

# New Process Water Filter that Eliminates Biofouling for Optimum Performance

With biofouling and maintenance issues having become a problem with some high efficiency flat-bed media filters over the past few years, Amiad Water Systems UK has launched a new range of filters, called the DVF Series, which has removed these problems to give optimum performance.

It has long been recognised that a flat-bed filter produces the best profile for the filtration of water. However, Amiad identified that traditional media filtration using this design was prone to biofouling due to the static nature of the bed. It was also found to limit the size of the media that could be incorporated as finer media only accentuated this problem and promoted the biofouling process.

It was further discovered that the introduction of a tangential inlet to create a vortex to activate the bed surface to produce an effective scouring action was actually doing the reverse. The vortex inadvertently re-profiled the bed resulting in fluid taking the easiest route which then shortcut the deepest part of the bed where optimum filtration took place. In a double whammy it was found that this vortex created a 'quiet zone' above it where microbiological growth could proliferate.

Previous media filters had also incorporated nozzle devices which emitted fine jets of water to continuously flatten the bed. However, because the water distributed by the nozzles contained the solids from the filter inlet this resulted in the jets blocking, creating additional maintenance.

The Amiad DVF automatic filter has been engineered in the UK as a proven solution to all the problems effecting other high efficiency media filters that are or were available on the market. The DVF Series is an extremely simple but highly effective technology that filters down to 1.0 micron to produce a supply of clean water that is virtually free of solids and has a reduced bacterial count. It is also drinking water approved so the system can be incorporated in the most sensitive applications with the confidence of excellent performance.

The filter uses media which is activated glass rather than the traditional sand as the glass resists microbiological fouling. All the other advantages of a traditional filter design have been retained in terms of the bed height and the inlet system which allows very fine media to be processed so that optimum of performance can be achieved repeatedly.

The patented inlet design incorporates a vortex generating system than ensures the vortex effect is maintained throughout the upper part of the filter vessels. This gives a balanced dynamic within the whole top section of the vessels with no quiet zones. Additionally, a vortex can be created even at minimal flows eliminating the previous issue relating to minimum flow requirements of technologies with vortex generating inlet designs.

The lower nozzles have large orifices so no blockage is possible whilst still maintaining an active regenerating filter bed.

The newly designed backwash nozzle minimises backwash volumes yet further as well as acting as a physical barrier to prevent media migrating downstream with the finest media being larger than the retention capability of the nozzles.

Furthermore this system can be retrofitted to some of the recent high efficiency water filtration technology being used by industry further improving performance and reducing planned maintenance requirements.

The filters are manufactured in standard sizes of 125, 200, 300, 600, 900, 1200 and 2.2 meter diameters allowing flow rates from 0.74m<sup>3</sup>/h up to 150m<sup>3</sup>/h in the larger DVF2200 vessel to be accommodated. They are used for the filtration of municipal water, industrial water, irrigation, oil & gas and closed loop heating systems.

## The Filtering Process

Untreated water enters via the inlet which is located at the top of the vessel and is passed through the patented DVF vortex generator. This pipe has a dual outlet configuration inside the vessel which generates a double vortex. This allows for the solids to be suspended above the filter bed. This leaves the water being cleaned free to pass through the specially constructed media bed with less resistance whilst giving the filter bed longer life before backwashing is needed. The filter bed is constructed of 4 different grades of Active Glass media of which the coarse layer is used at the bottom, followed by 2 additional layers of support media and the special blend top layer. The cleaning process is achieved by backwashing the media.

## The Self-Cleaning Process

Backwashing the filter bed is achieved by either a set time or, if backwashing is needed sooner, a pressure differential gauge which senses the Delta P when it reaches the pre-set value. Once this has been triggered either by time or pressure differential, then the self-cleaning process begins. The inlet valve shuts followed by the process water out valve.

The backwash valve then opens followed by the drain valve. This forces the water being used for backwashing up through the nozzles at the bottom of the vessel, through the filter bed which lifts the solids from the top layer of the media.

Once lifted off the bed it is discharged through the drain which is located at the top of the vessel. When the backwash is finished at a pre-determined time, the valves shut in reverse and filter process is resumed.

Filter Type	DVF 125	DVF 200	DVF 300	DVF 600	DVF 900	DVF 1200
Backwash flow at 2 barg	0.3 m3/h	0.79 m3/h	1.77 m3/h	7.07 m3/h	16 m3/h	28 m3/h
Backwash time	2 – 4 mins adjustable	2 – 4 mins adjustable	2 – 4 mins adjustable	2 – 4 mins adjustable	2 – 4 mins adjustable	2 – 4 mins adjustable
Backwash water volume	1L based on a 2 min cycle	26L based on a 2 min cycle	59L based on a 2 min cycle	240L based on a 2 min cycle	530L based on a 2 min cycle	94 L based on a 2 min cycle
Rated operation voltage	110v or 240v/1/50hz	110v or 240v/1/50hz	110v 240v/1/50hz or	110v or 240v/1/50hz	110v or 240v/1/50hz	110v 240v/1/50hz or
Maximum flow rate	0.75 m3/h	2 m3/h	4.3 m3/h	17 m3/h	40 m3/h	68 m3/h
Inlet/outlet diameter	1" inlet ½" outlet	½" inlet ½" outlet	1" inlet 1" outlet	1 ½" inlet 1 ½" outlet	2" inlet 2" outlet	3" inlet 3" outlet
Design pressure maximum	5 barg	7 barg	7 barg	7 barg	7 barg	7 barg
Min. working pressure	1 bar	1 bar	1 bar	1 bar	1 bar	1 bar
Maximum allowed DP	1.5 bar	1.5 bar	1.5 bar	1.5 bar	1.5 bar	1.5 bar
Maximum temperature	65 degrees	65 degrees	65 degrees	65 degrees	65 degrees	65 degrees
Shipping weight (approx.)	90 kg	280 kg	387 kg	875 kg	2155 kg	3800 kg

## The Control System

An AC controller allows for the backwash timings to be altered to suit the specific site requirements. It also allows for pumps to be added to the system to aid with process and/or backwash flow. There is also a manual backwash facility which will work in conjunction with the set time and differential pressure settings for the filters.

The self-cleaning cycle is initiated as a result of any of the followings:

- Receiving a signal from the pressure differential gauge
- Time interval parameter set at the controller
- Manual start
- Remote access

## Contact