

CCS Technical Information

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To: Relevant departments of the Headquarters of CCS, the Society's surveyors, Plan Approval Centers, related shipowners, ship management companies, shipyards and designers

Notice on list of IMO requirements which will enter into force in the second half of 2019

There are 6 IMO requirements which will enter into force in the second half of 2019 (1 July 2019 to 31 December 2019), which are important requirements. For details, please see attached Table 1. In addition to MEPC.301(72), these resolutions also apply to fishing vessels.

CCS had been authorized by the Governments of 48 countries or regions to perform statutory surveys for the ships flying their flags at present. CCS will implement the resolutions in Table 1 taking into account instructions from the 48 countries or regions.

The English version of the resolutions in Table 1 can be downloaded using the hyper-link.

Should you have any question during the implementation of the Circulars, please contact: Technology & Information Dept. of the Headquarters(email: ti@ccs.org.cn).

Table 1

List of IMO requirements which will enter into force from the second half of 2019

No.	Resolution	Title	valid from
1	MEPC.296 (72)	Amendments to regulations A-1 and D-3 of the BWM Convention	2019-10-13
2	MEPC.297(72)	Amendments to regulation B-3 of the BWM Convention	2019-10-13
3	MEPC.298(72)	Determination of the Survey Referred to in Regulation B-3, as Amended, of the BWM Convention	2019-10-13
4	MEPC.299(72)	Amendments to regulations E-1 and E-5 of the BWM Convention	2019-10-13
5	MEPC.300(72)	Code for Approval of Ballast Water Management Systems (BWMS Code)	2019-10-13
6	MEPC.301(72)	Amendments to MARPOL Annex VI (ECAs and required EEDI for ro-ro cargo ships and ro-ro passenger ships)	2019-09-01

RESOLUTION MEPC.296(72)
(adopted on 13 April 2018)

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

Amendments to regulations A-1 and D-3
(Code for Approval of Ballast Water Management Systems (BWMS Code))

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING article 19 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the BWM Convention), which specifies the amendment procedure and confers upon the Marine Environment Protection Committee of the Organization the function of considering amendments thereto for adoption by the Parties,

NOTING ALSO resolution MEPC.300(72), by which it adopted the Code for Approval of Ballast Water Management Systems (BWMS Code),

HAVING CONSIDERED, at its seventy-second session, proposed amendments to regulations A-1 and D-3 of the BWM Convention to make the provisions of the BWMS Code mandatory,

1 ADOPTS, in accordance with article 19(2)(c) of the BWM Convention, amendments to regulations A-1 and D-3, the text of which is set out in the annex to the present resolution;

2 DETERMINES, in accordance with article 19(2)(e)(ii) of the BWM Convention, that the amendments shall be deemed to have been accepted on 13 April 2019 unless, prior to that date, more than one-third of the Parties have notified the Secretary-General that they object to the amendments;

3 INVITES the Parties to note that, in accordance with article 19(2)(f)(ii) of the BWM Convention, the said amendments shall enter into force on 13 October 2019 upon their acceptance in accordance with paragraph 2 above;

4 REQUESTS the Secretary-General, for the purposes of article 19(2)(d) of the BWM Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the annex to all Parties to the BWM Convention;

5 REQUESTS ALSO the Secretary-General to transmit copies of the present resolution and its annex to Members of the Organization which are not Parties to the BWM Convention;

6 REQUESTS FURTHER the Secretary-General to prepare a consolidated certified text of the BWM Convention.

ANNEX

AMENDMENTS TO THE ANNEX TO THE BWM CONVENTION

(BWMS Code)

Section A – General provisions

Regulation A-1 – Definitions

- 1 A new paragraph 8 is added as follows:

"8 "BWMS Code" means the *Code for Approval of Ballast Water Management Systems* adopted by resolution MEPC.300(72), as may be amended by the Organization, provided that such amendments are adopted and brought into force in accordance with article 19 of the present Convention relating to amendment procedures applicable to the Annex."

Section D – Standards for ballast water management

Regulation D-3 – Approval requirements for ballast water management systems

- 2 Paragraph 1 is replaced with the following:

- "1 Except as specified in paragraph 2, ballast water management systems used to comply with this Convention shall be approved by the Administration as follows:
- .1 ballast water management systems installed¹ on or after 28 October 2020 shall be approved in accordance with the BWMS Code, as may be amended; and
 - .2 ballast water management systems installed¹ before 28 October 2020 shall be approved taking into account the guidelines² developed by the Organization or the BWMS Code, as may be amended."

1 Refer to paragraph 2 of the Unified interpretation of appendix I (Form of the International Ballast Water Management Certificate) of the BWM Convention related to "date installed" contained in BWM.2/Circ.66.

2 Refer to resolutions MEPC.125(53), MEPC.174(58) or MEPC.279(70), as appropriate."

环保会 MEPC.296(72)决议
(2018 年 4 月 13 日通过)

《2004 年船舶压载水和沉积物控制与管理国际公约》的修正案

对第 A-1 和 D-3 条的修正案
(压载水管理系统认可规则(BWMS 规则))

海上环境保护委员会，

忆及国际海事组织公约第 38(a)条关于防止和控制海洋污染的国际公约赋予海上环境保护委员会的职能，

注意到《2004 年船舶压载水和沉积物控制与管理国际公约》(BWM 公约)第 19 条规定的修正程序和赋予本组织海上环境保护委员会审议相关修正案以供各缔约国通过的职能，

还注意到以 MEPC.300(72)决议通过的压载水管理系统认可规则(BWMS 规则)，

在其第 72 届会议上，审议了对 BWM 公约第 A-1 和 D-3 条的修正建议案，以使压载水管理系统规则的规定变成强制性规定，

1. 根据 BWM 公约第 19(2)(c)条的规定，**通过**了对第 A-1 和 D-3 条的修正案，其文本载于本决议附件；
2. 根据 BWM 公约第 19(2)(e)(ii)条的规定，**决定**该修正案于 2019 年 4 月 13 日应视为已被接受，除非在此日期之前，有超过三分之一的缔约国通知秘书长其反对该修正案；
3. **提请**各缔约国注意，按 BWM 公约第 19(2)(f)(ii)条的规定，所述修正案在按上述 2 被接受后，应于 2019 年 10 月 13 日生效；
4. **要求**秘书长按 BWM 公约第 19(2)(d)条规定，将核准无误的本决议及附件中修正案文本的副本分发给所有 BWM 公约缔约国；
5. **还要求**秘书长将本决议及其附件的副本分发给非 BWM 公约缔约国的本组织成员；
6. **进一步要求**秘书长起草经核准的 BWM 公约综合文本。

附 件

BWM 公约附则修正案

(压载水管理系统规则)

第 A 节 一 般 规 定

第 A-1 条 定义

1. 新增 8 如下：

“8 BWMS 规则系指：以 MEPC.300(72)决议通过的经本组织修正的《压载水管理系统认可规则》，前提是这些修正案是按照本公约第 19 条关于适用于本附则的修正程序通过及生效。”

第 D 节 压载水管理标准

第 D-3 条 压载水管理系统认可要求

2. 第 1 款由下文替代：

“1. 除第 2 款中的规定外，使用的符合本公约规定的压载水管理系统应由主管机关按照以下要求进行认可：

- .1 2020 年 10 月 28 日或以后安装^①的压载水管理系统应按照可能经修正的 BWMS 规则进行认可；和
- .2 对 2020 年 10 月 28 日以前安装^①的压载水管理系统的认可应考虑到本组织制定的指南^②或可能经修正的 BWMS 规则。”

① 参见 BWM 公约附录 1(国际压载水管理证书格式)的统一解释第 2 段关于“安装日期”的文本，其文本载于 BWM.2/Circ.66 中。

② 参见 MEPC.125(53)决议、MEPC.174(58)决议或 MEPC.279(70)决议(视情况而定)。”

RESOLUTION MEPC.297(72)
(adopted on 13 April 2018)

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

Amendments to regulation B-3

(Implementation schedule of ballast water management for ships)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING article 19 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the BWM Convention), which specifies the amendment procedure and confers upon the Marine Environment Protection Committee of the Organization the function of considering amendments thereto for adoption by the Parties,

HAVING CONSIDERED, at its seventy-second session, proposed amendments to regulation B-3 of the BWM Convention concerning the implementation schedule of ballast water management for ships,

RECALLING resolution MEPC.287(71), by which it resolved that the Parties should implement the amended regulation B-3 immediately after the entry into force of the BWM Convention, in lieu of the implementation schedule recommended in resolution A.1088(28) on the application of the BWM Convention and notwithstanding the schedule set forth in regulation B-3, with a view to avoiding the creation of a dual treaty regime during the time period between the entry into force of the BWM Convention and the entry into force of the amended regulation B-3,

1 ADOPTS, in accordance with article 19(2)(c) of the BWM Convention, amendments to regulation B-3, the text of which is set out in the annex to the present resolution;

2 DETERMINES, in accordance with article 19(2)(e)(ii) of the BWM Convention, that the amendments shall be deemed to have been accepted on 13 April 2019 unless, prior to that date, more than one-third of the Parties have notified the Secretary-General that they object to the amendments;

3 INVITES the Parties to note that, in accordance with article 19(2)(f)(ii) of the BWM Convention, the said amendments shall enter into force on 13 October 2019 upon their acceptance in accordance with paragraph 2 above;

4 REQUESTS the Secretary-General, for the purposes of article 19(2)(d) of the BWM Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the annex to all Parties to the BWM Convention;

5 REQUESTS ALSO the Secretary-General to transmit copies of the present resolution and its annex to Members of the Organization which are not Parties to the BWM Convention;

6 REQUESTS FURTHER the Secretary-General to prepare a consolidated certified text of the BWM Convention.

ANNEX

AMENDMENTS TO THE ANNEX TO THE BWM CONVENTION

(Implementation schedule of ballast water management for ships)

Section B – Management and control requirements for ships

Regulation B-3 – Ballast water management for ships

1 The text of regulation B-3 is replaced with the following:

"1 A ship constructed before 2009:

- .1 with a ballast water capacity of between 1,500 and 5,000 cubic metres, inclusive, shall conduct ballast water management that at least meets the standard described in regulation D-1 or regulation D-2 until the renewal survey described in paragraph 10, after which time it shall at least meet the standard described in regulation D-2;
- .2 with a ballast water capacity of less than 1,500 or greater than 5,000 cubic metres shall conduct ballast water management that at least meets the standard described in regulation D-1 or regulation D-2 until the renewal survey described in paragraph 10, after which time it shall at least meet the standard described in regulation D-2.

2 A ship constructed in or after 2009 and before 8 September 2017 with a ballast water capacity of less than 5,000 cubic metres shall conduct ballast water management that at least meets the standard described in regulation D-2 from the date of the renewal survey described in paragraph 10.

3 A ship constructed in or after 2009, but before 2012, with a ballast water capacity of 5,000 cubic metres or more shall conduct ballast water management in accordance with paragraph 1.2.

4 A ship constructed in or after 2012 and before 8 September 2017 with a ballast water capacity of 5,000 cubic metres or more shall conduct ballast water management that at least meets the standard described in regulation D-2 from the date of the renewal survey described in paragraph 10.

5 A ship constructed on or after 8 September 2017 shall conduct ballast water management that at least meets the standard described in regulation D-2.

6 The requirements of this regulation do not apply to ships that discharge ballast water to a reception facility designed taking into account the Guidelines developed by the Organization for such facilities.

7 Other methods of ballast water management may also be accepted as alternatives to the requirements described in paragraphs 1 to 5 and paragraph 8, provided that such methods ensure at least the same level of protection to the environment, human health, property or resources, and are approved in principle by the Committee.

8 A ship constructed before 8 September 2017 to which the renewal survey described in paragraph 10 does not apply, shall conduct ballast water management that at least meets the standard described in regulation D-2 from the date decided by the Administration, but not later than 8 September 2024.

9 A ship subject to paragraphs 2, 4 or 8 will be required to comply with either regulation D-1 or regulation D-2, until such time as it is required to comply with regulation D-2.

10 Notwithstanding regulation E-1.1.2, the renewal survey referred to in paragraphs 1.1, 1.2, 2 and 4 is:

- .1 the first renewal survey, as determined by the Committee,¹ on or after 8 September 2017 if:
 - .1 this survey is completed on or after 8 September 2019; or
 - .2 a renewal survey is completed on or after 8 September 2014 but prior to 8 September 2017; and
- .2 the second renewal survey, as determined by the Committee,¹ on or after 8 September 2017 if the first renewal survey on or after 8 September 2017 is completed prior to 8 September 2019, provided that the conditions of paragraph 10.1.2 are not met."

¹ Reference is made to resolution MEPC.298(72).

环保会 MEPC.297(72)决议
(2018 年 4 月 13 日通过)

《2004 年国际船舶压载水和沉积物控制和管理公约》修正案

第 B-3 条修正案

(船舶压载水管理执行时间表)

海上环境保护委员会，

忆及国际海事组织公约第 38(a)条关于防止和控制船舶造成海洋污染的国际公约赋予海上环境保护委员会的职能，

注意到《2004 年船舶压载水和沉积物控制与管理国际公约》(BWM 公约)第 19 条规定的修正程序和赋予本组织海上环境保护委员会审议相关修正案以供各缔约国通过的职能，

在其第 72 届会议上审议了 BWM 公约第 B-3 条有关船舶压载水管理执行时间表的修正建议案，

忆及 MEPC.287(71)决议决定，作为 A.1088(28)决议中关于 BWM 公约应用的推荐的实施时间表的替代且尽管第 B-3 条规定了时间表，缔约国应在 BWM 公约生效之后立即实施经修正的第 B-3 条，以避免在 BWM 公约生效日和经修正的第 B-3 条生效日之间的时间段形成双重条约机制，

- 1 按 BWM 公约第 19(2)(c)条规定，**通过**第 B-3 条的修正案，其文本载于本决议附件；
- 2 按 BWM 公约第 19(2)(e)(ii)条规定，**决定**该修正案于 2019 年 4 月 13 日应视为已被接受，除非在此日期之前，有三分之一以上的本公约缔约国政府向秘书长通报其反对该修正案；
- 3 **提请**各缔约国政府注意，按 BWM 公约第 19(2)(f)(ii)条规定，该修正案在按上述 2 被接受后，应于 2019 年 10 月 13 日生效；
- 4 **要求**秘书长按 BWM 公约第 19(2)(d)条规定，将核准无误的本决议及其附件中的修正案文本的副本分发给 BWM 公约所有缔约国政府；
- 5 **还要求**秘书长将本决议及其附件的副本分发给非 BWM 公约缔约国的本组织成员；
- 6 进一步**要求**秘书长**编制**经核准的 BWM 公约综合文本。

附 件

BWM 公约第 B-3 条修正案

(船舶压载水管理执行时间表)

第 B 节 — 船舶的管理和控制要求

第 B-3 条 船舶压载水管理

第 B-3 条文字替换如下：

“1 在 2009 年前建造的船舶：

- .1 压载水容量在 $1,500$ 至 $5,000\text{m}^3$ 之间(包括 $1,500$ 和 $5,000\text{m}^3$)时，应在第10款所述换证检验以前执行至少符合第D-1或D-2条所述标准的压载水管理，此后应至少符合第D-2条所述标准；
- .2 压载水容量小于 $1,500\text{m}^3$ 或大于 $5,000\text{m}^3$ 时，应在第10款所述换证检验以前执行至少符合第D-1或D-2条所述标准的压载水管理，此后应至少符合第D-2条所述标准。

2 在 2009 年或以后但在 2017 年 9 月 8 日前建造的、压载水容量小于 $5,000\text{ m}^3$ 的船舶，应自第 10 款所述换证检验之日起执行至少符合第 D-2 条所述标准的压载水管理。

3 在 2009 年或以后但在 2012 年以前建造的、压载水容量等于或大于 $5,000\text{ m}^3$ 的船舶，应按第 1.2 款执行压载水管理。

4 在 2012 年或以后但在 2017 年 9 月 8 日前建造的、压载水容量为 $5,000\text{ m}^3$ 或以上的船舶，应自第 10 款所述换证检验之日起执行至少符合第 D-2 条所述标准的压载水管理。

5 在 2017 年 9 月 8 日或以后建造的船舶，应执行至少符合第 D-2 条所述标准的压载水管理。

6 本条要求不适用于将压载水排放到根据本组织制定的指南而设计的接收设施中的船舶。

7 压载水管理的其它方法，如能确保对环境、人体健康、财产或资源的同等保护并得到本委员会的原则批准，则也可被接受为第 1 至 5 款和第 8 款所述要求的替代方法。

8 在 2017 年 9 月 8 日前建造的、不适用第 10 款所述换证检验的船舶，应自主管机关决定的日期起，但不迟于 2024 年 9 月 8 日，执行至少符合第 D-2 条所述标准的压载水管理。

9 受第 2、4 或第 8 款规定约束的船舶在要求符合第 D-2 条以前应符合第 D-1 条或第 D-2 条。

10 尽管有 E-1.1.2 条规定，第 1.1、1.2、2 或 4 款所述换证检验是指：

.1 由本委员会^①确定的 2017 年 9 月 8 日或以后的第一次换证检验，如果：

.1 本检验于 2019 年 9 月 8 日或以后完成；或

.2 换证检验在 2014 年 9 月 8 日或以后但在 2017 年 9 月 8 日前完成；和

.2 由本委员会^②确定的 2017 年 9 月 8 日或以后的第二次换证检验，如果 2017 年 9 月 8 日或以后的第一次换证检验于 2019 年 9 月 8 日前完成，前提是不满足第 10.1.2 款的条件。”

① 参见 MEPC.298(72)决议。

② 参见 MEPC.298(72)决议。

RESOLUTION MEPC.298(72)
(adopted on 13 April 2018)

**DETERMINATION OF THE SURVEY REFERRED TO
IN REGULATION B-3, AS AMENDED, OF THE BWM CONVENTION**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING resolution MEPC.297(72), by which it adopted amendments to regulation B-3 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the BWM Convention),

NOTING ALSO that paragraph 10 of regulation B-3 of the BWM Convention, as amended, states that the Committee shall determine the renewal survey to which paragraphs 1.1, 1.2, 2 and 4 of regulation B-3 of the BWM Convention shall apply,

DETERMINES that the renewal survey referred to in paragraph 10 of regulation B-3 of the BWM Convention is the renewal survey for the ship associated with the International Oil Pollution Prevention Certificate pursuant to Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL).

环保会 MEPC.298(72)决议
(2018 年 4 月 13 日通过)

关于经修正的 BWM 公约第 B-3 条提及的检验的确定

海上环境保护委员会，

忆及国际海事组织公约第 38(a)条关于防止和控制海洋污染的国际公约赋予海上环境保护委员会的职能，

注意到以 MEPC.297(72)决议通过对《2004 年船舶压载水和沉积物控制与管理国际公约》(BWM 公约)第 B-3 条的修正案，

还注意到经修正的 BWM 公约第 B-3 条 10 规定，本委员会应确定 BWM 公约第 B-3 条 1.1、1.2、2 及 4 应适用的换证检验，

确定 BWM 公约第 B-3 条 10 提及的换证检验系指按经 1978 年议定书修订的《1973 年国际防止船舶造成污染公约》(MARPOL)附则 I 对船舶进行的与国际防止油污证书有关的换证检验。

RESOLUTION MEPC.299(72)
(adopted on 13 April 2018)

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

Amendments to regulations E-1 and E-5

**(Endorsements of additional surveys on the
International Ballast Water Management Certificate)**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING article 19 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the BWM Convention), which specifies the amendment procedure and confers upon the Marine Environment Protection Committee of the Organization the function of considering amendments thereto for adoption by the Parties,

HAVING CONSIDERED, at its seventy-second session, proposed amendments to regulations E-1 and E-5 of the BWM Convention concerning endorsements of additional surveys on the International Ballast Water Management Certificate,

1 ADOPTS, in accordance with article 19(2)(c) of the BWM Convention, amendments to regulations E-1 and E-5, the text of which is set out in the annex to the present resolution;

2 DETERMINES, in accordance with article 19(2)(e)(ii) of the BWM Convention, that the amendments shall be deemed to have been accepted on 13 April 2019 unless, prior to that date, more than one-third of the Parties have notified the Secretary-General that they object to the amendments;

3 INVITES the Parties to note that, in accordance with article 19(2)(f)(ii) of the BWM Convention, the said amendments shall enter into force on 13 October 2019 upon their acceptance in accordance with paragraph 2 above;

4 INVITES FURTHER the Parties to consider the application of the aforesaid amendments to the BWM Convention as soon as possible to ships entitled to fly their flag;

5 REQUESTS the Secretary-General, for the purposes of article 19(2)(d) of the BWM Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the annex to all Parties to the BWM Convention;

6 REQUESTS ALSO the Secretary-General to transmit copies of the present resolution and its annex to Members of the Organization which are not Parties to the BWM Convention;

7 REQUESTS FURTHER the Secretary-General to prepare a consolidated certified text of the BWM Convention.

ANNEX

AMENDMENTS TO THE ANNEX TO THE BWM CONVENTION

(Endorsements of additional surveys on the International Ballast Water Management Certificate)

Section E – Survey and certification requirements for ballast water management

Regulation E-1 – Surveys

1 In paragraph 1.5, the last sentence "Such surveys shall be endorsed on the Certificate issued under regulation E-2 and E-3" is deleted.

Regulation E-5 – Duration and validity of the Certificate

2 In the chapeau of paragraph 8, the words "annual survey" are replaced by "annual or intermediate survey".

3 In paragraph 8.3, the words "annual surveys" are replaced by "annual or intermediate surveys".

4 The existing paragraph 9.1 is deleted and the existing paragraphs 9.2 to 9.4 are renumbered as paragraphs 9.1 to 9.3, respectively.

环保会 MEPC.299(72)决议
(2018 年 4 月 13 日通过)

《2004 年船舶压载水和沉积物控制与管理国际公约》修正案

对第 E-1 和 E-5 条的修正案
(国际压载水管理证书上附加检验的签注)

海上环境保护委员会，

忆及国际海事组织公约第 38(a)条关于防止和控制海洋污染的国际公约赋予海上环境保护委员会的职能，

注意到《2004 年船舶压载水和沉积物控制与管理国际公约》(BWM 公约)第 19 条规定的修正程序和赋予本组织海上环境保护委员会审议相关修正案以供各缔约国通过的职能，

在其第 72 届会议上审议了对 BWM 公约第 E-1 和 E-5 条关于国际压载水管理证书上附加检验的签注的修正建议案，

1. 根据 BWM 公约第 19(2)(c)条，通过对第 E-1 和 E-5 条的修正案，其文本载于本决议附件；
2. 根据 BWM 公约第 19(2)(e)(ii)条，决定该修正案于 2019 年 4 月 13 日应视为已被接受，除非在此日期之前，有超过三分之一的缔约国通知秘书长其反对该修正案；
3. 提请各缔约国注意，按 BWM 公约第 19(2)(f)(ii)条的规定，所述修正案在按上述 2 被接受后，应于 2019 年 10 月 13 日生效；
4. 进一步提请各缔约国考虑尽快将所述的对 BWM 公约的修正案应用到悬挂其国旗的船舶上，
5. 要求秘书长按 BWM 公约第 19(2)(d)条规定，将核准无误的本决议及附件中修正案文本的副本分发给所有 BWM 公约缔约国；
6. 还要求秘书长将本决议及其附件的副本分发给非 BWM 公约缔约国的本组织成员；
7. 进一步要求秘书长起草经核准的 BWM 公约综合文本。

附 件

BWM 公约附则修正案

(国际压载水管理证书上附加检验的签注)

第 E 节 压载水管理的检验及发证要求

第 E-1 条 检验

1. 在 1.5 中，删除最后一句话“此种检验应在根据第 E-2 或 E-3 条颁发的证书上作出签注。”。

第 E-5 条 证书的期限和效力

2. 在 8 的起首部分中，“年度检验”一词由“年度或中间检验”替代。
3. 在 8.3 中，“年度检验”一词由“年度或中间检验”替代。
4. 删除现有 9.1，其后 9.2 至 9.4 相应重新编号为 9.1 至 9.3。

RESOLUTION MEPC.300(72)
(adopted on 13 April 2018)

CODE FOR APPROVAL OF BALLAST WATER MANAGEMENT SYSTEMS
(BWMS CODE)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING that regulation D-3 of the Annex to the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the BWM Convention), provides that ballast water management systems used to comply with the Convention must be approved by the Administration,

NOTING ALSO that it adopted, by resolution MEPC.125(53), *Guidelines for approval of ballast water management systems* (Guidelines (G8)), and by resolutions MEPC.174(58) and MEPC.279(70) revisions thereof,

DESIRING to make the Guidelines (G8) mandatory under the BWM Convention in the form of a code for approval of ballast water management systems,

NOTING resolution MEPC.296(72), by which it adopted amendments to regulations A-1 and D-3 of the BWM Convention to make the provisions of the Code for Approval of Ballast Water Management Systems referred to above mandatory,

RECALLING that it agreed, at its sixty-eighth session, to provisions for non-penalization of early movers that have installed ballast water management systems approved taking into account resolutions MEPC.125(53) and MEPC.174(58), as contained in the Roadmap for the implementation of the BWM Convention,

BEARING IN MIND the Organization's established practice with regard to the validity of type approval certification for marine products (MSC.1/Circ.1221), which is that the Type Approval Certificate itself has no influence on the operational validity of existing ballast water management systems approved and installed on board a ship and manufactured during the period of validity of the relevant Type Approval Certificate, meaning that the system need not be renewed or replaced due to expiration of such Certificate,

HAVING CONSIDERED, at its seventy-second session, the draft Code for Approval of Ballast Water Management Systems,

1 ADOPTS the *Code for Approval of Ballast Water Management Systems (BWMS Code)*, as set out in the annex to the present resolution;

2 INVITES Parties to the BWM Convention to note that the BWMS Code will take effect on 13 October 2019 upon entry into force of the associated amendments to the BWM Convention;

3 AGREES to keep the BWMS Code under review in the light of experience gained with its application and to amend it as necessary;

4 DECIDES that ballast water management systems approved not later than 28 October 2018, taking into account the Guidelines (G8) adopted by resolution MEPC.174(58), may be installed on board ships before 28 October 2020;

5 RESOLVES that, for the purpose of operative paragraph 4 of this resolution, the word "installed" means the contractual date of delivery of the ballast water management system to the ship. In the absence of such a date, the word "installed" means the actual date of delivery of the ballast water management system to the ship;

6 RESOLVES that references to the Guidelines (G8) and 2016 Guidelines (G8) in existing IMO instruments should be read to mean references to the BWMS Code;

7 AGREES that the dates referenced in this resolution will be considered in any reviews carried out in accordance with regulation D-5 of the BWM Convention, to determine whether a sufficient number of appropriate technologies are approved and available;

8 RESOLVES to revoke the *2016 Guidelines for approval of ballast water management systems* (G8) adopted by resolution MEPC.279(70) when the BWMS Code takes effect;

9 REQUESTS the Secretary-General to transmit certified copies of the present resolution and the text of the BWMS Code contained in the annex to all Parties to the BWM Convention;

10 REQUESTS FURTHER the Secretary-General to transmit copies of the present resolution and the text of the BWMS Code contained in the annex to the Members of the Organization which are not Parties to the BWM Convention.

ANNEX

CODE FOR APPROVAL OF BALLAST WATER MANAGEMENT SYSTEMS (BWMS CODE)

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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

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.

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

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

² Refer to *Validity of type approval certification for marine products* (MSC.1/Circ.1221).

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 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.

³ Refer to the *Guidelines for ballast water sampling (G2)* (resolution MEPC.173(58)).

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

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;
- .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 m³. 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 of the operation. The total sample volume shall be at least 3 m³;
 - .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 guidelines⁵ 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.

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

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.

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

- .1 a minimum capacity of 200 m³;
- .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.

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

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 m³/h shall not be downscaled.

2.27 For BWMS with at least one model that has a TRC higher than 200 m³/h or 1000 m³/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 m³/h but lower than 1,000 m³/h may be downscaled to a maximum of 1:5 scale, but may not be lower than 200 m³/h; and
- .2 BWMS with at least one model with a TRC equal to, or higher than, 1,000 m³/h may be downscaled to a maximum of 1:100 scale, but may not be lower than 200 m³/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

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

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 10^6 but not less than 10^5 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 10^4 but not less than 10^3 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 10^4 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 the 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 accreditation⁸ 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

⁸ Refer to *General requirements for the competence of testing and calibration laboratories* (ISO/IEC 17025:2017).

⁹ Refer to IACS UR E10, Rev.6, October 2014 – *Test Specification for Type Approval*.

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 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 Organization¹⁰ 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;

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

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

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 to 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.

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

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;

¹⁴ Refer to *Digital interfaces for navigational equipment within a ship* (IEC 61162).

- .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;

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

- .6 the operational safety requirements of the BWMS and all safety-related findings that have been made during the type approval process;
- .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 (m³/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.

环保会 MEPC.300(72)决议
(2018 年 4 月 13 日通过)

压载水管理系统认可规则
(BWMS 规则)

海上环境保护委员会，

忆及国际海事组织公约第 38(a)条关于防止和控制船舶造成海洋污染的国际公约赋予海上环境保护委员会的职能，

注意到《2004 年国际船舶压载水与沉积物控制和管理公约》(BWM 公约)附则中第 D-3 条规定，为符合公约要求而使用的压载水管理系统必须经主管机关予以认可，

还注意到其以 MEPC.125(53)决议通过的压载水管理系统认可导则(G8 导则)以及以 MEPC.174(58)和 MEPC.279(70)决议对导则(G8)的修订，

期望使导则(G8)以压载水管理系统认可规则的形式成为 BWM 公约下的强制性要求，

注意到其以 MEPC.296(72)决议通过的对 BWM 公约 A-1 和 D-3 条的修正案，以使上述压载水管理系统认可规则的规定成为强制性要求，

忆及在其 68 届会议上同意对已安装按 MEPC.125(53)决议和 MEPC.174(58)决议认可的压载水管理系统的早期行动者不处罚的规定，该规定包含在压载水管理公约实施路线图中，

牢记本组织关于船用产品型式认可发证有效性的规定(海安会通函 MSC.1/Circ.1221)，即型式认可证书本身对经认可并安装上船且在相关型式认可证书有效期内制造的现有压载水管理系统的运行有效期没有影响，这意味着系统无需由于该证书到期而换证或替换，

在其 72 届会议上，**审议了**压载水管理系统认可规则草案，

1. **通过**压载水管理系统认可规则(BWMS 规则)，其文本附于本决议附件；
2. **提请**BWM 公约的各缔约国注意 BWMS 规则将在 BWM 公约相关修正案生效后于 2019 年 10 月 13 生效；

3. **同意**根据应用 BWMS 规则所获得的经验保持对 BWMS 规则的评审并视必要进行修正；
4. **决定**根据经 MEPC.174(58)决议通过的导则(G8)不迟于 2018 年 10 月 28 日认可的压载水管理系统可在 2020 年 10 月 28 日之前安装上船；
5. **决定**就本决议第 4 段而言，“安装”一词系指压载水管理系统的合同交船日期。如无该日期，“安装的”一词系指压载水管理系统的实际交船日期；
6. **决定**现有 IMO 文件中本导则(G8)和 2016 年导则(G8)的引用应被解读为 BWMS 规则的引用；
7. **同意**在按照 BWM 公约第 D-5 条进行任何评审时考虑本决议中述及的日期，以确定是否有足够数量的适当技术经认可且可供使用；
8. **决定** BWMS 规则生效后，废除以 MEPC.279(70)决议通过的《2016 年压载水管理系统认可导则(G8)》；
9. **要求**秘书长将核准无误的本决议副本及其附件中包含的 BWMS 规则文本分发给 BWM 公约的所有缔约国；
10. **进一步要求**秘书长将本决议副本及其附件中包含的 BWMS 规则文本分发给非 BWM 公约缔约国的本组织成员。

附 件

压载水管理系统认可规则 (BWMS 规则)

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1 引言

通则

1.1 《压载水管理系统认可规则》(BWMS 规则)主要针对主管机关或其指定组织以评估压载水处理系统(BWMS)是否满足《2004 年国际船舶压载水和沉积物控制和管理公约》(本公约)第 D-2 条规定的标准。此外,本规则拟用作生产商和船东实施设备评估程序以及制订压载水管理系统要求的参考。规则的实施应确保客观、一致和透明,本组织将定期对其实施情况进行评估。

1.2 本规则中述及的条款和规定系指公约中的条款和规定。

1.3 本规则包括设计、安装、性能、测试、环境可接受性、评估技术程序、《压载水管理系统型式认可证书》签发程序以及向本组织报告的一般要求。

1.4 本规则旨在整个框架范围内适合系统的性能评估,包括按第 D-4 条规定进行的原型系统的实验性船上评估、完全符合公约要求的压载水管理系统和相关系统的认可以及为符合公约第 9 条规定而进行的港口国控制取样。

1.5 第 D-3 条认可要求规定,为符合公约要求而使用的压载水管理系统必须经主管机关按本规则予以认可。除第 A-2 条和第 B-3 条规定的压载水管理系统认可外,公约还规定船舶压载水排放必须在现行基础上满足第 D-2 条性能标准的要求。系统认可旨在筛检出不满足公约第 D-2 条规定标准的压载水管理系统。然而,系统认可并不确保该系统适用于所有船舶或在所有情况下适用。为满足公约要求,在船舶整个寿命期间,排放必须符合 D-2 标准。

1.6 压载水管理系统应设计为不得危害船舶或人员的健康和安全,也不得对环境和公众健康造成严重危害。

1.7 压载水管理系统应满足公约第 D-2 条的标准以及公约第 D-3 条中的条件。本规则用于评估那些设计用于满足上述标准和条件的系统的安全性、环境可接受性、实用性和生态有效性。已经型式认可的设备的成本效率将用于确定是否需要对这些规则进行修订。

1.8 为确保实施的一致性,认可程序要求制订和采用统一的试验、样品分析和结果评估方式。秘书长应适时分发本规则的修正案。压载水管理系统的实用性应予以适当考虑。

目标和目的

1.9 本规则的目标是确保统一和正确实施公约中的标准。为此，应按最新的知识和技术需求对规则进行更新。

1.10 本规则旨在提供第 D-3 条要求的统一解释和应用，并：

- .1 确定压载水管理系统认可的试验和性能要求；
- .2 规定压载水管理系统认可所必需的适当的设计、结构和工作参数；
- .3 为主管机关、设备生产商和船东确定设备适宜性提供指导，以满足公约和经处理的水环境可接受性的要求；和
- .4 确保经主管机关认可的压载水管理系统在陆基和船上评估时，能达到第 D-2 条的标准，而不对船舶、船员、环境或公共健康造成不可接受的危害。

适用性

1.11 本规则适用于按公约要求对压载水管理系统的认可。

1.12 本规则适用于拟安装在要求符合第 D-2 条规定的所有船上的压载水管理系统。

1.13 根据经 MEPC.279(70)决议通过的 2016 年导则(G8)认可的压载水管理系统应视为符合 BWMS 规则。

2 背景

2.1 第 D-3 条规定了公约中关于船用压载水管理系统认可的要求。

2.2 第 D-2 条规定，按本公约压载水性能标准进行压载水管理的船舶应排放：

- .1 每立方米排放水中所含的最小尺寸为大于或等于 50 微米的存活生物少于 10 个；
- .2 每毫升排放水中所含的最小尺寸小于 50 微米但大于或等于 10 微米的存活生物少于 10 个；和

.3 小于下列指示剂微生物浓度，作为人体健康标准：

- .1 产生有毒物质的**弧菌性霍乱**(血清型 O1 和 O139)，每 100 毫升排放水中少于 1 群体形成单位(cfu)，或每 1 克(湿重)浮游生物样品中少于 1cfu；
- .2 大肠埃希氏杆菌，每 100 毫升排放水中少于 250cfu；和
- .3 肠道球菌素，每 100 毫升排放水中少于 100cfu。

3 定义

就本规则而言：

3.1 活性物质系指一种物质或有机物，包括病毒或真菌，其对有害水生物和病原体具有一般或特定的有利或不利作用。

3.2 压载水管理系统(BWMS)系指对压载水进行处理使其达到或高于第 D-2 条规定的压载水性能标准的任何系统。压载水管理系统包括压载水处理设备、所有相关控制设备、生产商指定的管系装置、控制和监测设备以及取样设施。就本规则而言，BWMS 不包括未设置 BWMS 时要求的管系、阀、泵等船舶压载水配件。

3.3 压载水管理计划系指公约第 B-1 条所述的说明每艘船上的压载水管理过程和程序的计划。

3.4 控制和监测设备系指为有效操作和控制压载水管理系统并评估其操作有效性而安装的设备。

3.5 公约系指《2004 年国际船舶压载水和沉积物控制和管理公约》。

3.6 失败的试验循环系指一个有效的试验循环，在该循环中压载水管理系统的性能导致处理过的水不符合第 D-2 条中规定的标准。失败的试验循环中断所要求的连续试验循环并终止试验。

3.7 无效的试验循环系指一个试验循环，在该循环中由于超出压载水管理系统的控制，不满足有效的试验循环的要求。如果一个试验循环无效，则其不计入试验要求的连续试验循环之一，试验可继续。

3.8 陆基试验系指为确认压载水管理系统满足公约第 D-2 条中所述的压载水性能标准，按本规则附件第 2 和第 3 部分规定，在实验室、设备厂或中间试制工厂(包括系泊的试验驳船或试验船)进行的压载水管理系统试验。

3.9 主要部件系指直接影响系统满足第 D-2 条中所述的压载水性能标准的能力的部件。

3.10 有代表性的取样系指反映(化学品)相对浓度以及(有机物)种群数量和组成的取样。取样应以时间整合的方式进行, 取样设施的安装应按照本组织制定的导则^①。

3.11 取样设施系指本规则和本组织制定的导则^①中规定的用于对已经处理或未经处理的压载水进行取样的装置。

3.12 船上试验系指为确认系统符合公约第 D-2 条规定的标准, 按本规则附件第 2 部分的规定, 在船上进行的完整的压载水管理系统的实船试验。

3.13 成功的试验循环系指一个有效的试验循环, 在该循环中压载水管理系统按照其技术规定运行, 且经确定处理过的水满足第 D-2 条中所述的压载水性能标准。

3.14 压载水管理系统的系统设计限制(SDL)系指除要求的型式认可试验参数之外确定的水质和运行参数, 其对压载水管理系统的操作非常重要, 且对于每个参数, 规定压载水管理系统设计能达到第 D-2 条的性能标准的低值和/或高值。系统设计限制为压载水管理系统正在使用的程序而设, 且不应限于评定为型式认可过程部分的参数。参照本组织制定的指南和按照本规则, 系统设计限制应经生产商确定并在主管机关的监督下验证。

3.15 试验循环系指按照给定的用于确定压载水管理系统满足标准的能力的要求的一个试验重复(应包括适当的吸收、处理、保存和排放)。

3.16 试验系指要求的试验循环组。

3.17 额定处理能力(TRC)系指进行型式认可的压载水管理系统的最大连续能力(m^3/h)。其说明了为满足第 D-2 条中压载水性能标准要求, 压载水管理系统每单位时间能处理压载水的量。额定处理能力在压载水管理系统的进口处测量。

3.18 有效的试验循环系指一个试验循环, 在该循环中所有要求的试验工况和装置, 包括测试工况、试验控制和监测装置(包括管系、机械和电气装置), 以及试验分析程序由试验机构完成。

3.19 存活生物系指能成功形成新的个体以繁殖物种的有机物。

^① 参见《压载水取样导则(G2)》(MEPC.173(58)决议)。

4 技术规定

4.1 本节详细阐述了压载水管理系统为获得型式认可而应满足的一般技术要求。

一般操作原则

4.2 无论温度高低,压载水管理系统应在短航程和长航程(即处理和排放之间的短和长间隔)有效地满足 D-2 标准,除非系统有意建造成在特定水域中使用。

4.3 无论温度高低,处理后排放的压载水应在短航程和长航程(即处理和排放之间的短和长间隔)上对环境安全。

4.4 压载水管理系统的设计应说明这样一个事实,即无论使用的压载水管理系统技术,处理后剩余的存活生物可在处理和排放之间的间隔中繁殖。

压载水管理系统

4.5 压载水管理系统的设计和构造应:

- .1 可靠并适宜在船上环境下操作;
- .2 满足预定用途;
- .3 当安装时能减轻对船上人员的任何危害。能释放危险气体/液体的设备应有至少 2 种独立的探测和关闭压载水管理系统方式(即达到较低爆炸限制(LEL)的危险气体水平或能对人体健康造成严重影响的有毒浓度水平); 和
- .4 采用与所使用的物质、拟定用途、工况和船上环境条件兼容的材料。

4.6 压载水管理系统不应包含或使用任何危险物质,除非包括主管机关接受的用于储存、应用、安装和安全处理的适当减轻风险的措施。

4.7 如果发生影响压载水管理系统正常操作的故障,所有压载水操作控制站应发出声光报警信号。

4.8 所有易磨损或破损的压载水管理系统工作部件应便于维修。生产商应在操作、维修保养和安全手册中清楚说明压载水管理系统日常保养和维修程序。所有的维修保养和修理情况应予以记录。

4.9 为确保压载水管理系统正常工作,应安排下列布置:

- .1 必须启封才能使用除 4.8 规定的基本要求以外的压载水管理系统功能;

- .2 如适用，压载水管理系统的构造应确保当压载水管理系统处于工作状态时，清洁、校准或修理的可见指示始终处于被激活状态，控制和监测设备应记录这些情况；和
- .3 压载水管理系统应设有必要的连接以确保压载水管理系统的旁通激活报警，控制和监测设备记录旁通事件。

4.10 应提供设备，在换证检验时按生产商的须知规定，检查测量的压载水管理系统部件的性能。为便于检查，船上应备有证明最近一次校准日期的校准证书。只有生产商或生产商授权的人员才能进行精度检查。

4.11 压载水管理系统的操作和控制应简单有效。应设有一个通过必要的装置确保压载水管理系统正常工作的控制系统。

4.12 如果拟安装在危险区域处所，压载水管理系统应符合这类处所相关的安全规定。作为压载水管理系统一部分的电气设备应置于非危险区，或应经主管机关证明在危险区域使用是安全的。在危险区域安装的任何活动部件应避免产生静电。

4.13 压载水管理系统应设计为不危害船员的健康和安全，负面影响船舶系统和货物或产生任何不利的环境影响。压载水管理系统不应通过压载系统和其他处所的腐蚀作用对船舶和船员安全造成长期影响。

4.14 应通过数学模型和/或计算证明压载水管理系统的任何缩放比例不会影响船上拟发证类型和尺寸的设备的功能和有效性。在这种情况下，设备生产商应考虑本组织制定的相关导则。

4.15 缩放比例资料应允许主管机关验证任何按比例缩小的模型至少与陆基试验模型一样可靠。主管机关负责验证使用的缩放比例适于压载水管理系统的操作设计。

4.16 船上试验装置的处理能力应至少能虑及进一步确认比例缩放的数学模型和/或计算，并最好在压载水管理系统额定能力的上限进行选择，除非另经主管机关认可。

控制和监测设备

4.17 主管机关应确保经型式认可的压载水管理系统具有适当的控制和监测系统，自动监测和记录足够的数据以验证系统的正确操作。控制和监测设备应记录压载水管理系统正常工作或失效情况。如实际可行，压载水管理系统应对系统设计限制参数进行监测和记录以确保其正确操作。

4.18 压载水管理系统应包括自动监测和调整必需的处理剂量或强度或船舶压载水管理系统其他方面的控制设备，虽然这并不直接影响处理工作，但为必需的处理工作的正确管理所要求。

4.19 设备应能按照附件第 5 部分按正式检查或维修保养的要求生成(例如显示、打印或输出)适用的自我监测参数报告。

4.20 为便于符合第 B-2 条规定，控制和监测设备也应能储存数据至少 24 个月。更换控制和监测设备时，应采取措施确保更换前记录的数据仍能在船上保存 24 个月。

4.21 对于能释放危险气体的压载水管理系统，应在压载水管理系统处所设置冗余安全系统的气体探测装置，且在发生泄漏时，应在该处所和在有人值班的压载水管理系统控制站激活听觉和视觉报警。气体探测设备应按照 IEC 60079-29-1 或主管机关接受的其他认可标准进行设计和试验。压载水管理系统应设有独立关闭的危险气体监测措施。

4.22 试验前评估之后引入系统的所有软件变更应按照确保可追溯性的变更处理程序进行。

5 型式认可过程

5.1 压载水管理系统的型式认可要求描述如下。

5.2 设备生产商应按附件第 1 部分的规定，提交压载水管理系统的设计、结构、操作和功能方面的资料，包括关于对系统操作重要的水质和运行参数的资料。该资料应为主管机关进行适宜性初步评估的基础。

5.3 在主管机关进行试验前评估后，压载水管理系统应按照附件第 2 和第 3 部分中所述的程序进行陆基、船上和其他试验。进行型式认可试验的压载水管理系统应为满足第 4 节要求的最终完整产品，其应采用用于制造生产单元的相同材料和程序制造。

5.4 如果圆满完成附件第 2 和第 3 部分所述的要求和程序以及本规则所有其他要求，主管机关应按照第 6 节所述规定签发型式认可证书。

5.5 压载水管理系统的局限性以及在附件 2.29 和 2.46 中确定且由生产商提交、并经主管机关确认的所要求的型式认可试验参数应在型式认可证书上予以记录。这些设计限制不确定设备是否可进行型式认可，但是提供了超过型式认可试验参数之外的设备可预期正常运行条件的资料。

5.6 如果船上安装了经型式认可的压载水管理系统，则应按第 8 节的规定进行安装检验。

5.7 送交认可的证明文件应至少包括以下内容：

- .1 压载水管理系统的描述和简图；
- .2 操作、维修保养和安全手册；
- .3 危险标识；
- .4 环境和公共健康影响；
- .5 系统设计限制。

6 认可和发证程序

6.1 主管机关可认可船上安装各方面均符合规则要求的压载水管理系统。认可应采用《压载水管理系统型式认可证书》的形式，具体说明压载水管理系统和确认的系统设计限制条件的主要细节部分。这类证书应按照附件第 7 部分按附录的格式签发。

6.2 如果在签发的型式认可证书中用“限制操作”的描述清楚地规定相应的限制操作，主管机关应只认可各方面均符合规则要求的压载水管理系统，其未在附件第 2 部分规定的所有温度和盐度条件下进行试验除外。对于限制值，应查阅系统设计限制。

6.3 《压载水管理系统型式认可证书》应签发给特定适用范围的经认可的压载水管理系统，例如用于特定的压载水容量、流速、盐度或温度、或其他限制操作条件或环境，如适用。

6.4 确认符合附件第 1、2、3 和 4 部分所有试验要求后，主管机关应签发《压载水管理系统型式认可证书》。

6.5 系统设计限制应在《型式认可证书》的一张表格中予以规定，该表格标识每个水质和运行参数以及压载水管理系统设计能达到第 D-2 条中所述的压载水性能标准的经验证的低值和/或高值。

6.6 主管机关可根据已由另一主管机关监督下进行的试验，签发《压载水管理系统型式认可证书》。当主管机关基于另一主管机关进行的试验批准在其授权下操作的船上安装压载水管理系统时，可以通过签发《国际压载水管理证书》予以批准。

6.7 按照第 D-3.2 条，《型式认可证书》应只对主管机关已确定的使用经本组织认可的活性物质的压载水管理系统签发。另外，主管机关应确保在签发《型式认可证书》之前已考虑本组织认可时提出的任何建议。

6.8 《型式认可证书》的签发应考虑及本组织制定的导则^①。

① 参见《船用产品型式认可发证的有效性》(MSC.1/Circ.1221 通函)。

6.9 为能在其船上使用，其他主管机关可对已经认可的压载水管理系统进行型式认可。如果已经一国认可的压载水管理系统未能通过另一国的型式认可，则相关两国应协商达成一个互相接受的协议。

6.10 认可压载水管理系统的主管机关应按照附件第 6 部分的规定立即向本组织提供型式认可报告。收到型式认可报告后，本组织应立即采用合适的方法提供给公众和成员国。

6.11 如果型式认可完全根据已由另一主管机关监督下进行的试验，则应制订型式认可报告和存档，并通知本组织。

6.12 如果压载水管理系统先前已经主管机关型式认可并虑及经 MEPC.174(58)决议通过的经修订的指南(G8)，生产商在按本规则申请新的型式认可时，应仅要求向主管机关提交本规则中规定的附加试验报告和文件。

7 在型式认可后的安装要求

7.1 压载水管理系统应按本组织制定的导则^①安装取样设备，其布置应能确保采集到有代表性的船舶压载水排放样品。

7.2 应安装和使用保护船舶和人员安全的适当的旁通或越控装置，发生紧急情况时，其应与压载水管理系统连接以使压载水管理系统的任何旁通应激活报警。控制和监测设备应记录旁通事件，且旁通事件应载于压载水记录簿中。

7.3 7.2 中的要求不适用于船舶压载水的内部转移(例如抗横倾操作)。如果压载水管理系统的内部水转移可能影响船舶符合第 D-2 条中所述的标准(即循环或舱内处理)，7.2 中的记录应标识这类内部转移操作。

8 在型式认可后的安装检验和试运转程序

8.1 下述附加资料旨在便利船舶操作和检查，并帮助船舶和主管机关准备本组织制定的《检验和发证协调系统下国际船舶压载水与沉积物控制和管理公约检验导则》^②中规定的程序，以说明图纸和设计审查以及第 E-1 条要求的不同检验。

① 参见《压载水取样导则》(G2)(MEPC.173(58)决议)。

② 参见《2017 年检验和发证协调系统(HSSC)检验指南》(经修正的 A.1120(30)决议)。

8.2 签发《国际压载水管理证书》的主管机关应验证船上有格式适当的下列文件：

- .1 就资料而言，《压载水管理系统型式认可证书》副本；
- .2 压载水管理系统的操作、维修保养和安全手册；
- .3 船舶的压载水管理计划；
- .4 安装规定，例如安装图、管路和仪表图等；和
- .5 安装试运转程序。

8.3 签发《国际压载水管理证书》前且安装压载水管理系统后，主管机关应验证：

- .1 已按照 8.2.4 中的安装技术规定安装压载水管理系统；
- .2 压载水管理系统符合相关的《压载水管理系统型式认可证书》；
- .3 已按照生产商的设备说明书安装整个压载水管理系统；
- .4 工作进口和出口位于泵系和管系布置图中标示的位置；
- .5 安装工艺令人满意，特别是舱壁贯穿件或压载系统管系贯穿件符合经认可的相关标准；和
- .6 已完成安装调试程序。

附 件

第 1 部分 试验前对系统证明文件的评估规定

1.1 在进行压载水管理系统认可试验前，作为认可过程的一部分，应准备足够的证明文件提交主管机关并与试验机构分享。对独立的认可试验，应先对提交的证明文件进行认可。

1.2 生产商/开发商应提供证明文件的主要目的是评估压载水管理系统是否随时可进行认可试验，以及评估生产商提议的系统设计限制和验证程序。

证明文件

1.3 提交的作为准备就绪评估一部分的证明文件应至少包括以下内容：

.1 压载水管理系统技术规定，至少包括：

- .1 压载水管理系统和采用的处理过程的说明以及任何需要许可的详细情况；
- .2 充足的资料，包括泵系和管系布置、电子/电气线路、监测系统、废流和取样点的说明和示意图。这些资料应能发现故障；
- .3 主要部件和使用材料的详细情况(包括证书，如合适)；
- .4 设备清单，显示进行试验的所有部件，包括规格、材料和序列号；
- .5 按照生产商关于部件位置和安装、保持安全和危险处所边界完整性的装置以及取样管的布置的安装衡准要求的安装规定；
- .6 设备安装的特点和布置情况(包括拟安装设备的船舶的范围(尺度、类型和操作))方面的资料。这些资料可在设备和船舶压载水管理计划之间形成链接；
和
- .7 压载水管理系统旁流(例如，滤出物、分离出的浓缩液、废弃物或残余化学品)的说明，包括计划正确管理和处置这些废弃物而采取的措施的说明；

- .2 操作、维修保养和安全手册应至少包括：
 - .1 压载水管理系统正确操作说明书，包括压载水处理设备发生故障时未经处理水的排放程序；
 - .2 压载水管理系统正确布置说明书；
 - .3 维修保养和安全须知以及记录的必要性；
 - .4 故障解决程序；
 - .5 船舶保护所必需的应急程序；
 - .6 压载水管理系统安全有效操作所必需的任何补充资料，例如按《使用活性物质的压载水管理系统认可程序》(G9)(MEPC.169(57)决议)认可需提供的记录文件；和
 - .7 校准程序；
- .3 如果压载水管理系统或处理化学品的贮存舱会发出危险气体或液体，关于为确定潜在危害并规定适当的控制措施而进行的危险标识的资料；
- .4 关于环境和公共健康影响的资料，包括：
 - .1 基于为确保不产生有害影响而进行的环境研究，确定对环境的潜在危害；
 - .2 对使用活性物质或包含一种或多种活性物质的配制品的压载水管理系统，使用的任何活性物质的剂量和最大许可排放浓度；
 - .3 对于未使用活性物质或制剂但合理预期会导致排放后经处理水的化学成分的变化而可能产生对接收水域造成不利影响的压载水管理系统，证明文件应包括本附件 2.19 所述的对经处理的水毒性试验的结果；和
 - .4 使试验机构能确定任何潜在的健康或环境安全问题、特殊的操作要求(人力或材料)以及与副产品或废流处理相关的问题的足够的资料；
- .5 关于系统设计限制的资料，包括：
 - .1 对压载水管理系统的设计敏感的所有已知参数的确定；

- .2 对于每个参数，生产商应声明压载水管理系统能达到第 D-2 性能标准的低值和/或高值；和
- .3 应列出确认每个声明的系统设计限制的建议方法，以及关于方法的来源、适宜性和可靠性的资料；
- .6 软件变更处理和修订控制文件，包括试验前评估之后纳入系统的所有软件变更。这应按照确保可追溯性的变更处理程序进行。因此，生产商应提供一个程序，以说明应如何处理变更以及如何保持修订控制。至少对于改装要求而言，应产生并记录下列信息：
 - .1 改装的理由；
 - .2 建议变更的说明；
 - .3 改装授权；
 - .4 试验记录；
- .7 功能说明，包括文字说明，包含必要的支持性图纸、图表和数字，涉及：
 - .1 系统配置和布置；
 - .2 供应范围；
 - .3 系统功能，涉及控制、监测、报警和安全功能；
 - .4 自动诊断和报警功能；和
 - .5 每个功能的安全状态。

1.4 证明文件可包括按规则规定进行陆基试验所用的试验装置的具体资料。这些资料应包括确保正常运行所需的取样情况以及确保正确评估设备功效和影响所需的其他相关资料。所提供的资料还应指出型式认可程序期间符合适用的环境、健康和安全管理标准。

准备就绪评估

1.5 准备就绪评估期间，主管机关应确认本规则第 4 节所列的技术规定已得到满足，而不是评估是否满足后续试验的技术规定。

1.6 准备就绪评估应检查压载水管理系统的设计和结构以确定船上是否存在可能限制压载水管理系统按生产商的建议进行压载水管理以及安全操作等能力方面的严重问题。

1.7 主管机关应确认已进行与压载水管理系统安全操作相关的适当的风险评估(包括采取预防措施)。

1.8 作为第一步,生产商应提供在试验期间关于压载水管理系统的安装、校准和操作(包括维修保养)要求和程序的资料。该评估应能帮助试验机构确定潜在的健康或环境安全问题、特殊的操作要求(人力或物力)以及与副产物或废流处理相关的问题。

1.9 试验机构应有处理试验前出现偏离的程序以及包含评定和确认过程以解决试验期间可能出现的任何无法预见的偏离的评估过程。应完整报告与试验程序的偏差。

1.10 准备就绪评估期间,应确定压载水管理系统的主要部件。主要部件视为直接影响系统满足第 D-2 条中所述性能标准的能力的部件。在型式认可试验期间,不应发生主要部件的升级或变更。主要部件的变更要求重新提交试验建议,并应包含重新评估和重复陆基和船上试验。

1.11 型式认可期间,主管机关可允许更换同等规格的非主要部件(按认可的相同操作标准独立认可)。试验期间非主要部件的更换应予以报告。

1.12 型式认可期间和之后,可允许与压载水管理系统的安全操作相关的升级,并应予以报告。如果这类安全升级直接影响系统满足第 D-2 条中所述标准的能力,按照上述 1.10,其应视作主要部件的变更。

1.13 评估应确定压载水管理系统中的消耗部件。型式认可试验期间,主管机关可允许更换与之前同样的消耗部件,且所有更换应予以报告。

系统设计限制评估

1.14 主管机关应进行系统设计限制评估。其应评估生厂商声明的依据,即系统设计限制,包括对压载水管理系统的设计敏感的所有已知的水质和运行参数,这些参数对其达到第 D-2 条中所述的性能标准的能力非常重要。

1.15 主管机关也对所建议的确认每个系统设计限制的低值和/或高值的方法的适宜性和可靠性进行评估。这些方法可包括陆基、船上或实验室试验和/或使用适当的现有数据和/或模型期间进行的试验。

第2部分 压载水管理系统认可的试验和性能规定

2.1 主管机关确定陆基试验和船上试验的顺序。用于测试的压载水管理系统必须经主管机关验证是否与附件第1部分所述的压载水管理系统相同,且主要部件与按本附件1.3.1.3和1.3.1.4提交的证明文件中所述的内容一致。

质量保证和质量控制程序

2.2 测试机构应采用两种方法证明其进行有效型式认可试验的能力:

- .1 已实施了由一个独立的认证机构认可、发证和审核,或令主管机关满意的严格的质量控制/质量保证计划;和
- .2 证明其能够对适合的测试压载水进行的有效测试循环、样品采集、样品分析和方法测定限制的能力。

主管机关或其授权机构负责确定测试机构的可接受性。

2.3 测试机构的质量控制/质量保证计划应包括:

- .1 质量管理计划(QMP),涉及试验机构(含分包商和外部实验室)质量控制管理结构和方针;
- .2 质量保证项目计划(QAPP),规定了测试机构用于压载水管理系统试验的一般方法、程序以及质量保证和质量控制(QA/QC)。它确定了测试小组成员,以及包括所有的相关标准操作程序(SOPs),通常作为附录;和
- .3 试验/质量保证计划(TQAP),说明在一给定的地点和时间内对一给定的压载水管理系统进行试验的具体细节。TQAP包括压载水管理系统调试的详细计划、试验计划、调试结束和结果报告。TQAP识别了进行试验的所有机构并包括压载水管理系统制造商的文件资料和性能要求。同时还确定了所有记录的数据、确定为有效测试循环的运行和测试参数、验证报告所示的数据分析以及试验大纲。应考虑适合的统计分布并将其应用于数据分析中。

2.4 进行压载水管理系统试验的测试机构应是独立的,其不应为压载水管理系统制造商或销售商所有或为其隶属机构,也不应为该设备主要部件的制造商或供应商所有。

避免抽样偏差

2.5 抽样计划必须保证将生物的死亡降低到最少程度，如：采用合适的阀门和流速以控制取样设备中的流速、样品采集时将网沉入水中、选用合适的取样时间和次数以及适合的浓缩方法。对所有避免抽样偏差的方法均应进行验证并使主管机关满意。

船上试验

2.6 船上试验循环包括：

- .1 船上压载水吸入；
- .2 按附件 2.8.4 规定由压载水管理系统进行的压载水处理；
- .3 在一个航次中船上压载水的储存；和
- .4 船上压载水排放。

2.7 应由独立于压载水管理系统制造商的测试机构，按照操作、维护和安全手册对船员操作和维护的压载水管理系统进行船上试验。

船上试验的合格衡准

2.8 评估船上压载水管理系统装置性能时，应提供下列资料和结果，并使主管机关满意：

- .1 试验前提交试验计划；
- .2 证明管路上的压载水管理系统的能力反映其额定处理能力内压载水泵流量的文件；
- .3 证明采取液舱内处理形式的压载水管理系统的能力能反映其在规定时间内处理拟处理压载水量的文件；
- .4 船上试验循环中测试的压载水总量应与船舶正常压载操作一致，压载水管理系统应以其拟认可的额定处理能力工作；
- .5 证明每一有效测试循环的排放均符合第 D-2 条规定的文件。当需处理的压载水中的存活生物浓度超过第 D-2.1 条最大许可规定值的 10 倍时，试验才是有效的；
- .6 取样方法和分析所需的量：
 - .1 为计算最小尺寸大于或等于 50 微米或以上的活的有机物：
 - .1 应在吸入期间采集流入水样作为一个时间整合样品。样品应为单一，连

续采集的水样或序列样品的混合，如：在操作的开始、中间和结束的间隔时采样。总样品容量应至少为 1 立方米。如果能证明少于 1 立方米的样品中具有代表性的有机物，则也行；

- .2 应在各舱排放期间采集经处理的排放水样作为一个时间整合样品。样品可以为单一，连续采集的水样或序列样品的混合，如：在操作开始、中间和结束过程中采集。总样品容量应至少为 3 立方米；
- .3 如果将样品浓缩计数，应使用对角线尺寸不大于 50 微米的细筛集中有机物。只有当有机物的最小尺寸大于 50 微米时，才可进行计算；和
- .4 除非有机物的总数很高，如 100，应对样品的全容积进行分析。这种情况下，平均密度可以根据混合样品采用经验证的方法进行推算；

.2 为计算最小尺寸大于或等于 10 微米且小于 50 微米的存活生物：

- .1 应在吸入期间采集流入水样作为一个时间整合样品。样品应为单一，连续采集的水样或序列样品的混合，如：在操作的开始、中间和结束的间隔时采样。应采集至少 10L 的样品。小部分可以进行第二次抽样以运送到实验室，只要其为具有代表性的水样并至少为 1L。有机物的计算总共需要对至少 3 份各 1ml 的子样品进行分析；
- .2 应在各舱排放期间采集经处理的排放水样作为一个时间整合样品。样品可以为单一，连续采集的水样或序列样品的混合，如：在操作开始、中间和结束过程中采集。应采集至少 10L 的样品。小部分可以进行第二次抽样以运送到实验室，只要其为具有代表性的样品并至少为 1L。有机物的计算总共需要对至少 6 份各 1 ml 的子样品进行分析；
- .3 除非程序经过验证，否则不可以将样品进行浓缩计数分析。只有当有机物的最小尺寸大于 10 微米且小于 50 微米时，才可进行计算；和

- .4 除非有机物的总数很高，如 100，应对样品的全容积进行分析。这种情况下，平均密度可以根据混合样品采用经验证的方法进行推算；
- .3 细菌评估：
 - .1 对于吸入和排放的样品而言，应使用 2.8.6.2.1 和 2.8.6.2.2 要求的最少 10L 的样品，或以相似方法采集的容积至少为 10L 的另外一种样品，可运送至少 1L 的子样品到无菌容器中进行分析；
 - .2 至少从如上所述的 1L 子样品中提取 3 份适当容积的子样品对 D-2 条所列的细菌菌落形成单位进行分析；和
 - .3 应在一个经相应认可的实验室内进行毒性试验。如没有经认可的实验室可用，则该分析方法可被验证为令主管机关满意。
- .7 试验循环(包括无效的试验循环)的时间跨度不得少于 6 个月；
- .8 应进行符合第 D-2 条规定的 3 个连续试验循环。无效的试验循环不影响连续的顺序；
- .9 6 个月的船上试验期在符合 D-2 条标准的成功的试验循环或无效的试验循环完成后开始和结束。按 2.8.8 所要求的 3 个连续试验循环和有效的试验循环必须在这 6 个月期间适当分开；
- .10 试验循环的源水的特征应通过测量盐度、温度、有机碳颗粒、总悬浮固体和溶解有机碳确定；和
- .11 对于试验期间的系统操作，还应提供下列资料：
 - .1 所有压载水操作的记录文件，包括吸入和排放量及位置、是否遭遇恶劣天气及其地点；
 - .2 船舶试验期间所有压载和卸载连续操作的压载水管理系统的记录文件；
 - .3 应视实际情况提供由试验机构确定的详细说明水质参数的记录文件；

- .4 那些可能导致试验循环无效或试验循环排放不符合 D-2 标准的原因,对于这些原因应进行调查并向主管机关报告;
- .5 按计划进行系统维护的记录文件;
- .6 未按计划进行的系统维护和修理的记录文件;
- .7 监测到的与具体系统有关的工程参数的记录文件;
- .8 详细说明控制和监测设备功能的报告。

陆基试验

2.9 陆基试验提供了确定考虑进行型式认可的压载水管理系统的生态有效性和环境可接受性的资料。型式认可旨在确保其他处理设备的可复制性和可比性。

2.10 主管机关应及时记录和评估本导则所述的压载水管理系统的试验程序的任何限制。

2.11 试验装置(包括压载水管理系统)应在各种盐度下至少 5 个连续的成功试验循环期间,根据提供的操作、维护和安全手册的规定进行操作。

2.12 陆基试验循环应包括:泵抽吸压载水、压载水的储存、压载水管理系统内的压载水处理(对照舱内除外)和泵排放压载水。其次序取决于压载水管理系统。

2.13 应至少在压载水管理系统制造商规定的最小持续时间内就每个盐度进行两个试验循环以评估是否符合 D-2 条标准。

2.14 对试验循环后储存时间多于或少于 5 天的经处理的压载水进行相关化学物质确定和毒性试验的测试机构应确保在 5 天之后采集到或在效用试验后保留足够量的经处理的压载水以能在每个盐度下至少进行一次本组织为使用活性物质的压载水管理系统的认可制定的导则^①中要求的评估。

2.15 压载水管理系统的陆基试验不应由系统制造商进行。

2.16 应按本附件 2.29 和 2.31 的规定,依次采用不同水况进行试验。

2.17 对于每个试验循环,压载水管理系统应以额定处理能力或按本附件 2.25 至 2.28 所示能力进行试验。试验时,设备应按说明书运作。

① 参见《使用活性物质的压载水管理系统的认可程序》(G9)(MEPC.169(57)决议)。

2.18 对每个试验循环中经处理的水排放进行分析以确定排放是否满足 D-2 条的规定。

2.19 还应采用相关试验循环中对经处理的水排放的分析，以评估相关化学物质的形成和使用活性物质的压载水管理系统的毒性。同时还应对未使用活性物质或制剂但合理预期会导致排放后经处理水的化学成分的变化而可能产生对接收水域造成不利影响的压载水管理系统进行相同的评估。应按本组织制定的导则^①对经处理的水进行毒性试验。

陆基试验装置

2.20 用于认可试验的测试装置应能代表拟安装设备的船舶类型的特点和布置。因此，测试装置应至少包括以下部分：

- .1 进行试验的整个压载水管理系统；
- .2 管系和泵布置；和
- .3 模拟压载舱的贮存舱，其结构应确保舱内水完全与光线隔绝。

2.21 对照舱和经处理的模拟压载舱均应包括：

- .1 至少 200m³ 的容积；
- .2 船舶设计、结构的标准工业惯例的使用；表面涂层应符合《所有新船专用海水压载舱和散货船双舷侧处所保护涂层性能标准》(PSPC)(MEPC.215(82)决议)；和
- .3 为确保陆上结构完整性而至少应进行的改装。

2.22 控制和经处理的模拟压载舱应包括常规的内部结构，包括照明和排水孔。

2.23 试验程序开始前以及试验循环之间，试验装置应经水压力清洗，然后干燥并打扫以清除碎片、有机物和其他杂质。

2.24 试验装置包括本附件 2.40 和 2.41 所述的取样设施以及本附件 2.29、2.30、2.33 和 2.34 规定的向系统提供进水的装置。在每种情况下，安装布置应符合按本规则第 7 节所述程序具体规定和认可的要求。

① 参见《使用活性物质的压载水管理系统认可程序》(G9)(MEPC.169(57)决议)的 5.2.3 至 5.2.7。

压载水处理设备缩放比例

2.25 压载水管理系统的缩放比例应按照由本组织制定的指南^①。主管机关应验证所使用的缩放比例是否适于压载水管理系统的操作设计。

2.26 至少包括一台 TRC 等于或小于 200 m³/h 设备的压载水管理系统不应缩减比例。

2.27 至少包括一台 TRC 高于 200m³/h 或 1000m³/h 设备的压载水管理系统在进行陆基试验时必须符合如下要求。只有计入下列标准时，才能减少进行陆基试验的串联处理设备的尺寸：

- .1 至少包括一台 TRC 高于 200m³/h，但低于 1000m³/h 设备的压载水管理系统可缩减比例至最高为 1:5，但不得低于 200 m³/h；和
- .2 至少包括一台 TRC 等于或高于 1000m³/h 设备的压载水管理系统可缩减比例至最高为 1:100，但不得低于 200m³/h。

2.28 舱内处理设备应以一个能验证全尺寸有效性的比例进行试验。试验装置的合适性应由生产商评估，并经由主管机关认可。

陆基试验设计 – 进口和出口衡准

2.29 对任何给定的一组试验循环(5 个为 1 组)，应为每个循环选择盐度范围。给定了在淡水、淡盐水和海水中试验循环的试验装置的盐度后，每种试验水应具有下表所列化合物之一的分解和颗粒含量。如与表中海水和淡盐水盐度范围有偏差，应予以报告和证明，且压载水管理系统的结果试验的难度应不比无偏差的情况低。

	盐 度		
	海水 28-36 PSU	淡盐水 10-20 PSU	淡水 < 1 PSU
溶解的有机碳(DOC)	>1 mg/L	>5 mg/L	>5 mg/L
颗粒有机碳(POC)	>1 mg/L	>5 mg/L	>5 mg/L
总悬浮颗粒(TSS)	>1 mg/L	>50 mg/L	>50 mg/L

2.30 试验水源应采用自然水。若需在试验水样中增加任何的溶解性有机碳(DOC)、颗粒有机碳(POC)或总悬浮颗粒(TSS)以能达到最低要求的含量，则应经主管机关的验证和批准。由于自然的 DOC 成分是复杂的且主要为芳香烃，增加的 DOC 的种类对压载水管理系统性能的评估尤为重要。验证应保证相关的增强水的特性(如氧化剂的要求/TRO 衰减和 200 至 280nm 范围内

① 参见《压载水管理系统缩放比例指南》(BWM.2/Circ.33/Rev.1 通函)。

紫外线的吸收、杀菌剂的副作用以及悬浮颗粒的粒子大小分布), 以 mg/L 计, 应与在数量上符合测试条件的自然水相当。另外, 验证还应确保这种增加不能偏向或不利于任何特殊处理过程的试验。试验报告应包含选择、使用和验证的基础。

2.31 压载水管理系统必须在批准的条件下进行试验。就获取与盐度相关的无限制的型式认可证书的压载水管理系统而言, 应进行 3 个盐度范围和上述 2.29 中规定的相关分解和颗粒含量的 1 组试验循环。如果试验取上表中的相邻盐度范围, 则其应至少相差 10 PSU。

2.32 标准测试有机物的使用(STO):

- .1 如果测试机构中自然产生的水的测试等级需要增加, 则可允许使用标准测试有机物(STO)。STO 的使用不应作为标准实践行为, 且主管机关应就每一种情况对所增加的 STO 的选取、数量和使用进行评审以确保能为压载水管理系统提供稳定的试验。STO 的使用不应偏向或不利于任何有关具体处理过程的试验。应局部隔离以保证将周围环境的风险降至最低, 且禁用对环境可能带来危害的外来有机物;
- .2 STO 使用的程序、过程和指南应以最为相关的和最新可用的科学资料为基础。这种程序、过程和指南应作为测试机构质量保证方针的一部分; 和
- .3 试验报告中应记录 STO 的使用, 包括浓度和种类。试验报告还应包含与 STO 使用评价和论证相关的资料以及 STO 的使用对其他试验参数和可能对所做试验影响的评估。报告中的资料应能反映 STO 使用的正面和负面影响。

2.33 流入水应包括:

- .1 在总密度为每立方米最好 10^6 但不少于 10^5 的个体中, 应有最小尺寸大于或等于 50 微米或以上的试验有机物, 并应包括取自至少 3 个不同门/类的至少 5 个物种;
- .2 在总密度为每毫升最好 10^4 但不少于 10^3 的个体中, 应有最小尺寸大于或等于 10 微米但小于 50 微米的试验有机物, 并应包括取自至少 3 个不同门/类的至少 5 个物种;
- .3 活的异养菌密度应为每毫升至少 10^4 个; 和
- .4 无论是否采用自然有机物群集或是经培养的有机物以满足密度和有机物多样化要求, 都应按上述尺寸等级规定, 记录有机物种类。

2.34 下列细菌无需添加至流入水中，但应在流入水排放时测定：

- .1 大肠菌；
- .2 肠球菌组；
- .3 弧菌性霍乱；和
- .4 异养菌。

2.35 如果采用培养的试验有机物，培养和排放时应虑及当地适用的检疫规定。

陆基监测和取样

2.36 应采用附件第4部分(4.5至4.7)所述方法测量储存期间模拟压载舱内经处理的试验有机物的数量变化。

2.37 应核实处理设备在试验循环期间在规定的参数范围(例如功耗和流速)内工作。

2.38 压载水管理系统期望在工作中达到的操作流速的范围及最大和最小的操作流速(如果技术合适)应在泵的排放一侧的滤器后进行验证。流速的范围可以通过经验测试或计算建模获取。如果技术上可行，低流速下的系统效能显示能反映出压载作业最终阶段中流速降低的要求。

2.39 应在采集所述水样的同时测定环境参数，例如 pH 值、温度、盐度、分解氧、TSS、DOC、POC 和混浊度(标称混浊度单位，NTU)。

2.40 应在下列时间和地点进行试验期间的采样以确定生态效能：直接在处理设备前、直接在处理设备后和在适当的保留时间后的排放时。

2.41 对照和处理循环可同时或依次进行。对照循环取样应在流入和排放时，采取与 2.40 条规定的设备试验相同的方法。

2.42 应提供取样设施或布置以确保能采集到有代表性的经处理和对照水样，其对有机物几乎不会产生不利影响。

2.43 2.40 和 2.41 所述的样品应以下列取样方法和分析所需数量进行采集:

.1 为计算最小尺寸大于或等于 50 微米或以上的活的有机物:

- .1 应在吸入期间采集流入水样作为一个时间整合样本。样品应为单一,连续采集的水样或一个序列样品的混合, 如: 在操作的开始、中间和结束的间隔时采样。总样品容量应至少为 1 立方米。如果能证明少于 1 立方米的样品中具有代表性的有机物, 则也行;
- .2 应在各舱排放期间采集对照水样和经处理的排放水样作为一个时间整合样本。样品可以为单一, 连续采集的样品或序列样品的混合, 如: 在操作开始、中间和结束过程中采集。总样品容量应至少为 3 立方米;
- .3 如果对样品进行浓缩计算, 应使用对角线尺寸不大于 50 微米的细筛集中有机物。只有当有机物的最小尺寸大于 50 微米时, 才可进行计算; 和
- .4 除非有机物的总数很高, 如 100, 应对样品的全容积进行分析。这种情况下, 平均密度可以根据混合样品采用经验证的方法进行推算;

.2 为计算最小尺寸大于或等于 10 微米且小于 50 微米的活的有机物:

- .1 应在吸入期间采集流入水样作为一个时间整合样本。样品应为单一, 连续采集的水样或序列样品的混合, 如: 在操作的开始、中间和结束的间隔时采样。应采集至少 10 L 的样品。小部分可以进行第二次抽样以运送到实验室, 只要其为具有代表性的样品并至少为 1L。有机物的计算总共需要对至少 3 份各 1ml 的子样品进行分析;
- .2 应在各舱排放期间采集对照水样和经处理的排放水样作为一个时间整合样本。样品可以为单一, 连续采集的样品或序列样品的混合, 如: 在操作开始、中间和结束过程中采集。应采集至少 10 L 的样品。小部分可以进行第二次抽样以运送到实验室, 只要其为具有代表性的样品并至少为 1L。有机物的计算总共需要对至少 6 份各 1ml 的子样品进行分析;

.3 除非程序经过验证，否则样品不可以进行浓缩计数分析。只有当有机物的最小尺寸大于 10 微米且小于 50 微米时，才可进行计算；和

.4 除非有机物的总数很高，如 100，应对样品的全容积进行分析。这种情况下，平均密度可以根据混合样品采用经验证的方法进行推算；和

.3 细菌评估：

.1 对于吸入和排放的样品而言，应采用上述 2.8.6.2.1 和 2.8.6.2.2 分别要求的最少 10L 的样品，或以相似方法采集的容积至少为 10L 的另外一种样品，可运送至少 1 L 的子样品到无菌容器中进行分析；

.2 至少从如上所述的 1L 子样品中提取 3 份适当容积的子样品对 D-2 条所列的细菌菌落形成单位进行分析；和

.3 应在一个经相应认可的实验室内进行毒性试验。如没有经认可的实验室可用，则该分析方法可被验证为令主管机关满意。

2.44 取样后应尽快对水样进行分析，并在 6 个小时内当场进行分析或采取能确保进行正确分析的方式。

2.45 如果在任何试验循环中，对照水样排放结果的浓度小于或等于 D-2.1 条规定中值的 10 倍时，则此试验循环无效。

温度

2.46 主管机关进行验证的评估要点为压载水管理系统在压载水温为 0℃至 40℃(淡水为 2℃至 40℃)及中档温度 10℃至 20℃范围内能发挥有效性能。

2.47 评估可以包括：

.1 陆基试验、船上、实验室或小规模试验；和/或

.2 现有资料和/或模型的使用，只要记录其来源、适合性和可靠性。

2.48 提交给主管机关的报告应包括所有的与温度评估相关的文件记录(含程序、方法、数据、模型、结果、解释和备注)。报告应至少包括本附件 2.57 所述的资料。

生物再生能力的评估

2.49 应在陆基和/或船上试验对有机物的再生能力进行评估，每个盐度下至少进行两个试验循环，评估结果能使主管机关满意。

2.50 如果陆基试验在少于 5 天的储存时间内进行，则应在与相关储存舱类似的条件下储存足够容量的经处理的吸入水。如果是船上试验，应在一个船上试验循环期间在船上保留水样以便进行再生物评估。额外的试验台可用于对陆基和/或船上试验的补充。

2.51 如果压载水管理系统中包括在排放时或吸入期和排放期之间连续进行杀菌、无害化或去除压载水有机物的机械、物理、化学和/或生化处理，应按照本附件“船上试验”和“陆基试验”部分的规定，至少保留 5 天进行评估。

2.52 否则，对采用机械、物理、化学和/或生化处理方式进行杀菌、无害化或去除压载水有机物的所有工作完成至少 5 天后，对拟进行生物再生能力评估的有机物进行计数。。

2.53 压载水管理系统所要求的任何压载水中和应在储存期结束，且紧接在有机物计数之前进行。

2.54 对生物再生能力进行评估的目的并不是针对压载舱或管系内因未作处理的水或残余沉积物而产生的杂质进行评价。

2.55 应向主管机关提交包括与生物再生能力评估相关的所有文件记录(含程序、方法、数据、结果、解释和备注)。该报告应至少包括本附件 2.57 所列的资料。

试验结果的报告

2.56 完成认可试验后，应向主管机关提交一份报告。该报告应包括每个试验循环(含无效试验循环)试验设计、分析方法和分析结果、压载水管理系统维护记录及任何观察到的压载水管理系统对船舶压载系统(如：泵、管系、液舱、阀门)影响的资料。船上试验报告应包括压载水管理系统总操作时间和连续操作时间的资料。

2.57 按照上述 2.56 规定提交的报告应至少包括如下资料：

- .1 进行或监督检验、试验或评估的实验室的名称和地址及其国家论证或质量管理认证，如适用；
- .2 制造商的名称；
- .3 检验、试验或评估的设备的商标、产品设计(型号)和详细说明；

- .4 每个认可检验、试验或评估进行的时间、日期和地点；
- .5 每个执行、监督和见证试验和评估人员的姓名和职位；
- .6 摘要；
- .7 引言和背景；
- .8 对每个试验循环，进行的检验或评估的下列概述：
 - .1 试验设计；
 - .2 方法和程序；
 - .3 结果和讨论，包括任何无效试验循环(本附件第 2 部分的报告)以及与预期性能的比较；和
 - .4 如为陆基试验，则为包括本附件 2.30 所列的测试水样准备情况的试验条件；
- .9 检验、试验或评估中使用的程序和仪器的说明或照片，或者引用另一份含适当的说明或照片的文件；
- .10 至少一张显示试验、检验或评估的设备或材料的全景的照片，以及显示如下内容的其他照片：
 - .1 设计细节；和
 - .2 认可试验或评估期间设备和材料发生的损坏或变形；
- .11 压载水管理系统操作安全要求和所有与检验、试验或评估期间与安全相关的发现项；
- .12 证明已按要求进行检验、试验或评估以及报告中不含已知错误、遗漏或虚假声明。该文件必须经实验室主要负责人或其代表签字；
- .13 附录，包括：
 - .1 试验和评估按照上述 2.57.8 产生的完整的试验计划 and 数据，至少含如下内容：
 - .1 就陆基试验而言，是否使用了环境的、培养的或混合的有机物(包括培养有机物菌种的确定和环境有机物最低潜在分类等级的确定)；

- .2 就船上试验而言,成功处理操作(如剂量率、紫外线强度和压载水管理系统在正常或试验 TRC 下的能耗,如有)期间系统的运行参数;
- .3 对于 SDL,所有与验证相关的程序、方法、数据、结果、解释和备注的细节;和
- .4 无效试验资料。

- .2 QMP、QAPP 和质量保证及质量控制记录;
- .3 维护记录,包括任何被替代的消耗品的记录;和
- .4 试验期间保留或产生的相关记录和试验结果。

2.58 如果在按本附件“船上试验”和“陆基试验”部分规定进行陆基试验和船上试验时显示压载水管理系统均满足第 D-2 条中的标准,且在所有单个试验循环中吸入水质满足 4.7 所列的要求,则该系统的生态有效性试验结果应予以接受。

2.59 试验报告应包括陆基试验和船上试验期间进行的所有试验循环,含陆基试验和船上试验的失败的试验循环和无效的试验循环,以及 2.8.11.4 所要求的对失败和无效试验循环的说明。

2.60 主管机关应确定和汇编商业敏感信息(专有的且与压载水管理系统性能无关的信息),并确保相关利益方和本组织可得到除此以外的其他信息。这些信息应包括所有的含失败的陆基试验和船上试验的试验报告。

第 3 部分 压载水管理系统认可的环境试验规定

3.1 以标准生产配置的压载水管理系统的电气和电子部分应在经主管机关认可的实验室或认证机构认可的实验室,且相关认证^①覆盖相关试验标准,进行如下 3.3 规定中的相关试验。

3.2 如果完全符合下列环境试验要求,生产商应向主管机关提交相关证明以及型式认可申请。

3.3 设备应按照国际型式认可试验规程^②进行试验。

① 参见《检测和校准实验室能力的一般要求》(ISO/IEC 17025:2017)。

② 参见 IACS UR E10 第 6 版(2014 年 10 月)—《型式认可试验规程》。

3.4 应向主管机关提交环境试验报告，报告中应至少包括本附件 2.57 中规定的信息。

第 4 部分 确定压载水生物成分的样品分析法

样品处理和分析

4.1 压载水管理系统测试时采集的样品可能含有多种分类有机物，其大小迥异并易因取样和分析而受损。

4.2 应采用被广泛接受的样品采集、处理(包括浓缩)、储存和分析的标准方法(如有)。这些方法应在试验计划和报告中确切引用和说明，包括探测、计算、确定有机物的最小尺寸和标识有机物以及确定活性的方法(本规则中定义)。

4.3 如无针对具体有机物或分类组的标准方法，所制订的使用方法应在试验计划和报告中予以详细说明。含有说明内容的证明文件应包括为证实这些方法适用而进行的任何试验。

4.4 由于自然水和经处理水样品的复杂性、第 D-2 条规定的经处理水样品中要求的有机物的稀有性以及目前标准方法的费用和时间要求，可能会制订一些新方法，用以分析压载水试样成分、浓度和有机物活性。鼓励主管机关/缔约国使用现有的科学地点，共享压载水样品分析方法的信息以及本组织分发的文件。

在满足排放标准时确定有效性的样品分析

4.5 样品分析系指确定样品中物种成分和存活生物的数量。可取不同的样品以确定活性和物种成分。

4.6 应按照本组织制定的导则^①采用适用于受试压载水处理技术的方法确定有机物的活性。该方法应能确保有机物不会从已杀菌的或对环境、人体健康、财产和资源无害化的压载水中去除。活性能力的建立可以通过对一个或多个生命的必要特点，如结构完整性、代谢作用、繁殖、运动性或刺激反应的存在进行评估以完成。

4.7 如果符合下列条件，处理试验循环应视为成功：

- .1 根据本附件 2.8.5(船上)或 2.29、2.30、2.33 和 2.47(陆基试验)规定(如适合)，试验循环是有效的；

① 参见《可用于确定生物活性数量方法的指南》(BWM.2/Circ.61 通函)。

- .2 平行样品中，最小直径大于或等于 50 微米的有机物的密度小于每立方米 10 个存活生物；
- .3 平行样品中，最小直径小于 50 微米但大于或等于 10 微米的有机物的密度小于每毫升 10 个存活生物；
- .4 弧菌性霍乱(血清型 O1 和 O139)的密度小于每 100 毫升 1cfu，或小于每克(湿重)浮游生物样品 1cfu；
- .5 平行样品中，E.大肠杆菌的密度小于每 100 毫升 250cfu；
- .6 平行样品中，肠内肠道球菌素的密度小于每 100 毫升 100cfu；和
- .7 试验运行未作平均，或未计入已发生的失效试验运行。

4.8 建议考虑一份标准方法和创新研究技术^①的不完全清单。

用于确定排放的生态毒理学可接受性的样品分析

4.9 应按照本组织制定的导则^②对经处理的水排放进行毒性试验。

第 5 部分 自我监测

引言

5.1 压载水管理系统应监测和保存最少量的参数以进行详细的分析。另外，所有系统的指示和报警均应保存并供检验之用。数据的储存和检索应遵循通用标准。本部分给出了最低要求的自我监测参数。

参数的监测

5.2 每个压载水管理系统均应对下列适用的自我监测参数进行记录^③。任何系统性能和安全认证所必要的附加参数均应由主管机关确定并保存在该系统中。如果因为系统的特点导致参数不适用，主管机关可以不要求记录参数。对压载水管理系统的限制操作条件应由制造商确定，并由主管机关批准。

① 建议来源可包括但不限于：

- .1 《水和废水分析标准方法手册》。
- .2 国际标准组织标准法。
- .3 联合国教科文组织标准法。
- .4 世界卫生组织。
- .5 美国试验和材料协会(ASTM)标准法。
- .6 美国环境保护委员会标准法。
- .7 科学杂志上发表的研究论文。
- .8 海上环境保护委员会文件。

② 参见《使用活性物质的压载水管理系统认可程序》(G9)(MEPC.169(57)决议)的 5.2.3 至 5.2.7。

③ 本组织拟制定的相关监测参数和记录间隔技术细则模板的指南。

所有系统的一般资料

5.3 所有系统拟记录的资料和适用的自我监测参数应主要包括：

- .1 一般资料：船名、IMO 呼号、压载水管理系统制造商和型号、压载水管理系统系列号、压载水管理系统安装上船日期、压载水管理系统处理额定能力和处理原理(管路内/舱内)；
- .2 运行参数：所有记录的参数应有时间标记(如适用)：压载水管理系统运行模式和任何过渡模式，包括旁通作业(如：吸入、排放、暖机、清洁和起动)、操作中的压载水泵运转(是/否—如果可在船上获取该信息)，系统出口的流速、和压载水操作所涉及的压载水舱的显示(如可行)；
- .3 建议自动记录压载水操作和处于储存时间的位置信息。否则，应手动输入到压载水记录簿中，如合适。鼓励主管机关最大程度地使用船舶建造期间安装上船的压载水管理系统的自动定位信息记录；
- .4 系统报警和显示：所有系统应设立报警机制。每个报警器应有记录和时间标记。为了有助于检验，如有可能，每一次压载水操后均应自动记录报警；
- .5 一般报警包括：有维修要求时系统在操作期间的关停、压载水管理系统旁通阀的状态、和代表系统操作状态的压载水管理系统阀，如适合；
- .6 操作报警：无论何时当相关参数超过主管机关批准的可接受范围时，系统应发出报警。另外，即使每一单独参数没有超过其批准的范围，当相关参数的组合大于系统要求时，也应对报警进行记录和时间标记。如果与压载水管理系统相关的安全性参数(船员、货物和/或船舶安全性)超过了批准的极限，报警/警告应为强制性的(如在合适测量点上的氢等级)；
- .7 主管机关可以依据系统设计与将来发展情况要求附加的报警；和
- .8 系统设计限制参数及其相应的数据，例如范围、警报限制、报警延迟等有密码保护至正常操纵和维护所要的等级之上，即：系统管理员等级。应在维护进入等级上自动记录和获取任何有密码保护的数据或参数的变更以及测量中断(掉线、信号超出范围)。

资料储存和获取

5.4 资料的储存应遵循本规则 4.17 至 4.21 所述的要求。设备应能储存按照本组织确定的通用标准的自我监测参数的最小量。

5.5 控制和监测设备应自动记录无用户交互的压载水管理系统正常运作或失效并为每一次进入增加时间标记。另外，系统应具有产生每次压载水操作的摘要文件以满足支持检验工作的需要。

5.6 系统应按照可接受的格式储存要求的资料以便显示、打印或为正式检验输出资料。可接受的格式为：

- .1 国际标准可读格式(如：文本格式、pdf、MS Excel)；或
- .2 可扩展标记语言(xml)。

5.7 设备应尽可能设计为对系统储存的资料或已经记录的资料不得随意篡改。任何干扰资料完整性的行为均应记录。

5.8 应不能进行记录文件的永久性删除。系统应能储存资料至少 24 个月以符合本公约 B-2 条的规定。如果采用航行设备与监测系统连接的方法提供记录资料，则其接口应符合相关国际标准^①的适用部分。

第 6 部分 系统设计限制的验证

6.1 系统设计限制方法的目的分为两个部分。首先，确保对压载水管理系统性能的相关已知水质和对其运作至关重要的运行参数，包括本规则中可能没有明确规定的参数进行明晰地评估。其次，对可能超出本规则具体标准的制造商的压载水管理系统性能要求提供了透明监管。虽然系统设计限制的验证以型式认可证书中的资料为主，但这些资料不应影响合格的压载水管理系统取得型式认可

6.2 应对每个系统设计限制的低参数值和/或高参数值进行验证以使主管机关满意：

- .1 验证应经主管机关监督，并应包括压载水管理系统制造商特殊要求的严格的基于证据的评估以证明该设备在预设的参数值之间运行；
- .2 测试以验证系统设计限制的测试应符合本附件 2.4 节的规定。如果 QAPP 规定了验证测试不会影响本附件第 2 部分所述的具体程序，则这些测试可以与陆基试验和/或船上试验合并进行。实验室或试验台试验也可用于系统设计限制的验证；

① 参见《船上航行设备数字接口》(IEC 61162)。

.3 测试以外的方法，如采用现有资料和/或模型，可用于系统设计限制的验证。应报告这些方法的来源、适用性和可靠性；和

.4 验证并不是对压载水管理系统进行负荷试验或确定设备失效点过程。验证应由非压载水管理系统制造商进行，并应与压载水管理系统研发活动分开。如合适，可由制造商提供资料和模型，但不应由制造商独立进行评估。

6.3 还应对开放式性能要求(缺少系统设计限制的低参数值或高参数值)进行验证。

6.4 压载水管理系统制造商可以保留系统设计限制要求的误差值。为此，没有必要将系统设计限制理解为超出压载水管理系统无法运行范围的精确的参数值。主管机关在考虑是否在与系统设计限制验证相关的型式认可证书中包含任何附加限制时，应计入这个误差值。

6.5 对压载水管理系统运行至关重要的敏感设计的所有已知参数应设立系统设计限制。如果系统设计限制参数同时也需符合本附件第 2 部分具体标准，则应遵循第 2 部分所列的程序规定。就这些参数而言，6.2 所述的方法仅适用于超出第 2 部分具体标准的性能要求范围。

6.6 应向主管机关提交包括与系统设计限制验证相关的所有的文件资料(含程序、方法、数据、模型、结果、解释和备注)。该报告应至少包括本附件 2.57 所述的资料。

第 7 部分 型式认可证书和型式认可报告

型式认可证书

7.1 压载水管理系统的型式认可证书应：

- .1 确定适用的压载水管理系统的类型和型号及确定设备装配图纸的正确日期；
- .2 确定具有型号规格编号或等效标识细节的相关图纸；
- .3 包括全性能试验协议所依据的参考；
- .4 确定证书是否由主管机关根据之前由另一主管机关签发的型式认可证书而签发。这种证书应确定对压载水管理系统进行试验监督的主管机关，并且原始试验结果应附在压载水管理系统型式认可证书之后；
- .5 确定船上压载水管理系统安装的所有条件和限制；
- .6 包括列出在标题“本设备的设计满足下列运行条件的要求”之下的系统设计限制；

- .7 包括主管机关设置的因最短储存时间导致的或满足本附件 6.4 要求的任何限制；这些限制应涉及任何适用的环境条件(如：紫外线透光率等)和/或系统运行参数(如：最低/最高压力、压差、最小/最大总残余氧化剂量(TRO)(如适用)等)；和
- .8 包括每个陆基试验和船上试验循环的结果的附录。这些试验结果应至少包括盐度数值、温度、流速和紫外线透光率(如适用)。另外，这些试验结果应包括所有的其他相关变量。型式认可证书应列出任何确定的系统设计限制参数。

型式认可报告

7.2 应向本组织提交型式认可报告，并采用合适的方法提供给公众和成员国。报告应至少包括：

- .1 压载水管理系统型式认可的资料，含：
 - .1 认可日期；
 - .2 主管机关名称；
 - .3 制造商名称；
 - .4 压载水管理系统商标和产品设计(型号)；和
 - .5 一份型式认可证书复印件，含附录、附则和附件；
- .2 执行摘要；
- .3 压载水管理系统的描述，如 BMWS 采用活性物质，含下列资料：
 - .1 所使用的活性物质或制剂的名称；和
 - .2 标明具体的海上环境保护委员会(MEPC)报告和按照本组织制定的导则^①要求准许签发最终批准的段落号；
- .4 主管机关评估压载水管理系统过程的概要，包括每个测试机构的名称和作用、分包商和承担压载水管理系统试验和认可的试验机构、每个型式认可决定的报告以及主管机关全面质量保证和质量控制的总结；
- .5 按照本附件 2.48、2.55 至 2.57、3.4 和 6.6 规定编制的每份试验报告的摘要；

① 参见《使用活性物质的压载水管理系统的认可程序》(G9)(MEPC.169(57)决议)。

.6 压载水管理系统操作安全要求及型式认可过程期间与安全相关的发现项；

.7 主管机关评估注解讨论部分，压载水管理系统：

.1 在所有方面应满足本规则的要求，包括在陆基试验和船上试验所规定的程序和条件下证明其满足 D-2 条所列的压载水性能标准；

.2 按照要求和标准进行设计和制造；

.3 符合所有适用的要求；

.4 考虑了 MEPC 的关于压载水管理系统最终认可的建议案，如有，进行认可；

.5 在系统设计限制范围内以额定处理能力运行，性能和可靠性符合制造商的规定；

.6 保持控制和监测设备的正确运行；

.7 按照制造商的技术安装规格书进行安装以供各类测试；和

.8 在船上试验期间将压载水的处理量和流速调整到与船舶正常压载操作情况相一致；和

.8 下列附件：

.1 质量控制和保证的适当资料；和

.2 按照本附件 2.48、2.55 至 2.57、3.4 和 6.6 规定编制的每份完整的试验报告；

7.3 向本组织提交之前，主管机关可编写型式认可报告中关于制造商的相关信息。

7.4 如果型式认可证书和型式认可报告(包括全部的内容和所有的附则、附录或其他附件)不是英文、法文或西班牙文编制的，则应翻译成其中的一种语言。

7.5 文件不应以文件指向形式纳入到型式认可证书中。如果参考资料(如：互联网网址)为永久有效的，则主管机关可以采用附件形式将其纳入型式认可报告。当任何参考失效时，主管机关应及时重新向本组织提交型式认可报告，并包含其参考文件或更新后的参考；本组织应立即通过合适的方法向公众和成员国提供经修改报告。

附 录

标记或编码

(限制操作条件适用)^①

主管机关名称

压载水管理系统型式认可证书

兹证明，已按《压载水管理系统认可规则》(MEPC.300(72)决议)中的要求和规定，对下列压载水管理系统进行了检查和试验。本证书仅对下列压载水管理系统有效。

压载水管理系统供应方名称：

压载水管理系统生产商：

指定类型和型号.....
并包括：

设备/组件图号：日期：

其他设备生产商：

设备/组件图号：日期：

额定处理能力：m³/h

任何时候，安装了压载水管理系统的船上应备有一份型式认可证书的副本以供船上检查。如果型式认可证书的签发是基于另一国主管机关的认可，则应参照该型式认可证书。

规定的限制条件见本文件的附录。

(温度/盐度)

其他的限制包括：

本设备的设计满足下列运行条件的要求：^②

公章	署名.....
	主管机关.....
	日期.....
	有效期至.....

① 不适用者删除。

② 插入系统设计限制。

RESOLUTION MEPC.301(72)
(adopted on 13 April 2018)

**AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1997 TO AMEND THE
INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS,
1973, AS MODIFIED BY THE PROTOCOL OF 1978 RELATING THERETO**

Amendments to MARPOL Annex VI

(ECAs and required EEDI for ro-ro cargo ships and ro-ro passenger ships)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocols of 1978 and 1997 relating thereto (MARPOL), which specifies the amendment procedure and confers upon the appropriate body of the Organization the function of considering amendments thereto for adoption by the Parties,

HAVING CONSIDERED, at its seventy-second session, proposed amendments to MARPOL Annex VI concerning ECAs and the required EEDI for ro-ro cargo ships and ro-ro passenger ships,

1 ADOPTS, in accordance with article 16(2)(d) of MARPOL, amendments to MARPOL Annex VI, the text of which is set out in the annex to the present resolution;

2 DETERMINES, in accordance with article 16(2)(f)(iii) of MARPOL, that the amendments shall be deemed to have been accepted on 1 March 2019 unless prior to that date, not less than one third of the Parties or Parties the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3 INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of MARPOL, the said amendments shall enter into force on 1 September 2019 upon their acceptance in accordance with paragraph 2 above;

4 INVITES FURTHER the Parties to consider the application of the aforesaid amendments to regulation 21 of Annex VI of MARPOL concerning new parameters for determination of reference values of the EEDI to ships entitled to fly their flag as soon as possible, prior to entry into force;

5 REQUESTS the Secretary-General, for the purposes of article 16(2)(e) of MARPOL, to transmit certified copies of the present resolution and the text of the amendments contained in the annex to all Parties to MARPOL;

6 REQUESTS FURTHER the Secretary-General to transmit copies of the present resolution and its annex to Members of the Organization which are not Parties to MARPOL.

ANNEX

AMENDMENTS TO MARPOL ANNEX VI

(ECAs and the required EEDI for ro-ro cargo ships and ro-ro passenger ships)

Regulation 13 – Nitrogen oxides (NO_x)

1 In paragraph 5.3, the words "an emission control area designated under paragraph 6 of this regulation" are replaced with the words "a NO_x Tier III emission control area".

Regulation 21 - Required EEDI

2 In table 2 (Parameters for determination of reference values for the different ship types) of paragraph 3, rows 2.34 and 2.35 for ro-ro cargo ships and ro-ro passenger ships are replaced by the following:

2.34 Ro-ro cargo ship	1405.15	DWT of the ship	0.498
	1686.17*	DWT of the ship where DWT ≤ 17,000* 17,000 where DWT > 17,000*	
2.35 Ro-ro passenger ship	752.16	DWT of the ship	0.381
	902.59*	DWT of the ship where DWT ≤ 10,000* 10,000 where DWT > 10,000*	

* to be used from phase 2 and thereafter.

**环保会 MEPC.301(72)决议
(2018 年 4 月 13 日通过)**

**对经 1978 年议定书修订的 1973 年国际防止船舶造成污染公约的
1997 年议定书附则的修正案**

MARPOL 附则 VI 的修正案

(排放控制区及滚装货船及客滚船的要求的船舶能效设计指数(Required EEDI))

海上环境保护委员会，

忆及国际海事组织公约第 38(a)条关于防止和控制海洋污染的国际公约赋予海上环境保护委员会的职能，

注意到经 1978 年和 1997 年议定书修订的《1973 年国际防止船舶造成污染公约》(MARPOL)第 16 条规定的修正程序和赋予本组织相关机构审议修正案以供各缔约国通过的职能，

审议了在其第 72 届会议上提出的对 MARPOL 附则 VI 关于滚装货船及客滚船的排放控制区及要求的船舶能效设计指数(Required EEDI)的修正案，

1. 根据 MARPOL 第 16(2)(d)条的规定，通过对 MARPOL 附则 VI 的修正案，其文本载于本决议附件；

2. 按 MARPOL 第 16(2)(f)(iii)条规定，决定该修正案于 2019 年 3 月 1 日应视为已被接受，除非在此日期之前，有不少于三分之一的缔约国或拥有商船合计吨位数不少于世界商船总吨数 50%的缔约国通知本组织其反对该修正案；

3. 提请各缔约国注意，按 MARPOL 第 16(2)(g)(ii)条规定，所述修正案在按上述 2 被接受后，应于 2019 年 9 月 1 日生效；

4. 进一步提请各缔约国考虑将上述对 MARPOL 附则 VI 第 21 条关于确定船舶 EEDI 基线值新参数的修正案在生效前尽快应用到悬挂其国旗的船舶上，

5. 要求秘书长按 MARPOL 第 16(2)(e)条规定，将核准无误的本决议及附件中修正案文本的副本分发给所有 MARPOL 缔约国；

6. 进一步要求秘书长将本决议及其附件的副本分发给非 MARPOL 缔约国的本组织成员。

附 件

MARPOL 附则 VI 的修正案

(排放控制区及滚装货船及客滚船的要求的船舶能效设计指数)

第 13 条 氮氧化物(NO_x)

1. 在 5.3 中, 文字“按照本条 6 指定的排放控制区”由“氮氧化物第 III 阶段排放控制区”取代。

第 21 条 要求的船舶能效设计指数(Required EEDI)

2. 在本条 3 表 2(用于确定不同船型基线值的参数)中, 针对滚装货船和客滚船的第 2.34 行和第 2.35 行由以下取代:

2.34 滚装货船	1405.15	船舶载重吨	0.498
	1686.17*	当载重吨≤17,000*, 船舶的载重吨 当载重吨>17,000*时, 为 17,000	
2.35 客滚船	752.16	船舶载重吨	0.381
	902.59*	当载重吨≤10,000*, 船舶的载重吨 当载重吨>10,000*时, 为 10,000	

* 从第 2 阶段开始适用。