FLOWTEC

Empowering Progress & Innovation

CONTINUOUS BACKWASH UPFLOW SAND FILTERS

FLOWTEC ENGINEERING (U.K) LIMITED

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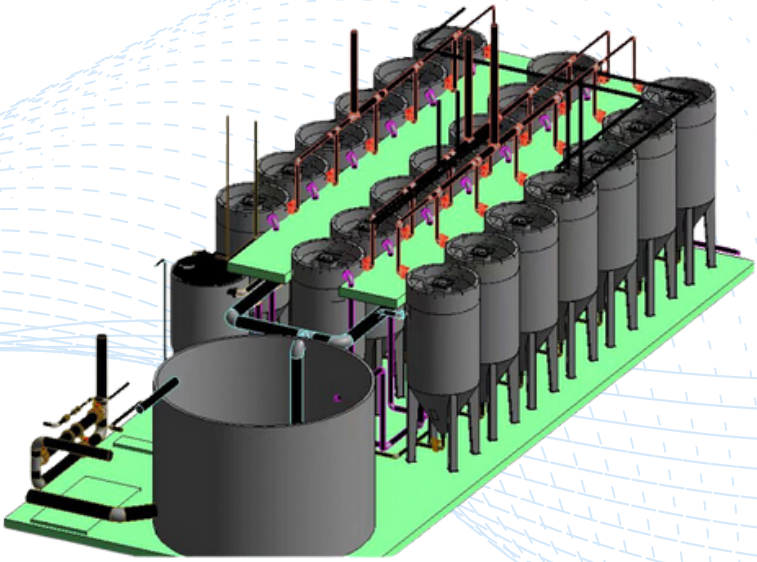
INTRODUCTION

At Flowtec Engineering (UK) Limited, we are proud to introduce our Continuous Backwash Upflow Sand Filter, a modern solution designed to offer an uninterrupted filtration process. Unlike traditional fixed bed filters that require frequent shutdowns for cleaning, this system eliminates the need for daily stoppages by ensuring continuous operation, making it an efficient and cost-effective option for a variety of applications.

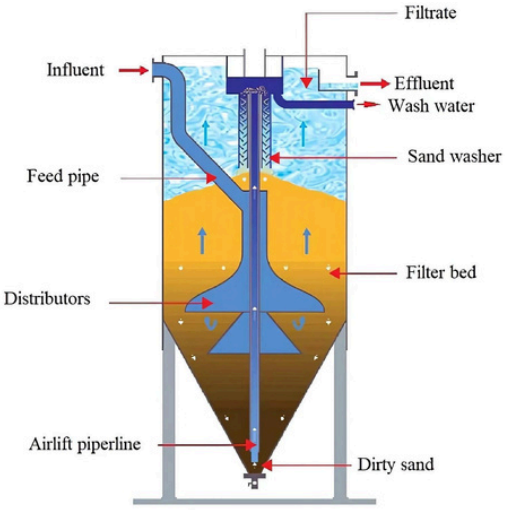


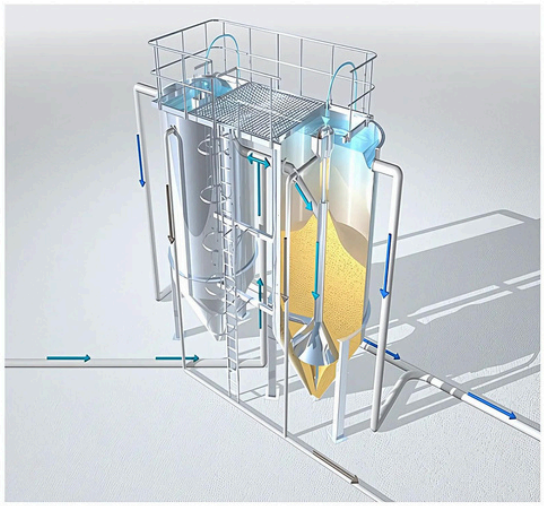
Key Applications

- Reclaimed water reuse
- Paper manufacturing, printing, dyeing, and metallurgical industries
- Oilfield and port wastewater
- Cooling water recycling
- Food industry water treatment
- Upgrading traditional filter systems
- Heavy metal removal in electroplating plants
- Phosphorus and suspended solid removal in municipal wastewater treatment

WORKING PRINCIPLE

Raw water enters the filter from the bottom, passing upwards through a bed of quartz sand. Suspended particles are trapped within the filter bed, allowing clean water to overflow at the top and exit through a weir. The quartz sand, now containing impurities, is automatically cleaned by an air-lift system that transports it to a washing unit. The robust sand-washing mechanism uses compressed air to scrub the sand clean, after which it is returned to the bed, ready to resume filtration. This ensures a seamless operation without any need for intervention.





EFFICIENT FILTRATION PROCESS

Filtration

Raw water enters the filter through the conical diversion channel and is filtered as it ascends through the bed. Suspended matter is captured by the sand, while filtered water exits through the overflow weir. For wastewater containing oils or binders, specially designed quartz sand ensures optimal filtration efficiency.

Sand Washing

Contaminated sand collects in the sand-collecting box, where it is transported by a sand pump to the washing unit. Compressed air separates the air from the water, ensuring a thorough clean. The washed sand is then redistributed evenly across the filter bed, while wastewater is drained through a separate outlet. Operators can monitor the process visually, allowing for easy adjustment and maintenance.

SUPPORTING EQUIPMENT

Pre-treatment of Raw Water

To prevent large particles from obstructing the system, pre-treatment may be required depending on water quality.

Sand Collecting Box

Collects contaminated sand and is fitted with a wear-resistant control ring to regulate sand intake.

Sand Pump

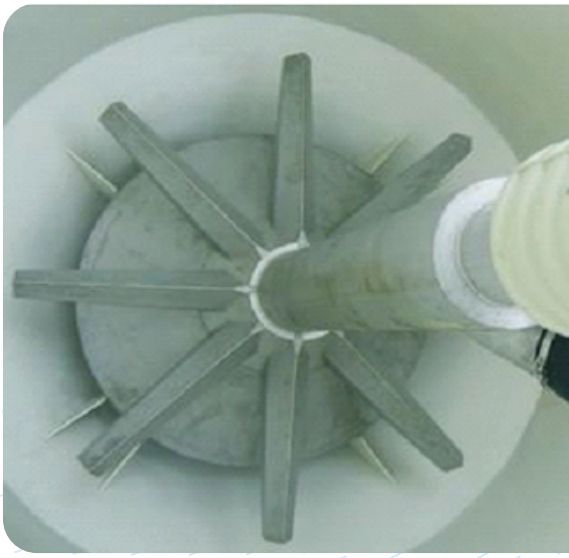
Lifts contaminated sand to the washing unit. The sand pump is air-powered, requiring compressed air at 4-6 kg/cm².

Air Control System

Manages compressed air supply, ensuring smooth operation of the sand pump and washing system.

Sand Washing Device

Designed with a labyrinth channel that maximizes cleaning efficiency while minimizing water usage.



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PRODUCT RANGE

At Flowtec Engineering (UK) Limited, we take pride in our reputation as a leading British manufacturer, offering innovative solutions for fluid management and water treatment. The following models of our standout product, the Continuous Backwash Upflow Sand Filter, are highly efficient and reliable designed to provide uninterrupted service, ensuring clean water treatment for industrial and municipal applications.

Model	Filter Area (m^2)	Filter Layer Depth (m)	Flow Volume (m^3/h)	Diameter (mm)	Wastewater Discharge (%)	Equipment Height (mm)	Max. Air Consumption (m^3/h at 0.4 MPa)
FKCS-05	0.5	1.5–2.0	3–5	800	5–10	3500–4000	2
FKCS-10	1	1.5–2.0	5–10	1150	5–10	4300–4800	2.5
FKCS-15	1.5	1.5–2.0	10–15	1400	5–10	4600–5100	3
FKCS-20	2	1.5–2.0	15–20	1600	5–10	5000–5500	4
FKCS-30	3	1.5–2.0	20–30	2000	5–10	5400–5900	6
FKCS-40	4	1.5–2.0	30–40	2260	5–10	5800–6300	8
FKCS-55	5.5	1.5–2.0	40–55	2650	5–10	6200–6700	10
FKCS-60	6	1.5–2.0	55–60	2770	5–10	6500–7000	12

OUR MANUFACTURING FACILITIES

OPERATIONAL CONSIDERATIONS

Sand Filling

Filter sand is typically delivered in plastic bags. During initial operation, some shrinkage of the filter bed may occur.

Air Control System

The air system requires clean, dry compressed air at a pressure of 5-7 kg/cm².

Water Injection

Start the system with clean water to avoid clogging the filter bed.

Sand Movement and Washing

Regular monitoring ensures optimal sand circulation and washing performance. Sand falling rates and water discharge can be adjusted based on filtration needs.

Key Technical Performance Features

1. Temperature Range

Our Continuous Backwash Upflow Sand Filter is built to handle water temperatures between **0°C and 65°C.** If your operational environment demands temperatures beyond this range, bespoke solutions are available upon request.

2. Micro-Flocculation Device for Filtration Efficiency

When used with a micro-flocculation device, the filter effectively treats influent with suspended solids (SS) concentrations of up to **120 mg/L**, achieving a removal rate exceeding **90%**, delivering exceptionally clear water output.

3. Minimal Water Head Loss

The system boasts an impressively low water head loss of less than **0.1 MPa**, maximising efficiency by reducing energy consumption.

4. Air Consumption for Lifting Filter Material

Our system is designed for efficient air consumption, utilising **0.15 to 0.2 m³** of air per ton of water to lift filter material. The required air pressure is maintained below **0.35 MPa**, ensuring smooth operations.

5. Filter Material Specifications and Filtration Rate

The filter material particle size is **0.7 to 1.2 mm**, with a filtration rate of **6 to 13 m/h**. The cycle time for the filter material is between **4 and 8 hours**, ensuring a consistent and uninterrupted filtration process.

6. Water Consumption for Washing

The system requires between **5% to 10%** of the treated water volume for cleaning purposes, ensuring that filter media remains effective without excessive water usage.

The operational elements of our Continuous Backwash Upflow Sand Filter are designed to ensure ease of use, reliability, and precision, making it an ideal choice for those seeking efficient, continuous filtration systems.

4.1. Sand Filling

Filter sand is delivered in plastic bags with volumes ranging from **0.83 to 0.85 m³**. When filling the sand, a screening mesh of under 10 mm is recommended to prevent any residue or debris from entering. During the initial operation, the sand bed will settle slightly due to shrinkage, and the height of the sand filling will decrease accordingly.

4.2. Installation of Air Control System

The air control system should be conveniently placed, complete with a display panel for ease of operation. Compressed air with a pressure of **5 to 7 kg/cm²** is connected to the system, while the pressure regulator should be linked to the water separator's drain pipe.

4.3. Injection of Clear Water

At the start of the filtration process, clean water must be used to fill the system. Initially, wastewater may block the filter bed's screen holes until the sand washing mechanism becomes fully operational.

4.4. Degradation Rate Measurement of Filter Bed and Adjustment of Sand Rate

To ensure peak filtration performance, it is essential to monitor the degradation rate of the filter bed. The falling speed of the sand bed is measured with a calibrated measuring rod. Insert the rod into the sand layer to a depth of **100-200 mm** and record its descent over a **2-minute period**. The sand bed should decrease at an average rate of **3-6 mm/min**.

Different filters may have varying points of measurement, typically **3-4 internal points** within **150-300 mm** of the side wall, or **3-4 external points** located **200-500 mm** from the centre of the filter. The central sand layer generally descends more quickly than the surrounding edges.

If a portion of the sand bed ceases to fall, consult the **“Trouble and Countermeasure” guide.**

For a 1 m² filter area, with a sand layer descending at **4 mm/min**, the sand lifting capacity of the pump should reach **4 L/min**. Adjust the air supply so that sand lift per m² reaches **3-6 L/min**.

To gauge the sand lifting volume, detach the front end of the sand lifting pipe from the air separator and measure the amount of sand lifted per unit of time using a suitable container.

4.5. Washing Drainage

The recommended washing drainage volume is **1-3 times** the sand increment, with **2.0 times** being the standard. For raw water with high suspended solids concentrations, a greater volume of washing water will be required, while less washing water will suffice when handling lower levels of contamination.
To measure the washing drainage, close the main pipe valve and divert the washing drainage into a container to assess the volume over a set period. Alternatively, if the system is equipped with a measuring device, the volume can be read directly.

4.6. Cleaning of Filter Sand

If the newly added sand contains dirt, such as mud, the filter should be operated using clean water to rinse the sand bed. By supplying adequate clean water, the system will overflow into the washing tank. Based on the contamination level of the sand, **2-4 cycles** of cleaning, each lasting **6-10 hours**, may be necessary.

4.7. Adjustment of Raw Water Supply

To adjust the raw water supply, place the switch on the electric control panel into the open position and start the water supply pump. Gradually open each filter's raw water inlet valve and adjust the flow to the desired level.

4.8. Operation of Air Control Panel

- Ensure the compressed air pressure to the control panel is at least **6 kg/cm².**
- Check that the control panel’s internal components are correctly installed and lock the adjustment button on the air flowmeter.
- Adjust the pressure switch to **4 kg/cm².**
- Open the manual valve and adjust the air regulator to match the pressure gauge reading.
- Set the selector switch on the control panel to "manual."
- Press the solenoid valve "ON" button to open the valve.
- Adjust the air flowmeter to achieve the required air volume.
- Supply air to the sand lifting pump and check whether sand is moving in the sand lifting pipe.

Flowtec Engineering (UK) Limited’s Continuous Backwash Upflow Sand Filter embodies innovation, efficiency, and reliable performance. With its advanced operational controls, minimal maintenance needs, and ability to provide continuous filtration, this system ensures long-term operational success and represents the next generation of water treatment technology.

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