

**BOLLFILTER Automatic  
Type 6.18.3**



***Backflushing pre-filtration unit  
perfectly adapted to BWT-Systems***

## Pre-filtration for BWT-Systems

Due to national and international regulations, equipping seagoing vessels with BWT-Systems is mandatory for ship owners and ship operators. To guarantee the trouble-free function of the BWT-System, a fine filter is installed between the seawater intake screens and the disinfection unit.

The IMO recommendation is to remove organic matters and sediments larger than 50 µm from the ballast water.

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

- guarantee the required degree of separation with absolute reliability,
- combine the required filter fineness with high flow rates and long service lives,
- resist clogging of filter mesh despite the high occurrence of organisms in ballast water
  - at least 250,000 organisms per cubic metre,
- resist the corrosive nature of seawater,
- be easy to install, retrofit, operate and maintain,
- have a small footprint,
- contribute to keep operating costs of the plant as low as possible,
- have a low height and there be adapted to retrofit
- be capable to handle TSS up to 1,000 mg/l depending on the volume flow.

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



Organic matters, which are pre-filtered by the BOLLFILTER Automatic Type 6.18.3



# Cost-efficient advanced technology for new buildings and retrofits

Between the conflicting priorities of strict legal requirements, tough technical demands and high economic pressure, the BOLLFILTER Automatic Type 6.18.3 constitutes the ideal solution for ballast water filtration.

The BOLLFILTER Automatic Type 6.18.3 is a part of the BOLLFILTER automatic water filter series with operational experience in various industrial applications for more than 40 years.

## The housing

The compact filter is manufactured in three parts (inlet, outlet and drain), which allows a perfect adaptation to the different possible installation options.

The variability of the technology and the flange orientation allow an optimized configuration of the ballast water filter for the specific requirements and conditions of the individual application.

A wide series with different housing sizes and nominal diameters of DN 200 to DN 900 means that the filter dimensions can be adapted to a large range of operating requirements. As such, significant cost benefits can be achieved.

Nodular cast iron is used for nominal diameters up to DN 400 and welded carbon steel for larger housings. The housing is internally coated with a seawater resistant lining.

The filter has a very small footprint making it especially suitable for retrofits and new buildings.

Its simple and robust design makes it extremely durable and easy to maintain.

## The elements

Filter candle / fine sieve cylinder

The core of the filter is the filter element. According to application and requirements, a filter candle or a fine sieve cylinder can be used, which are made of Super Duplex mesh. The fine sieve filter cylinder element used in cast housings up to DN 400 is a result out of application and market requirements driven by technical Research & Development. The BOLLFILTER Ballast Water concept is a step forward by responding to the market requirements of getting finer filtration.



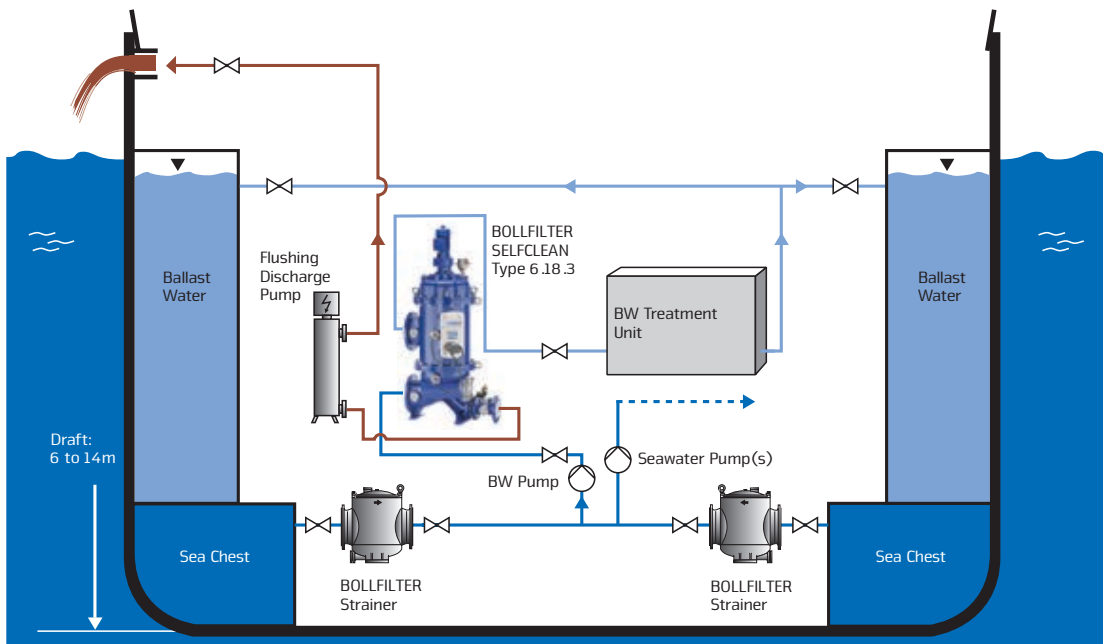
The housing

Filter candle open at both ends



Fine sieve cylinder

# Protecting the BWT-System through pre-filtration



## Independent lab testimonials

Since 2012, BOLL & KIRCH have been operating its own test bench for Ballast Water filtration at the Flensburg University of Applied Sciences. Thereby, a continuous development is self-evident. Two independent institutes, NIOZ and DHI, were assigned, to test the BOLLFILTER Automatic 6.18.3 concerning TSS-load and biological efficacy performance. Both institutes are approved to certify that the BWT-Systems are in accordance with the US Cost Guard rules and the G8 guideline (IMO).

"Of course, there are physical limits regarding the fine mesh filtration, in particular in the ballast water application. TSS-load, seasonal variation of organic matter, which can vary by a factor of 1000 and water temperature influence the performance of the filter with regards to max. throughput and back flush performance. Although the filter can easily cope with the limits of G8 guideline (IMO 2008) with max. TSS concentration of 50 mg/L, it can struggle when the system is operated in challenging water like Yangtze River. To cope with current high dirt load, throughput should be reduced to help the filter to remain operational."

*Karsten Cartarius – Head of R & D*



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



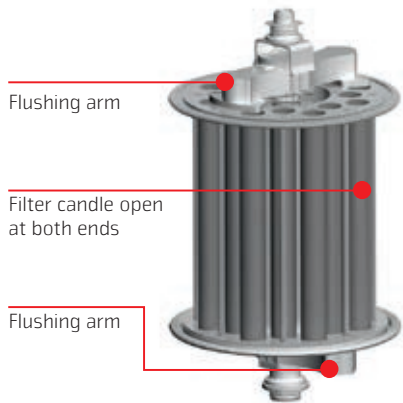


# Filtration and backflushing with filter candles

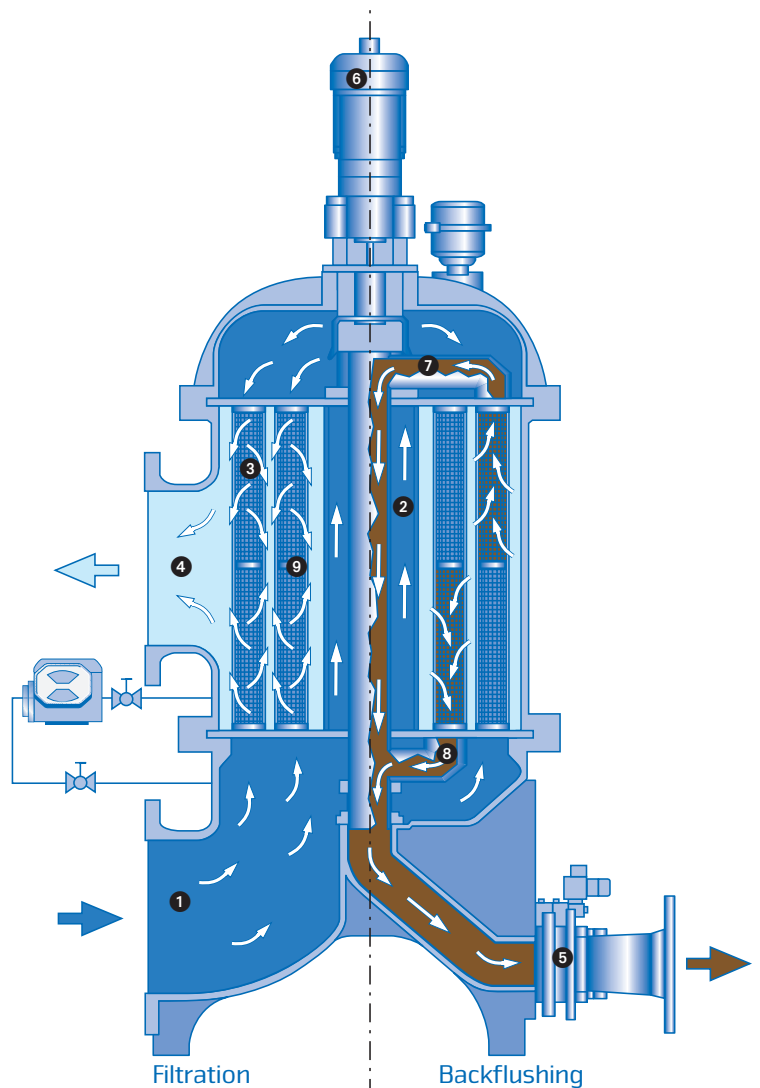
In filtering mode, the seawater to be filtered flows through the inlet flange ① into the housing. A partial flow ② reaches the upper part of the housing via the distance tube and enters the candles from the top whilst the remainder enters the candles from the bottom.

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 seawater are retained on the mesh of the filter candles. The cleaned water ④ 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. 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 seawater 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 result 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 ⑤ is closed and the filter is returned to clean condition. Throughout the regeneration phase the full throughput is guaranteed.



6.18.3 with filter candles: Fineness 40 and 50 µm			
Filter Type	Nominal Diameter	BWT Pump Capacity in m³/h	Vessel
casted filter	DN 200	370	12000 DWT
	DN 250	500	RoRo
	DN 300	750	38000 DWT
			4800 TEU
			64000 DWT
DN 400	1,400	82000 DWT	
		10000 TEU	
welded filter	DN 500	2,100	135000 TEU
	DN 600	2,500	158000 DWT
	DN 700	3,800	180000 DWT
			208000 DWT
	DN 800	4,600	250000 DWT
	DN 900	5,400	and larger

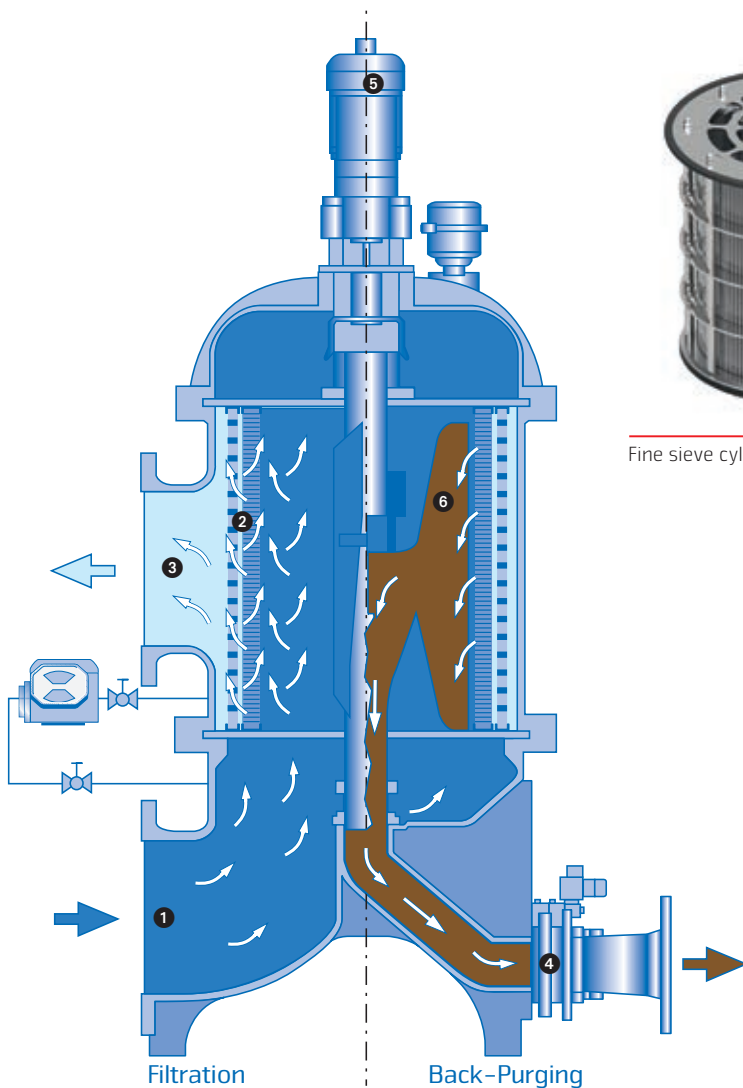


## Large sieve surface area – segmental backflushing

The seawater being filtered flows into the filter housing via the inlet flange ❶. The medium flows through the fine sieve cylinder ❷ from the inside to the outside. Particles in the flow are held back by the mesh of the sieve cylinder. The cleaned seawater proceeds to the filter outlet ❸. The flushing valve ❹ remains closed. The gear motor ❺ is switched off.

The particles held back by the fine sieve cylinder generate a growing differential pressure between filter inlet and outlet. Backflushing is triggered by the controller when the pressure difference reaches a certain value. The gear motor ❺ is switched

on and turns the backflushing device ❻ past the perforated plate of the fine sieve cylinder. At the same time the flushing valve ❹ is opened. As a result, there is a high axial reverse flow through the mesh and the particles that had been held back are flushed off and transported through the flushing device ❻ out of the filter. The dimensions of the flushing device and the resulting flow velocities guarantee that the fine sieve cylinder is properly regenerated. After a set time, the controller switches the gear motor ❺ off and closes the flushing valve ❹. The filter is cleaned. The full flow rate is maintained even during the regeneration phase.



\* 2 filters required

BOLLFILTER Automatic Type 6.18.3 with fine sieve cylinder: Fineness 30 and 40 µm			
Filter Type	Nominal Diameter	BWT Pump Capacity in m³/h	Vessel
casted filter	DN 200	370	12000 DWT
	DN 250	500	RoRo Vessel
	DN 300	600	38000 DWT
	DN 400	1,250	64000 DWT 82000 DWT
2 casted filter with flange adaptor*	DN 500	2,500	158000 DWT 135000 TEU
	DN 600	2,500	158000 DWT 135000 TEU

## Efficient and effective operation – reduced costs

BOLLFILTER Automatic TYPE 6.18.3 is convincing, both in terms of technical and economic performance by meeting the most stringent requirements.

The most important of many advantages are:

- heavy duty design: corrosion-resistant equipment with only welded and bolted connections,
- perfect for demanding retrofit projects, as the inlet to the outlet flange can have flexible orientations,
- sacrificial anode for seawater,
- low space requirements and easy installation,
- low maintenance requirements,
- use of existing BWT-pumps due to perfect backwash performances,
- low backflush quantity,
- high flow rates per hour,
- precise filtration result,
- optimized flushing action

Filter characteristics:	filter candles	fine sieve cylinder
Max. flow rate	3,570 m <sup>3</sup> /h depending on fineness and filter size	4,070 m <sup>3</sup> /h depending on fineness and filter size
Filter fineness	40µm and 50µm	30µm and 40µm
Nominal diameter of connection	DN 200 to DN 900	DN 200 to DN 600
Min. operating pressure	2,0 bar	1,5 bar
Housing material	nodular cast iron up to DN 400 / welded carbon steel for filter larger than DN 400	nodular cast iron
Backwash principle	backflushing arm at the top and bottom side of the candle	slotted backwash device
Backflush quantity	details on request	details on request
Backflushing control	differential pressure or time	differential pressure or time
Fine mesh material	Super Duplex	Super Duplex
Optional accessories	backwash pump in the discharge line	backwash pump in the discharge line
<b>Considerable Advantage</b>		
	particularly long service life because of robust filter candles	fine filtration up to 30 µm even with high solid load because of large filtration area

## Maximum customer focus for maximum satisfaction

BOLL & KIRCH continues to prove its strengths as a manufacturer and supplier longtime 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 centres, BOLL & KIRCH has at its fingertips the ideal logistical basis for providing perfect customer support. Naturally, users of the BOLLFILTER Automatic Type 6.18.3 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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