Oldcastle Infrastructure™
A CRH COMPANY

Grit King®

Fluidized Bed Grit Washing & Dewatering

Engineered by Hydro International®

Grit King®

Low headloss with phenomenal performance.

The Grit King® is an advanced hydrodynamic separator that uses structured flows to augment gravitational forces to separate grit from water. Engineered by Hydro International, the Grit King® is an economical choice for new or existing municipal or industrial wastewater applications.

Performance

- Removes 95% of particles equal to or greater than 75 microns at the design flow rate
- Less than 5% volatile solids and greater than 90% total solids when paired with an Oldcastle grit washing and dewatering system
- Typically less than 6 inches (15 cm) headloss at peak flow

Capacity

- Single units can handle flows as low as 0.25 Mgal/d (1.0 MLD) and multiple units can be provided to handle virtually any flow
- Turndown ratios for a standard design unit are 4:1 from peak to average flow. Note: ratios in excess of 15:1 can be accommodated
- For larger applications, typically flows over 10 Mgal/d (37.5 MLD), the specialized internal components can be mounted in a concrete chamber

Configurations

- The Grit King® is available as either a free standing or in-situ unit for versatile installation.
- Multiple inlet and outlet configurations are available. The inlet and overflow channel may be rotated 360 degrees about the central axis. Overall elevations can be varied to accommodate local site conditions

Design Notes

- All-hydraulic design with no moving parts ensures a long product life
- Internal flow structuring components create a long flow path aiding settlement and maximizing grit capture
- 304 or 316 stainless steel

Applications

- New wastewater treatment plants
- Treatment plant retrofits
- Sediment removal pretreatment for potable water
- Grit removal for industrial effluent
- Pre-treatment for MBR and many other process upgrades
- Grit separation in collection system

Benefits

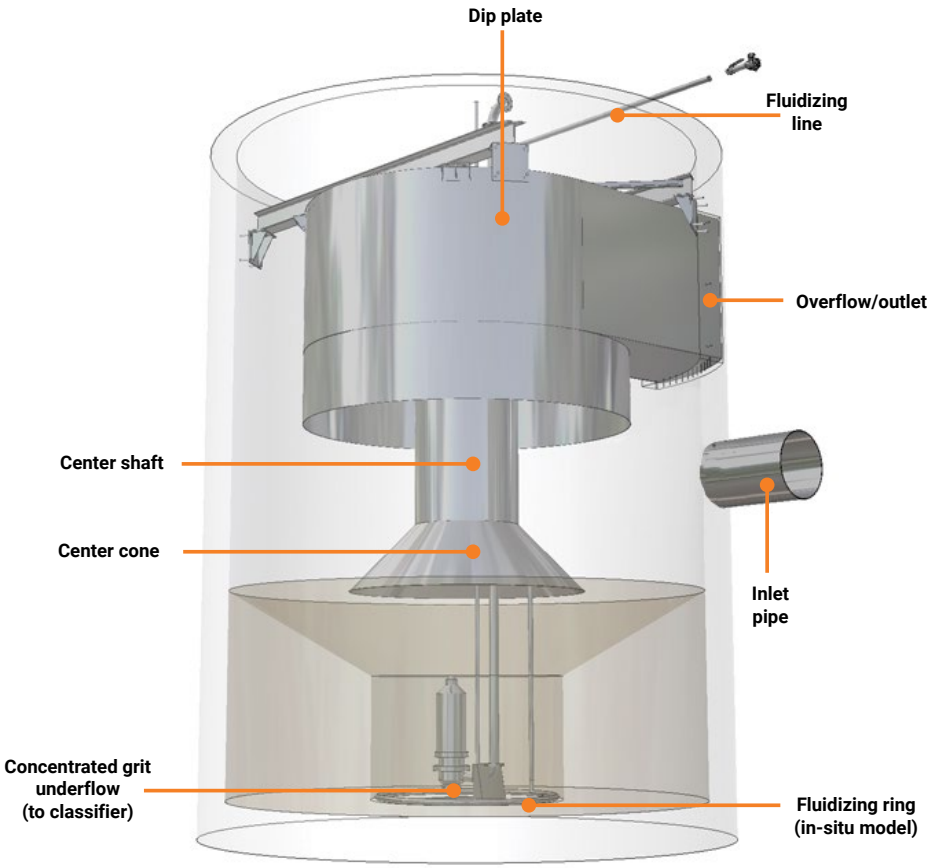
- No moving parts
- No external power source
- Economical to own and operate
- Compact design
- Minimal headloss

How it Works

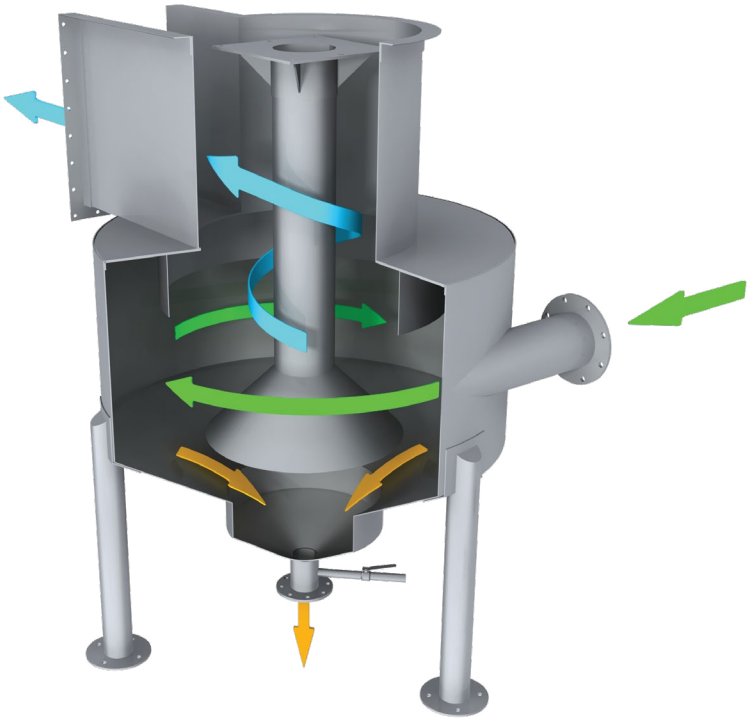
Flow is introduced into the Grit King® via a tangentially positioned inlet causing a rotational flow path around the dip plate. The flow spirals down the wall of the chamber as solids settle out by gravitational forces and forces created by the rotating flow (green arrow in the graphic to the right). The grit collects in the grit pot as the center cone directs flow away from the base, up and around the center shaft into the inside of the dip plate (blue arrow).

The upward flow rotates at a slower velocity than the outer downward flow. The resulting “shear” zone scrubs out the finer particles. The concentrated grit underflow is pumped or gravity fed to a grit classifier for dewatering (yellow arrow). The result is clean dewatered grit with low organic content.

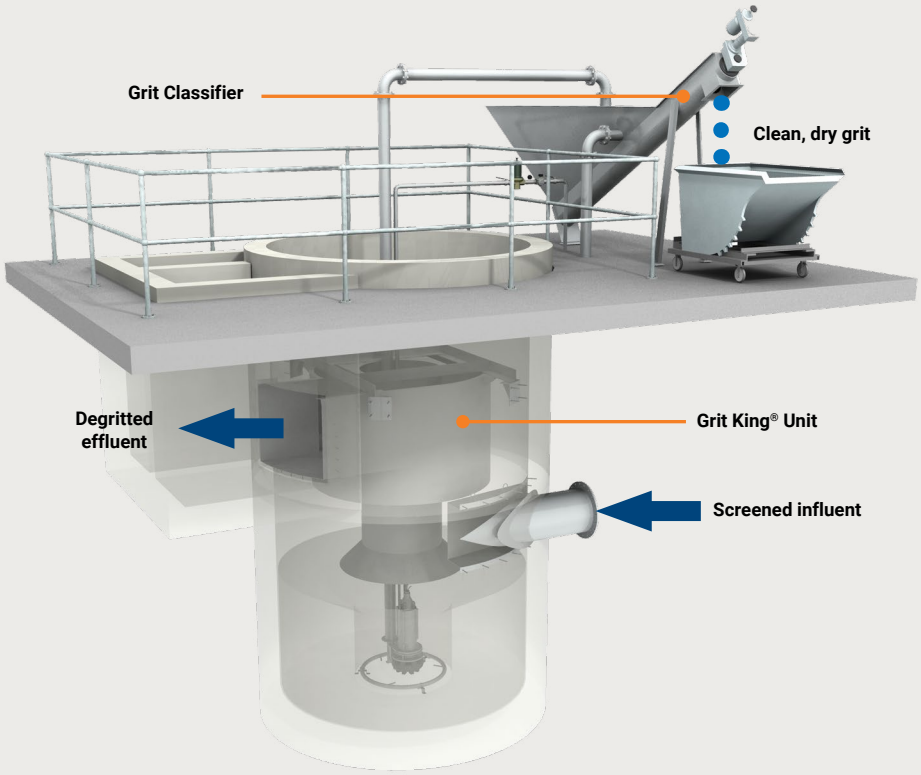
Visit the Grit King® product page to learn more. Grit King®



Grit King® Flow Path



In-Situ Grit King® and Classifier System



Case Study

Grit King System Saves the Plant From a Near Disaster.

When a pump malfunction directed sand from the effluent filters to the plant drain (rather than back to the filter beds) their newly installed Grit King grit removal system not only kept the plant running, it alerted plant operators that there was a problem.

Owner
Chehalis Regional WRF - Chehalis, WA

Plant Equipment
Two (2) 11' (3.4 m) Diameter Free Standing Grit King® Units

One (1) Grit Classifier

Project Parameters at Start-Up
1.3 Mgal/d (57 L/s) Average Flow

13 Mgal/d (50 MLD) Peak Flow

Ojective

Chehalis was building a new WWTP and required a grit removal system that was simple to use with minimal moving parts.

Solution

Oldcastle's Grit King® grit removal system not only prevented grit from impacting the plant, it also protected the plant from being overwhelmed when a sand filter recirculation pump sent filter media back into the headworks.

The city of Chehalis straddles Interstate 5 at a point almost exactly halfway between Portland and Seattle. The city was originally called Saundersville in honor of the person who donated the land to the city. The city is now named after the Chehalis people, a native tribe of western Washington State. The city of Chehalis got its start in 1873 as a settlement around a warehouse next to the railroad track. The first wastewater treatment plant was built in 1948. Following several upgrades over the years, the plant became unable to keep up with projected future flow rates and stringent Department of Ecology permit requirements. A new design was started for the Chehalis Regional Water Reclamation Facility, a completely new plant to be located on a new site, 200 yards to the northeast.

The grit system was not the most important process consideration when designing an entirely new treatment plant in Chehalis. When a pump malfunction directed sand from the effluent filters to the plant drain (rather than back to the filter beds) the installed Grit King grit removal system not only kept the plant running, it alerted plant operators that there was a problem.

A design-bid-build project, the plant was constructed to treat an average flow of 1.3 Mgal/d (57 L/s), with peak flows in excess of 10 Mgal/d (38 MLD) three to four times per year. When the Chehalis River drops below a certain level, up to 3.5 Mgal/d (16 MLD) is treated to reclaimed water standards and used to irrigate the city's 250 acre (1 km^2) poplar tree plantation.

Flow is pumped to two parallel screens with ¼" (6 mm) openings in the elevated headworks. Flow is then directed to two 11' (3.4 m) diameter free-standing Grit King units, with shared influent and effluent boxes, designed to remove 95% of all grit 150 micron (µm) and larger at a peak flow of 13 Mgal/d (50 MLD) through both units. Collected grit is washed and discharged from the bottom of the Grit King units into a classifier for dewatering. Grit and screenings are disposed of at the landfill.

From the headwords, flow is treated in one or more of three Sequencing Batch Reactor (SBR) tanks, depending on flow, each having a capacity of 1.55 million gallons (58.9 million liters). During dry weather the wastewater is chemically treated with alum prior to sand filtration and UV disinfection and then pumped to the City's poplar tree plantation. Sludge is dewatered by a belt filter press then lime pasteurized and heated to produce a class A biosolid which is sold to local farmers.

According the Wastewater Superintendent at the time of installation "We were building a brand new plant with all new processes so the grit system was the least of our worries, it just needed to be simple to use and have minimal moving parts. The Grit King system met this requirement. Construction of the new system was easy. It was delivered to the site and the contractor bolted it into place within a couple of days."

The Grit King is an advanced hydrodynamic separator that augments gravitational forces to effectively separate grit from water. Internal flow structuring components create a long flow path for solids, aiding settlement and maximizing grit capture in an all-hydraulic device. The Grit King is available as a free standing or in-situ unit. The free standing unit often requires no grit pump making the classifier screw the only mechanical component on the grit system.

After start-up of the new grit system it typically filled their 1 cubic yard (0.7 m^3) grit dumpster every week. Shortly thereafter, they noticed something was amiss when the dumpster began filling up within days. It quickly became apparent that the material in the dumpster was identical to the high grade silica sand used in the sand filters. An investigation determined that the discharge to one of the airlift pumps designed to cycle the sand back through the filters was plugged. Rather than being directed into the sand filter the sand ended up in the plant drain system which is directed back to the headwords.

The filter sand was captured and removed by the Grit King units, protecting the SBRs downstream. Once the cause of the problem was identified, the fluidizing and discharging of grit from the Grit King units was performed more frequently to purge the system of the increased load. The plant continued to successfully operate during the entire event with no equipment shutdowns.

"The Grit King system worked great without any problems" said the plant superintendent about the event. Regarding normal operation he commented "Since its installation the system has been excellent. It has been virtually trouble free. Our grit is cleaner with fewer odors." Each year one of the three SBRs is cleaned. The superintendent estimates the amount of grit in the bottom of one basin, measuring 97 feet (30 m) on each side - 9,409 ft^2 (874 m^2) is "maybe a wheelbarrow full".

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