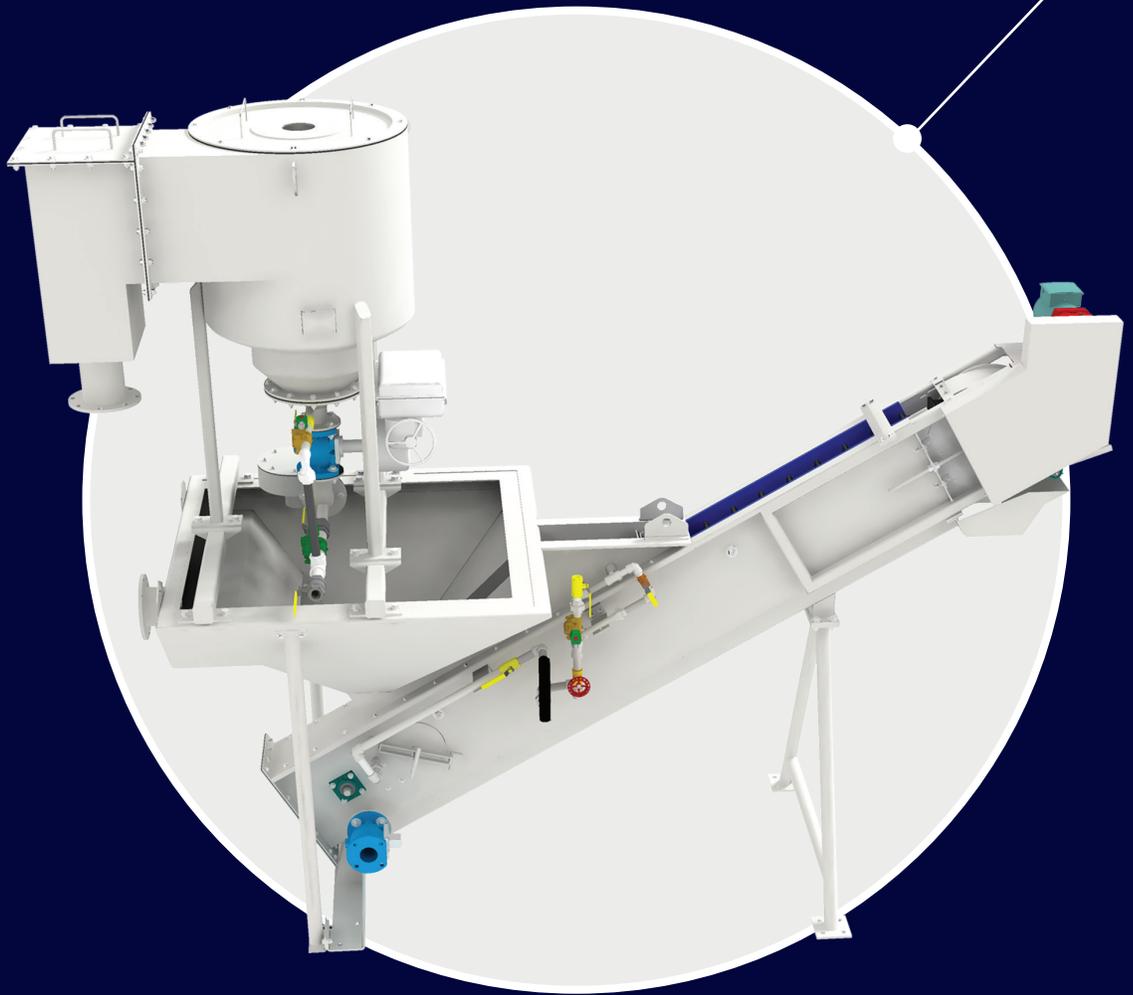


# TeaCup<sup>®</sup>



## Advanced Grit Removal & Classification

*Engineered by Hydro International*

TeaCup®

## Industry leading performance for over 50 years.

The TeaCup® is a versatile system well suited for grit removal or grit washing in many plants. Engineered by Hydro International, the TeaCup® is used for grit collection, grit washing, sediment removal on pumped flows and for classifying and washing grit on systems where batch discharge is required.



**TeaCup® / Grit Snail® with  
Standard Discharge Box Design**

### Performance

- Removes 95% of particles equal to or greater than 75 micron ( $\mu\text{m}$ ) at the design flow rate
- Less than 20% volatile solids
- Greater than 60% total solids

### Applications

- Grit removal & washing at WWTP headworks
- Snail shell removal from trickling filters
- Grit system replacement and upgrades
- Sediment removal pretreatment for potable water

### Benefits

- An economical alternative to concrete grit chambers for smaller plants
- Durable 304 or 316 Stainless Steel construction
- No moving parts and all-hydraulic design
- Typically requires 1-5 feet (0.31 - 1.52 m) of headloss
- Requires up to 80% less area than conventional grit chambers
- TeaCup units with a discharge cap can be operated under pressure with up to 14.7 psi of available head at the influent flange to push flow to the next treatment process.

### Design Notes

- Open free vortex design
- Simple operation, long product life
- Large diameter easily handles peak flow volumes
- Prefabricated modular components
- Discharges a clean grit slurry, low in volatile solids
- Standard turndown ratio of 3:1 peak to average daily flow
- Batch processing operation

### Capacity

- Handles flow of 70 gpm to 8 Mgal/d (44 L/s to 30.3 MLD)
- Sizes from 24" to 96" (0.61 to 2.44 m) diameter
- Solids concentration up to 1%

### Configurations

- Inlet and outlet can be oriented to accommodate many piping configurations.

TeaCup® / Decanter with  
Optional Pressure Cap Design



Visit the TeaCup® product page to learn more. [TeaCup®](#)



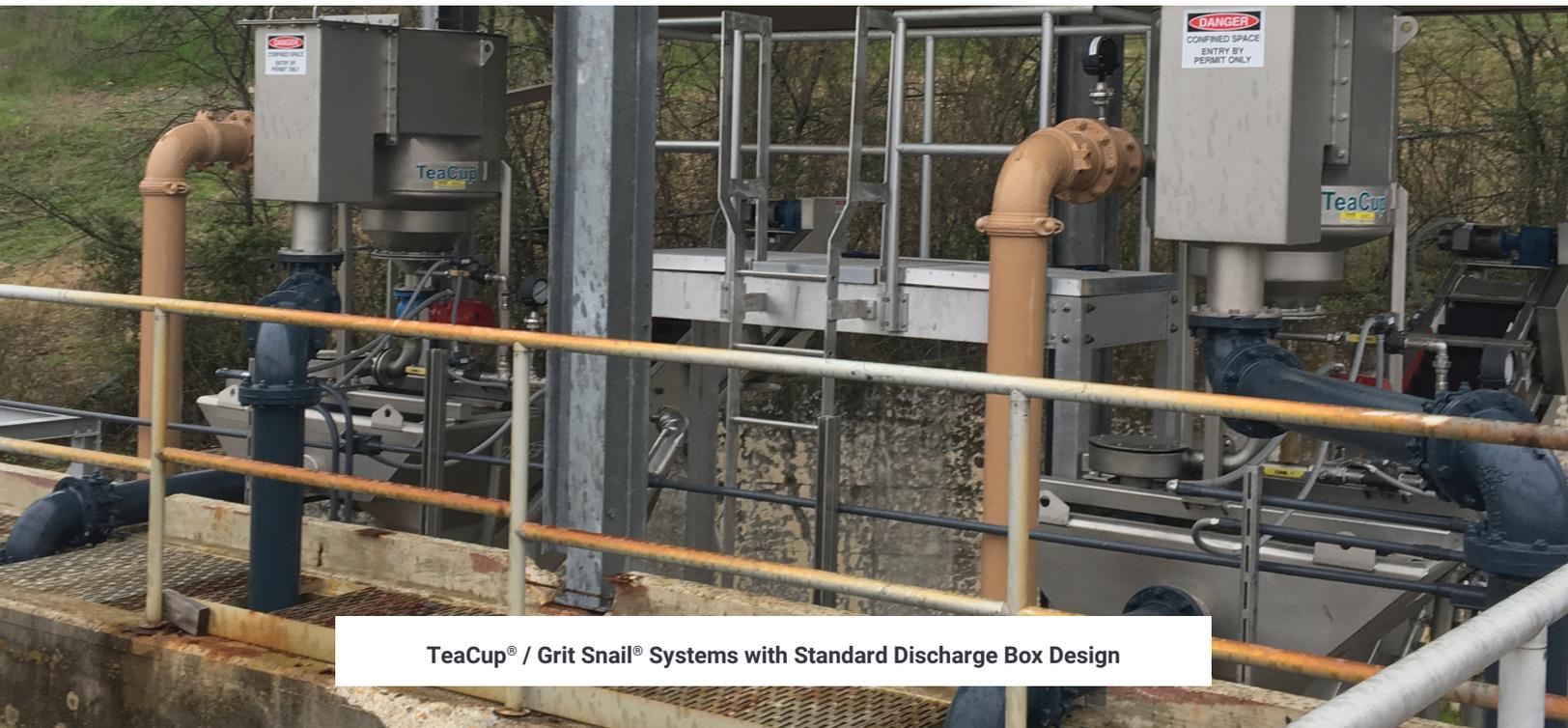
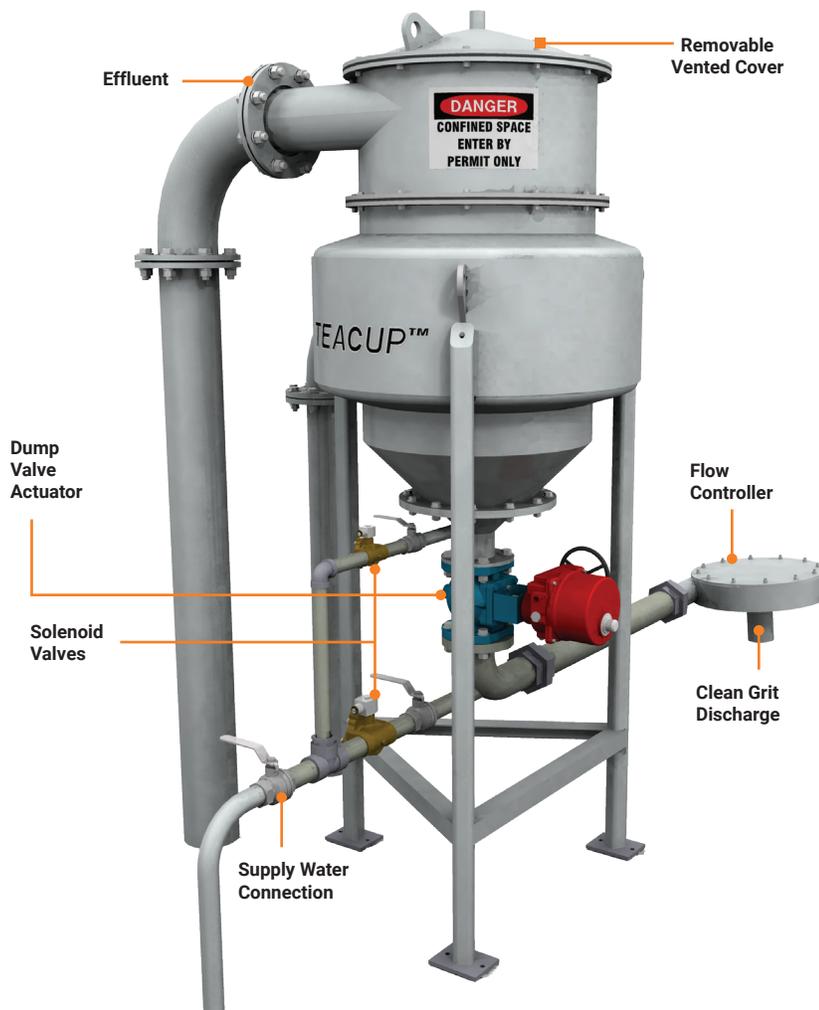
## How it Works

Flow enters the stainless steel vessel tangentially at a controlled rate and velocity. The flow regime established in the device forms a free vortex which results in high centrifugal forces and a thin predictable boundary layer. Grit is forced to the outside perimeter or held in suspension until it falls by gravity into the boundary layer which sweeps the grit, but not volatile solids, into the collection chamber at the bottom of the unit.

The concentrated slurry is collected in the chamber at the bottom of the unit. Periodically fluidizing water is added and the grit is purged by gravity in a grit slurry out of the unit. The slurry discharged is clean and ready for dewatering. The water containing the volatile solids exits the top and returns to the WWTP for treatment.



### TeaCup® Components with Optional Pressure Cap Design



TeaCup® / Grit Snail® Systems with Standard Discharge Box Design

# HeadCell® / TeaCup® / Decanter System Provides Protection Kewaskum, WI Required

## Owner

The Village of Kewaskum

## Project Parameters

1 Mgal/d (44 L/s) Average Flow

3 Mgal/d (131 L/s) Peak Flow

## Plant Equipment

One (1) 6' (1.8 m) 7 tray HeadCell®

One (1) 24" (0.6 m) TeaCup®

One (1) 1.5 yd<sup>3</sup> (1.2 m<sup>3</sup>) Decanter

## Objective

A capacity upgrade switching airlift to mechanical pumps required advanced grit removal performance.

## Solution

A HeadCell® / TeaCup® / Decanter system was selected to protect the plant from the impacts of grit.

The Village of Kewaskum was named for Chief Kewaskum of the Potawatomi tribe, whose name translates to “turning on his tracks.” This name was chosen because it also describes the Milwaukee River as it makes a horseshoe bend just north of the village. Kewaskum is located 45 miles (72 km) North of Milwaukee and is known as the Gateway to the Kettle Moraine State Forest.

This village of 4,220 people began planning for a significant capacity upgrade to the wastewater treatment plant and hired a consulting engineering firm to do the design. The upgrade would result in many of the plant’s airlift pumping systems being replaced with mechanical pumps. Concerns about grit causing wear on these pumps led them to include grit removal as part of the plant’s new headworks.

At the recommendation of their engineering consultant, the village visited a HeadCell grit removal system in northern Illinois. Based on the positive feedback given by the operations personnel the village decided to include the HeadCell system in their design. The village also liked the fact that the HeadCell system had no moving parts in the basin. The only moving part was the grit pump which could be located in an easily accessible area.

The TeaCup separation and classification unit washes organics from grit captured by a HeadCell grit separator. It minimizes organic content to reduce objectionable odor and makes the grit suitable for landfill disposal. The separation and classification unit uses a combination of a free vortex-type flow regime and boundary layer effects to capture, classify and remove fine grit, and other high-density solids. Grit and fine abrasives are then discharged into the Decanter unit for dewatering before landfilling.

Installation went smoothly and the system was commissioned. Since installation, the operations personnel have been very happy with the project and the plant is producing effluent well below permit levels. One of the noted benefits of the plant upgrade has been a much cleaner sludge as well as reduced sludge volume. The grit management system removes approximately 14 cubic feet per week during normal operations which increases noticeably during wet weather flows.

Kewaskum’s Director of Public Works said, “We have seen a big improvement in the quality of our waste sludge since installing the HeadCell system. We have seen a nice reduction in our sludge volume too.”



# TeaCup® / Grit Snail® - The Ultimate Trickling Filter Snail Shell Elimination System

## Overview

The presence of snail shells in trickling filter plants are known to be an abrasive nuisance. Removing them from the process stream is important in order to minimize retention time and abrasive impact in the trickling filter. Snails also cause sedimentation and abrasion problems in any processes downstream of trickling filters, such as aeration tanks, anaerobic digesters, pumps and sludge lines. The high costs associated with snail shell removal can be avoided with use of an effective removal system.

Removing snail shells that would otherwise deposit in the secondary clarifier and be returned to the aeration basins or follow the sludge treatment process allows these plant processes to operate more efficiently. Snail shells quickly build up in wastewater processes after relatively short cycles of operation which can impact air transfer efficiency and require frequent basin cleaning or equipment repair or replacement due to abrasive wear.

Build ups in digesters can create unstable operating conditions by reducing volatile solids destruction, impairing mixing, and reducing gas production. Removing these deposits is very expensive, dangerous and time-consuming, requiring taking the digesters offline, exposure to toxic gasses, confined space entry, repairs and recommissioning, not to mention removing, handling and disposing of the deposited material.

The TeaCup/Grit Snail solids separator and dewatering system, engineered by Hydro International can be used to effectively remove snail shells from trickling filter plants, preventing snail build-up and problems in downstream processes.

**Snail shell deposition and abrasion causes serious problems for WWTPs. Hydro International provides the ideal way to remove them!**

## TeaCup® / Grit Snail® Operation

The TeaCup uses a high energy vortex to remove snails on a continuous basis. Conventional snail shell removal systems typically incorporate cyclone concentrators and grit classifiers or low energy vortex units. Low energy vortex units do not impart enough velocity to prevent the snail from adhering to the tank surfaces and recurrence of the snail shell problem. The outlet apex valves required on cyclone concentrators restrict the amount of shells they can process and are subject to plugging as loads increase, particularly during sloughing events. Typical classifiers have small clarifier tanks with high overflow rates and fast turning turbulent screws for washing and transporting material. Both of these features reduce the size and amount of shells that can be retained.



TeaCup® / Grit Snail® Snail Shell Removal System



Post-It Note in Cleaned, Dewatered Snail Shells Removed from a Trickling Filter Plant by TeaCup / Grit Snail System



Nuisance Snail Shells





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