



Marine & Offshore
Division

Certificate number: 44661/A1 BV

File number: ACM 149/2517/01

Product code: 1543I

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

AMIAD WATER SYSTEMS LTD.

- ISRAEL

for the type of product

FILTER FOR BALLAST WATER TREATMENT EQUIPMENT

OMEGA Filters for Ballast Water Filtration
Series OMEGA I-IE, OMEGA II-IIE & OMEGA-54K

Requirements:

- BUREAU VERITAS Rules for the Classification of Steel Ships

This certificate is issued to attest that BUREAU VERITAS did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 09 May 2021

For BUREAU VERITAS,
At BV PIRAEUS, on 11 Nov 2016,
Dimitris DIMITROPOULOS



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with BUREAU VERITAS. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of BUREAU VERITAS Marine & Offshore Division available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against BUREAU VERITAS for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

The electronic version is available at: <http://www.veristarm.com/veristarnb/jsp/viewPublicPdfTypepec.jsp?id=rfp3crmdkc>

BV Mod. Ad.E 530 October 2014

This certificate consists of 4 page(s)

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION

OMEGA Filters for Ballast Water Filtration

Series OMEGA I-IE, OMEGA II-IEE & OMEGA-54K

E= Extended Model

1.1 Design

- The Amiad Omega Series are automatic filters, with multiple screens operated by a single electric self-cleaning mechanism.
- **Filtration Process:** Raw water enters from the filter inlet and passes through the multi-screens. Clean water flows through the filter outlet. The gradual dirt buildup on the inner multi screen surface causes a filter cake to develop, with a corresponding increase in the pressure differential across the multi-screens. A pressure differential switch senses the pressure differential and when it reaches a pre-set value, the self-cleaning process begins.
- **Self-Cleaning Process:** Cleaning of the filter is carried out by multiple suction scanners with an option for SLN (Spring Loaded Nozzles) which scans across the multi-screens by a common gear operated by up to 3 electric motors. The DP switch signals to open the exhaust valves creating a high velocity suction stream at the nozzle tip which “vacuums” the filter cake from the multi screens.
- **Control System:** The Omega operation and cleaning cycle is controlled and monitored by a Programmable Logic Control (PLC). The PLC allows maximum flexibility in control options and is provided with a wide range of control options from a local independent stand alone controller to a fully integrated with the customer central control system. During the self-cleaning cycle the PLC controls a solenoid that operates the exhaust valves by means of an hydraulic command or compressed air.

1.2 Technical Specifications as described by the manufacturer

BW OMEGA Filter Model	I-13.5K	IE-18K	II-27K	IEE-36K	54K
Maximum flow rate [m3/hr]*	380	500	750	1,000	1500
Minimum flow rate [m3/hr]*	130	180	270	360	540
Design pressure [bar]	10	10	10	10	10
Minimum working pressure [bar]	2	2	2	2	2
Continuous flushing flow rate [m3/hr] @ 2.0 bar	30	40	60	80	120
Inlet/Outlet Diameter **	8" [DN 200] 10" [DN 250] 12" [DN 300]	8" [DN 200] 10" [DN 250] 12" [DN 300]	10" [DN 250] 12" [DN 300] 14" [DN 350]	10" [DN 250] 12" [DN 300] 14" [DN 350] 16" [DN 400]	16" [DN 400] 18" [DN 450] 20" [DN 500]
Seam factor	0.6	0.6	0.6	0.6	0.6
Class as per BV rules	Class 3	Class 3	Class 3	Class 3	Class 3
Mounting	Vertical	Vertical	Vertical	Vertical	Vertical

* Depending on filtration degrees ** Flange standards as per request

1.3 Raw Materials

Filter housing	Carbon steel, epoxy coating inside & outside
Filter lid	Carbon steel, epoxy coating inside & outside
Screen	Weavewire 316L/SMO 254/duplex/super duplex/2205
Cleaning mechanism	Polymeric materials & Stainless steel 316L/SMO 254/duplex/super duplex/2205/Titanium
Seals	Synthetic rubber, NBR/EPDM/Viton

When other choices of materials are used per manufacturer's recommendations, the BV agreement is to be obtained.

2. DOCUMENTS AND DRAWINGS

Drawings for OMEGA I-IE

General Arrangement	Bottom Housing	Upper Housing
No. QP-0240-1 rev B 12" Omega I-13.5K No. QP-0241-1 rev B 12" Omega IE-18K No. DLN2-002085 rev A LID Omega I-IE	No. DLN1.H080F.001 rev A 8" Omega I-IE No. DLN1.H100F.001 rev B 10" Omega I-IE No. DLN1.H120F.001 rev A 12" Omega I-IE	No. DLN1.H080F.002 rev B 8" Omega I No. DLN2.H080F.001 rev B 8" Omega IE No. DLN1.H100F.002 rev B 10" Omega I No. DLN2.H100F.001 rev B 10" Omega IE No. DLN1.H120F.002 rev B 12" Omega I No. DLN2.H120F.001 rev B 12" Omega IE

Drawings for OMEGA II-IIE

General Arrangement	Bottom Housing	Upper Housing
No. QP-0229-1 rev B 14" Omega II-27K No. QP-0228-1 rev B 14" Omega IIE-36K No. QP-0575 rev 0 16" Omega IIE-36K No. DLN4-002076 rev D LID Omega II-IIE	No. DLN3.H100F.001 rev B 10" Omega II-IIE No. DLN3.H120F.001 rev B 12" Omega II-IIE No. DLN3.H140F.001 rev B 14" Omega II-IIE No. DLN3.H160F.006 rev A 16" Omega II-IIE	No. DLN3.H100F.002 rev B 10" Omega II No. DLN4.H100F.001 rev C 10" Omega IIE No. DLN3.H120F.002 rev B 12" Omega II No. DLN4.H120F.001 rev C 12" Omega IIE No. DLN3.H140F.002 rev B 14" Omega II No. DLN4.H140F.003 rev C 14" Omega IIE No. DLN4.H160F.002 rev 0 16" Omega IIE

Drawings for OMEGA-54K

General Arrangement	Bottom Housing	Upper Housing
No. QP-0568 rev 0 16" No. QP-0515 rev A 18" No. QP-0566 rev 0 20" No. DLR9.L020F.001 rev A LID	No. DLR9.H160F.001 rev A 16" No. DLR9.H180F.001 rev C 18" No. DLR9.H200F.001 rev A 20"	No. DLR9.H160F.002 rev A 16" No. DLR9.H180F.002 rev C 18" No. DLR9.H200F.002 rev A 20"

Documentation

- Catalogue 910101-000366/09.2013Omega Series for seawater applications
- Assembly Procedure rev. Draft 3
- Omega I-IE Calculations dated 22/12/2014 rev. 1 approved acc. to Lloyd's Register and AD 2000 regulation
- Omega II-IIE Calculations dated 22/12/2014 rev. 1 approved acc. to Lloyd's Register and AD 2000 regulation
- Omega II-IIE 16" Calculations dated 16/06/2016 rev. 0 approved acc. to Lloyd's Register and AD 2000 regulation
- Omega 54K Calculations dated 01/08/2016 rev.1 approved acc. to Lloyd's Register and AD 2000 regulation
- QSEM-422-01 version 04 dated 05/06/2014 Integrated System Guide
- Manual of installation, use and maintenance 01/2015
- Name plates 900103-xxxxxx_BV [sheets 1/7 to 4/7] rev. A dated 21/04/2016

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

3. TEST REPORTS

Not applicable.

4. APPLICATION / LIMITATION

- 4.1 To use as automatic pre-filter intended in Ballast Water Treatment Systems.
- 4.2 The scope of the appraisal made by Bureau Veritas to issue this certificate is strictly restricted to bare filters according to the Society's Rules stated on the front page of this certificate. Other requirements like Ship's Flag Administration Regulations, typically for electrical components and instrumentations including PLC-HMI, safety devices and cables are excluded from the scope of this certificate.
- 4.3 Reviewed as Class 3 vessel according to the Society's Rules Pt C, Ch 1, Sec 3 with a seam factor of 0,6.
- 4.4 This approval doesn't cover the functional performance and the good operating in service of the filter.
- 4.5 Ex-certification is not covered by this certificate. Application for use in hazardous areas to be approved in each case.

4.6 The fitting on board will be made according to the manufacturer's recommendations and instructions.

4.7 Each filter unit is to be delivered with the relevant documentation for maintenance and operation.

5. PRODUCTION SURVEY REQUIREMENTS

5.1 The filters are to be supplied by **Amiad Water Systems Ltd.** in compliance with the type and the requirements described in this certificate. This type of product is within the category IBV of Bureau Veritas Rule Note NR320.

5.2 Work's certificate to provide for raw materials of shell assembly and head according to the Society's Rules Pt C, Ch 1, Sec 3 [table 24 Class 3 vessels].

5.3 Each filter is to be hydraulically pressure tested to 1.5 times the design pressure under witnessing of a Society's Surveyor. Bureau Veritas certificate is required for final assembly of the filter according to the Society's Rules Pt C, Ch 1, Sec 3 [Table 24 Class 3 vessels].

Amiad Water Systems Ltd. has declared to Bureau Veritas the following production sites:

Amiad Water Systems Ltd.: D.N. Galil Elyon 1, 1233500 ISRAEL

Amiad China: Yixing Taixing Environtec Co., Ltd., Baihe Chang #70, Xingjie, Yixing Jiangsu Province, CHINA

6. MARKING OF PRODUCT

Each filter shall be marked with:

- Manufacturer's name or logo
- Type designation
- Maximum working pressure / temperature
- Test pressure
- Year and serial number
- Society's brand as relevant

7. OTHERS

It is **Amiad Water Systems Ltd.**'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.

This certificate supersedes the Type Approval Certificate No. 44661/A0 BV issued by the Society.

***** END OF CERTIFICATE *****