

EC-TYPE EXAMINATION CERTIFICATE (MODULE B)

Certificate No:
MEDB00007J0

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 passenger ships in all areas, including a MARPOL Annex IV special area)

with type designation(s)

ECOMar 20 S-R, 32 S-R, 45 S-R, 70 S-R, 145 S-R and 340 S-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/2.6a Marpol 73/78 as amended, Annex IV Regulation 9, IMO Res. MEPC.227(64) including section 4.2.

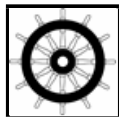
Further details of the equipment and conditions for certification are given overleaf.

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**

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 This certificate remains valid unless suspended, withdrawn, recalled or cancelled.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 S-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) adding a fixed amount of dilution water, iv) maceration and return to treatment tank, v) filtration and UV treatment prior to overboard discharge, vi) washing of the tank and discharge of the waste (sewage sludge).

The chemical treatment and flocculation processes uses hydrogen peroxide and ECOFLOC (*). After the chemical treatment the sewage batch is diluted with sea water (within the limits prescribed in IMO Res.MEPC.227(64)).

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

The ECOmar S-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 S 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 S, the upgrade is given a new name, ECOmar S-R.

Application

Model	Hydraulic Loading (litres/day) (**)	Organic Loading, BOD ₅ without nitrification (kg/day)
ECOmar 20 S-R	2,000	0.70
ECOmar 32 S-R	3,200	1.12
ECOmar 45 S-R	4,500	1.58
ECOmar 70 S-R	7,000	2.46
ECOmar 145 S-R	14,500	5.09
ECOmar 340 S-R	34,000	20.54

(**) Litres of sewage (excluding dilution water).

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 S-R series may 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

Dilution water may be either salt water (sea water) or fresh water.

Sewage Sludge shall be directed to a sludge tank/holding tank, as shown in the Flow Diagrams listed in the Type Examination documentation.

The upgrade from the old ECOmar unit to the new ECOmar S-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 V3.5 – 30.11.18
-----------------------	---------------------------------------

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, Retrofit and ECOMar S Comparison - P&ID	130721-F02R1	1 (13.07.2021)
ECOMar 20 S - Complete System - P&ID	201118-F01R1	01 (20.11.2018)
ECOMar 32 S - Complete System - P&ID	301118-F01R1	01 (30.11.2018)
ECOMar 45 S - Complete System - P&ID	301118-F02R1	01 (30.11.2018)
ECOMar 70 S - Complete System - P&ID	301118-F03R1	01 (30.11.2018)
ECOMar 145 S - Complete System - P&ID	301118-F04R1	01 (30.11.2018)
ECOMar 340 S - Complete System - P&ID	190319-F01R1	01 (19.03.2019)

Arrangement Drawings:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Ecomar 20 S-R PP Overall Dimensions	100921-D01R1	1 (10.09.2021)
Ecomar 20 S-R S.S. Overall Dimensions	090921-D04R1	1 (09.09.2021)
Ecomar 32 S-R PP Overall Dimensions	100921-D02R1	1 (14.12.2020)
Ecomar 32 S-R S.S. Overall Dimensions	100921-D03R1	1 (10.09.2021)
Ecomar 45 S-R PP Overall Dimensions	100921-D04R1	1 (30.08.2021)
Ecomar 45 S-R S.S. Overall Dimensions	100921-D05R1	1 (10.09.2021)
Ecomar 70 S-R Overall Dimensions	100921-D06R1	1 (10.09.2021)
Ecomar 145 S-R Overall Dimensions	100921-D07R1	1 (10.09.2021)
Ecomar 340 S-R Overall Dimensions	100921-D08R1	1 (10.09.2021)
Additional Kit for upgrading to ECOMar 20 S	200421-A01R1	1 (20.04.2021)
Additional Kit for upgrading to ECOMar 32 S	200421-A02R1	1 (20.04.2021)
Additional Kit for upgrading to ECOMar 45 S	200421-A03R1	1 (20.04.2021)
Additional Kit for upgrading to ECOMar 70 S	200421-A04R1	1 (20.04.2021)
Additional Kit for upgrading to ECOMar 145 S	200421-A05R1	1 (20.04.2021)
Additional Kit for upgrading to ECOMar 340 S	200421-A06R1	1 (20.04.2021)
Comparison retrofit Ecomar to Ecomar S	140721-D03R2	2 (26.08.2021)
Main Equipment List for Tecnicomar S.T.P. Model: ECOMar 20-145 S-R	EQ.Lis-ECOS-R-20-145-R0	0 (15.09.2021)
Main Equipment List for Tecnicomar S.T.P. Model: ECOMar 340 S-R	EQ.Lis-ECOS-R-340-R0	0 (15.09.2021)
Main Equipment List - ECOMar S retrofit comparison	-	10.08.2021

Flow Diagrams:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Old, Retrofit and ECOMar S Comparison - Flow Diagram	130721-F01R1	1 (13.07.2021)
ECOMar 20 S - Complete System - Flow Diagram	041218-F01R1	01 (04.12.2018)
ECOMar 32 S - Complete System - Flow Diagram	111218-F01R1	01 (11.12.2018)
ECOMar 45 S - Complete System - Flow Diagram	111218-F02R1	01 (11.12.2018)
ECOMar 70 S - Complete System - Flow Diagram	121218-F01R1	01 (12.12.2018)
ECOMar 145 S - Complete System - Flow Diagram	131218-F01R1	01 (13.12.2018)
ECOMar 340 S - Complete System - Flow Diagram	190319-F02R1	01 (19.03.2019)
Cycle Scheme	071118-F03R5	05 (10.12.2018)
ECOMar 20 S to 145 S Untreated Sewage & Sludge Discharge Management-Flow Diagram	150519-F01R1	01 (15.05.2019)

ECOMar 230 S to 545 S-Untreated Sewage & Sludge Discharge Management-Flow Diagram	270519-F01R1	01 (27.05.2019)
---	--------------	-----------------

Electrical Drawings:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Additional Kit ECOMar 159 - S Adaptation - Connection Diagram for Plastic Box	140721-E01R1	1 (14.07.2021)
Additional Kit ECOMar 159 - S Adaptation - Connection Diagram for Steel Box	150721-E01R1	1 (15.07.2021)
Additional Kit ECOMar 227- S Adaptation - Connection Diagram	200721-E01R1	1 (20.07.2021)
Additional Kit ECOMar 120 - S Adaptation - Connection Diagram	220721-E01R1	1 (22.07.2021)
Additional Kit ECOMar 340 - S Adaptation - Connection Diagram	210721-E01R1	1 (21.07.2021)
Valves Control Box	150321-E01R1	1 (15.03.2021)
Connections for Magnetic probe inside treatment tank	131118-E06R1	01 (13.11.2018)
Level probe control box connections - 3 rods - 1 tank	160119-E01R1	01 (16.01.2019)
Level probe control box connections - 3 rods - 2 tank	160119-E02R1	01 (16.01.2019)
Level probe control box connections - 4 rods - 1 tank	160119-E03R1	01 (16.01.2019)
Level probe control box connections - 4 rods - 2 tank	160119-E04R1	01 (16.01.2019)
Level Probes Inputs Control Diagram	131118-E05R1	01 (13.11.2018)
ECOMar remote control (CD MAR2 connections)	280119-E01R1	01 (28.01.2019)
ECOMAR from 230 S to 545 S - Connect. Lat. probes	131118-E06R1	01 (13.11.2018)

Installation and upgrade drawings:

<i>Drawing Title:</i>	<i>Drawing Number:</i>	<i>Revision:</i>
Additional Kit ECOMar 159 - S Adaptation - Connection Diagram for Plastic Box	140721-E01R1	1 (14.07.2021)
Additional Kit ECOMar 159 - S Adaptation - Connection Diagram for Steel Box	150721-E01R1	1 (15.07.2021)
Additional Kit ECOMar 227- S Adaptation - Connection Diagram	200721-E01R1	1 (20.07.2021)
Additional Kit ECOMar 120 - S Adaptation - Connection Diagram	220721-E01R1	1 (22.07.2021)
Additional Kit ECOMar 340 - S Adaptation - Connection Diagram	210721-E01R1	1 (21.07.2021)
Installation additional kit	140721-D01R1	1 (14.07.2021)
Instructions for the upgrade of Old ECOMar S.T.P. to New ECOMar S S.T.P.	-	00 (13.07.2021)
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 S-R	MAN-ECOS-R-20-145-R0	00 (26.10.2021)
Instructions for the use and maintenance of Tecnicomar system for sewage water treatment model : ECOMar 340 S-R	MAN-ECOS-R-340-R0	00 (28.10.2021)

Performance Test Plans:

<i>Title:</i>	<i>Revision:</i>
Testing Plan for ECOMar 45 S unit S.T.P.	2019-R1
Testing Plan for ECOMar 230 S unit S.T.P.	2019-R3

Basis of acceptance

Tests reports

Performance Tests:

- Testing Plan for ECOMar 45 S unit S.T.P, Annex: Performance Test Results, Rev.4, dated 01.03.2019. (Test Reports from Eurolab S.r.l. dated 11.01.2019 to 14.01.2019).

- Testing Plan for ECOmar 230 S unit S.T.P, Annex: Performance Test Results, Rev.2, dated 17.05.2019. (Test Reports from Eurolab S.r.l. dated 26.03.2019 to 06.04.2019).

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 S-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 MEDB00004X5 for the "mother" ECOmar S 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) including Section 4.2 for Passenger Ships in Special Areas:

Sewage treatment plant type:

Manufactured by:

Organization responsible for the test:

Organization handling the samples and responsible
for analysis at the test site:

Organization responsible for 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:

.....

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 (with additional confirmatory testing including Section 4.2 for Passenger Ships in Special Areas):

Sewage treatment plant type:

Manufactured by:

Organization responsible for the test:

Organization handling the samples and responsible
for analysis at the test site:

Organization responsible for 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:

.....