

Which Advanced Grit Management® system is right for you?



Choose Your Weapon for the War on Grit

The HeadCell® and Grit King® are both excellent choices as the first step in an Advanced Grit Management system or for sand removal at surface water treatment plants. Removal efficiency with the HeadCell® is based on surface overflow rate (gpm/ft²) while the efficiency of the Grit King® is based on a combination of surface overflow rate and volumetric loading rate (gpm/ft³). Both utilize a low-energy vortex flow regime which generates a sweeping action in the boundary layer on the base of the vessel to move material to a central location for collection. The HeadCell® achieves effective grit capture by providing a large amount of surface area in a very small footprint. The Grit King® uses a structured flow regime to eliminate short-circuiting and extend particle residence time allowing fine grit particles to be retained.

Advanced Grit Separation Comparison Points

HeadCell®		Grit King®
Headworks grit separation Sand removal at water treatment plants	Applications	Headworks grit separation Sand removal at water treatment plants
95% removal of grit ≥ 75 micron	Performance	95% removal of grit ≥ 75 micron
Small	Footprint	Medium
≤ 12" (30 cm)	Headloss (at peak flow)	≤ 12" (30 cm)
No moving parts within vessel	Mechanical Components	No moving parts within vessel
Free Standing (9' (2.7 m) diameter & smaller) or In-situ	Construction	Free-standing (12' (3.7 M) diameter & smaller) or In-situ
Free Standing: 8.7 mgd (32.9 MLD) In Situ: 46.1 mgd (175.1 MLD)	Max Flow in Single Unit	Free Standing: 4-8.8 Mgal/d (15.1-33.3 MLD), depending on cut point. In Situ: approx. 48 Mgal/d (181.7 MLD)
Yes – always	Is Grit Washing & Dewatering Required?	Yes if turndown* > 3:1 No if turndown* < 3:1
Continuous water requirement, max. 20 gpm (1.26 L/s)	Water Requirement (50 psi)	Intermittent water requirement, max. 50 gpm (3.1 L/s)
Easy, in basins with sufficient depth	Ability to Retrofit	Moderate to difficult
Continuous or intermittent	Grit Underflow	Typically intermittent
Dry-pit or submersible on larger diameter units only	Pump Configuration	Dry-pit or submersible on larger units. Gravity discharge possible on free standing units.

*Turndown – ratio of peak to average flow

Both systems provide industry leading performance.

When Would I Choose Grit King® over HeadCell®?

The Grit King® is available in free standing units making it a very attractive option for relatively small elevated headworks. In this configuration, the grit underflow can often flow by gravity to the dewatering unit eliminating the need for a grit pump. The in-situ Grit King® is applicable where the peak to average flow varies widely (i.e. 100 year flood) and where loss of performance at the infrequent ultimate peak flow is acceptable. Another Grit King® option is available for smaller plants (peak flow <3 Mgal/d (11.4 MLD)) using polyethylene internal components in a precast concrete tank to provide a cost-effective option for Advanced Grit Management®.

When Would I Choose HeadCell® over Grit King®?

HeadCell® system layout and design is very flexible as four different tray diameters are available and tray stacks can vary from 2 to 12 trays. The same amount of surface area can be provided in a short stack of large diameter trays or in a taller stack of smaller diameter trays, therefore layout can require a larger footprint and shallower basin or smaller footprint and deeper basin, whichever best fits site requirements. The HeadCell® can also be provided in an expandable design to accommodate a lower flow at time of initial installation, with expandability to a higher, future capacity. A HeadCell® system is typically more cost-effective when turndown exceeds 3:1 and both the HeadCell® and Grit King® would require a grit washing and dewatering system. The HeadCell® is more compact, compared to the Grit King®, in both footprint and depth and is typically preferred when space is a consideration. For these and other reasons the HeadCell® is often the equipment of choice for Advanced Grit Management®.

What are the Hydraulic Limitations of the Grit King® and HeadCell®?

The peak hydraulic capacity of any HeadCell® is at a surface overflow rate of 23.6 gpm/ft² which corresponds with a removal efficiency of 95% of all grit 212 micron and larger. The peak hydraulic capacity of a Grit King® is typically limited by the inlet pipe diameter, which is somewhat adjustable, however as loading rates increase headloss also increases and removal efficiency decreases.

When Would I Pump Continuous or Intermittent?

In many instances, constant and continuous grit pump operation is recommended to ensure the pump is in operation during wet weather events when higher grit volumes enter the plant and the pumped grit slurry remains at or below 1% TS to reduce potential for plugged piping and to optimize performance of the washing and dewatering equipment.

Intermittent Pump Operation may be Considered by Plants with:

- Strong energy / water use reduction drivers
- Wide peak to average flow ratios
- Low overnight influent flows
- Designs that accommodate high future flow rates while current flow rates are much lower
- Low influent grit loading

When operating the grit system intermittently, it is suggested the system provides for continuous operation during wet weather events when higher grit volumes enter the plant.

What is Meant by Turndown Ratio?

Turndown ratio is relationship between the peak and average flow rate. For example, a treatment plant with an average flow of 10 Mgal/d (37.9 MLD) and peak of 30 Mgal/d (113.6 MLD) would have a 3:1 turndown ratio. Grit King® systems with turndown ratios higher than 3:1 typically require a grit washing and dewatering system while systems with lower turndown often only need dewatering.

Learn more

To learn more about how **Hydro International's Advanced Grit Separation Solutions** can improve your plant, visit hydro-int.com, or contact us:

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