DESCALING A REACTION CHAMBER, TRANSMISSION PUMPS AND PIPES AT WATERSCHAP ZEEUWSE EILANDEN IN KAPELLE BIEZELINGE

A definite end to calcium carbonate deposits

Scale*watcher*™ removes obstructions in the purification process

Wastewater purification involves several steps. One important phase is the removal of nutrients such as nitrates (NO_3) and phosphates (PO_4). The Waterschap Zeeuwse Eilanden, a wastewater purification facility in Kapelle Biezelinge in the south western part of the Netherlands, uses iron-rich sludge and sulphuric acid as flocculants to get rid of these nitrates and phosphates. This process, however, results in the precipitation of calcium carbonate that then leads to unwanted obstructions. The installation of the Scale*watcher*™ descaling device has eliminated this problem.

It is a generally known fact that wastewater purification processes are having to satisfy increasingly stricter requirements. The percentage of residual substances allowed to be discharged into surface water is minimal. Both national and international regulations are placing tight restrictions on the discharging of these substances, particularly in regard to the discharge of nutrients such as nitrates and phosphates. This means that wastewater treatment plants are having to remove these substances in addition to having to minimise their use of energy and chemicals to get the job done.

Reason behind the choice of purification agents
Nutrients in wastewater can be isolated by adding iron sulphate or iron sulphite, but these substances are relatively expensive. This is why the Waterschap Zeeuwse Eilanden is using the iron-rich sludge produced as a waste product by other sewage treatment plants in the vicinity as one of its processing agents. By using this collected iron-rich sludge, the phosphates and nitrates can be removed from the wastewater at an affordable cost.

The purification process
At the Waterschap Zeeuwse Eilanden, the iron-rich sludge (about 150 m^3/month) is transported in lorries to the facility and then stored in a storage tank (photo 1). From this storage tank, the sludge is sent through a reaction chamber consisting of three compartments. During this process, sulphuric acid (78%) is added. The acidified sludge then enters a sludge receptacle where the mixture is diluted with the wastewater (pH approx. 7) intended for purification. The highly diluted iron-rich sludge now has a pH of about 6. After a reaction period and having added polymers, the mixture finally flows to a resettling tank for further purification.

Obstructions and calcium deposits
As soon as the iron-rich sludge is added to the wastewater with polluted sludge, the phosphates, nitrates and other substances start to flocculate and are thus easy to remove. A less desirable side effect in this process is the precipitation of the calcium carbonate found in the mixture. At the wastewater purification plant in Kapelle, this was resulting in obstruction problems in the reaction chamber, in the transmission pumps and in the pipes. A consultation with the specialists at **Scale***watcher* resulted in a proposal for the placement of varying models of electronic descaling devices at three locations.

Better protection

The first of these models, the **Scale***watcher*™ Industrial 1 EP, is in use on the main supply pipe (63 mm) running from the storage tank holding the iron-rich sludge to the three-step reaction chamber. This **Scale***watcher*™ has been installed to protect the reaction chamber. Another model has also been installed on the two supply hoses (40 mm) located in the plant diagram to the right of the pumps. This is the **Scale***watcher*™ Industrial 1 SM in which the induction cable is wrapped around both hoses at once. This alternative was selected because the two supply hoses had been laid inside one larger pipe sleeve so that there was limited space for the induction cable (photos 3+4). The installation of these two units proved sufficient to keep the reaction chamber and the underground pipes carrying acidified sludge completely free of calcium deposits.

Completely safe

But there was still a problem in the pipes running between the reaction chamber and the pumps. A major factor in this was that the distance covered by the pipe between the chamber and the pumps was too short: one metre. **Scale***watcher* proposed extending this distance to six metres. By means of this change, and with the addition of an extra unit, de **Scale***watcher*™ IE2, the water purification plant is no longer bothered by calcium deposits in its pipes and pumps either. **Scale***watcher*™ descaling devices are proving to be perfect for wastewater purification plants, particularly because they have absolutely no effect on the composition of the wastewater and are completely safe for the pipe system. This is important because purification plants are increasingly employing biological processes in which a complex microbial ecosystem is required that may not be disturbed.

How the device works

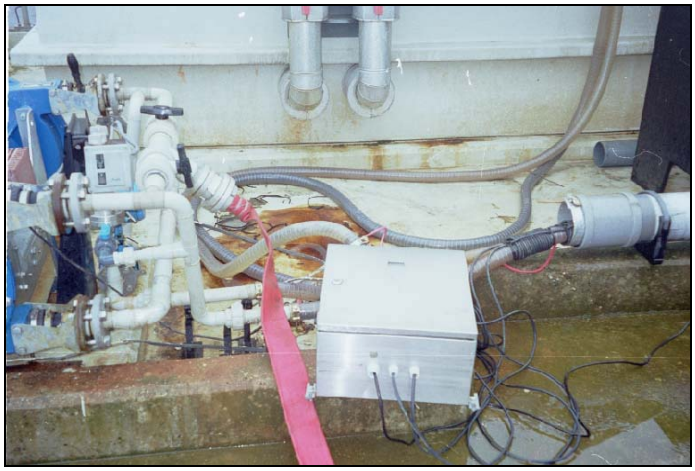
The **Scale***watcher*™ is an electronic device that was developed and patented in the 1980s and is still being updated. By generating a frequency-modulated signal, **Scale***watcher*™ promotes the growth of calcium carbonate crystals in the bulk of the liquid rather than on pipe walls. At the same time, this process increases the water's ability to dissolve old scale layers. This means that any existing calcium precipitation in the pipes is dissolved and very gradually carried away with the water without drastically changing the composition of the water. And this is why Kiwa, the research institute specialised in water, concluded after having tested the device that the **Scale***watcher*™ is safe for drinking water in pipe systems.

Simple to install

When installing the **Scale***watcher*™, one (or more) special electrical cable (induction cable) that generates an electromagnetic field is placed around the supply pipes for the water system. The cable is connected to the control unit that requires no high-voltage current but can simply be connected to the normal 220 network. The device itself uses less than 25 Watts/hour. The installation of the cable and the device is a simple task that can be done while the water process remains in normal operation. The effect of the device is guaranteed for pipes ranging in diameter from 5 to 1250 mm.

NR 1

NR 2



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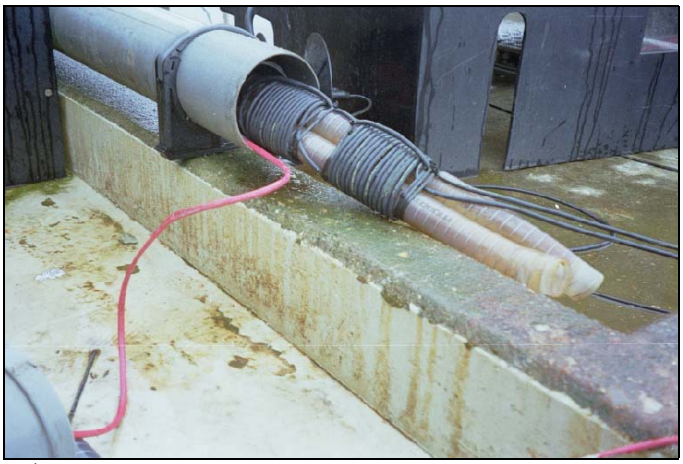
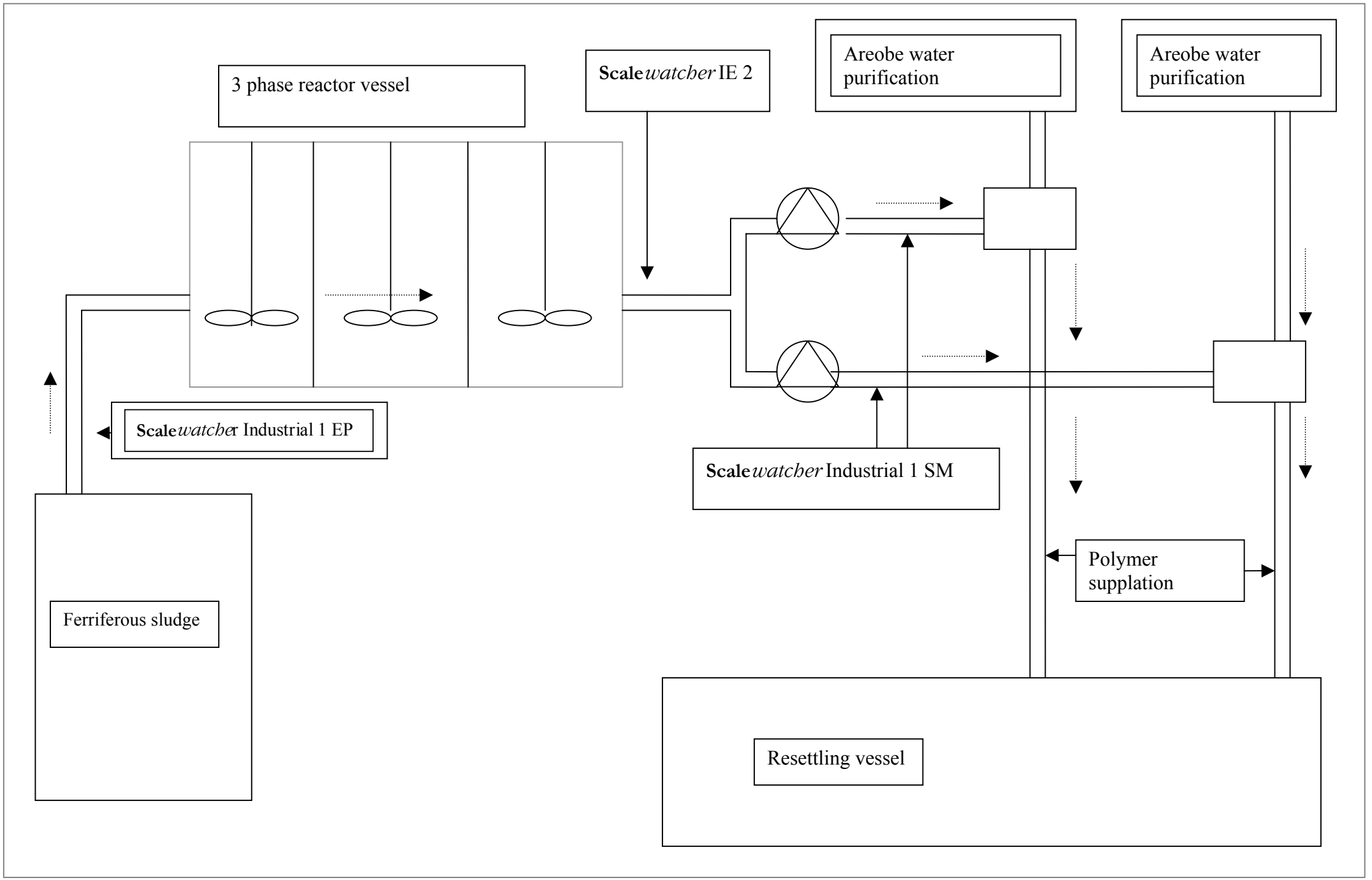


NR.4

NR.5


3 phase reactor vessel
Scale*watcher* IE 2
Areobe water purification
Areobe water purification
Scale*watcher* Industrial 1 EP
Scale*watcher* Industrial 1 SM
Ferriferous sludge
Polymer supplation
Resettling vessel