



## FACTSHEET

# WASSER 3.0 PE-X®

Upstream Microplastic Removal in Industrial Wastewater -  
Plastic Packaging Industry

**97%**

MP Removal (mass)

**99%**

MP Removal (count)

**79%**

COD Reduction

**80%**

Water Reuse



**REMEDIES**

MEDITERRANEAN SEA BASIN LIGHTHOUSE



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## OVERVIEW

This factsheet summarises the results of a five-week pilot study investigating automated microplastic (MP) removal from industrial wastewater at a plastic packaging company. The Wasser 3.0 PE-X® pilot plant operated in fully automated 200 L batches, treating process wastewater with extremely high MP loads.

## TEST SITE & METHODOLOGY

<b>Location</b>	Medium-sized plastic packaging company, Germany
<b>Wastewater source</b>	Process wastewater from plastic packaging processing
<b>Test duration</b>	5 weeks (5 test series × 5 working days = 25 test runs)
<b>Total treated volume</b>	17 m <sup>3</sup> (85 batches × 200 L)
<b>Sampling</b>	Influent + effluent per batch; 10 samples per test series
<b>Parameters</b>	MP (TSS + particle count), COD, turbidity, photometric TSS, pH
<b>Annual wastewater</b>	1,016 m <sup>3</sup> /year (240 working days, avg. 4.2 m <sup>3</sup> /day)

## TECHNOLOGY

<b>Process</b>	Wasser 3.0 PE-X® Agglomeration-Fixation Technology (Clump & Skim), fully automated
<b>Reactor</b>	200 L stainless steel reactor with mechanical stirrer + dosing pump
<b>Separation</b>	Inclined belt filter with polyester fleece (70–80 µm pore size)
<b>Reagent</b>	abcr eco Wasser 3.0 PE-X®, industrial wastewater (AB930006)
<b>Throughput</b>	Max. 800 L/h; average 680 L/day during trials
<b>MP detection</b>	Fluorescence staining (Wasser 3.0 detect mix MP-1) + Zeiss Axiozoom.V16; automated particle counting
<b>TRL</b>	9 (industrial wastewater treatment)

## KEY RESULTS

<b>MP influent (mass)</b>	1,019–2,572 mg/L (mean 1,725 ± 377 mg/L)
<b>MP effluent (mass)</b>	0.6–121 mg/L (mean 46 ± 23 mg/L)
<b>MP removal (mass)</b>	97.4% (range 96.4–99.5%)
<b>MP influent (count)</b>	38–1,112 million particles/L (mean 673 ± 183 Mio/L)
<b>MP effluent (count)</b>	2.7–14.1 million particles/L (mean 5.8 ± 2.8 Mio/L)
<b>MP removal (count)</b>	99.1% (range 97.7–99.7%)
<b>COD influent</b>	5,410–10,200 mg/L (mean 7,570 ± 1,339 mg/L)
<b>COD effluent</b>	1,257–2,243 mg/L (mean 1,577 ± 427 mg/L)
<b>COD removal</b>	78.8% (range 72.0–83.4%)
<b>Turbidity removal</b>	92.3 ± 6.6% (avg. 1,926 → 112 NTU)
<b>pH</b>	Stable; 8.76 → 8.52 (slight decrease, p = 0.002)
<b>Particle size</b>	Mean 22.7 µm (untreated) → 10.2 µm (treated); larger particles removed preferentially

## CIRCULAR ECONOMY & AVOIDED EMISSIONS

<b>Avoided MP/year</b>	1.7 tonnes (mass) / 680 trillion particles
<b>Avoided COD/year</b>	6.0 tonnes
<b>Agglomerates/year</b>	1,912 kg (dry weight); calorific value 28.6–38.6 MJ/kg
<b>Water reuse</b>	Up to 80% of process water reused (estimated 4× reuse cycles)
<b>Energy consumption</b>	1.4 kWh/m <sup>3</sup> treated water (1,422 kWh/year)
<b>Reagent consumption</b>	0.7 L/m <sup>3</sup> (711 L/year)
<b>Agglomerate reuse</b>	Thermal recycling (energy recovery) or potential filler for asphalt materials

## BENEFITS OF UPSTREAM REMOVAL

Upstream MP removal at the industrial source reduces final environmental MP emissions by a factor of 50 compared to end-of-pipe treatment at municipal WWTPs. For the studied facility: without treatment, 140 million MP/day reach surface waters; with upstream Wasser 3.0 PE-X® treatment plus subsequent WWTP treatment, only 2.8 million MP/day remain. When water reuse is included, this drops to 560,000 MP/day. Additional benefits include lower total wastewater volumes, reduced energy demand for treatment, adherence to the polluter-pays principle, and reduced burden on municipal WWTP infrastructure.

## KEY ADVANTAGES

<b>Fully automated</b>	200 L batch operation; scalable to higher throughput (max. 800 L/h)
<b>Stable performance</b>	Consistent removal across 25 runs despite fluctuating wastewater composition
<b>Low-tech design</b>	Tank, stirrer, dosing pump, and belt filter required
<b>Circular process</b>	Water reuse (80%) + agglomerate recovery + chemical reuse (surfactants)
<b>Cost-effective</b>	Positive cost-benefit through water savings, reduced discharge fees, and agglomerate valorisation
<b>Polluter pays</b>	Shifts treatment responsibility and costs to the industrial source

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### Publication

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