



Type Approval Certificate of Ballast Water Management System

This is to certify that the Ballast Water Management System listed below has been examined and tested in accordance with the requirements of the specifications contained in the Guidelines contained in IMO resolution MEPC 174.58. This certificate is valid only for Ballast Water Management system referred to below.

**This certificate is issued to
Producer**

Hyde Marine
2000 McClaren Woods Drive
Coraopolis,
Pennsylvania, 15108
United States of America (USA)

Address

Ballast Water Management System supplied:

Hyde Marine Inc

Under type and model designation and incorporating:

Hyde GUARDIAN®, Type HG 300, incorporating types HG 60 to HG 6000 with alternative filter housings of SF50, SF70 and SF90 for Galaxy Filters and alternative filter types of Filtrex ACB, Hydac RF10, Filtersafe/Ballastsafe and Amiad Omega.

Ballast Water Management System manufactured by:

Hyde Marine Inc

To equipment/assembly drawing No:

E5868-00, Rev. J

Date: undated

Other equipment manufactured by:

Berson Milieutechniek BV
Arkal Filtration Systems
Calgon Carbon

To equipment/assembly drawing No:

E5868.1, Rev. A
E5868.3, Rev. A

Date: undated

Treatment Rated Capacity:

60 to 6000

M³/h

A copy of this Type Approval Certificate should be carried on board a vessel fitted with this Ballast Water Management System at all times. A reference to the test protocol and a copy of the test results should be available for inspection on board the vessel. If the Type Approval Certificate is issued based on approval by another Administration, reference to that Type Approval Certificate shall be made.

Limiting Conditions imposed as described in the Design Appraisal Document forms part of this certificate.

This certificate remains valid up to the expiry dated unless cancelled or revoked, or until such date where it is superseded by the requirements of the Marine Equipment Directive whichever is the earlier, provided the conditions in the attached schedule are complied with and the equipment remains satisfactory in service.

Date of issue 13 April 2014

Expiry date 12 April 2019

Certificate No. MCA 0900032/M4

Signed Sahan Abeysekara
Hampton GTC Office Office

Lloyd's Register EMEA



Sheet No 1 of 11

Name S. Abeysekara
Specialist to Lloyd's Register EMEA
is a subsidiary of the Lloyd's Register Group

Note:

This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify the nominated body named on this certificate of any modification or changes to the equipment in order to obtain a valid Certificate.



This certificate is issued under the authority given in Merchant Shipping Notice No MSN 1735 (M+F) as amended to date.

Notified Body authorised by the MCA



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MARINE TECHNOLOGY & ENGINEERING SERVICES

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF

Telephone 0330 4140 345

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Page 2 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
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ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. MCA 0900032/M4

The undernoted documents have been appraised for compliance with the relevant International Conventions and UK legislation for the Type Approval of Marine Equipment for use on Merchant Ships Registered in the United Kingdom.

This Design Appraisal Document forms part of the Certificate that is issued under the authority given in the MCA Merchant Shipping Notice No MSN 1735.

APPROVED RATINGS IN CERTIFICATE NO MCA 0900032/M3

Model	Flow rate (m ³ /hr)	Filter unit	UV unit
HG 60	60	3" x 8	080620
HG 100	100	4" x 3	160620
HG 150	150	4" x 4	160620
HG 200	200	4" x 5	160635
HG 250	250	4" x 6	160635
HG 300	300	4" x 6	160835
HG 350	350	4" x 8	161235
HG 400	400	4" x 8	161235
HG 450	450	4" x 10	161235
HG 500	500	4" x 12	201235
HG 600	600	6" x 8	201235
HG 700	700	6" x 10	201835
HG 800	800	6" x 12	201835
HG 900	900	6" x 12	201835
HG 1000	1000	6" x 14	201835
HG 1250	1250	6" x 16	201850
HG 1350	1350	6" x 18	201850
HG 1400	1400	6" x 20	201850
HG 1500	1500	6" x 20	201850
HG 1600	1600	6" x 24	201835 x 2
HG 2000	2000	6" x 28	201835 x 2
HG 2500	2500	6" x 32	201850 x 2
HG 3000	3000	6" x 42	201850 x 2
HG 4000	4000	6" x 56	201850 x 3
HG 5000	5000	6" x 64	201850 x 4
HG 6000	6000	6" x 80	201850 x 4

Filters:

Filtration grade (µm): 55



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Page 3 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

Alternative filter housing arrangements:

Model	Flow rate (m ³ /hr)	Filter unit	UV unit
HG 1350	1350	SF50 x 3	201850
HG 1400	1400	SF50 x 4	201850
HG 1500	1500	SF50 x 4	201850
HG 1500	1500	SF70 x 3	201850
HG 1600	1600	SF50 x 4	201835 x 2
HG 1600	1600	SF70 x 3	201835 x 2
HG 2000	2000	SF50 x 5	201835 x 2
HG 2000	2000	SF70 x 4	201835 x 2
HG 2000	2000	SF90 x 3	201835 x 2
HG 2500	2500	SF50 x 6	201850 x 2
HG 2500	2500	SF70 x 4	201850 x 2
HG 2500	2500	SF90 x 3	201850 x 2
HG 3000	3000	SF50 x 7	201850 x 2
HG 3000	3000	SF70 x 5	201850 x 2
HG 3000	3000	SF90 x 4	201850 x 2
HG 4000	4000	SF50 x 9	201850 x 3
HG 4000	4000	SF70 x 7	201850 x 3
HG 4000	4000	SF90 x 5	201850 x 3
HG 5000	5000	SF50 x 11	201850 x 4
HG 5000	5000	SF70 x 8	201850 x 4
HG 5000	5000	SF90 x 6	201850 x 4
HG 6000	6000	SF50 x 13	201850 x 5
HG 6000	6000	SF70 x 10	201850 x 5
HG 6000	6000	SF90 x 8	201850 x 5

Filters:

Filtration grade (µm): 55



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Page 4 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

APPROVED RATINGS IN CERTIFICATES NO MCA 090032/M3

Alternative filter design arrangements:

Filtrex ACB

Model	Flow rate (m ³ /hr)	Filter unit	UV unit
HG 60	60	ACB-906-100	080420/080620
HG 100	100	ACB-910-150	160620
HG 150	150	ACB-915-150	160620
HG 250	250	ACB-935-200	160635
HG 300	300	ACB-945-200	160835
HG 350	350	ACB-955-250	161235
HG 450	450	ACB-955-250	161235
HG 500	500	ACB-955-250	201235
HG 600	600	ACB-985-300	201235
HG 700	700	ACB-985-300	201835
HG 800	800	ACB-999-350	201835
HG 900	900	ACB-999-350	201835
HG 1000	1000	ACB-999-350	201835
HG 1250	1250	ACB-9100-400	201850
HG 1500	1500	2 x ACB-985-300	201850
HG 1600	1600	2 x ACB-999-350	201835 x 2
HG 2000	2000	2 x ACB-999-350	201835 x 2
HG 2500	2500	2 x ACB-9100-400	201850 x 2
HG 3000	3000	3 x ACB-999-350	201850 x 2
HG 4000	4000	4 x ACB-999-350	201850 x 3
HG 5000	5000	5 x ACB-999-350	201850 x 4
HG 6000	6000	6 x ACB-999-350	201850 x 4

Filters:

Filtration grade (µm): 30



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Page 5 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

Hydac RF10

Model	Flow rate (m ³ /hr)	Filter unit	UV unit
HG 60	60	RF10-10	080420/080620
HG 100	100	RF10-10	160620
HG 150	150	RF10-20	160620
HG 250	250	RF10-20	160635
HG 300	300	RF10-25	160835
HG 350	350	RF10-25	161235
HG 450	450	RF10-25	161235
HG 500	500	RF10-25	201235
HG 600	600	RF10-30	201235
HG 700	700	RF10-30	201835
HG 800	800	RF10-35	201835
HG 900	900	RF10-35	201835
HG 1000	1000	RF10-35	201835
HG 1250	1250	RF10-40	201850
HG 1500	1500	RF10-40	201850
HG 1600	1600	RF10-50	201835 x 2
HG 2000	2000	RF10-50	201835 x 2
HG 2500	2500	RF10-60	201850 x 2
HG 3000	3000	RF10-60	201850 x 2
HG 4000	4000	2 x RF10-50	201850 x 3
HG 5000	5000	2 x RF10-60	201850 x 4
HG 6000	6000	2 x RF10-60	201850 x 4

Filters:

Filtration grade (µm): 40



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Page 6 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

Filtersafe Ballastsafe

Model	Flow rate (m ³ /hr)	Filter unit	UV unit
HG 60	60	BS-031-4	080420/080620
HG 100	100	BS-061H/V-06	160620
HG 150	150	BS-061H/V-06	160620
HG 250	250	BS-101H/V-10	160635
HG 300	300	BS-151H/V-10	160835
HG 350	350	BS-151H/V-12	161235
HG 450	450	BS-201H/V-12	161235
HG 500	500	BS-201H/V-14	201235
HG 600	600	BS-201H/V-T-14	201235
HG 700	700	BS-300H/V-14	201835
HG 800	800	BS-300H/V-14	201835
HG 900	900	BS-300H/V-T-14	201835
HG 1000	1000	BS-400H/V-14	201835
HG 1250	1250	BS-400H/V-16	201850
HG 1500	1500	BS-603H/V-16	201850
HG 1600	1600	BS-603H/V-16	201835 x 2
HG 2000	2000	BS-804H/V-18	201835 x 2
HG 2500	2500	BS-1004H/V-20	201850 x 2
HG 3000	3000	BS-1204H/V-24	201850 x 2
HG 4000	4000	2 x BS-804H/V-18	201850 x 3
HG 5000	5000	2 x BS-1004H/V-24	201850 x 4
HG 6000	6000	2 x BS-1204H/V-24	201850 x 4

Filters:

Filtration grade (µm): 40



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Page 7 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

Amiad Omega			
Model	Flow rate (m³/hr)	Filter unit	UV unit
HG 60	60	SAF4500	080420/080620
HG 100	100	SAF4500	160620
HG 150	150	SAF6000	160620
HG 250	250	Omega I	160635
HG 300	300	Omega I	160835
HG 350	350	Omega I	161235
HG 450	450	Omega I E	161235
HG 500	500	Omega I E	201235
HG 600	600	Omega II	201235
HG 700	700	Omega II	201835
HG 800	800	Omega II	201835
HG 900	900	Omega II E	201835
HG 1000	1000	Omega III	201835
HG 1250	1250	Omega III	201850
HG 1500	1500	Omega III	201850
HG 1600	1600	Omega III E	201835 x 2
HG 2000	2000	Omega III E	201835 x 2
HG 2500	2500	Omega IV E	201850 x 2
HG 3000	3000	Omega IV E	201850 x 2
HG 4000	4000	2 x Omega III E	201850 x 3
HG 5000	5000	2 x Omega IV E	201850 x 4
HG 6000	6000	3 x Omega IV E	201850 x 4

Filters:
Filtration grade (µm): 40

UV-C Light Source (Medium Pressure):
Size of chamber (inch): 8, 16 & 20
Number of lamps: 4, 6, 8, 12 & 18
Lamp power (kW): 2, 3.5 & 5

Max. water pressure (bar): 10
Max. water temperature (°C): 80

HAZARDOUS AREA CERTIFICATION

Ex II 2 G Ex c d e ia ib px T4 Gb



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Page 8 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

APPROVAL DOCUMENTATION

Request form	02-Dec-2013
Hyde Marine drawing no. E5868-00, rev. J	undated
Hyde Marine drawing no. E5868.1, rev. A	undated
Hyde Marine drawing no. E5868.3, rev. A	undated
Hyde Guardian Ballast Water Treatment System, Operation and Maintenance Manual, CGS Manual Iss. 1	undated
Hyde Guardian Filter Service and Maintenance Manual	undated
Hyde marine In Line UV System Operations and Maintenance Manual, Version 2.0	July 2008
Hyde Guardian Electrical Components by Location	undated
Hyde Marine email	08 Apr 2009
Hyde Marine letter	07 Apr 2009
Hyde Marine letter, re additional filter housings	23-Dec-2010
Hyde Marine letter , re filter scaling	23-Dec-2010
Hyde GUARDIAN Ballast Water Treatment System	undated
LR Design Appraisal Document no. BDSO 182595, Issue 1	22-Mar-2011
Drawings and documents as listed on above LR Design Appraisal Document	
Hyde Marine drawings HG-300S Gen II Control Cabinet Fab Rev A	Mar 2013
Hyde Marine drawings HG-300S Gen II Power Cabinet Fab Rev A	Mar 2013
Hyde Marine drawings HG-300S Gen II Elect System Fab Rev A	Mar 2013
Software Quality Plan QP270 Rev 1	Undated
Scheduled drawing list of ATEX critical components Rev 6	Feb 2011
Hyde Marine email, Filter maintenance manual	17 March 2014
Hyde Marine email, Filter test results	19 August 2013
Hyde Guardian Implementation matrix	Undated
Hyde Guardian component comparison	Undated
Reactor assembly drawings No G300514, G300539	Oct 2012
System General Arrangement No G900391 rev A	March 2013
UV vessel general arrangement No G300585 rev A	March 2013
UV vessel components No G300583 rev A	March 2013

TEST REPORTS

Environmental acceptability evaluation of the Hyde Guardian Ballast water Treatment System as part of the Type Approval Process, Version 2	13 Feb 2009
Royal Netherlands institute for Sea Research (NIOZ) final report of the land-based testing of the Hyde-Guardian® system	January 2009
University of Maryland Center for Environmental Sciences report of shipboard trials of the Hyde 'Guardian' system in Caribbean Sea and Western Pacific Ocean	January 2009
Lou Baxter & Associates report	06 Mar 2009
Lou Baxter & Associates report	30 Mar 2009



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Page 9 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

Summary of the test results for the shipboard and land based trials of the Hyde GUARDIAN® Ballast Water Treatment System

Inspection and Surveillance of production facilities, Con No NYK 1400059

EC Type Examination certificate no. DNV 11 ATEX 04992X

Test reports as listed on above referenced EC Type Examination certificate

Compact NSX, rated 100A/160A/250A/400A/630A 3 and 4 pole circuit breakers LR TA CERTIFICATE 09/00032(E1)

ISO 9001:2008 Management System Standard certificate no 87859-2010-AQ-USA-ANAB

Report submitted to Maritime and Coastguard Agency (MCA)

Comparative filter performance test report, DHI

CFD analysis of reactor UV8B (080420) and HG 1500

Vibration, Environmental, Power fluctuation and Tilt test report

Performance evaluation in Land-based test facility, Project no 11817651

27 Apr 2009

21 March 2014

09-Dec-2011

08 Aug 2012

05-Nov-2013

28 March 2014

Feb 2014

March 2014

Sept 2011

18 March 2016

PLACE OF PRODUCTION

Calgon Carbon
2000 McClaren Woods Drive
Coraopolis
15108 Pennsylvania
United States of America



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Page 10 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

CONDITIONS OF CERTIFICATION

1. Within five years, the licensee must submit a report to the United Kingdom's competent authority, the Maritime and Coastguard Agency (MCA), detailing all experiences with the operation of the ballast water system, including results and analysis of any scientific research relevant to the safe operation and environmental impact of the system.
2. Notwithstanding the requirement to report before the fifth anniversary of the date of the type approval certificate the licensee is required to comply with the following additional provisions:
 - 2.1 The licensee must report immediately all events to the MCA leading to harm either to human health or the environment as a result of the operation of the ballast water management system.
 - 2.2 Any indications that the ballast water management system is not performing to the standards of the ballast water convention must be reported to the MCA including any deficiencies identified by port State control.
 - 2.3 All accidents (e.g., accidental exposure to UV) in connection with the ballast water management system must be reported immediately to the MCA.
 - 2.4 Significant changes in the construction of the ballast water management system must be reported to both the MCA and the recognised organisation that issued the type approval certificate on behalf of the MCA; if they potentially affect the efficiency of the system, they must be approved by the MCA.
 - 2.5 The licensee must take reasonable measures to ensure that the operator of the system is familiar with the operation of the system and is capable of operating and maintaining the system in accordance with the operating manual.
 - 2.6 If the licensee does not comply with these additional provisions, the type approval may be revoked by the MCA.
3. Details of the location of the Hyde GUARDIAN® ballast water treatment system, and its connection into the ship's ballast system are to be shown on the ship's plans, which are to be submitted for approval.
4. Due to lab capabilities and client direction the unit was only tested at 22.5° static condition along the 3300 mm axis; raising only the outlet side of the unit. The deviation from these angles is permitted, taking into consideration the type, size and service conditions of the ship and operational functioning of the equipment as the test is not a required for the electrical components as per MEPC.174(58) Annex 4, Part 3 Section 3.14.
5. This system is tested and approved for statutory compliance only if the ballast water is subjected to treatment at both uptake and discharge.



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Page 11 of 11
Document number MCA 0900032/M4
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 13 April 2016	Quote this reference on all future communications MTES/ENG/TA/SA/WP25411625
-----------------------	--

6. The following Land based and Ship board test reports are to be made available with the certificate MCA 0900032/M4.
- Royal Netherlands institute for Sea Research (NIOZ) final report of the land-based testing of the Hyde-Guardian® system January 2009
 - University of Maryland Centre for Environmental Sciences report of shipboard trials of the Hyde 'Guardian' system in Caribbean Sea and Western Pacific Ocean January 2009

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 Southampton GTC Office



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LR031.1.2013.2

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