

4 X HUBER VORMAX VORTEX GRIT CHAMBER SCREENS IN SAUDI ARABIA

CASE STUDY



OVERVIEW

There are different types of grit traps: longitudinal grit traps (un-aerated or aerated) and circular grit traps. Circular grit traps are subdivided into two subcategories: simple hydraulic units and Vortex plants which, independent of the flow rate, keep constant the rotary speed of the wastewater within the grit trap. Four of such VORTEX grit trap plants, which we call VORMAX, were put into operation in Dharan a year ago.

THE DESIGN

The VORMAX units certainly cannot complain about too little sand there in Saudi Arabia, the country of sand. A STEP SCREEN® Vertical SSV is installed upstream of each VORMAX to ensure perfect grit removal. The VORMAX units are designed for the maximum flow rate of 876 l/s each so that 90% of grit of 200 µm grain size is separated. The function principle of the VORMAX is based on the physical principle of centripetal force. A centripetal force is defined as to make solid particles follow a curved path towards the centre of curvature of the path. This principle is also known as the tea cup effect. The slowly turning stirrer in the grit trap creates a constant circular motion with the result that the grit moves from the bottom towards the centre. But the foundation for well functioning grit removal is laid already in the inlet.

A regular and constant flow downstream of the step

screen up to the grit trap bottom is the key. There are no bottom steps in the grit trap inlet and no baffle plates that could hinder grit removal efficiency. The stirrer has a slowly turning, strong gear motor. The service factor for this gear drive is dimensioned to factor 5 to ensure sufficient power is permanently available. For the increased life of the stirrers their propellers are hard metal reinforced for wear protection. The separated grit is drawn to the centre of the grit trap, as explained above, and dropped automatically into a deeper pump sump from where the grit-water mix is delivered to the grit classifier by an above-ground installed centrifugal pump. The grit trap outlet is designed to ensure hydraulic loss is kept to a minimum.

OUTCOME

After a year in operation the plants have successfully coped with the first wandering sand dunes coming in. The overall concept with SSV Step Screen® units, WAP wash presses, RoSF 3 grit classifiers and the four VORMAX grit traps represents a quite impressive solution.