



TYPE APPROVAL CERTIFICATE OF BALLAST WATER MANAGEMENT SYSTEM

issued under the authority of the Government of
BARBADOS
by Polish Register of Shipping¹

No. No. TM/1578/867023/21

THIS IS TO CERTIFY that the ballast water management system listed below has been examined and tested in accordance with the requirements of the specifications contained in the *Code for Approval of Ballast Water Management Systems* (resolution MEPC.300(72)).

This certificate is valid only for the ballast water management system referred to below.

Name of ballast water management system **Optimarin Ballast System, Optimarin Ballast System Ex**
Ballast water management system manufactured by Optimarin AS Sjøveien 34, 4315 Sandnes, Norway
Under type and model designations Optimarin Ballast System 167/72BK3 - 3000/3100BK3,
167/50BK4 - 1000/1040BK4 and 167/87FX2 - 3000/3000FX2

and incorporating:

To equipment/assembly drawing No. Equipment according to Flowcharts and Electrical system date -
layouts as listed in Addendum to this Certificate

Other equipment manufactured by

To equipment/assembly drawing No. Listed in Addendum to this Certificate date -

Treatment Rated Capacity [m³/h] 72 ÷ 3000

A copy of this Type Approval Certificate shall be carried on board a ship fitted with this ballast water management system, for inspection on board the ship. This Type Approval Certificate is based on DNV approval on behalf of Norwegian Maritime Authority, No.: TAP0000271, issued on 23 October 2020.

Limiting Operating Conditions imposed are described in Type Approval Certificate and its Addendum.

Other restrictions imposed include the following: ---

This equipment has been designed for operation in the following conditions: No limitation

Issued at

Gdańsk, 2021-12-31



Grzegorz Pettke

¹ Polish Register of Shipping means Polski Rejestr Statków S.A., seated in Gdańsk, al. gen. Józefa Hallera 126, 80-416 Gdańsk, Poland, registered in the Register of Entrepreneurs of the National Court Register, under entry number 0000019880. Polish Register of Shipping, its affiliates and subsidiaries, their respective officers, employees or agents are, individually and collectively, referred to as Polish Register of Shipping or as PRS for short.

ADDENDUM TO TYPE APPROVAL CERTIFICATE NO. TM/1578/867023/21

Polish Register of Shipping certifies that the undernoted product type

BALLAST WATER TREATMENT SYSTEM

Description of product:

OPTIMARIN BALLAST WATER TREATMENT SYSTEM

Models:

**Optimarin Ballast System, Optimarin Ballast System Ex
167/72BK3 - 3000/3100BK3,
167/50BK4-1000/1040BK4,
167/87FX2 - 3000/3000FX2.**

manufactured by

Optimarin AS

Sjøveien 34, 4315 Sandnes
Norway

is approved as complying with the requirements of the

- International Convention for the Control and Management of Ship's Ballast Water and Sediments, 2004,
- Res. MEPC.300(72) and IMO Res. MEPC.169(57),
- PRS Rules for Statutory Survey of sea-going ships, Part IX Environmental Protection, 2021.

Certificate No. **TM/1578/867023/21**

Expiry date **2026-12-30**

Issued at

Gdańsk, 2021-12-31



Signature

Product Description:

Optimarin Ballast System (OBS) and Optimarin Ballast System Ex (OBS Ex) are automated in-line treatment systems for the biological disinfection of ballast water. Systems operate without chemicals and combine initial filtration with a form of UV treatment to remove organisms.

Each system consists of the following main components: filter, back flush pump, filter control cabinet, flowmeter, UV chamber(s), control panel.

In addition, Optimarin Ballast System Ex (OBS Ex) is prepared for installation in hazardous areas because electrical components are provided with appropriate Ex certificates.

OBS BWMS model designation:

xxxx/yyyyBK3 and xxxx/yyyyFX2, where xxxx designates the below listed UV model and yyyy the below listed filter model of either the filter series manufactured by Boll & Kirch (BK3) or the filter series manufactured by Filtrex (FX2).

UV models: 167, 334, 500, 667, 834, 1000, 1167, 1334, 1500, 1667, 1834, 2000, 2167, 2334, 2500, 2667, 2834 and 3000.

BK3 filter models: 72, 94, 204, 378, 518, 614, 1274, 1384, 2040 and 3100.

BK4 filter models: 50, 100, 170, 340, 515, 770 and 1040.

FX2 filter models: 87, 135, 190, 255, 340, 515, 770, 1040, 1500, 2100 and 3000.

A OBS BWMS model suitable for installation in hazardous area are designated with the suffix EX (e.g. xxxx/yyyyBK3EX).

Technical characteristics:**The treatment sequence:**

- Ballast water uptake: Filter and UV disinfection.
- Ballast water discharge: UV disinfection.

The treatment rated capacity:

- 72 - 3000 m³/h

The system may be fitted with the following self-cleaning screen filters:

- aquaBoll 6.18.3 filter series with 25 µm mesh manufactured by Boll & Kirch (BK3 or BK3 EX).
- aquaBoll BWT filter series with 25 µm mesh manufactured by Boll & Kirch (BK4)
- ACB filter series with 20 µm mesh manufactured by Filtrex (FX2 or FX2 EX).

Temperature and Salinity:

Temperature and salinity of the ballast water are not a limiting condition for the ballast water treatment system.

Holding time:

The OBS BWMS has demonstrated performance to the discharge standard with a minimum holding time between uptake and discharge of 24 hours in land-based testing for the IMO mode. UV treatment is instant and does not require any hold time in a ballast tank to render organisms inviable. Therefore, holding time is not found to be a limiting condition for the ballast water management system.

Dosing:

The BWMS has demonstrated performance to the discharge standard when the UV intensity (UVI) and flow rate is measured above the below parameters.

Operation mode	TRC [m ³ /h]	UVI lower limit at 24% of full flow [W/m ²]	UVI lower limit at full flow (TRC) [W/m ²]
IMO	167 per chamber	150*	400 **

* UVI below lower limit implies that the ballast water is not treated in accordance with this certificate. When targeting this UVI limit in land-based testing, the measured UVT was 45-46%. UVT may vary depending on the water quality parameters, i.e. particles and dissolved organic carbon.

** When targeting this UVI limit in land-based testing, the measured UVT was 54-56%.

The system has also includes UV-lamp power optimization control based on measured UV-intensity. Lamp power can be reduced when UVI measures above 800 W/m².

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 USCG mode.

Treatment Rated Capacity (TRC) of the BWMS:

The Treatment Rated Capacities (TRC) of the designated OBS BWMS models during ballasting is limited to either on the TRC of the UV system or the TRC of the selected filter model, whichever is lowest.

During deballasting, the TRC is limited to the TRC of the UV system only.

The UV system is formed by several UV chambers installed in parallel configuration using specific manifolds with the TRCs as listed below. The TRC of the filter models, BK3 and FX2 are also listed in tables below. The minimum flow rate at which designated OBS BWMS model can be operated is the minimum flow rate of the selected filter model + (10m³/h*number of UV chambers).

The OBS BWMS controls the flow rate in the ballast water line by using a flow control valve to ensure that flow rates are kept within the TRC.

Manifold model	Number of UV chambers	TRC [m ³ /h]	Manifold model	Number of UV chambers	TRC [m ³ /h]
Type 1, DN150	1	167	Type 2, DN200	2	334
Type 1, DN200	2	334	Type 2, DN250	3	500
Type 1, DN250	3	500	Type 2, DN300	4	667
Type 1, DN300	4	667	Type 2, DN300	5	834
Type 1, DN300	5	834	Type 2, DN350	6	1000
Type 1, DN350	6	1000	Type 2, DN400	7	1167
Type 1, DN400	7	1167	Type 2, DN400	8	1334
Type 1, DN400	8	1334	Type 2, DN400	9	1500
Type 1, DN400	9	1500	Type 2, DN500	10	1667
Type 1, DN500	10	1667	Type 2, DN500	11	1834
Type 1, DN500	11	1834	Type 2, DN500	12	2000
Type 1, DN500	12	2000	Type 2, DN500	13	2167
Type 1, DN500	13	2167	Type 2, DN500	14	2334
Type 1, DN500	14	2334	Type 2, DN500	15	2500
Type 1, DN500	15	2500	Type 2, DN500	16	2667
			Type 2, DN600	17	2834
			Type 2, DN600	18	3000

Filtrex ACB	Model designation	Flow range [m ³ /h]	Boll & Kirch 6.18.3/AquaBoll	Model designation	Flow range [m ³ /h]
ACB-906-100	87FX2	15 - 87	aquaBoll 273	72BK3	19-72
ACB-910-150	135FX2	25 -135	aquaBoll 324	94BK3	19-94
ACB-915-150	190FX2	35 - 190	aquaBoll 356	204BK3	24-204
ACB-935-200	255FX2	35 - 255	aquaBoll 419	378BK3	33-378
ACB-945-200	340FX2	45 - 340	aquaBoll 521	518BK3	33-518
ACB-955-250	515FX2	50 - 515	aquaBoll 600	614BK3	34-614
ACB-985-300	770FX2	65 - 770	aquaBoll 750	1274BK3	50-1274
ACB-999-350	1040FX2	95 - 1040	aquaBoll 900	1384BK3	47-1384
ACB-9100-400	1500FX2	126 - 1500			

Boll & Kirch AquaBoll BWT	Model designation	Flow range [m ³ /h]
aquaBoll BWT DN 80	50BK MK4	8-50
aquaBoll BWT DN 100	100BK MK4	15-100
aquaBoll BWT DN 150	170BK MK4	23-170
aquaBoll BWT DN 200	340BK MK4	51-340
aquaBoll BWT DN 250	515BK MK4	59-515
aquaBoll BWT DN 300	770BK MK4	88-770
aquaBoll BWT DN 350	1040BK MK4	109-1040

Pressure:

The minimum and maximum system operating pressure and the differential pressure triggering backflushing are listed below.

Filter Type	Minimum inlet pressure (back-pressure)	Differential pressure triggering backflushing	Maximum operating pressure
Filtrex Type ACB, FX2	1.5 bar	>0.3 bar	10 bar
aquaBoll 6.18.3, BK3 aquaBoll BWT, BK4	1.5 bar	>0.38 bar	10 bar

Control and monitoring equipment:

Software version:

The OBS BWMS is type approved with system control software version: 2.1x

Any change to the software is to be recorded as long as the system is in use on board. Major changes in the software, as defined in the Optimarin checklist, OM-C-59, require approval. Testing of the application functions of a revised software may be required.

Safety measures:

The OBS BWMS is type approved with the following instruments for monitoring the safe operation of the BWMS and for activating, as necessary, an automatic shutdown of the BWMS:

- Temperature sensor (TTxx) installed in each UV chamber,
- Temperature switch (TSxx) installed in each UV chamber and arranged with safety function independent of BWMS control,
- Pressure sensors (PT01) installed after the filter,
- Flow meter (FM01) installed after the filter.

The OBS BWMS is type approved with the electrical and electronic components (including the above listed instruments for monitoring safe operation of the BWMS) indicated on the P&ID and as specified in the BOM. Except for the components listed in the table below, alternate models may be used provided that information regarding the selected components is part of the documentation related to the specific installation, by providing either a reference to valid type approval certificate or technical documentation demonstrating that the selected component was subject to environmental testing as per IACS UR E10.

For the following electrical and electronic components, the models specified in the table below shall be used:

Tag ID	Description	Item	Manufacturer
+CP	CONTROL PANEL MK3	150876	Optimarin AS
+SCP	SUB-CONTROL PANEL MK3	152052	Optimarin AS
+FC	FILTER CONTROL MK3	150737	Optimarin AS
	FILTER CONTROL EX MK3	151199	Optimarin AS
	FILTER CONTROL EX MK3 MTL	152706	Optimarin AS
+SBx	SENSOR BOX OVA MK3	151128	Optimarin AS
	SENSOR BOX 250VA MK3	151114	Optimarin AS
	SENSOR BOX 700VA MK3	151058	Optimarin AS
	SENSOR BOX MK3	151135	Optimarin AS
	SENSOR BOX OVA EX MK3	151215	Optimarin AS
	SENSOR BOX 250VA EX MK3	151231	Optimarin AS
	SENSOR BOX 700VA EX MK3	151763	Optimarin AS
	SENSOR BOX EX MK3	151207	Optimarin AS
	SENSOR BOX OVA EX MK3 MTL	152695	Optimarin AS
	SENSOR BOX 250VA EX MK3 MTL	152700	Optimarin AS
	SENSOR BOX 700VA EX MK3 MTL	152702	Optimarin AS
	SENSOR BOX EX MK3 MTL	152704	Optimarin AS
+EXIP	EX INTERFACE PANEL MK3	151142	Optimarin AS
+IP	INTERLOCK PANEL MK3	151859	Optimarin AS
+FWP	FRESH WATER PANEL MK3	151779	Optimarin AS
+ACP	ACTUATOR CONTROL PANEL 700VA MK3	151822	Optimarin AS

	ACTUATOR CONTROL PANEL 1600VA MK3	151813	Optimarin AS
	ACTUATOR CONTROL PANEL 3600VA MK3	151804	Optimarin AS
+PDP	POWER DISTRIBUTION PANEL SMALL MK3	152053	Optimarin AS
+GPS	GPS JUNCTION BOX MK3	152057	Optimarin AS
	GPS JUNCTION BOX 230VAC MK3	152058	Optimarin AS
+ UVPXX	UV POWER CABINET TYPE NED MK3	145923	NedapN.V.
	UV POWER CABINET TYPE ETA	145128	Eta plus electronic GmbH
	UV POWER CABINET TYPE UVA	150431	Uvantech AS
+TBxx	TERMINAL BOX MK3	148644	Optimarin AS
	TERMINAL BOX MK2 TYPE TRA	148540	R. Stahl Tranberg AS
	TERMINAL BOX MK2 EX TYPE TRA	145956	R. Stahl Tranberg AS
+EXJBxx	JUNCTION BOX EX TYPE TRA	148640	R. Stahl Tranberg AS
	JUNCTION BOX EX TYPE BAR	145466	Bartec Technor AS
Uvxx	UV SENSOR 2300W_m2 TYPE ILM	117079	IL Metronie Sensortechnik GmbH
	UV SENSOR 2300W_m2 EX2C EX TYPE ILM	149352	IL Metronie Sensortechnik GmbH

Hazardous area / Ex-proof

According to the Rules and Ex-certification / Special Condition for Safe Use, listed in a valid Ex-certificate issued by a Ex-certification is not covered by this certificate. Installation in a hazardous area are to be approved in each case notified/recognized Certification Body.

Documents and drawings

See Appendix 1 – List of technical documentation.

Documents listed in above mentioned Appendix 1 contain information of OPTIMARIN Ballast Treatment System needed for installation, commissioning and operation onboard ships classed by PRS.

Basis of approval

Biological test reports:

NIVA, Land-based testing of OBS 334 Ballast Water Management system of Optimarin AS - Final Report, Report SNO 6921-2015, Final report v2.1, June 2016.

NIVA, Shipboard testing of the Ballast Water Management System OBS1000 of Optimarin AS, Report SNO 7063-2016, Final report v2.0, June 2016.

NIVA, Land-based testing of OBS 334 Ballast Water Management system of Optimarin AS - Final Report, Report SNO 7523-2020, Final report, August 2020.

DHI, Biological comparison tests of three filters manufactured project 11824919, Final test report, 11 January 2021.

Environmental test reports:

Applica EMC and Environmental testing of Gonnheimer Elektronik GmbH Control unit F850S and power supply for Optimarin AS, Report 20226, Rev. 1.

Applica Technical Report Optimarin AS Environmental testing of Temperatures Switches, Report No. 21250 Rev 1.

Applica Technical Report Optimarin AS Environmental testing of Sensor Box +EXSB01 and temperature transmitter TR-34, Report No. 21356 Rev 0.

Applica Technical Report Optimarin AS Environmental testing, Report No. 20597 Rev 0.

Applica Technical Report Optimarin AS Environmental testing of Environmental testing of TB (Terminal Boxes) Report No.20984 Rev 0.

Applica Technical Report Optimarin AS EMC and Environmental testing of new components to Optimarin BWMS, Report No. 30486 Rev 0.

DNV GL Type Approval Certificate TAE000037U issued to UVANTECHAS for UV Power Cabinet Type UVA.

Applica Technical Report, Optimarin AS EMC and Environmental testing of Optilink Panel 4G, Report No. 30732 Rev. 0.

System descriptive documentation:

Installation Manual for Optimarin Ballast System, Rev. 7, Template dated 2021-09-21. This manual is prepared specific to BK MK3, BK MK4, FX MK2, BK MK3 EX or FX MK2 EX filters

Optimarin, OM-C-59 Software maintenance and development checklist, Rev 3.

Optimarin, UV chamber with instrumentation, Illustration for DNVGL dual safety layer requirement, Drawing No. 100000.

DNV GL report, flow balance calculation, Flow Distribution in Parallel UV chambers, 2015-0885, Rev. 1, 25.09.2015.

DNV GL, Filter comparison of Boll & Kirch filter model 6.18.2 and 6.18.3, 385FIST130315-2.

Optimarin, Filter Comparison Data Type BK, 2020.

Optimarin, Filter Comparison Data Type FX, 2020.

Optimarin, Flow pressure valve replacement report, Rev.1.

DNV, Evaluation test report, Equivalence of the aquaBoll BWT, BWT RB and 6.18.3 filter designs, file 262.1-034941-J-3, Rev. 0

Commissioning procedure:

DNV Class survey checklist for Optimarin Ballast System, Rev. 4, template dated 2021-09-21

Tests carried out:

Land-based testing in accordance with Resolution MEPC.279(70) and 46 CFR 162.060-26 using Optimarin OBS model 334 and Boll & Kirch 6.18.2 filter with 40 im mesh.

Shipboard testing in accordance with Resolution MEPC.279(70) and 46 CFR 162.060-28 using Optimarin OBS model 1000 and Boll & Kirch 6.18.2 filter with a 40 im mesh.

Additional Land-based testing in accordance with Resolution MEPC.300(72) and 46 CFR 162.060- 26 using Optimarin OBS model 334 and Boll & Kirch 6.18.3 aquaBoll filter with 25 im mesh filter.

Additional Land-based testing in accordance with Resolution MEPC.300(72) and 46 CFR 162.060- 26 using Optimarin OBS model 334 and Filtrex filter ACB 945-200 with 20 im mesh.

Biological comparison testing using Boll & Kirch aquaBoll 6.18.3 and aquaBoll BWT filter with 25 µm mesh filter.

Type tests of the control and automation system witnessed by DNV GL.

Testing in accordance with environmental test specification for instrumentation and automation equipment, DNVGL Standard for Certification no DNVGL-CG-0339 (December 2019) and Resolution MEPC.300(72) and 46 CFR 162.060-30.

Additional testing of Optimarin OBS model in accordance with environmental test specification for instrumentation and automation equipment, DNVGL-CG-0339 Environmental test specification for electrical, electronic and programmable equipment and systems (Jan, 2020) and Resolution MEPC. 174(58).

Type test of the control and automation system for optimized flow control, witnessed by DNV GL.

Remarks

1. Installation on board is to be carried out in accordance with Manufacturer's Instructions.

Application / Limitation

This certificate is issued for the ballast water treatment system **OPTIMARIN Ballast System** as far as the classification is concern.

1. Details of the location of the BWTS and its connection to the ship's ballast system are to be indicated on the ship's plans, which are to be submitted for approval.
2. Application for use in hazardous areas to be approved in each case based on the Rules and Ex Certification.
3. The system is to be operated according to the manual provided by the manufacturer.
4. A copy of the operating manual is to be maintained onboard.
5. A copy of the Type Approval Certificate of BWTS issued by PRS should be carried onboard ships fitted with such system at all times as well as the DNV Type Approval Certificate issued on behalf of Norwegian Maritime Authority, No.: TAP0000271 on 23 October 2020.

Notes

- 1 The approval is valid only when the product is used in accordance with the manufacturer's conditions.
- 2 Changes of product design and materials which influence product quality are to be agreed with PRS.
- 3 Type Approval Certificate will be cancelled in the case of dissatisfactory service results, modifications made in the product structure or materials without PRS' consent, not advising PRS of the manufacturer's name change.

In carrying out survey activities Polski Rejestr Statków S.A. (PRS) makes efforts to ensure that they are conducted with conscientiousness and the principles of good practice, with due regard paid to the state-of-the-art technology. However, neither PRS nor its Surveyors shall bear any civil liability for damage, loss or expense which may arise in consequence or as the outcome of conducting these activities, or the result of information or advice given to the customer by PRS, irrespective of whether or not such were the result of neglect, error or lack of proper information. Nevertheless, should the customer prove that such damage, loss or expense was due to negligence on the part of the Society or its Surveyors, PRS will pay compensation to the customer for his loss up to but not exceeding the amount due for services provided, forming the basis of the customer's claim. In no cases will PRS be responsible for indirect losses (loss of prospective profits, loss of contract, inability to undertake activities, etc.) sustained by the customer and associated with the executing of a commission by PRS.

Appendix 1 – List of technical documentation

Type	Title		Dwg No.	Rev.	Status
Piping and instrumentation diagram (P&ID)	Optimarin Ballast Treatment System Flow Diagram	Flow Diagram	300000	Rev. 6 2021-07-02	AP
		Flow Diagram EX			
		Flow Diagram (stripping with filter)			
		Flow Diagram (stripping without filter)			
General arrangement (GA) drawings	<p>Filter BK3 (10 sizes): FILTER 72M³H DN80 PN10 TYPE BK MK3 to FILTER 3100M³H 600A 10K TYPE BK MK3</p> <p>Filters BK3 Ex (10 sizes): FILTER 72M³H DN80 PN10 IIB EX TYPE BK MK3 to FILTER 3100M³H 600A 10K IIB EX TYPE BK MK3</p> <p>Filter BK MK4 (10 sizes): FILTER 50M³H DN80 PN10 TYPE BK MK4 to FILTER 1040M³H DN350 PN10 TYPE BK MK4</p> <p>Filters FX2 (11 sizes): FILTER 87M³H DN100 PN10 TYPE FX MK2 to FILTER FILTER 3000M³H DN600 PN10 TYPE FX MK2</p> <p>Filters FX MK2 EX (11 sizes): FILTER 87M³H DN100 PN10 IIB EX TYPE FX MK2 to FILTER 3000M³H DN600 PN10 IIB EX TYPE FX MK2</p> <p>Manifolds system 1 (13 sizes): MANIFOLD DN150 PN10 SYSTEM1-1 to MANIFOLD DN500 PN10 SYSTEM1-15</p> <p>Manifolds system 2 (13 sizes) MANIFOLD DN200 PN10 SYSTEM2-2 to MANIFOLD 600A 10K SYSTEM2-18</p> <p>FLOW PRESSURE VALVE DN100 PN10 TYPE GA EX to FLOW PRESSURE VALVE DN500 PN10 TYPE GA EX</p> <p>FLOW PRESSURE VALVE DN100 PN10 TYPE BER to FLOW PRESSURE VALVE DN400 PN10 TYPE BER</p> <p>FLOW PRESSURE VALVE DN150 PN10 WAF or LUG TYPE ELT to FLOW PRESSURE VALVE DN600 PN10 WAF or LUG TYPE ELT</p> <p>FLOW PRESSURE VALVE DN150 PN10 WAF or LUG TYPE ELT EX</p>		1xxxxx	See, BOM	AP
Electrical wiring diagrams	Manuals	CONTROL PANEL Internal Wiring Diagram	501188	Rev.1	AP
		Optimarin Ballast System Cable list	File: 06 XXXXXX-XX- XX-XX Cable list	Rev.1	AP
		Optimarin Ballast System Cable list (Ex)	File: 06 XXXXXX-XX- XX-XX Cable list	Rev.1	AP
Electrical wiring diagrams	Generic flow and wiring	CONTROL PANEL Internal Wiring Diagram	500000 Rev.5 File: 500000_5_OBS_ Wiring_diagram _with_ETA	Rev.5 2021-06-25	AP
		CONTROL PANEL Internal Wiring Diagram	500000 Rev.5 File: 500000_5_OBS_ Wiring_diagram	Rev.5 2021-06-25	AP



		CONTROL PANEL Internal Wiring Diagram	500000 Rev.5 File: 500000_5_OBS_ Wiring_diagram _with_ETA_	Rev.5 2021-06-25	AP
	UV system	Environmental testing of Ballast Water Management System	Report No.: 20597	Rev.0	VC
Electrical wiring diagrams	Optimarin Ex solution 01 Ex p controller	EMC and Environmental testing of Gönzheimer Elektronik GmbH Control unit F850S and power supply for Optimarin AS	Report No. : 20226	Version: 1	VC
	Instrumentation 01 Flow - 01 TYPE MEA (Megatest)	Technical Report Optimarin AS Environmental testing of Ballast Water Management System	Report No.: 20597	Rev No.0	VC
	Temperature - 01 Transmitter - 01 TYPE WIK	Technical Report Optimarin AS EMC and Environmental testing of sensor box +EXSB01 and temperature transmitter TR-34	Report No.: 21356	Rev No.0	VC
	Temperature - 02 Switch - 01 TYPE JUM	Technical Report Optimarin AS Environmental testing of Temperatures Switches	Report No.: 21250	Rev No.1	VC
Electrical wiring diagrams	Temperature - 02 Switch - 02 TYPE SOL	Technical Report Optimarin AS Environmental testing of Temperatures Switches	Report No.: 21250	Rev No.1	VC
	UV-intensity- 01 TYPE ILM	Technical Report Optimarin AS Environmental testing of Ballast Water Management System	Report No.: 20597	Rev No.0	VC
	Cabinets, horns and transformers - 01 Cabinets MK1_2	Technical Report Optimarin AS Environmental testing of Ballast Water Management System	Report No.: 20597	Rev No.0	VC
	Cabinets, horns and transformers - 02 Cabinets MK3	Technical Report Optimarin AS EMC and Environmental testing of new components to Optimarin Ballast Water Management System	Report No.: 30486	Rev No.0	VC
Electrical wiring diagrams	Cabinets, horns and transformers - 03 UV Power Cabients - 01 TYPE NED	Technical Report Optimarin AS Environmental testing of Ballast Water Management System	Report No.: 20597	Rev No.0	VC
	Cabinets, horns and transformers - 03 UV Power Cabients - 02 TYPE ETA	Technical Report Optimarin AS Environmental testing of Ballast Water Management System	Report No.: 20597	Rev No.0	VC
	Test Reports	EMC and Environmental testing of Gönzheimer Elektronik GmbH Control unit F850S and power supply for Optimarin AS	Report No. : 20226	Version: 1	VC
		Technical Report Optimarin AS Environmental testing of Ballast Water Management System	Report No.: 20597	Rev No.0	VC
		Technical Report Optimarin AS Environmental testing of TB (Terminal Boxes)	Report No.: 20984	Rev No.0	VC

Electrical wiring diagrams		Technical Report UVanTECH EMC and Environmental testing of UV Power type UVanTECH 35KWC	Report No.: 21104	Rev No.1	VC	
		Technical Report Optimarin AS Environmental testing of Temperatures Switches	Report No.: 21250	Rev No.1	VC	
		Technical Report Optimarin AS EMC and Environmental testing of sensor box + EXSB01 temperature transmitter TR-34	Report No.: 21356	Rev No.0	VC	
		Technical Report Optimarin AS EMC and Environmental testing of new components to Optimarin Ballast Water Management System	Report No.: 30486	Rev No.0	VC	
	Bill of materials (BoM)	OBS complete BoM	-	Rev. 2 2021-09-21	AP	
	Operation, maintenance and safety manual (OMSM)	Operation, maintenance and safety manual for Optimarin Ballast System	Template OMS for BK3	3XXXX-XX-XX-XX	Rev. 7 2021-09-21	N
Template OMS for BK3 EX						
Template OMS for FX2						
Template OMS for FX2 EX						
AP – approved, VC – verified for conformity with PRS Publication 11/P, N – Noted						