salsnes filter™

Eco-Efficient Solids Separation

Benchmarking **water solutions**

THREE CRITICAL PROCESSES

In a Salsnes Filter system **SOLIDS SEPARATION, SLUDGE THICKENING and DEWATERING** are performed in one compact unit, **removing >50% TSS, >20% BOD and producing drier sludge (20–30% DM).** A Salsnes Filter system can completely replace conventional primary treatment and does so in a **fraction of the footprint, at 30–60% lower capital cost and with significantly lower total lifecycle costs. What's more, sludge handling, transportation and disposal costs are drastically reduced.** Today, Salsnes Filter systems are installed around the world in a variety of applications within municipal wastewater treatment plants and in challenging industrial solids separation applications.

Cost-effective, compact, high-performing, chemical-free and sustainable – the Salsnes Filter system defines eco-efficient.

Seemingly Endless **Applications**

Municipal Wastewater Treatment

- Enhance primary treatment performance – without adding chemicals
- Solids separation upstream of:
  - Oxidation Ditches
  - Sequencing Batch Reactors
  - Biological Aerated Filters
  - Dissolved Air Flotation
  - Moving Bed Bio Reactors
  - Membrane Bio Reactors
- Primary treatment for new plants
- Primary sludge thickening
- Primary sludge dewatering
- Increase primary or secondary process capacity
- Plant expansion where land is expensive or unavailable
- Dig-free, concrete-free solution for mountainous or earthquake-prone areas
- Combined sewer overflow (CSO) treatment
- Stormwater treatment

Industrial Wastewater Treatment

- Aquaculture
- Tanneries
- Pulp & paper
- Slaughterhouses
- Food processing
- Breweries and wineries

All The **Flexibility** You Need

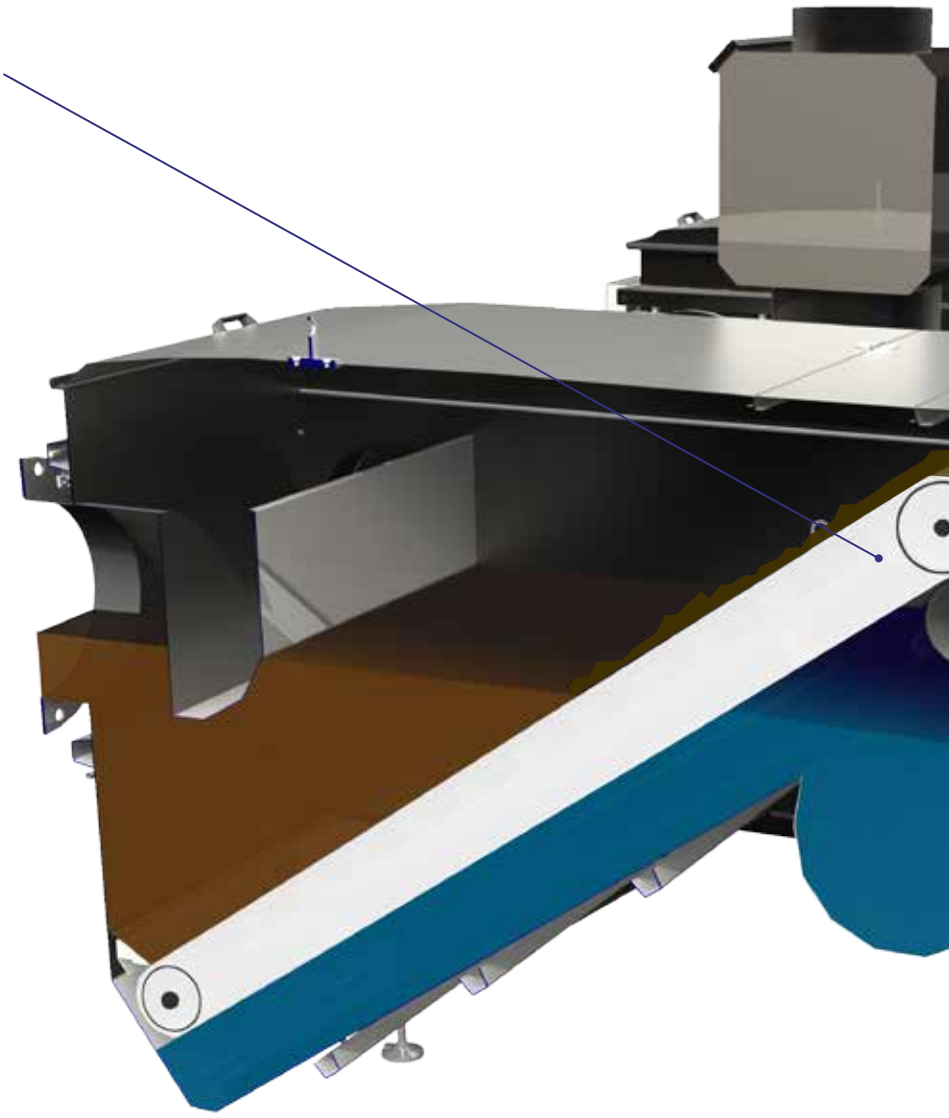
With both Enclosed and Open modular systems, unlimited design flow capacity and the option to install indoors or outdoors, a Salsnes Filter system provides all the flexibility you need.

SF systems are free-standing and enclosed

SFK systems are open for concrete channel installation

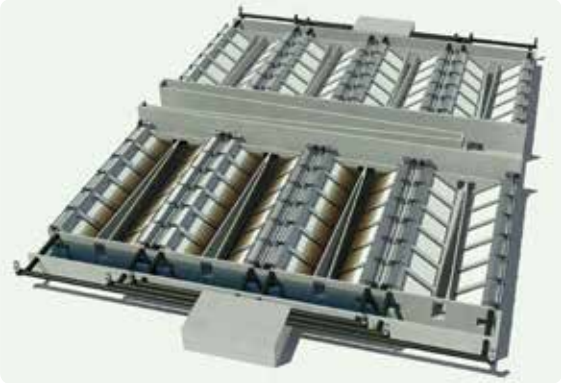
Filtermesh & Cogwheel Design

The filtermesh is made of polyethylene and is very durable. The way it's mounted and tensioned to the cogwheel is patented - it improves performance and allows the filter to handle higher flow rates, increasing treatment capacity in a smaller footprint.



Unlimited Design Flow Capacity

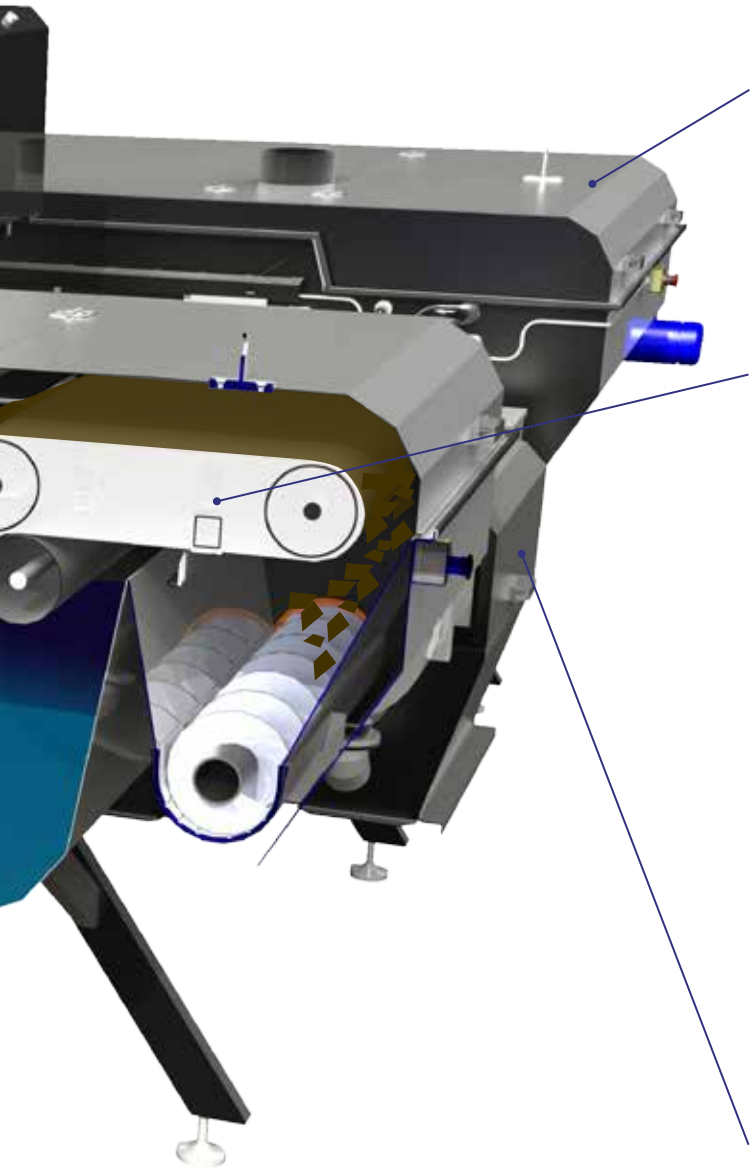
The modular design of the Salsnes Filter system allows for installation configurations to serve any capacity requirement. Each module can have up to 12 filters (six per side). Each side (or half module) performs together as one, sharing components such as the dewatering unit and compressed air for the Air Knife cleaning system.



The Agua Prieta WWTP in Guadalajara, Mexico arranged modules to treat 350 MGD (55,200 m^3/h) of wastewater using only 10,550 ft^2 (980 m^2) of land. Primary settling tanks would have needed 215,000 ft^2 (20,000 m^2) of land.

Programmable Logic Controller (PLC)

The PLC makes this a completely automated system, ideal for remote or unstaffed facilities. A water pressure sensor tells the unit when to rotate the filtermesh (and at what speed), while the PLC simultaneously starts the Air Knife and sludge screw press.



*Two SF:6000 models shown, in parallel configuration

Quick Connects

You will find only quick connects for fast and easy maintenance.

Access Hatch

Enables quick visual inspections of performance and internal components.

Air Knife

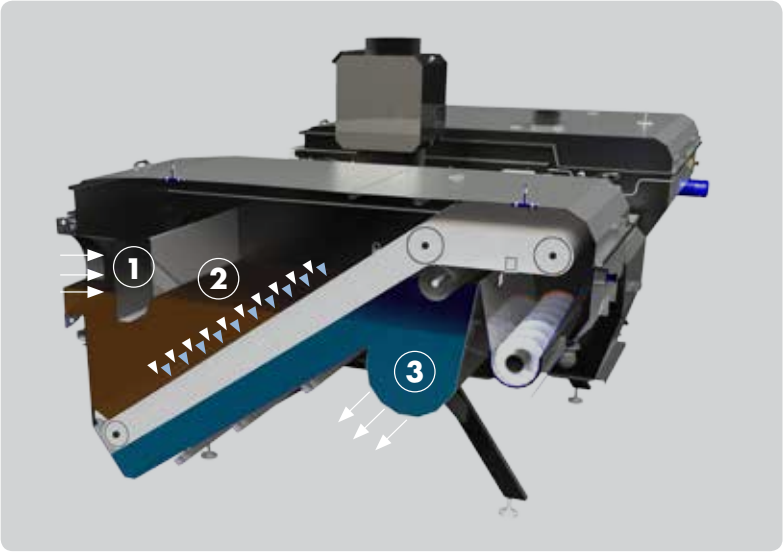
The Air Knife filtermesh cleaning system starts automatically when the mesh begins to rotate. It uses compressed air to clean, which has many benefits compared to scrapers, brushes or water-based cleaning systems. Air is gentler on the mesh (to elongate its life) and on particles (so they don't break into smaller pieces). Air cleaning also keeps sludge drier for more effective dewatering.

Integrated or Stand-alone Dewatering Unit

To save space and money, the enclosed SF systems contain an integrated sludge thickening and dewatering process. Typical dewatering results are 20–30% DM. For larger installations, a stand-alone dewatering unit is available (shown below) to dewater sludge from multiple filters. It applies higher pressure to produce even drier sludge (20–40% DM typical).

Fully-Automated and Integrated **Process**

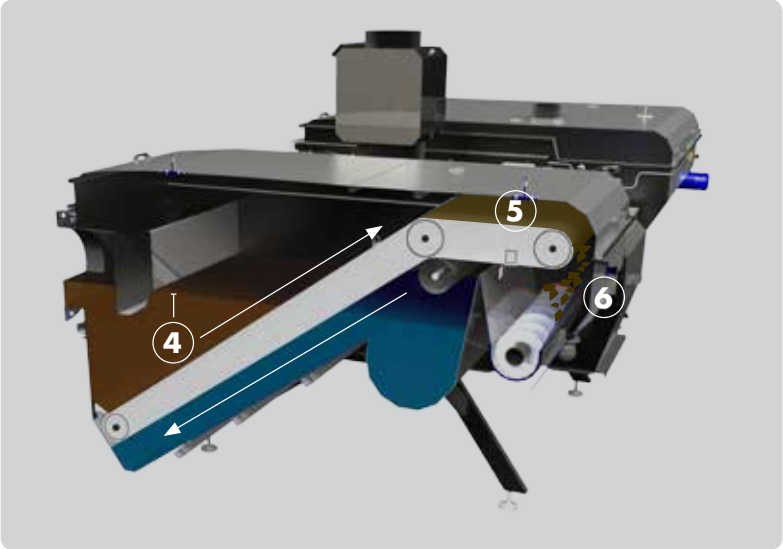
Separation, Thickening and Dewatering - All in one compact unit.



① Wastewater enters the inlet chamber.

② The solids above the filtermesh create a "filter mat." The mat enhances filtration performance as particles build-up on the mesh, creating progressively smaller holes that retain increasingly smaller particles.

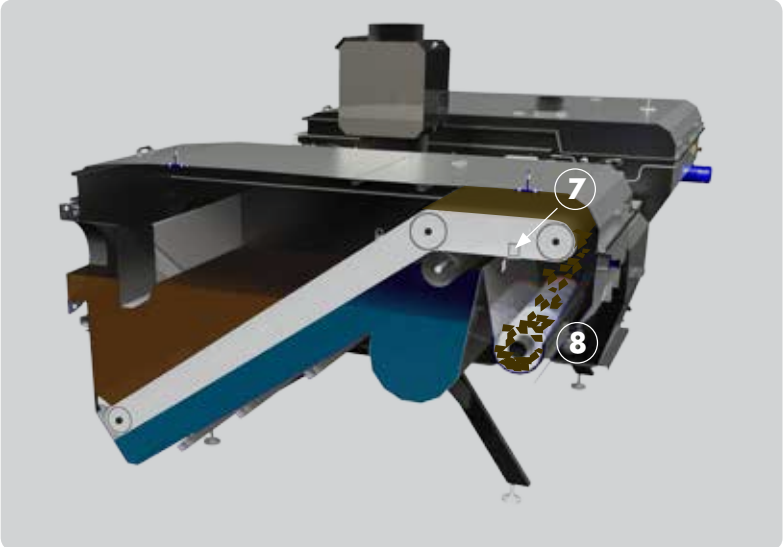
③ Water that is filtered past the mesh exits through the outlet.



④ Wastewater influent rises to a certain level (measured by a water pressure sensor) and the filtermesh starts to rotate like a conveyor belt, transporting sludge and enabling the thickening process.

⑤ Gravity thickens the sludge to 3–8% DM.

⑥ Sludge drops into the collection area.



⑦ Using air (not water) the Air Knife automatic cleaning system removes any remaining sludge from the filtermesh into the collection area.

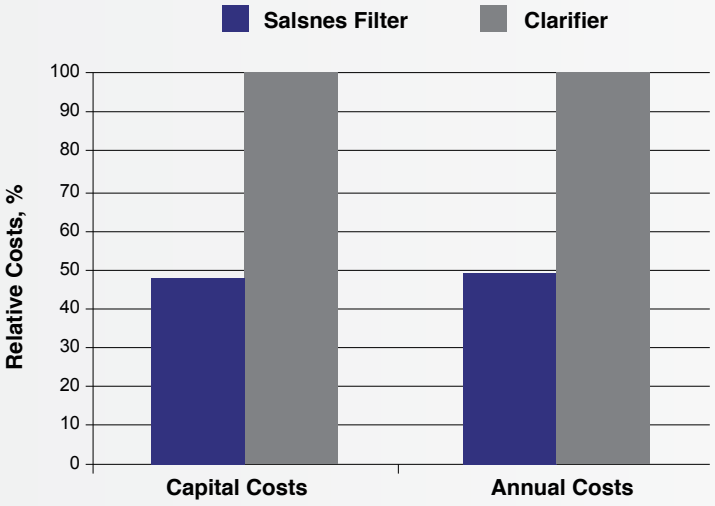
⑧ A screw press further dewaters the sludge to 20–30% DM before it exits the unit.

Compared To Conventional Primary Treatment, a Salsnes Filter System Can Offer:

- 30 – 60% lower investment cost. See **Figure 1**.
- 1/10th the land requirements. See **Figure 2**.
- Integrated thickening and dewatering
- Significantly lower lifecycle costs
- Smaller volume of drier sludge that reduces disposal costs. See **Figure 3**.
- Less civil works (no concrete basins required)
- Higher removal of TSS (>50%) and BOD (>20%) – with the ability to design systems for up to 80% TSS removal
- Smaller secondary/biological treatment processes (less aeration and/or space needed)
- Primary sludge with higher energy value
- Fully-automated equipment
- Fast and easy maintenance
- Lower operating costs (no chemicals to purchase)

"Our real driver was to reduce the loading on the downstream processes, which was successfully accomplished."

– Ralph Martini, Plant Operator
Heyburn WWTP, Idaho, USA



* Design load of 1.3 MGD (200 m^3/h) at 250 mg/l TSS
* Designed for average TSS removal of 65% for Salsnes Filter and 50% for primary clarifiers

Figure 1. Cost Comparison

The above evaluation was completed by the Norwegian State Pollution Control Agency to discover cost efficient technology that could fulfill the European Union's stringent criteria for primary treatment. As you can see, the savings are substantial. A Salsnes Filter system costs half that of conventional primary sedimentation and clarification.

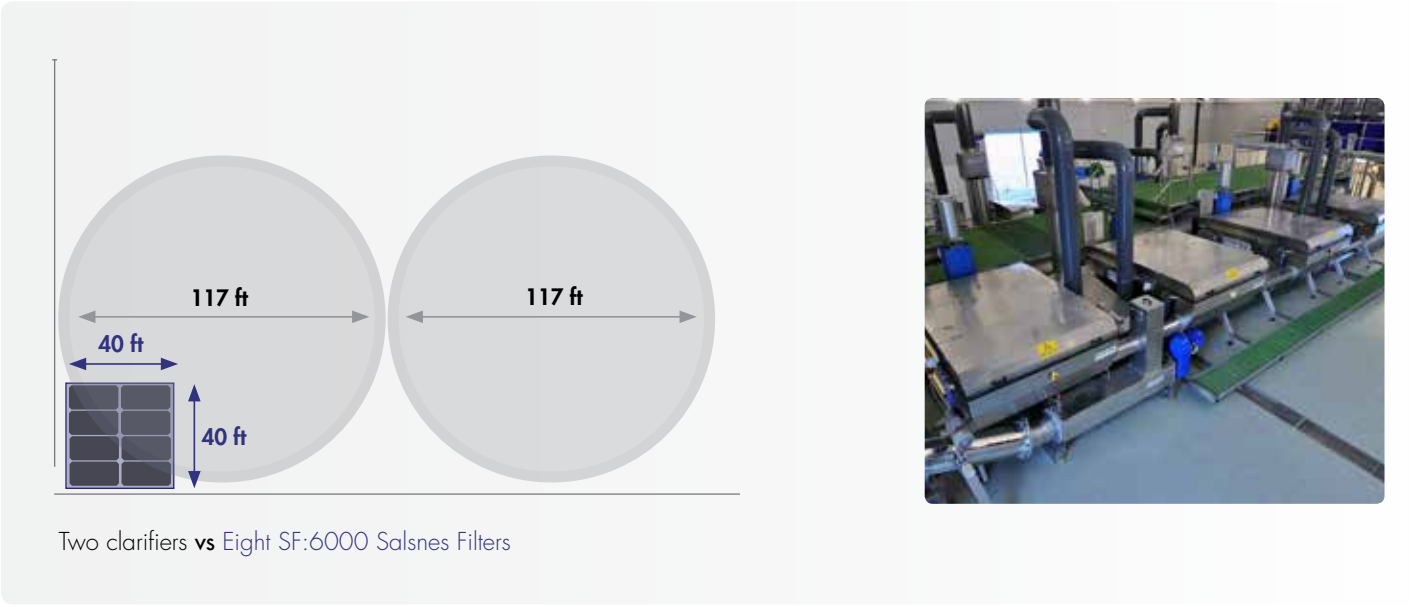


Figure 2. Land Requirements Comparison
Tromso WWTP, Norway - 10.5 MGD (1,650 m^3/h)

For those expanding primary or secondary capacity where land is expensive or unavailable, a Salsnes Filter system is ideal. It will typically use 1/10th the land of conventional treatment systems. The wastewater treatment plant in Tromso, Norway would have needed 21,530 ft^2 (2,000 m^2) of land to install clarifiers. Instead they installed a Salsnes Filter system and only used 1,600 ft^2 (150 m^2) of land.

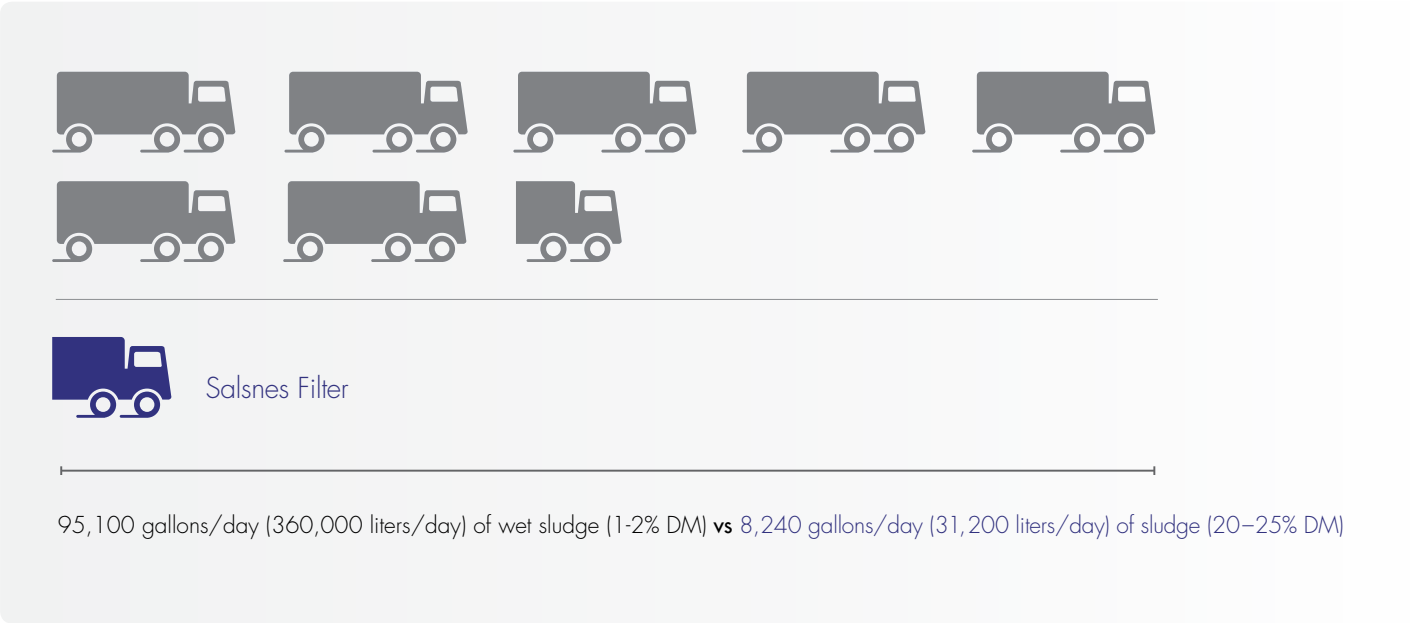


Figure 3. Sludge Volume Comparison
Enderby WWTP, BC, Canada - 0.5 MGD (83 m^3/h)

Prior to installing a Salsnes Filter system, the Enderby WWTP produced sludge with only 1–2% DM. After installation upstream of their oxidation ditch, the plant's total sludge volume was reduced by 87% - thanks to the integrated thickening and dewatering processes in the Salsnes Filter SF:4000.

There Are Even **Environmental** Benefits

- Less CO_2 produced during construction and operation. See **Figure 4**.
- No chemicals/polymers required
- Less concrete for installation due to small footprint

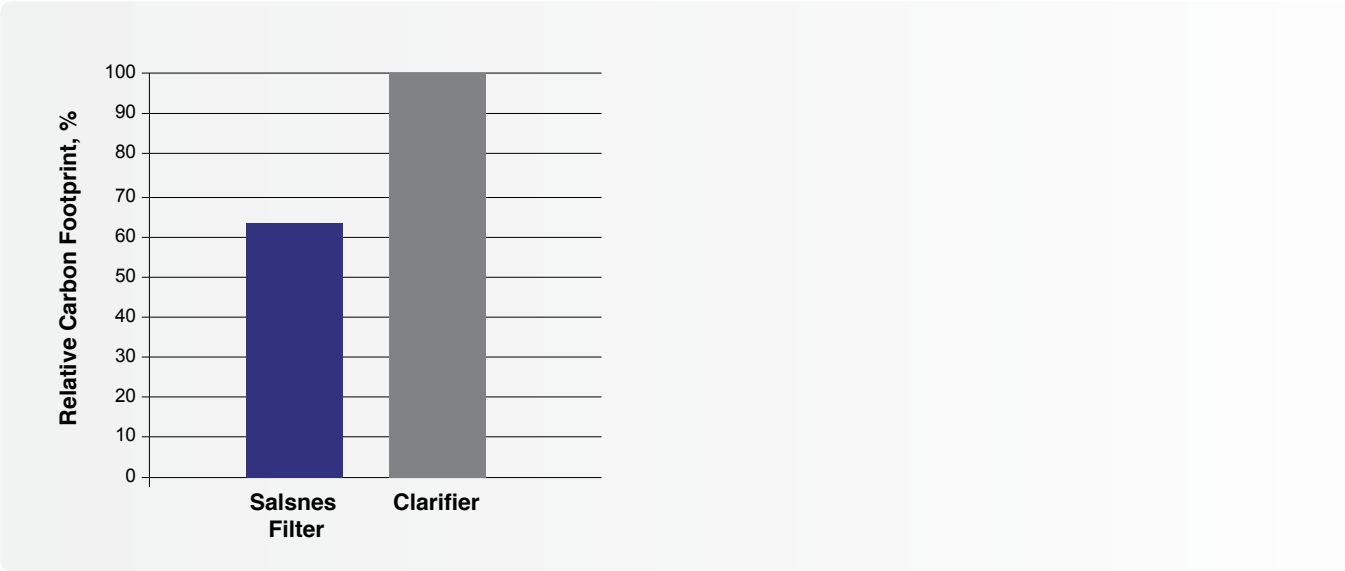


Figure 4. Carbon Footprint Analysis

This carbon footprint analysis compares the Salsnes Filter SF:6000 to a clarifier in a 2 MGD (315 m^3/h) municipal wastewater treatment plant. It reveals that over 20 years, the Salsnes Filter system has a substantially lower environmental impact.

Clarifier	Carbon Footprint (kg CO_2e)
Making rebar, scrapers and concrete for tanks	195,033
Scraper replacement	98,495
Energy requirement (for scrapers, pumps and dewatering)	428,560
Total (20 years)	**722,088**

Salsnes Filter	Carbon Footprint (kg CO_2e)
Making chamber, filtermesh and building surrounding infrastructure	4,418
Filtermesh replacements	2,920
Energy requirement (for filtermesh, Air Knife and screw press)	452,720
Total (20 years)	**460,058**

Our **Company**

Operating from Norway since 1991, we have focused on perfecting our solids separation filter technology through research, product development, testing, and quality initiatives. This focus and dedication has produced a highly efficient and reliable filter that maximizes solids separation, while dramatically decreasing costs including capital, operating, maintenance and land. With installations around the world and in a variety of municipal and industrial applications, the Salsnes Filter system is synonymous with eco-efficient solids separation technology.

Salsnes Filter is a brand in the Trojan Technologies group of companies.

About Trojan Technologies

The Trojan Technologies group of companies offers products under the brands Aquafine, OpenCEL, Trojan Marinex, TrojanUV, Salsnes Filter, US Peroxide and VIQUA. Applications and markets served include municipal wastewater, drinking water, environmental contaminant treatment, water treatment in residential and commercial/industrial, filtration and biosolids treatment. Trojan Technologies has offices in Australia, Canada, China, France, Germany, Italy, Mexico, Spain, United Arab Emirates, United Kingdom, and United States. For more information on our businesses, please visit www.trojanuv.com.

System **Specifications**

Model	SF:1000	SF:2000	SF:4000	SF:6000
Style	Enclosed, free-standing			
Material of Construction	316L Stainless Steel			
Weight	1,102 lbs (500 kg)	2,006 lbs (910 kg)	2,425 lbs (1100 kg)	2,954 lbs (1340 kg)
Performance				
Maximum Hydraulic Flow	0.34 MGD (54 m^3/hr)	0.92 MGD (144 m^3/hr)	1.82 MGD (288 m^3/hr)	3.65 MGD (576 m^3/hr)
Maximum Head Loss	–	12" (300 mm)	13" (330 mm)	14" (350 mm)
TSS Removal Efficiency	40 - 80% (design dependant)			
BOD Removal Efficiency	20 - 35% (design dependant)			
Sludge Dry Matter After Thickening	3 – 8%			
Sludge Dry Matter After Integrated Dewatering Unit	20 – 30%			
Sludge Dry Matter After Stand-alone Dewatering Unit	20 – 40%			
Dimensions				
Length x Width x Height (complete unit)	5 x 4.5 x 4.7' (1.5 x 1.3 x 1.4 m)	7 x 5.4 x 4.5' (2.1 x 1.6 x 1.4 m)	8 x 6.5 x 5' (2.5 x 2.0 x 1.5 m)	9.1 x 8.1 x 6' (2.8 x 2.5 x 1.8 m)
Inlet Diameter (pumped/gravity)	4 " (100 mm)	6" / 8" (150/200 mm)	8" / 14" (200/350 mm)	10" / 16" (250/400 mm)
Outlet Diameter	6" (150 mm)	10" (250 mm)	14" (350 mm)	16" (400 mm)
Overflow Diameter	Combined with outlet	10" (250 mm)	14" (350 mm)	16" (400 mm)
Water Connection	½" NPT or 13 mm BSP			
Utilities				
Operating Power Consumption (Typical)	2.1 KW	3.6 KW	4.6 KW	5.5 KW

Model	SFK:200	SFK:400	SFK:600
Style	Concrete open channel (by others)		
Material of Frame	316L Stainless Steel		
Weight	661 lbs (300 kg)	816 lbs (370 kg)	1,543 lbs (700 kg)
Performance			
Maximum Hydraulic Flow	0.92 MGD (144 m^3/hr)	1.82 MGD (288 m^3/hr)	3.65 MGD (576 m^3/hr)
TSS Removal Efficiency	40 - 80% (design dependant)		
BOD Removal Efficiency	20 - 35% (design dependant)		
Sludge Dry Matter after Thickening	3 – 8%		
Sludge Dry Matter After Integrated Dewatering Unit	20 – 30%		
Sludge Dry Matter After Stand-alone Dewatering Unit	20 – 40%		
Dimensions			
Length x Width x Height (frame)	6.6 x 3.3 x 5' (2 x 1 x 1.5 m)	8 x 3.3 x 4.2' (2.4 x 1 x 1.3 m)	8 x 5.9 x 5.9' (2.4 x 1.8 x 1.8 m)
Inlet/outlet	Channel mounted. Default 3.3' (1 m) channel width. Adaptations possible on request.	Channel mounted. Default 4.3' (1.3 m) channel width. Adaptations possible on request.	Channel mounted. Default 6' (1.8 m) channel width. Adaptations possible on request.
Overflow	Arranged in channel wall		
Water Connection	½" NPT or 13 mm BSP	½" NPT or 13 mm BSP	¾" NPT or 19 mm BSP
Utilities			
Operating Power Consumption (Typical)	3.6 KW	4.6 KW	5.5 KW

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