



Marine & Offshore  
Division

Certificate number: 24799/B0 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
- NI 538 November 2011 Ballast Water Management Systems
- IMO Res. MEPC.174(58)
- IMO Res. MEPC.169(57)

*This certificate is issued to attest that BUREAU VERITAS 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: 13 Feb 2022**

**For BUREAU VERITAS,**

At BV OSLO, on 13 Feb 2017,

Rune MARSTEIN

*Rune Marstein*



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with BUREAU VERITAS. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of BUREAU VERITAS Marine & Offshore Division available on the internet site [www.veristar.com](http://www.veristar.com). Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against BUREAU VERITAS for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

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BV Mod. Ad.E 530 October 2014

This certificate consists of 6 page(s)

## THE SCHEDULE OF APPROVAL

### **1. PRODUCT DESCRIPTION**

#### **Optimarin Ballast System (OBS)**

#### **Optimarin Ballast System Ex (OBS Ex)**

#### **Ballast Water Technology**

- The Optimarin Ballast System consists 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 based on filtration and UV-treatment
- The system is operated from a control panel, which starts the automated ballast and de-ballast processes

#### **OBS Models**

167/100BK, 167/220BK, 334/220BK, 334/400BK, 500/400BK, 500/600BK, 667/600BK, 667/800BK, 834/800BK, 1000/1200BK, 1167/1200BK, 1334/1200BK, 1334/1600BK, 1500/1600BK, 1667/1600BK, 1667/2500BK, 1834/2500BK, 2000/2500BK, 2167/2500BK, 2334/2500BK, 2500/2500BK,

167/370BK2, 334/370BK2, 500/370BK2, 500/500BK2, 667/750BK2, 834/750BK2, 834/1400BK2, 1000/1400BK2, 1167/1400BK2, 1334/1400BK2, 1500/1400BK2, 1500/2100BK2, 1667/2100BK2, 1834/2100BK2, 2000/2100BK2, 2167/2100BK2, 2167/2500BK2, 2334/2500BK2, 2500/2500BK2, 2667/3800BK2, 2834/3800BK2, 3000/3800BK2

167/50FS, 167/125FS, 167/180FS, 334/180FS, 334/250FS, 334/375FS, 500/375FS, 500/500FS, 667/750FS, 834/750FS, 834/1000FS, 1000/1000FS

167/87FX, 167/135FX, 167/190FX, 334/190FX, 334/255FX, 334/340FX, 500/340FX, 500/515FX, 667/515FX, 667/770FX, 834/770FX, 834/1040FX, 1000/1040FX, 1167/1040FX

#### **Filters**

##### **1) Boll & Kirch Filter (BK)- 40 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. Horizontal mounting. Material of filter house: Boll Filter Type 6.18.2 carbon steel P265GH, fabricated with rubber lining protection on the inside, Boll Filter Type 6.18.3 cast iron coated

Filter Type	Flow range (m3/h)	Filter Type	Flow range (m3/h)
Bollfilter 100	24 – 100	Bollfilter MK2 370	83 – 370
Bollfilter 220	74 – 220	Bollfilter MK2 500	85 – 500
Bollfilter 400	110 – 400	Bollfilter MK2 750	85 – 750
Bollfilter 600	124 – 600	Bollfilter MK2 1400	168 – 1400
Bollfilter 800	150 – 800	Bollfilter MK2 2100	205 – 2100
Bollfilter 1200	182 – 1200	Bollfilter MK2 2500	214 – 2500
Bollfilter 1600	204 – 1600	Bollfilter MK2 3800	326 – 3800
Bollfilter 2500	271 – 2500		

Minimum back-pressure 1 bar; Max. pressure drop allowed 0.5 bar

##### **2) Filter Safe Filter (FS) - 40 µm wire mesh**

Filter Safe'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. Horizontal and vertical mounting. Material of filter house: carbon steel 37-2 with 300 micron protective coating

Filter Type	Flow range (m3/h)	Filter Type	Flow range (m3/h)
BS-025H/V	10 - 50	BS-150H/V	50 - 375
BS-050H/V	30 - 125	BS-200H/V	60 - 500
BS-070H/V	30 - 180	BS-300H/V	60 - 750
BS-100H/V	40 - 250	BS-400H/V	80 - 1000

Minimum back-pressure 1.7 bar; Max. pressure drop allowed 0.5 bar

**3) Filtrex Filter (FX) - 40 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. Horizontal and vertical mounting. Material of filter house Bz-Al ASTM B148 C95800 Alloy

Filter Type	Flow range (m3/h)	Filter Type	Flow range (m3/h)
ACB-906-100	15 – 87	ACB-945-200	45 – 340
ACB-910-150	25 – 135	ACB-955-250	50 – 515
ACB-915-150	35 – 190	ACB-985-300	65 – 770
ACB-935-200	35 – 255	ACB-999-350	95 – 1040

Minimum back-pressure 1.7 bar; Max. pressure drop allowed 0.3 bar

**UV-System**

Operational range of one UV-chamber is 20 m3/h – 167 m3/h.

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

**UV-Intensity meter**

Acceptable range: 100 – 2500 W/m2

The control equipment has been designed and tested to keep the measured UV intensity above 800 W/m2.

**UV-Power**

UV power Nedap and ETA

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

The control equipment has been designed and tested to keep the flow rate between 20 m3/h – 167 m3/h per UV-chamber. The FPV controls the flow to not exceed the maximum of 167m3/h per UV chamber.

**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

**Explosion proof version OBS Ex**

The Ex certified components are listed in the manufacturer's document Ex OBS Rev.4 dated 02/04/2014

**Materials**

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

**2. DOCUMENTS AND DRAWINGS****Documents**

- (BK & BK2) Operation, maintenance and safety Manual for Optimarin Ballast System, Rev. 1 Nov. 2016
- (FS) Operation, maintenance and safety Manual for Optimarin Ballast System, Rev. 1 Nov. 2016
- (FX) Operation, maintenance and safety Manual for Optimarin Ballast System, Rev. 1 Nov. 2016
- Installation Manual Optimarin Ballast System, Optimarin Project No. 10000-011 (including Ex) - Boll & Kirch filter Rev. 1
- OM-C-39 MC Commissioning and Class survey list, Rev. 3 dated 02/07/2014

*Above documents contain information on Optimarin Ballast System needed for installation, commissioning and operation.*

- Ex Equipment List Rev.4 dated 02/04/2014
- Marking OBS components
- DNV GL Type Approval Certificate A-14198 issued to Eta plus electronic gmbh for UV Power Cabinet Type Eta

**Drawings**

- P&I Diagram "OBS Generic Flow Diagram 13000-043" No. 300056 Rev. 01
- No. 140506-5 Assembly Principle and Spare Parts UV-Unit System 1
- No. 140508-5 Assembly Principle and Spare Parts UV-Unit System 2
- GA Sampling Assembly: No. 132760-2 Sampling Assembly Installation, No. 137453-5 Sampling Assembly for DN100 Pipes PN10-16, No. 100687-5 Sampling Assembly DN150-DN350 and No. 143212-2 Sampling Assembly DN400-DN600

*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**

- IMO Type Approval Certificate No. TAP000006X dated 31/01/2011 issued by DNV on behalf of the Norwegian Maritime Directorate (Norway).
  - Land-based testing report No. 5643-2008 dated 02/07/2008 issued by NIVA (Norway)
  - Shipboard testing report No. 5828-2009 dated 18/08/2009 issued by NIVA (Norway)
  - Additional land-based testing report No. 5840-2009 dated 07/09/2009 issued by NIVA (Norway)
- During testing, the test equipment was provided with one filter and two UV-chambers @ a flow rate of max. 334 m3/h.*
- Additional land-based testing of the Optimarin BWMS with alternate filter, Report SNO 6284-2012 approved by DNV
  - DNV report No. 385FIST130315-2 - Assessment of Bollfilter Automatic Filter type 6.18.3 versus 6.18.2
  - EMC and Environmental testing report No. 2009-3397, rev. 01 dated 04/11/2009 issued by DNV
  - EMC test report of the UV Power Cabinet, Report No. 9505 330 462XX 002, rev. 3 approved by DNV on 23/08/2012
  - Mechanical and Climate test report of the UV Power Cabinet, Report No. 9505 330 462XX 001 approved by DNV on 23/08/2012
  - EMC and Environmental testing of Gönzheimer Elektronik GmbH Control unit F850S and power supply for Optimarin AS, Report 20226, Rev. 1
  - Survey report for verification and testing of addition of Back Flush Cabinet, Fresh Water Panel and Interlock Panel dated 09/12/2013

### **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 Treatment Rated Capacity: 167 m3/h (one UV-chamber). The rated capacity of the BWMS is not be less than the flow rate of the largest ballast pump. The UV-treatment is built up by UV-chambers each with a capacity of 167 m3/hr. The number of UV-chambers is calculated as a multiple of 167 depending on the actual flow to be treated (rated value of the ballast pumps). The UV-chambers are to be fitted horizontally and the assembly must be properly supported to the ship.

4.3 Intended for Ballast Water Treatment systems:

- Ballast Water Uptake: Filtration + UV disinfection
- Ballast Water Discharge: UV disinfection

4.4 Limit values and Environmental Conditions of the **Optimarin Ballast System (OBS)**

<b>System Design Pressure</b>	Max. 10 bar
<b>Flow Range</b>	50 - 3000 m3/h
<b>Power Consumption</b>	Max. 40 kW per UV chamber
<b>Power Supply</b>	400-440 VAC +/-10% / 3PH / 60Hz
<b>Water Temperature</b>	-2 → +37 °C
<b>Ambient Air Temperature</b>	0 → +50 °C
<b>Relative Humidity</b>	Max. 90 %
<b>Inclination</b>	+/- 15° either way, +/-22.5° rolling & +/-7.5° pitching
<b>Range of Salinity</b>	The system has not been tested in fresh water
<b>IP Rating</b>	Systems with Nedap UVpower: IP44 Systems with ETA Plus: IP 54

*Note: Temperature is no limiting condition for this system.*

4.5 UV Intensity

- UV-chamber: 20-167 m3/h (one UV-chamber)
- UV-lamp power: 35 kW
- UV-intensity meter: 100-2500 W/m2

*Note: UV intensity below 100 W/m2 implies that the ballast water is not treated in accordance with this certificate.*

4.6 Application for use in hazardous areas is to be approved in each case according to the Society's rules. 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

The Ex certified components are listed in the manufacturer's document Ex OBS Rev.4 dated 02/04/2014

4.7 Installation surveys and commissioning procedures on board BV-classed ship: To be witnessed by the Society surveyor for each on-board installation of a Type Approved OBS system. It shall be the duty of **Optimarin AS**'s customers to submit the following documents for approval to the Society for each installation intended for retrofits or new construction:

- 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 24].

- 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.174(58).

### **Production location (Final assembly)**

**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**

7.1 This approval is given on the understanding that the manufacturer will accept full responsibility for informing shipbuilders or their sub-contractors of the proper method of fittings and general maintenance of the Ballast Water Management system and of the conditions of this approval.

7.2 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.

*This certificate supersedes the Type Approval Certificate No. 24799/A0 BV issued on 01/11/2011 by the Society.*

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