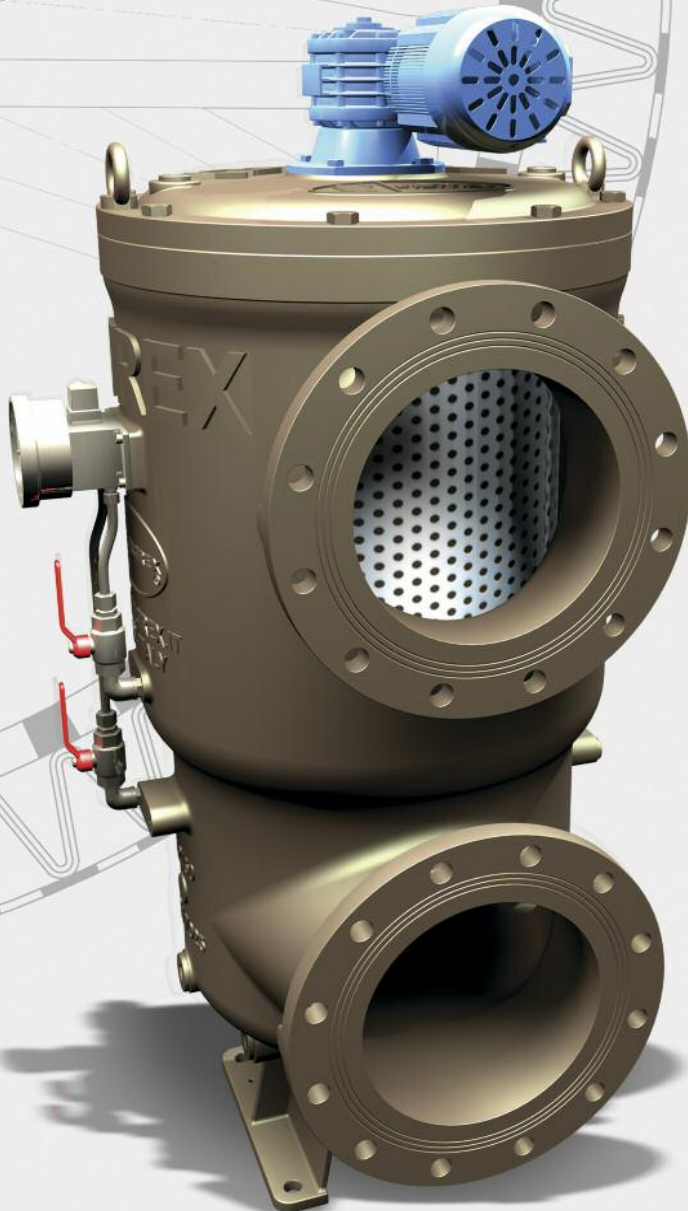




# ACB<sup>®</sup>

*Automatic  
Backwashing Filter*



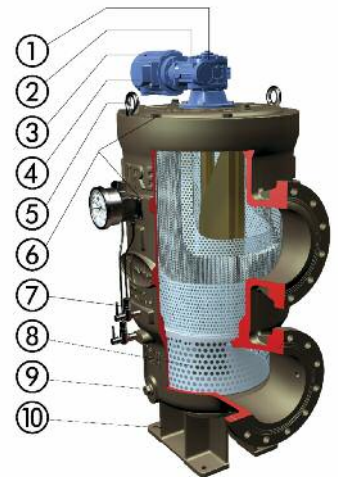
*Ballast Water Filters*

**NO COMPETITION** No other filter on the market is able to match or even come close to the performance of the ACB® filter for operation with high TSS, reliability, filtration and backwashing efficiency, durability, easy operation and maintenance. Since 1982 FILTREX has installed worldwide thousands of filters with the same operating principle.

**NO WEAKNESSES** The filter operates continuously, with a precise filtration degree (down to 6 µm). The armored filter element is made of stainless steel and is able to withstand high differential pressures without problems. The filter body and internal parts are built entirely of bronze-aluminium alloy ASTM B148 C95800 with a strict quality control system, approved by all major classification organizations.

### MANY ADVANTAGES

- Ability to operate with high TSS
- Compact dimensions in both height and footprint, even in the presence of the backwashing pump, that is directly connected to the filter.
- The **bronze aluminum construction** guarantees a high durability, even with improper maintenance.
- No need for painting, which may get easily damaged.
- Simple: made of a few elements for easy, fast and accurate maintenance.
- Reduced flow of backwash.
- High regeneration capacity of the filter element, in just a few seconds.
- Long service life of the filter element.
- Great filtration efficiency (down to 6 µm).
- Completely manufactured by Filtrex in the Milano (Italy) factory.
- Large stock available.
- New application of an established technology with proven experience.



### DETAILS MAKE THE DIFFERENCE

- 1 Electric Motor IE3 RAL 5010
- 2 Han-drive Connection
- 3 316L Gear shaft and keys
- 4 ATEX Gear reducer
- 5 316L Lifting eyes
- 6 316L Bolting
- 7 316L DP Valves, joints and piping
- 8 316L Pre-Filter
- 9 3 sides 316L socket head plugs
- 10 Orientable baseframe and backwash outlet

The comparative analysis carried out by approved certifying bodies, on samples collected during the IMO certification in diverse oceans, with varying degrees of filtration (in addition to the traditional 40 µm) demonstrated the high capacity of the ACB® filter to remove zooplankton, with an efficiency increase of 85%, from 40 µm (Average Zooplankton. inds./m<sup>3</sup> 582) to 20 µm (Average Zooplankton. inds./m<sup>3</sup> 87).

### Zooplankton removal efficiency

#### 40 µm Filtration degree

##### Testing Certificate

|                                                                                                    |                                                                                                                                                                                                                        |                                                    |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|                                                                                                    | Korea Marine Equipment Research Institute<br>(주)한국조선해양기자재연구원<br>부산광역시 영도구 해영로 435 (우 606-806)<br>435 Haeyang-ro Yeongdo-gu 606-806 Busan Korea<br>Tel: +82-51-400-5000 Fax: +82-51-400-5091<br>http://www.komeri.re.kr | 시험실적서 번호<br>Certificate No.: KOMERI-0906-12T1810-1 |
| 접수일자 : 2012. 11. 23<br>Date of Receipt                                                             | 접수번호 : 12T1810<br>Receipt No.                                                                                                                                                                                          |                                                    |
| 신청자 : FILTREX s.r.l.<br>Applicant                                                                  |                                                                                                                                                                                                                        |                                                    |
| 주소 : Via Rubattino 94B, Milan - ITALY<br>Address                                                   |                                                                                                                                                                                                                        |                                                    |
| 시료명 Name of Product:<br>Automatic Backwashing Filter (Filtering element : 40 µm filtration degree) | 모델 Model:<br>ACB-999-300, 1 000 m <sup>3</sup> /h                                                                                                                                                                      | 일련번호 Serial No.:<br>S/N16062-C27847/12             |
| Certificate No. : KOMERI-0906-12T1810-1                                                            |                                                                                                                                                                                                                        |                                                    |

#### 1.6 TEST RESULTS

##### 1.6.1 Zooplankton

| Sample Tag     | Sampling Time (hh:mm) | Zooplankton density (inds./m <sup>3</sup> ) | Removal efficiency (%) | Survival rate (%) |
|----------------|-----------------------|---------------------------------------------|------------------------|-------------------|
| Inlet water    | 15:00                 | 23 667                                      | 97.54                  | 2.46              |
| Outlet water 1 | 14:30                 | 495                                         |                        |                   |
| Outlet water 2 | 14:47                 | 534                                         |                        |                   |
| Outlet water 3 | 14:56                 | 717                                         |                        |                   |

\* Data indicates an arithmetic mean.

Average 582

#### 20 µm Filtration degree

##### Testing Certificate

|                                                                                                    |                                                                                                                                                                                                                        |                                                  |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
|                                                                                                    | Korea Marine Equipment Research Institute<br>(주)한국조선해양기자재연구원<br>부산광역시 영도구 해영로 435 (우 606-806)<br>435 Haeyang-ro Yeongdo-gu 606-806 Busan Korea<br>Tel: +82-51-400-5000 Fax: +82-51-400-5091<br>http://www.komeri.re.kr | 시험실적서 번호<br>Certificate No.: KOMERI-0906-12T1810 |
| 접수일자 : 2012. 11. 23<br>Date of Receipt                                                             | 접수번호 : 12T1810<br>Receipt No.                                                                                                                                                                                          |                                                  |
| 신청자 : FILTREX s.r.l.<br>Applicant                                                                  |                                                                                                                                                                                                                        |                                                  |
| 주소 : Via Rubattino 94B, Milan - ITALY<br>Address                                                   |                                                                                                                                                                                                                        |                                                  |
| 시료명 Name of Product:<br>Automatic Backwashing Filter (Filtering element : 20 µm filtration degree) | 모델 Model:<br>ACB-999-300, 1 000 m <sup>3</sup> /h                                                                                                                                                                      | 일련번호 Serial No.:<br>S/N16062-C27847/12           |
| Certificate No. : KOMERI-0906-12T1810                                                              |                                                                                                                                                                                                                        |                                                  |

#### 1.6 TEST RESULTS

##### 1.6.1 Zooplankton

| Sample Tag     | Sampling Time (hh:mm) | Zooplankton density (inds./m <sup>3</sup> ) | Removal efficiency (%) | Survival rate (%) |
|----------------|-----------------------|---------------------------------------------|------------------------|-------------------|
| Inlet water    | 11:18                 | 23 667                                      | 99.63                  | 0.37              |
| Outlet water 1 | 11:34                 | 109                                         |                        |                   |
| Outlet water 2 | 11:51                 | 72                                          |                        |                   |
| Outlet water 3 | 12:04                 | 80                                          |                        |                   |

\* Data indicates an arithmetic mean.

Average 87

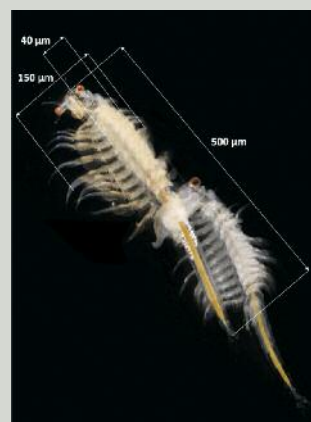
85%

| Size | ND  | m³/h (±5%)<br>@ Δp ≤ 0.1 bar<br>40 μm | Backwash<br>flow<br>(lt/sec) | Footprint dimensions<br>(without backwashing pump) |      |      | Volume<br>(lt) | Installed<br>Power (kW) |      | Weight<br>(kg) |
|------|-----|---------------------------------------|------------------------------|----------------------------------------------------|------|------|----------------|-------------------------|------|----------------|
|      |     |                                       |                              | m x m                                              |      | m²   |                | filter                  | pump |                |
| 902  | 50  | 25                                    | 1,70                         | 0,36                                               | 0,36 | 0,13 | 4              | 0,12                    | 1,10 | 61             |
| 903  | 65  | 35                                    | 2,15                         | 0,36                                               | 0,36 | 0,13 | 4              | 0,12                    | 1,10 | 62             |
| 904  | 80  | 55                                    | 2,66                         | 0,36                                               | 0,36 | 0,13 | 10             | 0,12                    | 1,10 | 73             |
| 906  | 100 | 87                                    | 4,09                         | 0,36                                               | 0,36 | 0,13 | 12             | 0,12                    | 1,10 | 104            |
| 910  | 150 | 135                                   | 6,82                         | 0,45                                               | 0,45 | 0,20 | 27             | 0,12                    | 1,50 | 164            |
| 915  | 150 | 190                                   | 9,55                         | 0,50                                               | 0,50 | 0,25 | 37             | 0,12                    | 2,20 | 198            |
| 935  | 200 | 255                                   | 9,55                         | 0,55                                               | 0,55 | 0,30 | 46             | 0,18                    | 2,20 | 232            |
| 945  | 200 | 340                                   | 12,82                        | 0,55                                               | 0,55 | 0,30 | 75             | 0,18                    | 3,00 | 330            |
| 955  | 250 | 515                                   | 12,82                        | 0,70                                               | 0,70 | 0,49 | 140            | 0,25                    | 3,00 | 440            |
| 985  | 300 | 770                                   | 19,22                        | 0,80                                               | 0,80 | 0,64 | 210            | 0,37                    | 4,00 | 653            |
| 999  | 350 | 1040                                  | 25,95                        | 0,85                                               | 0,85 | 0,72 | 320            | 0,37                    | 5,50 | 842            |
| 9100 | 400 | 1500                                  | 35,00                        | 0,85                                               | 0,85 | 0,72 | 500            | 0,37                    | 9,20 | 1020           |
| 9120 | 500 | 2100                                  | 35,00                        | 1,00                                               | 1,00 | 1,00 | 890            | 0,75                    | 9,20 | 1600           |
| 9200 | 600 | 3000                                  | 35,00                        | 1,30                                               | 1,30 | 1,69 | 1700           | 0,75                    | 9,20 | 2400           |

## FILTREX ACB® Choice of the Configuration

Depending on the operational requirements, the ACB® filter can also be supplied with the following accessories:

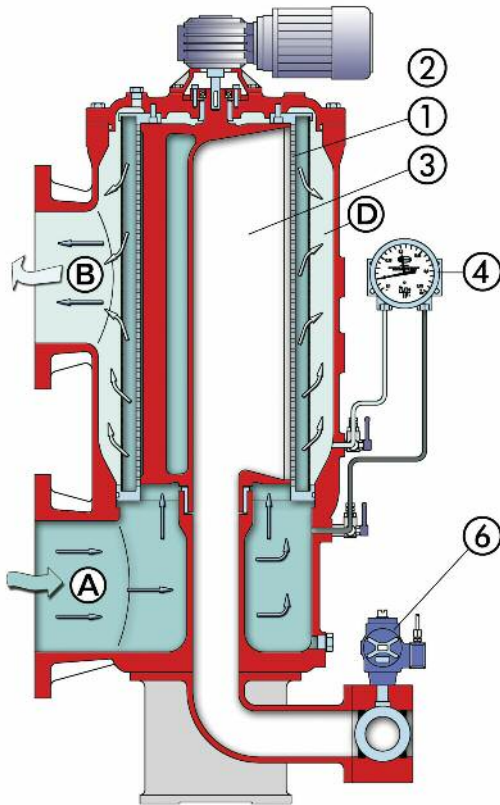
- Electric panel
- Backwash pump
- Bronze aluminium fittings for filter by-pass
- Automatic valves for venting, draining and refilling.



## FILTREX ACB® Technical Information

|                            |                                                                   |
|----------------------------|-------------------------------------------------------------------|
| Application                | Ship ballast water treatment units, fresh, brackish and sea water |
| Type of filter             | Automatic backwashing                                             |
| Filtration                 | Continuous                                                        |
| Cleaning cycle             | By differential pressure and/or timer                             |
| Cleaning system            | Backwash by reverse flow, sector by sector                        |
| Cleaning fluid             | Same filtered fluid                                               |
| Power supply               | Electric and pneumatic                                            |
| Nominal Pressure           | From 2 to 10 bar                                                  |
| Inlet/Outlet connections   | From ND 50 to ND 600, NP 10                                       |
| Nominal Temperature        | 60 deg C                                                          |
| Material                   | Bronze-Aluminium alloy ASTM B148 C95800                           |
| Building tolerances        | EN 226768-1 class V                                               |
| Gaskets                    | Buna                                                              |
| Type of filtering element  | Armored pleated element                                           |
| Filtering element material | Stainless Steel AISI 316L                                         |
| Filtration degree          | Down to 6 μm                                                      |
| Certification              | ATEX/IECEX                                                        |

## PHASE 1 - FILTRATION



$\Delta p < \Delta p_{set}$

Differential pressure gauge (4) in "clean" condition

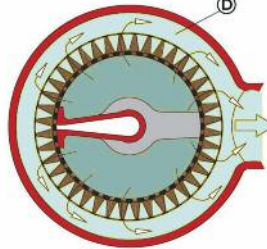
Electric motor (2) in "off" position

Backwashing shaft (3) "not rotating"

Backwashing valve (6) "closed"

1 - FILTRATION: The fluid enters from A, and flows through the sectors of the filter element (1) (inside to outside filtration). The filtered fluid is conveyed into the chamber (D) and exits from B.

During this phase, the filter operates as a static filter, and the cleaning of the filter element is not active. As the impurities accumulate in the filter element sectors, the differential pressure  $\Delta p$  indicated by the pressure gauge (4) gradually increases until it reaches the set value, starting phase 2 (cleaning during filtration).



## PHASE 2 - FILTRATION and CLEANING

$\Delta p \geq \Delta p_{set}$

Differential pressure gauge (4) reaches the set value

Electric motor (2) in "on" position

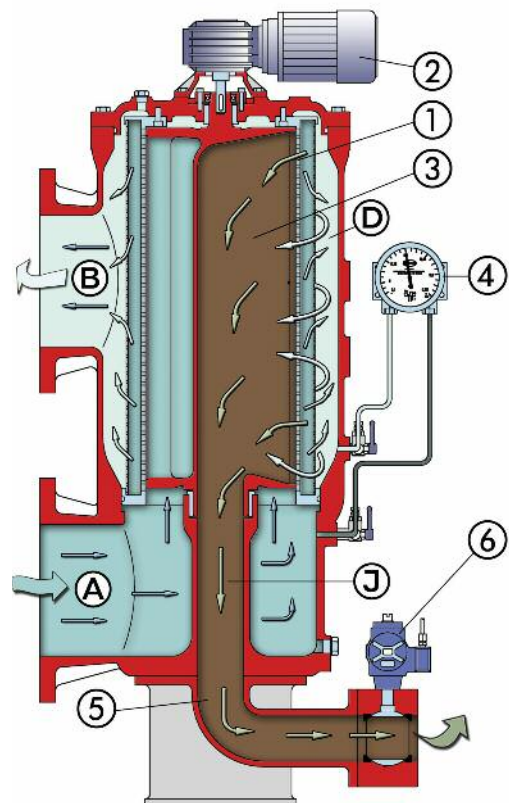
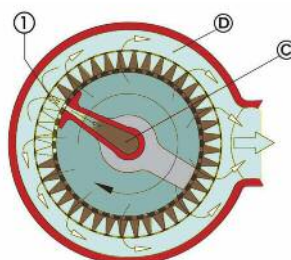
Backwashing shaft (3) "rotating"

Backwash valve (6) "open"

1 - FILTRATION: The filtration is carried on by the sectors of the filter element (filtration from inside to outside).

2 - CLEANING THE FILTER DURING FILTRATION: While all sectors of the filter element ensure normal filtration, the sector in front of the backwashing shaft is cleaned by the reverse flow drawn from the filtered fluid chamber (D) (outside to inside backwash). The impurities are transported by the backwashing fluid (filtered water), through the chamber (C) and the duct (5), before leaving from (J).

At the end of the backwashing cycle, the electric motor (2) stops and the backwash valve (6) closes, thus bringing the filter back to the Phase 1 (static filtration).



ACB® filters have been tested and certified by the leading certifying organizations. Thanks to its small dimensions the automatic filter ACB® may be installed in tight spaces, on all new and existing ships



Filter ACB-955 - tested at DHI, Denmark.



Filter ACB-9100 on test bench: Flowrates up to 4.200 m³/h



Very small footprint



ACB filters in operation



High production capacity



Short lead time



Filtrex Corporate Headquartes - Milano (Italy)

Filtrex s.r.l. with its headquarters and state of the art manufacturing facilities in Milano, Italy provides filtration solutions and technical services to many industries such as hydrocarbon, chemical, environment protection, power generation, water treatment, Navy and marine transport. Filtrex operates from its headquartes in Italy and through worldwide branches, and has received prestigious certifications for quality and standards of engineering and manufacturing.

Filtrex provides its customers with a comprehensive scope of work, services and supply, preparing the engineering design specifications and P&ID's, purchasing equipment and materials, fabricating and assembling the filters into module(s) in its fabrication shop, furnishing data books and operating manuals, and providing technical services for inspection, installation, commissioning, start up and after start up.



Filtrex Manufacturing Unit #4 - Vignate (Italy)

***ACB® is only one of the comprehensive range of filters manufactured by FILTREX.  
Please contact us for details and documentation***

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