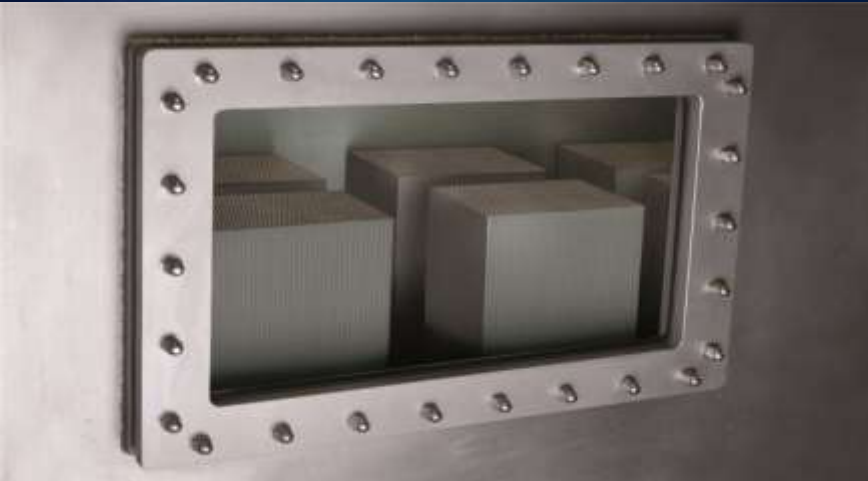




SAINT-GOBAIN R-SIC MEMBRANES FOR POOL FILTRATION

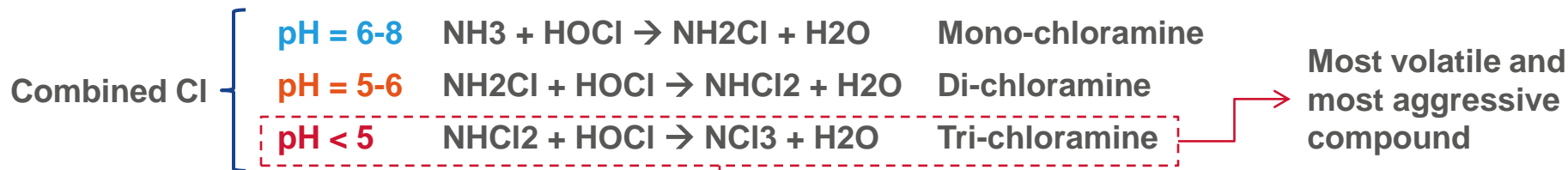


kris.verhelst@saint-gobain.com

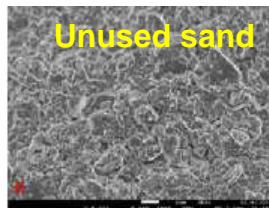
CONCERNS WITH WATER QUALITY OF SWIMMING POOLS

Average person enters the pool with

- ❖ Billions of skin microbes
- ❖ 0.14 grams of fecal matter
- ❖ 0.5 kg of sweat
- ❖ 1 cup of urine



pH within biofilms, for instance those formed onto the very high specific surface of sand filters



Zhen Li et al., Transport of nanoparticles with dispersant through biofilm coated drinking water sand filters. Water Research 47(17), September 2013

S. Cornelia Kaydos-Daniels et al., Health effects associated with indoor swimming pools: A suspected toxic chloramine exposure. Public Health (2008) 122, 195–200

Thickett KM, et al., Occupational asthma caused by chloramines in indoor swimming-pool air. Eur Respir J 2002;19:827–32.

Bernard A, et al. Lung hyperpermeability and asthma prevalence in schoolchildren: unexpected associations with the attendance at indoor chlorinated swimming pools. Occup Environ Med 2003;60:385–94.

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Free chlorine + humic substances → trihalomethanes (THM)

THM formation increased by

- ↗ Temperature
- ↗ Reaction time
- ↗ Total organic carbon (TOC)
- ↗ pH
- ↗ Free chlorine
- ↗ bromide ion content

Chloroform



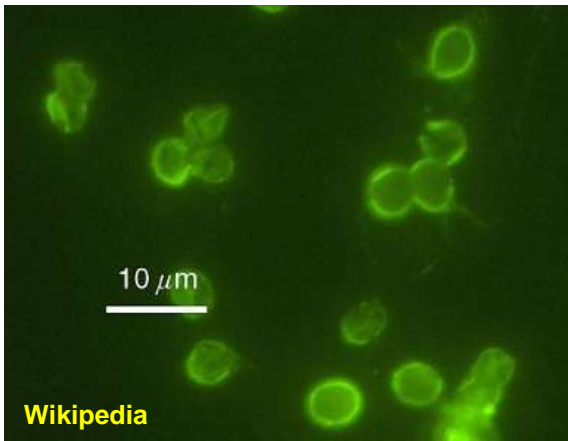
Hervé Gallard, Urs von Gunten. Chlorination of natural organic matter: kinetics of chlorination and of THM formation. Water Research, Volume 36, Issue 1, January 2002, Pages 65–74

Motasem Saidan et al., Investigation of Factors Affecting THMs Formation in Drinking Water. American Journal of Environmental Engineering 2013, 3(5): 207-212

CONCERNS WITH WATER QUALITY OF SWIMMING POOLS

Outbreaks caused by pathogenic organisms

Cryptosporidium parvum



Escherichia coli



Legionella pneumophila



The Sydney Morning Herald December 2016

DECEMBER 22 2016

Cryptosporidium outbreak prompts swimming pool warning to parents from NSW Health

 Kate Aubusson

Manchester Evening News

May 2016

Swimming pool forced to close after traces of potentially-deadly bacteria found

Bosses say they are monitoring the situation closely



BY SAM RICHARDSON
10:05 15 MAY 2016

CONCERNS WITH WATER QUALITY OF SWIMMING POOLS

8 in 10 public swimming pools in USA failed routine safety inspections (May 2016 CDC report)

- ❖ High levels of cryptosporidium and chloramines
- ❖ Prompted the Model Aquatic Health Code – guidelines to help states update existing codes

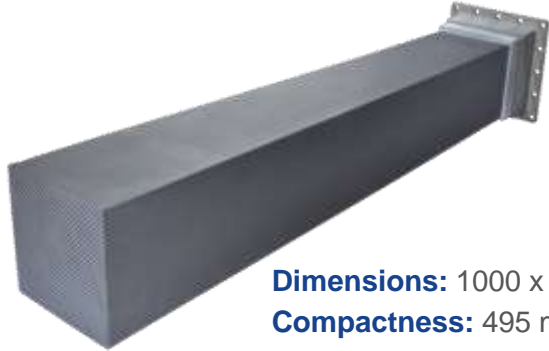
Current sand and other filtration media solutions fail to provide

- ❖ Efficient barrier against pathogenic organisms (big pore sizes, channeling effects)
- ❖ Efficient reduction of water turbidity to maximize UV transmissivity
- ❖ Efficient use of chlorine to disinfect pools without generating harmful by-products

Challenge: how to provide a **cost effective solution to reduce **health risks** in swimming pools and to enhance the **pleasant experience** of a non irritating, chlorine-odorless water?**

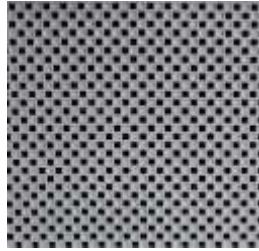
SAINT-GOBAIN R-SIC TECHNOLOGY FOR POOL FILTRATION

Monolith, dead-end configuration: engineered filtration barrier that allows efficient and continuous wall filtration

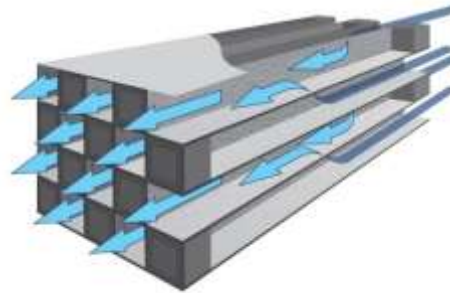


Dimensions: 1000 x 149 x 149 mm

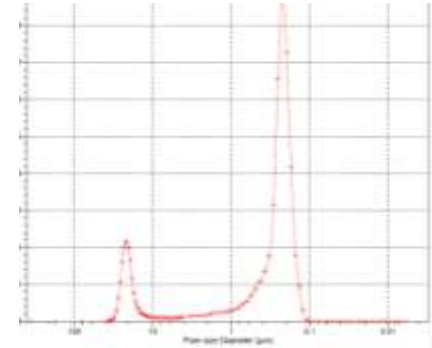
Compactness: 495 m²/m³



Alternatively plugged channels



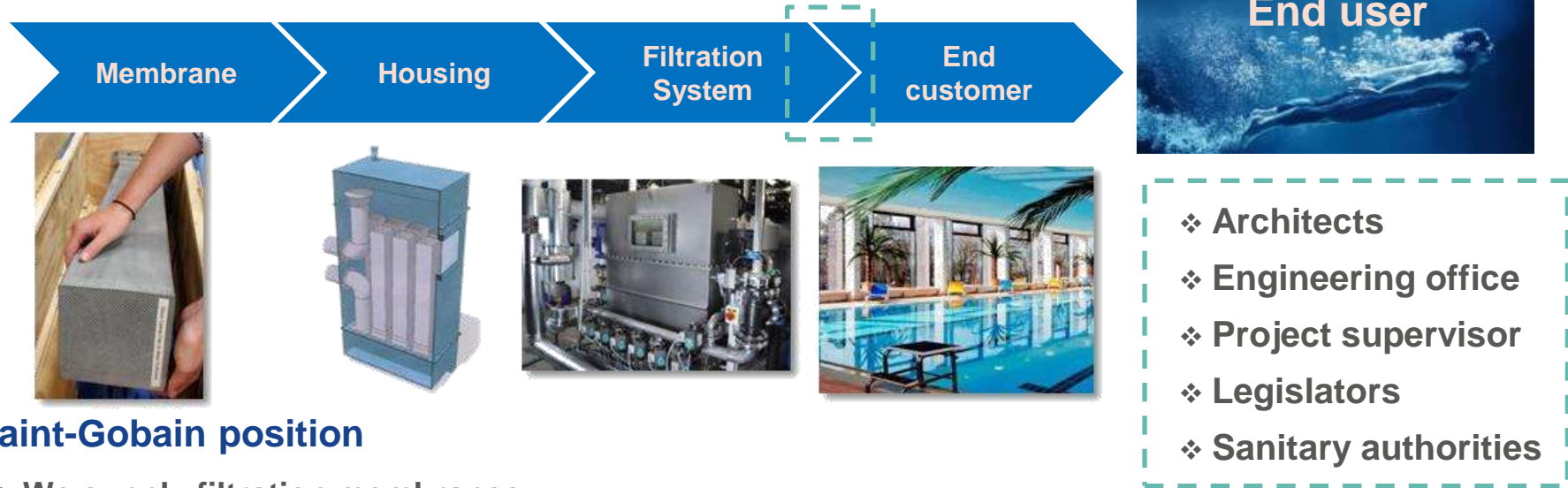
Tight, well controlled membrane pore size



	HiPur	HiFlo	Sand Filter
Channels Dh [mm]	2	2	NA
Membrane OP [%]	45	45	variable
Membrane d50 [nm]	250	4000	>15000
Filtration area / length	11 m ² /m	11 m ² /m	variable

SAINT-GOBAIN R-SIC TECHNOLOGY FOR POOL FILTRATION

Value Chain



Saint-Gobain position

- ❖ We supply filtration membranes
- ❖ We can provide specifications for dead-end membrane modules
- ❖ We partner with local integrators to offer complete, turn-key filtration systems
- ❖ We work with decision makers and **technical innovators to promote** our technology to users

SAINT-GOBAIN R-SIC TECHNOLOGY FOR POOL FILTRATION

Compilation of performance data from 3 different pools in Europe:

- ❖ Rödental (Germany, 5 years of operation)
- ❖ Burgebrach (Germany, 3 years of operation)
- ❖ Sandefjord (Norway, pilot tests performed in 2016)

	HiPur	HiFlo	Sand Filter
Flow rate	Medium – 6 m ³ /h	High – 14 m ³ /h	variable
Operating pressure	< 0.5 bar	< 0.5 bar	< 1.0 bar
Water quality	Excellent	Good	Poor
Water consumption	Low	Low	High
Power consumption	Medium	Low	High
Chemicals consumption	Low	Medium	High
Footprint	Medium	Low	High

Results SG R-SiC microfiltration vs. sand filter acc. DIN 19643

- ❖ **30% lower** footprint required
- ❖ **50% lower** height
- ❖ **70% lower** backwash water consumption
- ❖ **40% less** turbidity of pool water
- ❖ **40% less** combined chlorine (chloramines)
- ❖ **30% less** THM (trihalomethanes)



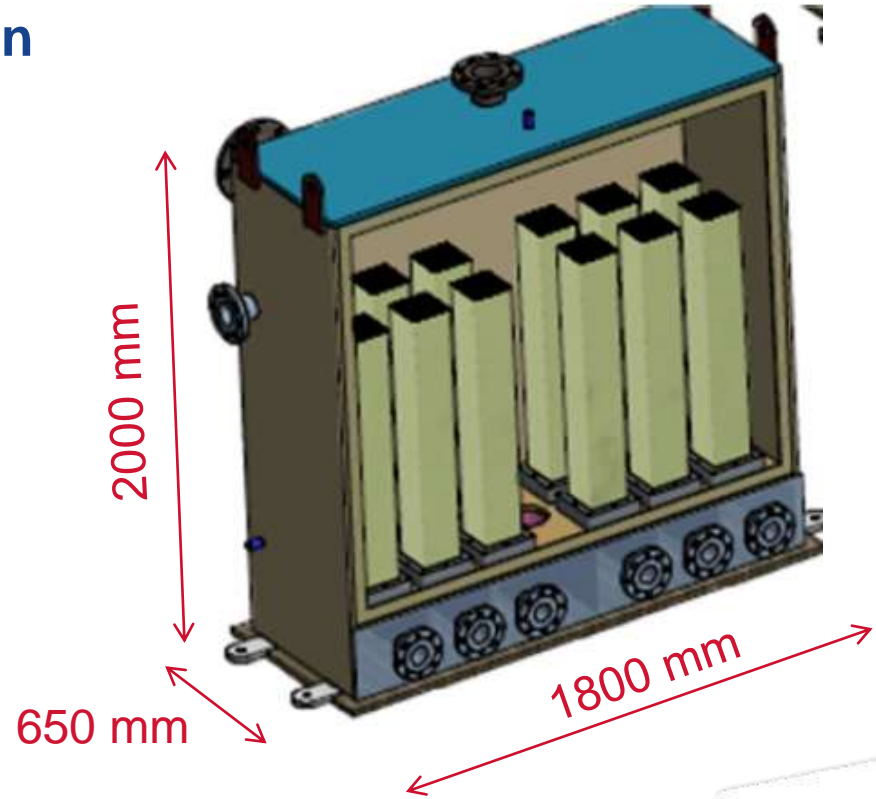
Example of filtration module design

- ❖ Filtration capacity with 12 HiPur filters

72 m³/h

- ❖ Filtration capacity with 12 HiFlo filters

168 m³/h





CHECK OUR YOUTUBE VIDEO (SET SUBTITLES TO ENGLISH OR FRECH):

[HTTPS://WWW.YOUTUBE.COM/WATCH?V=QAIH_ZEABK0](https://www.youtube.com/watch?v=QAIH_ZEABK0)

(IF THE LINK ABOVE DOES NOT WORK, RUN A SEARCH WITH “CRYSTAR SAINT-GOBAIN” AS KEY WORDS)