

Permutit® Filters

AVGF® Gravity Filters

Operating Principles

Filtering:

The AVGF® gravity filter operates on the loss of head principle. Raw water enters the filter chamber, flows down through the filter media into the collection chamber and up through the effluent duct to service.

As the filter bed collects dirt during the filter run, head loss increases and the water level raises in both the inlet and backwash pipes. When the water starts flowing over and into the downward section of the backwash pipe, a siphon action occurs and backwash begins.

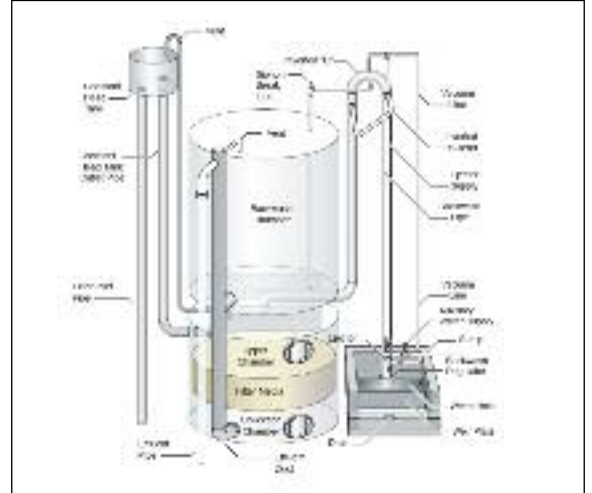
Backwashing:

Flow through the backwash pipe reduces pressure immediately above the filter bed. This draws water from the backwash storage compartment down through the ducts and up through the strainers expanding the filter bed and cleaning it, then discharging to waste.

Back-washing continues until the backwash water level drops below the end of the siphon breaker. This admits air to the top of the backwash pipe terminating the siphon action and backwash. On multiple unit installations, the units are interlocked so that only one can backwash at a time.

Rinsing:

At this point inlet water resumes its flow down through the filter chamber automatically rinsing, settling and leveling the bed. This rinse water then flows up into the backwash storage chamber where it is held for the next backwash. When water rises to the effluent outlet level, all filtered water then flows to service.



Filter Media:

Standard filter sand or anthracite is generally used as the filter media. However, other types of filter media such as Zeo-Rex® (manganese zeolite) and Neutralite® or combinations (Dual Media) may be specified to meet particular treatment requirements. The AVGF® gravity filter requires only simple modification of the wash rate to accommodate such various media. Multiple compartment units can be provided which reduce straight height requirements and backwash flow rates.

Applications

Process Water:

From pretreatment plants of boiler feed water systems in central generating stations to pulp and paper mills and chemical plants, from food processors to automotive manufacturers, the AVGF® gravity filter is repeatedly specified.

Potable Water:

Approved and used by a majority of the states for treatment of potable water supplies and virtually every municipal water treatment application.

Iron Removal:

The AVGF® gravity filter is an ideal filter for removal of oxidized iron from raw waters.

Cooling Towers:

The AVGF® gravity filter is widely used to reduce turbidity of cooling tower waters. A small portion of the circulating water is continuously filtered by an AVGF® gravity filter. This "side stream filtration" greatly lowers overall turbidity in the cooling water. This improves cooling tower efficiency and reduces maintenance and cleaning costs.

Advantages**Minimum Labor:**

The AVGF® gravity filter operates itself, filtering, backwashing, rinsing and returning to service without attention or use of valves, timers or switches.

Minimum Maintenance:

In the AVGF® gravity filter only the water moves. It has no valves, pumps, flow controllers, timers, and no switches, and requires no electricity. This means no maintenance.

Uniform High Quality Effluent:

Because the filtered water is discharged above the filter bed, a negative head loss cannot develop. This eliminates the problems of conventional filters including channeling, mud balls, and upset beds. The net result is uniform high quality effluent water.

Complete Control:

Backwash can be manually initiated at any time regardless of bed condition; this permits convenient adjustment of plant schedules.

Saves Water:

Unlike conventional filters, rinse water through a freshly back-washed AVGF® gravity filter is not discarded to drain, but rather stored and used for the next backwash cycle.

Air Scour Option:

Where water backwash alone is not capable of adequately cleaning the filter bed, an air scour step can be incorporated. However, then valves must be added to the design.

Suggested Specifications**General Requirements**

The system will be complete with all required components, including accessories necessary for proper operation of the equipment even though not itemized herein. The system will conform to the following design specifications:

Tank

The tank will be constructed of 1/4" steel plate with suitable stiffening members and connections for piping.

The tank is physically divided into three (3) functional compartments; the upper tank section (backwash compartment) to store backwash water obtained from the previous rinse operation (internal piping will be provided to prevent rinse water from flowing to service), and the lower tank sections; divided by the strainer plate, the filter compartment (housing the media), and the plenum compartment for filtered water collection.

Industrial design filters are constructed of a continuous cylindrical tank with the backwash and filter/plenum compartments physically separated by a common steel plate. The backwash compartment will be supported by the lower filter/ plenum compartment.

Municipal design filters are constructed in two separate tank sections: the backwash storage compartment and the filter/plenum compartment. The upper compartment is supported by structural steel members resting upon the lower compartment. This separation prevents contamination of the filtered backwash water with dirty backwash water.

Piping

Each filter unit will be furnished with all necessary filter, backwash and control piping required to perform the function of filtering, backwashing and returning the unit to service automatically.

The piping is to be arranged so that each unit will backwash when the total head loss has reached approximately 4'-6'. Suitable interlock piping will be provided for multiple filter installations so that only one filter will backwash at one time. Piping between the head box outlet flange and the inlet flange to the filter compartment, and all interconnecting piping between units is to be provided by the contractor.

Wash Collector

Each unit will have a suitable system for collecting backwash water over the surface area at a rate of approximately 18 gpm per square foot at the start of the wash and 12 gpm per square foot at the end of the wash.

Filter Media

Each filter unit will be provided with a 24" bed of _____ having _____mm effective size with a uniformity coefficient of _____.

Underdrain System

The underdrain of each filter unit will include a steel plate to form a false bottom in the lower section of the filter unit. This plate will be equipped with (plastic disc) (stainless steel screen) strainers spaced on approximately 9-inch centers. The false bottom chamber formed beneath the strainer plate assembly will be connected with the backwash storage chamber by adequately sized riser pipes located within the filter tank.

Inlet Head Tank

Each filter will have one inlet head tank with an outlet connection projecting from the bottom inside of the tank a suitable distance in each direction.

Painting

All steel tankage will be shipped (assembled) (unassembled for field erection) with an external shipping primer. After erection, the contractor will prime and paint the units as per the Painting Specifications.



Automatic Valveless Gravity Filters (AVGF®) Flow Rates from 14 to 1,472 gpm

AVGF® Gravity Filters operate automatically without a single valve, backwash pump, flow control or other instrumentation. Nothing moves but the water. The design and performance of the AVGF® filter has been proven through years of continuous use at hundreds of water treatment facilities worldwide. Widely used in pretreatment plants for boiler feedwater, generating stations, pulp and paper mills and chemical plants, the AVGF® filter is also approved by a majority of states for treatment of potable water supplies.

- For process water, potable water, iron removal and cooling tower sidestreams
- Requiring little labor or maintenance, the AVGF® filter operates by itself – filtering, backwashing, rinsing and returning to service without the use of valves, timers or switches
- Unique design, including the discharge of filtered water above the filter bed, results in consistent high-quality effluent water
- The AVGF® filter rinse water is not discharged to drain, but stored and used for the next backwash cycle to save water

AVGF® Gravity Filters Specifications

SYSTEM SPECIFICATIONS

Model Number	AVGF-3	AVGF-4	AVGF-5	AVGF-6	AVGF-7	AVGF-8	AVGF-9	AVGF-10	AVGF-11
Flow Rate									
2 gpm/sq. feet	14 gpm	25 gpm	39 gpm	56 gpm	77 gpm	100 gpm	127 gpm	157 gpm	190 gpm
3 gpm/sq. feet	21 gpm	38 gpm	59 gpm	85 gpm	115 gpm	151 gpm	191 gpm	236 gpm	285 gpm
Wash Water Flow Rate	147 gpm	263 gpm	412 gpm	594 gpm	809 gpm	1,056 gpm	1,336 gpm	1,649 gpm	1,995 gpm
System Dimensions									
Filter Tank Diameter (feet)	3'	4'	5'	6'	7'	8'	9'	10'	11'
Remaining dimensions vary depending on type and tank diameter. Please request a product specification sheet for dimensions, overall height is 252".									
Pipe Size									
Inlet/Outlet	2"	2-1/2"	3"	4"	4"	6"	6"	6"	8"
Drain	6"	8"	8"	10"	10"	12"	12"	14"	14"
Shipping Weight									
Industrial lb.	2,600	3,500	4,400	5,400	6,300	7,300	8,500	9,700	11,200
kg	1,179	1,588	1,996	2,449	2,858	3,311	3,856	4,400	5,080
Municipal lb.	3,400	4,200	5,400	6,500	7,500	9,000	10,400	11,500	14,100
kg	1,542	1,905	2,450	2,948	3,402	4,082	4,717	5,216	16,396

SYSTEM SPECIFICATIONS

Model Number	AVGF-12	AVGF-13	AVGF-14	AVGF-15	AVGF-16	AVGF-18	AVGF-20	AVGF-22	AVGF-25
Flow Rate									
2 gpm/sq. feet	226 gpm	265 gpm	308 gpm	353 gpm	402 gpm	509 gpm	629 gpm	760 gpm	982 gpm
3 gpm/sq. feet	339 gpm	398 gpm	462 gpm	530 gpm	603 gpm	763 gpm	943 gpm	1,140 gpm	1,472 gpm
Wash Water Flow Rate	2,373 gpm	2,787 gpm	3,232 gpm	3,711 gpm	4,223 gpm	5,345 gpm	6,598 gpm	7,982 gpm	10,300 gpm
System Dimensions									
Filter Tank Diameter (feet)	12'	13'	14'	15'	16'	18'	20'	22'	25'
Remaining dimensions vary depending on type and tank diameter. Please request a product specification sheet for dimensions, overall height is 252".									
Pipe Size									
Inlet/Outlet	8"	8"	8"	10"	10"	10"	12"	12"	14"
Drain	14"	15"	16"	18"	18"	20"	24"	24"	30"
Shipping Weight									
Industrial lb.	12,200	13,700	15,100	16,100	17,300	21,200	25,200	29,000	34,500
kg	5,534	6,214	6,849	7,303	7,847	9,616	11,430	13,154	15,550
Municipal lb.	15,600	17,400	19,700	22,300	25,000	30,100	34,800	41,500	48,300
kg	7,076	7,893	8,936	10,124	11,340	13,653	17,237	18,825	21,908

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