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 shall therefore 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 shall be completely shielded from light.

[5] Refer to the Procedure for approval of ballast water management systems that make use of Active Substances (G9) (resolution MEPC.169(57))

[6] Refer to paragraphs 5.2.3 and 5.2.7 of the Procedure for the approval of ballast water management systems that make use of Active Substances (G9) (resolution MEPC.169(57))

2.21 The control and treated simulated ballast tanks shall each include:

1 a minimum capacity of 200 m^3;

2 the use of standard industry practices for design and construction for ships; surface coatings shall be in accordance with the ***Performance standard for protective coatings of dedicated seawater ballast tanks on all new ships and of double-sided skin spaces of bulk carriers*** (PSPC) (resolution MSC.215(82)); and

3 the minimum modifications required for structural integrity on land.

2.22 The control and treated simulated ballast tanks should include normal internal structures, including lightening and drainage holes.

2.23 The test set-up shall 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.

2.24 The test set-up shall include facilities to allow sampling as described in paragraphs 2.40 and 2.41 of this annex and provisions to supply influents to the system, as specified in paragraphs 2.29, 2.30, 2.33 and 2.34 of this annex. The installation arrangements shall conform in each case with those specified and approved under the procedure outlined in section 7 of this Code.

Ballast water management system scaling

2.25 Scaling of the BWMS should take into account guidance developed by the Organization.[7] The Administration shall verify that the scaling used is appropriate for the operational design of the BWMS.

2.26 BWMS with at least one model with a TRC equal to or smaller than 200 m^3/h shall not be downscaled.

2.27 For BWMS with at least one model that has a TRC higher than 200 m^3/h or 1,000 m^3/h the following must be observed for land-based testing. In-line treatment equipment may be downsized for land-based testing, but only when the following criteria are taken into account:

1 BWMS with at least one model with a TRC higher than 200 m^3/h but lower than 1,000 m^3/h may be downscaled to a maximum of 1:5 scale, but may not be lower than 200 m^3/h; and

[7] Refer to the Guidance on scaling of ballast water management systems (BWM.2/Circ.33/Rev.1)

2 BWMS with at least one model with a TRC equal to, or higher than, 1,000 m^3/h may be downscaled to a maximum of 1:100 scale, but may not be lower than 200 m^3/h.

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

Land-based test design – inlet and outlet criteria

2.29 For any given set of test cycles (five are considered a set) a salinity range shall be chosen for each cycle. Given the salinity of the test set-up for a test cycle in fresh, brackish and marine water, each shall have dissolved and particulate content in one of the combinations set out in the table below. Deviations from the marine and brackish salinity ranges of the table shall be reported and justified and the resulting tests shall not be less challenging for the BWMS than would be the circumstance if the deviations had not occurred:

	Salinity		
	Marine 28 - 36 PSU	Brackish 10 - 20 PSU	Fresh < 1 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

2.30 The source of the test water shall be natural water. Any augmentation of test water with dissolved organic carbon (DOC), particulate organic carbon (POC) or total suspended solids (TSS) to achieve the minimum required content shall be validated and approved by the Administration. As natural DOC constituents are complex and primarily of aromatic character, the type of added DOC is particularly critical to the evaluation of BWMS performance. The validation shall ensure that relevant properties of the augmented water (such as the oxidant demand/TRO decay and UV absorption in the range of 200 to 280 nm, the production of disinfectant by-products and the particle size distribution of suspended solids) are equivalent, on a mg/L basis, to that of natural water that would quantitatively meet the challenge conditions. In addition, the validation shall ensure that augmentation does not bias a test for or against any specific treatment process. The test report shall include the basis for the selection, use and validation of augmentation.

2.31 The BWMS must be tested in conditions for which it will be approved. For a BWMS to achieve an unlimited Type Approval Certificate with respect to salinity, one set of test cycles shall be conducted within each of the three salinity ranges with the associated dissolved and particulate content as prescribed in paragraph 2.29 above. Tests under adjacent salinity ranges in the above table shall be separated by at least 10 PSU.

2.32 Use of standard test organisms (STO):

1 the use of standard test organisms (STO) is permissible if the challenge levels in naturally occurring water at the test facility require supplementation. The use of STO shall not be considered standard practice and the Administration shall in every case review that the selection, number and use of supplementary STOs ensures that the challenge posed to the BWMS provides an adequately robust test. The use of STOs shall not bias a test for or against any specific treatment process. They shall be locally isolated to ensure that the risk to the local environment is minimized; non-indigenous organisms which have the potential to cause harm to the environment shall not be used;

2 procedures, processes and guidance for the use of STO shall be based on the most relevant and up-to-date available scientific data. Such procedures, processes and guidance shall form a part of the testing facilities quality assurance regimes; and

3 the use of STO, including concentrations and species, shall be recorded within the test report. The test report shall include information pertaining to the evaluation and justification for the use of STO, an assessment of the impact of their use on other test parameters and potential impacts on the test being undertaken. The information contained within the report shall reflect both the positive and negative impacts of the use of STO.

2.33 The influent water shall include:

1 test organisms of greater than or equal to 50 μm or more in minimum dimension that shall be present in a total density of preferably 106 but not less than 105 individuals per cubic metre, and shall consist of at least five species from at least three different phyla/divisions;

2 test organisms greater than or equal to 10 μm and less than 50 μm in minimum dimension that shall be present in a total density of preferably 104 but not less than 103 individuals per mL, and shall consist of at least five species from at least three different phyla/divisions;

3 heterotrophic bacteria that shall be present in a density of at least 104 living bacteria per mL; and

4 a variety of organisms which shall be documented according to the size classes mentioned above regardless of whether natural organism assemblages or cultured organisms were used to meet the density and organism variety requirements.

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

1 coliform;

2 Enterococcus group;

3 *Vibrio cholerae*; and

4 heterotrophic bacteria.

2.35 If cultured test organisms are used, local applicable quarantine regulations shall be taken into account during culturing and discharge.

Land-based monitoring and sampling

2.36 Change of numbers of test organisms by treatment and during storage in the simulated ballast tank shall be measured using methods described in Part 4 of this annex (paragraphs 4.5 to 4.7).

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

2.38 The range of operational flow rates that a BWMS is expected to achieve in service, at the maximum and minimum operational flow rates (where it is appropriate for that technology), shall be verified after the filter on the discharge side of the pump. The range of flow rate may be derived from empirical testing or from computational modelling. Where appropriate for the technology, demonstration of system efficacy at low flow rates shall reflect the need for flow reduction during the final stages of ballast operations.

2.39 Environmental parameters such as pH, temperature, salinity, dissolved oxygen, TSS, DOC, POC and turbidity (Nominal Turbidity Unit, NTU) shall be measured at the same time that the samples described are taken.

2.40 Samples during the test for the purposes of determining biological efficacy shall be taken at the following times and locations: immediately before

the treatment equipment, immediately after the treatment equipment and upon discharge after the appropriate holding time.

2.41 The control and treatment cycles may be run simultaneously or sequentially. Control samples are to be taken in the same manner as the equipment test as prescribed in paragraph 2.40 above and upon influent and discharge.

2.42 Facilities or arrangements for sampling shall 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.

2.43 Samples described in paragraphs 2.40 and 2.41 above shall be collected with the following sampling regime and volumes for analysis:

1 for the enumeration of viable organisms greater than or equal to 50 μm or more in minimum dimension:

1 influent water shall be collected over the duration of uptake as one time-integrated sample. The sample shall be collected as a single, continuous sample or a composite of sequential samples, e.g. collected at intervals during the beginning, middle and end of the operation. The total sample volume shall be at least one cubic metre. If smaller volume is validated to ensure representative sampling of organisms, it may be used;

2 control and treated discharged water shall be collected as one time-integrated sample over the duration of discharge from the tank(s). The sample may be collected as a single, continuous sample or a composite of sequential samples, e.g. collected throughout the beginning, middle and end of the operation. The total sample volume shall be at least 3 m^3;

3 if samples are concentrated for enumeration, the organisms shall be concentrated using a mesh with holes no greater than 50 μm in the diagonal dimension. Only organisms greater than 50 μm in minimum dimension shall be enumerated; and

4 the full volume of the sample shall be analysed unless the total number of organisms is high, e.g. 100. In this case, the average density may be extrapolated based on a well-mixed subsample using a validated method;

2 for the enumeration of viable organisms greater than or equal to 10 μm and less than 50 μm in minimum dimension:

1 influent water shall be collected over the duration of uptake as one, time-integrated sample. The sample shall be collected as a single, continuous sample or a composite of sequential samples, e.g. collected at intervals during the beginning, middle and end of the operation. A sample of at least 10 L shall be collected, and a fraction may be subsampled for transport to the laboratory, provided it is representative of the sample and is a minimum of 1 L. A minimum of three 1 mL subsamples shall be analysed in full to enumerate organisms;

2 control and treated discharged water shall be collected as one time-integrated sample over the duration of discharge from the tank(s). The sample may be collected as a single, continuous sample or a composite of sequential samples, e.g. collected throughout the beginning, middle and end of the operation. A sample of at least 10 L shall be collected, and a fraction may be subsampled for transport to the laboratory, provided it is representative of the sample and is a minimum of 1 L. A minimum of six 1 mL subsamples shall be analysed in full to enumerate organisms;

3 the sample may not be concentrated for analysis unless the procedure is validated. Only organisms greater than 10 μm and less than 50 μm in minimum dimension shall be enumerated; and

4 the full volume of the sample shall be analysed unless the total number of organisms is high, e.g. 100. In this case, the average density may be extrapolated based on a well-mixed subsample using a validated method; and

3 for the evaluation of bacteria:

1 for the influent and discharge samples, a minimum 10 L sample referred to in paragraphs 2.8.6.2.1 and 2.8.6.2.2 above, respectively, or another sample at least 10 L in volume and collected in a similar manner, should be used; a subsample of minimum 1 L may be transferred to a sterile container for analysis;

2 a minimum of three subsamples of appropriate volume taken from the 1 L subsample described above shall be analysed for colony forming units of bacteria listed in regulation D-2; and

3 the toxicogenic test requirements shall be conducted in an appropriately approved laboratory. If no approved laboratory is available, the analysis method may be validated to the satisfaction of the Administration.

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

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

Temperature

2.46 The effective performance of BWMS through a ballast water temperature range of 0°C to 40°C (2°C to 40°C for fresh water) and a mid-range temperature of 10°C to 20°C shall be the subject of an assessment verified by the Administration.

2.47 This assessment may include:

1 testing during land-based, shipboard, laboratory or bench-scale testing; and/or

2 the use of existing data and/or models, provided that their source, suitability and reliability is reported.

2.48 The report submitted to the Administration shall contain all documentation (including procedures, methods, data, models, results, explanations and remarks) associated with the temperature assessment. The report shall include at least the information identified in paragraph 2.57 of this annex.

Evaluation of regrowth

2.49 The evaluation of regrowth of organisms shall be undertaken to the satisfaction of the Administration in land-based and/or shipboard testing in at least two test cycles in each salinity.

2.50 In the case of land-based testing being performed with a holding time of less than five days, a sufficient volume of treated uptake water shall be held under conditions similar to conditions in the relevant holding tank. In the case of shipboard testing, water shall be retained on board for the evaluation of regrowth during a shipboard test cycle. Additional bench-scale testing may be used to supplement the land-based and/or shipboard testing.

2.51 In the case of a BWMS that includes mechanical, physical, chemical and/or biological processes intended to kill, render harmless or remove organisms within ballast water at the time of discharge or continuously between the time of uptake and discharge, regrowth shall be assessed in accordance with sections "Shipboard tests" and "Land-based testing" of this annex with a holding time of at least five days.

2.52 Otherwise, the enumeration of organisms to assess regrowth shall be undertaken at least five days after the completion of all of the mechanical, physical, chemical and/or biological processes intended to kill, render harmless or remove organisms within ballast water.

2.53 Any neutralization of ballast water required by the BWMS shall occur at the end of the holding time and immediately before the enumeration of organisms.

2.54 The evaluation of regrowth is not intended to evaluate contamination in ballast tanks or piping, such as may arise from the presence of untreated water or residual sediments.

2.55 A report shall be submitted to the Administration containing all documentation (including procedures, methods, data, models, results, explanations and remarks) associated with the evaluation of regrowth. The report shall include at least the information identified in paragraph 2.57 of this annex.

Reporting of test results

2.56 After approval tests have been completed, a report shall be submitted to the Administration. This report shall include information regarding the test design, methods of analysis and the results of these analyses for each test cycle (including invalid test cycles), BWMS maintenance logs and any observed effects of the BWMS on the ballast system of the ship (e.g. pumps, pipes, tanks, valves). Shipboard test reports shall include information on the total and continuous operating time of the BWMS.

2.57 The reports submitted in accordance with paragraph 2.56 above shall contain at least the following information:

1 the name and address of the laboratory performing or supervising the inspections, tests or evaluations, and its national accreditation or quality management certification, if appropriate;

2 the name of the manufacturer;

3 the trade name, product designation (such as model numbers), and a detailed description of the equipment or material inspected, tested or evaluated;

4 the time, date, and place of each approval inspection, test or evaluation;

5 the name and title of each person performing, supervising, and witnessing the tests and evaluations;

6 executive summary;

7 introduction and background;

8 for each test cycle, inspection or evaluation conducted, summary descriptions of:

1 experimental design;

2 methods and procedures;

3 results and discussion, including a description of any invalid test cycle (in the case of a report referred to in Part 2 of this annex) and a comparison to the expected performance; and

4 in the case of land-based testing, test conditions including details on challenge water preparation in line with paragraph 2.30 of this annex;

9 a description or photographs of the procedures and apparatus used in the inspections, tests or evaluation, or a reference to another document that contains an appropriate description or photographs;

10 at least one photograph that shows an overall view of the equipment or material tested, inspected or evaluated and other photographs that show:

1 design details; and

2 each occurrence of damage or deformation to the equipment or material that occurred during the approval tests or evaluations;

11 the operational safety requirements of the BWMS and all safety-related findings that have been made during the inspections, tests or evaluations;

12 an attestation that the inspections, tests or evaluations were conducted as required and that the report contains no known errors, omissions or false statements. The attestation must be signed by the chief officer of the laboratory, or the chief officer's representative;

13 appendices, including:

1 the complete test plan and the data generated during tests and evaluations reported under paragraph 2.57.8 above, including at least:

1 for land-based tests, whether ambient, cultured or a mixture of test organisms have been used (including a species-level identification for cultured organisms, and an identification to the

lowest possible taxonomic level for ambient organisms);

2 for shipboard tests, the operating parameters of the system during successful treatment operations (e.g. dosage rates, ultraviolet intensity and the energy consumption of the BWMS under normal or tested TRC, if available);

3 for SDL, details of all procedures, methods, data, models, results, explanations and remarks, leading to validation; and

4 invalid test information.

2 the QMP, the QAPP and quality assurance and quality control records;

3 maintenance logs including a record of any consumable components that were replaced; and

4 relevant records and test results maintained or created during testing.

2.58 The results of biological efficacy testing of the BWMS shall be accepted if during the land-based and shipboard testing conducted as specified in sections "Shipboard tests" and "Land-based testing" of this annex it is shown that the system has met the standard in regulation D-2 and that the uptake water quality requirements were met in all individual test cycles as provided in paragraph 4.7 below.

2.59 The test report shall include all test cycles during land-based and shipboard tests, including failed test cycles and invalid test cycles with the explanation required in paragraph 2.8.11.4 for both shipboard and land-based tests.

2.60 The Administration shall identify and redact commercially sensitive information (information that is proprietary and not related to the BWMS performance) and make all other information available to interested parties and the Organization. The information shall include all of the test reports, including failed tests from both land-based and shipboard testing.

PART 3 – SPECIFICATION FOR ENVIRONMENTAL TESTING FOR APPROVAL OF BALLAST WATER MANAGEMENT SYSTEMS

3.1 The electrical and electronic sections of the BWMS in the standard production configuration shall be subject to the relevant tests specified in paragraph 3.3 below at a laboratory approved for the purpose by the Administration or by the accreditation body of the laboratory, with relevant accreditation[8] covering the relevant test standards.

3.2 Evidence of successful compliance with the environmental tests below shall be submitted to the Administration by the manufacturer together with the application for type approval.

3.3 Equipment is to be tested taking into account international test specifications for type approval.[9]

3.4 A report on environmental tests shall be submitted to the Administration and include at least the information identified in paragraph 2.57 of this Annex.

PART 4 – SAMPLE ANALYSIS METHODS FOR THE DETERMINATION OF BIOLOGICAL CONSTITUENTS IN BALLAST WATER

Sample processing and analysis

4.1 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.

4.2 When available, widely accepted standard methods for the collection, handling (including concentration), storage, and analysis of samples should be used. These methods shall be clearly cited and described in test plans and reports. This includes methods for detecting, enumerating, and determining minimum dimension of and identifying organisms and for determining viability (as defined in this Code).

4.3 When standard methods are not available for particular organisms or taxonomic groups, methods that are developed for use shall be described in

[8] Refer to general requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2017)
[9] Refer to ICS UR E10, Rev. 6, October 2014 - Test Specification for Type Approval

detail in test plans and reports. The descriptive documentation shall include any experiments needed to validate the use of the methods.

4.4 Given the complexity in samples of natural and treated water, the required rarity of organisms in treated samples under regulation D-2, and the expense and time requirements of current standard methods, it is likely that several new approaches will be developed for the analyses of the composition, concentration and viability of organisms in samples of ballast water. Administrations/Parties are encouraged to share information concerning methods for the analysis of ballast water samples, using existing scientific venues, and documents distributed through the Organization.

Sample analysis for determining efficacy in meeting the discharge standard

4.5 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.

4.6 The viability of organisms shall be determined taking into account guidance developed by the Organization[10] using methodologies appropriate to the ballast water treatment technology being tested. Such methodologies shall provide assurance that organisms not removed from ballast water have been killed or rendered harmless to the environment, human health, property and resources. Viability may be established by assessing the presence of one or more essential characteristics of life, such as structural integrity, metabolism, reproduction, motility or response to stimuli.

4.7 A treatment test cycle shall be deemed successful if:

1 it is valid in accordance with paragraph 2.8.5 (shipboard) or 2.29, 2.30, 2.33 and 2.47 (land-based testing) of this annex as appropriate;

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

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

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

[10] Refer to the Guidance on methodologies that may be used for enumerating viable organisms (BWM.2/Circ.61)

5 the density of ***E. coli*** in the replicate samples is less than 250 cfu per 100 mL;

6 the density of Intestinal Enterococci in the replicate samples is less than 100 cfu per 100 mL; and

7 no averaging of test cycles, or the discounting of failed test cycles, has occurred.

4.8 It is recommended that a non-exhaustive list of standard methods and innovative research techniques be considered.[11]

Sample analysis for determining eco-toxicological acceptability of discharge

4.9 Toxicity tests of the treated water discharge shall be conducted taking into account guidelines developed by the Organization.[12]

PART 5 – SELF-MONITORING

Introduction

5.1 BWMS shall monitor and store a minimum number of parameters for detailed evaluation. In addition, all system indications and alerts shall be stored and available for inspection. Data storage and retrieval shall follow common standards. This part gives an overview of the minimum required self-monitoring parameters.

Monitoring of parameters

5.2 The applicable self-monitoring parameters listed below shall be recorded for every BWMS.[13] Any additional parameters that are necessary to ascertain system performance and safety shall be determined by the Administration and stored in the system. If a parameter is not applicable due to the particulars of the system, the Administration may waive the requirement to

[11] Suggested sources may include but are not limited to:
1. The Handbook of Standard Methods for the Analysis of Water and Waste Water.
2. ISO standard methods.
3. UNESCO standard methods.
4. World Health Organization.
5. American Society of Testing and Materials (ASTM) standard methods.
6. United States EPA standard methods.
7. Research papers published in peer-reviewed scientific journals.
8. MEPC documents.

[12] Refer to paragraphs 5.2.3 and 5.2.7 of the Procedure for approval of ballast water management systems that make use of Active Substances (G9) (resolution MEPC.169(57))

[13] Associated guidance for a template on technical details of the monitoring parameters and record intervals to be developed by the Organization.

record that parameter. Limiting operating conditions on the operation of the BWMS shall be determined by the manufacturer and approved by the Administration.

General information for all systems

5.3 The information and applicable self-monitoring parameters to be recorded for all systems shall include, inter alia:

1 general information: ship name, IMO number, BWMS manufacturer and type designation, BWMS serial number, date of BWMS installation on ship, BWMS TRC and principle of treatment (in-line/in-tank);

2 operational parameters: all recorded parameters should be time tagged if applicable: BWMS operational modes and any transition modes, including bypass operations (e.g. uptake, discharge, warming-up, cleaning and start up), ballast water pump in operation (yes/no – if information is available from ship), flow-rate at system outlet, and indication of the ballast water tank that is involved in the ballast water operation when practicable;

3 it is recommended that positional information on ballast water operations and on the holding time should be recorded automatically. Otherwise it shall be entered manually in the ballast water record book as appropriate. Administrations are encouraged to apply automatic position information recording to ships which install BWMS during a ship's building to the greatest extent possible;

4 system alerts and indications: all systems shall have an alert regime. Every alert shall be logged and time stamped. To assist the inspections it would be helpful to record an alert summary after each ballast water operation automatically, if possible;

5 general alerts include: shutdown of system while in operation, when maintenance is required, BWMS bypass valve status and status of BWMS valves representing system operational mode as appropriate;

6 operational alerts: whenever a relevant parameter exceeds the acceptable range approved by the Administration, the system shall give an alert. In addition, an alert shall be logged and time stamped also when a combination of relevant parameters exceeds system specifications, even if each single parameter does not exceed its approved range. If a safety relevant parameter (safety for crew, cargo and/or the ship) related to the BWMS exceeds approved limits, an alert/alarm shall be mandatory (e.g. hydrogen level at appropriate measurement point(s));

7 the Administration may require additional alerts depending on the design of the system and for future developments; and

8 the SDL parameters and their corresponding data such as range, alarm limit, alert delay, etc., be password protected on a level above what is required for normal operation and maintenance, i.e. on a system administrator level. Change of any data or parameters which are password protected and interruption of the measurement (wire break, signal out of range) shall be automatically logged and retrievable on a maintenance access level.

Data storage and retrieval

5.4 Storage of data shall follow the requirements in paragraphs 4.17 to 4.22 of this Code. The equipment shall be able to store a minimum number of self-monitoring parameters following common standards determined by the Organization.

5.5 The control and monitoring equipment shall automatically record the proper functioning or failure of a BWMS without user interaction and add a time stamp to every entry. Additionally, the system shall have a tool to produce summary text files for each ballast water operation on demand to support inspections work.

5.6 The system shall store the required data in an acceptable format to be able to display, print or export the data for official inspections. An acceptable format could be:

1 an internationally standardized readable format (e.g. text format, pdf, MS Excel); or

2 the extensible mark-up language (xml).

5.7 The equipment shall be so designed that, as far as is practical, it will not be possible to manipulate either the data being stored by the system or the data which has already been recorded. Any attempt to interfere with the integrity of the data shall be recorded.

5.8 Permanent deletion of recordings shall not be possible. The system shall be capable of storing recorded data for at least 24 months to facilitate compliance with regulation B-2 of the Convention. Where navigation equipment is connected to the monitoring system to provide data for recording, the interfaces shall be developed taking into account applicable parts of relevant international standards.[14]

[14] Refer to Digital interfaces for navigational equipment within a ship (IEC 61162)

PART 6 – VALIDATION OF SYSTEM DESIGN LIMITATIONS

6.1 The objective of the SDL approach is twofold. Firstly, it ensures that the performance of the BWMS has been transparently assessed with respect to the known water quality and operational parameters that are important to its operation, including those that may not be specifically provided for in this Code. Secondly, it provides transparent oversight of BWMS performance claims by the manufacturer that may go beyond specific criteria in this Code. Although the validation of SDL yields information that is reported on the Type Approval Certificate, this information does not affect the eligibility of a BWMS to receive type approval.

6.2 The low and/or high parameter values for each SDL shall be validated to the satisfaction of the Administration as follows:

1 the validation shall be overseen by the Administration and shall consist of a rigorous evidence-based assessment of a specific claim by the BWMS manufacturer that the equipment will operate as intended between pre-stated parameter values;

2 tests to validate SDL shall be undertaken in accordance with paragraphs 2.2 to 2.4 of this annex. Such tests may be combined with land-based and/or shipboard testing if the QAPP establishes that the validation tests will not interfere with the specific procedures in Part 2 of this annex. Laboratory or bench-scale testing may also be used in the validation of SDL;

3 methods other than testing, such as the use of existing data and/or models, may be used in the validation of SDL. The source, suitability and reliability of such methods shall be reported; and

4 validation is not intended as a stress-test of the BWMS or as a procedure for identifying equipment failure points. Validation shall be undertaken independently of the BWMS manufacturer and shall be separate from BWMS research and development activities. Data and models may be supplied by the manufacturer when appropriate but shall be independently assessed.

6.3 Claims of open-ended performance (expressed as the lack of either a low or a high parameter value for a System Design Limitation) shall also be validated.

6.4 BWMS manufacturers may include a margin of error in claiming SDL. For this reason, SDL should not necessarily be interpreted as the exact parameter values beyond which the BWMS is incapable of operation. The Administration shall take this into account in considering whether to include

any additional restrictions on the Type Approval Certificate in connection with the validation of SDL.

6.5 SDL shall be established for all known parameters to which the design of the BWMS is sensitive that are important to the operation of the BWMS. In the case of SDL parameters that are also subject to specific criteria in Part 2 of this annex, the procedure set out in Part 2 shall be followed. For such parameters, the approach in paragraph 6.2 above may be used only to the extent that the performance claim goes beyond the specific criteria in Part 2.

6.6 A report shall be submitted to the Administration containing all documentation (including procedures, methods, data, models, results, explanations and remarks) associated with the validation of SDL. The report shall include at least the information identified in paragraph 2.57 of this annex.

PART 7 – TYPE APPROVAL CERTIFICATE AND TYPE APPROVAL REPORT

Type Approval Certificate

7.1 The Type Approval Certificate of a BWMS shall:

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;

4 identify if it was issued by an Administration based on a Type Approval Certificate previously issued by another Administration. Such a certificate shall identify the Administration that supervised conduction of the tests on the BWMS and a copy of the original test results shall be attached to the Type Approval Certificate of the BWMS;

5 identify all conditions and limitations for the installation of BWMS on board the ship;

6 include the SDL, which shall be listed under the heading “This equipment has been designed for operation in the following conditions”;

7 include any restrictions imposed by the Administration due to the minimum holding time or in accordance with paragraph 6.4 of this annex; such restrictions shall include any applicable environmental conditions (e.g. UV transmittance, etc.) and/or system operational parameters (e.g. min/max pressure, pressure differentials, min/max Total Residual Oxidants (TRO) if applicable, etc.); and

8 include an appendix containing test results of each land-based and shipboard test cycle. Such test results shall include at least the numerical salinity, temperature, flow rates, and where appropriate UV transmittance. In addition, these test results shall include all other relevant variables. The Type Approval Certificate shall list any identified SDL parameters.

Type approval report

7.2 The type approval report shall be submitted to the Organization and made available to the public and Member States by appropriate means. It shall contain at least:

1 information on the type approval of the BWMS, including:

1 the approval date;

2 the name of the Administration;

3 the name of the manufacturer;

4 the trade name and product designation (such as model numbers) of the BWMS; and

5 a copy of the Type Approval Certificate including its appendices, annexes or other attachments;

2 an executive summary;

3 a description of the BWMS, including, in the case of BWMS using Active Substances, the following information:

1 the name of the Active Substance(s) or Preparation(s) employed; and

2 identification of the specific Marine Environment Protection Committee (MEPC) report and paragraph number granting Final Approval, taking into account guidelines developed by the Organization;[15]

4 an overview of the process undertaken by the Administration to evaluate the BWMS, including the name and role of each test facility, subcontractor and test organization involved in testing and approving the BWMS, the role of each report in the type approval decision, and a summary of the Administration's approach to overall quality assurance and quality control;

5 the executive summary of each test report prepared in accordance with paragraphs 2.48, 2.55 to 2.57, 3.4 and 6.6 of this Annex;

6 the operational safety requirements of the BWMS and all safety-related findings that have been made during the type approval process;

[15] Refer to the Procedure for approval of ballast water management systems that make use of Active Substances (G9) (resolution MEPC.169(57))

7 a discussion section explaining the Administration's assessment that the BWMS:

1 in every respect fulfilled the requirements of this Code, including demonstrating under the procedures and conditions specified for both land-based and shipboard testing that it met the ballast water performance standard described in regulation D-2;

2 is designed and manufactured according to requirements and standards;

3 is in compliance with all applicable requirements;

4 has been approved taking into account the recommendations provided by the MEPC in the Final Approval of the BWMS, if any;

5 operates within the SDL at the TRC, performance, and reliability as specified by the manufacturer;

6 contains control and monitoring equipment that operates correctly;

7 was installed in accordance with the technical installation specification of the manufacturer for all tests; and

8 was used to treat volumes and flow rates of ballast water during the shipboard tests consistent with the normal ballast operations of the ship; and

8 the following annexes:

1 appropriate information on quality control and assurance; and

2 each complete test report prepared in accordance with paragraphs 2.48, 2.55 to 2.57, 3.4 and 6.6 of this annex.

7.3 The Administration may redact proprietary information of the manufacturer from the type approval report before submitting it to the Organization.

7.4 The Type Approval Certificate and the type approval report (including their entire contents and all annexes, appendices or other attachments) shall be accompanied by a translation into English, French or Spanish if not written in one of those languages.

7.5 Documents shall not be incorporated by reference into the Type Approval Certificate. The Administration may incorporate an annex by reference into the type approval report if the reference (e.g. internet URL) is expected to remain permanently valid. Upon any reference becoming invalid, the Administration shall promptly re-submit the type approval report to the Organization and include the referenced document or an updated reference to

it; and the Organization shall promptly make the revised report available to the public and Member States through appropriate means.

APPENDIX

BADGE OR CIPHER (Limiting Operating Conditions apply)*

NAME OF ADMINISTRATION

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 Code for Approval of Ballast Water Management Systems (resolution MEPC.300(72)). This certificate is valid only for the ballast water management system referred to below.

Name of ballast water management system:……

Ballast water management system manufactured by:……..……

Under type and model designation(s)…….…….

and incorporating:

To equipment/assembly drawing No.: ..... date: .....……

Other equipment manufactured by:

To equipment/assembly drawing No.: ..... date: .....

Treatment Rated Capacity (m^3/h):.....

A copy of this Type Approval Certificate shall be carried on board a ship fitted with this ballast water management system, for inspection on board the ship. If the Type Approval Certificate is issued based on approval by another Administration, reference to that Type Approval Certificate shall be made.

Limiting Operating Conditions imposed are described in this document.

(Temperature / Salinity)

Other restrictions imposed include the following: .....

This equipment has been designed for operation in the following conditions:**

…….....

Official stamp Signed …….....

Administration of .....

Issued this ..... day of .....20 .....

Valid until this .....day of ..... 20 .....

_____

*Delete as appropriate

**Insert System Design Limitations.

SCHEDULE 2

Regulation 7(3)

Ballast Water Management System Type Approval Application Form

Name of Applicant:.....

Name of Company: .....

Name of ballast water management system: .....

Ballast water management system manufactured by: .....

Other equipment manufactured by: .....

Has an application for Type Approval for this ballast water management system ever been submitted to another Administration?

Yes No

If Yes, please give details:

……
……
……
……
……
……
……

A copy of this Application form should be submitted to the Marine Survey Office along with the following documentation:

1. A description and diagrammatic drawings of the ballast water management system;
2. The operation, maintenance and safety manual;
3. Hazard identification;
4. Environmental and Public Health impacts;
5. System Design Limitations;
6. Any other relevant information requested by the Marine Survey Office.

Signed: .....

Date: .....

SCHEDULE 3

Regulation 7(14)

BWM Certificate

INTERNATIONAL BALLAST WATER MANAGEMENT CERTIFICATE

Issued under the provisions of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (hereinafter referred to as "the Convention") under the authority of the Government of Ireland

……

(full designation of the country)

by……

(full designation of the competent person or organization authorized under the provisions of the Convention)

Particulars of ship[16]

Name of ship ……..

Distinctive number or letters ……..

Port of registry ……

Gross Tonnage ……

IMO number[17] …….

Date of Construction ……

Ballast Water Capacity (in cubic metres) ……

[16] Alternatively, the particulars of the ship may be placed horizontally in boxes.

[17] IMO Ship Identification Number Scheme adopted by the Organization by resolution A.1117(30), as may be amended.

Details of Ballast Water Management Method(s) Used

Method of Ballast Water Management used ……...

Date installed (if applicable) (dd/mm/yyyy) ……

Name of Manufacturer (if applicable) …….

The principal Ballast Water Management method(s) employed on this ship is/are:

in accordance with regulation D-1

in accordance with regulation D-2

(describe)……...

the ship is subject to regulation D-4

other approach in accordance with Regulation B-3.7

THIS IS TO CERTIFY:

1. that the ship has been surveyed in accordance with regulation E-1 of the Annex to the Convention; and

2. that the survey shows that Ballast Water Management on the ship complies with the Annex to the Convention.

This certificate is valid until ……. subject to surveys in accordance with regulation E-1 of the Annex to the Convention.

Completion date of the survey on which this certificate is based:

……

Issued at: …….

(*Place of issue of certificate*)

……

(*Date of issue*) (*Signature of authorized official issuing the certificate*)

(*Seal or stamp of the authority, as appropriate*)

ENDORSEMENT FOR ANNUAL AND INTERMEDIATE SURVEY(S)

THIS IS TO CERTIFY that a survey required by regulation E-1 of the Annex to the Convention has found the ship to comply with the relevant provisions of the Convention:

Annual survey: Signed ……..

(*Signature of duly authorized official*)

Place…….....

Date …….....

(*Seal or stamp of the authority, as appropriate*)

Annual* / Intermediate survey*: Signed…….……

(*Signature of duly authorized official*)

Place ……..…….

Date …….

(*Seal or stamp of the authority, as appropriate*)

Annual* / Intermediate survey* Signed ……..……..

(*Signature of duly authorized official*)

Place …….

Date …….....

(*Seal or stamp of the authority, as appropriate*)

Annual survey: Signed ….…….

(*Signature of duly authorized official*)

Place ……..

Date …….....

(*Seal or stamp of the authority, as appropriate*)

ANNUAL/INTERMEDIATE SURVEY IN ACCORDANCE WITH REGULATION E-5.8.3

THIS IS TO CERTIFY that, at an annual/intermediate* survey in accordance with regulation E-5.8.3 of the Annex to the Convention, the ship was found to comply with the relevant provisions of the Convention.

Signed …….

(*Signature of authorized official*)

Place ……..

Date…….....

(*Seal or stamp of the authority, as appropriate*)

ENDORSEMENT TO EXTEND THE CERTIFICATE IF VALID FOR LESS THAN 5 YEARS WHERE REGULATION E-5.3 APPLIES

The ship complies with the relevant provisions of the Convention, and this Certificate shall, in accordance with regulation E-5.3 of the Annex to the Convention, be accepted as valid until ….....

Signed …….

(*Signature of authorized official*)

Place ……..

Date ……..…….....

. (*Seal or stamp of the authority, as appropriate*)

ENDORSEMENT WHERE THE RENEWAL SURVEY HAS BEEN COMPLETED AND REGULATION E-5.4 APPLIES

The ship complies with the relevant provisions of the Convention and this Certificate shall, in accordance with regulation E-5.4 of the Annex to the Convention, be accepted as valid until ……..

Signed …….

(*Signature of authorized official*)

Place ……..

Date ……..…….....

(*Seal or stamp of the authority, as appropriate*)

ENDORSEMENT TO EXTEND THE VALIDITY OF THE CERTIFICATE UNTIL REACHING THE PORT OF SURVEY OR FOR A PERIOD OF GRACE WHERE REGULATION E-5.5 OR E-5.6 APPLIES

This Certificate shall, in accordance with regulation E-5.5 or E-5.6* of the Annex to the Convention, be accepted as valid until

…….

Signed …….

(*Signature of authorized official*)

Place ……..

Date ……..…….....

(*Seal or stamp of the authority, as appropriate*)

ENDORSEMENT FOR ADVANCEMENT OF ANNIVERSARY DATE WHERE REGULATION E-5.8 APPLIES

In accordance with regulation E-5.8 of the Annex to the Convention the new Anniversary date is

Signed …….

(*Signature of authorized official*)

Place ……..

Date ……..…….....

(*Seal or stamp of the authority, as appropriate*)

In accordance with regulation E-5.8 of the Annex to the Convention the new Anniversary date is ……...

Signed …….

(*Signature of authorized official*)

Place ……..

Date ……..…….....

(*Seal or stamp of the authority, as appropriate*)

SCHEDULE 4

Regulation 12(1)

Form of Ballast Water Record Book

INTERNATIONAL CONVENTION FOR THE CONTROL AND MANAGEMENT OF SHIPS' BALLAST WATER AND SEDIMENTS

Period From: ….…… To: ……..

Name of Ship …….…….....

IMO number ……..……..…….……

Gross tonnage ……...

Flag……

Total Ballast Water capacity (in cubic metres) …….……...

The ship is provided with a Ballast Water Management Plan

Diagram of ship indicating ballast tanks:

1. **Introduction**

In accordance with regulation B-2 of the annex to the International Convention for the Control and Management of Ships' Ballast Water and Sediments, a record is to be kept of each Ballast Water operation. This includes discharges at sea and to reception facilities.

2. **Ballast Water and Ballast Water Management**

"Ballast Water" means water with its suspended matter taken on board a ship to control trim, list, draught, stability, or stresses of a ship. Management of Ballast Water shall be in accordance with an approved Ballast Water Management Plan and taking into account guidelines[18] developed by the Organization.

3. **Entries in the Ballast Water Record Book**

Entries in the Ballast Water Record Book shall be made on each of the following occasions:

3.1 When Ballast Water is taken on board:

.1 Date, time and location of port or facility of uptake (port or lat/long), depth if outside port

.2 Estimated volume of uptake in cubic metres

.3 Signature of the officer in charge of the operation.

3.2 Whenever Ballast Water is circulated or treated for Ballast Water Management purposes:

.1 Date and time of operation

.2 Estimated volume circulated or treated (in cubic metres)

.3 Whether conducted in accordance with the Ballast Water Management Plan

.4 Signature of the officer in charge of the operation

[18] Refer to the *Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens* adopted by the Organization by resolution A.868(20)

3.3 When Ballast Water is discharged into the sea:

.1 Date, time and location of port or facility of discharge (port or lat/long)

.2 Estimated volume discharged in cubic metres plus remaining volume in cubic metres

.3 Whether approved Ballast Water Management Plan had been implemented prior to discharge

.4 Signature of the officer in charge of the operation

3.4 When Ballast Water is discharged to a reception facility:

.1 Date, time, and location of uptake

.2 Date, time, and location of discharge

.3 Port or facility

.4 Estimated volume discharged or taken up, in cubic metres

.5 Whether approved Ballast Water Management Plan had been implemented prior to discharge

.6 Signature of officer in charge of the operation

3.5 Accidental or other exceptional uptake or discharges of Ballast Water:

.1 Date and time of occurrence

.2 Port or position of the ship at time of occurrence

.3 Estimated volume of Ballast Water discharged

.4 Circumstances of uptake, discharge, escape or loss, the reason therefore and general remarks

.5 Whether approved Ballast Water Management Plan had been implemented prior to discharge

.6 Signature of officer in charge of the operation

3.6 Additional operational procedure and general remarks

4. Volume of Ballast Water

The volume of Ballast Water on board should be estimated in cubic metres. The Ballast Water Record Book contains many references to estimated volume of Ballast Water. It is recognized that the accuracy of estimating volumes of ballast is left to interpretation.

RECORD OF BALLAST WATER OPERATIONS

SAMPLE BALLAST WATER RECORD BOOK PAGE

Name of Ship: ……

Distinctive number or letters …….

Date	Item (Number)	Record of operations/signature of officers in charge

Signature of master …….

GIVEN under my Official Seal,
19 April, 2023.

EAMON RYAN,
Minister for Transport.

EXPLANATORY NOTE

(*This note is not part of the Instrument and does not purport to be a legal interpretation*)

These Regulations implement the International Convention for the Control and Management of Ships' Ballast Water and Sediments. They set out the requirements for shipowners to ensure there is a Ballast Water Management Plan in place, that ballast water exchange is undertaken in line with the Convention and that any ballast water operations are recorded and that such records are maintained. The Regulations also set out the survey and certification requirements and the powers of inspectors.

BAILE ÁTHA CLIATH
ARNA FHOILSIÚ AG OIFIG AN tSOLÁTHAIR
Le ceannach díreach ó
FOILSEACHÁIN RIALTAIS,
BÓTHAR BHAILE UÍ BHEOLÁIN,
CILL MHAIGHNEANN,
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