

Ballast water testing and compliance: match fit and fit-for-purpose?

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Page 23: Gireesh M Menon, Aries Marine, UAE

Page 31: Alfa Laval corporate literature

Part of
Ballast Water
Webinar Week
4-6 November 2020

Ballast Water
treatment technology

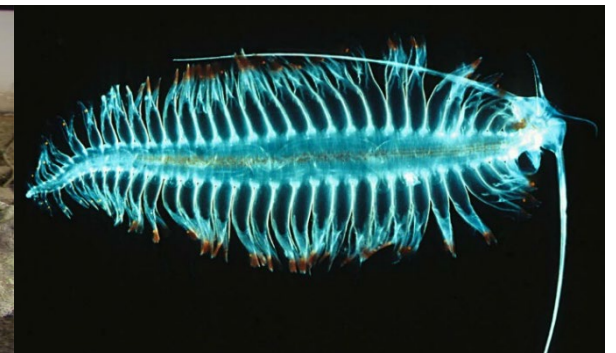
riviera >>>

Ballast Water Commissioning Testing

- Why test an Approved System?
- What We Do- Use the right Service Technician?
- Why should we/you conduct Commissioning Testing before regulation is in force?



Ballast Water



Commissioning Testing (Indicative/Detailed) and VGP Testing

Marine Environmental Services

- Ballast Water Testing
- Sewage Water Testing
- Oily Water Testing
- Scrubber Water Testing
- Potable Water

Marine Fuel Testing & Solutions

- Maritec Fuel Testing Programme
- Bunker Quantity Survey (BQS)
- Fuel System Check (FSC)
- Forensic Analysis
- Lubecheck Programme

Hong Kong Convention & EU Ship Recycling Regulation Compliance

- Inventory of Hazardous Materials
- IHM Maintenance
- Responsible Recycling Supervision

Asbestos Solutions

- Asbestos Surveys
- Asbestos Removal / Abatement
- Asbestos-free Certification

Ballast Water Testing

Why Test an Approved System



Ballast Water Testing

Service by Experienced Seagoing Technicians



Ballast Water Testing Service Guarantee

No 1 Testing Company in China with Labs that cover all major Ports/Shipyards

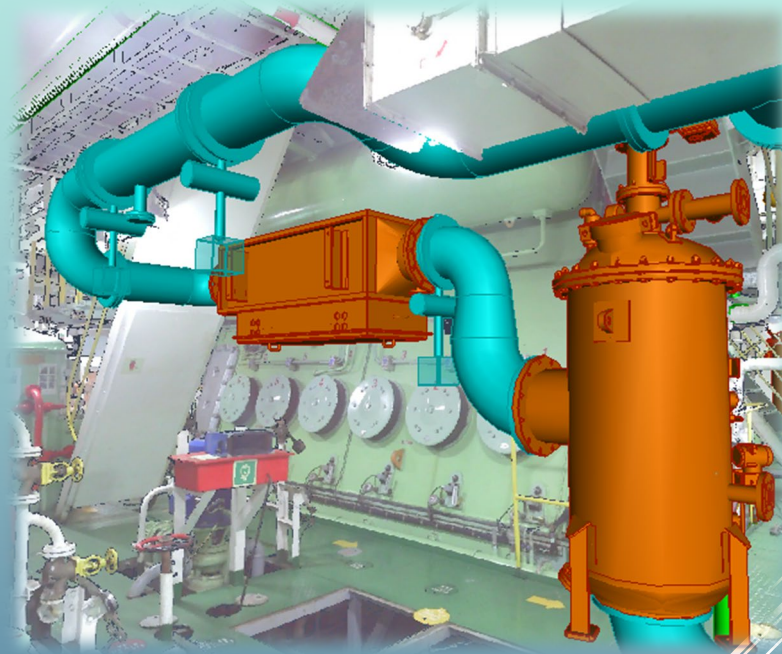
We have no further comments and herewith accept CTI for commissioning testing of BWMS on DNV GL classed vessels and we'll list CTI in our BWM FAQ (<https://www.dnvgl.com/maritime/ballast-water-management/frequently-asked-questions.html>)



Testing means “No Worries”



“Ballast water testing and compliance: match fit and fit-for-purpose ?



Gireesh M Menon
Managing Director
Aries Group of Companies
MSc (Offshore Technology)
Btech (Naval Architecture & Shipbuilding)

Aries Green solutions division of Aries Marine

- World's Leading Retrofit engineering service provider
- 800+ BWTS retrofit projects
- 200+ scrubber retrofits
- 400+ Strong Engineering team
- 3D scanning teams / tieups in all major trading areas including Middle East, Far East, Mediterranean, N. Europe, China, the Americas
- Installation supervision and Commissioning assistance



LNG Dual fuel conversions

Methanol/Wind/Hydrogen assisted propulsion

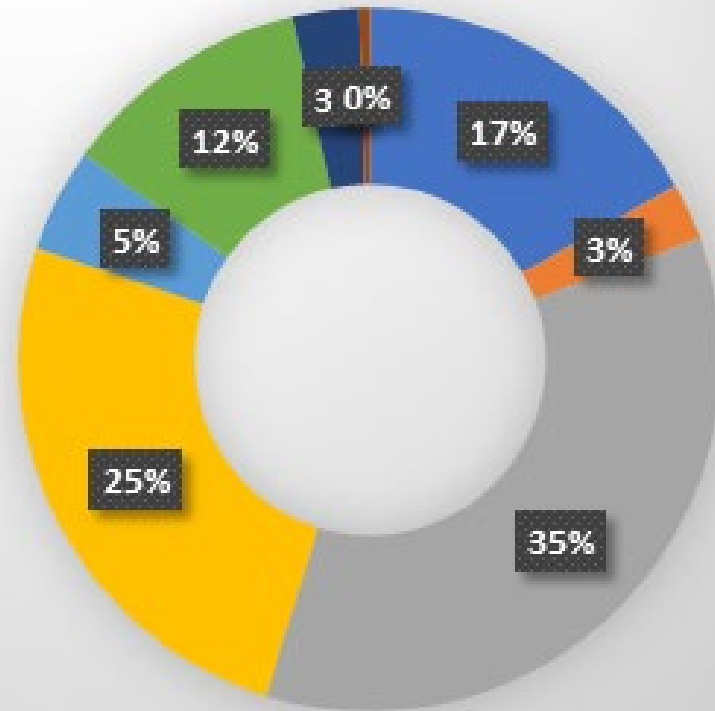
Hull and Trim Optimisation

Alternate fuel studies

800+ BWTS retrofit projects

Vessel Types

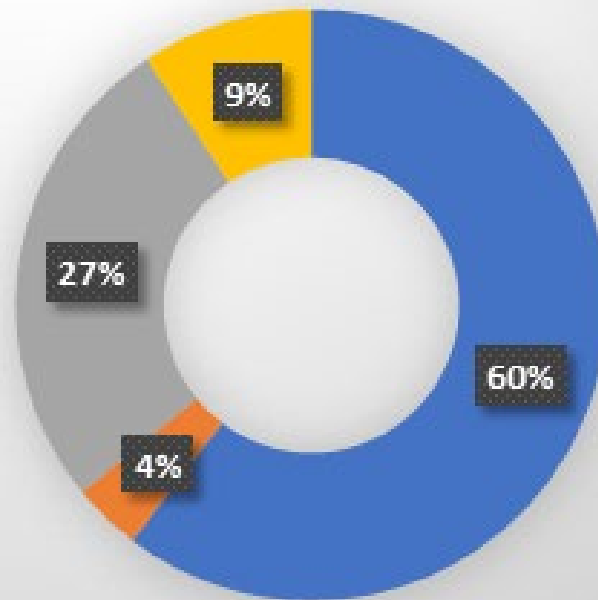
- BULK CARRIER
- CAR CARRIER
- CHEMICAL/OIL PRODUCT TANKER
- CONTAINER
- LNG/LPG
- CRUDE OIL TANKER
- SUPPLY VESSELS
- CEMENT CARRIER



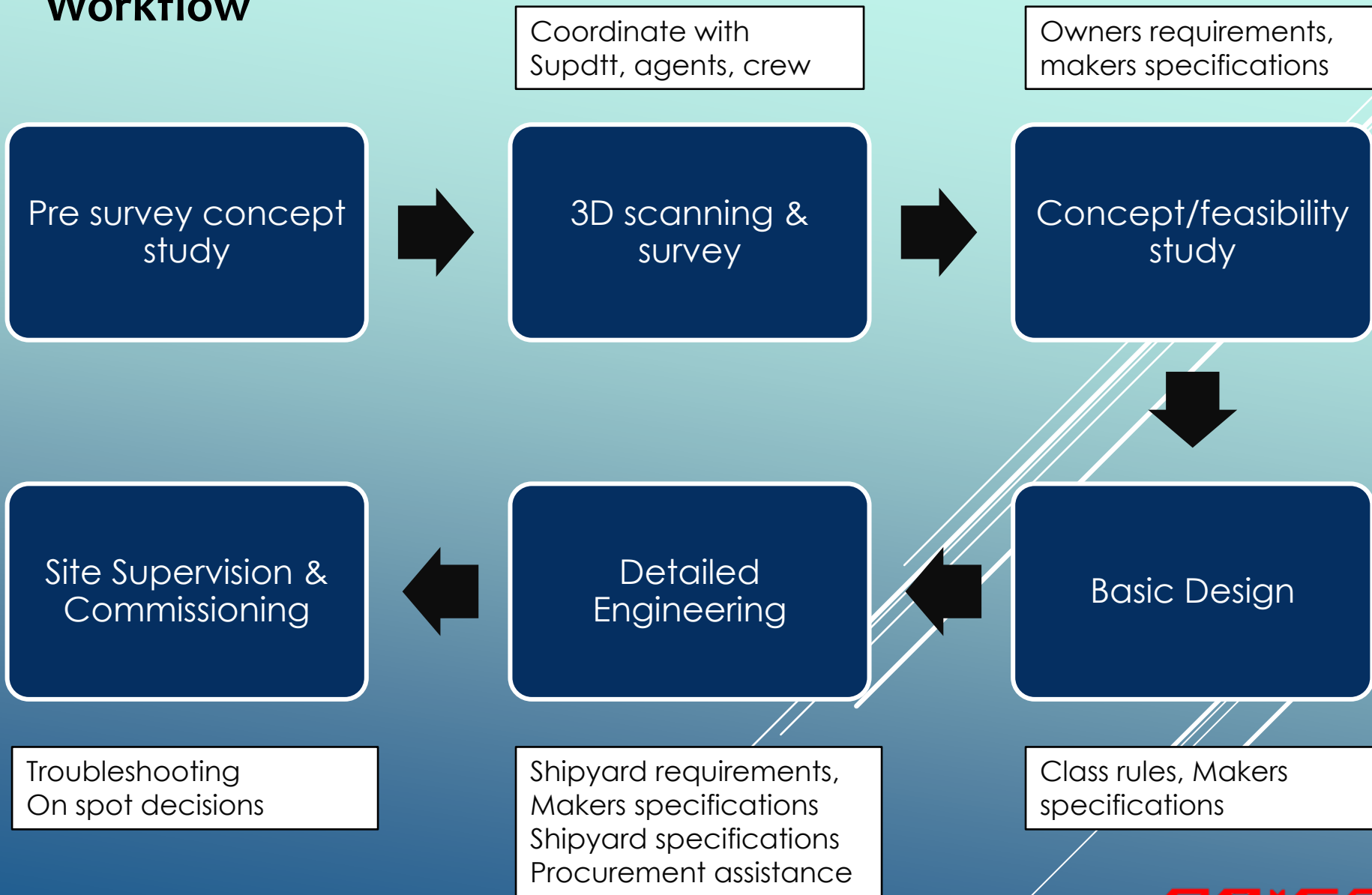
800+ BWTS retrofit projects

Treatment System Portfolio

- UV
- CHEMICAL
- ELECTROCHLORINATION
- UNDECIDED



Workflow



System makers - BWTS

**Alfa Laval
Warstila
Optimarin
Erma First
Sunrui
Desmi
NK O₃
Headway
Panasia
Ecochlor
Oceansaver**

**Envirocleanse
Techcross
Miura
JFE Engg
Bio UV
Denora
Hyundai Hi-Ballast
Hyde Guardian
Samsung Purimar
MMC
Cathelco**

Where are the installations happening

China
Korea
Singapore
Dubai
Bahrain
Turkey
Poland

Spain
Bulgaria
Romania
Gibraltar
Denmark
Brazil
Guatemala

2004 – 2020 The long journey so far

- 2004 – Adoption of International convention for Control & management of Ballast water and sediments
- 2009 – planned introduction
- Sep 2016 – requisite numbers for entry into force
- Oct 2016 – Guidelines for approval of BWMS (Revised G8) adopted. Res MEPC 279(70) - voluntary
- July 2017 – Experience Building Phase (EBP) established to carry out systematic evidence based review of BWM convention

2004 – 2020 The long journey so far

- 8 Sep 2017 – Entry into force
- April 2018– Res 300(72) BWMS Code superseding the 2016 guidelines.
Makes Revised G8 Mandatory from Oct 2020
- Sep 2019 – end of 2 year delay period for decoupling IOPP renewal
- 27 Oct 2020 – BWMS Code made mandatory
- 2022 – end of EBP. MEPC79 Any amendments ?

Persisting uncertainties in installations

- **systems that still do not meet the D-2 standard on commissioning**
- **operational problems reported by shipowners with their systems.**
- **failures in training, processes or system faults may not be spotted until during testing leaving shipowners at risk**
- **Regulatory uncertainty on testing protocol persists**
- **Process and form of compliance testing and the types and sizes of samples required**
- **Indicative testing initially, reducing the cost and burden of taking a large ballast water sampling for all ships.**

Uncertainties in Sampling

- **Indicative tests may not measure for all microbes**
- **Possibility of high margin of error to give conclusive results**
- **Triggering a full sample**
- **Logistical challenges in sampling, preservation, transportation and enumeration.**
- **Importance of accurate ballast water sampling and testing, conducted using a proven methodology measured to a consistent standard.**

- **Solution is**

Installing a reliable system with proven track record

Engineering carried out by a technical team with experience

Learning curve of past many years utilized

Installation by an experienced yard

Commissioning undertaken under close supervision of makers

Training of crew

Prompt and timely troubleshooting and maintenance support

Covid-19 Impact

- capacity at shipyards down
 - scarcity extends to spare parts and maintenance
 - Logistics in arranging engineering, commissioning engineers
 - Flag authorities granting temporary extensions to ship surveys,
-
- Owners who delay their retrofits today risk being stuck in a bottleneck when deadlines approach - considering the incoming increase in demand of equipment, engineering and installation services.

Importance of choosing the right engineering partner

- Expertise in conversion and modification projects
- Presence in key shipping locations around the world
- Ability to organize logistics

and coordination needed for surveying a fleet of ships

- Experience in liaising with Class societies for drawing approvals
- Expertise in supervision for newbuilds and conversion projects
- IN-HOUSE capabilities for all tasks
- Manpower availability and scaling up required
- Ability to take up multiple projects at a time



Focus on Biofouling impacts BWM

- **Biofouling management is not required by the BWM Convention, since it is not part of its scope, but biofouling is a significant contributor to the transfer of invasive aquatic species.**
- **EBP of BWM regulations have to be completed on priority.**
- **IMO needs to address uncertainties over interpretations of regulations**
Impending biofouling regulations could possibly leave this on a
backburner
- **Invasive species experts' focus on biofouling could delay further actions**
on ballast water management.

Thank you . . .

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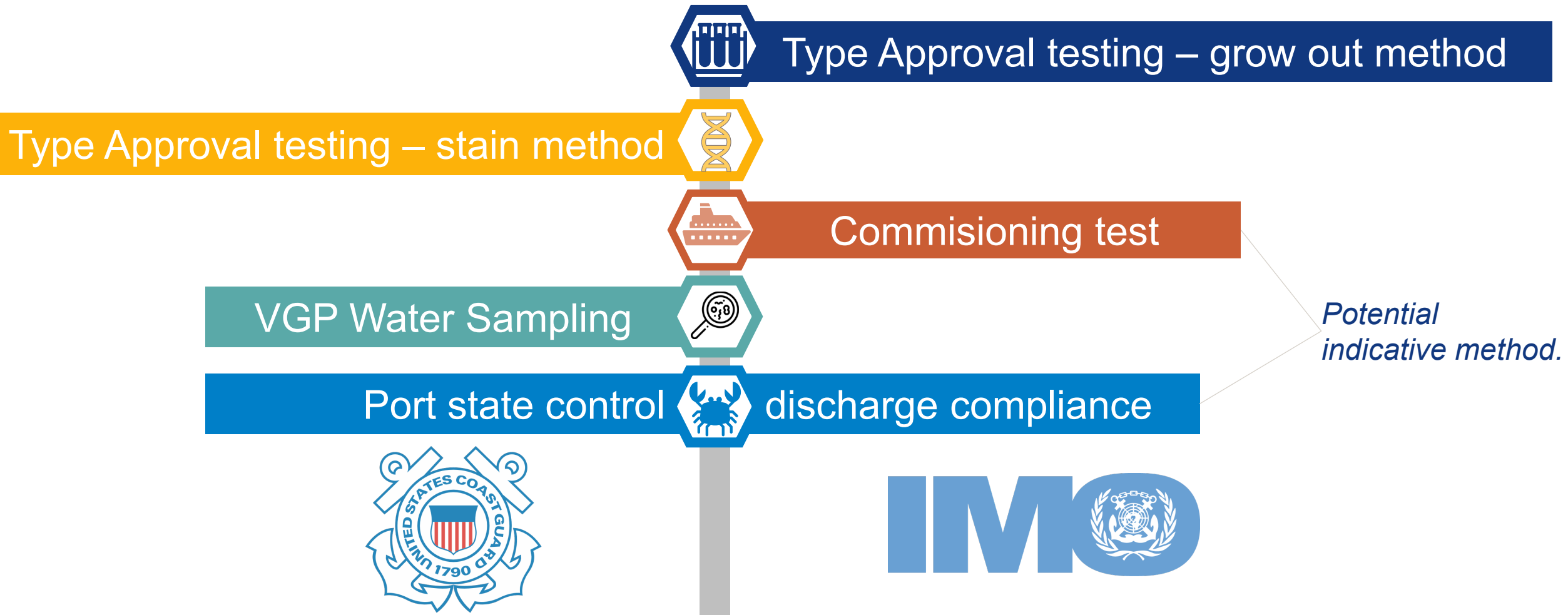
Ballast water testing and compliance

- Challenges, Opportunities and where are we today?

Viktor Friberg
Global Sales Manager, PureBallast

BWMS Compliance testing

- A summary for both USCG and IMO



Dead ends?

Pipes that collect water but are hard to flush out can be a source of organism growth and sample contamination.

Leaking valves?

Any valve that fails to seal tightly is a potential source of ingress and sample contamination.

Qualified installation?

An engineering company trained by the BWTS supplier is insurance against mistakes. Having the supplier oversee installation is the best insurance of all.

Correct sampling points?

Sampling as close as possible to the intake and discharge points will ensure a true picture of the challenge water.

Professional analysis?

A reputable lab partner will help safeguard the sampling procedure and use an analysis method appropriate to the BWTS technology.

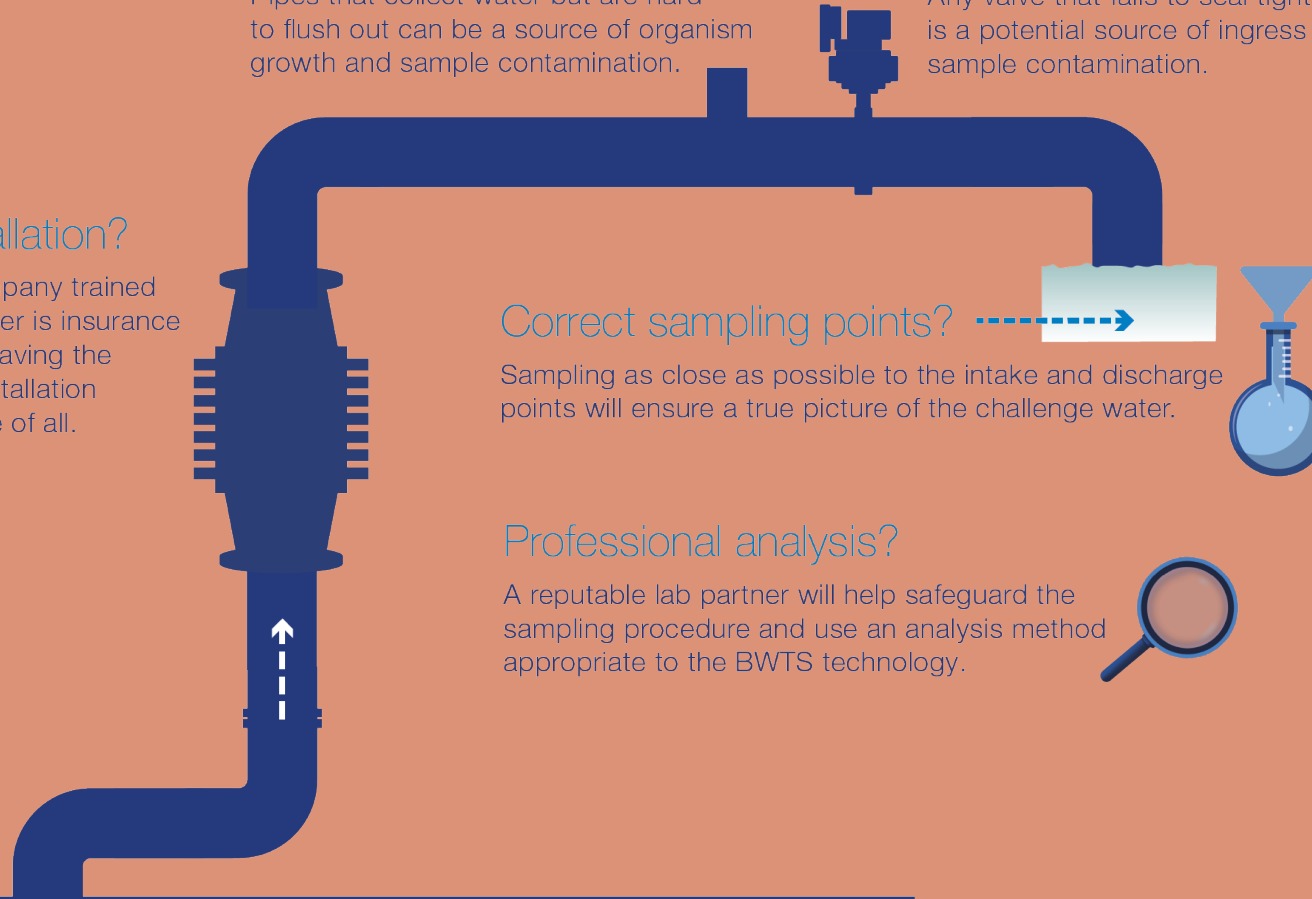
Make-or-break questions

Some simple questions can decide if your ballast water treatment system passes the sample analysis and other parts of the commissioning test – and if your vessel can sail.

Tanks and piping flushed?

Ballast tanks and piping should be flushed before BWTS installation to remove sediments and untreated water – and prior to sampling to remove installation residue.

Successful testing starts at Engineering stage!



There are a lot of methodologies and brands in the market

- Available indicative analysis instruments/methods



PAM Technology

FastBallast,
Ballast Check2,
Walz WATER-PAM,
Ballast Water Checker,
Hach BW680

ATP

LuminUltra B-QUA,
ENLITEN® ATP
Assay System

FDA stain

Ballast Eye,
Bulk FDA

Modified PAM

10Cells

Chlorophyll a based/MFA

Bw-monitor,
BallastWISE (MFA),
P. Counter (MFA)

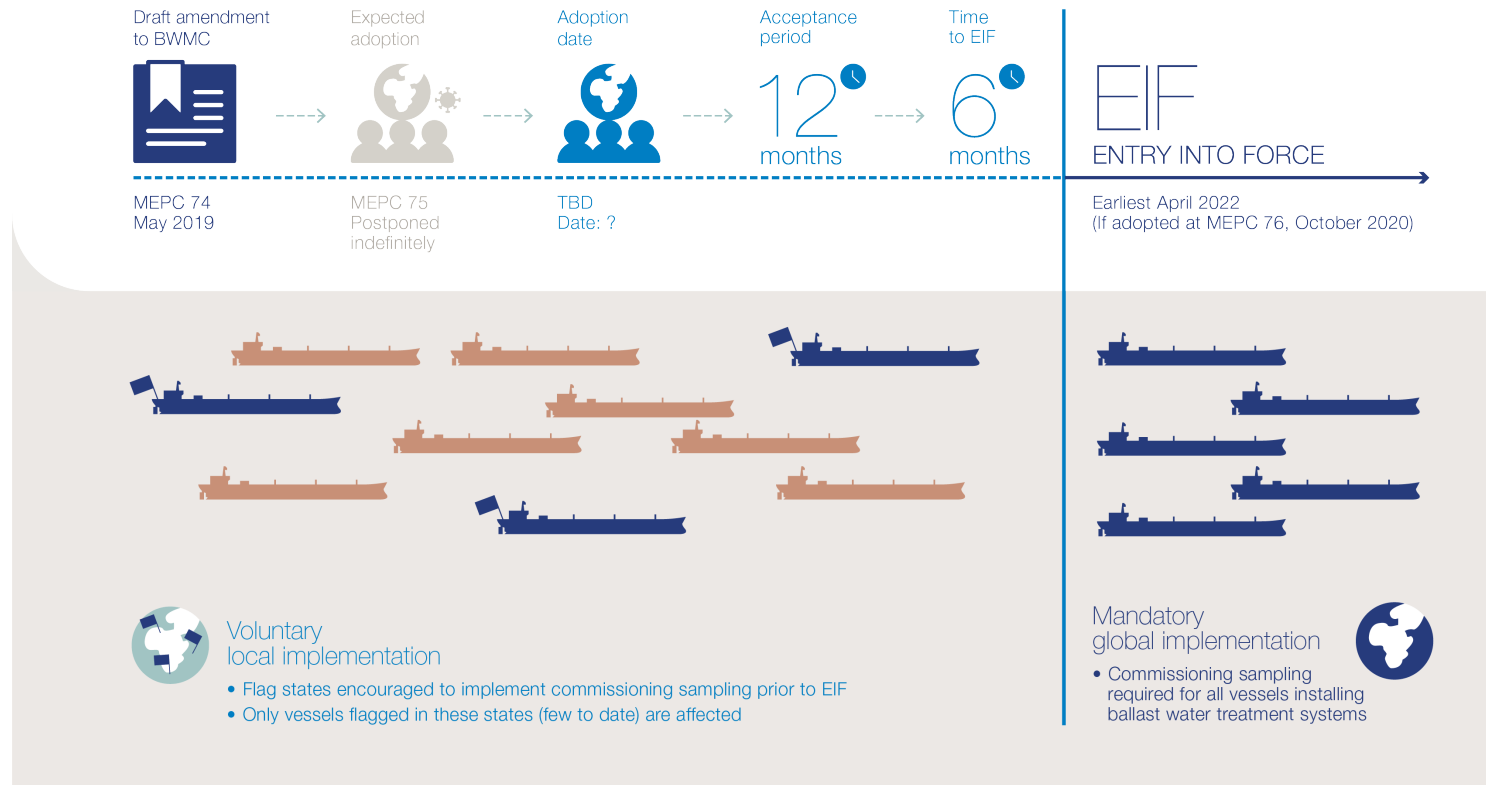
Flow cytometers

CytoSense,
Integrated Ballast
Testing,

Commissioning Sampling

- Background

- No earlier than May 2022 commissioning sampling will be required by the IMO. This is already required by Australia, Singapore, Cyprus and Greece.
- The purpose is to test the installation has been done correctly and the system can comply with the discharge standard (D-2).
- Indicative analysis methods would be preferred when properly available:
 - ❖ They are less time consuming.
 - ❖ Better suited for bringing on ships.
 - ❖ Cheaper



Today there are too many uncertainties in the indicative testing devices why it is preferred to also do actual counting/ detailed analysis.

Summary and conclusion



A **successful sample** starts already at the engineering stage

Indicative devices still have reliability challenges and must be used with caution when checking compliance of the installations.

ISO guideline on how to validate **indicative instruments/compliance monitoring devices** under development.

Industry must work together and Alfa Laval welcomes improved indicative measuring devices and are happy to **make our system available** for validation studies.



Commissioning sampling for ballast water treatment systems

Understanding the purpose and implementation

May 2020



Introduction

Water sampling in connection with commissioning testing – more simply expressed as commissioning sampling – is being introduced for newly installed ballast water treatment systems. The IMO requirement was laid out at MEPC 74 in an amendment to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention).

At present, commissioning sampling is not mandatory for the vast majority of vessels. Nor will it become a global requirement before early 2022. Nonetheless, there is already immense confusion on the market regarding the purpose and procedures for it.

This paper clarifies the new requirement, explaining not only what commissioning sampling is, but also why, how and when it should be done.



The commissioning sampling regulation

In fact, a demand to perform water sampling as part of ballast water treatment system commissioning first arose with Resolution A.1120(40) under the Harmonized System of Survey and Certification (HSSC). The demand was not part of the BWM Convention, however, which is why it was addressed at the MEPC 74 meeting in May 2019. There it was approved as a draft amendment to Regulation E-1 of the BWM Convention, with adoption expected at the next MEPC meeting.

The amendment requires sampling to take place as part of the operational testing of the ballast water treatment system once the installation is complete and finalized. The sampling is to be performed according to BWM.2/Circ.70, *Guidance for the commissioning testing of ballast water management systems*.

The amendment's entry into force has an uncertain timetable, due to the indefinite postponement of MEPC 75. Originally to begin in March 2020, MEPC 75 may simply be merged with MEPC 76 in October 2020. This would put entry into force no earlier than April 2022, which means compliance sampling would not become globally mandatory before that date.

Although the MEPC encourages flag states to implement the requirement today, only a handful have chosen to do so thus far. (See later section, *Implementation of commissioning sampling*.)

- Draft amendment approved at MEPC 74 but adoption delayed
- Earliest entry into force April 2022
- Voluntary implementation encouraged



What commissioning sampling is – and is not

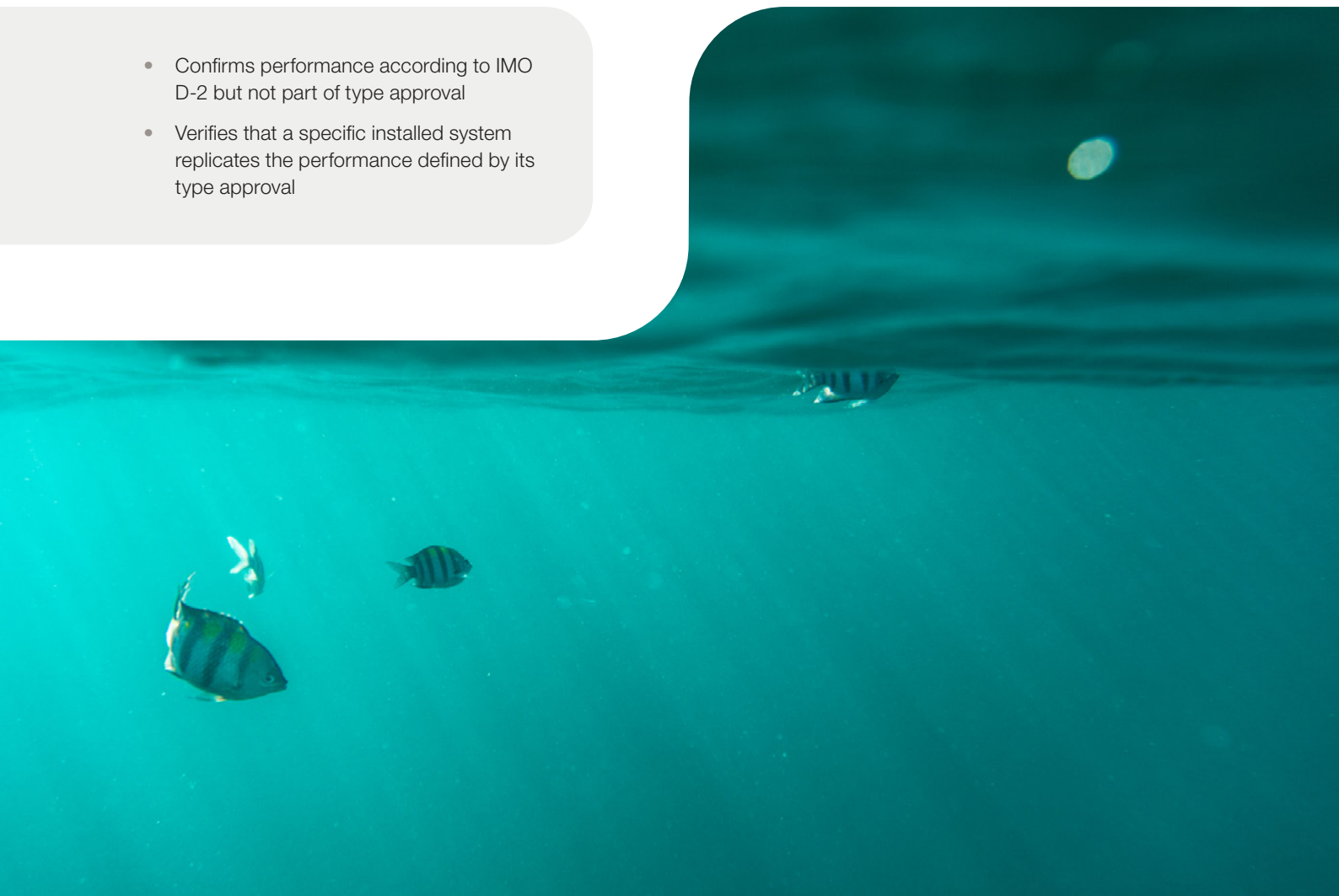
Commissioning sampling is a response to demands from the market. Shipowners have requested proof that their installed ballast water treatment systems will perform according to type approval and meet the IMO D-2 discharge standard. It is important, however, to understand what commissioning sampling actually validates.

Commissioning sampling does not validate the ballast water treatment solution as such. That validation is provided by the type approval, which is an approval of the standard ballast water treatment system design. The design itself has already been shown to meet the IMO D-2 discharge standard – so this is not in question.

Rather, commissioning sampling verifies that the specific installed system replicates the performance defined in the type approval. It is a tool for spotting deviation from the type-approved performance, perhaps caused by a manufacturing defect or an installation error. The sampling is part of the wider commissioning testing that ensures all mechanical, physical, chemical and biological processes are working properly within the system.

The sampling and the testing as a whole are overseen by the flag state or by a classification society authorized by the flag state, to whom any discrepancies must be reported.

- Confirms performance according to IMO D-2 but not part of type approval
- Verifies that a specific installed system replicates the performance defined by its type approval





The commissioning sampling procedure

Commissioning sampling is a straightforward procedure that is defined step-by-step in BWM.2/Circ.70, *Guidance for the commissioning testing of ballast water management systems*. The steps can be summarized as follows.

- **Sampling of ambient waters**

A sample characterizing the ambient water should be collected during ballast water uptake. This can be done by any means practical, e.g. using an inline sample port or taking a sample directly from the harbour. The ambient water should be accepted for testing, regardless of the level of challenge it poses to the ballast water treatment system. (NB! See also the next section of this white paper, *Considering System Design Limitations*.)
- **Sampling of ballast water discharge**

A sample of the corresponding ballast water discharge should be collected after full treatment has been applied, in accordance with the *Guidelines on ballast water sampling (G2)*. The sample should be representative of the whole discharge of ballast water from any single tank or combination of tanks being discharged. It should be collected as close as possible to the overboard discharge point and during ballast water discharge whenever feasible.
- **Evaluation of compliance with IMO D-2**

The respective samples should be analysed to confirm ballast water treatment performance that indicates compliance with the IMO D-2 discharge standard. Using reliable and accurate indicative* analysis methods, all size classes included in the standard need to be evaluated:

 - Organisms $\geq 50 \mu\text{m}$
 - Organisms $\geq 10 \mu\text{m}$ and $< 50 \mu\text{m}$
 - *Vibrio cholerae*, *Escherichia coli* and *Enterococci*

* Note that none of the indicative methods defined in Table 3 of BWM.2/Circ.42/Rev.1 have been fully evaluated thus far. Because the specified indicative methods are not yet validated, test organizations may instead recommend detailed methods they know to be reliable and accurate.
- **Reporting**

The sampling methods and analysis results should be documented for the flag state administration or the classification society authorized by the flag state as part of the written report on the wider commissioning testing.

Considering System Design Limitations

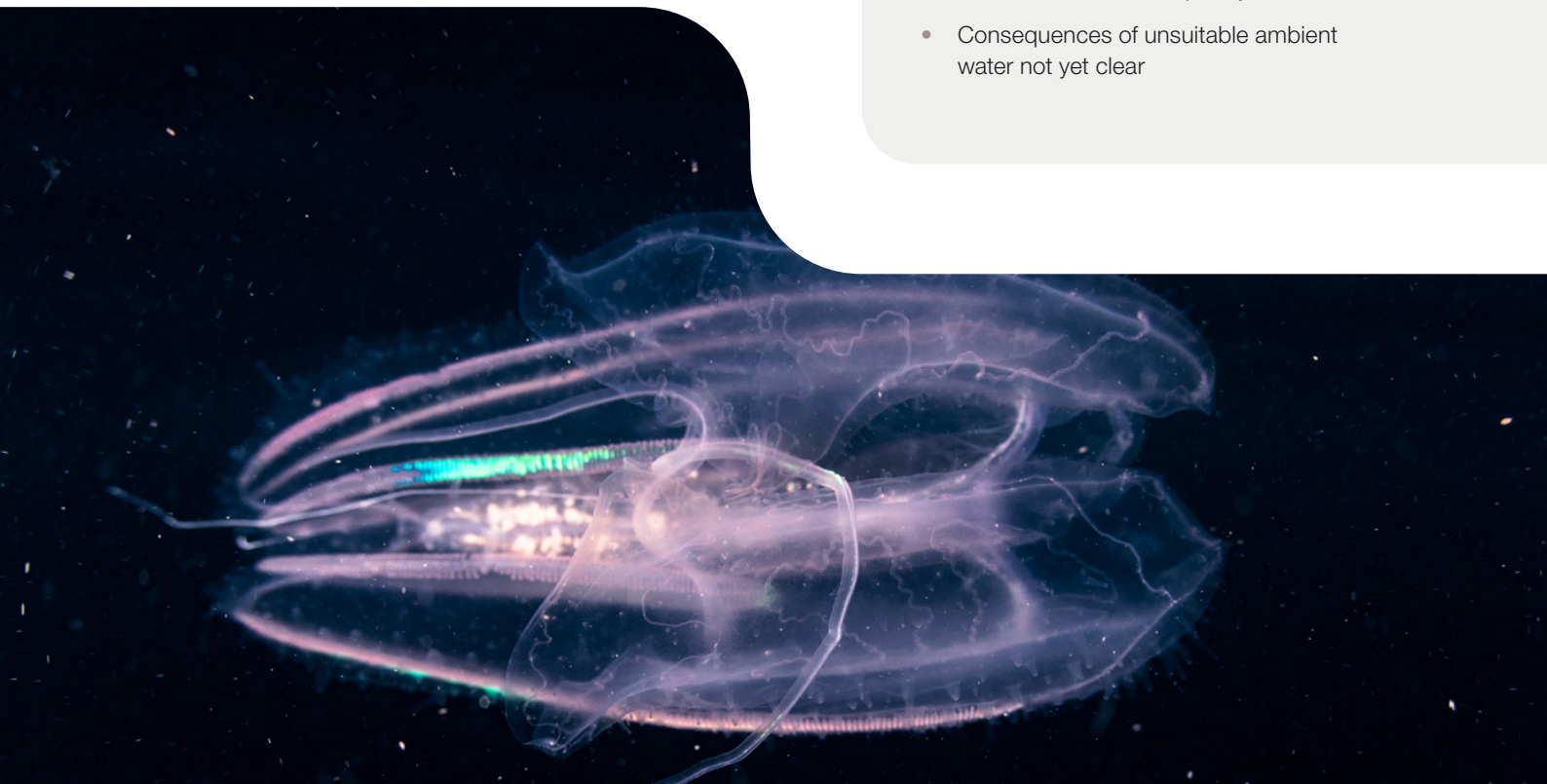
As part of the wider commissioning testing, BWM.2/ Circ.70 also requires an assessment of the ballast water treatment system's applicable self-monitoring parameters, e.g. flow rate, pressure, TRO and UV intensity. Not only should the correct operation of all sensors and related equipment be confirmed, the so-called System Design Limitations (SDL) of the ballast water treatment system should be considered. Possible limitations include minimum holding time, salinity requirements and UV transmittance or intensity values.

What remains ambiguous, at least as the guidance is written, is how the System Design Limitations should be related to the challenge level of the ambient water. The guidance states that the ambient water should be accepted for testing regardless of the challenge it poses to the ballast water treatment system. Presumably, this should refer to the biological challenge, i.e. the biological load in terms of organism densities or types. However, the lack of a definition leaves room for other interpretations, such as the properties of the water itself.

Until this is clarified, low salinity or low UV transmittance could also be seen as making the ambient water inappropriate for operational testing. It would then be up to the flag state to decide the course of action. According to the guidance, if the ambient water is not appropriate for operational testing because it falls outside the SDL of the ballast water treatment system, the testing should be evaluated to the satisfaction of the flag state administration.

It is likely, regardless how the challenge level is defined, that unsuitable ambient water would lead to testing in more appropriate conditions after the vessel has left the yard. In this case, a short-term International BWM Certificate with a Condition of Authority would be issued, requiring testing within 2–3 months. However, it remains to be seen how most flag states will deal with the issue in practice.

- Relationship between SDL and challenge level of ambient water poorly defined
- Consequences of unsuitable ambient water not yet clear



Implementation of commissioning sampling

As stated earlier, the draft amendment to Regulation E-1 of the BWM Convention will not enter into force before early 2022. Until that time, there is no global requirement to perform commissioning sampling. However, the MEPC encourages flag state administrations to begin implementing the procedure as soon as possible, which has led to confusion in the market.

As of March 2020, only a handful of flag states – e.g. Australia, The Bahamas, Cyprus, Panama and Singapore – have chosen to implement the amendment proactively. Australia and Singapore have issued circulars requiring commissioning sampling for ballast water treatment systems installed after 8 September 2019 on vessels

with their respective flags. The other countries have issued circulars as well, although these contain fewer details of what they require.

It is expected that other flag states will follow. However, it is only vessels flagged in these countries that must perform commissioning sampling at present. For vessels carrying any other flag, commissioning sampling is not necessary at this time.

- Not globally required until entry into force (earliest April 2022)
- Currently required by a few flag states implementing early – only vessels with these flags affected



Responsibilities associated with commissioning sampling

If commissioning sampling is required by a vessel's flag state, it is the shipowner who is responsible for contacting and making arrangements with an appropriate testing body. As the sampling is not a direct part of the commissioning work, managing it does not fall within the standard commissioning scope of the system supplier.

Likewise, the supplier's commissioning scope does not include the fault-finding, corrective actions and new sampling required if the first samples fail to show compliance with the IMO D-2 discharge standard. There may be many possible reasons for a negative result, including failure to clean the ballast water tanks and piping appropriately prior to installation.

Nonetheless, there is nothing in the IMO guidance that prevents the supplier from being involved in commissioning sampling. Flag states and classification societies may require that the actual lab analysis be performed by a facility independent from the supplier. Apart from this, the supplier may offer assistance by arranging for third-party sampling and/or lab analysis outside the standard commissioning scope.

- Sampling not included in standard supplier commissioning scope
- Shipowner responsible for arranging sampling, but supplier may assist to some degree

For shipowners installing Alfa Laval PureBallast 3

Alfa Laval stays up to date with marine legislation and related developments, including the implementation of commissioning sampling. When installing Alfa Laval PureBallast 3 on vessels flagged in applicable states, shipowners should contact their Alfa Laval representative to discuss commissioning sampling before they contact a testing body.





This is Alfa Laval

Alfa Laval is active in the areas of Energy, Marine, and Food & Water, offering its expertise, products, and service to a wide range of industries in some 100 countries. The company is committed to optimizing processes, creating responsible growth, and driving progress – always going the extra mile to support customers in achieving their business goals and sustainability targets.

Alfa Laval's innovative technologies are dedicated to purifying, refining, and reusing materials, promoting more responsible use of natural resources. They contribute to improved energy efficiency and heat recovery, better water treatment, and reduced emissions. Thereby, Alfa Laval is not only accelerating success for its customers, but also for people and the planet. Making the world better, every day. It's all about *Advancing better™*.

How to contact Alfa Laval

Contact details for all countries are continually updated on our web site. Please visit www.alfalaval.com to access the information.

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Alfa Laval reserves the right to change specifications without prior notification.