
IDEA2021
Powering the Future: District Energy/CHP/Microgrids
Sept. 27-29 | Austin Convention Center | Austin, Texas

NEW APPROACHES TO SOLIDS REMOVAL AND FILTRATION – A MODULAR APPROACH FOR VARIABLE FLOW RATES

Jim Phene – President

Epiphene

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EFFECTIVE LIQUID FILTRATION SOLUTIONS

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

ISSUES LIES IN THREE MAIN AREAS

Separator Tech

- Doesn't provide 5-microns Removal
- Doesn't Scale – High Flow & High Efficiency Removal
- Won't handle wide range of flows
- High Pressure Losses

Media Filter Tech

- Single Tank – Poor Design
- High Water Loss
- No Filtration During Backflush
- Won't handle wide range of flows

Design Limitations

- Either/Or
- Full Stream Impractical
- No Surge Capability
  - To Save Energy
  - To Address High Loading Events

COMPARISON – SEPARATORS

Separators most effective in removing inorganic particles & solids with specific gravities greater than 1.2

Current Separator Offerings

- Working Pressure Range 12 to 22 PSI to get any separation.
- Typical removal efficiency only removes 74 microns and some down to 40 Microns
- Jar Test - 3 Minutes shows the typical solids removed.
- Minimum Inlet Pressure – 20 PSI

Epiphene CPH Separators

- Working Pressure Range 1 to 15 PSI for efficient separation
- Typical removal efficiency down to 5 microns and some down to .5 Microns
- Jar Test – 24 hour or 1440 Minutes shows the typical solids removed.
- Minimum Inlet Pressure – 10 PSI

NEW APPROACH TO SEPARATION

ONLY SOLUTION TO REMOVE CLAY, SILT AND SAND

Designed to handle removal of settable solids in cooling systems, irrigation and industrial process as either pre-filter or primary filter.

Incorporates a highly efficient closely packed set of 16 hydro cyclones to reliably remove solids down to 1/2 microns.

Higher flow rates with high efficiency now possible.

Pre-filtration extends time between servicing as much as 5 times for standard bag, cartridge or media filter.

Closely Packed Hydro Cyclone – CPH-16

FLOW RATES:

13 TO 132 GPM

50 TO 500 LPM

ACCOMMODATES HIGHER FLOW RATES WITH PARALLEL DESIGNS

SIXTEEN ONE-INCH HYDRO CYCLONES IN ONE VESSEL OFFERING 94% REMOVAL OF 15-MICRON SOLIDS & ABOVE AT 2.6 SPECIFIC GRAVITY.

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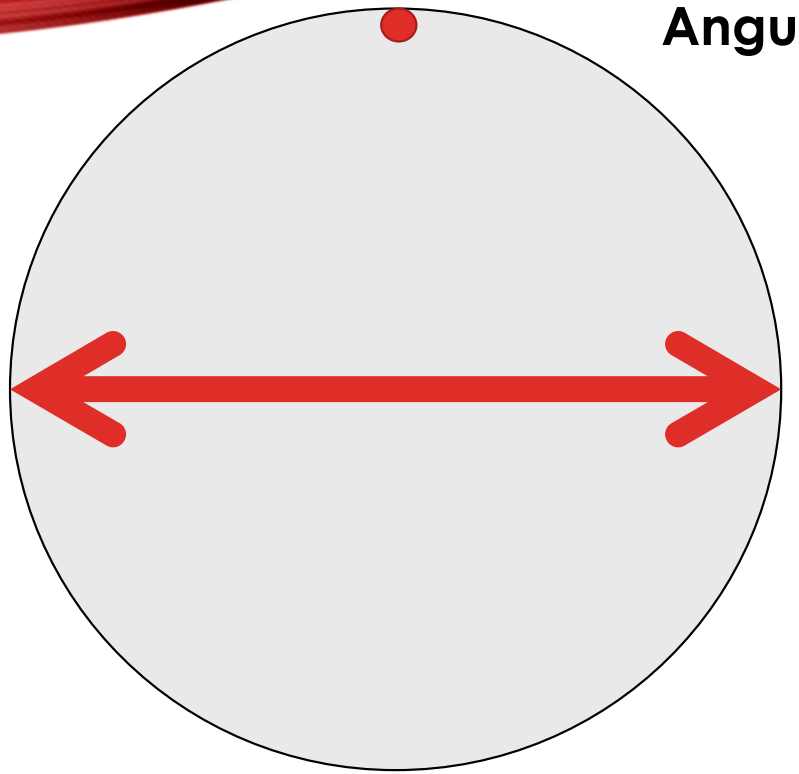
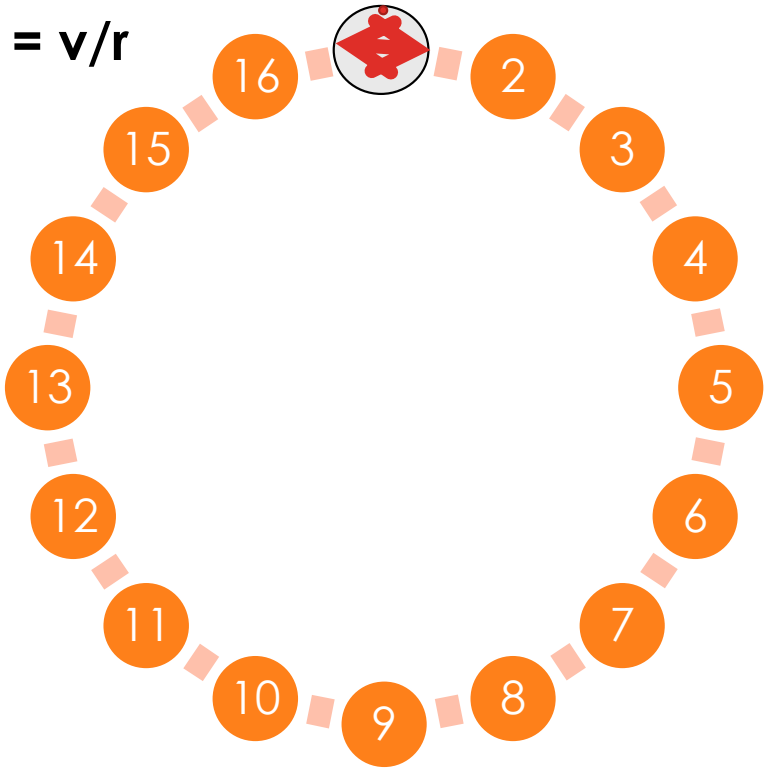
WHY IT WORKS IT SO WELL



Angular Velocity = v/r



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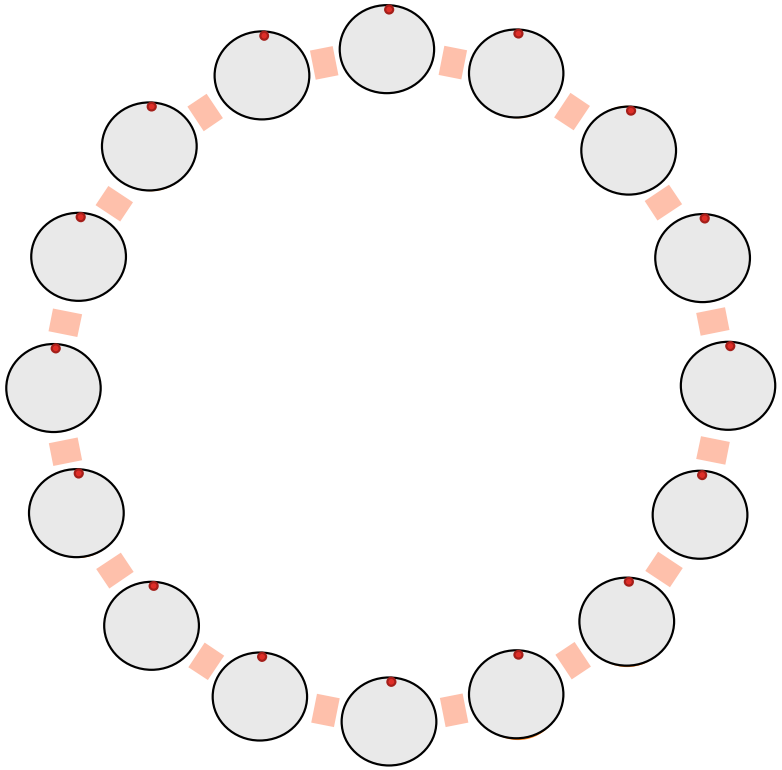
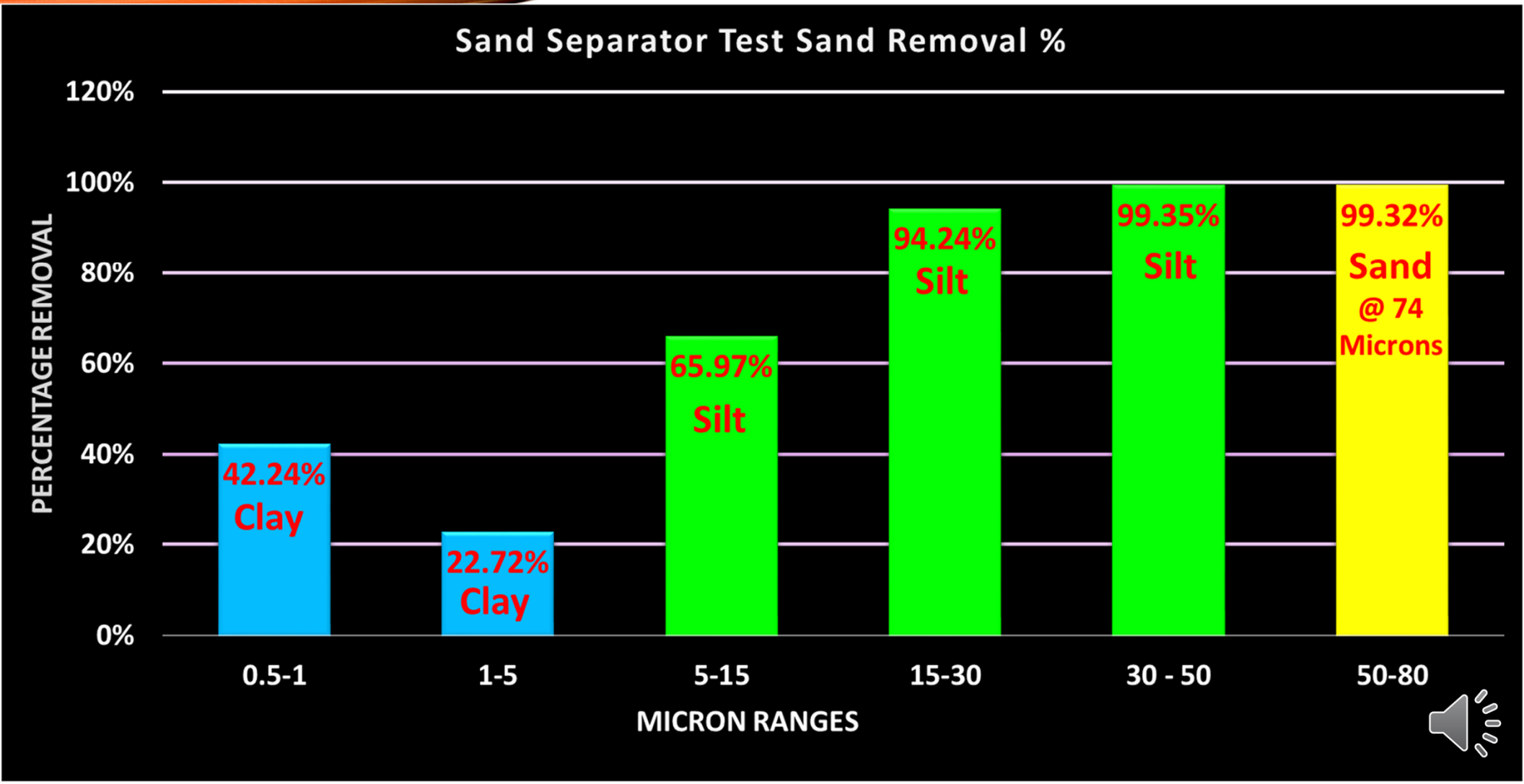


CPH 16 SEPARATOR PERFORMANCE

HIGH SOLIDS REMOVAL EFFICIENCY



JAR TEST COMPARISON

Agitated Sample – The **issue to address!**

Current Separators limited Removal -Settling after 3 Minutes

What CPH-16 Removes- Settling after 24 Hours

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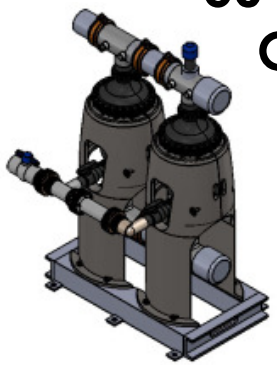
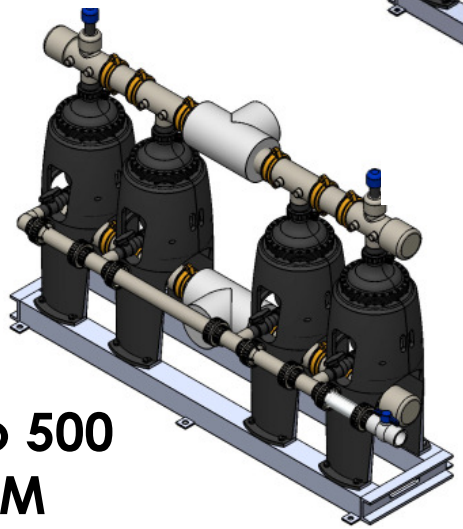
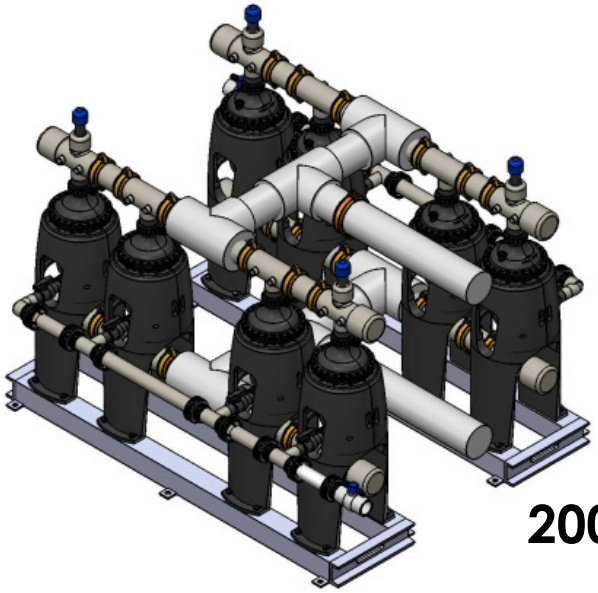


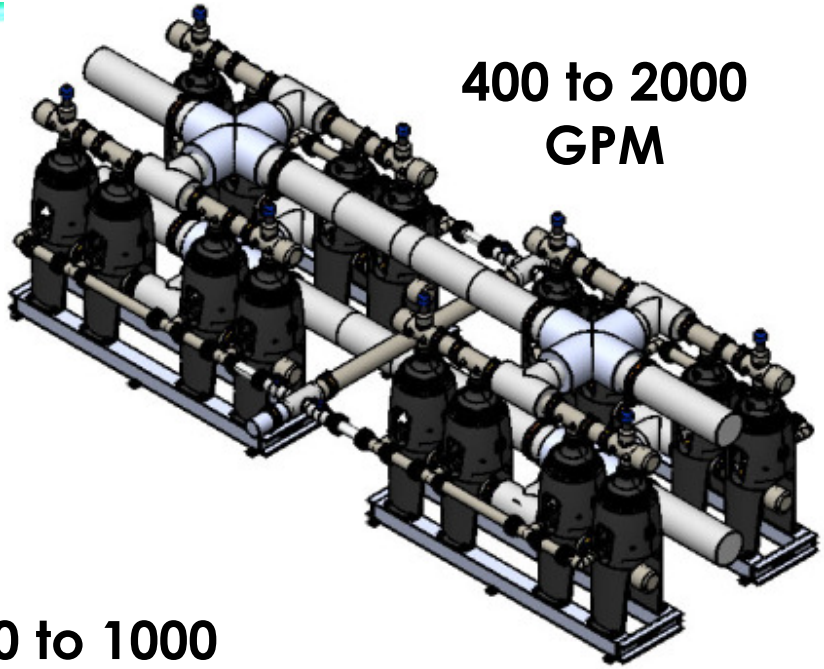
50 to 250 GPM



100 to 500 GPM



200 to 1000 GPM



400 to 2000 GPM

SEPARATOR MODULARITY

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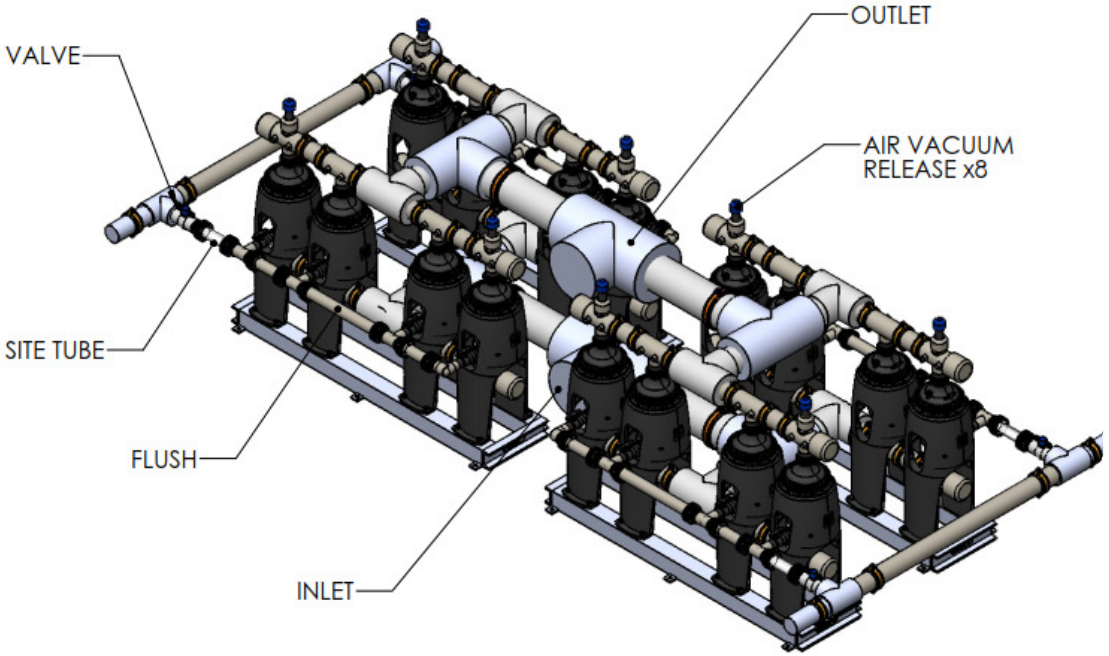
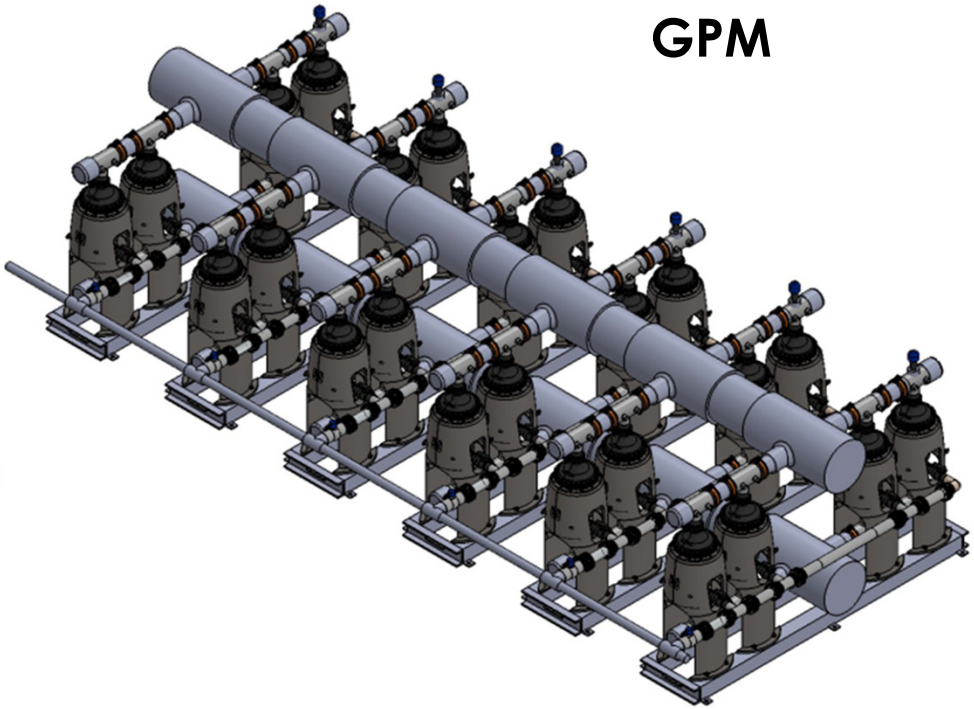
SEPARATOR MODULARITY

400 to 2000 GPM



600 to 3000 GPM



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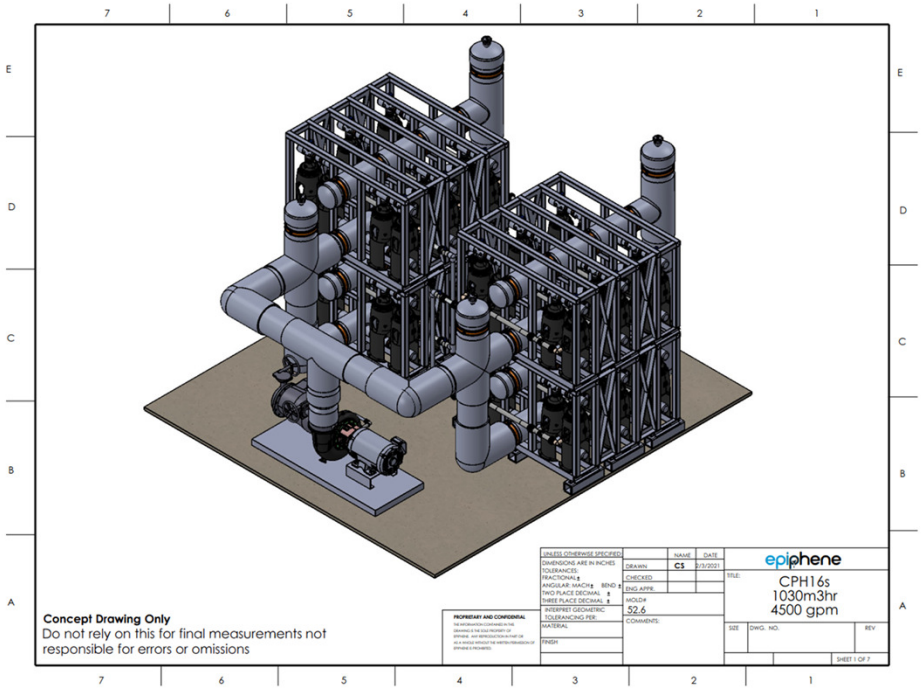
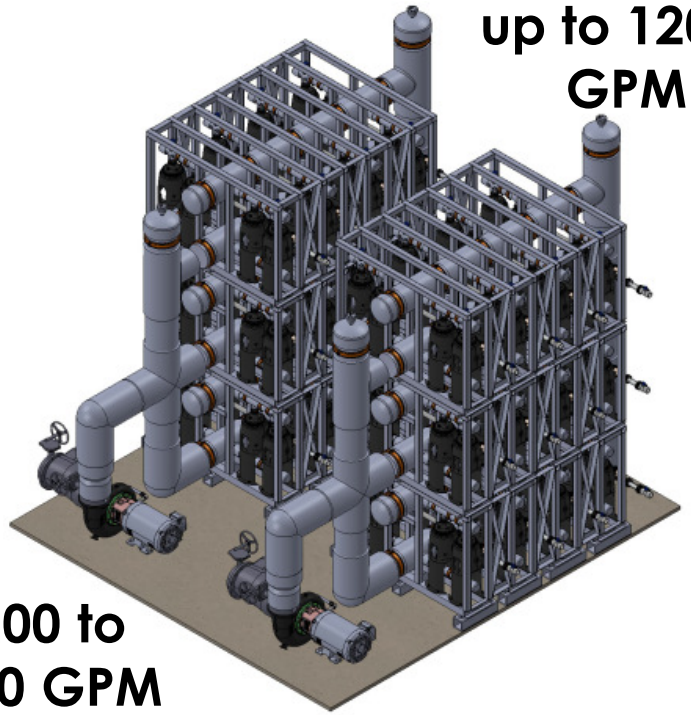
SEPARATOR MODULARITY
5 M X 6 M

1200 to 6000 GPM



Total for two up to 12000 GPM



1200 to 6000 GPM Each

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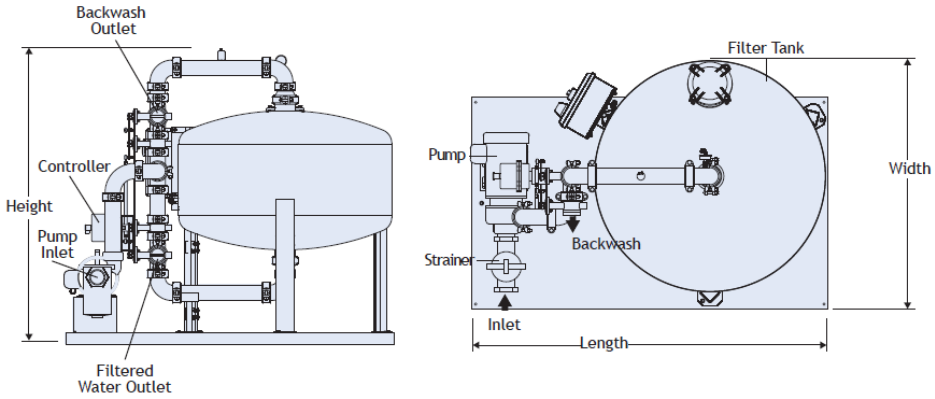
CURRENT APPROACH TO MEDIA FILTRATION IN HVAC IS WRONG



- Originally envisioned using clean water source to flush a single filter.
- Someone along the way decided to use the very water being filtered to flush the filter…
- Instead of adding an additional tank as all other industries do to provide filtered water to flush the filter.

- Using Single Tank Solutions leads to
  - **No Filtration During Flushing**
  - **Infiltration of Media by Contaminates**
  - **High Frequency of Continuous Flushing.**
  - **Failure of the filtration system**

COMPARISON – MEDIA FILTERS

Media Filtration for the most part is most effective for organic particles and solids with specific gravities significantly less than 2.6.

Current Offerings

- **Use Silica Oxides – susceptible to surface sealing from Carbonates and Bicarbonates – leads to high frequency flushing.**
- **Often requires gravel for underdrain support & diffusion – not single media**
- **Design Flow Rates too high for 5 & 10-microns filtration**
- **Underdrain designs have dead areas – contributes to surface sealing**

Epiphene Stacked Media

- **Offer Glass Media's – resistant to surface sealing**
- **Offer Single Media Solutions - Underdrain Self-Supporting**
- **Designs offered at flow rates commensurate with 5 & 10-Microns Flux (flow per unit area)**
- **Low-profile underdrain also acts as distribution – covers almost 100% of area under media – no dead areas**
- **Additional advantage – 70% less Media Required**

SMALL STACKED VERSUS SINGLE LARGE TANKS

- **Stackable Solution conserves space and costs for Filter Pad – Up easily 50%**
- **Lower Back Flush Flow reduces impact on Cooling System**
- **Lower Back Flush Flow Rates**
  - **(12 to 50 GPM vs 100 to 1000 GPM)**
  - **Saves Significant Water**
  - **Improves Overall System Efficiencies**
  - **Effectively filters even under high or continuous flush conditions**

- **Lower Back Flush Flow & Pressure Requirements positively impacts**
  - **Design**
  - **Pump & Motor Choices**
  - **Operating Costs**
  - **Life Cycle Costs**
  - **Productivity**

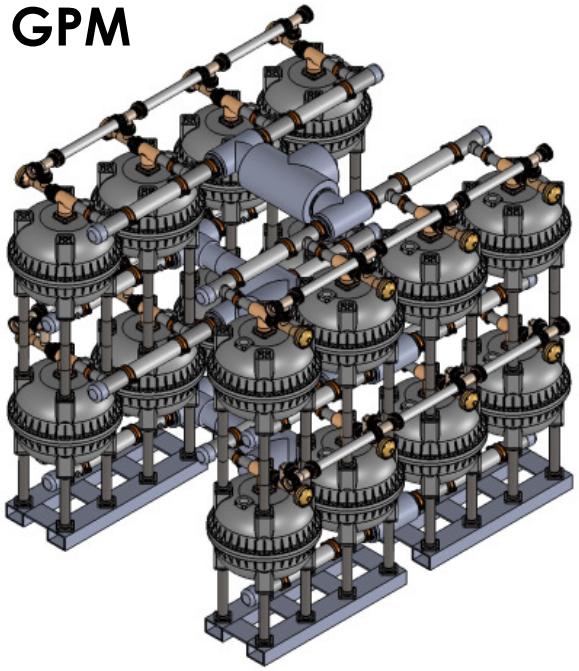
MEDIA FILTER BACKFLUSH (1 OF 8 TANKS – 60 SECONDS)

UNDERDRAIN WITHOUT MEDIA

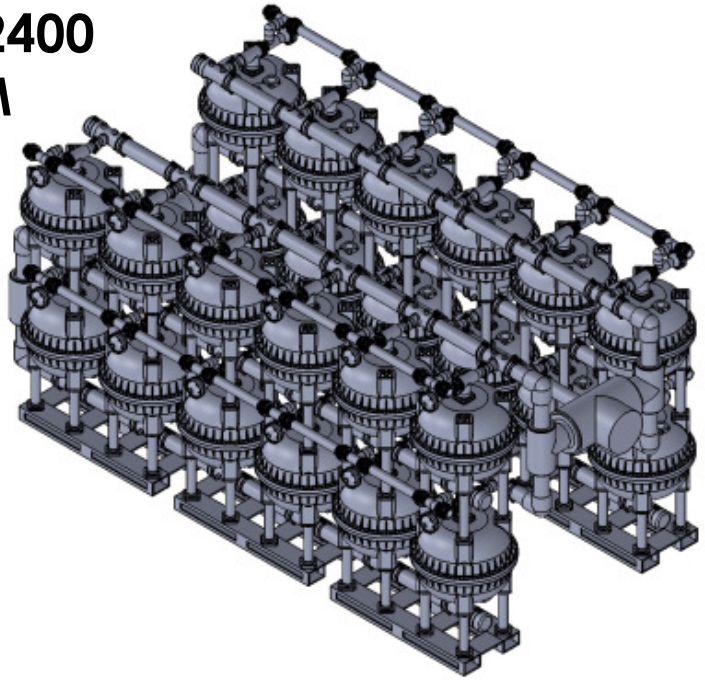
BACKFLUSH WITH MEDIA

SEPARATOR MODULARITY

250 to 1600 GPM



377 to 2400 GPM



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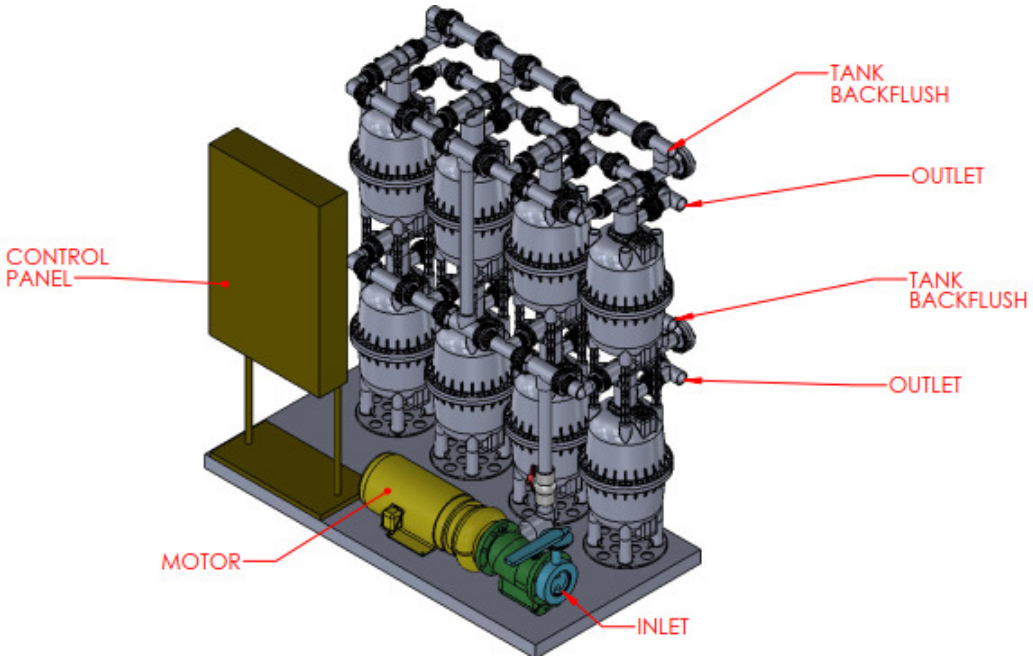
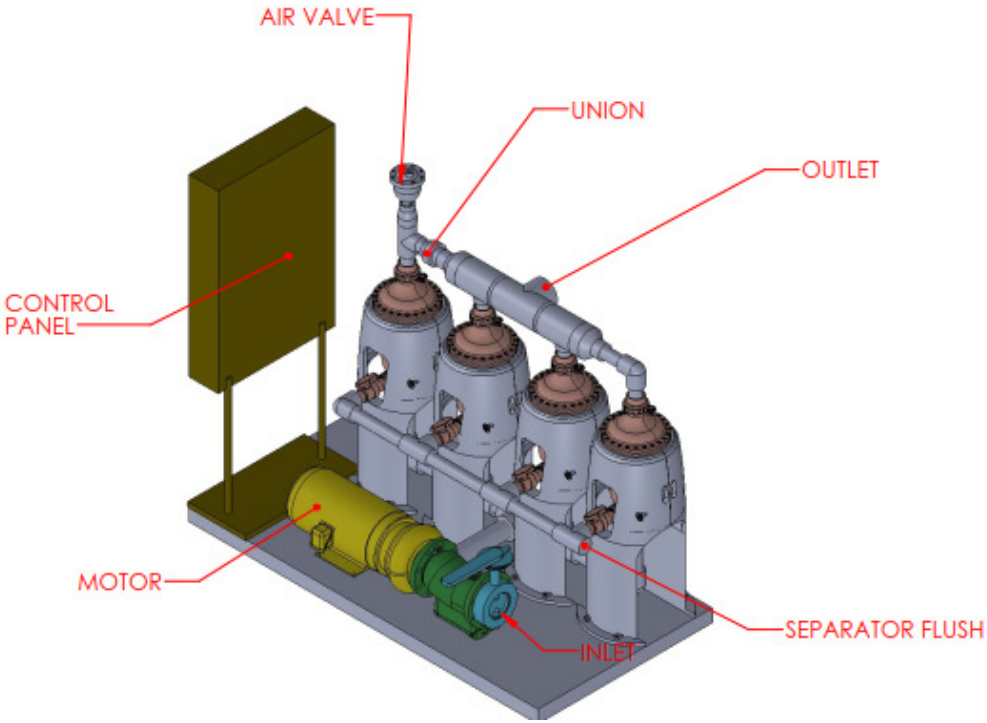
OFFER TWO SOLUTIONS

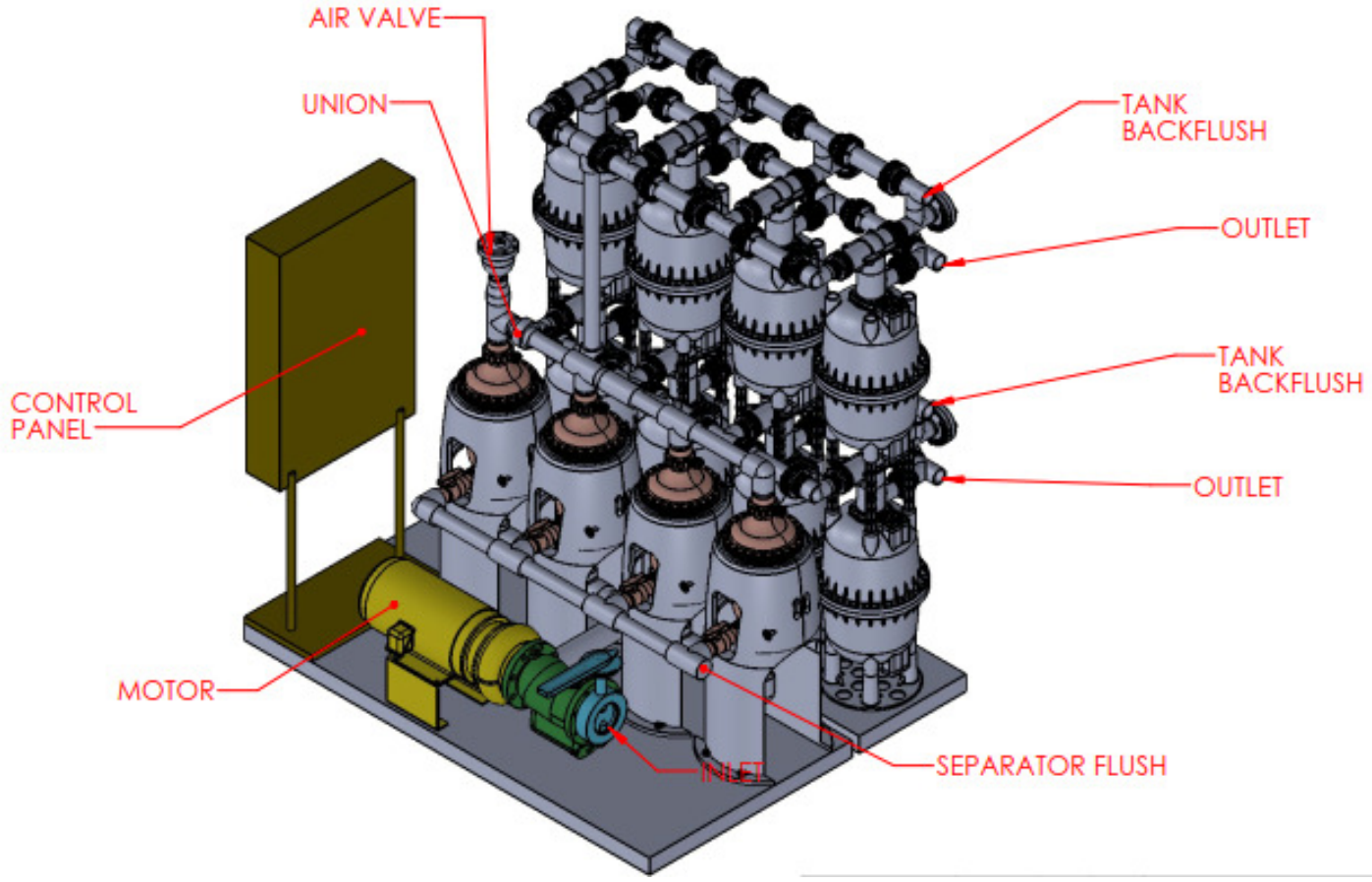
Stacked Media Filters

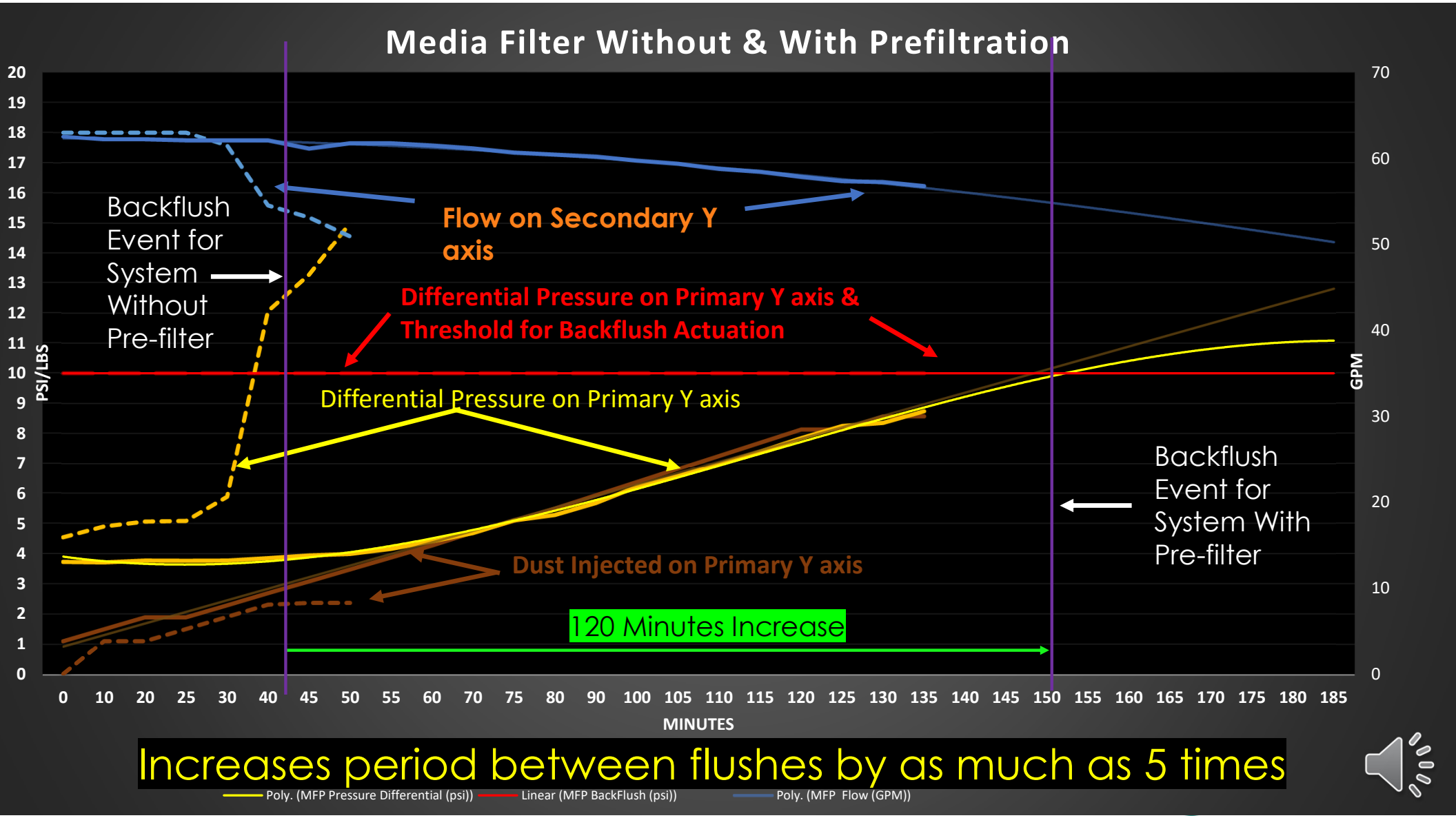


Silt Separators



TWO SOLUTIONS ONE PACKAGE INDUSTRY FIRST!

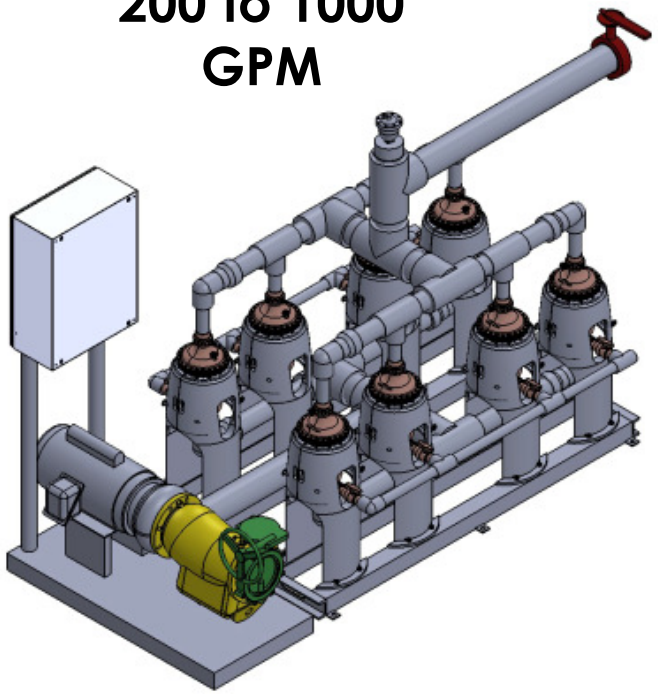




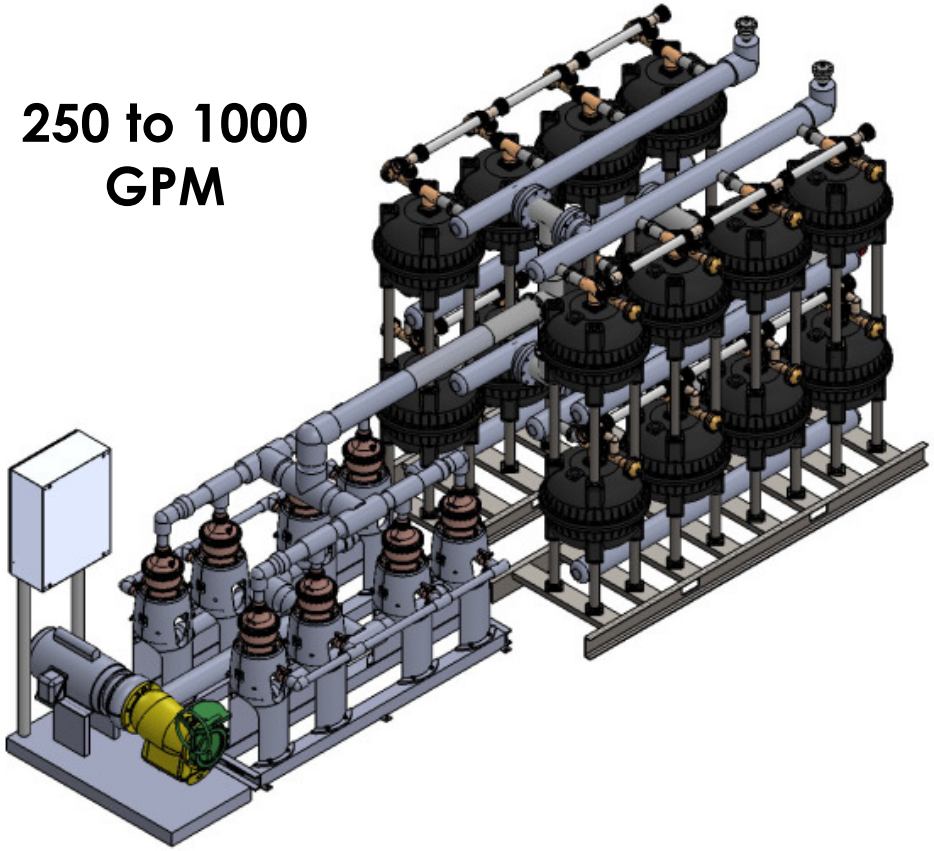
Increases period between flushes by as much as 5 times

SCALABLE TO ANY FLOW

200 to 1000 GPM



250 to 1000 GPM



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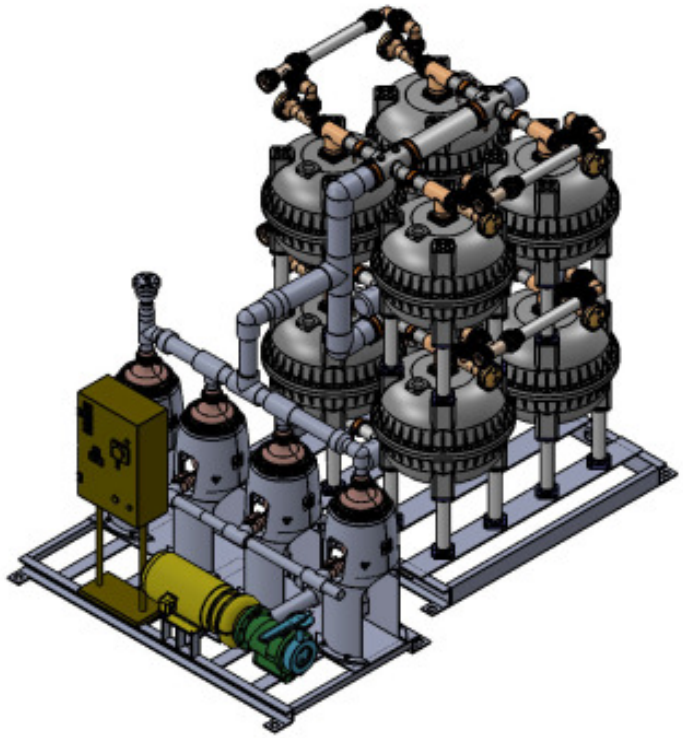
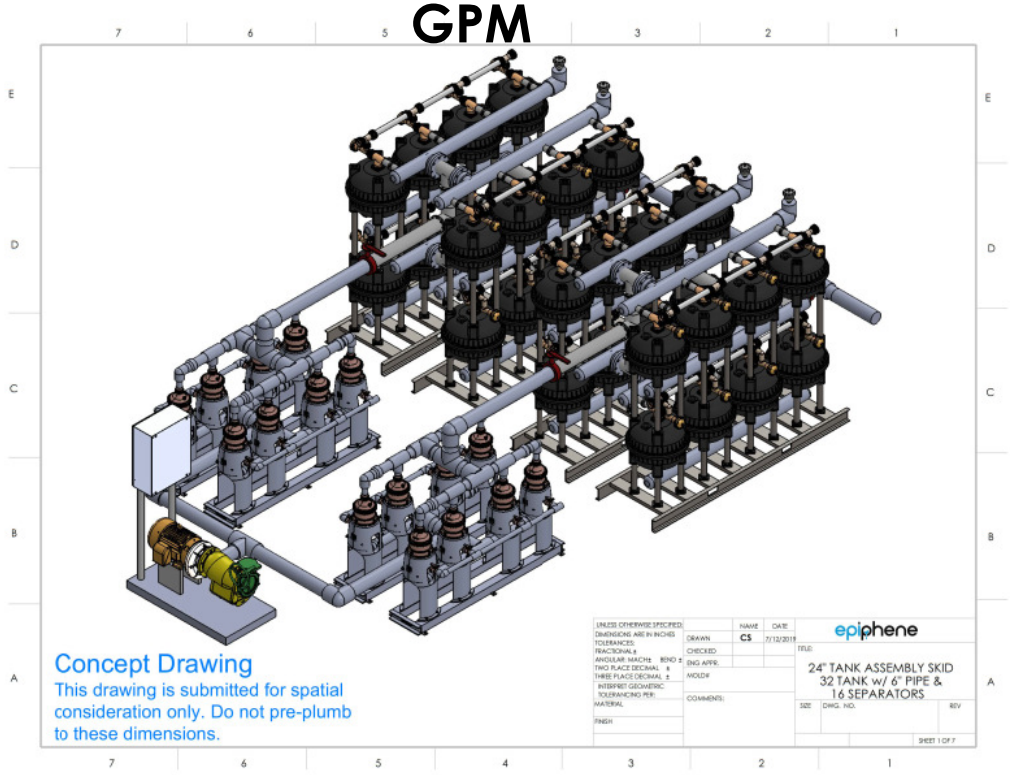


400 to 2000 GPM



SUMMARY & QUESTIONS

- **Performance**
- **Meet any conditions**
- **Modular**
- **Variable Flows Possible**