

oaseo

# zs Reijerwaard

Drinking-water in Ridderkerk.

Ridderkerk  
9/19/2007

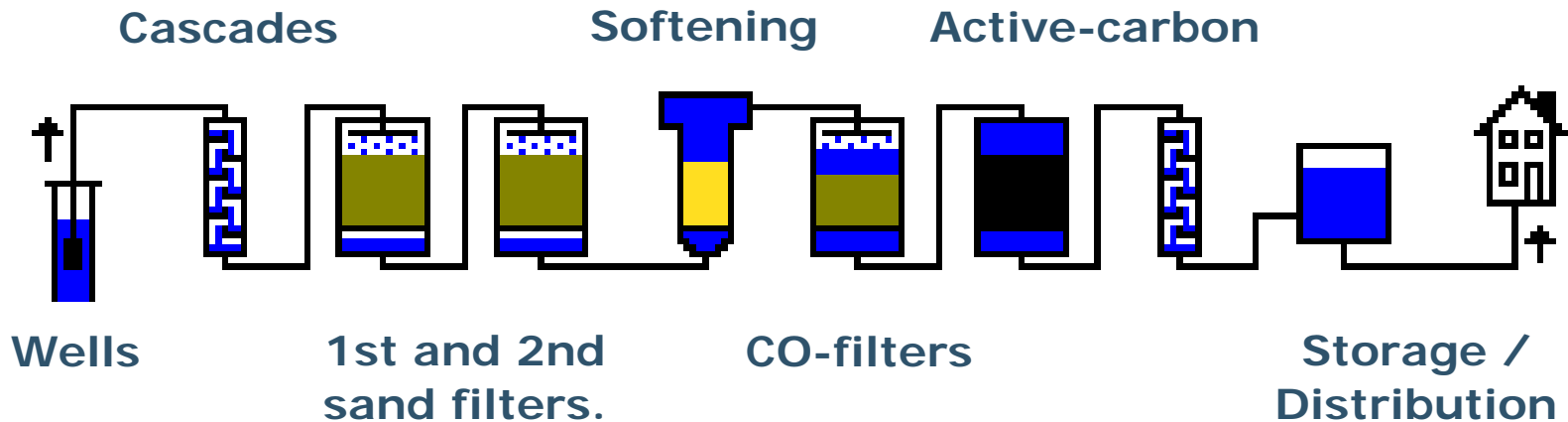


# History

- 1906** - The start of the water company.
- 1920** - Expansion of the purification capacity.
- 1939** - Modernization of the water tower.
- 1961** - Build of the current purification station.
- 1973** - Expansion of the storage capacity.
- 1992** - Active-carbon filters, extra sand filters.
- 1995** - Extra sand filters.
- 1996** - Water softening installation.
- 2004** - Membrane installation.



# Process overview.



# Wells

Water is taken from three sand layers in the ground.

Layer 1: 10 – 20 m

Layer 2: 50 – 70 m

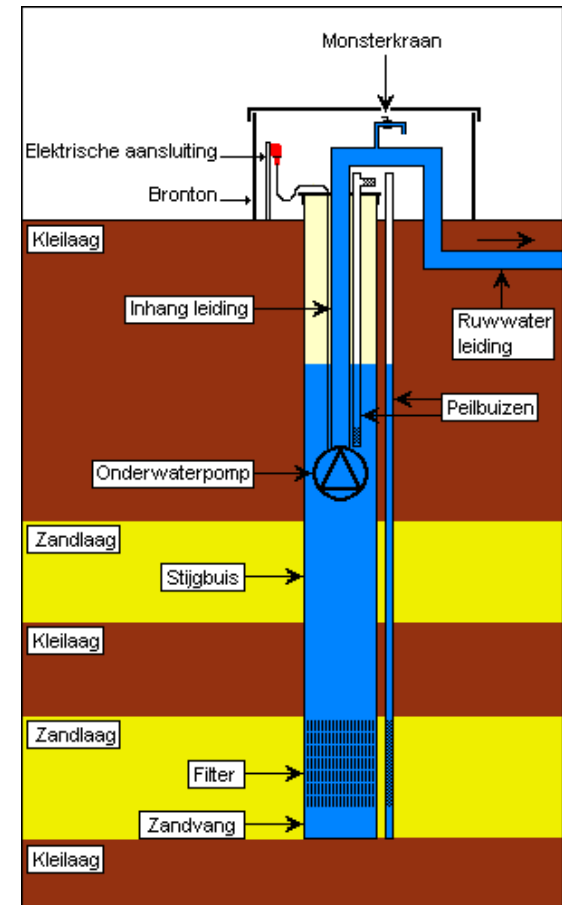
Layer 3: 90 – 110 m

Number: 31

Capacity wells: 25 m<sup>3</sup>/h

Capacity max.: 750 m<sup>3</sup>/h

Capacity avg.: 330 m<sup>3</sup>/h

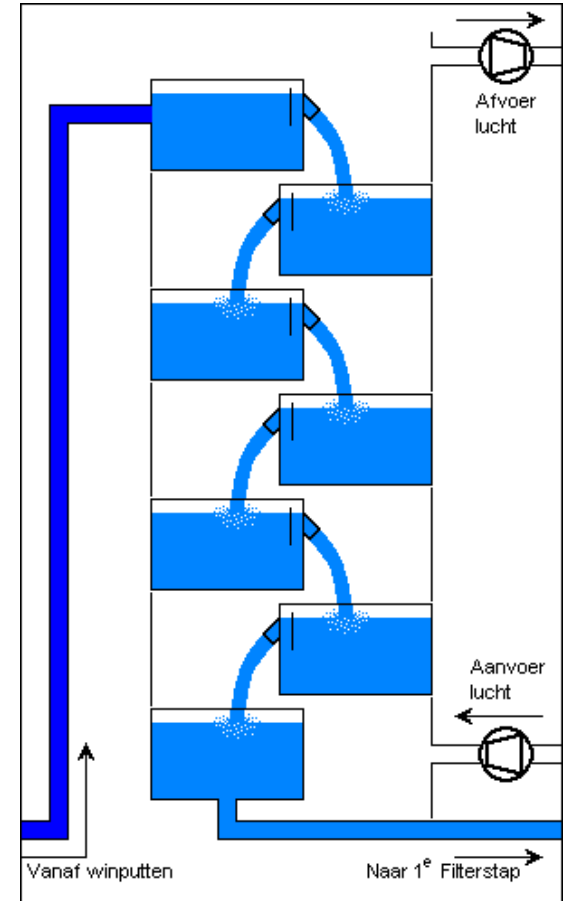


# Cascades

De cascade is made up out 7 stainless steel containers with overflow edges.

The well water doesn't contain any oxygen. But it does contain methane,  $H_2S$  and  $CO_2$ . The cascade removes methane,  $H_2S$  and  $CO_2$  and replaces it with oxygen. With ventilators fresh air is supplied and the unwanted gasses are removed.

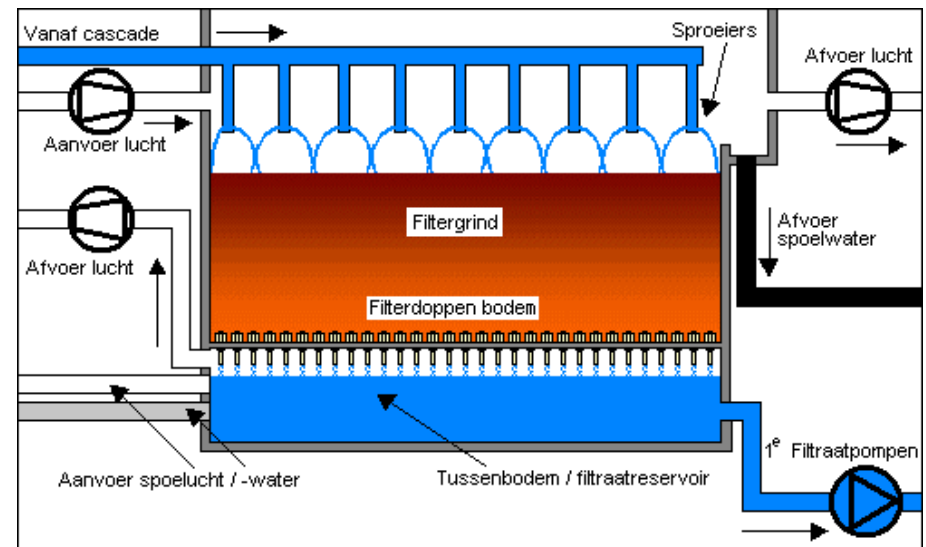
Number: 2  
Overflow edge length: 4,5 m.  
Drop height: (6x) 0,5 m.



# 1<sup>st</sup> Filtration step

De 1<sup>st</sup> filtration step is a concrete container filled with sand. In the cascade the water is supplied with oxygen. This will cause iron to oxidize. The oxidized iron particles will be collected in the sand filter. Ammonia is removed with the help of bacteria. Also manganese is collected by the sand filter. With ventilators fresh air is supplied and the unwanted gasses are removed.

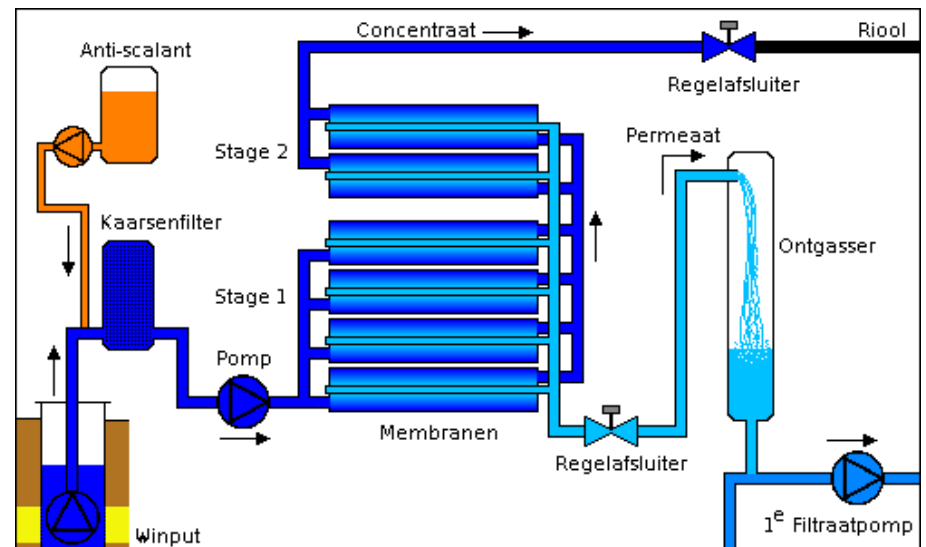
Number: 7  
 Filter square: 26 m<sup>2</sup>  
 Filter height: 2,2 m  
 Filter material: Sand / Anthracite



# Membrane installation

The membrane installation (reverse osmosis) is used to remove the chloride from the water. This water is merged with the main filtration between the 1<sup>st</sup> and 2<sup>nd</sup> filtration step. By removing all the chloride from a small part of the well water the chloride level in the total water stream is kept below the allowed level.

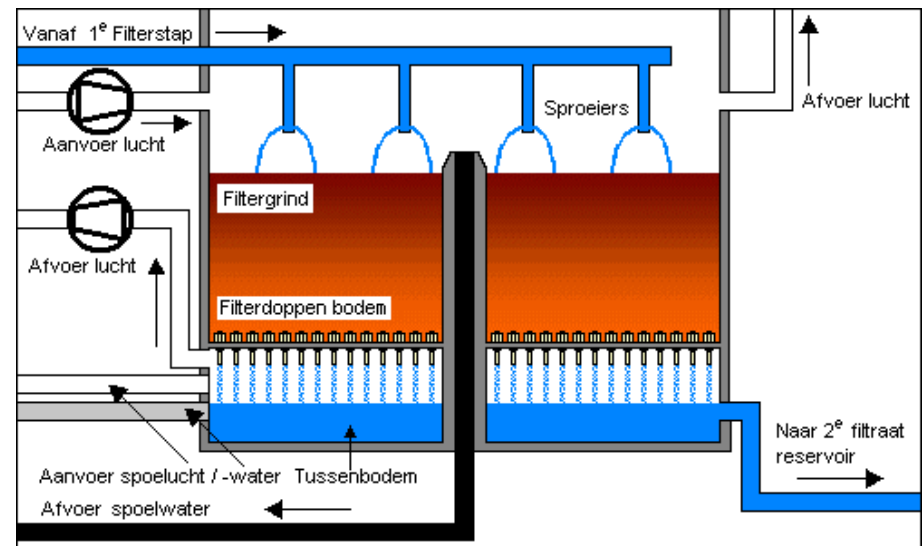
Number: 1  
Capacity: 25 m<sup>3</sup>/h (net)  
Output: 75%



## 2<sup>nd</sup> Filtration step

De 2<sup>nd</sup> filtration step is a concrete container filled with sand. What the 1<sup>st</sup> filtration step didn't remove is removed in the 2<sup>nd</sup> filtration step. The main thing it removes is ammonia. With ventilators fresh air is supplied and the unwanted gasses are removed.

Number:	9
Filter square:	18 m <sup>2</sup>
Filter height:	2 m
Filter material:	Sand

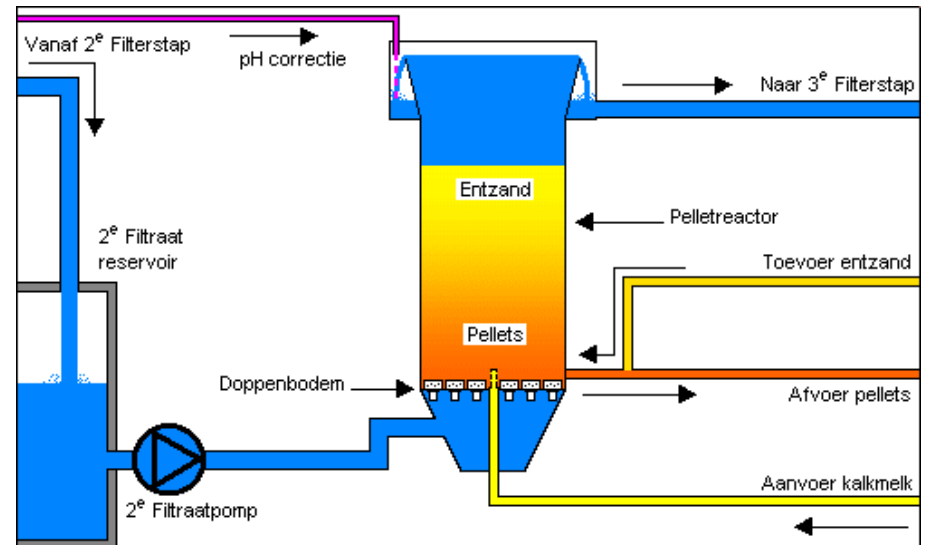




# Softening reactors

The softening reactor is a large steel vessel with a cone shape at the bottom and the top. At the bottom lime is added to the water. A chemical reaction will force the added lime and the calcium from the water on to the sand. The sand will grow into a pellet. When the pellets are a certain diameter they are removed and replaced with new sand.

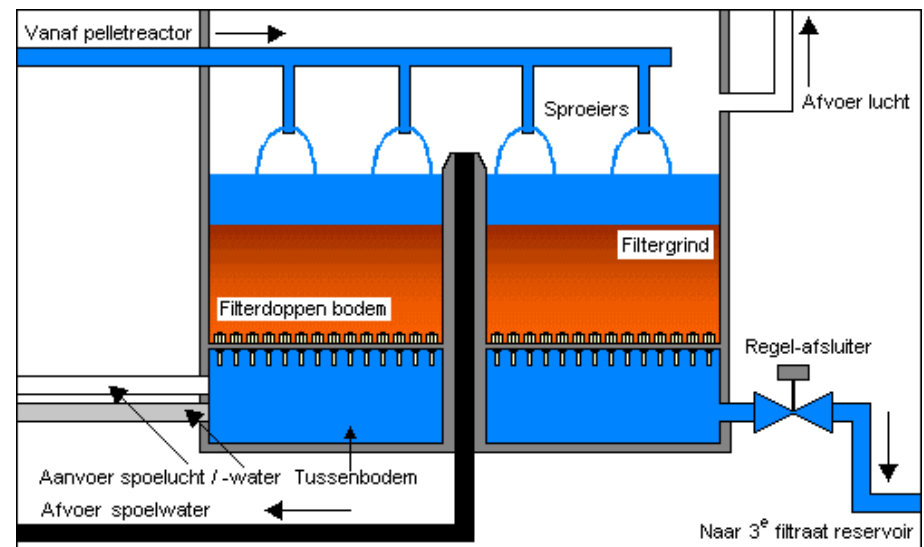
Number:	2 + 1
Height:	11 m
Diameter:	1,75 m
Sand/pellet level:	± 8 m
Sand:	0,5 mm
Pellet:	1 mm



## 3<sup>rd</sup> Filtration step

De 3<sup>rd</sup> filtration step is a concrete container filled with sand. The water level is kept at a certain height. (submerged filter) This filter “captures” calcium particles that could not stick to the sand or pellets in the softening reactor. The calcium particles that are collected are removed with backwashing the filter.

Number:	6
Filter square:	18 m <sup>2</sup>
Filter height:	1,6 m
Filter material:	Sand

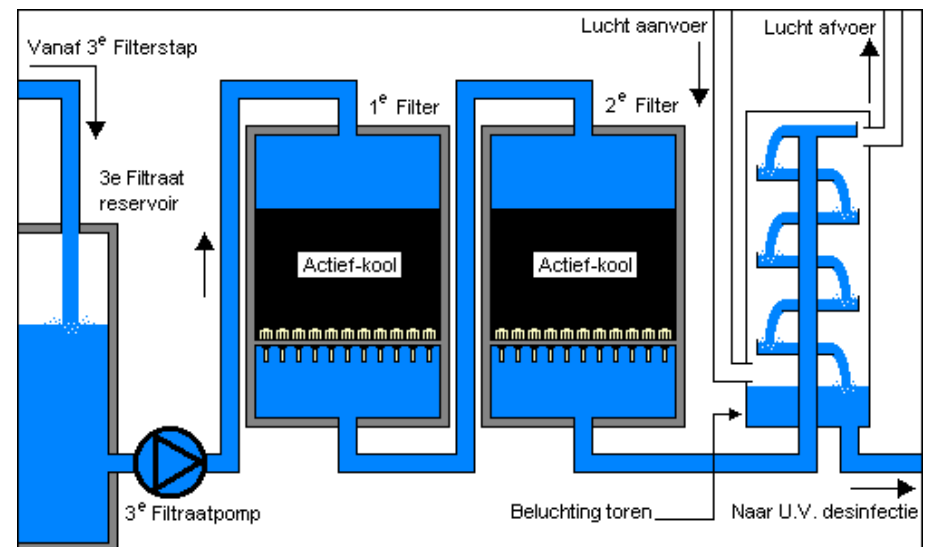


## 4<sup>th</sup> Filtration step

De 4<sup>th</sup> filtration step is a concrete container filled with active-carbon. The active-carbon adsorbs all kinds of chemicals like pesticides. Also the smell, color and taste of the water is improved.

The filters can be used in a 2 x 2 pseudo moving bed or as a 4 x 1 parallel configuration. The adsorbed “chemicals” will be removed at the supplier of the active-carbon.

Number: 4  
 Filter square: 26m<sup>2</sup>  
 Filter height: 2,1 m  
 Filter material: Active-cabon

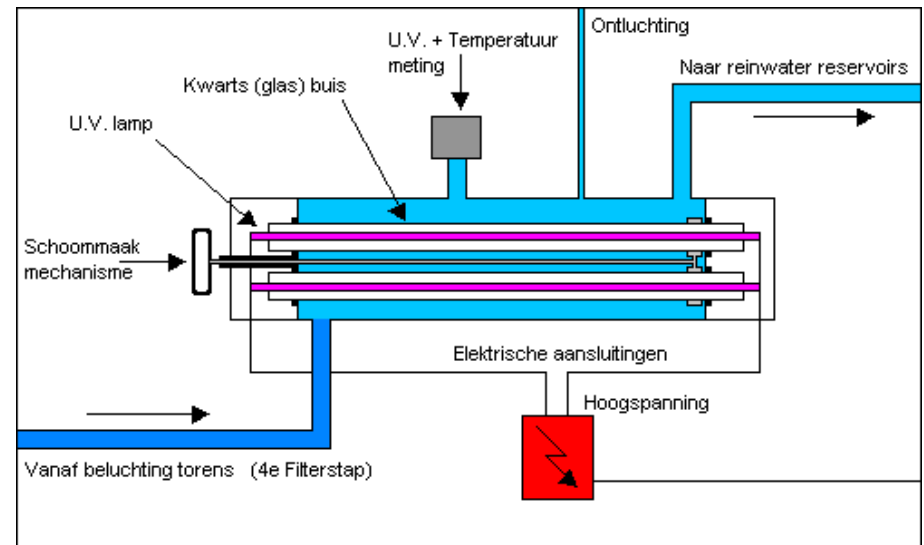


# UV Disinfection

The UV installation is a stainless steel tube with quartz glass tubes. Inside the quartz glass tubes there are UV lamps. The light spectrum is ultra violet light. This UV light will destroy viruses, bacteria, fungi and algae.

Number: 3 (each unit 4 lamps)

Capacity : 3 x 240 m<sup>3</sup>/h



# Storage / Distribution

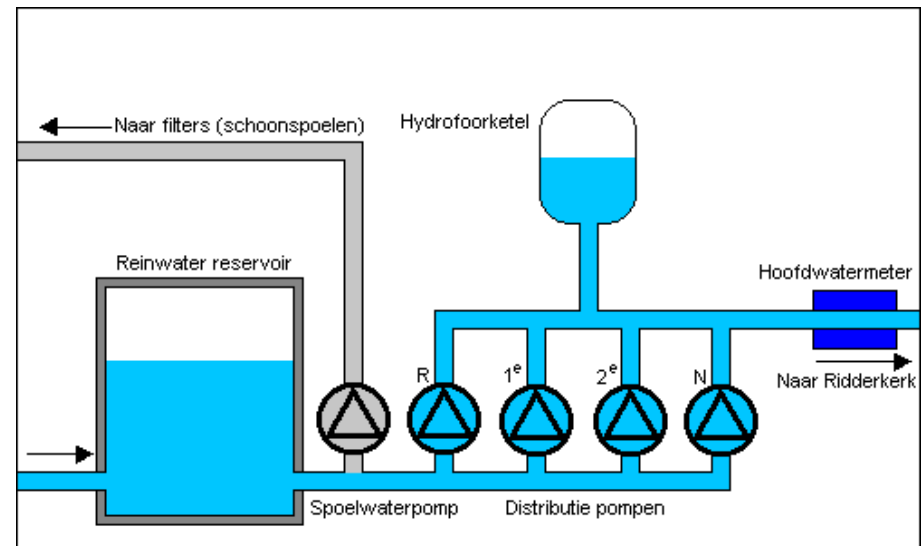
The drinking water is stored in large concrete containers. From the storage the water is distributed to the city of Ridderkerk.

The expansion vessels will dampen pressure peaks from the pumps when they are switching on or off.

Number: 4 storage reservoirs  
4 pumps  
2 expansion vessels

Capacity: 0 to 2000 m<sup>3</sup>/h

Storage: ± 5500 m<sup>3</sup>.



**zs Reijerwaard**

Thank you for watching.