Marine & Offshore

Certificate number: 24799/C0 BV
File number: ACM 223/1404/01
Product code: 9086I

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

Optimarin AS

SANDNES - NORWAY

for the type of product

BALLAST WATER MANAGEMENT SYSTEM

Optimarin Ballast System (OBS)
Optimarin Ballast System Ex (OBS Ex)

Requirements:
- BUREAU VERITAS Rules for the Classification of Steel Ships
- BUREAU VERITAS Rules for the Classification of Offshore units
- IMO Res. MEPC.300(72) - Code for Approval of Ballast Water Management Systems

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 20 Feb 2028

For Bureau Veritas Marine & Offshore,
At BV OSLO, on 20 Feb 2023,
Rune MARSTEIN

This certificate was created electronically and is valid without signature

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION

Optimarin Ballast System (OBS)

Optimarin Ballast System Ex (OBS Ex)

1.1 Ballast Water Technology

- The Optimarin Ballast System consists of two treatment steps in order to comply with the IMO D2 standard:

a) Mechanical Filtration by 20 or 25 micron automatic filter which removes sediments and larger organisms, and

b) Ultraviolet disinfection by a medium pressure UV system which inactivates or kills the smaller plankton and bacteria.

- The BWMS consist of 6 main components which are part of this approval: Filter, UV-System, Flow Meter, Flow Pressure Valve, UV-Power and Control System/PLC

- The system is operated from a control panel, which starts the automated ballast and de-ballast processes

OBS Models

xxxx/yyyyBK3 for BWMS with AquaBoll 6.18.3 filters manufactured by Boll & Kirch (BK3 or BK3 Ex)

xxxx/yyyyBK4 for BWMS with filter series with 25 ìm mesh manufactured by Boll & Kirch

xxxx/yyyyFX2 for BWMS with filters manufactured by Filtrex (FX2 or FX2 Ex)

xxxx: UV Model

yyyy: Filter designation

1.2 Filters

1) Boll & Kirch Filter (BK3 / BK3 Ex)- 6.18.3 aquaBoll Series - 25 µm wire mesh

Boll & Kirch's filters listed below part of this Type approval are required to be design-approved by BV prior to their installation on board BV-classed ships.

Filter Type	Designation	Flow range (m3/h)
aquaBoll 273	72BK3	19-72
aquaBoll 324	94BK3	19-94
aquaBoll 356	204BK3	24-204
aquaBoll 419	378BK3	33-378
aquaBoll 521	518BK3	33-518

Filter Type	Designation	Flow range (m3/h)
aquaBoll 600	614BK3	34-614
aquaBoll 750	1274BK3	50-1274
aquaBoll 900	1384BK3	47-1384

2) Boll & Kirch Filter (BK4)- aquaBoll BWT - 25 µm wire mesh

Boll & Kirch's filters listed below part of this Type approval are required to be design-approved by BV prior to their installation on board BV-classed ships.

Filter Type	Designation	Flow range (m3/h)
aquaBoll BWT DN80	65BK MK4	8-65
aquaBoll BWT DN100	125BK MK4	15-125
aquaBoll BWT DN150	220BK MK4	23-1220
aquaBoll BWT DN200	430BK MK4	51-430
aquaBoll BWT DN250	770BK MK4	59-770

Filter Type	Designation	Flow range (m3/h)
aquaBoll BWT DN300	1000BK MK4	88-1000
aquaBoll BWT DN350	1350BK MK4	109-1350
aquaBoll BWT DN400	1900BK MK4	136-1900
aquaBoll BWT DN500	2600BK MK4	152-2600

3) Filtrex Filters (FX2 / FX2 Ex) - ACB Series - 20 µm wire mesh

Filtrex's filters listed below part of this Type approval are required to be design-approved by BV prior to their installation on board BV-classed ships.

Filter Type	Designation	Flow range (m3/h)
ACB-906-100	87FX2	15-87
ACB-910-150	135FX2	25-135

Filter Type	Designation	Flow range (m3/h)
ACB-985-300	770FX2	65-770
ACB-999-350	1040FX2	95-1040

ACB-915-150	190FX2	35-190
ACB-935-200	255FX2	35-255
ACB-945-200	340FX2	45-340
ACB-955-250	515FX2	50-515

ACB-9100-400	1500FX2	126-1500

4) Technical characteristics

Type	6.18.3 aquaBoll Series	aquaBoll BWT	ACB Series
Manufacturer	Boll & Kirch Filterbau GmbH	Boll & Kirch Filterbau GmbH	Filtrex
Mounting	Horizontal	Horizontal	Horizontal and vertical
Material of filter house	carbon steel P265GH	carbon steel P265GH	Bz-Al ASTM B148 C95800 Alloy
Maximum operating pressure	10 bar	10 bar	10 bar
Minimum back-pressure	1 bar	2 bar	1.7 bar
Max. pressure drop allowed	0.38 bar	0.38 bar	0.3 bar

1.3 UV-System

Operational range of one UV-chamber is 10 m3/h – 167 m3/h.

UV Models: 167 to 3000

Power Consumption: 35 kW per UV Lamp

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

a) chambers mounted in parallel (vertically or horizontally),

b) the construction of the chambers (i.e. dimensions, form and material) is exactly the same and

c) the construction of the two manifolds (i.e. dimensions, form and material) is exactly the same

1.4 Flow Meter (FM) and Flow Pressure Valve (FPV)

The control equipment has been designed and tested to keep the flow rate between 10 m3/h – 167 m3/h per UV-chamber. The FPV controls the flow to not exceed the maximum of 167m³/h per UV chamber.

1.5 Control System/PLC

Includes Control Panel, Filter Control, Sensor Box, Terminal Box, Back Flush Cabinet, Fresh Water Panel, Interlock Panel, UV Power Type TT, UV Power Type NED, UV Power Cabinet Type ETA, UV sensor, OBS control software, Ex Interlock Panel, Ex Sensor Box and El. Act. Power Distribution Panel

1.6 Materials

- UV-chambers and manifolds: CuNiFer 90/10 with hot dipped galvanized loose flanges

1.7 Software version 2.2x

2. DOCUMENTS AND DRAWINGS

- Piping & Insturmentation Diagram N° 300000 Rev. 7 dated 10/05/2022
- Electrical Wiring Diagram N° 500000 Rev. 6 dated 10/05/2022
- Bill of Materials Rev. 3 dated 22/05/2022 (including detailed drawings for the main components and ATEX equipments)
- Operation, Maintenance & Safety Manual Rev. 8 dated 04/07/2022
- Class Survey Checklist Rev. 8 dated 04/07/2022
- Flow distribution in parallel UV Chambers report N° 2015-0885 Rev. 1 dated 25/09/2015
- PLC Revision History Rev. 2.20 dated 16/05/2022
- Filter evaluation test report N° 262.1-034941-J-3 Rev. 0 dated 14/04/2021
- TQAP N° 0514/2019 v4.4 dated 27/04/2020

No departure from the above documents shall be made without the prior consent of the Society named on this certificate. The manufacturer must inform the Society of any modification or changes to these documents and drawings.

3. TEST REPORTS

3.1 Certificate and reports verifying compliance with the Code for Approval of Ballast Water Management Systems (BWMS Code), Res. MEPC 300(72):

- IMO Type Approval Certificate N° TAP0000271 Rev. 2 dated 07/07/2022 issued by DNV on behalf of the Norwegian

Administration.

A copy of the Type Approval Certificate of Ballast Water Management System issued by an Administration should be carried onboard ships fitted with such a system at all times. A reference to the test protocol and a copy of the test results should be available for inspection onboard ships.

3.2 - **Land-based test**, NIVA. All land-based tests were performed with a OBS334 BWMS with a Treatment Rated Capacity of 334m3/h consisting of two 167m3/h UV reactors and one Boll & Kirch 6.18.2 filter with 40 ìm mesh (replaced by 6.18.3 in the current version).

- N° SNO 6921-2015 version 2.1 dated June 2016

Land-based test, NIVA. All land-based tests were performed with a OBS334 BWMS with a Treatment Rated Capacity of 334m3/h consisting of two 167m3/h UV reactors and one Boll & Kirch 6.18.3 filter with 25 ìm mesh or Filtrex filter ACB 945-200 with 20 ìm mesh (depending on the test cycle).

- N° SNO-7523-2020 dated 14/10/2020

3.3 - **Shipboard test**, DHI. All land-based tests were performed with a OBS1000 BWMS with a Treatment Rated Capacity of 1000m3/h consisting of six 167 m3/h UV reactors and one Boll&Kirch 6.18.2 (40µm mesh size) Filter (capacity of 1200m3/h - replaced by 6.18.3 in the current version)..

- N° SNO-7063-2016 version 2.0 dated June 2016

3.4 - **Environmental testing**

- EMC & Environmental test reports N° 30486 Rev. 0 dated 30/09/2020 & N° 20984 Rev. 0

- Techincal reports N° 20226 Rev. 1 dated 11/06/2014, N° 20597 Rev. 0 dated 02/09/2016, N° 21250 Rev. 1 dated 09/02/2018, N° 21356 Rev. 0 dated 24/05/2018

- Report N° 2009-3397 Rev. 1

- Test reports N° 30732 Rev. 0, N° 30906 Rev. 1, N° 30972 Rev. 0

- Test reports N° U211234E1 Rev. 0 & N° E211234E1 Rev. 0

4. APPLICATION / LIMITATION

4.1 - This certificate is issued for the Ballast Water Management System **Optimarin Ballast System (OBS) & Optimarin Ballast System Ex (OBS Ex)** as far as the classification is concerned. The installation onboard a ship is subject to approval by the Flag Administration of that ship.

4.2 - Intended for Ballast Water Treatment systems:

- Ballast Water Uptake: Mechanical Filtration + UV disinfection

- Ballast Water Discharge: UV disinfection

The system can be used in the following common ambient and water conditions:

Water temperature range	No limitation
Ambient temperature range	0 to +55°C
Water salinity range	No limitation

4.3 Operating Conditions for **Optimarin Ballast System (OBS):**

Treatment rated capacity	72 - 3000m3/h
Treatment rated capacity (per reactor)	167 m3/h
Minimum Operating Pressure	1.5 bar
Maximum Operating Pressure	10 bar
Minimum holding time	No limitation

The system has a USCG mode of operation which applies a higher UV dose than the described IMO mode above. This type approval therefore also applies to operation in the USCG mode.

4.4 - The treatment rated capacity of the BWMS is not to be less than the operated flow rate of ballast pump(s).

4.5 - Minimum UV Intensity

UV-reactor size	UV Intensity lower limit at full flow	UV Intensity lower limit at 24% of full flow
167 m3/h	400	150

* UV intensity below lower limit implies that the ballast water is not treated in accordance with this certificate.

4.6 - Ex-certification is not covered by this certificate. Application for use in hazardous areas to be approved in each case. Optimarin Ballast System Ex (OBS Ex) is designed for use in Zone 1 hazardous areas. The OBS Ex system requires:

- Components certified according to the ATEX regulations to be used in potentially explosive atmospheres

- The system must be installed, operated and maintained according to a selected standard used to eliminate the risk of explosion

4.7 - The following documentation is to be submitted for approval on a ship on a case-by-case basis:

- On-board location of the BWMS unit (individual or skid-mounted);
- All connection details of interface towards ship's ballast piping systems;
- Layout of the system;
- Ballast stripping operations;
- All associated control, alarm and monitoring equipment;
- Wiring diagrams and the cable specifications;
- Pipes with associated fittings, automatic self-cleaning filter and electrical equipment including control, sensors, safety devices and cables required to be type approved are to be in conformity with the applicable Society's Rules;
- Materials list;
- Arrangement and location of Ballast Water sampling ports.

4.8 - A copy of the operating manual is to be maintained onboard.

5. PRODUCTION SURVEY REQUIREMENTS

5.1 The Ballast Water Management systems are to be supplied by **Optimarin AS** in compliance with the type and the requirements described in this certificate. This type of product is within the category IBV of Bureau Veritas Rule Note NR320.

5.2 **Optimarin AS** has declared to **Bureau Veritas** that some components detailed in this certificate can be manufactured/assembled at his suppliers's production sites, but however always under his full responsibility and reliability.

5.3 Production surveys requested for components:

a) Filters and Pressure Vessels are classified as Class 3 pressure vessels according to the Society's Rules Pt C, Ch 1, Sec 3 [table 2].

- Housings are to be hydraulically pressure tested to 1.5 times the design pressure under witnessing of a Society’s surveyor;
- Work’s certificate is to be provided for raw materials of shell assembly according to the Society's Rules [Class 3 vessels];
- Bureau Veritas certificate is required for final assembly according to the Society's Rules Pt C, Ch 1, Sec 3 [Class 3 vessels]

b) Electric and functional tests of Power and Control cabinets are to be performed to the surveyor satisfaction.

c) Production surveys for other components (class III piping and manifold, sensors, pumps, electrical cables...) are to be in compliance with the **Optimarin AS**'s regime and Society's Rules.

d) When components (non-skid) are manufactured at supplier or subcontractor workshops, production surveys are to be carried out by the BV local surveyor in charge of the survey.

5.4 Fabrication and welding requirements to comply with the Society's Rules Pt C, Ch 1, Sec 3 [4.10 Class 3 vessels]. Welding procedures and welding consumables are to be approved by the Society.

5.5 A Bureau Veritas product certificate is required for the complete system. Factory acceptance tests records, including functional tests and electrical test are to be provided to the surveyor satisfaction.

5.6 Functional tests of the system to be carried out after onboard installation as required by the IMO resolution MEPC.300(72).

5.7 For information, **Optimarin AS** has declared to Bureau Veritas the following production site:

Optimarin AS
Sjøveien 34
4315 Sandnes
Norway

6. MARKING OF PRODUCT

Each Ballast Water Management system shall be marked with:

- Manufacturer's name or trade mark
- Type designation
- Serial number
- Capacity
- Society's brand as relevant

7. OTHERS

It is **Optimarin AS**'s responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.

This certificate supersedes the Type Approval Certificate No. 24799/B1 BV issued by the Society.

***** END OF CERTIFICATE *****