



Certificate No:
TAP00002HA

TYPE APPROVAL DESIGN CERTIFICATE

This is to certify:

That the **Ballast Water Management System**

with type designation(s)
NiBallast BWMS NB-100 - NB-4000

Issued to

Jiangsu Nanji Machinery Co., Ltd.
Taixing City, Jiangsu, China

is found to comply with

DNV rules for classification – Ships Pt.6 Ch.7 Sec.1 Ballast water management – BWM
DNV class guideline DNV-CG-0339 – Environmental test specification for electrical, electronic and programmable equipment and systems

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Compliance with the IMO D-2 performance standard is not covered by this certificate. Such compliance shall be confirmed by a separate type approval certificate issued by an Administration.

Alterations to the applicable rules may have impact on validity of this certificate and require re-assessment of the system design.

Operating media:

Issued at **Høvik** on **2022-06-23**

This Certificate is valid until **2027-06-22** .

DNV local unit: **Jiangyin NB & CMC**

for **DNV**

Approval Engineer: **Wenjun Wu**

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Dag Sæle-Nilsen
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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.



Form code: TA 291

Revision: 2021-10

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Product description

The NiBallast Ballast Water Management System (BWMS) combines physical filtration with membrane separation and then injects inert gas nitrogen. P/V valves (air pipe head closing device) are installed on the top of vent pipes of ballast tanks in order to keep tank pressure within safety range ($\pm 2 - \pm 3$ kPa) during voyage. The ballast water may be discharged overboard directly when de-ballasting. The NiBallast BWMS includes 15 models from NB-100 to NB-4000.

The major components of the NiBallast BWMS models, as well as the Treatment Rated Capacity (TRC) and Minimum Capacity of the designated NiBallast BWMS models are specified in the table below.

BWMS model	TRC (m ³ /h)	Min. capacity (m ³ /h)	Filter unit	Membrane separation unit	Control unit	Nitrogen generator*
NB-100	100	45	NB-100-F5	NB-100-MF	NB-100	PN-5
NB-200	200	45	NB-200-F5	NB-200-MF	NB-200	PN-10
NB-300	300	70	NB-300-F5	NB-300-MF	NB-300	PN-10
NB-400	400	70	NB-400-F5	NB-400-MF	NB-400	PN-15
NB-500	500	120	NB-500-F5	NB-500-MF	NB-500	PN-17
NB-600	600	120	NB-600-F5	NB-600-MF	NB-600	PN-25
NB-800	800	140	NB-800-F5	NB-800-MF	NB-800	PN-25
NB-1000	1000	140	NB-1000-F5	NB-1000-MF	NB-1000	PN-37
NB-1200	1200	160	NB-1200-F5	NB-1200-MF	NB-1200	PN-40
NB-1500	1500	210	NB-1500-F5	NB-1500-MF	NB-1500	PN-50
NB-1800	1800	250	NB-1800-F5	NB-1800-MF	NB-1800	PN-60
NB-2000	2000	250	NB-2000-F5	NB-2000-MF	NB-2000	PN-65
NB-2500	2500	350	NB-2500-F5	NB-2500-MF	NB-2500	PN-80
NB-3000	3000	550	NB-3000-F5	NB-3000-MF	NB-3000	PN-95
NB-4000	4000	550	NB-4000-F5	NB-4000-MF	NB-4000	PN-125

* Optional component. Nitrogen can also be supplied from the vessel.

Further details on installation and operation of the BWMS are included in the Operation, Maintenance and Safety Manual (OMSM).

Specifications/Operating conditions

Specifications

The main units of NiBallast BWMS are specified in the table below.

Units	Manufacturer	Material	Specifications
Filter unit	Jiangsu Nanji Machinery Co., Ltd.	Shell: Q-345-R Filter element: 316L	Pressure Vessel Class III Mesh size 50 μm
Membrane separation unit	Jiangsu Nanji Machinery Co., Ltd.	Shell: Q-345-R Membrane element: Polypropylene	Pressure Vessel Class III Mesh size 10 μm
Control unit	Jiangsu Nanji Machinery Co., Ltd.		Power input 380V AC, 50Hz / 440V AC, 60Hz IP44
N ₂ generator unit	Suzhou Since Gas System Co., Ltd	Assembly	Pressure Vessel Class III Feed N ₂ concentration: 99% N ₂ feeding capacity: $\geq 0.031 \text{ Sm}^3/\text{m}^3$ ballast water
P/V valve	Taixing Haixing Marine Machinery Co., Ltd.	Frame: Q235-B	Activated at $\pm 2 - \pm 3 \text{ kPa}$ tank pressure Equipped with a pressure transmitter

Operating conditions

The operating conditions of NiBallast BWMS are listed in the table below.

Filter differential pressure for triggering the back-flushing cycle	MPa	0.05
Time interval for triggering filter back-flushing cycle	Minute	10
Filter differential pressure at which the system will shut down	MPa	> 0.08
Membrane differential pressure for triggering the back-flushing cycle	MPa	0.05
Time interval for triggering membrane back-flushing cycle	Minute	2
Filter inlet pressure	MPa	≥ 0.1
BWMS outlet pressure	MPa	< 0.35
Maximum working pressure	MPa	Filter unit and Membrane separation unit: 0.5 Nitrogen generator: 0.8

Installation of BWMS

Installation of NiBallast BWMS shall be according to below listed equipment/assembly drawings.

Type	Title – appendix no.	Drawing no.	Rev.
P&ID	System principle diagram (Drawing within OMSM Appendix IV)	NB2NJ-00XT	Rev.3.2
General Arrangement Drawings	General Arrangement Plan (Drawing within OMSM Annex VI)	NB2NJ-1-00 to NB2NJ-40-00	Rev.3.2
Electric drawings	Electric principle diagram (Drawing within OMSM Appendix V)	NB3NJ-1D0 to NB3NJ-40D0	Rev.3.2
Assembly drawing	Filter unit drawings (Drawing within OMSM Appendix VII)	NB-100-F5 to NB-4000-F5	Rev.3.2
	Membrane separation unit drawings (Drawing within OMSM Appendix VIII)	NB-100-MF/M1 to NB-4000-MF/M1	Rev.3.2
	P/V valve drawings (Drawing within OMSM Appendix IX)	YLF-DN80-500	Rev.3.2
Assembly drawing (Optional)	Nitrogen Generator (Drawing within OMSM Appendix VIII)	NB2NJ-00NI	Rev.3.2

The external flange connections of the BWMS are specified in the table below.

Units	Ballast inlet	Ballast outlet	Back-flush water outlet	Vent pipe of ballast tank
Filter unit	DN125 – DN700	DN125 – DN700	DN32 – DN80	
Membrane separation unit	DN125 – DN700	DN125 – DN700	DN32 – DN100	
P/V valve				DN80 – DN500

Hazardous area / Ex-proof

The NiBallast BWMS currently does not include Ex-proof models and is thus not approved to be installed in hazardous areas.

Control and monitoring equipment

Software version

The NiBallast BWMS is type approved with the system control software version 3.1.xx (where xx shall be 8 or higher). Any changes to the software are to be recorded as long as the BWMS is in use onboard. The records of all changes are to be forwarded to DNV for evaluation. Major changes in the software, which can alter the performance of the system, require approval. Testing of the application functions of the revised software may be required.

Safety measures

The NiBallast BWMS is type approved with the following instruments related to safety:

- Two oxygen meters mounted at N₂ generator/supply unit, providing a low O₂ concentration alarm and shutdown when O₂ concentration below 19.5%
- A pressure transmitter mounted at BWMS outlet, triggering BWMS independent shutdown at 0.35 MPa
- P/V valves equipped with pressure sensors on vent pipe of ballast tanks, triggering alarm & shutdown for tank overpressure during ballast operation and maintaining tank pressure within safety range ($\pm 2 - \pm 3$ kPa) during voyage

Electrical and electronic components

The type approved BWMS shall include the following control and monitoring equipment (including the above listed instruments related to safety) indicated on the P&ID (NB2NJ-00XT, Appendix I to the OMSM) and specified on the component lists (NB2NJ-00BOM, Appendix I to the OMSM). Except for the components listed below, alternate models to the ones specified on the component lists 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 a 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 only the models specified in the component lists shall be used:

Name	Manufacturer	Model
Control unit	Jiangsu Nanji Machinery Co., Ltd.	NB-100 – NB-4000
Pressure transmitter	Danfoss AG	MBS3100
	Hube Control AG	Hube527
	Trafag AG	8264
N ₂ meter	Changai Electronic	GNL-3100C-30
		P860
O ₂ meter	Drager Safety AG	Polytron8100
	Henan Chicheng Electric Co., Ltd.	QB2000-O2N
N ₂ flow meter	Jiangsu Yuanwang Instrument Group Co., Ltd.	LUX
	Wuxi Qiuxin	LUGB
N ₂ generator (optional)	Suzhou Since Gas System Co., Ltd.	PN-5 – PN-125

Documents approval

The following documentation is to be submitted for approval for each BWMS installation:

- Piping and Instrumentation Diagram (P&ID) of the ballast system including the treatment system installation
- P/V valve capacity and ballast tank venting system should be checked and approved for each installation
- Power supply arrangement
- Interface description towards ship's existing systems including alarms for failure
- Description confirming the arrangement of alarms for bypass of the BWMS system (as part of Ballast Water Management Plan)
- BWMS Commissioning procedure
- Product certificates for components subject to assessment

Design type approval documentation

Test plans and reports:

- Test Outline for Type Approval of NiBallast BWMS, Shanghai Marine Auxiliary Mechanical & Electric Equipment Performance Environmental Test Centre, Rev. 1.1, 2021.03.22
- Test report for Type Approval of NiBallast BWMS S199A-2021, Shanghai Marine Auxiliary Mechanical & Electric Equipment Performance Environmental Test Centre, Rev. Signed, 2021.04.27
- Function Test – Survey Report of Nanji NiBallast BWMS, DNV, Rev. 0, 2020.01.02

System documents:

- NiBallast™ BWMS OMSM (Operation, Maintenance, Safety Manual) with Appendixes, Nanji, Rev. 3.2, 2020-05-02

Tests carried out

- Environmental testing in accordance with DNVGL-CG-0339 Class Guideline IACS UR E10
- Function tests of the control and automation system witnessed by DNV

Marking of product

For Traceability of this Type Approval for Design, each treatment system is to be marked with:

- Manufacturer's name or trademark
- Type designation
- Serial number

Periodical assessment

For retention of the Type Approval Design Certificate, DNV may perform periodical assessments to verify that the conditions of the TADC are not altered since the certificate was issued. The scope of periodical assessment includes:

- Review of the TA documentation and verification that the documentation is still used as basis for the production
- Review of possible changes in design, material and performance of the product
- Assessment of validity of the TADC in reference to the latest rules

Revision history

Rev.	Date of issuance	Description
-	2022-06-23	First issuance