EC-TYPE EXAMINATION CERTIFICATE (MODULE B)

Certificate No:
MEDB000083A

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)
NX10-C, NX20-C, NX25-C, NX30-C, NX35-C, NX40-C, NX45-C, NX50-C, NX55-C, NX60-C, NX65-C, NX70-C, NX75-C, NX80-C, NX90-C

Issued to
GERTSEN & OLUFSEN A/S
Allerød, **Denmark**

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 **2027-03-06**.

Issued at **Høvik** on **2022-03-07**

DNV local station:
Denmark CMC

Approval Engineer:
Michael Lehmann

Notified Body
No.: **0575**

for **DNV AS**

Sverre Olav Bergli
Head of Notified Body

NORWEGIAN ACCREDITATION PROD 019

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 This certificate remains valid unless suspended, withdrawn, recalled or cancelled.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.

Product description

The sewage system NX-C is for use by ships, other than passenger ships, or offshore installations in all areas and by passenger ships outside of a MARPOL Annex IV special area.

The sewage system NX-C is a membrane bioreactor (MBR) type, which combines biological treatment with membrane filtration.

Application/Limitations

Applicable models covered in this certificate and the limitations applicable to each model are listed below:

Model	Design hydraulic load (m^3/h)	Organic load (kg BOD/day)
NX10-C	1.7	0.6
NX20-C	3.3	1.2
NX25-C	6.6	2.3
NX30-C	9.9	3.5
NX35-C	13.2	4.7
NX40-C	16.5	5.9
NX45-C	19.8	7.0
NX50-C	26.4	9.4
NX55-C	39.6	14.1
NX60-C	52.8	18.7
NX65-C	79.2	28.1
NX70-C	118.8	42.2
NX75-C	264	93.7
NX80-C	495	175.7
NX90-C	990	351.5

Control and monitoring equipment

Environmental testing of electrical/electronic components was performed for the Gertsen & Olufsen control cabinet TFCTEH. Components other than the components installed in the control cabinet subject to environmental testing may be used provided that each alternate component has a valid type approval certificate or technical documentation demonstrating that the alternate component was subject to environmental testing as per DNVGL-CG-0339 (December 2019 or as amended) or IACS UR E10 (rev. 7 or as amended). Information on any alternate components shall be part of the documentation submitted for a specific installation.

The Administration confirms that the sewage treatment plant can operate at angles of inclination of 30° in any plane from the normal operating position.

Type examination documentation

Type	Title	Drawing no.	Date	Revision
Operation & Maintenance Manual	Operation & Maintenance Manual for Gertsen & Olufsen AS Sewage Treatment Plant NX series - Carbon Reduction	-		1.0

Tests carried out

Performance test of type NX-C, according to MEPC.227(64) excluding section. 4.2:
Prüfinstitut für Abwassertechnik GmbH (PIA), Test of a Marine Sanitation Device of Gertsen & Olufsen, Report No.: PIA2016-AT1602-10121-03 – Version 3, Dated 2016-12-20.

Environmental test according to MEPC.107(49):
Delta, Test for Marine Type Approval of control cabinet for sewage treatment system, type TFCTEH, Report No.: DANAK-19/16866, Dated 2016-09-13.

Marking of product

The marking shall give the following information:

- Manufacturers name or trademark
- Type designation
- Serial number
- Hydraulic Loading

Revision history of this certificate

Revision No.	Date of Issuance	Description
-	2022-03-07	The NX-C configuration was initially approved on 2017-03-07 together with the NX-N configuration in certificate no. MEDB000017N. At renewal of certificate no. MEDB000017N, this separate new certificate was created for approval of the NX-C configuration.

APPENDIX - SUMMARY OF TESTING

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:

Sewage treatment plant type:	NX-C
Manufactured by:	Gertsen & Olufsen A/S
Organization conducting the test:	Prüfinstitut für Abwassertechnik GmbH (PIA)
Organization handling the samples:	Prüfinstitut für Abwassertechnik GmbH (PIA)
Test Location:	PIA test facility, Aachen, Germany
Designed hydraulic loading:	3.30 m^3/day
Designed organic loading:	2.21 kg/day BOD_5
No. of effluent samples tested:	40
No. of influent samples tested:	40
Total suspended solids influent quality:	515 mg/l
Total nitrogen influent quality:	
- Geometric mean:	N/A
- Maximum	N/A
- Minimum	N/A
Total phosphorus influent quality:	
- Geometric Mean:	N/A
- Maximum:	N/A
- Minimum:	N/A
BOD_5 without nitrification influent quality:	341 mg/l
Maximum peak hydraulic loading:	7.92 m^3/day
Minimum hydraulic loading:	0.24 m^3/day
Average hydraulic loading (Qi):	3.3 m^3/day
Effluent flow (Qe):	3.3 m^3/day
Dilution compensation factor (Qi/Qe):	1.0
Geometric mean of total suspended solids:	3.0 mg/l
Geometric mean of the thermotolerant coliform count:	4.0 coliforms/100 ml
Geometric mean of BOD_5 without nitrification:	1.6 mg/l
Geometric mean of COD:	21.5 mg/l
Geometric mean of total nitrogen:	N/A
Percentage reduction of total nitrogen:	N/A
Geometric mean of total phosphorus:	N/A
Percentage reduction of total phosphorus:	N/A
Maximum pH:	7.6
Minimum pH:	6.9
Type of disinfectant used:	None
If Chlorine - residual Chlorine:	
- Maximum:	N/A
- Minimum:	N/A

Was the sewage treatment plant tested with:

Fresh water flushing?	☐ Yes ☒ No
Salt water flushing?	☐ Yes ☒ No
Fresh and salt water flushing?	☐ Yes ☒ No
Grey water added?	☐ Yes ☒ No

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

Temperature:	☒ Yes ☐ No
Humidity:	☒ Yes ☐ No
Inclination:	☒ Yes ☐ No
Vibration:	☒ Yes ☐ No
Reliability of Electrical and Electronic Equipment:	☒ Yes ☐ No

Limitations and the conditions of operation are imposed:

Salinity:	N/A tested against conditions specified in section 5.9 of resolution MEPC.227(64)
Temperature:	5-55ºC (operational ambient temperature)
Humidity:	N/A tested against conditions specified in section 5.9 of resolution MEPC.227(64)
Inclination:	30º tested to 30ºC inclination
Vibration:	N/A tested against conditions specified in section 5.9 of resolution MEPC.227(64)