



**MARITIME OPERATIONS DEPARTMENT
MARINE TECHNICAL**

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**INTERNATIONAL CONVENTION FOR THE CONTROL AND MANAGEMENT OF SHIPS'
BALLAST WATER AND SEDIMENTS, 2004 CONVENTION**

This report for the approval of ballast water management systems is provided in order to assess whether ballast water management systems meet the standard as set out in regulation D-2 of the Convention. Regulation D-3 of the Convention requires that ballast water management systems be approved by the Administration and for those systems which make use of active substances or preparations, by the IMO as well. In addition, this report can be used as guidance for manufacturers and shipowners on the evaluation procedure that equipment will undergo and the requirements placed on ballast water management systems.

MAKE OF SYSTEM:	MODEL OF SYSTEM:	ACTIVE SUBSTANCES: Y/N
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NAME OF ACTIVE SUBSTANCE:	MANUFACTURER OF EQUIPMENT NAME: ADDRESS: Tel: _____ Telex: _____ Fax: _____ E-Mail: _____
TREATMENT TYPE:	
YEAR BUILT:	

PLACE IREVIEWED:	
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DATE REVIEWED:	
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REVIEW TYPE:	<input type="checkbox"/> G8 (ADMINISTRATION) <input type="checkbox"/> G8&G9 (REQUIRES FINAL APPROVAL FROM IMO)
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Summary:

The system *does not use active substances* and has been examined and tested in accordance with the requirements of the specifications contained in the Guidelines under Resolution MEPC.174(58), Guidelines for approval of ballast water management systems (G8) and taking into consideration Guidance contained in BWM.2/Circ.43, as fully/substantially/partially complying with the requirements.

The system *uses active substances* and has been examined and tested in accordance with the requirements of the specifications contained in the Guidelines under Resolution MEPC. 174(58), Guidelines for approval of ballast water management systems (G8) and Resolution MEPC.169(57), Procedure for approval of ballast water management systems that make use of active substances (G9) and taking into consideration Guidance contained in BWM.2/Circ.43, as fully/substantially/partially complying with the requirements.

IMPORTANT NOTICE

TYPE APPROVAL OF A BALLAST WATER MANAGEMENT SYSTEM SHOULD NOT BE CONSIDERED AS AN INDICATION THAT A GIVEN SYSTEM WILL WORK ON ALL VESSELS IN ALL SITUATIONS. EVEN AFTER INSTALLING A TYPE APPROVED SYSTEM, THE OWNER/OPERATOR IS STILL RESPONSIBLE FOR COMPLIANCE OF THE DISCHARGE THROUGHOUT THE VESSEL'S LIFE.

Sincerely,

Print	Name of Reviewer	
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DEFICIENCIES OR OBSERVATIONS

No.	Section under G8, BWM.2/Circ.43	DEFICIENCIES (D) /OBSERVATIONS (O)

Additional Sheets may be added if needed

		Requirements relating to Resolution MEPC.174 (58), Guidelines for approval of ballast water management systems (G8) and MEPC.2/Circ.43: G8 addresses the suitability and efficacy of the system. In addition, where it can be reasonably concluded that the treatment process could result in changes to the chemical composition of the treated water such that an adverse impact to the receiving waters might occur upon discharge, additional testing such as whole effluent toxicity (WET) tests will be required by the G8 guideline.					
		Requirements relating to Resolution MEPC.169 (57), Procedure for approval of ballast water management systems that make use of active substances (G9): G9 addresses the acceptability of any active substances and preparations for use in ballast water treatment systems concerning ship safety, human health and the aquatic environment. The G9 guideline is provided as a safeguard for the sustainable use of active substances and preparations.					
Requirements relating to Resolution MEPC.174 (58), Guidelines for approval of ballast water management systems (G8) and MEPC.2/Circ.43.							
General		Y	N	Comments			
The following information has been provided by manufacturers of BWMSs for Type Approval							
1	The installation, operation and maintenance manuals						
2	The complete dossier's submitted to IMO for basic approval and the final approval						
3	The procedures implemented for shipboard and land-based testing along with test results						
4	Evidence and calculations of environmental testing						
5	The enclosures to the type Approval certificate issued by the Administration supervising the testing, which should include test results at different salinities (ship-based and land based)						
6	The physicochemical parameters before treatment at intake, at discharge after treatment and at discharge						
7	Verification that the treatment equipment performs within its specified parameters, such as power consumption and flow rate, during the test cycle provided						
8	Any mathematical modelling and/or calculations made, to determine that downsizing will not affect the ultimate functioning and effectiveness on board a ship of the type and size for which the equipment will be certified						
9	If consideration has been given to the US EPAs 'Environmental Technology Verification' (ETV) program						
10	Additional tests carried out in accordance with BWM.2/Circ.43 for efficacy in fresh water, cold water, under different sediment loads and at minimum effective treatment rated capacity (TRC).						
11	Any other information that will assist the review in accordance with G8 guidelines						
Part 1-Specifications for Pre-test Evaluation of System Documentation							
	Document requirements for the plan approval process	Y	N	NA	E	MEPC.174(58)	Comments
1	Is a description of the BWMS submitted? The description should include a diagrammatic drawing of the typical or required pumping and piping arrangements, and sampling facilities, identifying the operational outlets for treated ballast water and any waste streams as appropriate and necessary (Special consideration may have to be given to installations intended for ships that have unusual pumping and piping arrangements?)					5.1.1	
2	Does the equipment manual(s) supplied by the manufacturer, contain details of the major components of the BWMS and its operation and maintenance?					5.1.2	
3	Does the generic operations and technical manual for the complete BWMS cover the arrangements, the operation and maintenance of the BWMS as a whole and should specifically describe parts of the BWMS which are not covered by the					5.1.3	

	manufacturer's equipment manuals?						
4	Are normal operational procedures and procedures for the discharge of untreated water in the event of malfunction of the ballast water treatment equipment, maintenance procedures, and emergency action necessary for securing the safety of the ship and personnel provided through suitable by-passes or overrides?					5.1.4 4.5.3	
5	Are methods provided for the conditioning of treated water prior to discharge, and for assessment of discharged water including a description of the effect of treatment on the ship's ballast water, in particular the nature of any treatment residuals and by-products and the water's suitability for discharge into coastal areas?					5.1.5	
6	Does the treatment process result in changes to the chemical composition of the treated water such that adverse impacts to receiving waters might occur upon discharge? If YES, go to 7 and 8), otherwise go to 9)					5.1.5	
7	Is a description provided of any actions necessary to monitor, and if necessary "condition", treated water prior to discharge in order that it meets applicable water quality regulations?					5.1.5	
8	Are toxicity tests of the treated water from the relevant test cycles provided? Do the toxicity tests include assessments of the effects of hold time following treatment, and dilution, on the toxicity? (Toxicity tests of the treated water should be conducted in accordance with paragraphs 5.2.3 to 5.2.7 of G9)					5.1.5 Annex 2.3.6	
9	Is a description of the BWMS side streams (e.g., filtered material, centrifugal concentrate, waster or residual chemicals) provided, including a description of the actions planned to properly manage and dispose of such wastes?					5.1.6	
10	Is there a technical section of the manual including adequate information (description and diagrammatic drawings of the monitoring system and electrical/electronic wiring diagrams) to enable faultfinding and troubleshooting procedures and instructions for keeping a maintenance and repair record?					5.1.7 4.4	
11	Does the technical installation specification define, inter alia, requirements for the location and mounting of components, arrangements for maintaining the integrity of the boundary between safe and hazardous spaces and the arrangement of the sample piping?					5.1.8	
12	Is there a procedure to specify all the checks to be carried out in a functional test by the installation contractor and is there guidance provided for the surveyor when carrying out the on board survey of the BWMS and confirming the installation reflects the manufacturer's specific installation criteria?					5.1.9	
	Facilities for Sampling	Y	N	NA	E	MEPC.174(58)	Comments
13	Does the technical manual indicate that the BWMS is provided with sampling facilities so arranged in order to collect representative samples of the ship's ballast water?					7.1	
14	Does the technical manual indicate that the sampling facilities are located on the BWMS intake, before the discharging points, and any other points necessary for sampling to ascertain the proper functioning of the equipment in accordance with standard D-2?					7.2	
	Technical Specifications: Ballast water management systems (BWMS) (Physical inspection required, however, may be determined from documentation and drawings provided)	Y	N	NA	E	MEPC.174(58)	Comments
15	Does the BWMS use any substance of a dangerous nature, unless adequate arrangements for storage, application, mitigation, and safe handling, acceptable to the Administration, are provided to mitigate any hazards					4.2	

	introduced thereby?						
15a	Has the manufacturer submitted HAZID assessments and mitigation measures for use of the BWMS during the ship-board test?					MSC.2/Circ.43 3.1.14.5/5.2.13	
16	In case of any failure compromising the proper operation of the BWMS, Are audible and visual signals given in all stations from which ballast water operations are controlled?					4.3	
17	Are all working parts of the BWMS that are liable to wear or to be damaged easily accessible for maintenance?					4.4	
18	Does access to the BWMS beyond the essential requirements in item 17) above require the breaking of a seal?			NA		4.5.1	
19	If applicable, is a visual alarm provided whenever the BWMS is in operation for purposes of cleaning, calibration, or repair and these events are recorded by the control equipment?					4.5.2	
20	In case the BWMS is by-passed, is an alarm activated, and the bypass event recorded by the Control Equipment?					4.5.4	
21	Are facilities provided for checking, at the renewal surveys and according to the manufacturer's instructions, the performance of the BWMS components that take measurements?	Y				4.6	
	Technical Specifications: Ballast water treatment equipment (BWTE) (Physical inspection required, however, may be determined from documentation and drawings provided)	Y	N	NA	E	MEPC.174(58)	Comments
22	Is the BWTE robust and suitable for working in the shipboard equipment?					4.7	
23	Is the design and construction adequate and protected to reduce to a minimum any danger to persons onboard, paying due regard to hot surfaces and other hazards?					4.7	
24	Is the BWTE provided with simple and effective means for its operation and control? Is the control system provided with the necessary automatic arrangements to ensure the proper operation of the BWTE?					4.8	
25	Is the BWTE intended to be fitted in locations where flammable atmospheres may be present? If YES, go to 26 and 27 and 28, otherwise go to 29.					4.9	
26	Does the installation comply with the relevant safety regulations for use in flammable atmospheres?					4.9	
27	Is the electrical equipment that is part of the BWMS based in a non-hazardous area, or certified by the Administration as safe for use in a hazardous area?					4.9	
28	Are any moving parts fitted in a hazardous area arranged so as to avoid the formation of static electricity?					4.9	
	Technical Specifications: Control and Monitoring Equipment (Physical inspection required, however, may be determined from documentation and drawings provided)	Y	N	NA	E	MEPC.174(58)	Comments
29	Does the BWMS incorporate control equipment that automatically monitors and adjusts necessary treatment dosages or intensities?					4.10	
30	Does the control equipment incorporate a continuous self-monitoring function during the period in which the BWMS is in operation?					4.11	
31	Does the control equipment record the proper functioning or failure of the BWMS?					4.12	
32	To facilitate compliance with regulation B-2 of the Convention (ballast water record book), is the control equipment able to store data for at least 24 months, and able to display or print a record for official inspections as required?					4.13	
33	In the event the control equipment is replaced, are means provided to ensure the data recorded prior to replacement remains available on board for 24 months?					4.13	

34	Are simple means provided aboard to check on drift by measuring devices that are part of the control equipment, repeatability of the control equipment devices, and the ability to re-zero the control equipment meters?					4.14	
34a	Has a treatment system particulars (TSP), including details of the self-monitoring system (as described in document MEPC 61/INF.19) been issued by the Administration supervising the testing.					BWM.2/Circ.43 /3.2	

Part 2-Test and Performance Specifications for approval of Ballast Water management Systems

Quality assurance and Quality control procedures (If done under the supervision of another Administration)		Y	N	NA	E	MEPC.174(58)	Comments
35	Does the testing body performing the land-based and shipboard testing implement appropriate quality control measures in accordance with recognized international standards acceptable to the Administration?					Annex 2.1.1	
36	Did the testing process contain a rigorous quality control/quality assurance program, consisting of a Quality Management Plan (QMP) and a Quality Assurance Project Plan (QAPP)?					Annex 2.1.2.1	
37	Did the QMP address the quality control management structure and policies of the testing body?					Annex 2.1.2.2	
38	Did the QAPP reflect the specifics of the BWMS to be tested, the test facility, and other conditions affecting the actual design and implementation of the required experiments?					Annex 2.1.2.3	
Land-based testing, test design, inlet and outlet criteria		Y	N	NA	E	MEPC.174(58)	Comments
39	Were at least 5 valid replicate test cycles (a set) with each test cycle lasting a period of at least 5 days carried out?					Annex 2.3.1	
40	Did each test cycle include:						
	1) The uptake of ballast water by pumping;					Annex 2.3.2.1	
	2) The storage of ballast water for at least 5 days					Annex 2.3.2.2	
	3) The treatment of ballast water within the BWMS, except in control tanks; and					Annex 2.2.3.3	
	4) The discharge of ballast water by pumping					Annex 2.3.2.4	
41	Were at least three (3) sets of test cycles conducted sequentially, in different salinity ranges (fresh, brackish and marine water) and associated dissolved and particulate content as prescribed below? If tests are carried out under adjacent salinity ranges below, is the salinity separated by at least 10 PSU?					Annex 2.3.3 Annex 2.3.17 Annex 2.3.18 BWM.2/Circ.43 3.1.14.1	
Salinity							
	> 32 PSU(marine)	3 – 32 PSU(brackish)	< 1 PSU (fresh)				
DOC	➤ 1 mg/L	➤ 5 mg/L	➤ 5 mg/L			DOC: Dissolved Organic Carbon	
POC	➤ 1 mg/L	➤ 5 mg/L	➤ 5 mg/L			POC: Particulate Organic Carbon	
TSS	➤ 1 mg/L	➤ 50 mg/L	➤ 50 mg/L			TSS: Total Suspended Solids	
41a	Were tests carried out to verify operation with sediment loads normally found in rivers in the range of 200 – 400 mg/L?					BWC.2/Circ.43/ 3.1.14.3	
41b	Were the tests carried out in different temperatures ranging from cold, temperate and tropical					BWM.2/Circ.43/ 3.1.14.2	
42	Did the organism (naturally occurring or cultured) concentration in the influent water include?					Annex 2.3.20	
	1) test organisms of greater than or equal to 50micrometres or more in minimum dimension, in a total density of preferably 10 ⁶ but not less than 10 ⁵ individuals per cubic meter, and consist at least 5 species from at least 3 different phyla/divisions;					Annex 2.3.20.1	
	2) Test organisms greater than or equal to 10 micrometers and less than 50 micrometers in minimum dimension, in a total density of preferably 10 ⁴ but not less than 10 ³ individuals per milliliter, and					Annex 2.3.20.2	

	consist at least 5 species from at least 3 different phyla/divisions;						
	3) Heterophobic bacteria in a density of at least 10 ⁴ living bacteria per milliliter; and					Annex 2.3.20.3	
	4) Was the variety of organisms in the test water documented according to the size classes mentioned above regardless if natural organisms or cultured organisms were used to meet the density and organism variety requirements?					Annex 2.3.20.4	
43	Have the following bacteria been measured in the influent water and at the time of discharge? 1) Coliform 2) Enterococuss group 3) <u>Vibrio Cholerae</u> 4) Heterotrophic bacteria					Annex 2.3.21	
44	If cultured test organisms were used, have local applicable quarantine regulations been taken into account during culturing and discharge?					Annex 2.3.22	
	Ballast water treatment equipment scaling	Y	N	NA	E	MEPC.174(58)	Comments
45	Was the BWMS tested at its treatment rated capacity (TRC)? If not, go to 46, 47 and 48, otherwise go to 49.					Annex 2.3.4	
45a	Has the BWMS been tested to verify its operation at the minimum effective treatment flow rate?					BWC.2/Circ.43/ 3.1.14.4	
46	In case of in-line treatment Was the in-line treatment equipment downsized in accordance with the following rules: 1) Equipment with a TRC equal to or smaller than 200 m ³ /h should not be downscaled; 2) Equipment with a TRC larger than 200 m ³ /h but smaller than 1,000 m ³ /h may be downscaled to a maximum of 1:5 scale, but may not be smaller than 200 m ³ /h; and Equipment with a TRC equal to, or larger than, 1,000 m ³ /h may be downscaled to a maximum of 1:100 scale, but may not be smaller than 200 m ³ /h.					Annex 2.3.13	
47	Did the manufacturer of the equipment demonstrate by using mathematical modeling and/or calculations, that any downsizing will not affect the ultimate functioning and effectiveness on board a ship of the type and size for which the equipment will be certified?					Annex 2.3.14	
48	In case of In-tank treatment, was the in-tank treatment equipment tested on a scale that allows verification of full-scale effectiveness, as evaluated by the manufacturer and approved by the Administration?					Annex 2.3.15	
	Analysis and toxicity of treated water (also see item 8)	Y	N	NA	E	MEPC.174(58)	Comments
49	Does the analysis of the treated water discharge from each test cycle show that the average of the discharge samples does not exceed the concentrations in regulation D-2 of the Convention;					Annex 2.3.5	
	1) Less than 10 viable organisms per cubic meter greater than or equal to 50 micrometers in minimum dimension;						
	2) Less than 10 viable organisms per milliliter less than 50 micrometers in minimum dimension and greater than or equal to 10 micrometers in minimum dimension; and						

	<p>3) Less than the following concentrations of indicator microbes, as a human health standard:</p> <p>.1 Toxicogenic <i>Vibrio cholera</i> (serotypes O1 and O139) with less than 1 Colony Forming Unit (cfu) per 100 millilitres or less than 1 cfu per 1 gramme (wet weight) of zooplankton samples;</p> <p>.2 <i>Escherichia coli</i> less than 250 cfu per 100 millilitres; and</p> <p>.3 Intestinal <i>Enterococci</i> less than 100 cfu per 100 millilitres.</p>						
49a	Have all laboratory-scale and if appropriate, full-scale land-based results and documentation, including unsuccessful, failed and invalid tests been submitted?					BWM.2/Cicr.43/3.1.15	
	Land based set-up	Y	N	NA	E	MEPC.174(58)	Comments
50	Did the land-based test set-up include at least the following? <ul style="list-style-type: none"> 1) The complete BWMS to be tested; 2) Piping and pumping arrangements; and 3) The storage tank that simulates a ballast tank, constructed such that the water in the tank is completely shielded from light. 					Annex 2.3.9	
51	Did the control and treated simulated ballast tanks each include: <ul style="list-style-type: none"> 1) A minimum capacity of 200 m3; 2) Normal internal structures, including lightening and drainage holes; 3) Standard industry practices for design, construction and surface coatings for ships; and 4) The minimum modifications required for structural integrity on land. 					Annex 2.3.10	
52	Was the test set-up pressure-washed with tap water, dried and swept to remove loose debris, organisms and other matter before starting procedures, and between test cycles?					Annex 2.3.11	
53	Did the test set-up include facilities to allow sampling immediately before treatment equipment, immediately after the treatment equipment and upon discharge?					Annex 2.3.12	
54	Did the test set-up include provisions to supply influents to the system as described in 42 above?					Annex 2.3.12	
	Land-based monitoring and sampling	Y	N	NA	E	MEPC.174(58)	Comments
55	Was it verified that the treatment equipment performs within its specified parameters, such as power consumption and flow rate, during the test cycle?					Annex 2.3.24	
56	Have the environmental parameters such as pH, temperature, salinity, dissolved oxygen, TSS, DOC, POC and turbidity been measured at the same time that the samples are taken?					Annex 2.3.25	
57	Have the samples during the test been taken immediately before the treatment equipment, immediately after the treatment equipment and upon discharge?					Annex 2.3.26	
58	Have samples been taken in triplicate on each occasion in 57 above?					Annex 2.3.29	
59	Have separate samples been collected for? <ul style="list-style-type: none"> 1) Organisms of greater than or equal to 50 Um or more in minimum dimension (at least 20 liters of influent water and 1 cubic meter of treated water, in triplicate respectively); 2) Organisms greater than or equal to 10 Um and less than 50 Um in minimum dimension (at least 1 liter of influent water and at least 10 liters of treated water); 3) For coliform, enterococcus group, <i>Vibrio Cholerae</i> and heterotrophic bacteria (at least 500 ml of influent and treated water collected in sterile bottles); and 4) Toxicity testing of treated water, from the discharge, 					Annex 2.3.30 to 2.3.33	

	for BWMS that make use of active substances and also for those BWMS that so 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 occur upon discharge						
60	Have the samples been analyzed as soon as possible after sampling, and analyzed live within 6 hours?					Annex 2.3.34	
	Shipboard tests	Y	N	NA	E	MEPC.174(58)	Comments
61	Did the shipboard test cycle include? 1) The uptake of ballast water of the ship? 2) The storage of ballast water on the ship; 3) The treatment of the ballast water consistent with the normal ballast operations of the ship and the TRC of the BWMS for which it is intended to be approved; and 4) The discharge of ballast water from the ship					Annex 2.2.1	
62	Was the shipboard test plan approved by the Administration?					Annex 2.2.2.1	
63	Does the documentation indicate that the BWMS is of a capacity within the range of the TRC for which it is intended?					Annex 2.2.2.2	
64	Have the results of three (3) consecutive, valid test cycles showing discharge of treated water in compliance with regulation D-2 been provided?					Annex 2.2.2.4	
64a	Have all shipboard test results and documents, including unsuccessful, failed and invalid tests as well as detailed information of the test set up and flow rate at each test cycle been provided?					BWC.2/Circ.43/3.1.16	
65	Did the uptake water, for both the control tank and ballast water to be treated contain viable organism concentration exceed 10 times the maximum permitted values in regulation D-2.1 and the control tank viable organism concentration exceed the values of regulation D-2.1 on discharge?					Annex 2.2.2.5	
66	Sampling regime: 1) For the control tank: a) Were three (3) replicate samples of influent water, collected over the period of uptake (e.g., beginning, middle, end); and b) Were three (3) samples of discharge control water, collected over the period of discharge (e.g., beginning, middle, end) 2) For the treated ballast water: a) Were three (3) replicate samples of discharge treated water collected at each of three (3) times during the period of discharge (e.g., 3 X beginning, 3 X middle, 3 X end)					Annex 2.2.2.6	
67	Sample sizes: 1) Were samples of at least one (1) cubic meter collected for enumeration of organisms greater than or equal to 50 Um or more in minimum dimension? 2) Were samples of at least one (1) liter collected for enumeration of organisms greater than or equal to 10 Um and less than 50 Um in minimum dimension? 3) Was a sample of at least 500 ml taken from the influent and treated water?					Annex 2.2.2.6	
68	Did the test cycles including invalid and unsuccessful test cycles span a trial period of not less than six (6) months					Annex 2.2.2.7	
69	Were three (3) consecutive test cycles that comply with regulation D-2 and which are valid in accordance with 65 above performed?					Annex 2.2.2.8	
70	Was the source water for the test cycles characterized by					Annex 2.2.2.9	

	measurement of salinity, temperature, particulate organic carbon and total suspended solids?						
71	Was the following information provided for the system operation throughout the trial period? 1) Documentation of all ballast water operations including volumes and locations of uptake and discharge, and if heavy weather was encountered and where; 2) The possible reasons for the occurrence of an unsuccessful test cycle, or a test cycle discharge failing the D-2 standard ; 3) Documentation of scheduled maintenance performed on the system; 4) Documentation of unscheduled maintenance and repair performed on the system? 5) Documentation of engineering parameters monitored as appropriate to the specific system; 6) Documentation of functioning of the control and monitoring equipment;					Annex 2.2.2.10	
Part 3- Specification for environmental testing for approval of ballast water management systems							
72	Has evidence of successful compliance with the environmental tests below been submitted to the Administration by the manufacturer?					Annex 3.2	
	Vibration tests	Y	N	NA	E	MEPC.174(58)	Comments
73	Was a resonance search made in each of the three orthogonal planes over the following ranges of oscillation frequency and amplitude for a period of two hours a) 2 to 13.3 Hz with a vibration amplitude of 1 mm; and b) 13.2 to 80 Hz with an acceleration amplitude of 0.7 g.					Annex 3.4	
74	In the absence of any resonant frequency, was the equipment vibrated in each of the three orthogonal planes at 30 Hz with an acceleration of 0.7 g for a period of two hours					Annex 3.6	
75	After completion of the tests specified in 73 and 74 above, was a search made again for resonance without a significant change being detected in the vibration pattern?					Annex 3.7	
	Temperature tests	Y	N	NA	E	MEPC.174(58)	Comments
76	If the equipment is installed in exposed areas on the open deck, or in an enclosed space not environmentally controlled, was the equipment subjected for a period of not less than two hours, to: a) A low temperature test at -25 deg.C; and b) A high temperature test at 55 deg.C					Annex 3.8	
77	If the equipment is installed in an enclosed space that is environmentally controlled including an engine room, was the equipment subjected for a period of not less than two hours, to: a) A low temperature test at 0 deg.C; and b) A high temperature test at 55 deg.C					Annex 3.9	
78	After completion of the tests in 76 and 77 above, was the equipment switched on and function normally under the test conditions?					Annex 3.10	
	Humidity tests	Y	N	NA	E	MEPC.174(58)	Comments
79	Was the equipment left switched off for a period of two hours at a temperature of 55 deg.C in an atmosphere with a relative humidity of 90%?					Annex 3.11	
80	After this period, Did the equipment operate normally for a period of one hour under the test conditions?					Annex 3.11	
	Tests for protection against heavy seas	Y	N	NA	E	MEPC.174(58)	Comments
81	If the equipment is installed in exposed areas on the open deck, was the equipment tested for protection against heavy seas in accordance with 1P 56 of publication IEC 529 or its equivalent?					Annex 3.12	

	Tests for fluctuation in power supply	Y	N	NA	E	MEPC.174(58)	Comments
82	Did the equipment operate satisfactorily with? a) A voltage variation of +/- 10% together with a simultaneously frequency variation of +/- 5%; and b) A transient voltage of +/- 20% together with a simultaneously frequency transient of +/- 10% with a transient recovery time of three seconds?					Annex 3.13	
	Inclination test	Y	N	NA	E	MEPC.174(58)	Comments
83	Was the operation of the BWMS tested at an angle of list up to and including 15 degrees either way under static conditions and 22.5 degrees under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7.5 degrees by bow or stern?					Annex 3.14	
84	If a deviation is provided by the Administration from these angles, taking into consideration the type, size and service conditions of the ship and operational functioning equipment, the deviation is to be documented in the Type Approval Certificate issued by the Administration.					Annex 3.14	
Requirements relating to Resolution MEPC.169(57), Procedure for approval of ballast water management systems that make use of active substances (G9):							
	Data-set for Active substances and preparations	Y	N	NA	E	MEPC.169(57)	Comments
85	Has the effects on aquatic plants, invertebrates, fish, and other biota, including sensitive and representative organisms been evaluated and accepted by IMO?					4.2.1.1	
86	Has the toxicity on mammals been evaluated and accepted by IMO?					4.2.1.2	
87	Has the data on environmental fate and effect under aerobic and anaerobic conditions been evaluated and accepted by IMO?					4.2.1.3	
88	Has data on the physical and chemical properties for the Active Substances and Preparations and the treated ballast water been evaluated and accepted by IMO?					4.2.1.4	
89	Has the effects of the physical and chemical hazards of the Active Substances and Preparations on ship and personnel safety been evaluated and accepted by IMO?					6.3	
90	Has it been determined by IMO that the Active substances, preparations or relevant chemicals are not persistent, bio-accumulative and toxic (PBT) and do not exceed the criteria in G9-6.4.1, Table 1?					6.4	
91	Has a risk assessment been carried out taking into account PBT along with an Emission Scenario Document (ESD)					6.4	
92	Has an assessment been done to ensure the safe on-board handling and storage of chemicals used to treat the ballast water, using existing IMO Conventions, Codes and guidance as a basis?					7.1	
93	Does the system ensure that the maximum dosage of the Active substances is not exceeded and the maximum allowable discharge concentration of the relevant chemicals is not exceeded at any time?					7.1	
94	Are MSDS available for the chemicals that describe the appropriate storage and handling together with the effects of degradation and chemical reactivity during storage?					7.2	
94	Has the manufacturer provided detailed procedures and information for the safe application of Active substances and preparations on board, taking into consideration existing IMO Conventions, Codes and guidance?						
Basic Approval from IMO							
95	Has IMO provided basic approval for the BWMS? BWMS.2/Circ.XX					8.1	
Final Approval from IMO							

96	Has IMO provided final approval for the BWMS?					8.2	
	BWM.2/Circ.XX						