



BOLLFILTER
Protection Systems

Marine & Power

**BOLLFILTER Automatic
TYPE 6.18.3C**

Experience – innovation – success



*Automatic pre-filtration of sea water
for the protection of ballast water
treatment systems*

Protecting the function of ballast water treatment systems

Due to national and international regulations, equipping seagoing vessels with ballast water treatment systems is mandatory for ship owners and ship operators. To guarantee the trouble-free function of the multi-stage overall plant, a fine filter is installed between the seawater intake screens and the chemical or physical disinfection unit. The filter's task is to remove animal or plant organisms as well as sediments of a size range of 10 – 50 μm from the ballast water.

The requirements for ballast water filters are diverse and demanding. They have to:

- guarantee the required degree of separation with absolute reliability,
- combine the required filter fineness with high flow rates and long service lives,
- exclude clogging of filter mesh despite the high incidence of organisms in ballast water – at least 250,000 organisms per cubic metre,
- resist the naturally corrosive nature of sea water,
- be easy to install, retrofit, operate and maintain,
- have a small footprint and
- contribute to keeping operating costs of the plant as low as possible.



As stipulated both by the IMO and the USCG, ballast water treatment is compulsory.



According to experts, ten to twelve billion tons of ballast water are transported across the world's oceans each year.

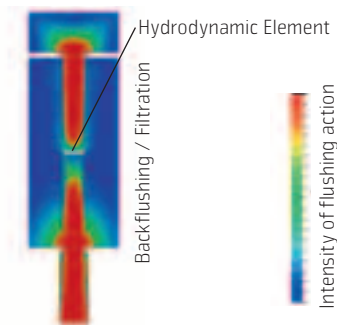
The concept

Cost-efficient high technology for new buildings and retrofits

In the conflict between strict legal requirements, complex technical demands and high economic pressure, the BOLLFILTER Automatic Type 6.18.3C presents an ideal solution for the filtration of ballast water.

The newly designed compact housing is manufactured as a three-part assembly made of internally coated nodular cast iron for sizes up to DN 400 and larger housings are made of welded carbon steel. A uniform series with different housing sizes and nominal diameters of DN 150 up to DN 900 allows a dimensioning of the filter which can be adapted to each individual situation. This flexibility of design can result in considerable cost advantages.

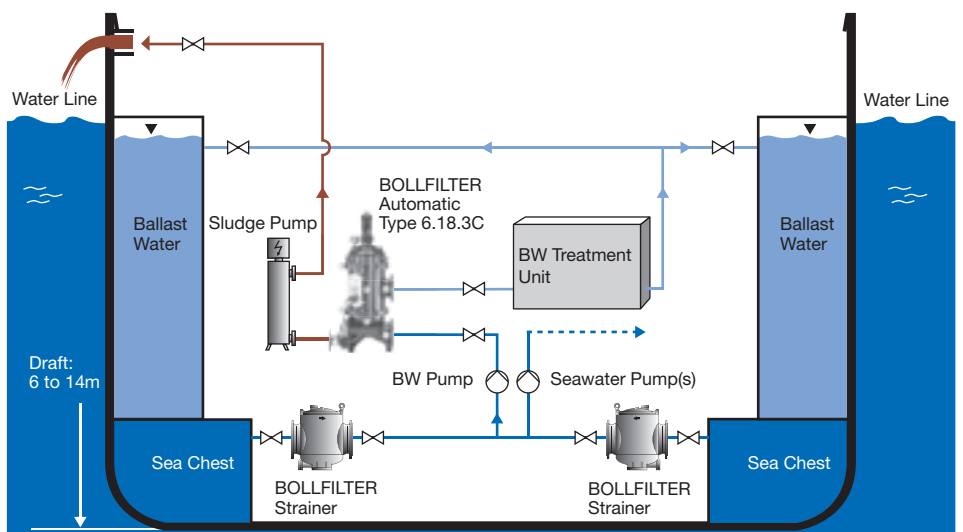
The filter has a very small footprint making it especially suitable for retrofits and new buildings. Due to its simple, robust design the filter is extremely durable and easy to maintain. The core of the filter is the filter element with precision filter candles open at both ends giving a dual backflushing effect. As contaminants build on the filter surface the resultant differential pressure triggers a backflush cycle. The open at both ends design of the filter elements contributes cross-flow turbulence in the backflush process which is further enhanced by the Hydrodynamic Element located in the middle of the candle. The hydrodynamic element increases the backflush flow velocity and spreads it over the whole filter surface; regeneration is very quick, efficient and effective without interrupting the filtration process.



Flow visualisation of the bipolar alternating cleaning at one filter candle with Hydrodynamic Element

The practice

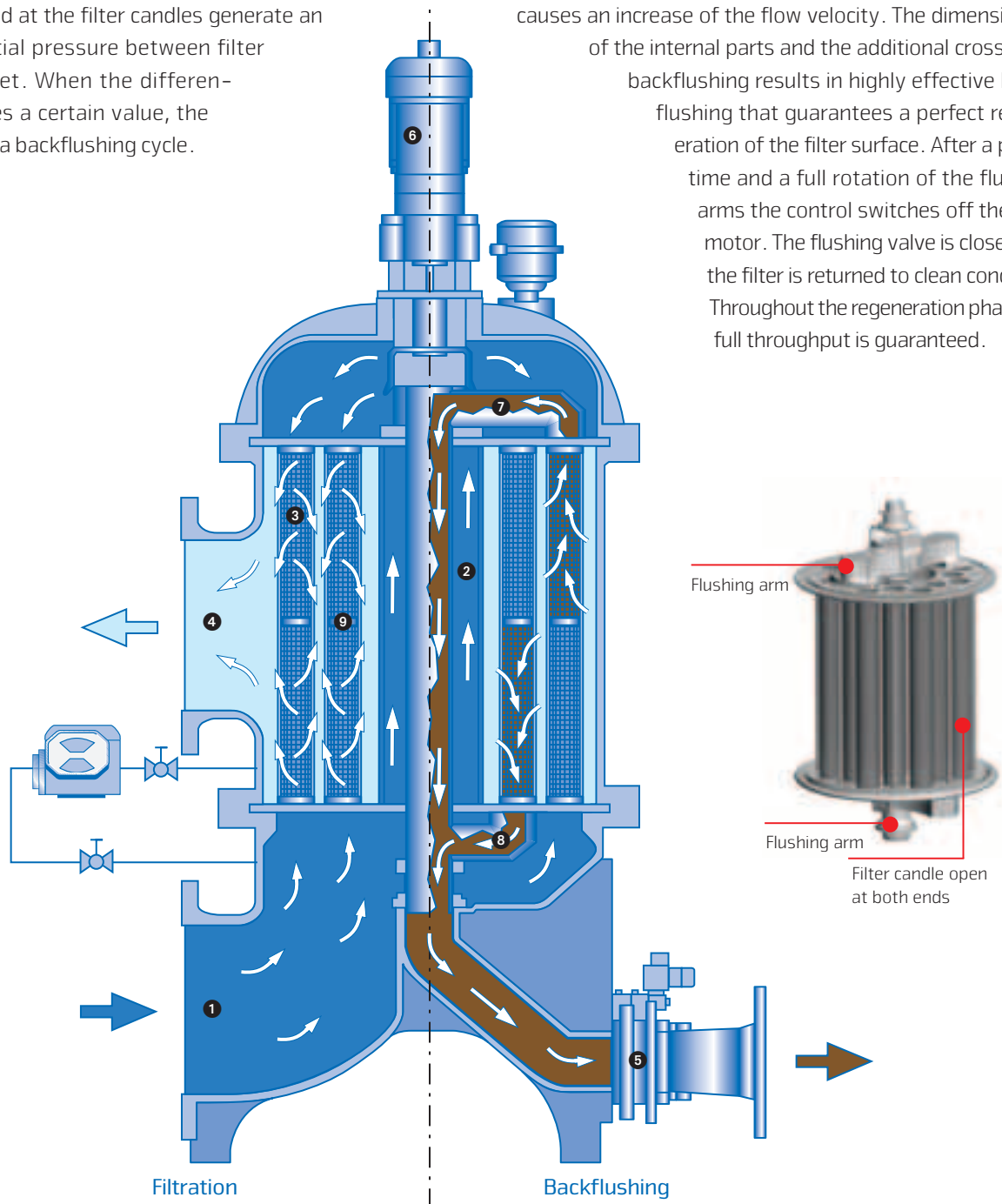
Protecting the BWTS through pre-filtration



Filtration from top and bottom – flushing in two directions

In filtering mode, the sea water to be filtered flows through the inlet flange ① into the housing. A partial flow ② reaches the upper part of the housing via the distance tube and enters the candles from the top whilst the remainder enters the candles from the bottom. It passes through the two open ends into the filter candles ③ and flows through the filter candles from the inside to the outside. The particles in the sea water are retained on the mesh of the filter candles ④. The cleaned water ⑤ reaches the filter outlet. The flushing valve ⑥ is closed. The gear motor is switched off. The particles retained at the filter candles generate an increasing differential pressure between filter inlet and filter outlet. When the differential pressure reaches a certain value, the control box initiates a backflushing cycle.

During the backflushing phase, the filter candles are cleaned one after the other via the upper ⑦ and lower flushing arm ⑧. The gear motor turns the flushing arms, which are offset by 90°, with the flushing bushes past each filter candle. At the same time, the flushing valve is opened. This causes a high axial flow within the filter candle and the retained dirt particles are washed off. The sea water flowing over the full length of the filter candles (cross-flow backflushing) transports the dirt particles out of the filter. The Hydrodynamic Element ⑨ placed in the middle of the filter candles causes an increase of the flow velocity. The dimensioning of the internal parts and the additional cross-flow backflushing results in highly effective backflushing that guarantees a perfect regeneration of the filter surface. After a preset time and a full rotation of the flushing arms the control switches off the gear motor. The flushing valve is closed and the filter is returned to clean condition. Throughout the regeneration phase the full throughput is guaranteed.



Control and monitoring

The fully automatic filter complies with, amongst other things, the regulations of the Marine Standards Authorities (GL, LRS, NV, BV, ABS, UdSSR-Reg. USCG etc.) for unsupervised operation onboard ship. As standard, the backflushing filter is provided with the Electronic Control Box Type 2200 which comprises the following features and functions:

- Membrane keypad with three keys
- 2-line display
- Impact-resistant display cover
- Display of backflushing operation and error messages, number of backflushes
- Adjustable over-current release
- CPU board with non-volatile EPROM and programme memory
- I. O. board in the control box
- Main switch with interlocking system



Data and facts at a glance

Type 6.18.3 C	
Range of application	filtration of ballast water
Filter fineness	optional 30 µm, 40µm or 50 µm
Nominal diameter of connection flanges	150 - 900 mm
Housing material	up to DN 400 nodular cast iron/ from DN 500 carbon steel
Backflushing control	depending on differential pressure
Filter candle type / Mesh type	cylindrical candles open at both ends / mesh made of Super Duplex (1.4410)
Type of cleaning	cross-flow hydrodynamic backflushing

Nominal diameter	Amount of ballast water*	Weight of filter	Floor space required
DN 200	370 m³/h	400 kg	0,5 m²
DN 250	500 m³/h	550 kg	0,6 m²
DN 300	750 m³/h	650 kg	0,8 m²
DN 400	1400 m³/h	1100 kg	1,1 m²
DN 500	2100 m³/h	1350 kg	1,5 m²
DN 600	2500 m³/h	1650 kg	1,8 m²
DN 700	3800 m³/h	2000 kg	2,2 m²
DN 800	4600 m³/h	2500 kg	2,5 m²
DN 900	5400 m³/h	2950 kg	3,0 m²

*with a filter fineness of 40-50 µm



Test rig with two filters installed in parallel and operating with sea water for long-term test series in cooperation with the Nautical and Maritime Technology Institute (INMT) of Flensburg University of Applied Sciences, Flensburg.

Efficient and effective operation – reduced costs

BOLLFILTER Automatic TYPE 6 .18 .3C is convincing, both in terms of technical and economic performance by meeting the most stringent demands.

The most important of many advantages are

- precise filtration result,
- high flow rates per hour,
- optimised flushing action,
- long service life due to robust design and corrosion-resistant equipment
- low space requirement and easy installation,
- low maintenance requirements,
- cost-effectiveness, in both capital outlay and in operation.



Compact design, low space requirement:
BOLLFILTER Automatic Type 6 .18 .3C is suitable
for both new buildings and retrofits.

Maximum customer orientation for maximum satisfaction

BOLL & KIRCH continues to prove its strengths as a manufacturer and supplier long after the product has been delivered. As a leading international supplier of marine and industrial filters for filtering fuels, lubricants, coolants and water with a global network of sales and service centers, BOLL & KIRCH has at its fingertips the ideal logistical basis for providing perfect customer support. Naturally, users of the BOLLFILTER Automatic TYPE 6.18.3C also benefit from the advantages this worldwide network provides – swift delivery, faster availability of technical support and a trouble-free supply of BOLLFILTER Genuine Parts.



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