



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. P-14281

This is to certify that the
Ballast Water Management System

with type designation(s)
MMC Ballast Water Management System

Manufactured by
MMC GREEN TECHNOLOGY AS
Fosnavåg, Norway

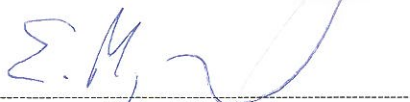
is found to comply with
Resolution MEPC.174(58)
DNV Type Approval Program No.771.91
Det Norske Veritas' Rules for Classification of Ships

Application

This is to certify that the Ballast Water Management System listed above has been examined and tested in accordance with the requirements of the specifications contained in Guidelines contained in Resolution MEPC.174(58) and DNV Rules stated above. This Certificate is valid only for the Ballast Water Management System referred to above.

The Certificate is issued on behalf of the Norwegian Maritime Directorate

Høvik, 2012-12-06
for Det Norske Veritas AS


Eivind Mykland
Head of Section



DNV local office:
Ulsteinvik

This Certificate is valid until
2016-12-31


Ingrid Sigvaldsen
Surveyor

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.

The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



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File No.: 771.91
Job Id.: 262.1-011262-1

Ballast Water Management System Supplier

MMC Green Technology AS

Under type and model designation

MMC BWMS 150 and MMC BWMS 300

Equipment / Assembly drawings

Ballast Water Management System (BWMS) manufactured equipment / assembly drawings referred to under Type Approval documentation below.

Product description

The MMC Ballast Water Management System description is given in "Installation and Operation Manual MMC BWMS" approved by DNV.

Treatment sequence:

- Ballast water uptake: Filtration and UV Treatment
- Ballast water discharge: UV Treatment

Application/Limitation

Treatment Rated Capacity: 150 m³/h (MMC BWMS 150) and 300 m³/h (MMC BWMS 300)

Operational specifications for the different components:

Filter

The type approved system includes a Boll & Kirch Filterbau GmbH Filter type 6.18.2 with 40µm mesh. The shipboard tests and landbased tests were performed with this filter installed.

Based on statement and documentation received from Boll & Kirch Filterbau GmbH, all filters listed in letter from Boll & Kirch dated 2012-12-05 are covered by this Type Approval.

UV reactor

Operational range of one UV-chamber is 10 m³/h – 150 m³/h (MMC BWMS 150)

Operational range of one UV-chamber is 10 m³/h – 300 m³/h (MMC BWMS 300)

A combination of UV-chambers is accepted under the following criteria:

- Chambers mounted in parallel (vertically or horizontally)
- The inlet to each UV chamber is designed such that the inflow profile and the holding time of water particles in the UV chambers are not substantially different than the type approved design given in document "Model for design of UV systems for MMC GT" reviewed by DNV.

Proposals of combinations must be approved by DNV on a case by case basis.



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UV-intensity meter

Acceptable minimum limit: 100mJ/cm² for the MMC BWMS 150 and MMC BWMS 300.

UV intensity below 100 mJ/cm² implies that the ballast water is not treated in accordance with this Certificate.

Stripping procedures

Stripping operations must be arranged and conducted in accordance with letter from the Norwegian Maritime Directorate dated 2012-10-25 with reference 201225852-2.

Flow Control Valve

The type approved system includes a flow control valve.

Information regarding the selected components shall be part of the documentation related to the specific installation, either by a reference to valid Type approval certificate or technical documentation.

Flow Meter

The type approved system includes a flow meter.

The flow meter listed under Control Equipment, tested and verified during land based and shipboard tests, is covered by this Type Approval.

Control Equipment

The type approved system includes the following control units and sensors:

Name	Manufacturer	Model	Software revision
Main control cabinet	MMC	BWMS	NA
UV power cabinet	MMC	DXL6-1500 Lambda	NA
UV sensor	MMC	Us3	NA
Pressure sensor	MMC	Vegabar S14	NA
Flow meter	MMC	Euromag 2200EL	NA
Controller	MMC	MMC BWMS Control	3.0

All changes in software are to be recorded as long as the system is in use onboard. The records of all changes are to be forwarded to DNV for evaluation and approval.

Major changes to the software are to be approved before installed in the computer.

A Certification of Application Functions may be required for the particular vessel.

Documents approval

The following documentation is to be submitted for approval in each case:

Control and instrumentation

- System block diagram
- Power supply arrangement
- List of controlled and monitored points
- Description of interface towards ship's existing system

Piping

- Piping and Instrumentation Diagram (P&ID) of the ballast system including the treatment system installation



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Type Approval documentation

- QAPP for fullscale testing of the Ballast Water Management System of MMC Green Technology AS approved by DNV on 2011-08-24.
- Land-based testing of the Ballast Water Management System of MMC Green Technology AS – Final report, Report SNO 6297-2012 approved by DNV on 2012-06-10.
- QAPP for shipboard testing of the Ballast Water Management System of MMC Green Technology AS approved by DNV on 2012-06-10.
- Treatment efficiency and toxicity effect of the fullscale MMC BWMS approved by DNV on 2011-08-24.
- Installation and Operation Manual MMC BWMS approved by DNV.
- Model for design of UV systems for MMC GT, reviewed by DNV.
- Environmental testing of ballast water treatment system, Report No. DANAK-19/12610, Rev.0, approved by DNV on 2012-11-21.
- Factory Acceptance test report endorsed by DNV on 2012-10-12.
- Customer Acceptance Test (CAT) MMC BWMS approved by DNV.

Tests carried out

- Land-based testing in accordance with Resolution MEPC.174 (58) witnessed by DNV
- Shipboard testing in accordance with Resolution MEPC.174 (58) witnessed by DNV
- Factory Acceptance Test of the control and automation system witnessed by DNV
- Environmental testing in accordance with Environmental test specification for instrumentation and automation equipment, DNV Standard for Certification No. 2.4 (April 2006) and Resolution MEPC.174 (58)

Marking of product

For traceability of this Type Approval, each treatment system is to be marked with:

- Manufacturer's name or trade mark
- Type designation
- Serial number



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Certificate retention survey

The scope of the retention/renewal survey is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the survey are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Retention survey is to be performed at least every second year and at renewal of this certificate.

Copy of type approval certificate

A copy of this Type Approval Certificate should be carried onboard a vessel fitted with this Ballast Water Management Systems at all times. A reference to the test protocol and a copy of the test results should be available for inspection onboard the vessel.

END OF CERTIFICATE