

EC-TYPE EXAMINATION CERTIFICATE (MODULE B)

Certificate No:
MEDB00007J1

Application of: Directive 2014/90/EU of 23 July 2014 on marine equipment (MED), issued as "Forskrift om Skipsutstyr" by the Norwegian Maritime Authority. This Certificate is issued by DNV AS under the authority of the Government of Norway.

This is to certify:

That the Sewage systems (for use by ships, other than passenger ships, in all areas and by passenger ships outside MARPOL Annex IV special areas)

with type designation(s)
ECOMar 20 SX-R, 32 SX-R, 45 SX-R, 70 SX-R, 145 SX-R and 340 SX-R

Issued to

TECNICOMAR S.P.A.
Marsala TP, Italy

is found to comply with the requirements in the following Regulations/Standards:

Regulation (EU) 2021/1158,
item No. MED/2.6b Marpol 73/78 as amended, Annex IV Regulation 9, IMO Res. MEPC.227(64) excluding section 4.2.

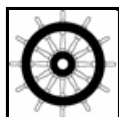
Further details of the equipment and conditions for certification are given overleaf.

This Certificate is valid until **2026-11-04**.

Issued at **Høvik** on **2021-11-05**

DNV local station:
Italy/Malta CMC

Approval Engineer:
Thomas Grafton



Notified Body
No.: **0575**

for **DNV AS**

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Sverre Olav Bergli
Head of Notified Body



The mark of conformity may only be affixed to the above type approved equipment and a Manufacturer's Declaration of Conformity issued when the production-surveillance module (D, E or F) of Annex B of the MED is fully complied with and controlled by a written inspection agreement with a Notified Body. The product liability rests with the manufacturer or his representative in accordance with Directive 2014/90/EU.
This certificate is valid for equipment, which is conform to the approved type. The manufacturer shall inform DNV AS of any changes to the approved equipment. This certificate remains valid unless suspended, withdrawn, recalled or cancelled.
Should the specified regulations or standards be amended during the validity of this certificate, the product is to be re-approved before being placed on board a vessel to which the amended regulations or standards apply.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Product description

The ECOMar SX-R series treats batches of sewage using the following process: i) transfer of a fixed amount of sewage from a holding tank to a treatment tank, ii) chemical treatment and addition of a flocculant, iii) maceration and return to treatment tank, iv) filtration and UV treatment prior to overboard discharge, v) washing of the tank and discharge of the waste (sewage sludge).

Periodically, a special washing cycle is performed using water to backflush the filter and fill the treatment tank. The special washing cycle begins with an empty treatment tank and uses the following process: i) Backflush the filter with water and fill the treatment tank, ii) chemical treatment and addition of a flocculant, iii) maceration and return to treatment tank, iv) filtration and UV treatment prior to overboard discharge, v) washing of the tank and discharge of the waste (sewage sludge).

The filter may also be backwashed manually using water (e.g. during commissioning, after changing the filter, or for maintenance) and the waste water may be discharged overboard.

The chemical treatment and flocculation processes uses hydrogen peroxide and ECOFLOC (*).

(*) ECOFLOC is a Tecnicomar S.p.A. brand product.

The ECOMar SX-R series is an upgrade applied to older ECOMar series models to meet the latest requirements. After the upgrade the model is similar to the ECOMar SX series which is covered by a separate EC Type Examination Module B certificate. Due to the re-use of some of the parts from the original ECOMar unit and the addition of some alternate parts compared to the ECOMar SX, the upgrade is given a new name, ECOMar SX-R.

Application

<i>Model</i>	<i>Hydraulic Loading (l/day)</i>	<i>Organic Loading, BOD₅ without nitrification (kg/day)</i>
ECOMar 20 SX-R	3,931	1.49
ECOMar 32 SX-R	5,847	2.21
ECOMar 45 SX-R	7,453	2.82
ECOMar 70 SX-R	10,985	4.15
ECOMar 145 SX-R	19,196	7.26
ECOMar 340 SX-R	53,989	22.14

Limitations

Condition of heel up to (max angle of pitch and roll):	22.5 degrees
Range of environmental temperature	0 to 55 degrees Celsius
Maximum environmental humidity	95%

The ECOMar SX-R series shall not be used on Passenger Ships in Special areas (ref. IMO Res. MEPC.227(64) Section 4.2).

The equipment is not permitted to be installed in spaces subject to explosion hazards.

The design of structural tanks and piping constructed by the shipyard (e.g. sewage collecting tanks, sludge tanks, piping marked as "yard supply", etc.) are not evaluated as part of the type examination.

Toilet cleaning products that affect the ECOFLOC and/or Hydrogen Peroxide treatment efficiency shall not be used. In case of doubt, the compatibility of toilet cleaning products should be checked and confirmed by Tecnicomar.

Installation requirements

Sewage Sludge shall be directed to a sludge tank/holding tank, as shown in the Flow Diagrams listed in the Type Examination documentation. The sludge holding tank may be independent or included as a separate tank inside the sewage collecting tank.

The washing water connection shall be supplied by clean (filtered) sea water or fresh non-chlorinated water.

The upgrade from the old ECOMar unit to the new ECOMar SX-R unit shall be done in accordance with Installation and upgrade drawings listed in the Type Examination documentation.

Electrical and control components

The units are controlled through a main control box containing a Printed Circuit Board (PCB). The PCB is approved with the following control firmware:

Control Box Firmware:	Tecnicomar_TMM_ECOMar V7.6 – 24.11.20
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Changes in the firmware which can alter the performance of the system shall be approved by DNV. Note that testing of the system with the revised firmware may be required. Documentation confirming the approval (and any testing) shall be kept together with the certificate, or the certificate shall be updated.

Type Examination documentation

Piping and Instrumentation Diagrams (P&ID):

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Old and retrofit ECOMar comparison - P&ID	190521-F02R2	2 (06.10.2021)
ECOMar 20 SX to 145 SX -P&ID	110221-F02R2	2 (28.04.2021)
ECOMar 230 SX to 545 SX – P&ID	120221-F02R2	2 (28.04.2021)

Arrangement Drawings and Parts Lists:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Ecomar 20 SX-R PP Overall Dimensions	270821-D03R1	1 (27.08.2021)
Ecomar 20 SX-R S.S. Overall Dimensions	300821-D01R1	1 (30.08.2021)
Ecomar 32 SX-R PP Overall Dimensions	270821-D01R1	1 (14.12.2020)
Ecomar 32 SX-R S.S. Overall Dimensions	270821-D02R1	1 (27.08.2021)
Ecomar 45 SX-R PP Overall Dimensions	300821-D02R1	1 (30.08.2021)
Ecomar 45 SX-R S.S. Overall Dimensions	300821-D03R1	1 (30.08.2021)
Ecomar 70 SX-R Overall Dimensions	300821-D04R1	1 (30.08.2021)
Ecomar 145 SX-R Overall Dimensions	310821-D01R1	1 (31.08.2021)
Ecomar 340 SX-R Overall Dimensions	310821-D02R1	1 (31.08.2021)
Additional SX1 kit (from Ecomar 6-8) PP for MEPC 159 models	120421-D02R4	4 (05.10.2021)
Additional SX1 kit (from Ecomar 6-8) S.S. for MEPC 159 models	110321-D14R4	4 (05.10.2021)
Additional SX2 kit (from Ecomar 16) PP for MEPC 159 models	110321-D12R4	4 (05.10.2021)
Additional SX2 kit (from Ecomar 16) S.S. for MEPC 159 models	110321-D11R4	4 (05.10.2021)
Additional SX3 kit (from Ecomar 24-50) for MEPC 159 models	110321-D08R4	4 (05.10.2021)
Additional SX4 kit (from Ecomar 120) for MEPC 159 models	110321-D10R6	6 (05.10.2021)
Additional SX1 KIT (Ecomar 20-32 SX) PP for MEPC 227 models	100321-D04R4	4 (05.10.2021)
Additional SX1 KIT (Ecomar 20-32 SX) S.S. for MEPC 227 models	100321-D05R4	4 (05.10.2021)
Additional SX2 KIT (Ecomar 45 SX) PP for MEPC 227 models	100321-D07R4	4 (05.10.2021)
Additional SX2 KIT (Ecomar 45 SX) S.S. for MEPC 227 models	100321-D06R4	4 (05.10.2021)
Additional SX3 KIT (Ecomar 70-145 SX) for MEPC 227 models	100321-D08R4	4 (05.10.2021)
Additional SX4 KIT (Ecomar 340 SX) for MEPC 227 models	110321-D10R6	6 (05.10.2021)
Comparison retrofit Ecomar PP Ecomar SX PP models 6-8-20-32	150621-D01R2	2 (06.10.2021)
Comparison retrofit Ecomar PP Ecomar SX PP models 16-24--50-45-70-145	150621-D03R2	2 (06.10.2021)
Comparison retrofit Ecomar S.S. Ecomar SX S.S. models 8-16-20-32	190521-D01R2	2 (06.10.2021)
Comparison retrofit Ecomar S.S. Ecomar SX S.S. models 16-24-50-45-70-145	150621-D02R2	2 (06.10.2021)
Comparison retrofit Ecomar S.S. Ecomar SX S.S. models 120-340	150621-D04R1	1 (19.05.2021)
Main Equipment List for Tecnicomar S.T.P. Model: ECOMar 20-145 SX-R	EQ.Lis-20.145-ECOSX-R-R0	00 (15.09.2021)
Main Equipment List for Tecnicomar S.T.P. Model: ECOMar 340 SX-R	EQ.Lis-340-ECOSX-R-R01	01 (29.10.2021)
Main Equipment List - ECOMar SX retrofit comparison	-	01 (06.01.2021)

Flow Diagrams:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Old and Retrofit ECOMar comparison - Flow Diagram	210521-F01R2	2 (10.09.2021)
Retrofit and New ECOMar comparison - Flow Diagram	190521-F01R1	1 (19.05.2021)
ECOMar 20 SX to 145 SX - Flow Diagram	110221-F01R2	2 (28.04.2021)
ECOMar 230 SX to 545 SX- Flow Diagram	120221-F01R2	2 (28.04.2021)
ECOMar SX – Cycle Scheme	090320-F01R4	4 (18.11.2020)
ECOMar SX – Maintenance Cycle Scheme	191120-F01R1	19.11.2020
Manual backwash scheme for ECOMar 20-145 SX	120421-D06R1	12.04.2021
Manual backwash scheme for ECOMar 230-545	130421-D01R1	13.04.2021

Electrical Drawings:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Additional Kit ECOMar 159 - SX adaptation - Connection Diagram for Plastic Box	160621-E01R2	2 (15.10.2021)
Additional Kit ECOMar 159 - SX adaptation - Connection Diagram for Steel Box	210621-E01R2	2 (18.10.2021)
Additional Kit ECOMar 227 - SX adaptation - Connection Diagram	220421-E01R2	2 (11.10.2021)
Additional Kit ECOMar 120 - SX adaptation - Connection Diagram	230621-E01R2	2 (20.10.2021)
Additional Kit ECOMar 340 - SX adaptation - Connection Diagram	220621-E01R2	2 (22.10.2021)
Valves Control Box	150321-E01R1	1 (15.03.2021)
Level Dosing Control Box	231120-E10R1	1 (23.11.2020)
Level Probes Inputs Control Diagram	231120-E05R1	23.11.2020
Multi-level Sensor Connections	231120-E06R1	23.11.2020
Level Probe control Box connections	231120-E08R1	23.11.2020
Junction Box for Lateral Sensor Connections	231120-E09R1	23.11.2020

Installation and Upgrade Drawings:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Additional Kit ECOMar 159 - SX adaptation - Connection Diagram for Plastic Box	160621-E01R2	2 (15.10.2021)
Additional Kit ECOMar 159 - SX adaptation - Connection Diagram for Steel Box	210621-E01R2	2 (18.10.2021)
Additional Kit ECOMar 227 - SX adaptation - Connection Diagram	220421-E01R2	2 (11.10.2021)
Additional Kit ECOMar 120 - SX adaptation - Connection Diagram	230621-E01R2	2 (20.10.2021)
Additional Kit ECOMar 340 - SX adaptation - Connection Diagram	220621-E01R2	2 (22.10.2021)
Installation additional kit PP	130521-D02R2	2 (04.10.2021)
Installation additional kit S.S.	070521-D01R3	3 (04.10.2021)
Installation additional kit models 120-340	130521-D03R2	2 (04.10.2021)
Instructions for the upgrade of old ECOMar S.T.P. to new ECOMar SX S.T.P.		01 (08.10.2021)
ECOMar S.T.P. upgrade to ECOMar S-R / SX-R: Retrofit Process Document	PO08A12RPECO-S-R.SX-R	3 (25.10.2021)

Operational and Maintenance Manuals:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Instructions for the use and maintenance of Tecnicomar system for sewage water treatment model : ECOMar 20, 32, 45, 70 and 145 SX-R	MAN-ECOSX-R-20-145-R0	00 (26.10.2021)
Instructions for the use and maintenance of Tecnicomar system for sewage water treatment model : ECOMar 340 SX-R	MAN-ECOSX-R-340-R0	00 (28.10.2021)

Other Drawings:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Scaling considerations for ECOMar SX corresponding to old ECOMar unit complete with additional SX Kit	SCA-C-M-20-545-SX-R1	1 (01.12.2020)
Validation of the Scaling Methods for ECOMar SX STP units	SCA-M-VAL-20-545-SX-R1	23.02.2021

Performance Test Plans:

<i>Title:</i>	<i>Revision:</i>
Test Plan for ECOMar 45 SX unit S.T.P. (corresponding to ECOMar 45 unit complete with additional SX2 Kit)	2 (01.12.2020)
Test Plan for Confirmatory test on ECOMar 230 SX unit S.T.P.	2 (01.12.2020)

Basis of acceptance

Tests reports

Performance Test:

- Testing Report for ECOMar 45 SX unit S.T.P. (corresponding to ECOMar 45 unit complete with additional SX2 Kit), OTR-ECO-45-SX-R0, Revision 0, dated 22.02.2021.

Confirmatory Test:

- Testing Report for Confirmatory test on ECOMar 230 SX unit S.T.P., OCTR-ECO-230-SX-R0, Revision 0, dated 22.02.2021.

Environmental Tests: -

Control box with PVC cabinet:

- Test Lab s.r.l., Environmental Test Report for Tecnicomar Control Box PVC, report 217190A dated 7th September 2021.

Control box with steel cabinet:

- Test Lab s.r.l., Environmental Test Report for Tecnicomar Control Box Ecomar, report 15A204A dated 4th November 2015

Additional Valves Control Box:

- Test Lab s.r.l., Environmental Test Report for Tecnicomar Valves Control Box (VCB), report 217191A dated 8th September 2021

Note on control box for ECOMar 340 SX-R:

- Validation of the Environmental Test for ECOMar S/SX STP units (control box correspondence between ECOMar S units and ECOMar SX units), dated 30th April 2021

Marking of product

For traceability to this type approval, each unit is to be marked with: -

- Manufacturer's name or trade mark
- Type and Model
- Serial No. and date of manufacture
- Hydraulic Loading
- Any operational or installation limits considered necessary by the manufacturer or the Administration

Copy of the certificate and operation and maintenance manual

A copy of this certificate should be carried on board any ship equipped with the above described sewage treatment plant.

The ship should have on board at all times a manual detailing the operational and maintenance procedures for the sewage treatment plant, including safety information about the chemicals and materials actually used in the operation of the sewage treatment plant.

Revision history

<i>Revision</i>	<i>Issue Date</i>	<i>Reason for revision</i>
-	2021-11-05	Initial certificate, based on MEDB0000720 for the "mother" ECOMar SX series.

APPENDIX TO CERTIFICATE OF TYPE APPROVAL FOR SEWAGE TREATMENT PLANTS

Test results and details of tests conducted on samples from the sewage treatment plant in accordance with resolution MEPC.227(64) excluding Section 4.2 for Passenger Ships in Special Areas:

Sewage treatment plant type:

Manufactured by:

Organization responsible for the test:

Organization responsible for handling the samples
and laboratory analysis:

Test Location:

Designed hydraulic loading:

Designed organic loading:

No. of effluent samples tested:

No. of influent samples tested:

Total suspended solids influent quality:

Total nitrogen influent quality:

- Geometric mean:
- Maximum
- Minimum

Total phosphorus influent quality:

- - Geometric Mean:
- - Maximum:
- - Minimum:

BOD5 without nitrification influent quality:

Maximum hydraulic loading:

Minimum hydraulic loading:

Average hydraulic loading (Q_i):

Effluent flow (Q_e):

Dilution compensation factor (Q_i/Q_e):

Geometric mean of total suspended solids:

Geometric mean of the thermotolerant coliform
count:

Geometric mean of BOD5 without nitrification:

Geometric mean of COD:

Geometric mean of total nitrogen:

Percentage reduction of total nitrogen:

Geometric mean of total phosphorus:

Percentage reduction of total phosphorus:

Maximum pH:

Minimum pH:

Type of disinfectant used:

If Chlorine - residual Chlorine:

Maximum:

Minimum:

Geometric mean:

Was the sewage treatment plant tested with:

Fresh water flushing?

Salt water flushing?

Fresh and salt water flushing?

Grey water added?

Was the sewage treatment plant tested against the environmental conditions specified in section 5.9 of resolution MEPC.227(64):

Temperature:

Humidity:

Inclination:

Vibration:

Reliability of Electrical and Electronic Equipment:

Limitations and the conditions of operation are imposed:

Salinity:

Temperature:

Humidity:

Inclination:

Vibration:

Results of other parameters tested:

a) Total Residual Oxidant (TRO):

- Geometric mean:
- Maximum:

b) One sample of effluent was taken after the "Special Washing Cycle":

- Geometric mean of total suspended solids:
- Geometric mean of the thermotolerant coliform count:
- Geometric mean of BOD5 without nitrification:
- Geometric mean of COD:
- pH:

c) The effect of the time that a sample is taken during the discharge was tested using three effluent samples drawn at the beginning, middle and end of the discharge period:



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- Geometric mean of total suspended solids:
- Geometric mean of the thermotolerant coliform count:
- Geometric mean of BOD5 without nitrification:
- Geometric mean of COD:
- Maximum pH:
- Minimum pH:
- Total Residual Oxidant (TRO):

APPENDIX TO CERTIFICATE OF TYPE APPROVAL FOR SEWAGE TREATMENT PLANTS – CONFIRMATORY TEST

Test results and details of tests conducted on samples from the sewage treatment plant in accordance with resolution MEPC.227(64) excluding Section 4.2 for Passenger Ships in Special Areas:

Sewage treatment plant type:

Manufactured by:

Organization responsible for the test:

Organization responsible for handling the samples
and laboratory analysis:

Test Location:

Designed hydraulic loading:

Designed organic loading:

No. of effluent samples tested:

No. of influent samples tested:

Total suspended solids influent quality:

Total nitrogen influent quality:

- Geometric mean:
- Maximum
- Minimum

Total phosphorus influent quality:

- - Geometric Mean:
- - Maximum:
- - Minimum:

BOD5 without nitrification influent quality:

Maximum hydraulic loading:

Minimum hydraulic loading:

Average hydraulic loading (Q_i):

Effluent flow (Q_e):

Dilution compensation factor (Q_i/Q_e):

Geometric mean of total suspended solids:

Geometric mean of the thermotolerant coliform
count:

Geometric mean of BOD5 without nitrification:

Geometric mean of COD:

Geometric mean of total nitrogen:

Percentage reduction of total nitrogen:

Geometric mean of total phosphorus:

Percentage reduction of total phosphorus:

Maximum pH:

Minimum pH:

Type of disinfectant used:

If Chlorine - residual Chlorine:

Maximum:

Minimum:

Geometric mean:

Was the sewage treatment plant tested with:

Fresh water flushing?

Salt water flushing?

Fresh and salt water flushing?

Grey water added?

Was the sewage treatment plant tested against the environmental conditions specified in section 5.9 of resolution MEPC.227(64):

Temperature:

Humidity:

Inclination:

Vibration:

Reliability of Electrical and Electronic Equipment:

Limitations and the conditions of operation are imposed:

Salinity:

Temperature:

Humidity:

Inclination:

Vibration:

Results of other parameters tested:

a) Total Residual Oxidant (TRO):

- Geometric mean:
- Maximum: