



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

APPLICATION PROFILE

APPLICATION MICROPLASTIC REMOVAL

INDUSTRY CHEMICAL AND PLASTICS MANUFACTURING

AQUA-AEROBIC SOLUTION CLOTH MEDIA FILTRATION UTILIZING OptiFiber® PILE CLOTH MEDIA

PILE CLOTH MEDIA FILTRATION REMOVES 97% OF MICROPLASTICS FROM WASTEWATER

The Challenge

Plastics are ubiquitous. Automobiles, shopping bags, beauty products, clothing, drinking straws, computers, packing material, tools and toys all contain plastic. When we discard, clean and manufacture these items, we generate microplastics.

As plastics live for years in the environment, they shed small plastic particles (microplastics) as they break down. Microplastics are fragments of any type of plastic less than 5 mm in length, according to the U.S. National Oceanic and Atmospheric Administration and the European Chemicals Agency. These small particles can easily pass through a typical wastewater treatment plant and end up in our oceans, rivers and lakes.

It has been reported that roughly 8 million metric tons of plastic enter the ocean each year, and the United States is one of the top contributors to plastic pollution. Found on beaches, floating on the surface, and embedded in the sea floor, microplastics accumulate in aquatic life and subsequently in the food chain they support. Depending on the volume consumed, the type of polymer and surrounding pollutants (toxic organics and microbes can be adsorbed onto microplastics), aquatic life can be devastatingly impacted. Research has shown that microplastics can shorten aquatic life span, reduce offspring and impact genetic expression.



Marine Debris - Photograph by NOAA

The Solution

Filtering microplastics from industrial wastewater prior to discharge is an effective way to reduce the volume of this waste material from entering our surface water. Industrial customers can rely on Aqua-Aerobic® pile cloth media filters to filter these harmful microplastics, while offering simple operation, small footprint and high forward flow to backwash ratio. The family of pile cloth media filters, available in several configurations including Aqua MiniDisk®, AquaDisk®, Aqua MegaDisk® and others, features OptiFiber® media capable of producing consistent effluent water quality.

The Proven Result

Aqua-Aerobic® pile cloth media filters used for final filtration of wastewater have proven to remove 97% of microplastics (Mintenig, Int-Veen, Loder, Primpke, & Gerdts, 2017). This study further categorized microplastics by size of the particle and isolated plastic fibers, which are a commonly discussed group of microplastics. The findings are summarized in Figure 1 below.

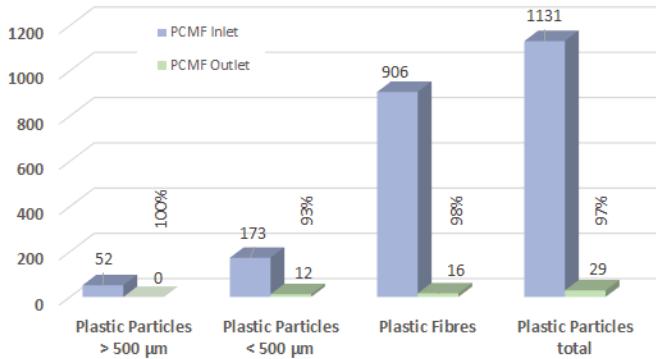


Figure 1: Microplastic Removal Across Pile Cloth Media Filter
(Mintenig, Int-Veen, Loder, Primpke, & Gerdts, 2017)

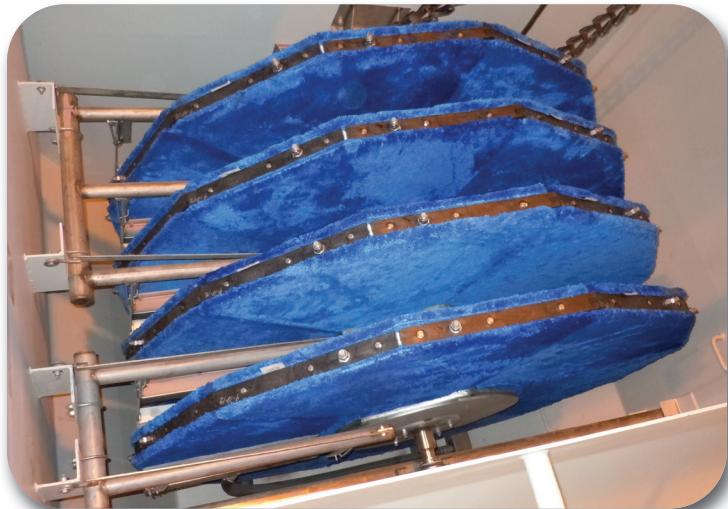
Conclusions

Microplastics are a growing area of concern for industrial and municipal wastewater treatment plants. As microplastics accumulate in the environment, it is crucial to maximize removal at wastewater treatment plants. Adding Aqua-Aerobic Systems' pile cloth media filters is a proven technique to remove microplastics from wastewater and protect the environment.

Aqua-Aerobic® pile cloth media filters are available in a number of configurations. The exclusive OptiFiber® pile cloth media is available in a range of media from 10 micron to 2 micron and can be applied to any application. These systems offer a compact footprint, simple operation and extremely low maintenance with minimal moving parts. The recommended design will meet the hydraulic conditions, loadings and available footprint. Retrofit options can be evaluated utilizing existing basins and tanks. The most suitable technology will be optimized for the application and unique process characteristics.

AquaDisk® FILTER ADVANTAGES

- Utilizes engineered OptiFiber® cloth filtration media
- Produces consistent, reuse-quality effluent
- Backwash system fluidizes fibers for efficient release of stored solids
- Tolerates extreme variations in load
- Vertically oriented disks reduce required footprint
- Lightweight, removable disk segments for ease of maintenance
- Low backwash volume results in water savings and energy reduction
- Available in painted steel, stainless steel or concrete tanks
- Eliminates sand media and underdrains



AquaDisk® Cloth Media Filters with OptiFiber PES-14® Pile Cloth Media

References

- de Wit, W., & Digaud, N. (2019). *No Plastic in Nature: Assessing Plastic Ingestion from Nature to People*. Gland, Switzerland: WWF International. Retrieved from http://awsassets.panda.org/downloads/plastic_ingestion_press_singles.pdf
- Karapanagioti, H. K., & Kalavrouziotis, I. (2018). Microplastics in Wastewater Treatment Plants - A Totally Preventable Source. *International Marine Debris Conference*. San Diego, California, USA. Retrieved from <http://internationalmarinedebrisconference.org/index.php/microplastics-in-wastewater-treatment-plants-a-totally-preventable-source/>
- Kay, P., Hiscoe, R., Moberley, I., Bajic, L., & McKenna, N. (2018). Wastewater Treatment Plants as a Source of Microplastics in River Catchments. *Environmental Science and Pollution Research*(25), 20264-20267. Retrieved from <https://link.springer.com/content/pdf/10.1007%2Fs11356-018-2070-7.pdf>
- Mintenig, S. M., Int-Veen, I., Loder, M. G., Primpke, S., & Gerdts, G. (2017). Identification of microplastic in effluents of waste water treatment plants using focal plane array-based micro-Fourier-transform infrared imaging. *Water Research*, 365-372.
- Murphy, F., Ewins, C., Carbonnier, F., & Quinn, B. (2016). Wastewater Treatment Works (WwTW) as a Source of Microplastics in the Aquatic Environment. *Environmental Science & Technology*, 50(11), 5800-5808.
- 2021 Ocean Conservancy; The Problem with Plastics www.oceanconservancy.org/trash-free-seas/plastics-in-the-ocean/