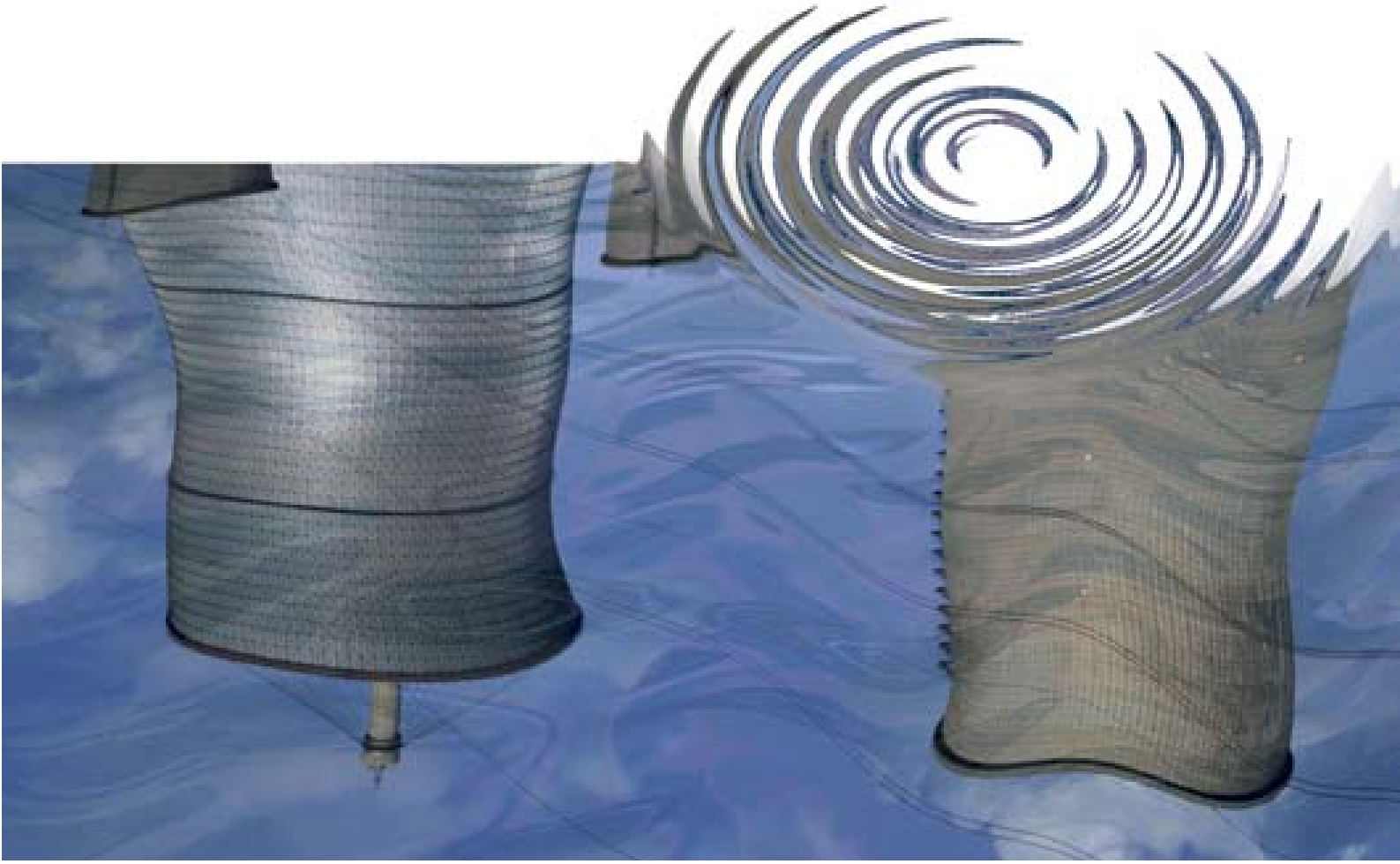
BOLLFILTER
Protection Systems

Safety needs quality.



PROTECT YOUR INVESTMENT *...and more.*

A company profile of
BOLL & KIRCH Filterbau GmbH

WHY THIS PROFILE?

A new millennium is just round the corner. Like every other company, BOLL & KIRCH will need all its strength to face the challenges of the "Global Village" and "Dynamic Change". Yet, this is nothing new for our company. For decades our direction has been determined by the international market and hence, in the end, the customer.

Our insistence on following our customers' interests is the reason why BOLL & KIRCH can celebrate 50 years of successful development. With its innovative ideas, "made in Germany" quality and a willingness to co-operate, our company has exceeded industrial structural change and equipped itself for global competition.

Today, BOLL & KIRCH has never been better prepared in the world market for fluids filters. This brochure presents the company's current position and the basic elements of its strategy for achieving success in the 21st century. And when you have finished your reading, we look forward to discussing your needs and expectations.

BOLL & KIRCH Filterbau GmbH

The Management

CONTENTS

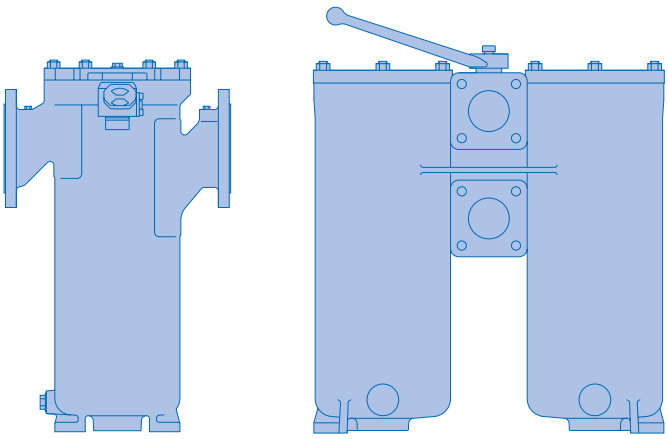
FILTERS MEAN

protection

...and more.

High-quality engine and gear components require optimum protection.

"All things are in flux," as even the Greeks knew. But where solids and liquids mix, undesired pollutants will need to be filtered out. The central task of fluids filter technology is to enable processes to work more efficiently. After all, the cleanliness of a liquid is often important for its usability. In principle, filtration is a simple matter: a filter cloth passes fluids through its meshes whilst retaining dirt particles. In practice, this is a highly complex problem of process technology.

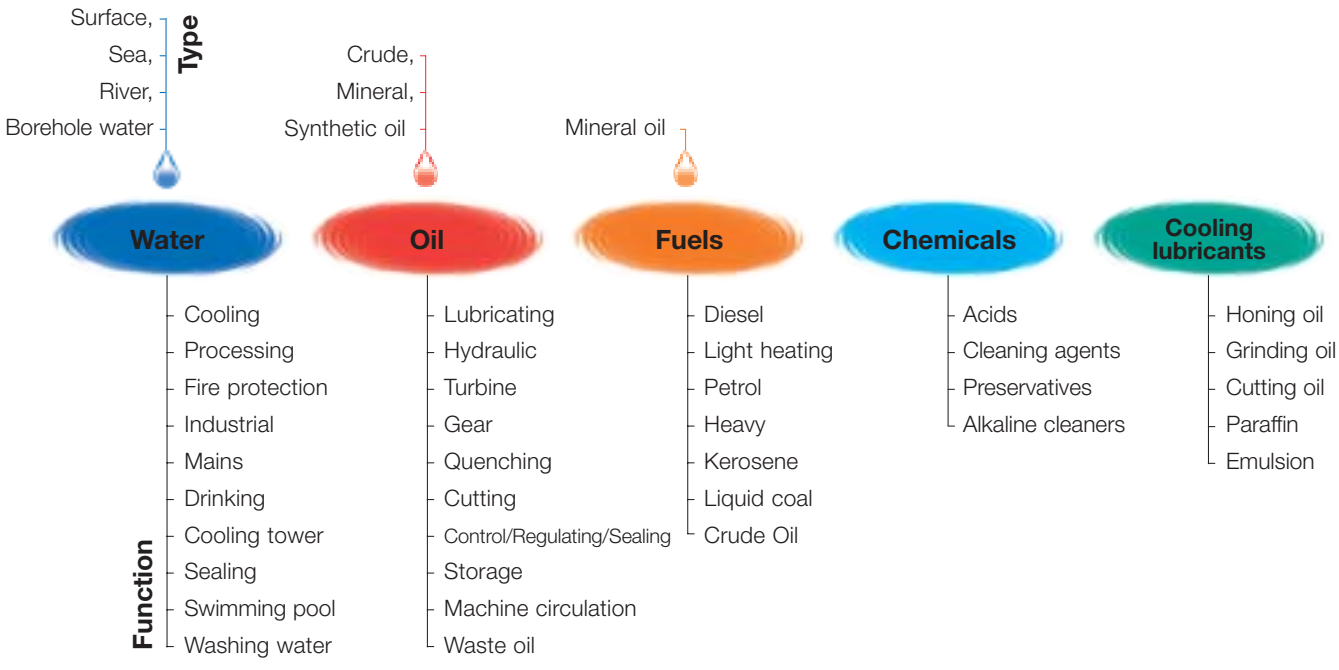


The quantity, size and material properties of the substances under filtration all affect the process, along with pressure, temperature and plant conditions. The lofty aim of BOLL & KIRCH is to offer model solutions in this field. BOLLFILTERS protect against unwelcome surprises.

And more: the formula for success is still the same: filtration = protection = retention of value = process efficiency = conservation of resources.

Large-scale plant demands the minimum of idle periods and downtimes.

BOLLFILTERS clean the following fluids:



CAPITAL INVESTMENTS REQUIRE

safety *...and more.*

The economical optimum is always the sum of "as much as possible" and "as little as necessary". For those making capital investments this means that the more complex, efficient and capital-intensive a machine, engine, ship or power station, the more relative is the often non-recurring expense of high-quality filter systems. And even in the majority of existing plants, expansion and improvement is possible when replacement time comes along. The road from the complete renewal of spent fluid to regular filtration and conservation in closed cycles is one of the givens of future-oriented business ideas. BOLLFILTERS protect high-quality capital investments from premature wear, because they reliably filter dirty fluids and feed the cleaned substances back into the process. They help secure the operating reliability of plant on a continuous and long-term basis. Saving resources, sparing the environment and reducing costs.

And more: BOLLFILTERS are the best insurance for both product and process. This provides you with opportunities for reinvestment for growth and wealth.

BOLLFILTER uses:

- **Diesel engine industries**
  - Ships' drives
  - Locomotives
  - Energy supply
- **Ship building**
  - Tankers
  - Container ships
  - Bulk carriers
  - Passenger liners
  - Ferries
  - Tugs
  - Naval ships
  - Fishing vessels
  - Inland vessels
- **Automotive industry**
  - Transfer lines
  - Special machinery
- **Steelworks**
- **Power station technology**
- **Heating/Ventilation/Air conditioning**
- **Refrigeration and heat technology**
- **Off-shore industry**
- **Paper industry**
- **Chemical industry**
- **Petrochemicals**
- **Water treatment and sedimentation plants**
- **Machine tool industry**

Wärtsilä diesel engine Type 32 fitted with BOLL automatic filter SELFCLEAN, Type 6.46

Navigation on the high seas would be unthinkable today without safety technology integrated in the total control system.

Off-shore platform or luxury liner - the power and danger of the sea requires the utmost reliability.
Safety needs quality.

Testing a filter cloth for dimensional stability and weaving errors in the Quality Assurance Department.

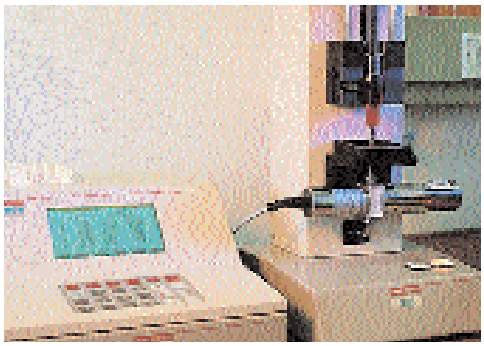
SPECIALISATION BRINGS quality *...and more.*

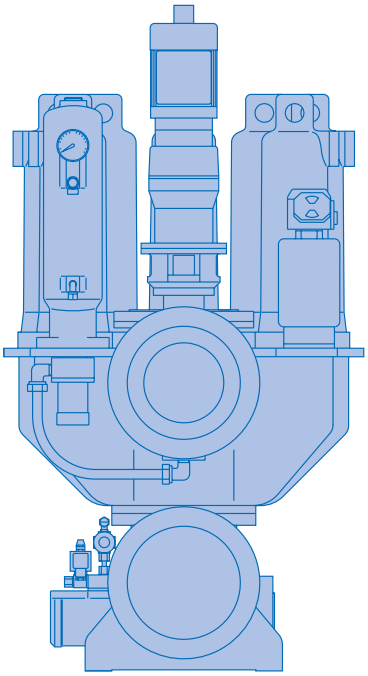
More and more, the culture of "dynamic change" is forcing engineering enterprises to adopt ruthless specialisation. That is why BOLL & KIRCH concentrates exclusively on the design of fluids filters, allowing the company to build up a leading position in the field. And with a Quality Management System certified under DIN/ISO 9001, all is set to maintain this position in the future. Many of the BOLLFILTER products are the result of our own research and development, and are protected by patent.

Regular quality tests of filter candles guarantee BOLLFILTERS their high safety standards.

Customers can take advantage of our specialist knowledge by involving BOLL & KIRCH's engineers in their projects right from the earliest stages. The combination of expertise on both sides in a Simultaneous Engineering environment will ensure perfect results.

And more: optimised and customer-adapted filter technology will often allow substantial and sustained cuts to be made in a plant's system and operating costs.





From top to bottom:
BOLLFILTER DOUBLE 2.93.2 as CAD image in design stage

Laboratory tests for determining volume and size of solids with a particle counter.

Flux tests on contaminated liquids with a vacuum filter.

Experts in dialogue:
Through dialogue with customers, customised and systems-optimised solutions are individually developed.
Safety needs quality.

COMPLEXITY REQUIRES INDIVIDUAL solutions *...and more.*

A filtration medium in the form of a cloth insert is the heart of every fluids filter. It essentially consists of a supporting body with a filter mesh. Different designs provide different sizes of filter surface. *And more:* through the optimum combination of core components every fluid can achieve the desired degree of cleanliness.

Basket element (1)
The basket element is suitable for coarse filtration or for minor contamination. The dirt collects in a basket-shaped filter insert and can be easily removed for cleaning.

Ring filter element (2)
The ring filter element is similarly constructed to the basket element, but has an additional concentric mesh cylinder, increasing filter area by about 30%.

Multi-Mantle element (3)
The multi-mantle element insert consists of several cylindrical filter mantles. These provide a large filter surface for only a small space requirement and permit the employment of fine-meshed cloths. Filtration takes place from the outside in.

Star-pleated element (4)
The star-pleated element has a large filter surface yet a small diameter due to the pleating of the filter element. This makes long cleaning intervals possible and the use of fine meshes with low pressure losses.

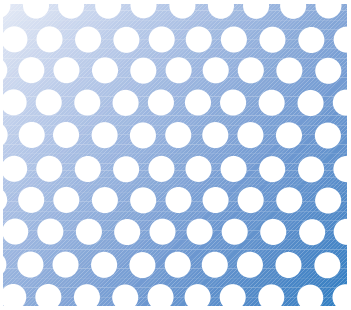
Filter candle insert (5)
This insert contains several mesh candle elements of the same size and mesh connected in parallel. This gives a large filter surface with a very compact design. The filter candles are outstanding for their particularly high resistance to differential pressure.

Filter candle insert for backflushing filters (6)
As in the ordinary filter candle insert, several filter candles are screwed into a single candle holder. The holder is fixed to the filter housing and remains there during backflushing in the filter chamber.

Filter cartridge (7)
The filter cartridge consists of non-woven pleated plastic,glass fibre or paper element. It is capable of filtering very fine dirt particles.

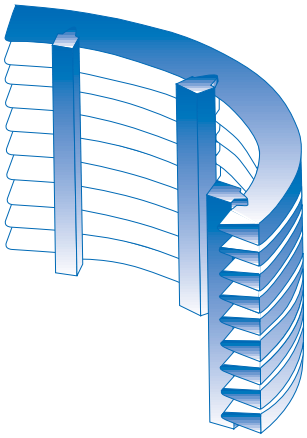
Perforated sheet...

... as a surface filter is suitable for coarse filtering of dirt particles from 3-10 mm. According to hole size and spacing, free filter cross-sections of up to 48% are achievable. In addition, perforated sheet can serve as a support for stretched filter media (meshes).



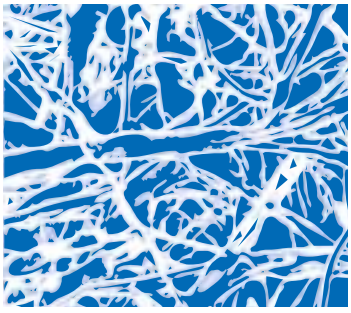
Wedge wire candles...

... consist of longitudinal rod sections around which metal sections are welded at the contact points. Gap widths are from 30 µm to 2 mm. They have an almost unlimited service life, are manufactured complete from stainless steel and are particularly suitable for fibrous contaminants.



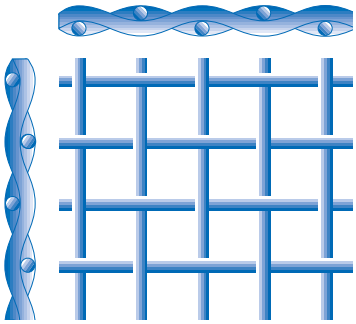
Filter papers and non-wovens...

... are three-dimensional filter media for the finest degrees of filtration. They consist of porous, absorbent papers, synthetics or glass fibres between 0.1 mm and 1.0 mm thick. They are used in oil filtration and also for water in special cases.

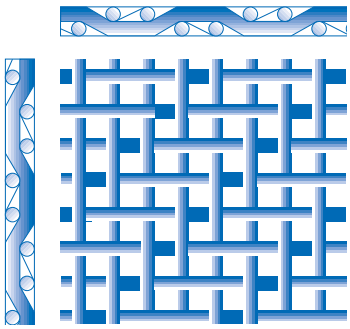


Wire meshes in different weaves...

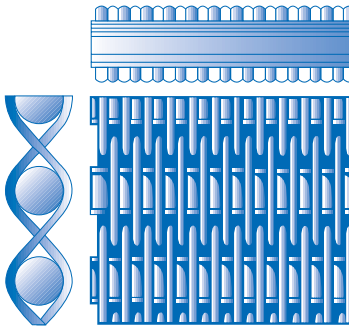
... are suitable for surface filtration with mesh sizes in the range 5 µm to 2 mm.



Square or plain weave
One warp thread is woven around each weft thread. This weave is suitable for filtration in the range of 100 µm to 2 mm and as a standard weave gives low flow resistance.



Twill weave
One warp thread is woven around two weft threads and vice versa. This weave is elastic and easily shaped. The filtration range is between 30 and 80 µm.



Special twist
The optimised braid weave is a combination of strong threads for really high strength and thin threads for the narrowest pore cross-section. Its special weave permits high dirt capture on the filter surface. It is the ideal mesh for all backflush candles, with high free flow cross-section and low flow resistance for a filtration range of 10-70 µm.

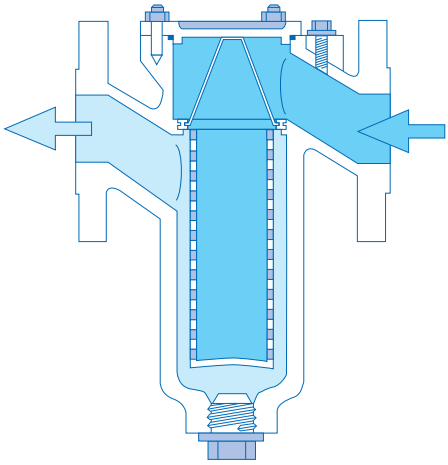
The BOLLFILTER-product range

BOLLFILTER products are integrated into suction and pressure pipes and protect important plant components such as valves, pumps and bearings from abrasive particles and choking. The filter housing consists of grey cast iron, nodular cast iron, steel or CrNi steel according to type and use.

They are designed to National and International standards and norms. Continuous or discontinuous operation, manual or fully automatic filter cleaning are the determinants of filter choice.

BASIC

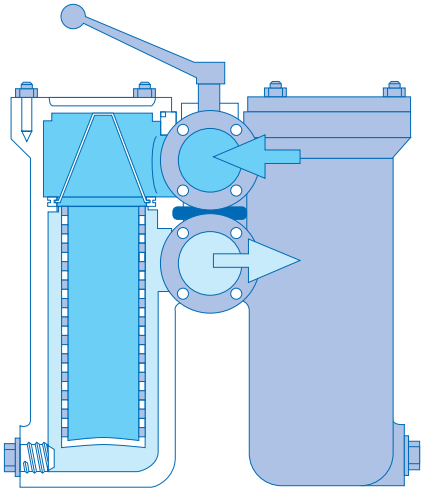
BOLL-Simplex Filter



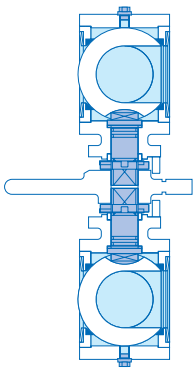
Simplex filters are the basic model of filter fluids technology. Their filtration efficiency is just as good and reliably as of duplex filters or automatic filters. All filter element designs with their different filter media can be employed. BASIC type BOLLFILTER equipment is for use in all circumstances where the plant or filter can be easily shut off to allow cleaning or replacement of filter elements.

DOUBLE

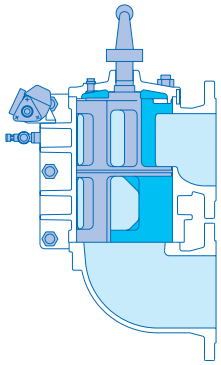
BOLL-Duplex Filter



Duplex filters consist of two filter housings. One half of the filter is in operation while the other is being cleaned or on stand-by. If contamination exceeds a tolerance threshold, the unit can switch over to the clean filter side without any pulse pressure. The contaminated filter element is then cleaned while operation continues. The change-over is performed by a change-over cock or by a two-stage three-way ball valve. The design of the filter excludes simultaneous isolation of both filter chambers.



Three-way ball valve



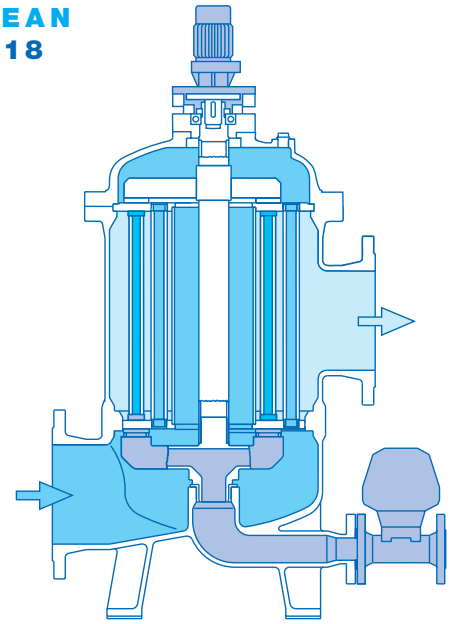
Change-over cock

SELFCLEAN

BOLL-Automatic Filter

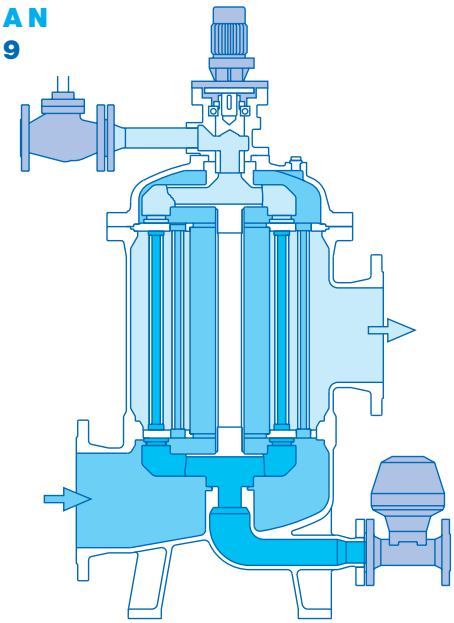
In all BOLL Automatic Filters the filter candles, wedge wire candles or wire mesh candles are automatically cleaned without interruption to operation by backflushing. Cleaning can be performed by the filtrate fluid, filtrate fluid accelerated by compressed air or by external medium and may be initiated by differential pressure or time. Filters of this type are employed when manual cleaning is uneconomical due to the continuing nature of contamination, or when the production process is totally automated.

SELFCLEAN TYPE 6.18



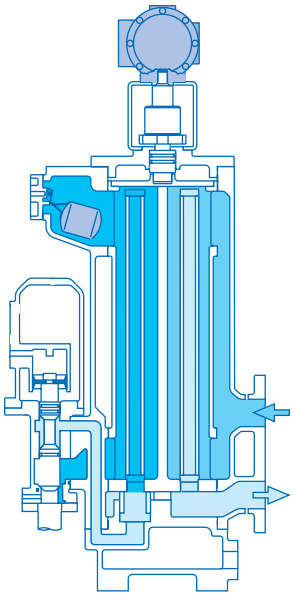
The main area of use of this BOLL Automatic Filter is water filtration, hence its internal parts are generally stainless steel. The product uses the very efficient Crossflow-Reverseflow backflush system. The filter candle is open at both ends and filtration takes place from the inside out. In the longitudinal wedge wire design it is ideal for fibrous contaminants.

SELFCLEAN TYPE 6.19



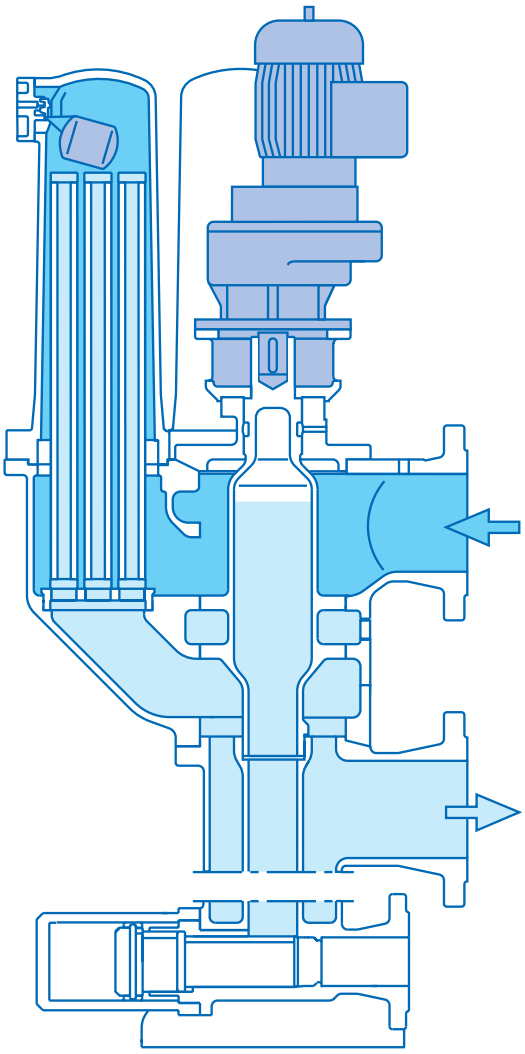
Type 6.18 becomes Type 6.19 by the incorporation of an external medium. Using high-pressure water or steam, this product achieves improved flushing efficiency and is recommended for low operating pressures or where sticky contaminants need to be released during flushing.

SELFCLEAN TYPE 6.62



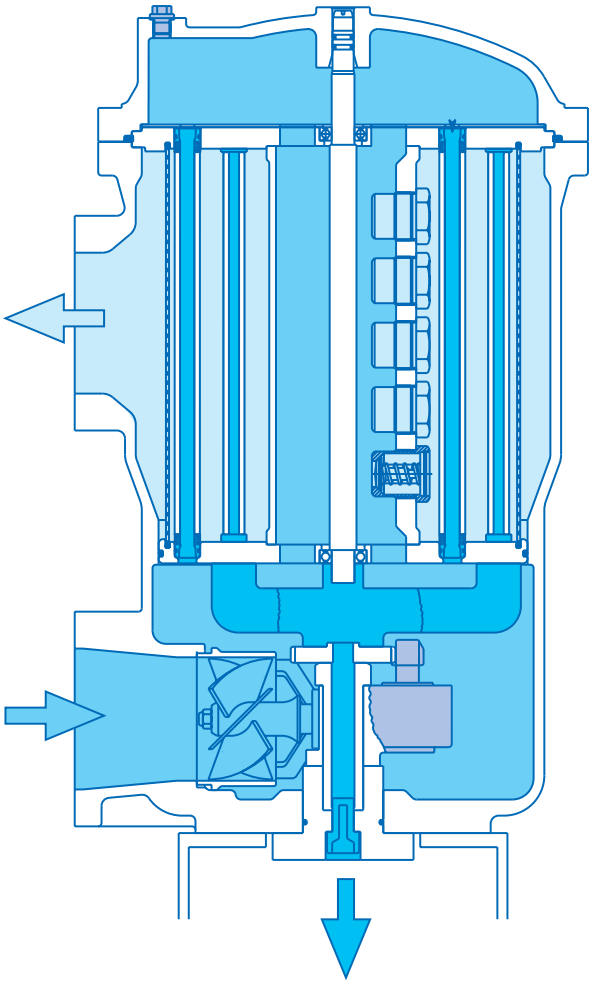
SELFCLEAN Type 6.62 is a new development especially designed for smaller flow rates of fuels and lubricating oils. The special design allows filter finenesses down to 10 µm. When in use as a fuel filter there is also a facility for integrating a bypass filter with change-over mechanism.

SELFCLEAN
TYPE 6.61



This BOLL Automatic Filter meets the highest demands for filtering moderate or large flows of oil, washing solutions or fuels. The combination of a flushing process dependent on the differential pressure and the multi-chamber system achieves the highest solids separation of any automatic filter. Backflush is aided by compressed air and creates flushing pulses equivalent to high-pressure cleaning whilst independent of the system pressure. Hence, pressure fall in the system and the flushing volume are very low. An electronic control system permits monitoring of system contamination.

SELFCLEAN
TYPE 6.46



This compact filter for horizontal or vertical fitting is employed chiefly in lubricating oil systems as a continuous cleaning unit. Its turbine-driven constantly revolving flush mechanism operates free from wear even with low flow rates and pressures. The fine-grade filter candles are stable under differential pressures of up to full operating pressure. The continuous Crossflow-Reverseflow backflush provides uniform cleaning over the entire candle length. A safety filter and an overflow safety device at the first stage provide safety in emergencies.

BOLLFILTERS at a glance

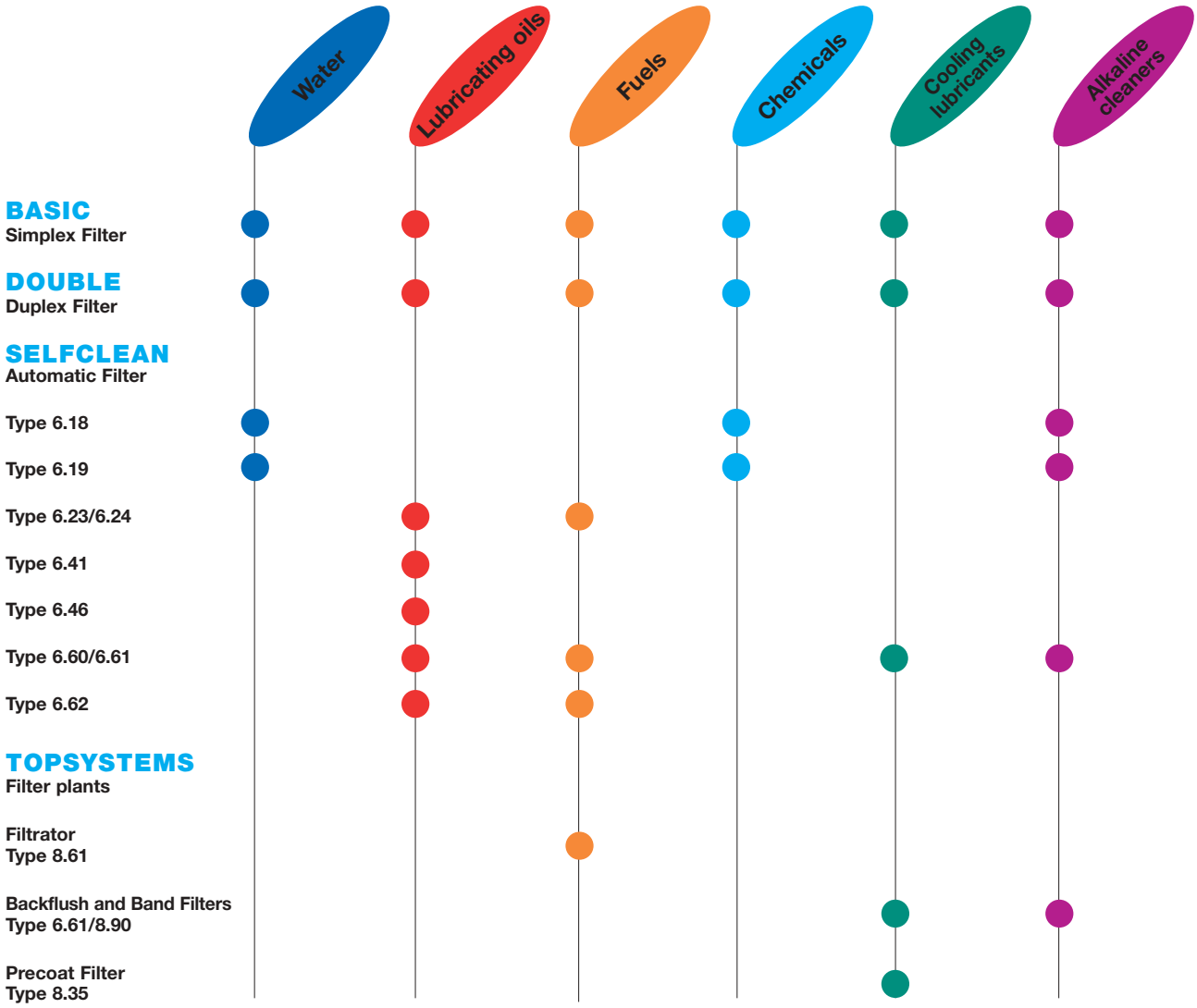
All BOLLFILTERS possess the following particularly advantageous properties:

- large filter surfaces
- long life span
- long maintenance intervals
- easy and quick cleaning and maintenance
- exactly defined filtration degree by means of precision filter meshes
- modular system with many possible variants
- simple handling
- robust and compact design
- low pressure losses

Further features of BOLL Automatic Filters are:

- precise backflush function
- reliable removal of retained solids
- low operating costs
- small flushing volumes

For every application the appropriate BOLLFILTER:



RESOURCES OFFER

opportunities ...and more.

Manufacturing the support body for the BOLL Quality Filter Candle

BOLL quality products derive from a manufacturing process which, whether in equipment, organisation or management, deserves the name "High-Tech" every time. Mechanical manufacturing equipment is replaced, on average, every 3.5 years. The reason is that CAD, DNC and CNC controlled machine tools and state-of-the-art welding techniques are just as important for results as inspirational quality management. Regular testing by independent bodies such as the classification societies and technical testing institutes confirm the quality of our work. All parts essential to the

High-value flame-cutting machine for individual components.

optimal functioning of the end product are manufactured in-house. Manufacturing sequences are constantly reviewed and optimised by our teams, and logistics are accelerated rather than slowed down.

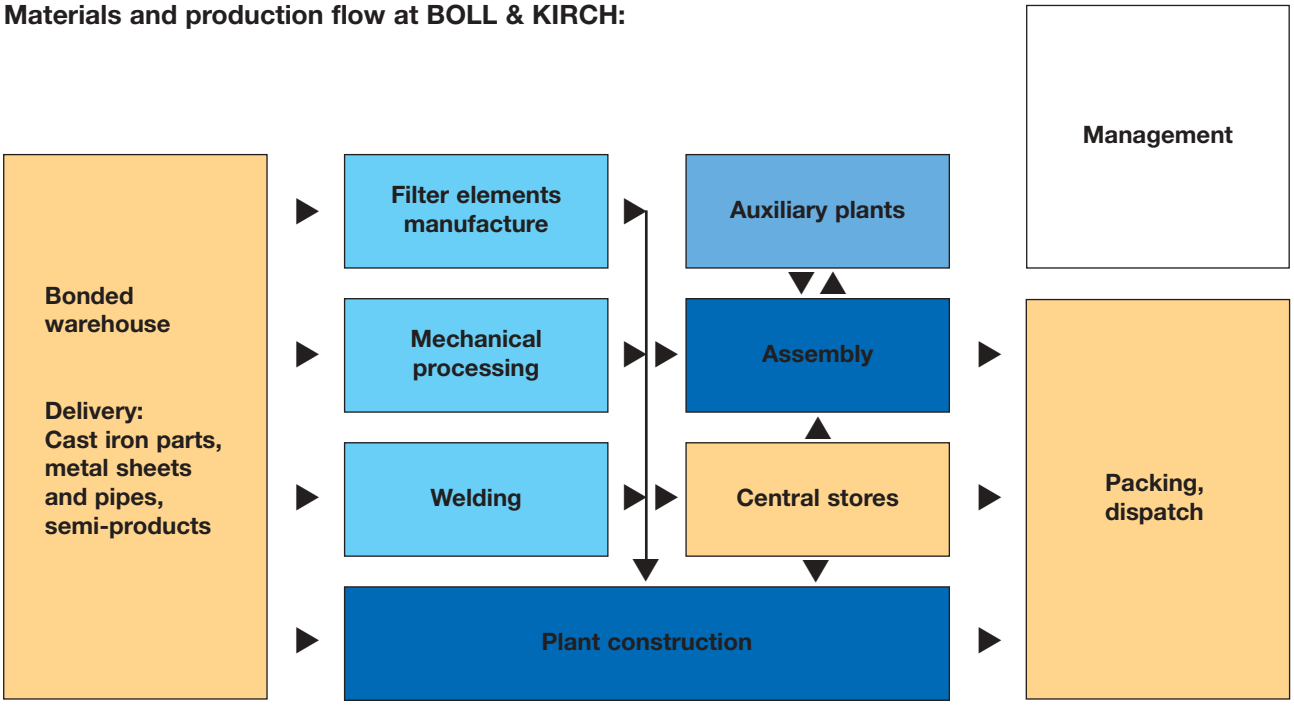
Our breadth of manufacture enables us to maintain optimum quality in our product, whilst at the same time considerably reducing expenditure on preparation and logistics.

And more: customer requests are carried out quickly, and at reasonable cost, too.

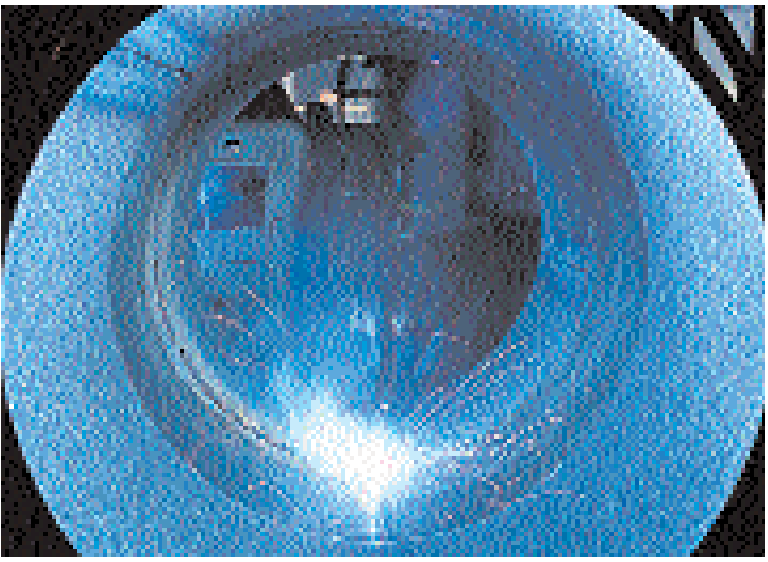
Special tools for economic manufacture with CNC and DNC-controlled machine tools.

The complex housings for BOLL Fluids Precision Filter Systems are efficiently assembled on DNC-controlled grouped workstations.

Materials and production flow at BOLL & KIRCH:



The BOLL manufacturing concept



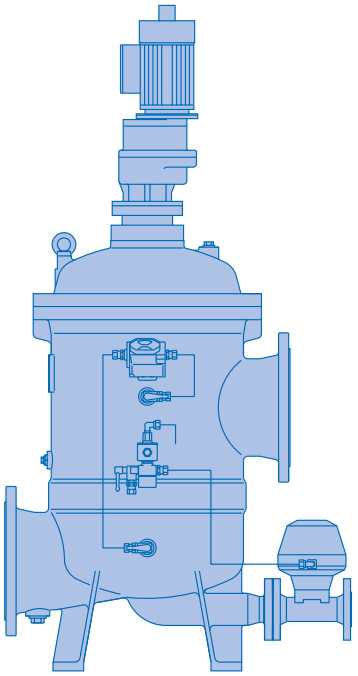
BOLL & KIRCH manufacture small runs and unique items to order and in close consultation with customers. Because of the variety of orders and tasks, flexibility in production planning and the use of resources is the most important organisational principle. With its network structure and a combination of assembly-line manufacture for component production and group and workshop manufacture for final assembly and plant manufacture, BOLL & KIRCH has found the right way of achieving this.

All manufacturing units plan and control their own assignments independently and are personally responsible for them. This lean production system guarantees the product quality and attention to deadlines for which the company has made its name as a systems supplier throughout the world.

From top to bottom:
No "value-for-money" construction can be achieved without welding - the UP welding machines form maximum-precision welded seams.

The subsequent X-ray inspection confirms the results.

Right:
Interim inspection of a BOLL Automatic Filter, SELFCLEAN Type 6.18.



Left:
Final inspection and function testing under high load in a classification society test.

Below:
Flexible operating manufacturing teams hold daily meetings about the tasks in hand.

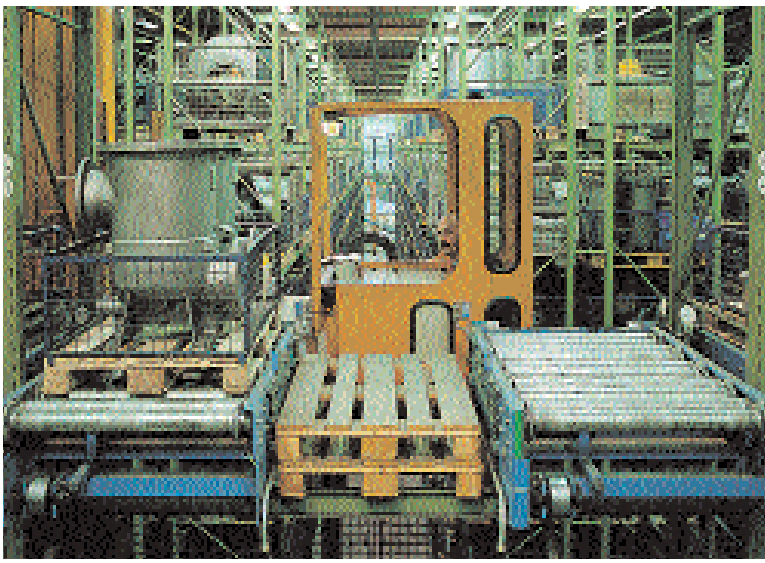
Our various stores and logistics systems underpin speedy and efficient production.

The BOLL logistics concept

Flexibility and decentralisation substantially reduce internal logistics costs. Materials acquisition, testing and storage are guided solely by the needs of the different manufacturing teams. This eliminates long lead times or transport and intermediate products are directly available in the different manufacturing areas.

Besides the synchronised availability of main components for manufacture, central stores stocks are sufficient to guarantee dispatch of original BOLL spare parts to customers world-wide within 24 hours.

The 7.000 most frequently used parts are always on stock. All other parts can be manufactured in a very short time. The unique and characteristic labelling of the parts and their packing guarantee the genuineness and the quality of them.



BOLLFILTER
Genuine Parts

PERFORMANCE OPENS UP

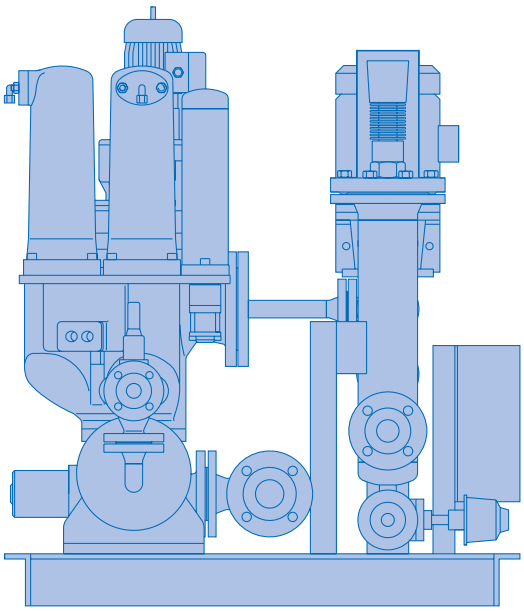
prospects

...and more.

BOLL & KIRCH currently employs over 250 staff, many of them the second or third generation of their family to do so. They are the company's most valuable asset, because their skills decide the quality of products they manufacture. Years of vocational training and experience within the company are the rule, and at the same time evidence of the steadfast links between employees and "their company".

Solid external qualifications and on-going internal training are a matter of course. Performance is encouraged and promoted. Together with team spirit and a feeling of "in-ness" these features go a long way to explaining BOLL & KIRCH's success. *And more:* commitment and willingness to deliver give individuals the chance to link their personal success with that of the company.

The young people and the world-wide operating service engineers are trained in BOLL & KIRCH's own training centre.



From top to bottom:
BOLL spare parts leave central stores within 24 hours.

Special packaging for sea transport and long-term storage.

After Sales Services:
Trained service engineers help the costumers world-wide solving their filtration system problems.

PRESENCE LEADS TO growth ...and more.

BOLLFILTERS originally won their outstanding reputation in the marine industry. From the start BOLLFILTER products were at home on the high seas. Then they progressed to many other areas and are today used all over the world. To meet constantly rising demand BOLL & KIRCH has built up a dense network of branch offices. Their global presence in all important industrial centres in turn generates new growth trends.

The company's presence thus forms a stable basis for further expansion in the 21st century.

And more: it guarantees customers throughout the world reliability and depth of service.

BOLL & KIRCH Filterbau GmbH in Kerpen, Germany: The headquarters of a global network.

The BOLL & KIRCH branch network:

Europe

Austria / Czech Republic / Slovakia / Slovenia
Schmachtl KG
A-4021 Linz

Belgium / Luxembourg
Auximeca S.A.
B-2170 Merksem

Croatia
Marine Trade d.o.o.
HR-47000 Karlovac

Cyprus
M.I.E. Services Ltd.
CY-3032 Limassol

Denmark / Sweden / Iceland / Norway
BOLL & KIRCH FILTER SKANDINAVIEN ApS
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D-22926 Ahrensburg

IVG Pumpen- und Filtrationstechnik Gera
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BOLL & KIRCH Filterbau GmbH
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