Continuous Sand Filters

Tertiary WWT and other applications

References from Saudi Arabia- Sewage Treatment Plants

Customer:	**Flow:**
•Abqaiq STP	960 m^3/h
•Dhahran WWTP	1056 m^3/h
•Hofuf STP Ph1	3000 m^3/h
•Dammam STP	6800 m^3/h
•Hofuf STP Ph2	1700 m^3/h
•Al Khobar STP	6800 m^3/h
•Qatif STP	6300 m^3/h

SAWEA-Workshop
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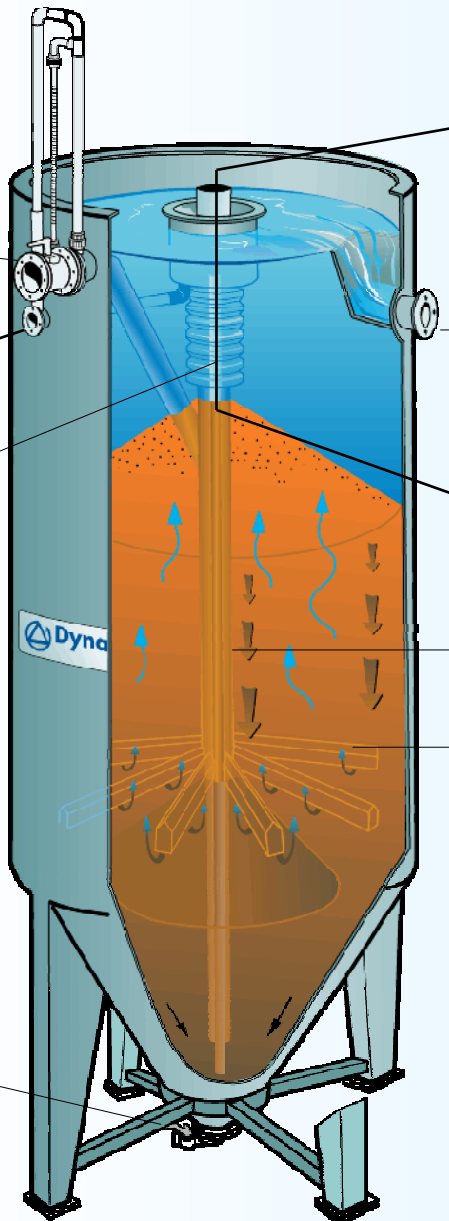
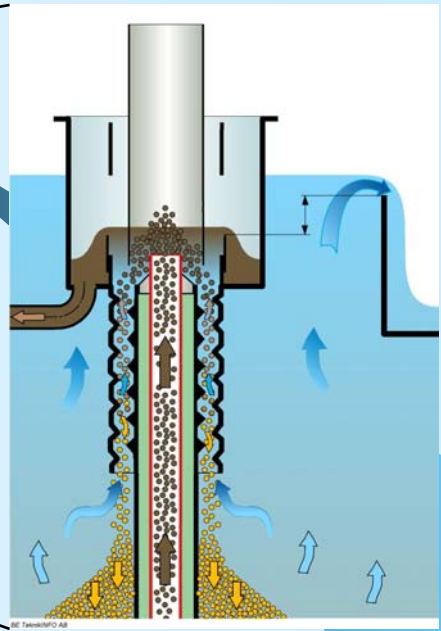
Mattias Feldthusen

Introduction:

- What does ”Continuous Sand filtration” mean?
- Doesn´t the filter need to be backwashed?
- How could good filtration results be achieved for applications like Tertiary Filtration with Continuous Sand Filtration?

Continuous filtration with DynaSand



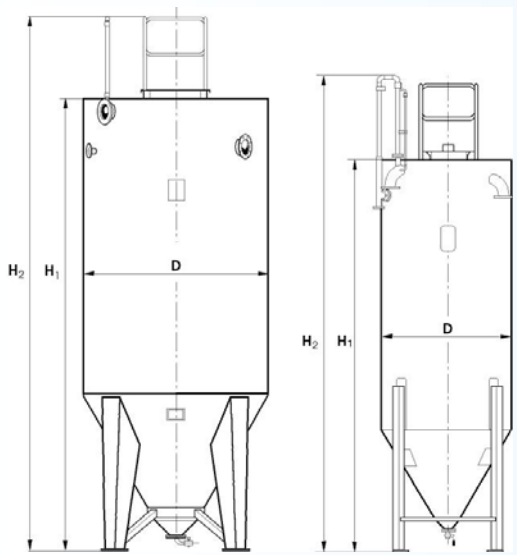


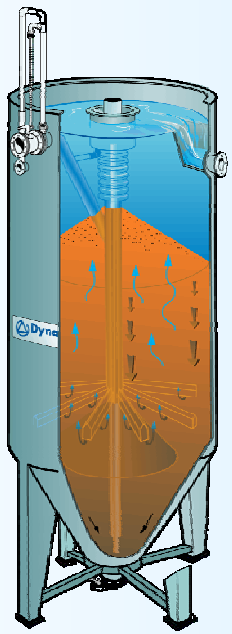
- Water upward, sand downward according to the counter-current principle.
- Continuous flow of reject washwater.

Continuous filtration with DynaSand

Free standing units in Stainless Steel

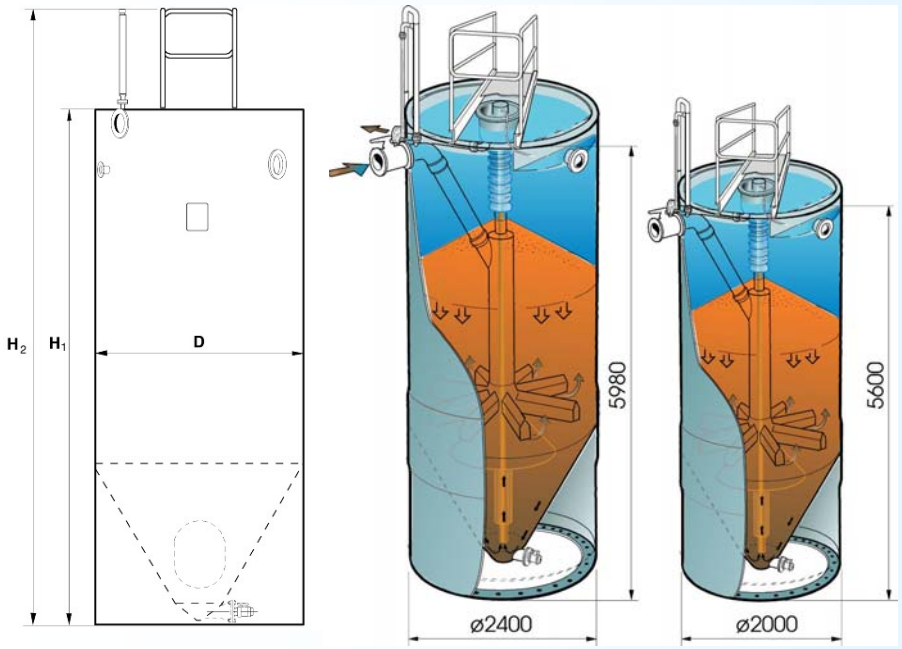
- Sizes from 0,3 – 5,0 m^2
- Water flow from 1,5m^3/hour and upwards
- Surface load rates 5 – 25 m/hour





Continuous filtration with DynaSand

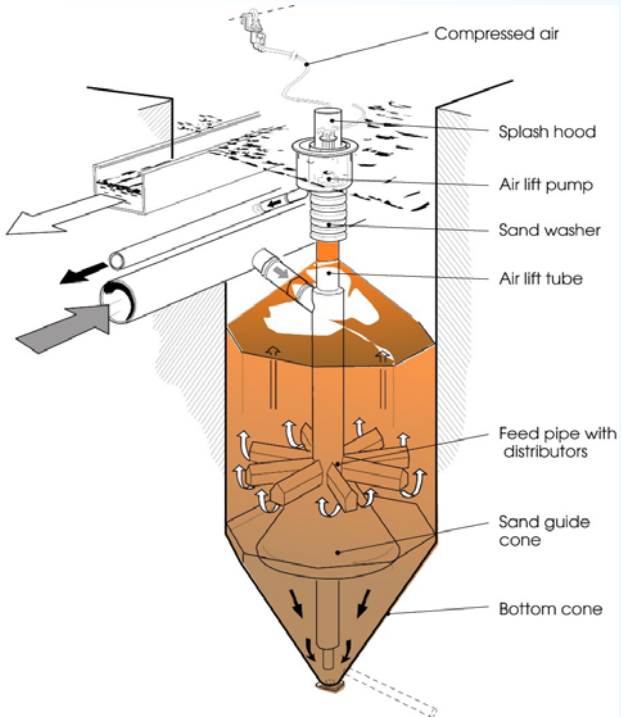
Free standing units in Glasfibre Reinforced Plastic (GRP)



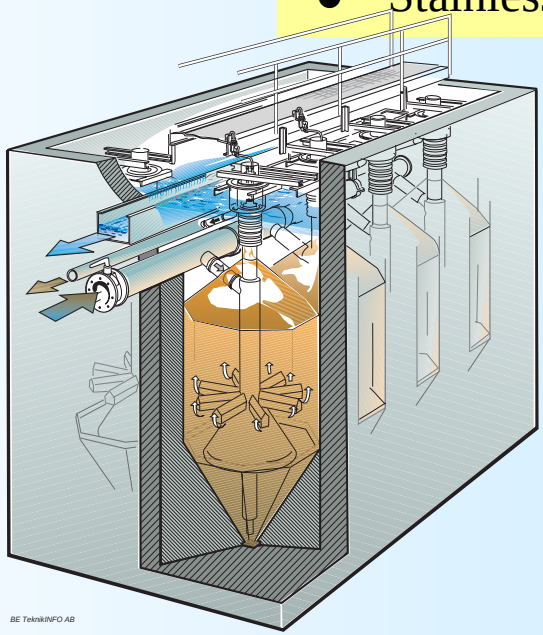
- Sizes from 0,7 – 4,5 m^2
- Water flow from 3,5m^3/hour and upwards
- Suface load rates 5 – 25 m/hour
- For high salinity and corrosive waters

Continuous filtration with DynaSand

Multimodule installations in concrete basins

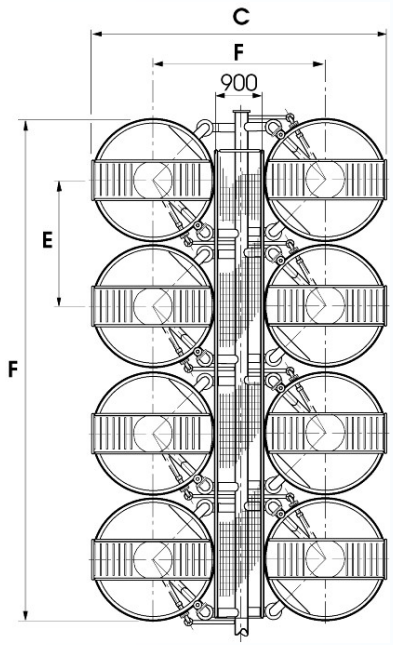


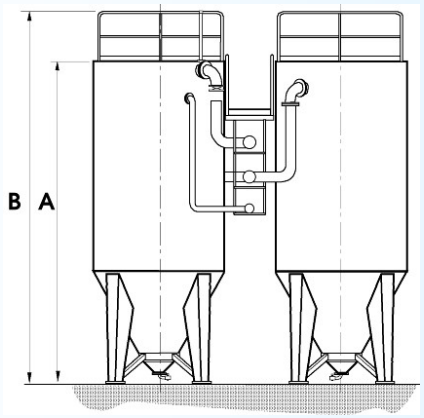
- Sizes: 5 and 6 m^2 /each unit
- 4 to 12 units in each basin
- Water flow from 25 m^3/hour and upwards
- Surface load 5 – 25 m/h
- Stainless steel or GRP



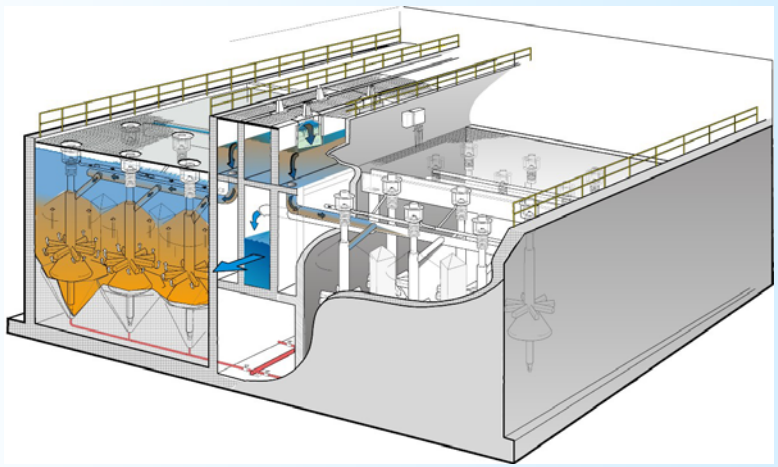
Continuous filtration with DynaSand

Systems





To treat as high flows as needed.

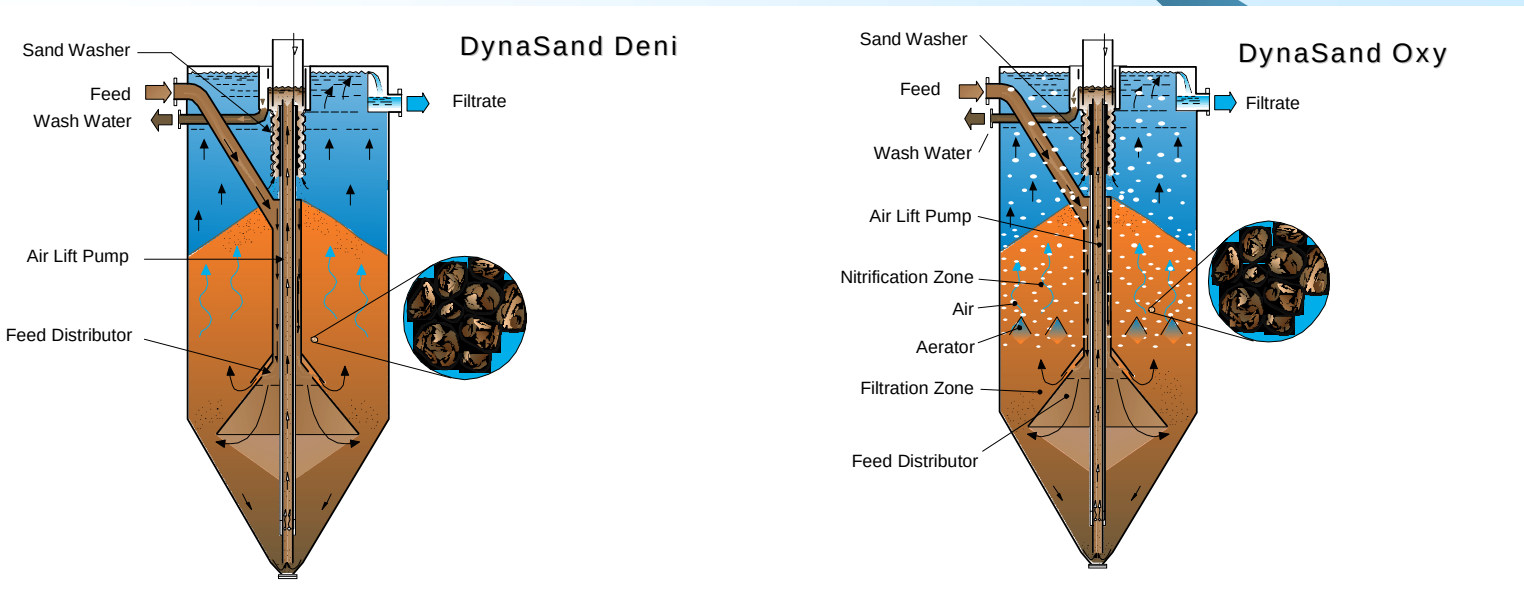


Continuous Sand filter advantages

- A revolutionary separation method in form of ”Continuous Contact Filtration”.
- Simple function without any moving parts. Only air is added to the air-lift pump.
- The DynaSand Filter has a very high reliability and a very low demand of maintenance and supervision.
- A compact installation
- No interruption for back-washing.
- Higher capacity per unit of filter area.
- Continuous flow of washwater. No shock-load on the wash water treatment system.
- No ”first filtrate”. Always high quality filter effluent.

Continuous filtration with DynaSand

Nitrification-/Denitrification



Continuous Sand filter history

The first pilot trial on Tertiary filtration of municipal waste water was carried out in August 1978.

DynaSand-the first Continuous filter

- Developed by The Axel Johnson Institute now Nordic Water Products AB in Nynäshamn, Sweden.
- The DynaSand Filter was introduced in 1979.
- The inventor is still with the company.
- The first filter was installed for metal finishing wastewater in 1979.
- The first municipal wastewater treatment plant with DynaSand also was erected in 1979.

DynaSand-the first Continuous Sand Filter

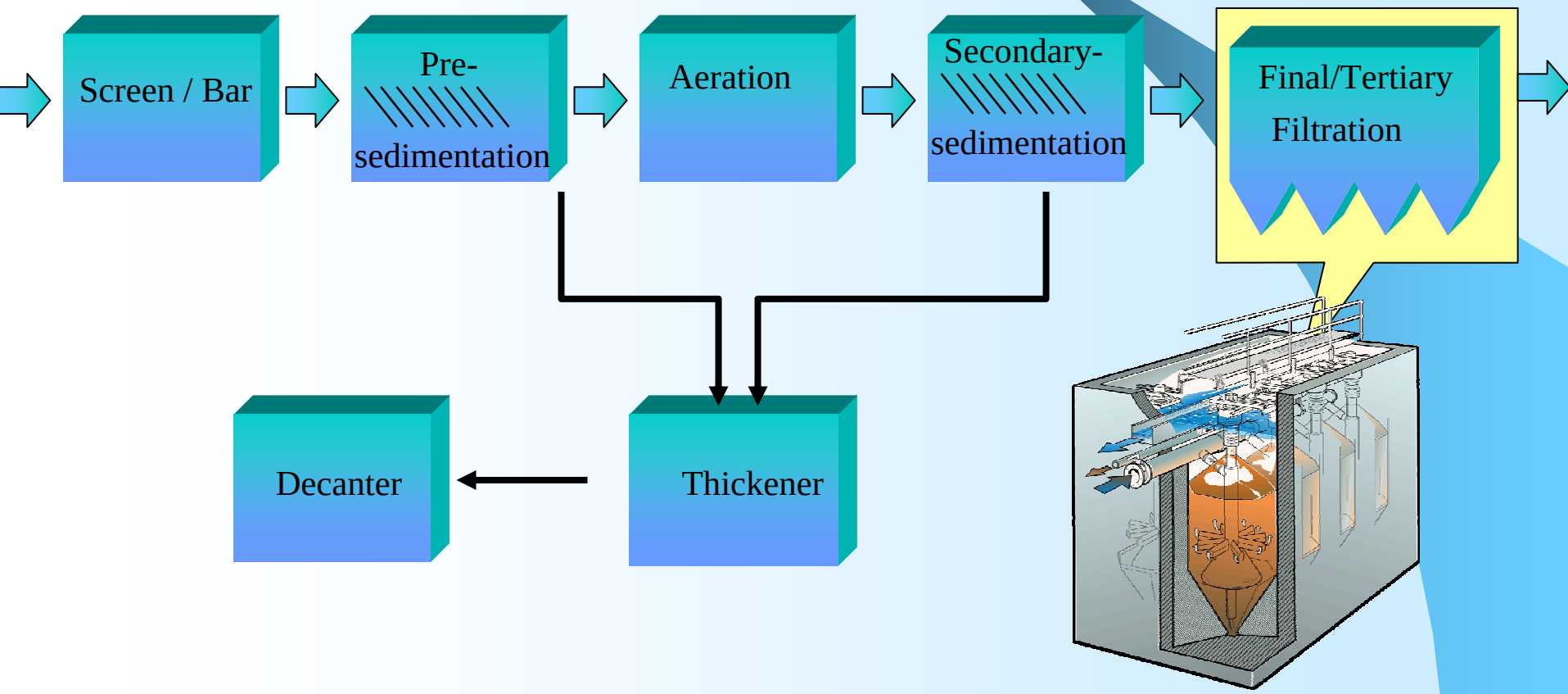
- Today there are over more then 18 000 installed filters worldwide, among them around 1000 in Sweden.
- DynaSand are installed in more then 50 contries.
- The worlds biggest Continuous Sand Filter installation is to be built in Saudi-Arabia.

Continuous Sand filter Applications

- Municipal drinking water
- Municipal wastewater
- Pulp and paper industry
- Iron & Steel industry
- Chemical industry
- Food industry
- Pharmaceutical industry
- Mining- and minerals industry
- Power and thermal power stations
- Metal finishing industry
- And several others….

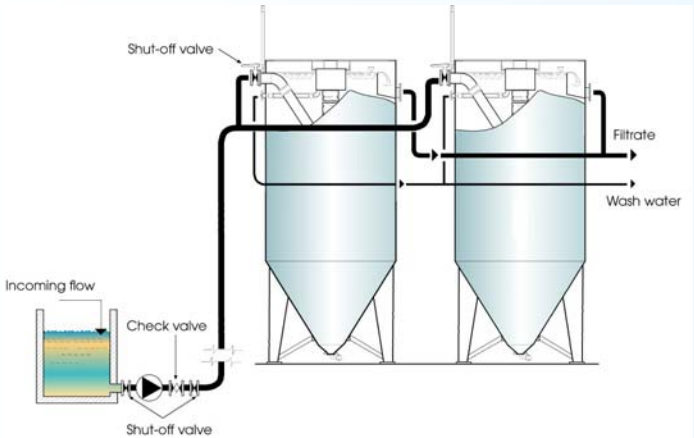
Tertiary Filtration

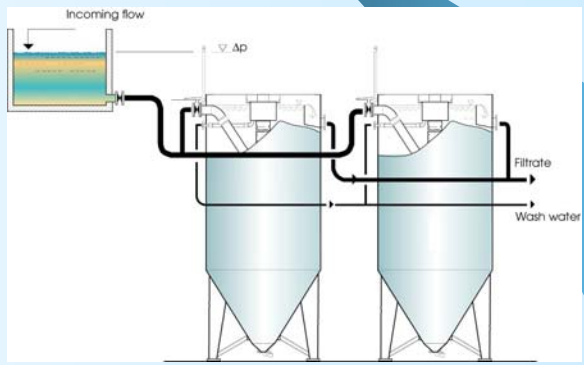
Mechanical filtration



Tertiary Filtration

Mechanical filtration





Tertiary Filtration

Mechanical filtration

Reduction by mechanical filtration:

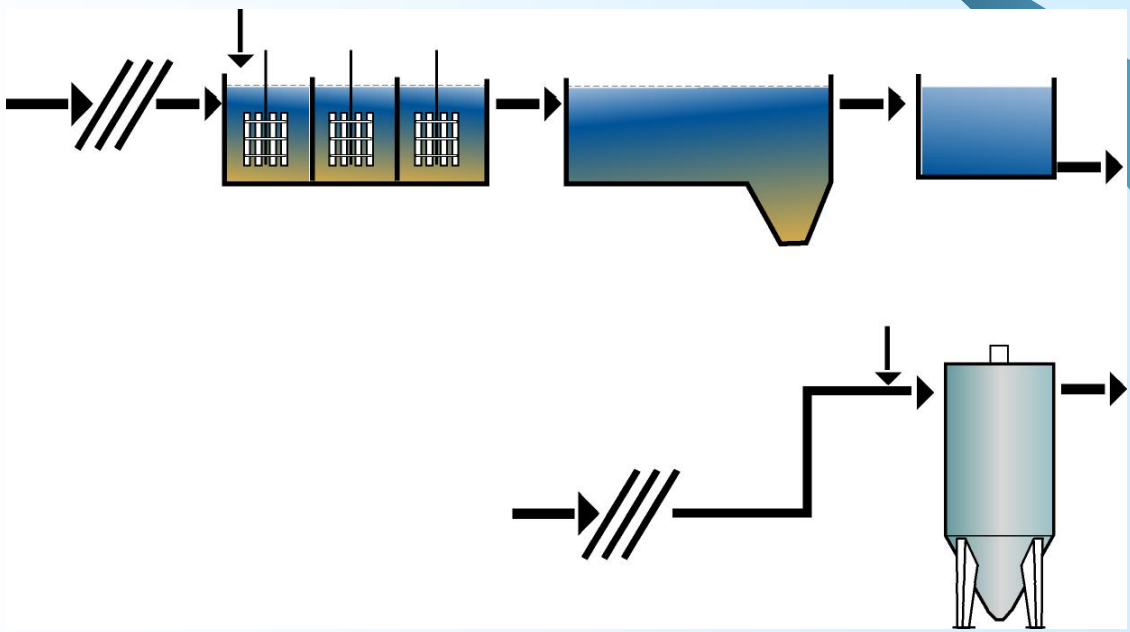
- Suspended Solids (SS): <10 mg/l (Max 100mg/l SS-inlet)
- Phosphorus: Particular bound Phosphorus

Surface load rate : 10-15 m/hour
Sand grain size: 1,2-2,0 mm
Filter bed height: ~ 1,5 m

Shock loading up to 400 mg/l SS can be handled.

Tertiary Filtration

Continuous Contact Filtration



Tertiary Filtration

Contact filtration

Reduction by Continuous Contact Filtration:

- Suspended Solids: < 5 mg/l (Max 60mg/l SS-inlet)
- Phosphorus: < 0,3 mg/l

Surface load rate : 5-10 m/hour
Sand grain Size: 1,2-2,0 mm
Filter bed height: ~ 2 m

Often much lower dosage of chemicals than conventional precipitation.

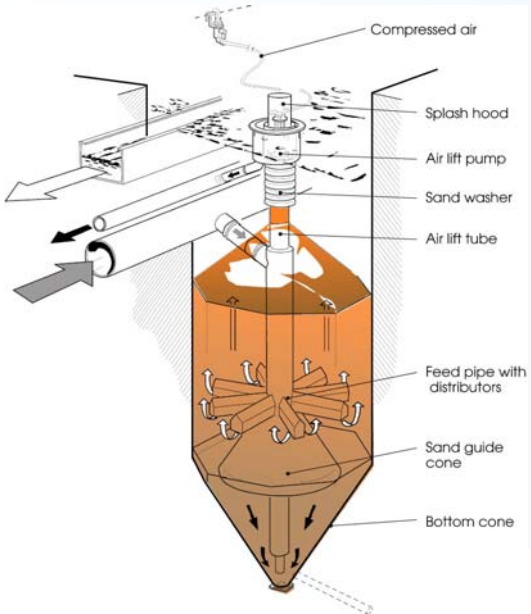
Long term operational experiences from Continuous Sand Filtration plant:

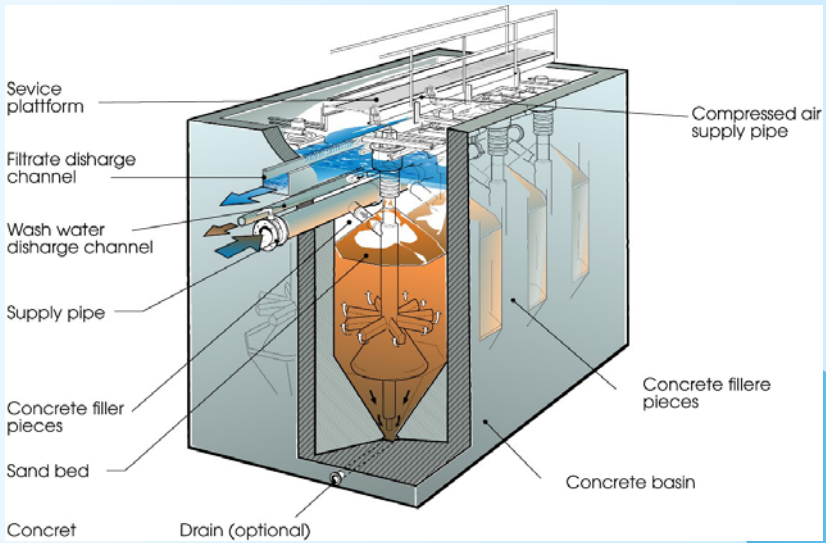
•Växjö, Sundet Municipal waste water treatment plant, Sweden

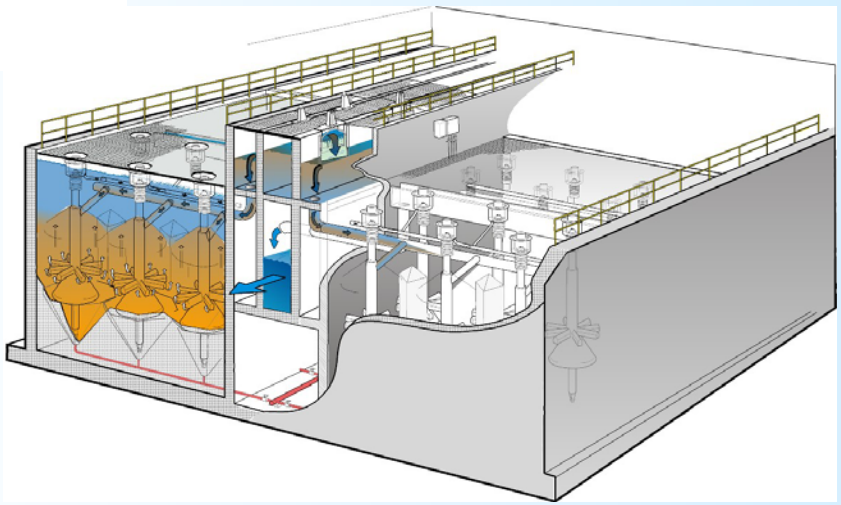
Växjö, Sundet WWTP, Sweden
Final/Tertiary filtration

- Dimensioned for 80 000 pe and 20 000 pe of them from Industry.
- Design flow 1 500 m^3/h.
- Maximum flow 3 000 m3/h
- Filtration area 300 m^2.
- 60 pcs DynaSand DST 50D Concrete version, 6 basins and 10 filters in each basin.

Växjö, Sundet WWTP, Sweden
Final-/Tertiary- filtration







Växjö, Sundet WWTP, Sweden
Final/Tertiary filtration

Primary settling ⇨ Biology ⇨ Secondary settling ⇨ **Filters**

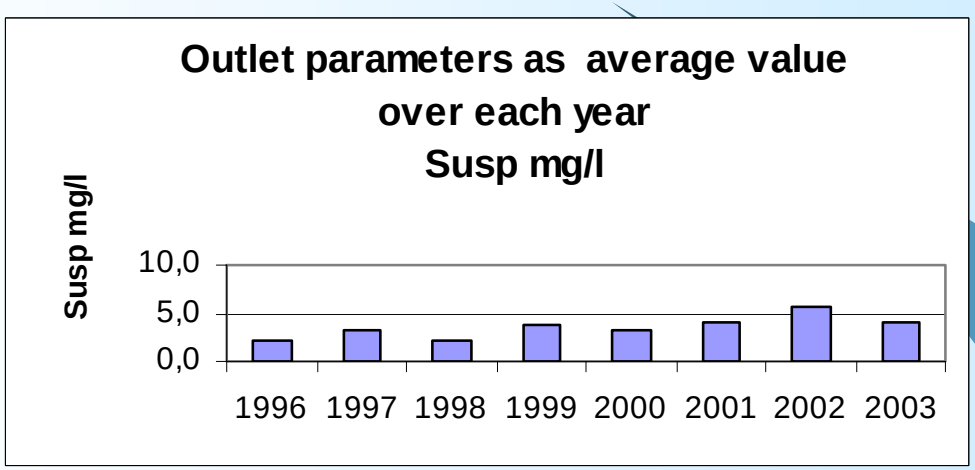
Outlet requirements / limit values:

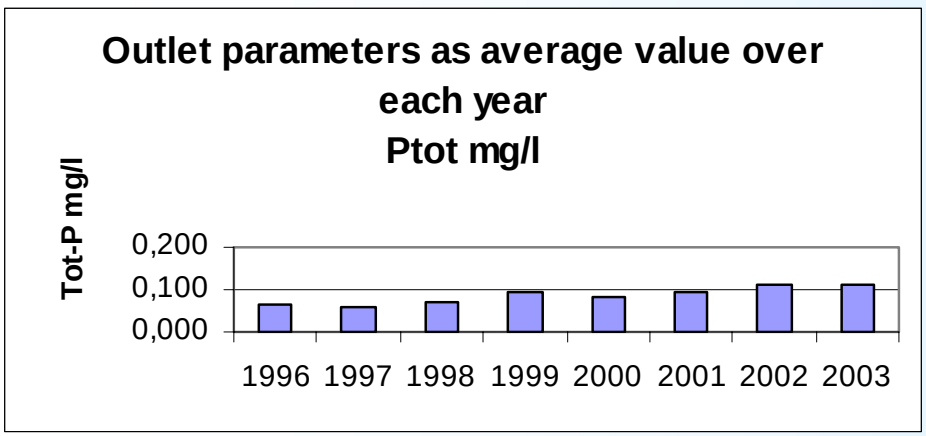
• BOD_7	10	mg/l
• P_{tot}	0,2	mg/l

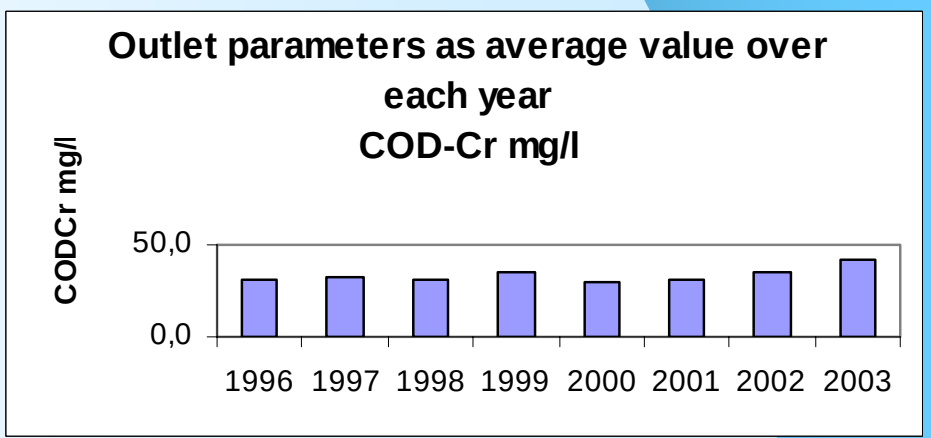
Process guarantees:

• Susp.	<8	mg/l

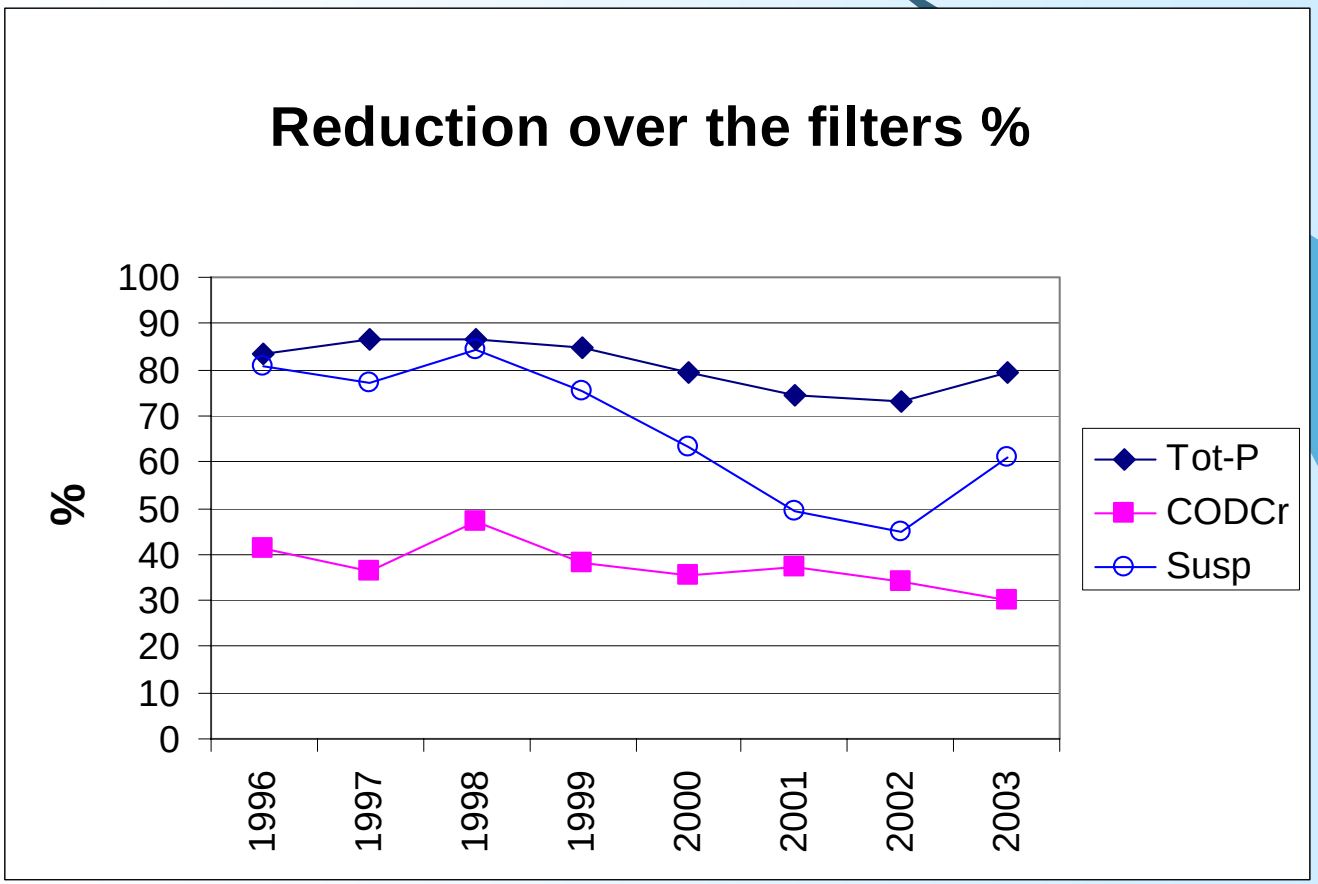
Växjö, Sundet WWTP, Sweden
Final/Tertiary filtration







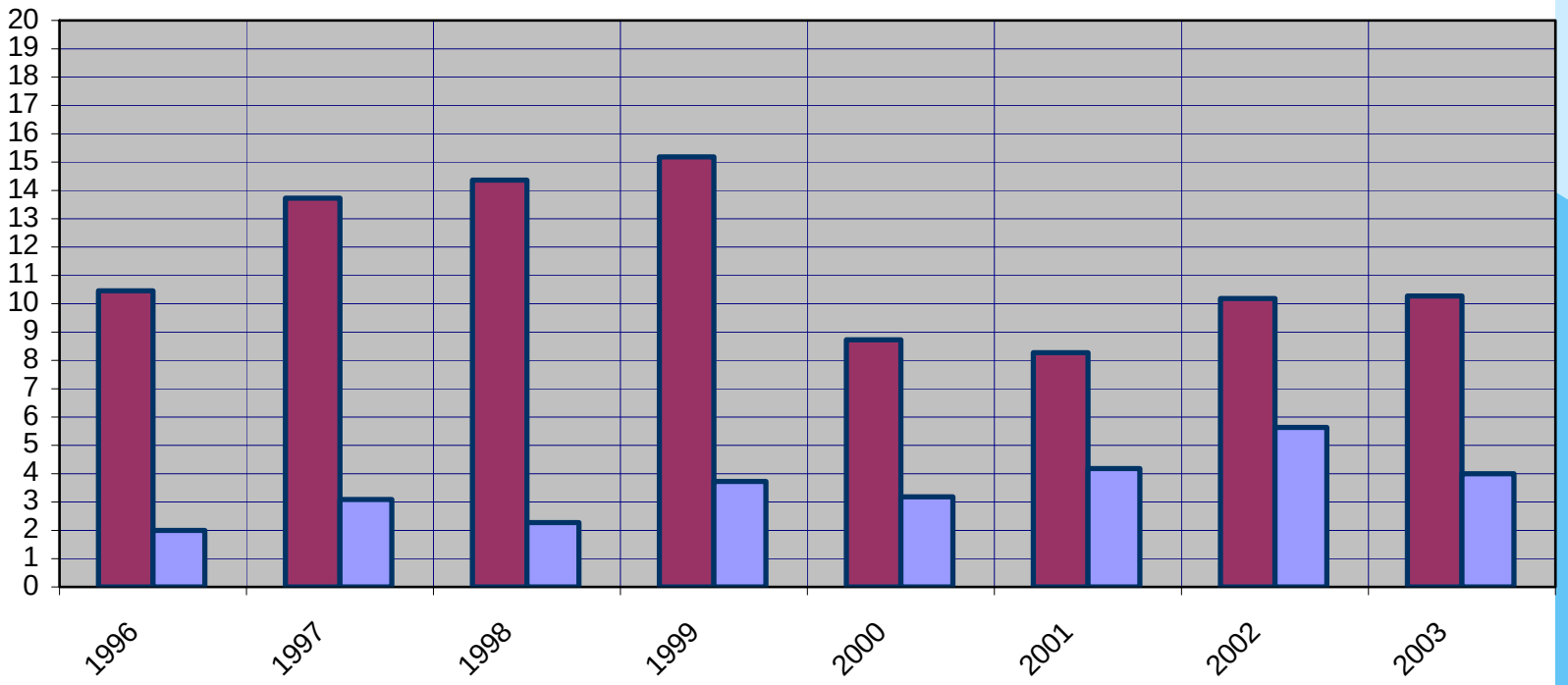
Växjö, Sundet WWTP, Sweden
Final/Tertiary filtration



Växjö, Sundet WWTP, Sweden
Final/Tertiary filtration

SUSPENDED SOLIDS mg/l

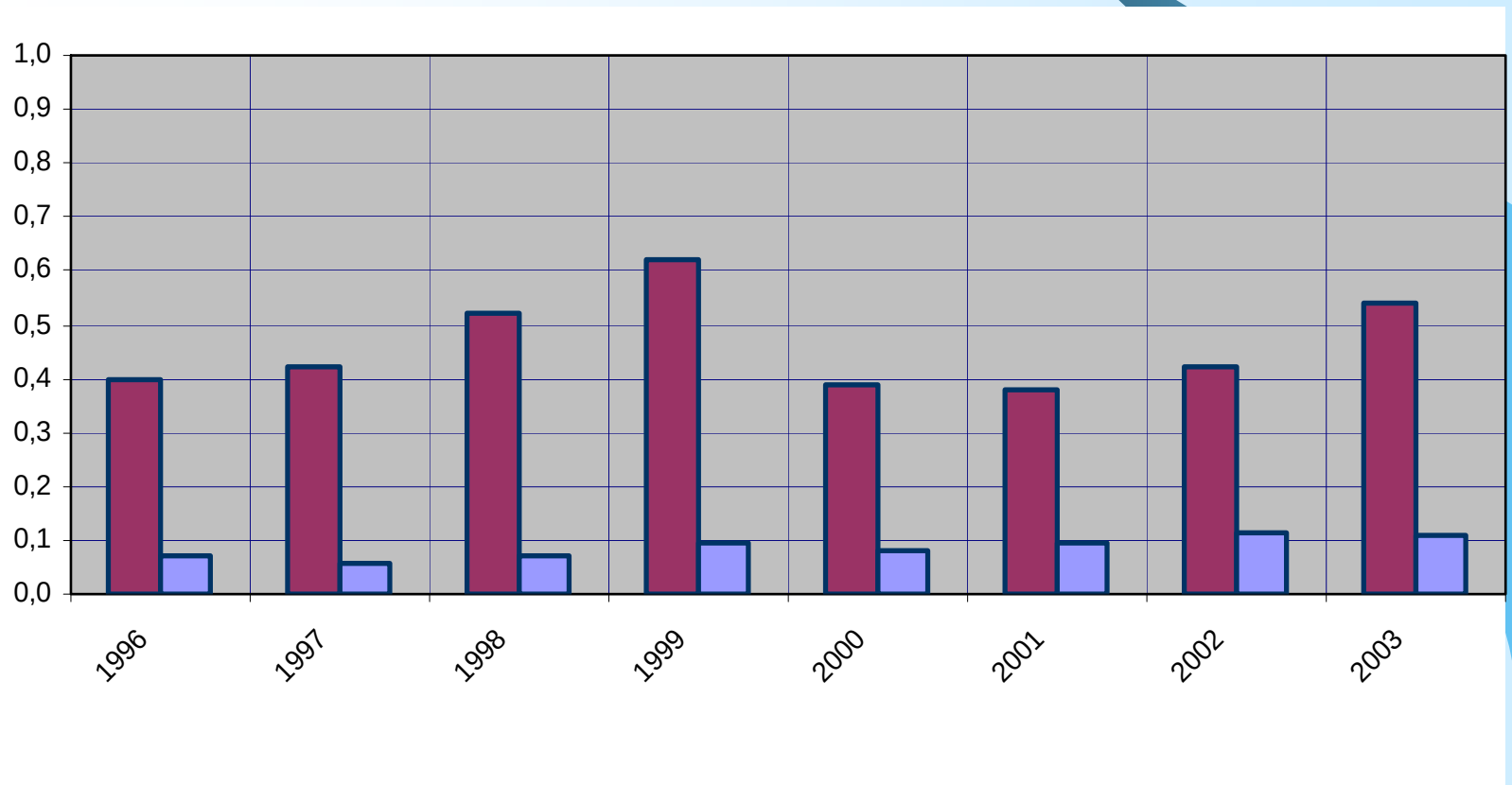
Inlet to DynaSand filters / Outlet from the DynaSand filters over the year 1996 - 2003



Växjö, Sundet WWTP, Sweden
Final-/Tertiary filtration

P_{tot} mg/l

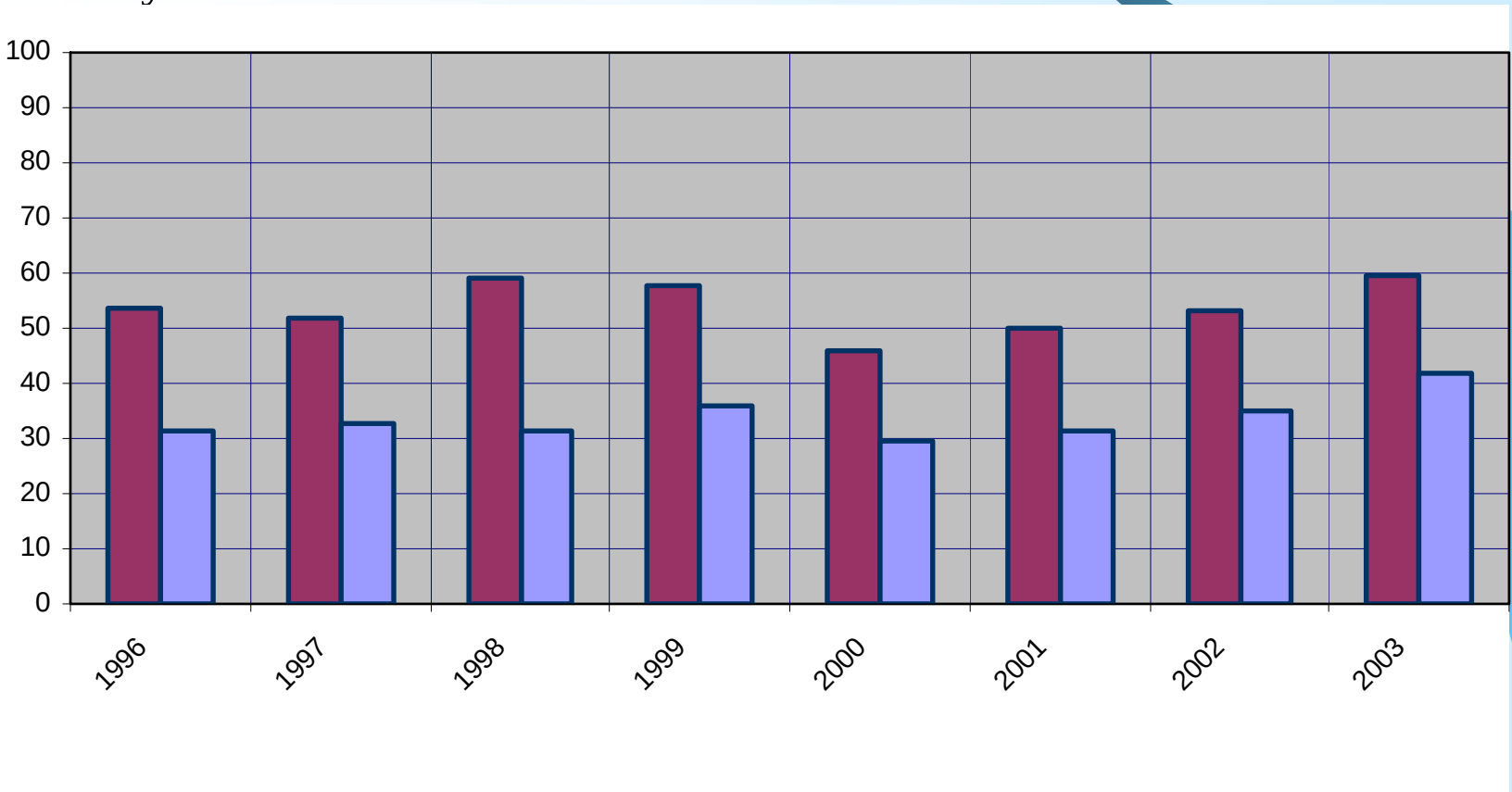
Inlet to DynaSand filters / Outlet from the DynaSand filters over the year 1996 - 2003



Växjö, Sundet WWTP, Sweden
Final/Tertiary filtration

COD_{Cr} mg/l

Inlet to DynaSand filters / Outlet from the DynaSand filters over the year 1996 - 2003



What is happening today?

- **Saudi Arabia**

  -The worlds largest continuous filtration plant, -DynaSand, are under construction installed in filtration of municipal waste water for irrigation use.

  - Three installations in total each with 216 filter units installed in concrete version.

  - Our representative in Saudi Arabia are Metito –Arab Industries Ltd

- **Biological filter**

  -Nitrification/denitrification and BOD-reduction in Germany, Great Britain and Norway

Thank you for your attention!

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