

THE FUTURE OF POOL WATER TECHNOLOGY

An introduction to our ceramic membrane filtration system



An introduction to MICROFILTRATION

- Filtration process
- Ceramic membrane
- Aggressive chemicals and fluids
- Extreme temperatures
- Filtering range 0.1-10 µm



Microfiltration is a physical filtration process where a contaminated fluid passes through a specific pore sized membrane to separate out microorganisms and suspended particles.

This is not a new form of filtration. Microfiltration has been used in many industries for over 30 years, including:

- Treatment of potable water supplies.
- Sterilisation of beverages and pharmaceuticals.
- Petroleum refining.
- Dairy processing.
- Production of paints and adhesives.
- Biochemical and bioprocessing applications.

The most common material used for microfiltration system membranes is *ceramic*, or *silicone carbide*. This material is perfectly suited to the harsh and aggressive fluids passed through the membrane and can cope with extreme temperature ranges.

Microfiltration processes can remove particles from 0.1-10µm. In terms of swimming pools, most current filtration technology (eg media bed filtration) will filter between 5-10 µm.

WHY CHANGE?



95% of public swimming pool filtration systems in the UK use media bed filtration to remove particulate. We have installed thousands of sand filters; this technology is simple and effective. It has been proven to achieve good quality pool water.

But media bed filters come with a few challenges, both in terms of design and operation.

Design challenges:

- Plantroom space for filters and future replacement.
- Plantroom height, typically 3.5m minimum.
- Logistics/access during install and future maintenance.
- Structural loading up to 20tonnes operational weight.
- Drainage systems for backwashing up to 50ltrs/sec.

Operational challenges:

- Ensuring correct backwash flowrates.
- Manual backwashing and air scouring processes.
- Ensuring PAC dosing system is correct.
- Media replacement every 7-10 years.
- Steel filter shotblasting and relining.
- GRP filter replacement.

In partnership with...







FT Leisure are swimming pool water treatment and filtration specialists; we know and understand the processes involved. However, we are not raw material manufacturers. We needed to team up with a specialist and we found the perfect partner: **Saint-Gobain.**

Saint-Gobain Ceramic Materials is an institution in the field of advanced engineered materials, providing unmatched expertise when it comes to ceramics technology. More specifically, Saint-Gobain Performance Ceramics & Refractories have been providing unique and high added value silicon carbide-based solutions for decades, including the first-to-market recrystallized silicon carbide (R-SiC) product. This outstanding ceramic forms the basis of their Crystar® filtration technology.

Crystar® FT is designed for liquid purity, security, and sustainability. The demands of filtration have changed dramatically over the years, as a growing global population forces industries to adopt more demanding processing capabilities to satisfy the needs of global sustainability efforts.

FT Leisure and Saint-Gobain have entered into a Bilaterally exclusive supply agreement for UK, Ireland and Channel Islands.

HOW IT WORKS

- 15m3/hr per membrane
- Filtration rate <1.4m³/m²/hr
- Guaranteed filtration of 4Microns (4µm)



Filtering

Swimming pool water is pumped through each ceramic membrane at a rate of 15m3/hr. The honeycomb structure of the ceramic membrane has alternately plugged channels, thereby forcing the water through the porous material.

Each individual membrane has a filtration area of 11m². That's a filtration rate of less than1.4m³/m²/hr, compared to traditional media bed filtration which is typically 25m³/m²/hr.

The Crystar® FT ceramic filters the pool water to 4µm. This is a guaranteed maximum pore size in the material, proven through mercury testing.



HOW IT WORKS

- Fully automated washing process
- No interruption of pool use
- Pressure losses controlled
- No retention of bacteria in filter



Washing

As particulate is collected in the pores, the pressure across the membrane increases. At a pre-set pressure or on a time-clock, a washing process will be automatically activated.

High pressure air (5 bar) is used initially to dislodge particles. The particles are then flushed out to drain with a backwash, using only 60litres of water at high velocity. Pre-filtered water is used for flushing (not pool or balance tank water), to avoid contamination of the clean side of the membranes. This whole process typically occurs 4-6 times a day, whilst the pool remains open.

An automatic CIP system will intermittently (typically twice a month) cleanse the system with a detergent, returning the ceramic to it's original state.



HOW IT WORKS







Micron4 CONTROL PANEL







SAFETY For the batter

Every person that uses a public swimming facility has different needs and expectations. Their motive may be relaxation, leisure, exercise, competitive sport, training, play or even therapy. All of these bathers however, have something in common; they all want to enjoy the experience.

Safe and clear water is a fundamental part of that experience. The Crystar® FT ceramic membranes have been laboratory tested and we can prove that FTMicron4® is achieving a much higher standard of pool water:

- Cryptosporidium 99.996% efficiency
- Giardia Lamblia 99.997% efficiency
- Legionella 99.96% efficiency
- Pseudomonas 97% efficiency
- Food contact performance EU 1935-2004
- Pool and drinking water conformance US NSF 61/50

ADVANTAGES For the building

Accommodating swimming pool technology into a building is complex. Our systems interface with architecture, structural, civil, mechanical and electrical design services. Failure to integrate pool technology in the building design will inevitably result in operational issues and potentially lower quality pool water.

Microfiltration is easier to accommodate than media bed filtration:

- 40% Less plantroom footprint than media bed filters
- Greater flexibility on location of filtration plant
- Only 2.5m plantroom height required
- No backwash attenuation tank required
- Less drainage infrastructure
- Smaller balance tanks for level deck pools
- Less structural load on plantroom slab
- Reduced access requirements
- Lower mains power supply



ADVANTAGES For the project

Our FTMicron4[®] system can be pre-fabricated and precommissioned. On new build projects, this reduces our overall installation and commissioning time, compared to media bed filtration.

For existing pools, the system can be broken down to component parts and carried through a single door.

ADVANTAGES For the operator

Swimming pools are expensive to run. They consume a lot of absorbed power, water, heat and chemicals; this is a real challenge to the facility business plan. Microfiltration can help!

- Up to 40% less absorbed power as a result of the regular washing process, the friction loss across the membranes is kept to a minimum. Pumps can therefore be designed with as low as 12m head (against 18m head for a media bed filtration system).
- 2. **Up to 40% less water** microfiltration removes more particulate than media bed filtration, thereby helping keep TDS levels under control. Microfiltration pools can operate using only 15-20ltrs per bather dilution.
- 3. Less heating and chemicals the potential to reduce water consumption leads to a reduction in the amount of chemicals and heat load.
- 4. **Less operator time** a completely automated and remotely monitored systems. No manual operations.



ADVANTAGES For the operator

With traditional filtration systems, it's the operator's responsibility to ensure that the plant is running efficiently. There are limited monitoring systems available with media bed filtration. Maintenance is therefore generally scheduled around the facility resource, not necessarily around water quality parameters.

FTMicron4[®] is a fully automated system, with remote monitoring services. We will support you by monitoring the performance of your system and where necessary, we can make adjustments remotely. Washing and cleaning processes can be carefully managed to ensure they are proportional to your bathing loads.

There is no daily, monthly or annual maintenance for you to carry out. We will carry out annual inspections of the mechanical elements of the system.

The membranes have a lifetime guarantee. *No refurbishment required*.



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COST ANALYSIS

Construction savings:

- Smaller plantroom footprint
- Reduced plantroom height
- Smaller balance tanks
- No backwash attenuation
- Less drainage infrastructure
- Smaller access requirements

As with any new technology, which has been developed, researched and tested prior to launch, it carries a higher capital cost than existing technology. However, some of that increased capital cost is cancelled out by savings in construction.

Whilst the overall capital cost is slightly higher than traditional media bed filtration, the operating costs are substantially less....for the life of the building.

Here's some figures based on a typical 25m 6 lane pool:

Capital Costs

- FTMicron4[®] £220,000.00
- Sand filtration £200,000.00 (includes reduction to construction costs)

Operating Costs

- FTMicron4[®] £35,000.00 pa
- Sand filtration £51,000.00 pa

Payback period only 1.25 years!





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