

AGF

AUTOMATIC GRAVITY SAND FILTERS... THE ONLY AUTONOMOUS VALVELESS SAND FILTER

AGF SERVES

AUTOMOBILE
BREWING
BRINE PROCESSING
CHEMICAL
FOOD
MINERALS
MINING
MUNICIPAL WATER
MUNICIPAL SEWAGE
OIL AND GAS
PETROCHEMICAL
PHARMACEUTICALS
PLASTICS
POWER GENERATION
REFINING
RUBBER
STEEL
TYRE



SINGLE BED VERSION



DOUBLE BED VERSION

AGF PROTECTS

DRINKING WATER
FILTRATION/IRON AND
MANGANESE REMOVAL.
PLANT SUPPLY WATER.
TERTIARY TREATMENT
AND FINAL EFFLUENT
FILTRATION.
SIDE-STREAM FILTRATION
OF FRESH WATER
COOLING SYSTEMS.
MAKE-UP WATER FOR
COOLING SYSTEMS.

AGF FEATURES

NO MOVING PARTS.
NO BACKWASH
PUMPS NEEDED
FOR OPERATION.
NO ELECTRICAL
REQUIREMENTS FOR
OPERATION.
NO PRESSURISED WATER
REQUIRED EITHER GRAVITY
FLOW OR LOW LIFT PUMPS
TO GET FEED TO INLET TANK.
IDEAL FOR USE IN ZONED
HAZARDOUS AREAS.

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AGF GRAVITY SAND FILTERS

1. INTRODUCTION

The Self Cleaning Autonomous Valveless Gravity Sand Filter consists of a 3-compartment vertical steel tank divided into a backwash storage compartment, a filter-bed compartment and a filtrate collection compartment. It operates entirely without any outside energy supply, whereby water is clarified solely through the process of sand filtration. Backwashing occurs on the loss of head principle as described in section 2. The design eliminates the need for backwash pumps and valves.

The backwash storage compartment is designed to hold an adequate amount of backwash water. It always fills to the same height thus providing a constant backwash volume. Also, as the level of water in the backwash compartment drops, the backwash rate diminishes, so that the backwash rate actually starts at about 44 m/h and gradually slows down to 30 m/h at the end. Extensive experience with this diminishing backwash rate has indicated it to be completely satisfactory for cleaning the filter bed. The high initial flow rate provides greater initial turbulence to wash the sand. The lower flow at the end of backwashing permits the bed to settle evenly and smoothly.

The filter-bed compartment contains fine filter sand. Unique strainers uniformly collect the filtered water and distribute the backwash water without the need for any gravel layer.

The unit operates to a mere 1,2 to 1,5 metres head loss. Experience has shown that under these conditions a surface wash and/or an air backwash is not required to break the surface mat to achieve effective regeneration of the filter bed.

2. PRINCIPLE OF OPERATION

The raw water fed to the head tank (2) flows through the inlet pipe (3) and the loop tank (4) and enters the filter-bed compartment (7) directly above the filter-mass (10). The air entrapped hereby accumulates in the upper part of the loop tank (4) and is carried off via the vent (5). The water subsequently sinks through the filter-mass (10) and the strainers (9) into the filtrate collector (12). Filter-mass (10) retains dirt and suspended matter.

The filtered water then flows from the collector chamber upward through the risers (13) and (15) and filtrate outlet (14) to service as soon as the backwash storage tank (17) is filled.

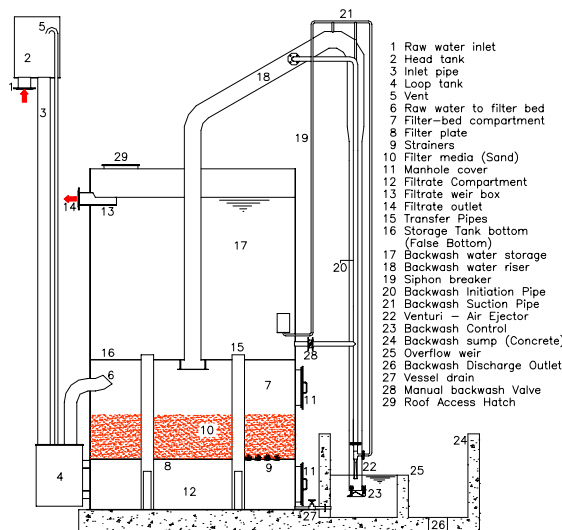
Accordingly, as the filter bed collects dirt during the filter run, the head loss increases. This is compensated by the water level slowly rising in the inlet pipe (3) and the backwash pipe (18) proportionally. Just before it reaches the top of the backwash pipe turn, water enters the feed line (20) of the suction jet pump (22).

After having passed the pump, it reaches the sump (24) whereby it evacuates the air from the backwash pipe (18) via the suction line (21). The resulting suction pulls water rapidly over so that a large volume of water flows down the pipe starting the siphon action that backwashes the filter.

During the siphon action, approximately 5 times as much water is discharged through the backwash pipe (18) as can be fed through the inlet pipe (3). This immediately reduces the static pressure above the

filter-mass (10) to below the pressure in the backwash storage tank (17). The water from the backwash storage tank flows down through the ducts (15) into the filtrate collector (12) and then penetrates upwards through the strainers into the filter-bed compartment (7) expanding the filter-mass and cleaning it. The dirt removed from the filter-mass is discharged via the backwash riser into the sump (24) and from there to the drain channel (26). Backwashing continues until the water level in the storage tank clears the orifice of the siphon breaker (19) that now admits air to the backwash pipe (18) interrupting the siphon and thus the backwash flow. The inlet water resumes its downward gravity flow through the filter bed, automatically rinsing it again. The first filtrate after backwashing which can generally be not of the same high quality as the standard filtrate, is however, not discharged to waste. It fills the storage tank up to the filtrate outlet level first, thus serving a double function. Filtered water only flows to service when the storage tank is filled.

Units are available for flows up to 1,130m³/hr through a single vessel up to 12m diameter and a double bed version is also available up to a maximum flow of 2,260m³/hr, the principle of operation of which is similar to the above. Using double beds units has advantages in certain installations relating to space saving, transport and instantaneous discharge while backwashing.



AGF AUTONOMOUS VALVELESS AUTOMATIC GRAVITY SAND FILTERS

FEATURES AND ADVANTAGES

- **NO MOVING PARTS**
- **NO BACKWASH PUMPS REQUIRED FOR OPERATION**
- **NO ELECTRICAL REQUIREMENTS REQUIRED FOR OPERATION**
- **STORES OWN RESERVOIR OF BACKWASH WATER FOR BACKWASHING PURPOSES WHEN REQUIRED**
- **OPERATION SO SIMPLE THAT FILTERS CAN BE “FITTED AND FORGOTTEN”**
- **HIGHER FLOWS CAN BE PUT THROUGH A SINGLE UNIT AGAINST THOSE THAT CAN BE ACHIEVED WITH MOVING BED FILTERS THUS LESS UNITS REQUIRED**
- **MINIMUM SAND LOSS OR CARRYOVER OCCURS**
- **WITH EASY INSTALLATION CAN EASILY BE RETROFITTED TO EXISTING SYSTEMS**
- **NO PRESSURISED WATER REQUIRED EITHER GRAVITY FLOW OR LOW LIFT PUMPS TO GET FEED TO INLET TANK**
- **ON COOLING SYSTEMS THE RECIRCULATING LINE PRESSURE CAN BE USED TO FEED THE FILTER ON A SIDE-STREAM BASIS WITH NO REQUIREMENT FOR POWER WHATSOEVER.**
- **IDEAL FOR USE IN ZONED HAZARDOUS AREAS**
- **MINIMUM MAINTENANCE AND OPERATOR INVOLVEMENT**
- **THE HUMAN ERROR FACTOR IS ELIMINATED AS THE FILTERS CANNOT BACKWASH TOO SOON OR TOO LATE, TOO FAST OR TOO SLOW, TOO LITTLE OR TOO MUCH**
- **FOR MANY APPLICATIONS NO AIR REQUIRED FOR SCOURING PURPOSES AND THEREFORE FOR MANY APPLICATIONS NO AUTOMATION OR SOPHISTICATED CONTROLS REQUIRED**
- **DOUBLE BED VERSION AVAILABLE SPACE AND COST SAVING**

AGF TYPICAL APPLICATIONS



Chemical Industry South Africa Side-Stream Filtration of Cooling Water Circuit 1 Double Bed Flow 200 m³/hr



Municipal WTW UK Drinking Water Iron and Manganese Removal 2 Single Beds Combined Flow 890 m³/hr



Municipal STW UK Tertiary Treatment Before Discharge to River 3 Single Beds Combined Flow 480 m³/hr



Food Industry UK Final Effluent Filtration Prior to Discharge to River 2 Single Beds Combined flow 320 m³/hr



Municipal WTW Namibia River Water Filtration for Drinking 3 Single Beds Combined flow 420 m³/hr



Gold Mine Mali River Water Filtration for Process 2 Single Beds Combined flow 120 m³/hr

AGF FILTER BACKWASHING

