

Minimizing Water Footprint in Dairy Industry by Vapor Condensate Recycling

Thomas Weißer, Klaus Dickhoff, Tibor Kretschmann

EnviroChemie GmbH, Technology for Water, Germany

Introduction

Drying and vaporization in dairy industry are popular processes for production of concentrates or powders. The Envopur[®] ReVap process delivers process water with drinking water quality, i.e. low-salt waters. The modular Envopur[®] ReVap plant for being implemented in existing dairy structure is a ready to use system. Herewith, the water footprint will be minimized significantly.

Objective of Envopur[®] ReVap concept for condensate recovery

The objective is to obtain purified water from the chemical and hygienic point of view, unconditionally fit for reuse. Hygienic conditions, smooth operation and small space requirements are main focus.

Process description

Vapor condensates are collected and disinfected with UV light within a stacking tank.

Vapor condensate enters the Envopur[®] ReVap plant. Within the first continuously operated biological treatment step, the organic load is converted to water, carbon dioxide and biomass. Biomass is formed as biofilms on carriers. The detached biomass is held back in the downstream fixed-bed reactor where persistent organic compounds are then biodegraded.

As a defined germ barrier and for polishing the filtrate from the multilayer filtration, an ultrafiltration system with pore sizes $< 0.2 \mu\text{m}$ is applied. An additional UV disinfection step protects the ultra-filtrate from subsequent germination. A last step of purification is realized with reverse osmosis, where even smallest amounts of dissolved organic compounds can be hold back on the membranes.

Results

With the described Envopur[®] ReVap plant, recovery rates up to 90% can be yielded. The clean vapor condensate can be reused for CIP processes, boiler feed water and make up water for cooling towers. Finally dairy reduces wastewater amount and fresh water consumption.

Conclusion

Implementing a Envopur[®] ReVap plant for condensate purification is a tool for lowering the water footprint of a dairy. Condensates are treated and reused in several processes enabling a ROI within 2 years.