TECHNICAL CIRCULAR No. 534 of 04th February 2019

To:	All Surveyors/Auditors
Applicable to flag:	All Flags
	Ballast Water System Installations
Reference:	BWM Convention

Lessons Learned from a Hundred Ballast Water System Installations

New WBS equipment is deployed worldwide on board some number of ships and users.

Background

The results in this article are based on surveys on board tankers (oil, chemical and LNG), container vessels, bulk carriers, general cargo vessels, heavy-lift semi-submersibles, barges and offshore supply vessels, with all their variations.

The sizes of the ships, for our purposes, are mainly related to their ballast water pumping capacity. This ranges from 200 m3/h to 3 x 4,000 m3/h for the largest ships, and up to 5 x 6,000 m3/h on the semi-submersibles.

Likewise, ballast water management systems vary from UV-based, electrolysis-based (direct flow and side-stream) and ozonation. Most of the systems originate from China and Korea, with some makers from Europe as exceptions, for example Alfa Laval.

It is furthermore important to include an important caveat; shipowners ask us to join their ships to check whether their ballast water management systems are working properly, because most of them either experience problems or are not sure if the installations are done properly.

The experience in this article also includes over 20 ships where we undertook operation and maintenance training for the crew, where ballast water management systems were supposedly

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working, but turned up not to in most of the cases.

There are three major categories of issues encountered: installation, equipment, operation & maintenance.

Installation

Some 50 percent of the issues encountered with malfunctioning ballast water management systems could have been avoided by proper installation, followed by commissioning. It is important to proper commissioning of a system (that is, checking that the system works together with the ballast system of the ship and the way the ship is intending to trade, rather than just punching a checklist that shows the human-machine interface of the system is working). In addition to proper commissioning, particularly filters installed in a way that does not ensure proper backlashing (i.e. the back pressure on the backflush line is so high that a backflush pump is required, adding another maintenance and failure point and affecting the ballasting capacity of the ship).

Additionally, Total Residual Oxidants (TRO) meters are usually also installed in a way that does not allow the sampling and drainage to be done efficiently. When the sampling line of a TRO meter gets filled with air, the TRO meter will give wrong readings.

In several ship types (for example MR tankers with submerged ballast pumps), TRO sampling lines on open deck will freeze unless drained properly. Drainage does not have to lead to the sensors of the TRO meter getting air, as air traps or means of isolation can be installed on those lines.

Additionally, drainage of TRO sampling lines must always be done by gravity. Paying attention to those details will improve the reliability of electrolysis-based ballast water management systems substantially.

Other installation issues we encounter are typically related to control and automation.

IMO and class rules include good indications and guidance to find solutions to those challenges. The most important is not to ignore those issues, as our experience is that they are solved much easier at the installation site, rather than at a later stage.

Many other small items that can make operation and maintenance of a ballast water management system easier during the lifetime of the ship are tagging (i.e. writing in plain English the purpose of

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the various pipes, ISO-painting hydrogen ventilation pipes, etc.), making room for maintenance and consumable replenishment (specially neutralization powder), as well as keeping a well-organized and managed spare parts list before the ship is delivered.

Equipment

Recent surveys, especially in 2018, show that more and more ballast water management systems use robust type approved equipment in their systems (type approval is not necessarily a sign of robustness, but it is generally considered as a good indication of quality). However, it is encountered skimpy equipment such as small sampling pumps, sensors, valves, actuators, etc. While it can be accepted to buy cheaper equipment that is usually regarded as non-essential by class, our recommendation is that this is not the place to save cost. All this equipment will decrease the reliability of the ballast water management system and increase the cost of maintenance and the probability of failure.

One important issue when it comes to choosing alternative equipment: some components like TRO meters, UV lamps, filter elements, electrodes, etc. cannot be replaced by "similar" components. Those are fixed by type approval and must be used as listed on the ballast water management system Type Approval Certificate. Alternatives must be listed on the certificate otherwise the system won't be compliant.

Operation & Maintenance

Often, we board ships with installed a ballast water management system that has not been used for a number of years. While this was not mandatory by regulation when the ship was delivered, it left the equipment completely inoperable and not maintained. In all of those cases, repairing and bringing the system up to speed has proven to be very challenging, if at all possible. In some cases, owners have decided to remove the equipment and replace it with a new one.

Intimately related to operation of the ballast water management system is training and knowledge of the crew. Training does not only involve teaching the Chief Mate how to press the buttons of the human machine interface screen but actually explaining how ballast water management is done on board that ship, including the use of the ballast water management system. We are talking about how to ballast, deballast, when to bypass the system, how to react in case of challenging water conditions, etc.

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Training also includes walking with the Chief Engineer throughout the complete installation and discussing maintenance, how to figure out if components are not working as they should and how to discover and deal with discrepancies in various sensors.

Operation and maintenance is often done loosely at delivery, and then becomes very inconsistent when the crew changes. Then the ship changes owners or managers, and that's where we see the major issues starting to surface: crew with very little knowledge of the actual ballast water management system they have on board.

Conclusions

In conclusion, there are large number of issues that, when combined, give a picture of ballast water management systems that are not reliable. Those issues lead to three main categories:

Installation: where proper planning and know-how can reduce the number of malfunctioning ballast water management systems by half, based on our experience

Equipment: The more robust and well-designed components used, the less failures occur. While this should be a given, we don't often see that implemented on board ships.

Operation & Maintenance: where continuous use of the ballast water management system and proper training, on board, of the crew on how to operate the complete ballast system of the ship, including the ballast water management system, and maintaining it properly increases the reliability of those systems significantly.

Finally, it is important to point to the new MEPC decision that all installations of ballast water management systems must be sampled for compliance with the D-2 standard prior to issuance of the International Ballast Water Management Certificate for the ship.

REFERENCES:

- BW Systems

- ATTACHMENTS: No

Kindest Regards,

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