

2023 Plastics Industry Awards Entry



Sustainability Initiative of the Year

Adreco Plastics
and
CURIO Group

INTRODUCTION

We are thrilled to submit our entry for the Sustainability Initiative of the Year category, showcasing our focus on the Environmental impact of our activities and seeking out innovative solutions for long established problems.

This entry highlights the strength of our partnership, collective vision, and the positive impact it has had on the environment by delivering a viable and truly closed loop recycling solution for the UK Water industry.

Highlights: Shared Vision and Objectives:

From the outset, both parties shared a common vision for the project and aligned objectives. We recognised the potential for transformation within the UK Water industry AND plastics industry and the need for positive solutions particularly against the backdrop of Plastics attracting so much negativity. By combining our expertise and resources, we have been able to bring this vision of a closed loop recycling solution to life.

Highlights: Environmental and Economical Sustainability at the Core:

Recognising the urgent need for sustainable practices, we focused on environmental responsibility that was also a viable economically sustainable solution. So often, a recycling or sustainability solution is implemented and then fails as it is not economically viable. Our joint commitment to sustainability extended beyond the project's lifecycle, as we integrated sustainable practices into our respective supply chains.

It is no coincidence that in the last 12 months Adreco Plastics has achieved ISO14001 certification for environmental management.



Conclusion:

By working effectively, productively, and sustainably with our customer CURIO GROUP, we have delivered a true improvement in customer experience, reduced waste and emissions, and an economically viable and sustainable solution .

We thank the award committee for considering our entry for the prestigious recognition of **Sustainability Initiative of the Year**.

Company Backgrounds

ADRECO PLASTICS

Adreco Plastics was established in 1977 and has been designing and manufacturing Plastic Injection Moulded components and their corresponding tools for over 45 years.

Acquired in 2012 by STH Plastics, a manufacturing group owned and lead by Sam Hill, the company operates from modern 20,000ft² facilities in Milton Keynes and offers the “Best of Both Worlds”. With extended toolmaking facilities in Shenzhen, China Adreco Plastics offers a full service from conceptual ideas in design, through to full production of tooling and injection moulding. They have been ISO9001 accredited since 2006 and work across a range of Industry sectors, including Medical, Aerospace, Construction, and Defence.

Adreco are huge advocates and supporters of the PIA having won Toolmaker Partnership awards in 2017, 2021 and Consumer Product of the year in 2022

CURIO Group

CURIO Group are proud of their engineering and innovation heritage. As a multi-disciplinary group, CURIO supply products and services to the Water and Malting Industries and are driven by their mantra “**BRAVE THINKING**”.

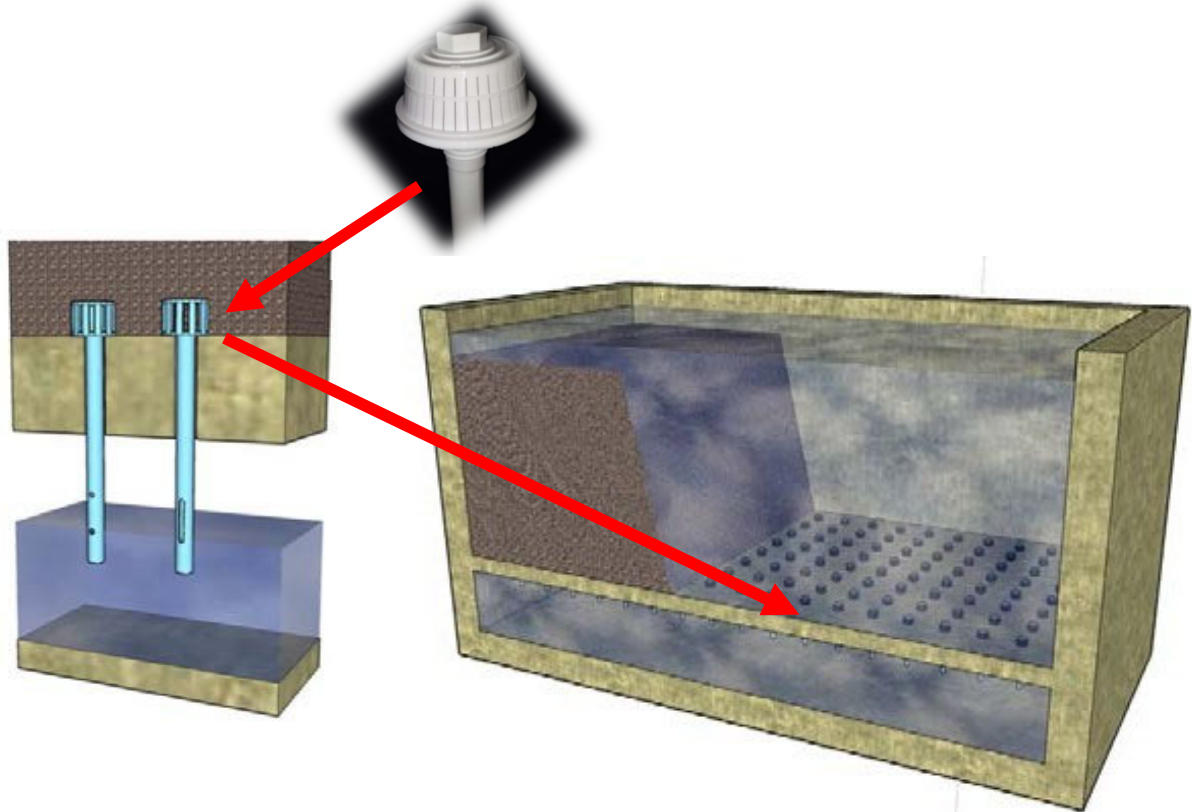
CURIO also share their passion and expertise through their e-learning platform, curio courses, helping individuals and organisations develop their own knowledge.

A circular graphic with a rainbow gradient background. The words "Brave" and "thinking." are written in a white, sans-serif font, stacked vertically in the center of the circle.

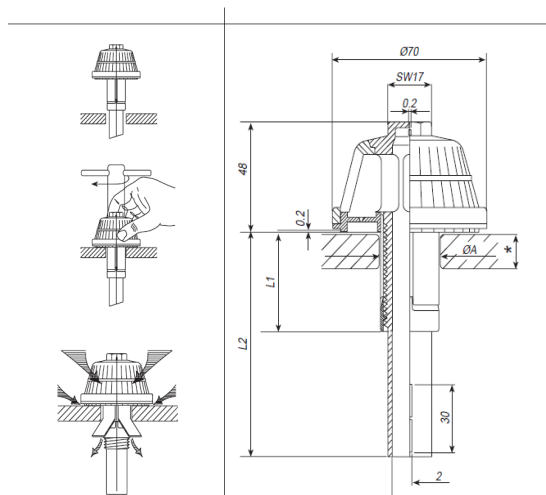
Filter Nozzles

Filter nozzles play a crucial role in rapid gravity filter (RGF) beds in water treatment plants across the UK and the world.

RGFs use graded sand and other granular media to remove particles and impurities that are often trapped in a floc using flocculation chemicals. The unfiltered water flows through the filter medium under gravity and the floc material is trapped in the sand matrix.



A rapid gravity filter bed is a **vital** component of a water treatment plant and is used to remove impurities and suspended particles from raw water to produce clean and potable water for consumption.



The process involves several steps:

- **Coagulation and Flocculation:** Raw water from a water source, such as a river or lake, contains suspended particles, organic matter, and microorganisms. Chemical coagulants (e.g., aluminum sulfate or ferric chloride) are added to the water to destabilize the particles and form small aggregates called flocs.
- **Mixing:** The water is gently mixed to allow the coagulants to interact with impurities and form larger flocs.
- **Sedimentation:** The water is then allowed to settle in a sedimentation basin, where the heavier flocs settle to the bottom of the basin, forming a layer of sludge. This process helps to remove larger particles and some organic matter.
- **Filtration:** After sedimentation, the partially clarified water is directed to the rapid gravity filter beds. Each filter bed is typically made up of several layers of different materials, such as gravel, coarse sand, fine sand, and anthracite coal. These layers are arranged in decreasing particle size from top to bottom.
- **Filtration Process:** The water percolates through the filter bed from the top to the bottom under the influence of gravity. As the water passes through the layers, the remaining suspended particles and flocs are trapped in the void spaces between the filter media.
- **Backwashing:** Over time, the accumulated particles and impurities in the filter bed reduce its efficiency. To clean the filter, a process called backwashing is performed. Water flow is reversed, and clean water is passed upward through the filter bed, dislodging, and carrying away the trapped particles. The backwash water, along with the dislodged particles, is collected and directed to waste treatment.
- **Disinfection:** After the filtration process, the water undergoes disinfection, usually by adding chlorine or other suitable disinfectants, to kill any remaining harmful microorganisms.
- **Distribution:** The treated water is then pumped into the distribution network, where it is supplied to consumers for various uses, including drinking, cooking, and sanitation.

RGFs are often the preferred filtration process for several reasons:

- **Uniform Water Distribution:** Filter nozzles ensure that water is evenly distributed across the entire filter bed surface. This uniform distribution prevents preferential flow paths and ensures that all areas of the filter bed are used effectively, maximizing the filtration efficiency.
- **Preventing Channeling:** Without filter nozzles, water might find easier paths through the filter bed, creating channels or preferential flow routes. These channels would lead to insufficient contact time between the water and the filter media, reducing the filtration effectiveness. Filter nozzles help to prevent channeling by evenly dispersing water over the entire bed, promoting a more thorough filtration process.
- **Supporting Filter Media:** The filter nozzles provide support to the layers of filter media (such as gravel, sand, and anthracite coal) in the filter bed. They prevent the filter media from being washed out or displaced during backwashing and normal operation, ensuring the longevity and stability of the filter bed.
- **Even Backwashing:** During the backwashing process, water flows upward through the filter bed to dislodge and remove trapped particles. Filter nozzles help in evenly distributing the backwash water across the filter bed, effectively lifting and fluidizing the filter media to flush out accumulated impurities.
- **Maintenance and Cleaning:** Filter nozzles are designed to be easily removable and replaceable, making maintenance and cleaning of the filter bed more straightforward. They can be accessed for inspection, repairs, or replacement without disturbing the filter media.
- **Minimizing Pressure Loss:** Filter nozzles are designed to minimize pressure loss during water filtration. They are configured to have optimal flow characteristics, ensuring that water can pass through them with minimal resistance, maintaining efficient filtration rates.

Overall, filter nozzles play a critical role in the proper functioning and efficiency of rapid gravity filter beds. They ensure uniform water distribution, prevent channeling, provide support to the filter media, aid in backwashing, and facilitate maintenance, all of which are essential for producing high-quality treated water in a water treatment plant.

However, the filter nozzles require regular replacement, and this has traditionally consumed a huge amount of virgin polymer and generated a great deal of waste.

Solving a problem

Millions of Plastic Nozzle filters are used by the UK Water industry each year.

Adreco Plastics and CURIO Group have launched a recycling solution that collects, recycles, and manufactures old Filter Nozzles and makes replacement ones out of the reclaimed rPP.

CLOSED LOOP RECYCLING for the UK Water industry



Plastic Filter nozzles are an integral part of the water treatment process, used in a variety of applications, including drinking water; production of demineralized water; urban and industrial wastewater treatment; filtration of river or well water for irrigation; and water for swimming pools.

Periodically, and typically annually, nozzles must be replaced as they become clogged or damaged. Currently all replaced filter nozzles are scrapped, and this is an enormous waste.

Each year over 11 million units are used, scrapped, and replaced to maintain the UK's water system. Adreco Plastics and CURIO Group knew there was a better way and have worked in partnership bringing the expertise from both companies to deliver a fundamentally better solution for the UK Water industry.

Introducing EcoJetFlow® –

The Sustainable Rapid Gravity Filter Nozzle for the Water industry

EcoJetFlow® is a revolutionary and innovative concept jointly developed by Adreco Plastics and Curio Group.



What sets EcoJetFlow® apart is its complete "cradle to grave" solution ensuring that all used nozzles are returned in a controlled, Closed-loop for recycling and reprocessing into new Filter Nozzles.

Old filter nozzles are collected by CURIO, then cleaned and granulated into rPP by Adreco Plastics.

This rPP flake is then used to manufacture replacement nozzles at Adreco's Milton Keynes factory. This avoids hundreds of tonnes of landfill and a genuine Closed Loop Recycling solution for the UK Water Industry.

There are 1,164 Rapid Gravity Filter beds in the UK operated by the 12 main Water companies.

Rapid Gravity Filter beds in UK water industry							
		1,164					
					110,224	Trees to plant to cancel CO2 generated	
		RGF beds	units pa	kg virgin pp required	tonnes virgin polymer saved	CO2 tonnes generated / saved	Trees equiv to plant
Thames Water	15.47%	180	1,800,000	121,788	122	426	17,050
Severn Trent Waters	13.81%	161	1,606,845	108,719	109	381	15,221
United Utilities	13.24%	154	1,540,199	104,210	104	365	14,589
Scottish Water	12.32%	143	1,433,369	96,982	97	339	13,577
Anglian Water	9.24%	107	1,074,675	72,713	73	254	10,180
Yorkshire Water	7.95%	92	924,847	62,575	63	219	8,761
Southern Water	5.85%	68	680,922	46,071	46	161	6,450
Welsh Water	5.64%	66	655,868	44,376	44	155	6,213
Northumbrian Water	5.54%	65	645,037	43,643	44	153	6,110
South West Water	4.15%	48	483,385	32,706	33	114	4,579
Wessex Water	3.66%	43	426,331	28,846	29	101	4,038
NI Water	3.14%	36	364,812	24,683	25	86	3,456
			11,636,290	787,311	787	2,756	
				787,311	kg of virgin polymer consumed pa		
				2,756	tonnes of co2		

With an average of 10,000 filter nozzles per bed, and them requiring annual replacement, the UK water industry consumes over 11 million units per annum.

Each nozzle set consists of 4 products totalling 68 grams of Virgin PP.

This means the UK Water industry's consumption of 11m units pa currently requires over 750 tonnes of PP per year for them to be made.

With all replaced nozzles currently being scrapped, it means this huge consumption is also a huge generation of waste... equivariant to nearly 3,000 tonnes of CO2 being pointlessly produced annually.

Filter Nozzles



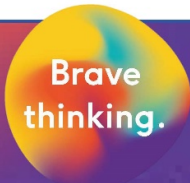
At the bottom of a Rapid Gravity Filter tank, hundreds of plastic nozzles are installed. They are designed to allow filtered water to pass through but retain the filter media (sand etc) in the tank.



The function of the Nozzle in operation is to "back wash" the filter bed to maintain the effectiveness of the filter media (Sand and GAC) and to keep it as clear as possible.



There are millions of nozzles installed in the UK's water treatment plants. Each year, 100's of thousands are scrapped and replaced having a terrible impact on our environment.



Recycling Nozzles



The nozzles are made from polypropylene (PP) and are replaced (typically annually) as they get clogged or damaged.

Once replaced, old nozzles are scrapped but... **we have found a way to use and avoid this waste**



When old nozzles are removed, they are collected then returned for reprocessing and recycling at our UK partner facility operated by **adreco plastics**. Nozzles are cleaned, then granulated into recycled Polypropylene flake (rPP) suitable for injection moulding



is used for making new nozzles. The high temperature (200°C+) of the moulding process removes any final contamination

These then go back to the clients ready to be installed as required.

Brave
thinking.

Summary

In the first year of operation, Adreco Plastics and Curio Group's Closed Loop recycling solution with their **EcoJetFlow**® Filter Nozzles, will...

- Recycle over 4,000,000 Filter Nozzles that otherwise would have been landfilled.
- Produce 4,000,000 replacement Filter nozzles out of the rPP reclaimed during the **EcoJetFlow**® “Cradle to Grave.”
- In 2023, this will save over 1,000 tonnes of CO2 being unnecessarily generated.
- In 2024, the commitment already received from other main water companies will mean that the annual CO2 reduction will rise to saving 2,000 tonnes of CO2 per year, every year.