



# HVAC SYSTEMS FILTRATION

COOLING TOWERS • EVAPORATIVE CONDENSERS • HEAT EXCHANGERS



**DECREASE MAINTENANCE COSTS BY 60% - 90% •  
DECREASE WATER CONSUMPTION • REDUCE FOULING**



# **PUROFLUX**

**C O R P O R A T I O N**



# WHY IS FILTRATION IMPORTANT?

*Environmental suspended solids negatively impact efficiency of heat transfer due to airborne silt, dirt, sand, and debris which create contaminants, fouling, corrosion, biological hazards, and scale.*

## FOULING

- Airborne particulate is washed out of the air stream by the cooling tower water as it cascades down the fill. What remains in suspension is pulled into the main outlet and deposited in low flow areas in the system piping, onto the heat transfer surfaces.
- Fouling as thin as .001" within chiller tubes and plate-frame heat exchangers can reduce efficiency by as much as 20% or more!
- Fouling of cooling tower fill and spray nozzles leads to inefficient evaporation.
- Poor water quality can lead to increased scale which can further foul equipment.
- Ultimately, particulate left unchecked between planned maintenance periods leads to scale and fouling creating an overall less efficient system = higher operating costs.



## BIOLOGICAL HAZARD TYPES

- The warm cooling tower water and debris build up provide the perfect harboring ground for bacterial growth.
- Legionella is the main bacteria strain associated with HVAC systems. The particulate build-up also serves as a nutrient for the bacteria to thrive. (ASHRAE Guideline 12-2000 (ASHRAE Standard, Minimizing the Risk of Legionellosis Associated with Building Water Systems))
- Minimizing the amount of debris on heat transfer surfaces will lessen the buildup of diverse biofilm which can support the growth of legionella.



## MAINTENANCE

- Nearly all evaporative cooling equipment are inherently air scrubbers.
- The amount and size of debris in any given cooling system will vary by geographic location, prevailing winds, installation, and many other factors.
- Side stream filtration will significantly reduce the build-up in low flow areas within the system, chiller tubes, cooling tower basins (hot / cold), ultimately reducing the overall maintenance required.
- When applied with cooling tower basin/remote sump sweeper piping; side stream filtration will further reduce the amount of debris settling out in the basin and reduce maintenance even more.



## CORROSION & CHEMICAL USAGE

- By keeping the surfaces free of debris, customers will realize a great reduction of corrosion and potentially save up to 20% of annual chemical costs.
- Debris build-up will keep rust inhibiting chemicals from getting to the surface to provide the intended protective layer.
- Higher concentrations of chemicals are required to combat the bacterial growth beneath the build-up.

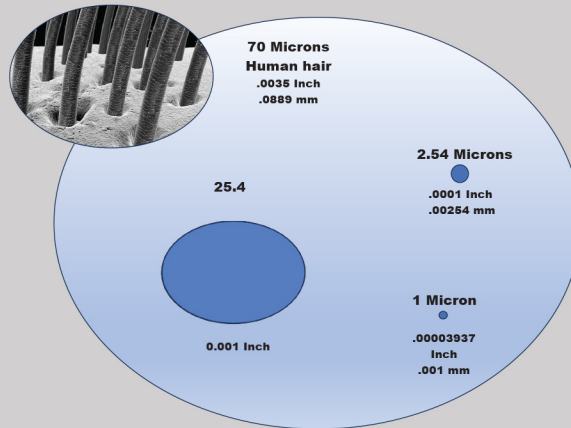


***Filtration/separation along with proper water treatment will lower operating costs, reduce fouling, maintenance, bacteria growth, leading to an efficient operation and longer equipment life.***

# WHICH SIZE PARTICLES ARE PROBLEMATIC?



Any size particulate in high concentrations can be problematic



Particle size vs. volume for a sample of particles<sup>1</sup>

Size of particle	Quantity of particle	Total volume
0.45 microns	212.5 billion particles	0.006 cubic inches
1 micron	212.5 billion particles	0.007 cubic inches
3 microns	212.5 billion particles	0.190 cubic inches
5 microns	212.5 billion particles	0.890 cubic inches
<b>Sub-total:</b>	<b>850 billion particles</b>	<b>1.088 cubic inches</b>
10 microns	37.5 billion particles	1.3 cubic inches
25 microns	37.5 billion particles	18.5 cubic inches
50 microns	37.5 billion particles	150.1 cubic inches
75 microns	37.5 billion particles	504.1 cubic inches
<b>Sub-total:</b>	<b>150 billion particles</b>	<b>674.0 cubic inches</b>

<sup>1</sup>Ref BAC Product & Application Handbook Volume V



# PUROFLUX

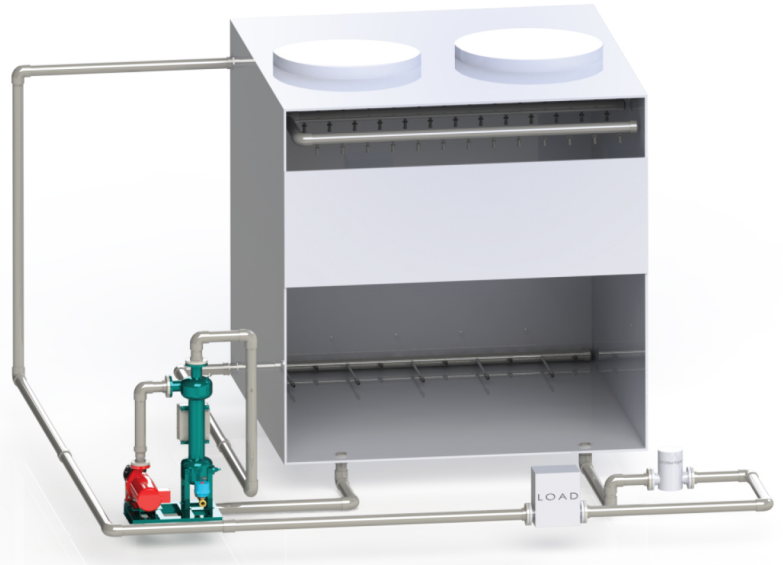
C O R P O R A T I O N

# FILTRATION APPLICATIONS

## BASIN/REMOTE SUMP SWEEPING APPLICATION

Benefits:

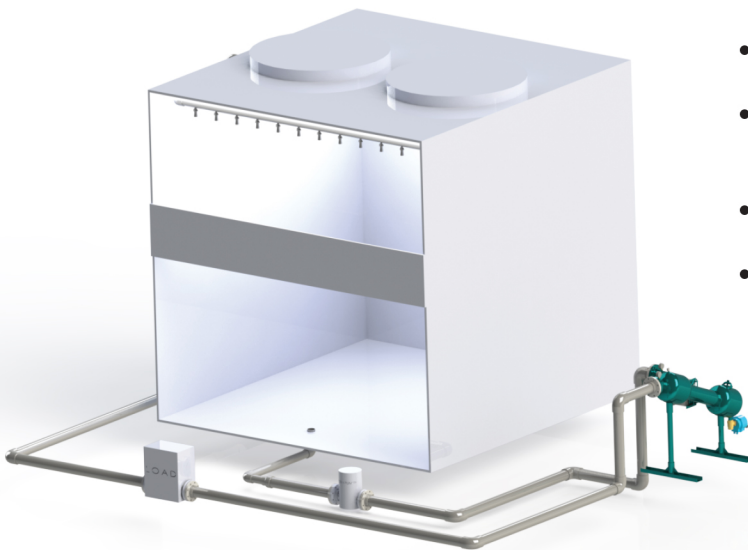
- A filtration option that is economical.
- When full flow is not applicable, and basins are not accessible for maintenance.
- Mainstream flow suspended particles are reduced.
- Can be easily retrofitted.
- A Puroflux recovery vessel offers zero liquid loss options.
- Puroflux Automatic Purge and backwash offer low-maintenance filtration.
- To further reduce downstream heat transfer loss and reduce suspended particles, utilize a Puroflux filter/separator in side stream configurations.



## FULL STREAM APPLICATION

Benefits:

- With zero downtime, filters the flow from the cooling tower to downstream equipment.
- On new and retrofit applications, maintain heat transfer efficiencies.
- Chiller tubes, plate heat exchangers, and compressor cleaning/maintenance intervals can be extended, and maintenance time reduced.
- When utilizing Puroflux controllers and automatic purge valves, filtration maintenance can be practically zero.
- Dedicated application.

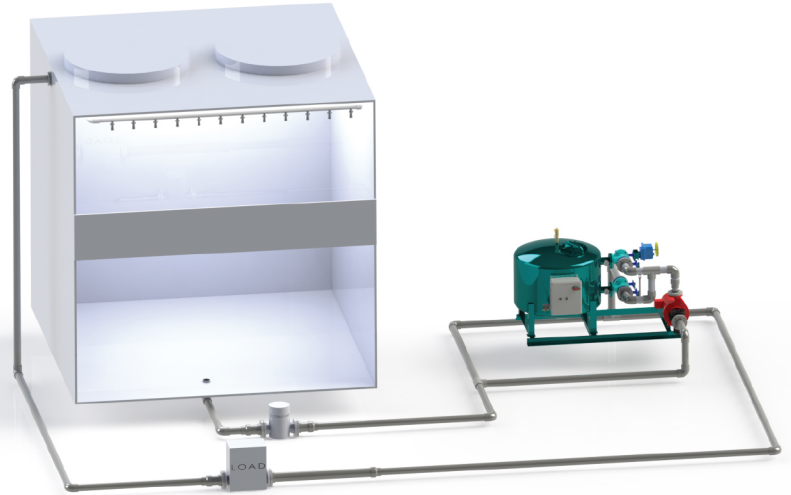


# FILTRATION APPLICATIONS

## SIDE/SLIP STREAM APPLICATION

Benefits:

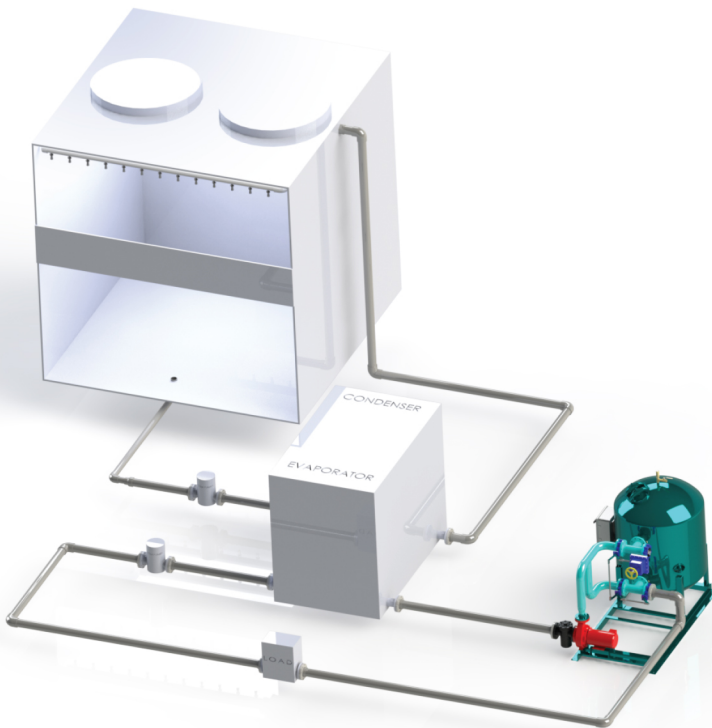
- To reduce downstream heat transfer loss and reduce suspended particles, utilize a Puroflux Media Filter or Separator in Side Stream configurations.
- A filtration option that is economical.
- When full flow is not applicable, and basin sweeping is not an option.
- Mainstream flow suspended particles are reduced.
- Can be easily retrofitted.
- Puroflux Automatic Purge and Backwash Valves offer low-maintenance filtration.
- Sizing can be tailored to meet any requirement based on:
  - o Turnover of system volume (total gallons ÷ X minutes = filtration GPM)
  - o Example A: 11,400 gallons ÷ 60 minutes = 190-GPM filtration for system volume turnover every hour.
  - o Example B: 10,080 gallons ÷ 720 minutes = 15-GPM filtration for system volume turnover twice daily.
  - o A percentage of system flow (between 2.0% and 25%)



## CLOSED LOOP APPLICATION

Benefits:

- By utilizing side stream filtration, remove particles in closed loops (chiller water/propylene/ethylene glycol).
- No spiral wound cartridges or side stream bags to replace.
- Remove suspended particles, dirt, scale, rust, and other contaminants with consistent pressure loss and no backwash requirements, by using a closed loop Puroflux System, including maintaining design efficiencies.





# PUROFLUX HYDROCYCLONE SEPARATOR

PF-64-series - Auto-Purge Package System-150 PSI



PF-63-series - Recovery Package System-150 PSI



PF-61-Series - 150 PSI



PF-65-series - 150 PSI



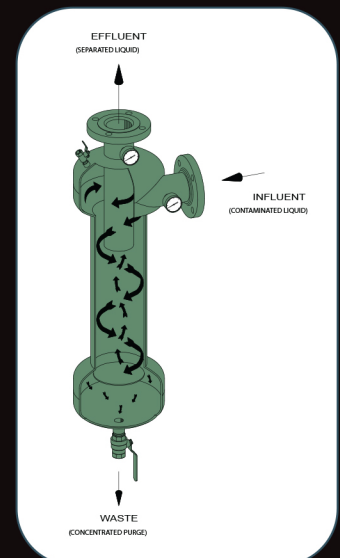
## HOW THEY WORK

### Hydrocyclone Separator

The basis of solid-liquid separation in the Puroflux PF-60 series separators is the centrifugal forces created within the separator. Initial separation takes place as the pressurized carrying fluid enters tangentially into the upper chamber. A downward helical flow causes high centrifugal forces to act on the carrying fluid and forces particulate to the outer wall, and downward to the accumulation chamber. The clean fluid, in the inner vortex, reverses its axial direction and moves upward through the separator outlet.

It is vital that the velocity of the carrying fluid is within the separator's listed ranges to ensure that it will perform as expected. Puroflux provides a flow vs. pressure loss chart for all sizes to aid in the proper selection. It is also important to know that the specific gravity of the solids must be higher than the carrying fluid. Puroflux separators are expected to remove high efficiencies (up to 99% aggregate) of particulate as fine as 25-micron and larger with specific gravity of 2.6 and higher.

Purging is necessary to expel the high concentration of solids build-up and can be performed while the separator remains on-line. The level of solids in the process will dictate the required frequency of purging. If a recovery system is used, the separator will constantly purge at a low rate and the recovery bags will require changing as necessary.





# PUROFLUX FILTRATION

PF-20 series sand filter designed for low pressure open applications- 75 PSI (fusion bonded polyester coated non-code 304-stainless steel) (higher pressure available)



PF-30 series sand filter designed for higher pressure applications- 100 PSI (fusion bonded polyester coated/epoxy lined carbon steel) (higher pressure available)



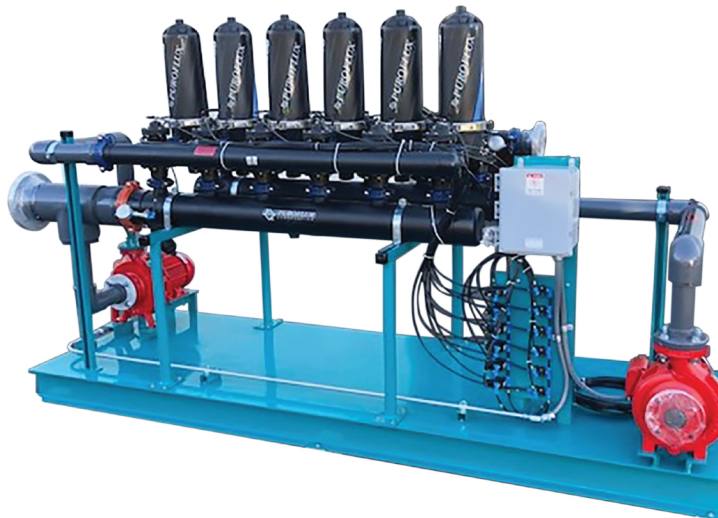
PF-40 series sand filter designed for larger applications-50 PSI (fusion bonded polyester coated/ epoxy lined carbon steel) (higher pressure available)



PF-50 series sand filter designed for closed loop application- 150 PSI (fusion bonded polyester coated/ epoxy lined carbon steel)



PF-70 series disc filters-145 PSI



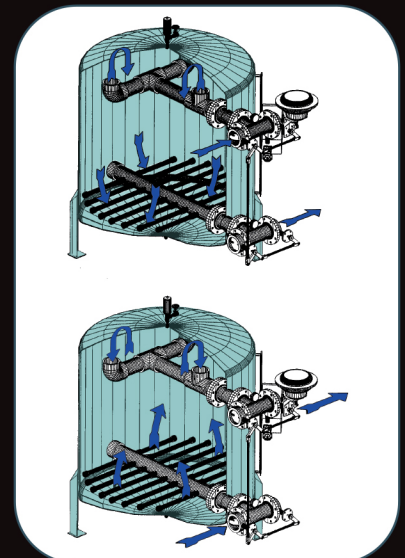
## HOW THEY WORK

### Permanent Media Filter

*Puroflux permanent media filters have a distinct advantage over disposable bags, cartridges, discs, screens, and separators. Media filtration is a positive filtering media that is easily backwashed. Puroflux provides media for all levels of filtration (10- $\mu\text{m}$  as standard with options for 5- $\mu\text{m}$ , 0.5- $\mu\text{m}$  and 0.25 $\mu\text{m}$ ).*

*The influent (dirty process water) is directed through a series of valves and an overdrain for even distribution through the media bed. As the fluid passes through, suspended particulate is trapped between the media and effluent (clean water) is returned to the original source.*

*To expel the captured particulate, a media filter will perform a backwash based on either pressure differential, time clock, or manual initiation. The filter is backwashed by reversing flow through the media bed, causing it to lift and separate (fluidize). This releases the trapped particulate and the fluid carries the particulate up through the overdrain and out to waste.*





**Puroflux** has been leading the industry with innovative concepts and products since 1994. Whatever the requirements, our engineering staff is highly qualified to address every aspect from design to commissioning. Our reputation for excellence in design is unparalleled. In recent years, the demand for more efficient and cost-effective designs has increased dramatically. With our strong technological edge, we have devoted our resources to define and develop new products to meet these demands.

Our dedication and persistence to assure quality products have set the industry standards. Exceeding our customer's expectations is required for each unit produced by PUROFLUX. Before shipment, all equipment must pass a rigorous quality control program, ensuring it meets our high standards and functional expectations before being placed into service.



This is a selected list of clients who have installed Puroflux filtration products. Logos are trademarks of their respective owners. This list is not intended, nor shall imply, any testimonial by the listed customers.

Puroflux equipment is manufactured in the USA.



FILTRATION AND CONTROL SYSTEMS

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