Grit King Inlet Design & Hydraulics

Overview of Hydraulic Design Considerations

Wastewater Application Sheet

Grit King® units are typically designed for less than 12 in. (30 cm) of headloss at peak hydraulic capacity and a 3-5 ft/sec (0.9-15 m/s) influent pipe velocity. Headloss (HL) is defined as the difference between static water level at the inlet of the Grit King® to the free water surface in the overflow channel, assuming a free discharge. Headloss can be calculated with the following equation:

$$H = (K_L * V^2) / 2G$$

Where:

- **H** = Headloss (ft)
- **K_L** = Loss coefficient (2 for the Grit King®)
- **V** = Velocity (ft/s)
- **G** = Acceleration due to gravity (32.17 ft/s²) (9.81 m/s²)

Note: This equation does not account for the Depth of Flow (DOF) in the effluent channel. *8-12 in. (20-30 cm) is typical headloss at peak flow but can vary based on specific site conditions.

The table below demonstrates an example Grit King® system and the HL and DOF resulting from different outlet and inlet configurations.

14 foot (168 in.) Diameter Grit King® Separator						
Flow (MGD)	20 in. inlet dia. 40 in. overflow		24 in. inlet dia. 48 in. overflow		30 in. inlet dia. 60 in. overflow	
	HL (in.)	*DOF (in.)*	*HL (in.)*	*DOF (in.)*	*HL (in.)*	*DOF (in.)*
7.5	11	12	6	10	3	9
4.5	4	9	2	7	1	6

METRIC UNITS 4.3 m Diameter Grit King® Separator						
Flow (L/s)	0.5 m inlet dia. 1 m overflow		0.6 m inlet dia. 1.2 m overflow		0.7 m inlet dia. 1.5 m overflow	
	HL (cm)	*DOF (cm)*	*HL (cm)*	*DOF (cm)*	*HL (cm)*	*DOF (cm)*
329	28	31	15	25	8	23
197	10	23	5	18	3	15

Depth of Flow is found utilizing a binary search method based on effluent channel width, which is typically two times the influent pipe diameter. The water level upstream of the Grit King® DOF in the influent channel or influent Hydraulic Grade Line (HGL) is calculated by adding the water elevation required by the effluent weir to the peak headloss through the Grit King® unit.

For Depth of Flow numbers or headloss based on a particular project's parameters consult the project specific proposal or contact Hydro International at (866) 615-8130.