

INDION

Automatic Valveless Gravity Filter

Introduction

As the name suggests Automatic Valveless Gravity Filter (AVGF) operates automatically, on the loss of head principle. This is generally accepted as being the most accurate control besides the constant analysis of the filtered water turbidity, which is seldom practical on a continuous basis. The head loss at which AVGF initiates backwashing is determined by the height of the inverted U-turn at the top of the backwash pipe. The level of water in this pipe is proportional to the head loss across the filter bed.

Product Description

AVGF consists of a tank divided into three functional compartments, a backwash storage space, a filter bed compartment and a collection chamber under a false bottom. The backwash storage space is designed to hold the adequate amount of backwash water. The filter bed compartment normally contains standard fine filter sand supported on a collection system of disc type plastic strainers, which provide uniform collection of filtered water and uniform distribution of backwash water without the use of gravel. Standard filter sand or dual media (sand and anthracite) is generally used as the filter media. The AVGF can be built in cylindrical construction of steel or rectangular of concrete. The standard models are available in steel.

Working Principle

Filtration

Unfiltered water from the constant head box

(which is used to provide a free fall at all times for water entering the filter and to prevent a pressure line from feeding directly into the filter) passes down the inlet pipe and enters the filter through an inlet wier box. Any air trapped in the unfiltered water is released through the small vent pipe. The unfiltered water flows downward through the filter media and the strainers into the collection chamber. As the unfiltered water passes through the bed of filter media, the dirt suspended impurities are trapped in the bed. The clean water from the collection chamber flows upward through the effluent duct, and when the backwash storage compartment has been filled, it flows through the effluent pipe to service.

As the filter bed collects dirt during the filter run, the head loss increases gradually, and the water level slowly rises in the inlet pipe and in the backwash pipe. Just before the water passes over into the downward section of the latter one, a self-actuated primer system evacuates air from the pipe. This pulls water rapidly over so that a large volume of water flows down the backwash pipe and initiates the siphon action that backwashes the filter.

Backwashing

Once the siphon has been established between the filter and the sump, the pressure immediately above the filter bed is lower than the pressure in the backwash storage compartment. This causes water from the backwash compartment to flow down the through the effluent duct, into the collection chamber and upwards through the strainers, expanding the bed and cleaning it. The backwash water with the dirt it has removed from

the filter bed then passes up the backwash pipe, over the U-Bend and out through the sump to waste. The backwash rate actually starts at a very high rate (around 2.62 – 2.68 ft/min) and gradually slows down to around 0.82 ft/min at the end. The performance of the various installed units has indicated that diminishing backwash rate satisfactorily cleans the filter bed. The high initial flow rate provides greater initial turbulence to wash the sand. The lower flow at the end of wash permits the bed to settle evenly and smoothly.

The backwash action continues until the level of the water in the backwash storage compartment drops below the end of the siphon breaker. When it does, air is admitted to the top of the backwash pipe and backwashing stops.

Rinsing

The inlet water automatically resumes its downward gravity flow through the filter bed as soon as the siphon is broken. The first water to be filtered rinses the bed and then flows up into the backwash storage compartment where it is stored for the next backwash. When this compartment is filled to the level of effluent pipe connection, it goes no higher, and all water filtered after this flows directly to service.

When more than one filter is used, the flow is divided equally among all the filters by means of a flow splitting box. In addition, an interlock between filters is provided to prevent more than one unit backwashing at any time.

Features

- Automatic backwash, hence reliable
- No need of manpower - as the filter operates automatically

- No need of expensive valves, instrumentation, and backwash pumps and hence cost competitive.
- No moving parts, hence less maintenance
- Uniform high quality treated water
- No need of expensive power, hence low operating cost
- Compact and modular design, hence low expansion and installation cost
- Even though AVGF is automatic, the backwash can be initiated manually, however, external water source at 20 – 30 psi has to be provided
- Space saving

Applications

Ideal for side stream filtration

In side stream filtration the suspended solids will be very high in the beginning of operation, but with time (several days typically) it will drop significantly (usually below 20 ppm). The AVGF is widely used to reduce turbidity of cooling tower waters. This improves cooling tower efficiency and reduces maintenance and cleaning costs.

Treatment for portable water

Internationally AVGF is approved and used by majority of Municipal corporations for treatment of potable water.

Polishing filter for domestic sewage as well as industrial effluent

AVGF (Municipal type) can be incorporated as a polishing filter after secondary clarifier of the sewage/effluent treatment plant where usually load of less than 40ppm can be anticipated.