



Numéro de certificat : 71811/A1 MMF

Numéro de dossier : .

Code produit : W0100F

Ce certificat n'est pas valable lorsque présenté sans les pages suivantes
comprenant au moins 7 paragraphes

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CERTIFICAT D'APPROBATION DE TYPE

Ce certificat est délivré sous l'autorité de l'Etat Français par Bureau Veritas Marine & Offshore, organisme habilité selon les dispositions des Divisions 140 et 310 du Règlement annexé à l'Arrêté du 23 novembre 1987 tel qu'amendé.

Bureau Veritas Marine & Offshore atteste avoir réalisé la procédure d'approbation relative au matériel ou matériau désigné ci-après selon les dispositions applicables des exigences énumérées ci-dessous.

Ce certificat est délivré à

NORWEGIAN GREENTECH AS
FOSNAVÅG - NORWAY

pour le type de produit

BALLAST WATER MANAGEMENT SYSTEM

NGT BWMS models DL1-BK273 to D5XL18-BK750 and DL1-BWT80 to D5XL24-BWT500

Exigences :

- Div. 218 & 310 du Règlement Français annexé à l'arrêté du 23 novembre 1987 modifié
- IMO Res. MEPC.300(72)

Ce certificat expirera le : 15 Sep 2027

Pour Bureau Veritas Marine & Offshore,

A BV OSLO, le 25 Sep 2025,

Rune Marstein

Ce certificat a été créé électroniquement et est valide sans signature



Ce certificat est valable jusqu'à la date indiquée ci-dessus, sauf s'il est annulé ou révoqué, pourvu que les conditions indiquées dans la(les) page(s) suivante(s) soient respectées et que le produit reste satisfaisant en service. Ce certificat n'est plus valable si le fabricant effectue des changements ou des modifications du produit approuvé, qui n'auraient pas été notifiés à Bureau Veritas Marine & Offshore et acceptés par écrit par Bureau Veritas Marine & Offshore. Si les Règlements ou les standards sont modifiés au cours de la période de validité de ce certificat, le(s) produit(s) doit(doivent) être ré-approuvé(s) avant d'être placé(s) à bord de navires pour lesquels les modifications sont applicables. La marque de conformité " MMF " ou " MMF/PL " ne peut être apposée par le fabricant sur le(s) produit(s) objet de ce certificat qu'à la condition que les dispositions décrites au paragraphe 5 de ce certificat soient respectées.

Ce certificat est délivré dans le cadre des Conditions Générales de la Marine & Offshore de Bureau Veritas Marine & Offshore disponible sur le site internet www.veristar.com. Toute personne qui n'est pas partie au contrat aux termes duquel ce document est délivré ne pourra engager la responsabilité de Bureau Veritas Marine & Offshore pour les inexactitudes ou omissions qui pourraient y être relevées ainsi que pour les erreurs de jugement, fautes ou négligences commises par le personnel de la Société ou par ses agents dans l'établissement de ce document et dans l'exécution des interventions qu'il comporte.

PROGRAMME D'APPROBATION

This is to certify that the Ballast Water Management System listed below has been examined and tested in accordance with the requirements of the Code for Approval of Ballast Water Management System (BWMS Code) adopted by IMO Resolution MEPC.300(72) on 13 April 2018 and the circular IMO BWM.2/Circ.33/Rev.1 Guidance on scaling of ballast water management systems. / Il est certifié que le système de gestion des eaux de ballast ci-après a été examiné et soumis à des essais conformément aux dispositions du code pour l'approbation des systèmes de gestion des eaux de ballast (BWMS Code) dans la résolution MEPC.300(72) de l'OMI adoptée le 13 avril 2018 et la circulaire IMO BWM.2/Circ.33/Rev.1 Guide sur la mise à l'échelle des systèmes de gestion des eaux de ballast.

This certificate is valid only for the Ballast Water Management System referred to below. / Le présent certificat n'est valable que pour le système de gestion des eaux de ballast décrit ci-dessous

1. PRODUCT DESCRIPTION / DESCRIPTION DU PRODUIT

NGT BWMS models with filters of the aquaBoll 6.18.3 series:

NGT BWMS models DL1-BK273, DL2-BK273, DL3-BK324, DL4-BK324, DL4-BK356, DXL6-BK356, DXL9-BK356, DXL9-BK419, DXL12-BK419, D4XL8-BK419, D4XL10-BK419, D4XL10-BK521, D4XL10-BK600, D4XL12-BK600, D4XL12-BK750, D5XL14-BK750, D5XL16-BK750, D5XL16-BK750 EX and D5XL18-BK750.

NGT BWMS models with filters of the aquaBoll BWT series:

DL1-BWT80, DL2-BWT80, DL3-BWT100, DL4-BWT100, DL4-BWT150, DXL6-BWT150, DXL9-BWT150, DXL12-BWT150, DXL9-BWT200, DXL12-BWT200, D4XL8-BWT200, D4XL10-BWT200, D4XL10-BWT250, D4XL10-BWT300, D4XL12-BWT300, D4XL12-BWT350, D4XL12-BWT400, D5XL14-BWT350, D5XL14-BWT400, D5XL16-BWT350, D5XL16-BWT400, D5XL18-BWT350, D5XL18-BWT400, D5XL20-BWT350, D5XL20-BWT400, D5XL22-BWT350, D5XL22-BWT500 and D5XL24-BWT500

1.1 - Ballast Water Technology

- The NGT BWMS consists of two treatment steps in order to comply with the IMO D2 standard:

- a) Mechanical Filtration by 20 micron automatic filter which removes sediments and larger organisms, and
- b) Ultraviolet disinfection by a medium pressure UV system which inactivates or kills the smaller plankton and bacteria.

The BWMS has two control modes, IMO Mode or USCG Mode. IMO Mode is used for ballasting and de-ballasting operations outside US waters. For any ballasting or de-ballasting operation in US waters, the USCG Mode must be activated. USCG Mode must also be activated before treating any ballast water that is planned discharged in US waters.

1.2 - Table for NGT BWMS Range Description

UV Chamber model	TRC (m3/h)	Number of UV lamps
DL1	30	1
DL2	60	2
DL3	90	3
DL4	150	4
DXL6	200	6
DXL9	260	9
DXL12	350	12
D4XL8	460	8
D4XL10	600	10
D4XL12	750	12
D5XL14	1005	14
D5XL16	1180	16
D5XL18	1323	18
D5XL20	1475	20
D5XL22	1645	22
D5XL24	1815	24

AquaBoll filter model	TRC (m3/h)
273	62
324	94
356	204
419	378
521	518
600	614
750	1274

aquaBoll BWT filter model	TRC (m3/h)
80	65
100	125
150	220
200	430
250	770
300	1000
350	1350
400	1900
500	2600

1.3 - Technical characteristics of filters

Maker / Fabricant	Boll & Kirch
Filtration size / Taille du filtre	20µm screen, automatic backflush
Working pressure / Pression de fonctionnement	10 bar Max. differential pressure: 1.0 bar; Backflush triggering pressure: 0.3 bar
Material of Filter housing / Matériau du corps de filtre	Cast iron

1.4 - Technical characteristics of UV assembly

Maker / Fabricant	BestUV
Flow rate per UV reactor / Débit par réacteur UV	30 to 1815 m3/h
Power Supply / Alimentation électrique	380 to 690V; 50-60 Hz, 3-Phase
Mounting / Installation	Horizontal. Mounting in parallel and/or in serie depending on BWMS model.
Material / Matériau	Stainless Steel

1.5 - Control and Monitoring

- PLC Program V4.6.X

The NGT BWMS is type approved with the system control software version 4.6.X. In the software version the “4” represents the major version number of the software. A major revision of the software will be any change to the control and operating philosophy of the NGT BWMS. The “6” represents the minor version number of the software and is reserved for new or changed features which do not affect core functionality. The “X” represents the patch level which is reserved for bug fixes and graphical user interface changes.

Any changes to the software are to be recorded as long as the system is in use onboard. Records of any software changes resulting in a revision of the major or minor version number or any changes to the hardware are to be forwarded to BV for evaluation. Testing of the application functions of the revised software may be required.

Le BWMS NGT est homologué avec la version 4.6.X du logiciel de contrôle du système. Dans la version du logiciel, le "4" représente le numéro de la version majeure du logiciel. Une révision majeure du logiciel correspond à toute modification de la philosophie de commande et de fonctionnement du système de gestion des eaux usées NGT. Le "6" représente le numéro de version mineure du logiciel et est réservé aux fonctionnalités nouvelles ou modifiées qui n'affectent pas la fonctionnalité de base. Le "X" représente le niveau de patch qui est réservé aux corrections de bugs et aux modifications de l'interface utilisateur graphique.

Toute modification du logiciel doit être enregistrée tant que le système est utilisé à bord. Les enregistrements de toute modification du logiciel entraînant une révision du numéro de version majeure ou mineure ou de toute modification du matériel doivent être transmis à BV pour évaluation. Il peut être nécessaire de tester les fonctions d'application du logiciel révisé.

2. DOCUMENTS AND DRAWINGS / DOCUMENTS ET PLANS**2.1 - P&ID for NGT BWMS:**

Model	Drawing N°	Revision
DL1-BK273	P0050	A
DL2-BK273	P0100	B
DL3-BK324	P0200	B
DL4-BK324	P0210	B
DL4-BK356	P0300	B
DXL6-BK356	P0400	B
DXL9-BK356	P0410	B
DXL9-BK419	P0420	B
DXL12-BK419	P0500	B
D4XL8-BK419	P0600	B
D4XL10-BK419	P0610	B
D4XL10-BK512	P0700	B
D4XL10-BK600	P0800	A
D4XL12-BK600	P0810	A
D4XL12-BK750	P0900	A
D5XL14-BK750	P1000	A
D5XL16-BK750	P1100	A
D5XL18-BK750	P1200	A

- P&ID for NGT BWMS with aquaBoll BWT filters:

Model	Drawing N°	date
DL1-BWT80	PW0050	25/01/2023
DL2-BWT80	PW0100	25/01/2023
DL3-BWT100	PW0200	25/01/2023
DL4-BWT100	PW0210	25/01/2023
DL4-BWT150	PW0300	25/01/2023
DXL6-BWT150	PW0400	25/01/2023
DXL9-BWT150	PW0410	25/01/2023
DXL12-BWT150	PW0415	25/01/2023
DXL9-BWT200	PW0420	25/01/2023
DXL12-BWT200	PW0500	25/01/2023
D4XL8-BWT200	PW0600	25/01/2023
D4XL10-BWT200	PW0610	25/01/2023
D4XL10-BWT250	PW0700	25/01/2023
D4XL10-BWT300	PW0800	25/01/2023
D4XL12-BWT300	PW0810	25/01/2023
D4XL12-BWT350	PW0900	25/01/2023
D4XL12-BWT400	PW0910	25/01/2023
D5XL14-BWT350	PW1000	25/01/2023
D5XL14-BWT400	PW1010	25/01/2023
D5XL16-BWT350	PW1100	25/01/2023
D5XL16-BWT400	PW1110	25/01/2023
D5XL18-BWT350	PW1200	25/01/2023
D5XL18-BWT400	PW1210	25/01/2023
D5XL20-BWT350	PW1300	25/01/2023

D5XL20-BWT400	PW1310	25/01/2023
D5XL22-BWT350	PW1400	25/01/2023
D5XL22-BWT500	PW1410	25/01/2023
D5XL24-BWT500	PW1500	25/01/2023

2.2 - General arrangement drawings for NGT BWMS:

Model	Drawing N°	Revision
DL1-BK273	D0050-11-02	A
DL2-BK273	D0100-11-02	A
DL3-BK324	D0200-11-02	A
DL4-BK324	D0210-11-02	A
DL4-BK356	D0300-11-03	A
DXL6-BK356	D0400-11-02	A
DXL9-BK356	D0410-11-02	A
DXL9-BK419	D0420-11-01	A
DXL12-BK419	D0500-11-01	A
D4XL8-BK419	D0600-11-01	A
D4XL10-BK419	D0610-11-01	A
D4XL10-BK512	D0700-11-01	A
D4XL10-BK600	D0800-11-01	A
D4XL12-BK600	D0810-11-01	A
D4XL12-BK750	D900-11-01	A
D5XL14-BK750	D1000-11-01	A
D5XL16-BK750	D1100-11-01	A
D5XL18-BK750	D1200-11-01	A

- General arrangement drawings for NGT BWMS with aquaBoll BWT filters:

Model	Drawing N°	Date
DL1-BWT80	DW0050-11-02	26/06/2023
DL2-BWT80	DW0100-11-02	24/05/2023
DL3-BWT100	DW0200-11-02	26/06/2023
DL4-BWT100	DW0210-11-02	26/06/2023
DL4-BWT150	DW0300-11-02	26/06/2023
DXL6-BWT150	DW0400-11-02	26/06/2023
DXL9-BWT150	DW0410-11-02	26/06/2023
DXL12-BWT150	DW0415-11-02	26/06/2023
DXL9-BWT200	DW0420-11-02	26/06/2023
DXL12-BWT200	DW0500-11-02	26/06/2023
D4XL8-BWT200	DW0600-11-02	26/06/2023
D4XL10-BWT200	DW0610-11-02	26/06/2023
D4XL10-BWT250	DW0700-11-02	26/06/2023
D4XL10-BWT300	DW0800-11-02	26/06/2023
D4XL12-BWT300	DW0810-11-02	28/06/2023
D4XL12-BWT350	DW0900-11-02	29/06/2023
D4XL12-BWT400	DW0910-11-02	18/09/2023
D5XL14-BWT350	DW1000-11-02	04/07/2023
D5XL14-BWT400	DW1010-11-02	06/07/2023
D5XL16-BWT350	DW1100-11-02	05/07/2023

D5XL16-BWT400	DW1110-11-02	07/07/2023
D5XL18-BWT350	DW1200-11-02	05/07/2023
D5XL18-BWT400	DW1210-11-02	07/07/2023
D5XL20-BWT350	DW1300-11-02	10/07/2023
D5XL20-BWT400	DW1310-11-02	10/07/2023
D5XL22-BWT350	DW1400-11-02	11/07/2023
D5XL22-BWT500	DW1410-11-02	14/07/2023
D5XL24-BWT500	DW1500-11-02	14/07/2023

2.3 - Bill of materials for NGT BWMS:

Model	Drawing N°	Revision	Date
DL1-BK273	D0050	C	30/03/2021
DL2-BK273	D0100	C	30/03/2021
DL3-BK324	D0200	C	30/03/2021
DL4-BK324	D0210	C	30/03/2021
DL4-BK356	D0300	C	30/03/2021
DXL6-BK356	D0400	C	30/03/2021
DXL9-BK356	D0410	C	30/03/2021
DXL9-BK419	D0420	C	30/03/2021
DXL12-BK419	D0500	C	30/03/2021
D4XL8-BK419	D0600	C	30/03/2021
D4XL10-BK419	D0610	C	30/03/2021
D4XL10-BK512	D0700	C	30/03/2021
D4XL10-BK600	D0800	C	30/03/2021
D4XL12-BK600	D0810	C	30/03/2021
D4XL12-BK750	D0900	C	30/03/2021
D5XL14-BK750	D1000	C	30/03/2021
D5XL16-BK750	D1100	C	30/03/2021
D5XL18-BK750	D1200	C	30/03/2021

- Bill of materials for NGT BWMS with aquaBoll BWT filters:

Model	Drawing N°	Date
DL1-BWT80	DW0050	06/01/2023
DL2-BWT80	DW0100	06/01/2023
DL3-BWT100	DW0200	06/01/2023
DL4-BWT100	DW0210	06/01/2023
DL4-BWT150	DW0300	06/01/2023
DXL6-BWT150	DW0400	06/01/2023
DXL9-BWT150	DW0410	06/01/2023
DXL12-BWT150	DW0415	06/01/2023
DXL9-BWT200	DW0420	06/01/2023
DXL12-BWT200	DW0500	06/01/2023
D4XL8-BWT200	DW0600	06/01/2023
D4XL10-BWT200	DW0610	06/01/2023
D4XL10-BWT250	DW0700	06/01/2023
D4XL10-BWT300	DW0800	06/01/2023
D4XL12-BWT300	DW0810	06/01/2023
D4XL12-BWT350	DW0900	06/01/2023

D4XL12-BWT400	DW0910	06/01/2023
D5XL14-BWT350	DW1000	06/01/2023
D5XL14-BWT400	DW1010	06/01/2023
D5XL16-BWT350	DW1100	06/01/2023
D5XL16-BWT400	DW1110	06/01/2023
D5XL18-BWT350	DW1200	06/01/2023
D5XL18-BWT400	DW1210	06/01/2023
D5XL20-BWT350	DW1300	06/01/2023
D5XL20-BWT400	DW1310	06/01/2023
D5XL22-BWT350	DW1400	06/01/2023
D5XL22-BWT500	DW1410	06/01/2023
D5XL24-BWT500	DW1500	06/01/2023

2.4 - Technical specifications for NGT BWMS:

- Rev. A dated 12/04/2021 for model DL1 -BK273
- Rev. A dated 06/05/2021 for model DL2 -BK273
- Rev. A dated 06/05/2021 for model DL3 -BK324
- Rev. A dated 12/04/2021 for model DL4 -BK324
- Rev. A dated 12/04/2021 for model DL4 -BK356
- Rev. A dated 12/04/2021 for model DXL6 -BK356
- Rev. A dated 06/05/2021 for model DXL9 -BK356
- Rev. A dated 06/05/2021 for model DXL9-BK419
- Rev. A dated 12/04/2021 for model DXL12-BK419
- Rev. A dated 06/05/2021 for model D4XL8-BK419
- Rev. A dated 06/05/2021 for model D4XL10-BK419
- Rev. A dated 06/05/2021 for model D4XL10-BK512
- Rev. A dated 06/05/2021 for model D4XL10-BK600
- Rev. A dated 12/04/2021 for model D4XL12-BK600
- Rev. A dated 12/04/2021 for model D4XL12-BK750
- Rev. A dated 12/04/2021 for model D5XL14-BK750
- Rev. A dated 12/04/2021 for model D5XL16-BK750
- Rev. A dated 06/05/2021 for model D5XL18-BK750
- dated 04/01/2023 for model DXL9 -BWT150
- dated 04/01/2023 for model DXL9 -BWT200
- dated 03/01/2022 for model DL4 -BWT150
- dated 03/01/2022 for model DL3 -BWT100
- dated 04/01/2022 for model DL1 -BWT80
- dated 04/01/2023 for model D4XL12 -BWT300
- dated 04/01/2023 for model D5XL14 -BWT400
- dated 04/01/2023 for model D4XL12 -BWT400
- dated 04/01/2023 for model D4XL8 -BWT200
- dated 04/01/2023 for model D4XL10 -BWT250
- dated 04/01/2023 for model D5XL18 -BWT400
- dated 04/01/2023 for model D5XL22 -BWT500
- dated 04/01/2023 for model D5XL20 -BWT400
- dated 04/01/2023 for model D5XL16 -BWT400
- dated 03/01/2022 for model DL2 -BWT80
- dated 03/01/2022 for model DL4 -BWT100
- dated 04/01/2023 for model DXL12 -BWT150
- dated 04/01/2023 for model DXL12 -BWT200

- dated 04/01/2023 for model DXL6 -BWT150
- dated 04/01/2023 for model D5XL16 -BWT350
- dated 04/01/2023 for model D4XL10 -BWT200
- dated 04/01/2023 for model D4XL10 -BWT300
- dated 04/01/2023 for model D4XL12 -BWT350
- dated 04/01/2023 for model D5XL14 -BWT350
- dated 04/01/2023 for model D5XL20 -BWT350
- dated 04/01/2023 for model D5XL18 -BWT350
- dated 04/01/2023 for model D5XL22 -BWT350
- dated 04/01/2023 for model D5XL24 -BWT500

2.5 - UV Units as per following documents:

- UV unit user manual Rev. A dated 08/04/2021
- UV Unit drawings :

Model	Drawing N°	Revision	Date
DL1	005873	00	26/02/2020
DL2	005873	00	18/02/2020
DL3	007590	00	26/02/2020
DL4	005602	00	28/02/2020
DXL6	005814	00	19/02/2020
DXL9	005813	01	20/02/2020
DXL9	005627	01	19/02/2020
DXL12	00513	01	20/02/2020
D4XL8	007571	00	25/02/2020
D4XL10	007551	X00	28/02/2020
D4XL12	007548	00	28/02/2020
D5XL14	007581	00	26/02/2020
D5XL16	007583	X00	26/02/2020
D5XL18	007584	X00	26/02/2020
D5XL20	010356	01	13/01/2023
D5XL22	010357	01	13/01/2023
D5XL24	010358	01	13/01/2023

UV unit and UV electrical drawings reference number, revision number and date may vary depending on the wiper option and/or the supply voltage.

- Electrical drawings of UV Units Rev. 00 dated 09/02/2021
- Handling of broken UV lamps Rev. A dated 20/04/2021

2.6 - Electrical Diagrams of control cabinet:

Model	Drawing N°	Revision
DL1-BK273 - DXL9-BK356	C3100-04 (380-440V) C3100-06 (690V)	A
DXL9-BK419 - D4XL12-BK600	C3200-04 (380-440V) C3200-06 (690V)	A
D4XL12-BK750 - D5XL18-BK750	C3300-04 (380-440V) C3300-06 (690V)	A
DL1-BWT80 - DXL12-BWT150	CW3100-04 (380-440V) CW3100-06 (690V)	A
DXL9-BWT200 - D5XL22-BWT350	CW3200-04 (380-440V) CW3200-06 (690V)	A

D5XL22-BWT500 - D5XL24-BWT500	CW3300-04 (380-440V) CW3300-06 (690V)	A
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2.7 - Wiring diagram N° E3XX0-04-1800 (380-440V) and E3XX0-06-1800 (690V) Rev. A with aquaBoll 6.18.3 filters

- Wiring diagram N° EWXXX0-04-1800 (380-440V) Rev. A and N° EWXXX0-06-1800 (690V) Rev. A with aquaBoll BWT filters

2.8 - Installation, Operation & Maintenance Manuals:

- Operation, Safety & Maintenance manual Rev. F dated 10/07/2023

- Installation manual Rev. C dated 16/08/2021

- Operating instructions for automatic filter Rev. 001 dated 05/2020 for filters aquaBoll 6.18.3

- Installation, Operation & Maintenance for backflush pumps Rev. 2 dated 04/11/2019

- Tightening of bolted connections and installation of seals in flanged connections Rev. A dated 24/09/2020

- Functional test procedure Rev. B dated 24/03/2021

- Alarm list Rev. E dated 06/05/2021

- Software Handling procedure Rev. A dated 09/03/2021

2.9 - Others:

- Scaling report of NGT BWMS N°27934666/DNVGL Dated 31/05/2021

- Design of UV Systems (CFD) dated 04/2021

No departure from the above documents shall be made without the prior consent of the Society named on this certificate. The manufacturer must inform the Society of any modification or changes to these documents and drawings.

3. TEST REPORTS / RAPPORTS D'ESSAIS

Tests carried out according to the Code for Approval of Ballast Water Management Systems (BWMS Code), Res. MEPC300(72).

3.1 - **Land-based tests**, NIVA (Norway). All land-based tests were performed with a NGT BWMS DXL9-419 with a Treatment Rated Capacity of 260 m3/h consisting of one 260 m3/h Best UV DXL9.1500. UV unit and one 378 m3/h B&K aquaBoll 419.200 filter.

- Report N°7488-2020 dated 18/11/2020

3.2 - **Shipboard tests**, NIVA (Norway). All land-based tests were performed with a NGT BWMS DXL12-BK419 with a Treatment Rated Capacity of 350 m3/h consisting of one 350 m3/h Best UV DXL12.1500. UV unit and one 378 m3/h B&K aquaBoll 419.200 filter.

- Report N° 7528-2020 dated 09/11/2020

3.3 - **Environmental tests**:

- Test report N° 30484 Rev. 0 dated 08/12/2020 performed by Applica Test & Certification AS, type testing of Flowmeter.

- Test report N° 30484 Rev. 1 dated 08/12/2020 performed by Applica Test & Certification AS, type testing of Ballast Water Management System - BWMS.

- Test for Marine Type Approval of MMC Ballast Water Management System performed by DELTA N° DANAK-19/12610 dated 15 11/2012

4. APPLICATION / LIMITATION

4.1 - This Type Approval Certificate is issued based on the statutory Type Approval Certificate N° TAP000028V Rev. 3 issued on 12/07/2023 by DNV GL on behalf of the Norwegian Maritime Authority. / *Ce certificat d'approbation de type est émis sur la base de l'approbation de type statutoire N° TAP000028V Rev. 3 émis le 12/07/2023 par DNV GL au nom de l'Administration Maritime Norvégienne.*

4.2 - Intended for Ballast Water Treatment: / *Application destinée au traitement des eaux de ballast:*

- Ballast Water Uptake: Filtration / UV-disinfection / *Au chargement de l'eau de Ballast: Filtration + Désinfection UV*

- Ballast Water Discharge: UV-disinfection / *Au rejet de l'eau de Ballast: Désinfection UV*

- The system can be used in the following common ambient and water conditions / *Le système peut être utilisé dans les conditions d'air et d'eaux suivantes:*

Ballast water temperature range / Plage de température de l'eau de Ballast	No limitation
Ambient temperature range / Plage de température ambiante	0 to +55 °C
Water salinity range / Plage de salinité de l'eau	No limitation
Minimum UV transmittance / Transmittance UV minimale	46 %

4.3 - Operating Conditions for NGT BWMS / Conditions d'utilisation du BWMS NGT

Treatment Rated Capacity / Capacité Nominale de Traitement	30~1815 m3/h
Minimum Operating Pressure / Pression de fonctionnement minimale	1.5 bar
Maximum Operating Pressure / Pression de fonctionnement maximale	10 bar

UV Dose & Flow rate to be operated / Dose UV & débit en opérations

UV Chamber model by bestUV	UVI limit for power reduction [W/m2]	UVI limit for at maximum flow rate [W/m2]*	Low UVI limit at minimum flow rate [W/m2]	Minimum flow rate for a Salinity ≥ 1PSU [m3/h]	Minimum flow rate for a Salinity < 1PSU [m3/h]
DL1	2 033	1 369	450	10	7.4
DL2	N/A	6 505	3 200	28	20
DL3	4 042	2 722	2 066	37	26
DL4	21 004	14 144	7 443	71	51
DXL6	12 768	8 598	3 173	81	58
DXL9	27 346	18 415	8 694	92	65
DXL12	23 639	15 919	6 209	178	127
D4XL8	9 456	5 332	280	180	128
D4XL10	16 559	11 151	4 023	237	169
D4XL12	25 077	16 887	7 014	310	221
D5XL14	15 297	10 301	4 109	433	308
D5XL16	17 340	11 677	4 700	518	369
D5XL18	21 525	14 495	5 515	581	414
D5XL20	22 649	15 252	5 913	654	466
D5XL22	23 583	15 881	6 161	726	517
D5XL24	22 750	15 320	5 571	813	579

*Determined as per CFD analysis, depending on the UV chamber model.

4.4 - The treatment rated capacity of the BWMS is not to be less than the operated flow rate of ballast pump(s). / La capacité nominale de traitement des systèmes de gestion des eaux de ballast (BWMS) ne peut pas être inférieure au débit de service de la (des) pompe(s) de ballast.

4.5 - Ex-certification is not covered by this certificate. Application for use in hazardous areas to be approved in each case. / La certification Ex n'est pas couverte par ce certificat. L'utilisation en zones dangereuses doit être approuvée pour chaque cas

4.6 - The following documentation is to be submitted for approval on a ship case-by-case basis: / La documentation suivante doit être soumise pour approbation par navire au cas par cas:

- On-board location of the BWTS skid-unit / - Emplacement de l'unité BWMS à bord
- All connection details of interface towards ship's ballast piping systems / - Détails de toutes les connexions d'interface avec les systèmes de tuyauteries de ballast du navire
- Management of stripping operations; / - Gestion des opérations d'assèchement
- Layout of the system; / - Agencement du système
- All associated control, alarm and monitoring equipment / - Equipements de contrôle, d'alarme et de surveillance afférents
- Wiring diagrams and the cable specifications / - Schémas de câblage et spécifications des câbles
- Materials list / Liste des matériaux
- Arrangement and location of Ballast Water sampling ports / - Agencement et emplacement des ports d'échantillonnage des eaux de ballast

4.7 - A copy of the operating manual is to be maintained onboard. / Un exemplaire du manuel d'exploitation doit être conservé à bord.

5. PRODUCTION SURVEY REQUIREMENTS / EXIGENCES DES INSPECTIONS DE PRODUCTION

5.1 - The Ballast Water Management systems are to be supplied by **NORWEGIAN GREENTECH AS** in compliance with the type and the requirements described in this certificate. / *Les systèmes de traitement des eaux de ballast doivent être fournis par **NORWEGIAN GREENTECH AS** en conformité avec le type et les exigences décrites dans le présent certificat*

5.2 - In compliance with French Regulations Division 218, the surveillance of the manufacturing of ballast water treatment systems is to be carried out in accordance with Division 310. / *Conformément à la Règlementation Française Division 218, la surveillance de fabrication des systèmes de traitement des eaux de ballast doit être effectuée selon les dispositions de la Division 310.*

5.3 - Pursuant to French Regulations Division 310, the ballast water treatment systems are categorised HBV as per Bureau Veritas Rule Note NR 320. / *Conformément à la Division 310, les systèmes de traitement des eaux de ballast sont catégorisés HBV suivant la Note Réglementaire Bureau Veritas NR 320.*

5.4 - **NORWEGIAN GREENTECH AS** has to make the necessary arrangements to have its works recognised by Bureau Veritas in compliance with the requirements of NR 320 for HBV products. / ***NORWEGIAN GREENTECH AS** doit prendre les dispositions nécessaires pour que les sites de production soient reconnus conformément à la note Bureau Veritas NR 320 pour les produits HBV.*

5.6 - For information, **NORWEGIAN GREENTECH AS** has declared to Bureau Veritas the following production site: / *Pour information, **NORWEGIAN GREENTECH AS** a déclaré à Bureau Veritas les sites de production suivants:*

NORWEGIAN GREENTECH AS

**Mjølstadneset
6092 FOSNAVÅG
NORWAY**

6. MARKING OF PRODUCT / MARQUAGE POUR IDENTIFICATION

Each Ballast Water Treatment System is to be marked with:

- Manufacturer's name or logo
- Serial number
- Type designation
- Mark of conformity as per French Rules Article 310-1.07: 0062/MMF/XX where XX are the last two digits of year of manufacturing.

The marking must be affixed with an indelible means on the approved product

Chaque système de traitement des eaux de ballast doit être marqué avec:

- *Nom du fabricant ou son logo*
- *Numéro de série*
- *Type et désignation*
- *Marque de conformité conforme à l'article 310-1.07 du Règlement Français: 0062/MMF/XX où XX correspond aux deux derniers chiffres de l'année de fabrication.*

Le marquage doit être apposé d'une manière indélébile sur le matériel approuvé

7. OTHERS / AUTRES

7.1 - It is **NORWEGIAN GREENTECH AS**'s responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval. / *Il est de la responsabilité de **NORWEGIAN GREENTECH AS** d'informer les chantiers ou leurs sous-traitants des méthodes appropriées de montage, d'utilisation et d'entretien général de l'équipement homologué et des conditions de cette homologation.*

7.2 - A copy of this Type Approval Certificate of Ballast Water Management System should be carried onboard a vessel fitted with this Ballast Water Management System at all times. A reference to the test protocol and a copy of the summary of the test results should be available for inspection on board the vessel. / *Un exemplaire du présent certificat devrait se trouver en permanence à bord d'un navire équipé de ce système de gestion des eaux de ballast. Une référence au protocole d'essai et une copie du procès-verbal d'essai devraient se trouver à bord pour pouvoir être inspectées.*

Appendix to the Type Approval Certificate of Ballast Water Management System N° 71811/A1 MMF

Summary of Test Results for NGT Ballast Water Treatment System (BWTS)

1- SCOPE OF TESTS AND APPROVAL

System Type: Ballast Water Management System

System Designation: NGT BWMS

Supplied by: NORWEGIAN GREENTECH AS

2- SUMMARY OF LAND-BASED TESTS

A total of 21 cycles (5 marine, 6 brackish & 10 freshwater) were performed with a NGT BWMS DXL9-BK419 with a Treatment Rated Capacity of 260m³/h consisting of one 260 m³/h Best UV DXL9.1500. UV unit and one 378 m³/h B&K aquaBoll 419.200 filter.

Laboratory: NIVA (Norway), test report N° 7488-2020 dated 18/11/2020

MPN method used for counting of organisms in the 10-50µm size category

Detailed ballasting flowrates can be found in the test reports

BRACKISH WATER

Cycle #	1	2	7	8	10	11
Salinity (PSU)	19.2	19.2	19.4	19.4	18.4	18.4
TSS (mg/L)	57.7	57.2	56.5	58	61.9	68.4
Temperature (°C)	6	6	11	11	12	12
Retention time (hours)	23.0	118.5	22	22	118.5	118.5
IMO Validity Criterion	yes	yes	yes	yes	yes	yes
Disch: >50µm (org/m ³)	428	2.3	<1	<1	0.3	0.6
Disch: 10-50µm (org/mL)	2.3	<0.2	0.2	<0.2	<0.2	<0.2
Disch: <10µm indicators	ok	ok	ok	ok	ok	ok
Cycle results	unsuccessful*	successful	successful	successful	successful	successful

* mesh size of 40 µm of the filter has been replaced by a mesh size of 20 µm after this test

MARINE WATER

Cycle #	3	4	5	6	9
Salinity (PSU)	31.4	31.4	31.5	31.6	31.3
TSS (mg/L)	60.2	62.5	57.8	59.1	45.0
Temperature (°C)	9	9	10	10	11
Retention time (hours)	23.5	23	119	119	22.5
IMO Validity Criterion	yes	yes	yes	yes	yes
Disch: >50µm (org/m ³)	<1	<1	<1	<1	0.3
Disch: 10-50µm (org/mL)	<0.2	<0.2	0.2	<0.2	0.2
Disch: <10µm indicators	ok	ok	ok	ok	ok
Cycle results	successful	successful	successful	successful	successful

FRESH WATER

Cycle #	12	13	14	15	16
Salinity (PSU)	0	0	0	0	0
TSS (mg/L)	61.3	63.5	61.8	52.6	55.5
Temperature (°C)	12	12	14	16	17
Retention time (hours)	22.5	23	24.5	23	23
IMO Validity Criterion	yes	yes	yes	yes	yes
Disch: >50µm (org/m3)	15.3	20	93	5.7	20
Disch: 10-50µm (org/mL)	<0.2	<0.2	0.9	1	2
Disch: <10µm indicators	ok	ok	ok	ok	ok
Cycle results	invalid*	invalid*	invalid*	successful	invalid*

Cycle #	17	18	19	20	21
Salinity (PSU)	0	0	0	0	0
TSS (mg/L)	53.8	53	51.8	53.3	53
Temperature (°C)	17	14	14	12	12
Retention time (hours)	23	118.5	118	22	22
IMO Validity Criterion	yes	yes	yes	yes	yes
Disch: >50µm (org/m3)	33	<1	<1	<1	<1
Disch: 10-50µm (org/mL)	3.6	0.14	0.39	0.21	0.77
Disch: <10µm indicators	ok	ok	ok	ok	ok
Cycle results	invalid*	successful	successful	successful	successful

*BWMS operating conditions outside of the system design limitations (minimum UVI lower than expected by SDL)

3- SUMMARY OF SHIPBOARD TESTS

A total of 6 cycles were performed on board cargo ship FRI SEA (IMO 9229166) with aa NGT BWMS DXL12-BK419 with a Treatment Rated Capacity of 350m³/h consisting of one 350 m³/h Best UV DXL12.1500. UV unit and one 378 m³/h B&K aquaBoll 419.200 filter.

Test period: 28 November. 2019 - 23 June 2020

Laboratory: NIVA (Norway), Report N° 7528-2020 dated 09/11/2020

MPN method used for counting of organisms in the 10-50µm size category

Cycle #	1	2	3	4	5	6
Ballasting date	28/11/2019	16/06/2020	18/06/2020	19/06/2020	21/06/2020	22/06/2020
Location	Coastal water off Cadiz, Spain	Fagerstrand, Norway	Fagerstrand, Norway	Fagerstrand, Norway	Tofte, Norway	Tofte, Norway
Salinity (PSU)	8.1	8.1	8	8.1	8.2	8.2
TSS (mg/L)	5	1.1	<1.3	1.9	2.3	1.7
Temperature (°C)	17	19	22	22	21	21
Ballasting Flowrate (m³/h)	175*	334	303	300	264	296
Retention time (hours)	26	22	22	22	23	24
IMO Validity Criterion	yes	yes	yes	yes	yes	yes
Disch: >50µm (org/m³)	3	466	1.3	4.2	3.5	1.4
Disch: 10-50µm (org/mL)	2.5	9.7	6.5	5.3	1.8	1.8
Disch: <10µm indicators	ok	ok	ok	ok	ok	ok
Cycle results	successful	invalid**	successful	successful	successful	successful

* The two ballast water pumps installed on the FRI SEA (independent of the BWMS) were not able to deliver a flow rate corresponding to the TRC of the BWMS (354m³/h). Following this test, a new ballast water pump has been installed.

** Filter basket was damaged during operations and needed to be replaced

***** FIN DU CERTIFICAT *****