INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON POLLUTION PREVENTION AND RESPONSE
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REVISED GUIDANCE ON BALLAST WATER SAMPLING AND ANALYSIS

Proposal for amendments to the Guidelines on ballast water sampling (G2) to incorporate standard sample port and relieve ships from designing and installing sample probes

Submitted by IMarEST

SUMMARY

Executive summary:	This document presents information for ships to provide a standard ballast water sample port that can be used in monitoring compliance of ships with regulation D-2 (Ballast water performance standard) of the Ballast Water Management Convention
Strategic direction:	2
High-level action:	2.0.1
Output:	No related provisions
Action to be taken:	Paragraph 16
Related document:	Resolution MEPC.173(58)

Introduction

1 Part 4 of the annex to the *Guidelines for approval of ballast water management systems* (G8) requests that information concerning methods for the analysis of ballast water samples be shared through the Organization. Further, section 7 of Guidelines (G8) (Installation requirements) currently states:

> *"Sampling facilities*
>
> 7.1 The BWMS should be provided with sampling facilities so arranged in order to collect representative samples of the ship's ballast water.
>
> 7.2 Sampling facilities should in any case be located on the BWMS intake, before the discharging points, and any other points necessary for sampling to ascertain the proper functioning of the equipment as may be determined by the Administration."

2 The annex to the *Guidelines for ballast water sampling* (G2) provides guidelines for sampling ballast water, and in part 3 agrees to keep these under review.

3 To date, shipowners have installed many variations of ballast water sampling ports that may not comply with the Guidelines (G2), are not aligned with port State control methods, may compromise the watertight integrity of the ship, or could likely result in false positive and false negative results due to sampling port contamination.

4 This document highlights recent developments in ballast water sampling systems and proposes recommendations that align with all of these sampling systems, protecting against equipment failures and false results, reduce the expense of shipyard modifications, and offer the opportunity of reliable compliance monitoring.

5 This document uses the following definitions:

.1 *Sample port* means the flanged opening with an isolation valve into the ballast main pipe; this is ship-supplied equipment and should be covered by a flange or blank plate when not in use.

.2 *Sample probe* means the tube inserted into the ballast main pipe through the sample port which provides the ability to collect a ballast water sample and deliver it to the sample collection device.

.3 *Sample collection device* means a device that can concentrate and collect the larger size class of organisms (via a filter or plankton net), collect a whole water sample, or both.

Background

6 Ongoing ballast water sampling work includes:

Developer	**Description**	**Collection ≥ 50 µm**	**Collection ≥ 10 and < 50 µm, and pathogens**	**Sample port attachment**	**Testing**
Glosten	Sample collection device, and specialized sample probe	Closed loop filter at 6 m^3/hr	Whole water samples	Supply: DIN 100 flange. Return: none, returns to supply port.	Shipboard, **T/S Golden Bear**
Great Ships Initiative	Sample collection device, and sample probe	Open plankton net at 4 m^3/hr	Whole water samples	Supply: 4 inch/DIN 100 flange. Return: non-specific.	Shipboard, Great Lakes
SGS INSTITUT FRENSENIUS	Sample collection device, and specialized sample probe	Closed loop filter at 1 to 5 m^3/hr	Whole water samples	Supply: DIN 80, DIN 100, JIS 80, JIS 100 Flanges. Return: non-specific.	More than 300 ships

Triton Marine Science & Consult	Sample collection device, and specialized sample probe	Closed loop filter	Whole water samples	Supply: DIN 25 to 100 flange. Return: non-specific.	Shipboard, **R/V Meteor**
US Naval Research Laboratory	P3SFS sample collection device	Closed loop filter at 10 m^3/hr	Whole water samples	Supply: non-specific. Return: non-specific.	Shipboard, Great Lakes

7 Shipowners have been installing ballast water sample ports since the Guidelines (G2) on sampling were published. While these Guidelines provide methods to calculate a sample probe size, they do not provide guidance on the sampling port connection size. As a result, there has been inconsistency in the installations of sampling probes. In some cases sampling probes have been installed ranging in size from DIN 12 to DIN 50. In other cases a flange is presented without a sample probe, ranging in size from DIN 25 to DIN 100.

8 There have now been more than 4,000 ships outfitted with sample ports that are not of a standard size or configuration. This highlights the need to support the use of a standard, consistent sampling port connection.

9 Ballast water sample ports and probes developed thus far have included a variety of device shapes and designs, where sample probes can be fitted permanently, semi-permanently, or inserted only during the sampling procedure. Many of these sample ports and probes do not address the need of some sample collect devices to discharge the sampled water to downstream locations of ballast piping (closed-systems).

Discussion

10 Ballast water treatment equipment manufacturers, approving Administrations and shipowners should benefit from increased clarity regarding a standardized sampling port.

11 Sampling systems, consisting of sample collection devices and sample probes, are currently required to fit an undefined range of sample ports. Varying sample port configurations impact sample probe dimensions and sample collection device mechanics. For example, a system designed to fit a DIN 100 flange may not fit a ship outfitted with a three-inch ANSI flange. A standardized sample port configuration would assist in the development of sampling devices with uniform fittings to match shipboard ballast water equipment that could be more quickly and consistently attached to sea-going ships. This would likely reduce the time required for port State control to take a ballast water sample at a sample port. This would also decrease the time and expense related to a ship operator or shipyard determining and installing the appropriate sample port design. In addition, sea-going ships and shipyards might benefit from increased clarity, or standardization, on what to install.

12 The sample port, if appropriately sized, will enable some sampling systems to both take in the sample and return the sampled water back to the same port. This will minimize the sampling burden on port State control and ship operators. A second downstream return sample port, of smaller size, will support the use of other sampling systems that do not return the sample to the same port.

13 Sample probes that are permanently or semi-permanently installed have the following drawbacks:

.1 there is risk that sample probes failure due to vibration and galvanic action could result in probe debris entering a ship's pump or valve seat, putting the ship at risk of further failures;

.2 the approach could result in biofouling of the sample probes, giving false positives during compliance testing; and

.3 the preinstalled sample probes will obstruct the insertion of any new sample probe that is designed to work with a specific sample collection device arrangement.

14 An effective shipboard sample collection device should be capable of collecting enough sample ballast water, including set-up and demobilization, without causing undue delay to the normal operation of the ship.

15 The sample port configuration in annex 2 is suggested as a standard, as meeting the following criteria:

.1 provides a robust and secure sample connection using standard ballast water piping components;

.2 removes the requirement to install sample probes on more than 60,000 sea-going ships;

.3 provides a universal connection, permitting sample collection devices to develop over time and still use the same standard sample port;

.4 permits, at least with some sample collection devices, the sample to be drawn and returned to the sample port, rather than draining the sample to the bilge; and

.5 enables, at least with some sample collection devices, the option of "hot tapping" of the sample port, such that ballasting operations need not be interrupted for taking a sample.

Action requested of the Sub-Committee

16 The Sub-Committee is invited to consider the information contained in this document, in particular, the proposed amendments to Guidelines (G2), set out in annexes 1 and 2, and take action as it deems appropriate.

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ANNEX 1

RECOMMENDED EDITS TO THE GUIDELINES FOR BALLAST WATER SAMPLING (G2)

The following changes are proposed:

Addition to section 3: Definitions:

.4 *Sample port* means the flanged opening with an isolation valve into the ballast main pipe; this is ship-supplied equipment and should be covered by a blank flange or plate when not in use.

.5 *Sample probe* means the tube inserted into the ballast pipe through the sample port which provides the ability to collect a ballast water sample and deliver it to the sample collection device.

.6 *Sample collection device* means a device that can concentrate and collect the larger size class of organisms (via a filter or plankton net), collect a whole water sample, or both.

Proposed deletion to the annex of Guidelines (G2):

- Part 1, section 4 – Technical specifications for design of in-line sampling facilities

- Part 1, section 5 – Technical specifications for installation of a sample point in the ballast water discharge line

Proposed addition to the annex of Guidelines (G2):

"Standard for International Ballast Water Sampling Ports" as per annex 2 of this document.

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ANNEX 2

STANDARD FOR INTERNATIONAL BALLAST WATER SAMPLING PORTS

International Ballast Water Sample Ports, Supply and Return, Specifications

1 Overview

1.1 There shall be two (2) sample port connections. One (1) shall be the supply sample port connection. One (1) shall be the return sample port connection.

1.2 The supply sample port connection shall be located upstream of the return sample port connection. The supply and return connections shall be located as close to each other as practical.

1.3 All equipment, materials, and workmanship shall be approved in accordance with all rules and regulations applicable to the vessel's ballast water system.

2 Supply sample port assembly

2.1 A pipe boss, saddle, or other approved method of DIN 100 dimensions shall be used to access the inside of the ballast main pipe. The inside of the access shall be unobstructed by the ballast main pipe with internal edges smoothed and de-burred.

2.2 The clear inside diameter of the sample port assembly, including valve, piping, and flanges, shall be a minimum of 97.0 mm, corresponding to the inside diameter of 100 DIN extra-strong schedule pipe.

2.3 An isolation valve of DIN 100 dimensions shall be provided to allow the sample port to be closed off from the ballast main pipe. The isolation valve shall be fully ported, such that a clear and straight opening of not less than 97.0 mm diameter is provided from the access flange into the ballast main pipe when the valve is fully open. Suitable isolation valves include fully ported ball valves and gate valves. Butterfly, globe, and similar valves that do not provide a clear and straight opening are not acceptable.

2.4 An access flange of DIN 100 dimensions shall be provided to allow connection of a sample collection device by others to the supply sample port. The access flange shall be of standard design to ANSI B16.5 class 150 or DIN 2544 PN25, which are identical dimensionally. It is acceptable to utilize a flanged isolation valve as the access flange provided it meets the ANSI or DIN standard. The access flange should be paired with a blank flange, gasket, and bolting suitable to close the sample port when not in use. The access flange shall be maintained and fitted with appropriate gaskets and fasteners so that that a sample collection device attached by others can achieve a tight seal.

2.5 The distance from the ballast main pipe inside diameter to the face of the access flange shall not exceed 300 mm.

3 Return sample port assembly

3.1 A pipe boss, saddle, or other approved method of DIN 50 dimensions shall be used to access the inside of the ballast main pipe. The inside of the access shall be unobstructed by the ballast main pipe with internal edges smoothed and de-burred.

3.2 An isolation valve of DIN 50 dimensions shall be provided to allow the return sample port to be closed off from the ballast main pipe.

3.3 An access flange of DIN 50 dimensions shall be provided to allow connection of a sample collection device by others to the return sample port. The access flange shall be of standard design to ANSI B16.5 class 150 or DIN 2544 PN25, which are identical dimensionally. It is acceptable to utilize a flanged isolation valve as the access flange. The access flange must be paired with a blank flange, gasket, and bolting suitable to close the sample port. The access flange must be maintained such that testing gaskets can fit tightly when sampling equipment by others is attached.

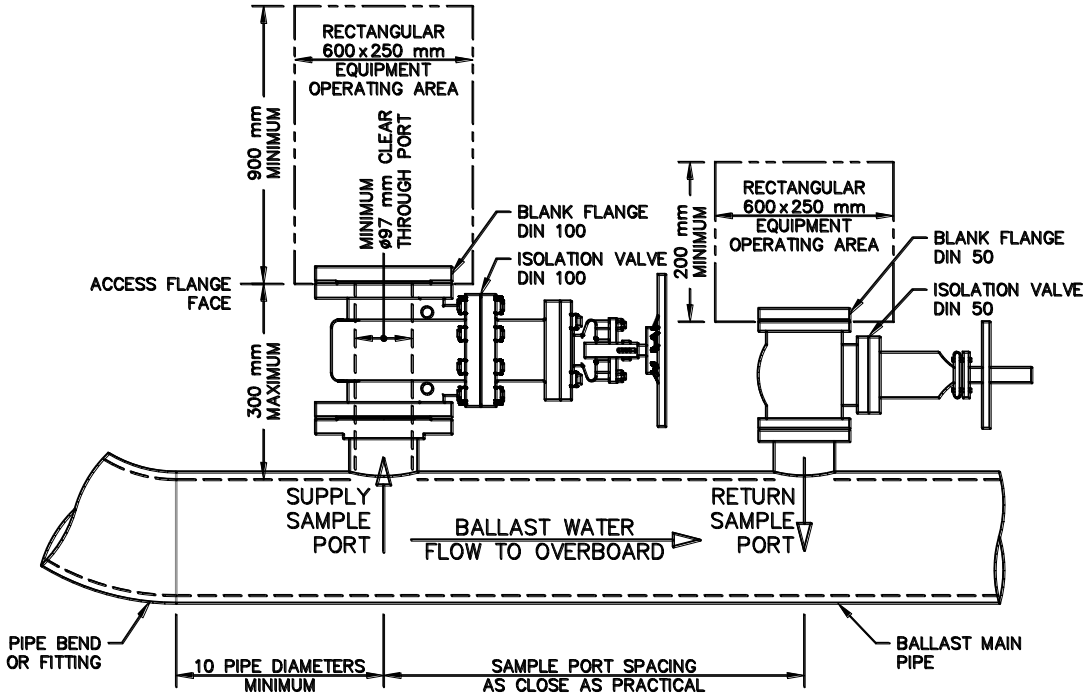

Figure 1: Supply and return sample port arrangement

4 Supply and return sample port location and access

4.1 The supply and return sampling ports shall be located downstream of the last treatment process, as near to the ballast water overboard discharge as practicable.

4.2 The supply sample port shall be placed in a straight section of pipe a minimum ten (10) pipe diameters from any pipe bend or fitting, or as approved by the Administration if this distance is not practical, to allow sampling of fully mixed and fully developed flow in the ballast main pipe.

4.3 The supply and return sample ports shall be accessible from a personnel working area of about 2 m^2 with clear head room of about 2 m. The working area should be on a flat platform or deck, have suitable lighting, and allow for safe access and conditions for two persons and their sampling/test equipment.

4.4 A clear equipment operating area shall be provided adjacent to the supply sample port access flange to allow attachment of a sample collection device by others. The supply sample port equipment operating area shall be a rectangular volume, free of all obstructions that extends outward at least 900 mm from the access flange face with a 600 mm width and 230 mm depth centred on the access flange face.

4.5 A clear equipment operating area shall be provided adjacent to the return sample port access flange to allow attachment of a sample collection device by others. The return sample port equipment operating area shall be a rectangular volume, free of all obstructions that extends outward at least 200 mm from the access flange face with a 600 mm width and 230 mm depth centred on the access flange face.

4.6 As many sample port points shall be provided as necessary to draw a ballast water sample during typical deballasting of any ballast water tank on the vessel