CG CHEMIKALIEN

EUROPEAN RESPONSIBLE CARE AWARDS 2015

Don't waste water – not even waste water

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Content

Introduction

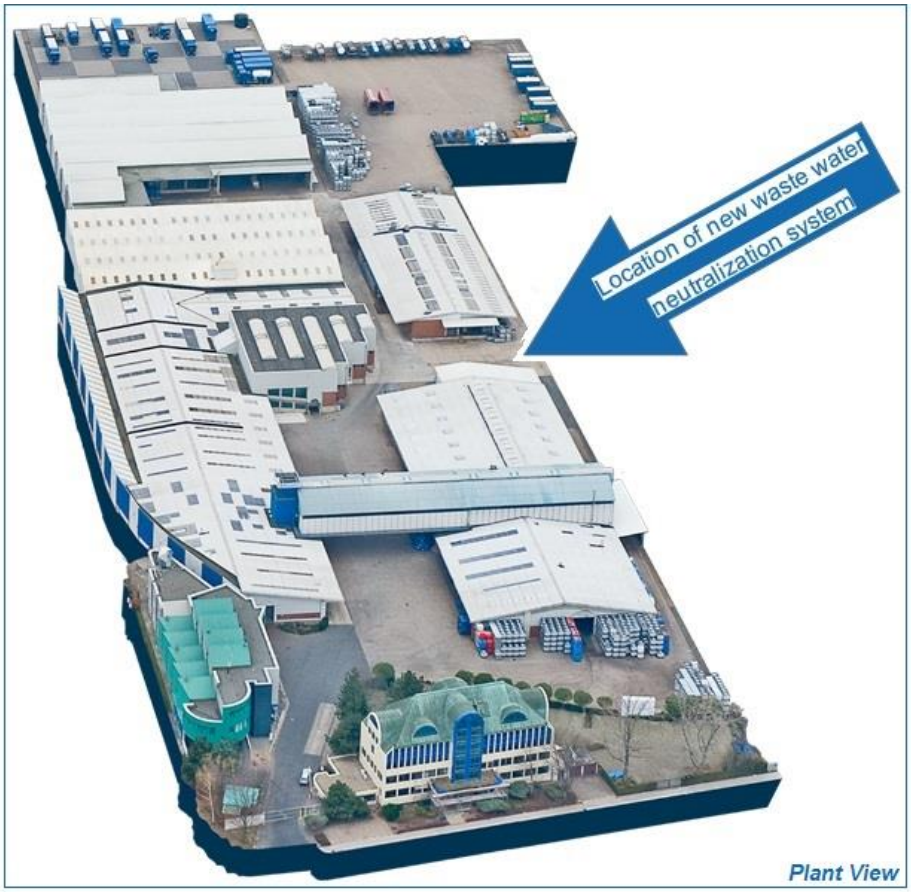
We at CG Chemikalien have committed to being a part of the *Responsible Care* program. The question, of course, is how to provide traceable proof of the path we have chosen based on such an initiative. Our answer to this question is: We are looking at a process of continuous improvement.

Naturally, such an answer forces us to critically ask ourselves “How can we guarantee continuous improvement?”

We want to continue to contribute to a sustainable development and a careful use of natural resources.

Due to our business of trading various chemicals, our company has a water consumption of 80 m³ per day. Almost a third of it is waste water (approx. 25 m³). In comparison, a normal household produces approx. 40 m³ per year. We have thus decided to build a new waste water neutralization system in order to recycle our waste water so we can reuse a significant part of it. Our goal is to reuse 90% of our waste water.

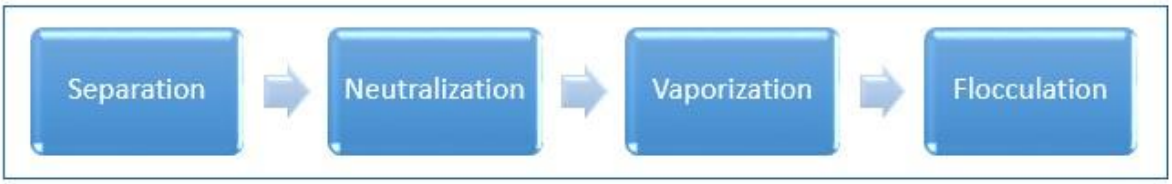
The reasons for our vast amounts of waste water are complex. On the one hand we are a member of the deposit system. Therefore we clean the containers in order to subsequently dispose of them properly. Additionally, as a retailer, we cover a spectrum of 2500 products and also conduct compounds, dilutions and repackaging for our customers. Hence the challenge of our newly planned waste water neutralization system lies in the “diversity” of our waste water. Because our waste water not only contains salts but also non-soluble components (like limewater, iron, etc.) as well as organic and volatile compounds (e.g. formic acid).



Process Overview

In order to eliminate aforementioned components and afterwards adjust the water quality for reuse, the waste water is treated in four steps:

Step 1: Separation of solid content
Step 2: Neutralization / Detoxification
Step 3: Vaporization
Step 4: Flocculation with Filtration



Process in Detail

The waste water is stored in two storage tanks (50 m^3 and 70 m^3). The second tank is used as a collection container and for buffering waste water fluctuations. At the bottom of the tanks, slurry is sedimented. This slurry is periodically disposed of via tank cleansing. Waste water from the storage tank is pumped in intervals by a membrane pump through a strainer into the reactor vessel. The strainer holds back the solid components. In the reactor vessel, the waste water is neutralized via two dosing systems with pH control. The neutralized water is then sent through the vaporizer.

Vaporizer Test Model

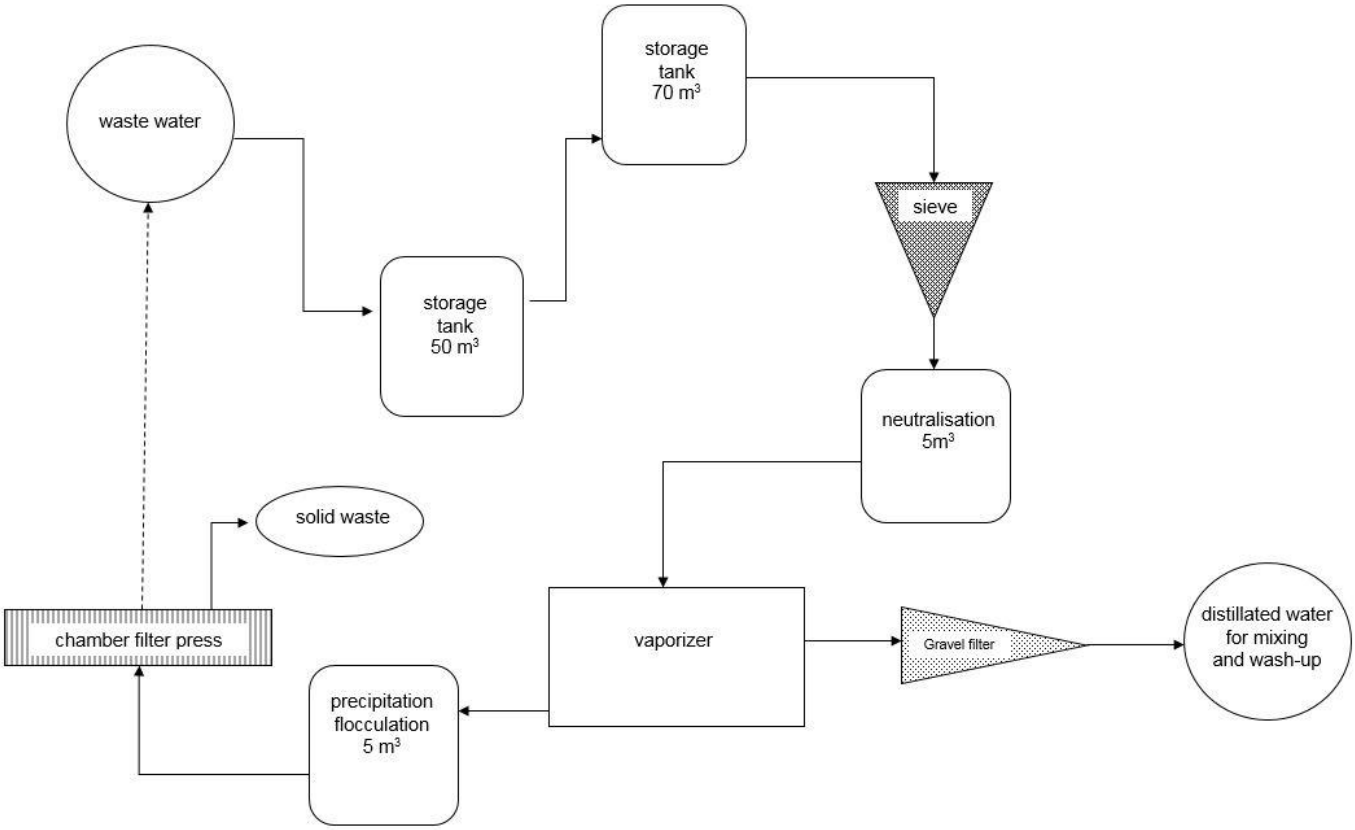
The system feed is pre-heated via pre heat exchangers, in counter current flow to the draining distillate, and subsequently reaches the main heat exchanger. There, the vaporization process is started and the water phase is separated from the residue phase. Through the operation of a vapor compressor, the system is evacuated from the suction side and the emerging steam is drawn from the separator. The compression of the steam in the blower leads to a rise in the steam temperature. The subsequent condensation makes the energy contained in the steam usable for the heating of the heat exchanger. This process of heat recovery on the one hand drastically lowers the system's energy consumption and on the other hand allows for natural circulation in the fluid circuit.

In order to guarantee a high purity of the distillate, a number of vapor purification systems are installed for the different phases of steam production. The purification is carried out successively through gravity separation, foam retention and coalescence separation.

The distilled water is ultimately sent through a gravel filter (with or without activated carbon), then stored in the storage tank and is now used for compounds (e.g. hydrochloric acid and sodium hydroxide in all concentrations) as well as rinsing purposes. It is also planned to use this water for the production of demineralized water.

The accumulated concentrate in the vaporizer is again directed into a storage container. Here, after appropriate precipitation and flocculation, the resulting slurry is dehydrated using a filter band or a chamber filter press. The remaining solids can now be disposed of more efficiently. In the course of the new project we will also revise our rinsing and cleansing processes. Through the installation of e.g. high pressure rotating swivels we expect a reduction of “rinsing waste water” by about one third.

Process Flow Diagram



Action Plan / Timeline

January 2015	Decision to install a waste water neutralization system
June 2015	two week trials with a test model
September 2015	Installation of waste water neutralization system
November 2015	Initial operation of waste water neutralization system
January 2016	90% of waste water is reused

Conclusion

The installation of such a complex waste water neutralization system is an exciting challenge for us. Besides the single aggregated steps within the complete operation process, primarily, the treatment of the diversity of our waste water is a uniquely complex task. Of course, we also have to adapt and optimize the internal operation processes accordingly. But our just finished trial run in June shows that most of the waste water is reusable, as expected. The analysis of the different waste water compositions has brought us the needed information, which will help in the final construction of the system.

In addition to these efforts, the reduction of our waste water to approx. 10% (less the solids waste), going along with the reduction of our overall water consumption by almost 50% are the facts that we, as a medium-sized business, can be particularly proud of.