The Most Advanced, Automatic,
Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS

Zero Gravity Filters

Presents

Innovations in Liquid Filtration

Cooling Towers

The Most Advanced, Automatic, Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS

Parameters for Successful Operation

- Prevent Scale Formation
- Control Corrosion
- Control Biological Fouling
- Remove Particle Debris

Cooling Towers

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Problems Caused by Particle Debris

- Plugged Condenser Tubes
- Reduced Heat Transfer Efficiency
- Fouling of Sensitive Equipment
- Reduced Flow Rates
- Excessive Sediment in Tower Basin

Cooling Towers

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Benefits of Removing Particle Debris

- Reduced Maintenance Costs
- Improved Efficiency of Cooling Circuit
- Extend Equipment Life of Condensers, PHE, Inter-Stage Coolers on Air Compressors, etc.
- Reduced Water and Chemical Costs
- Increased Water Treatment Efficiency

Corrosion Control

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Pounds of Cast Iron Lost at Various Corrosion Rates
Calculated Per Year, Per 100 Linear Feet of Pipe

	Corrosion Rate in Mils per Year (MPY)			
Pipe Size	1 MPY	5 MPY	10 MPY	15 MPY
4	4.55	22.76	45.53	68.29

For example, a pipe corrosion rate of 5 Mils per year on a 4 inch pipe will produce approximately 23 pounds of iron per 100 linear feet of pipe per year.

Plate Heat Exchangers

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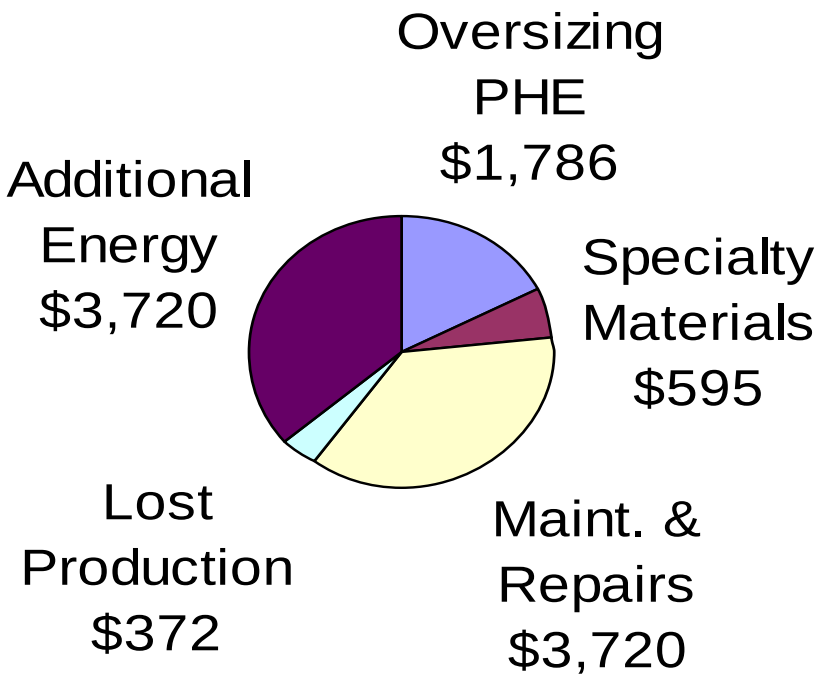
Costs of Fouled Heat Exchangers (in Millions)



Liquid Filtration

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Separate Solids From Liquids

Liquid

Solids

Conventional Filtration

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- Fixed Geometric Screen (Wedge Wire)
- Bags and Cartridges
- Sand Filters
- Hydrocyclones

Fixed Geometric Screens

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Drawbacks

- Systematic Blocking
- Deferred Maintenance
- Less Effective Filtration at <250 micron

Fixed Geometric Screens

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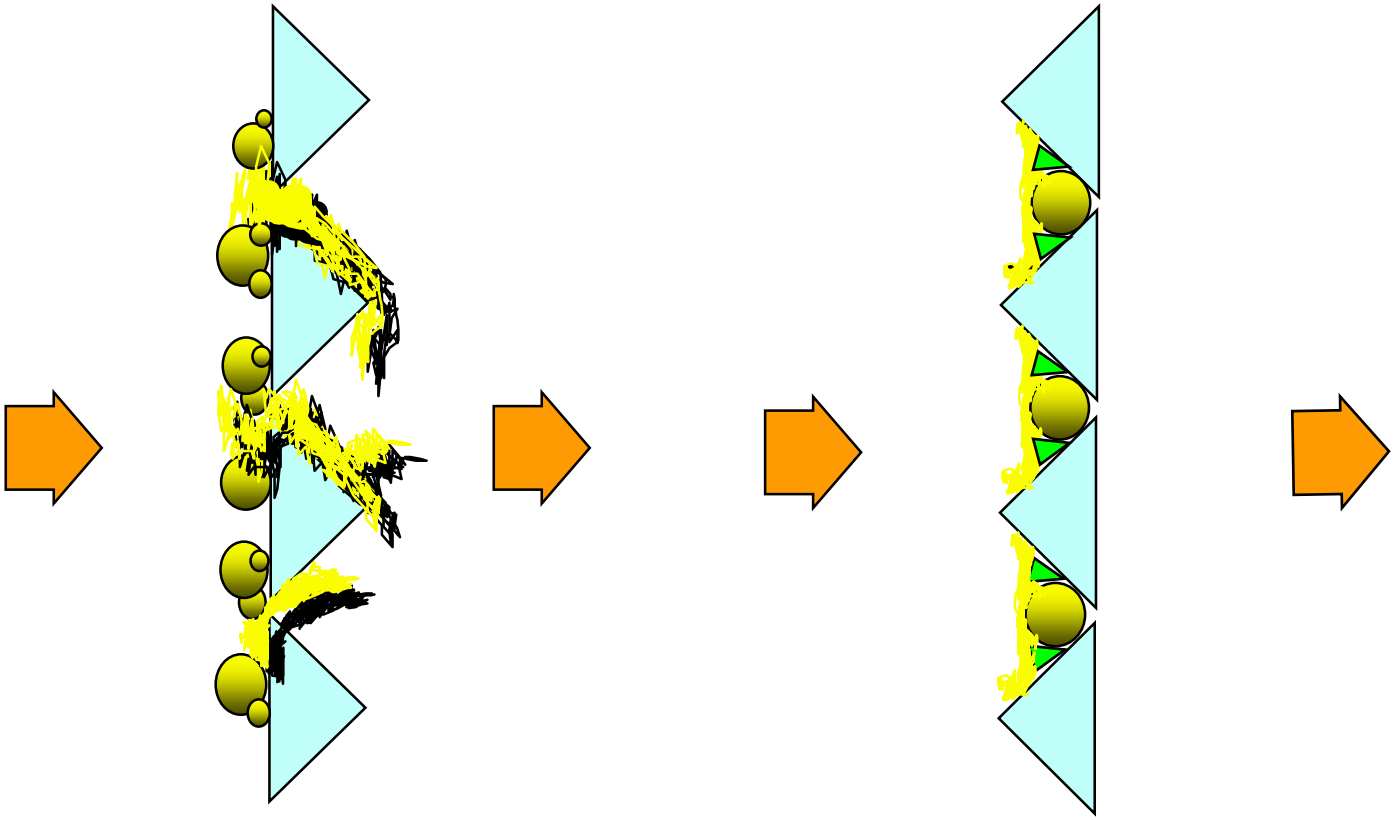
ZERO GRAVITY FILTERS



Contaminants become “wedged” on high pressure side of screen

Fixed Geometric Screens

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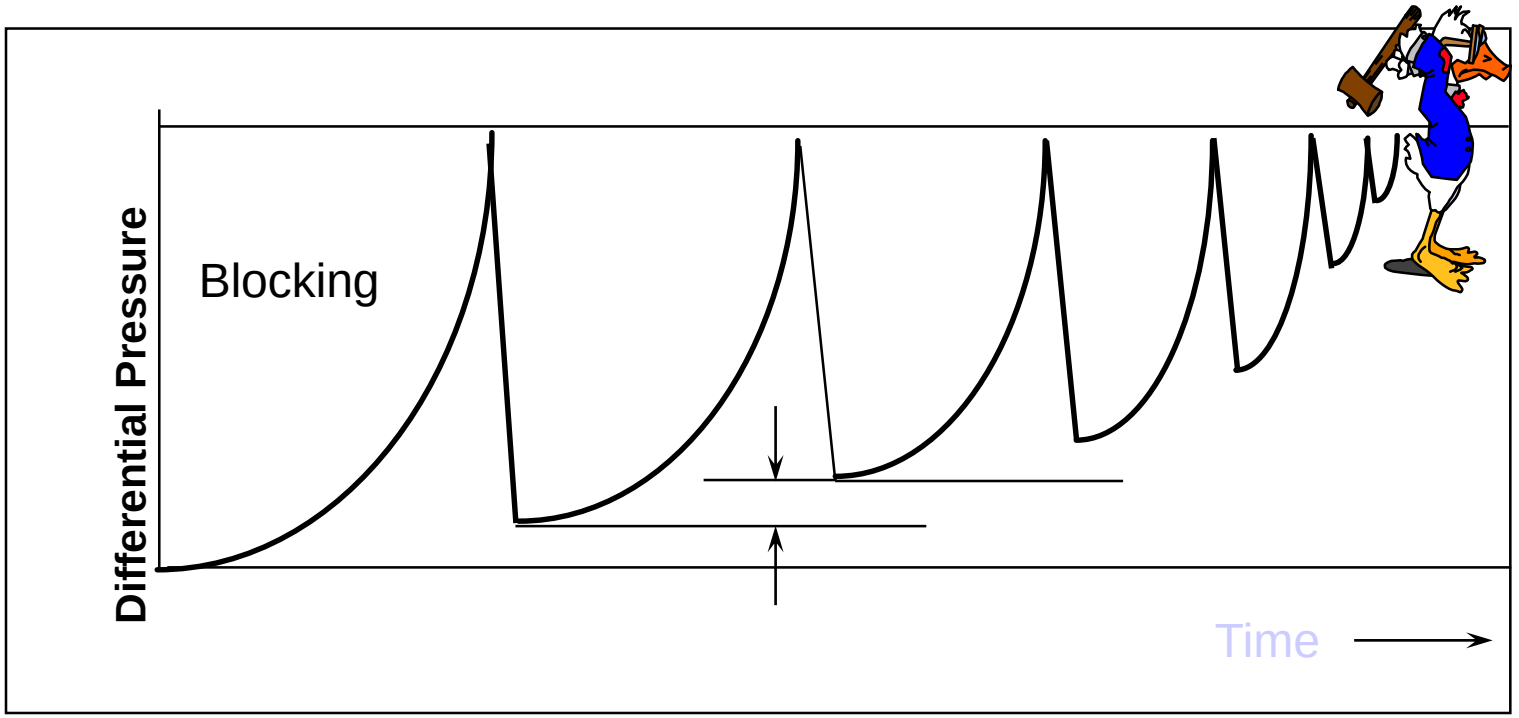
ZERO GRAVITY FILTERS



Less than 100% cleaning of filter will eventually lead to system down-time

Bags and Cartridges

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Drawbacks

- Non Self-Cleaning
- Disposal Issues
- Premature Blinding
- Nominal Micron Rating
- High Operating Costs

Bags and Cartridges

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Non-Disposable Liquid Filtration System

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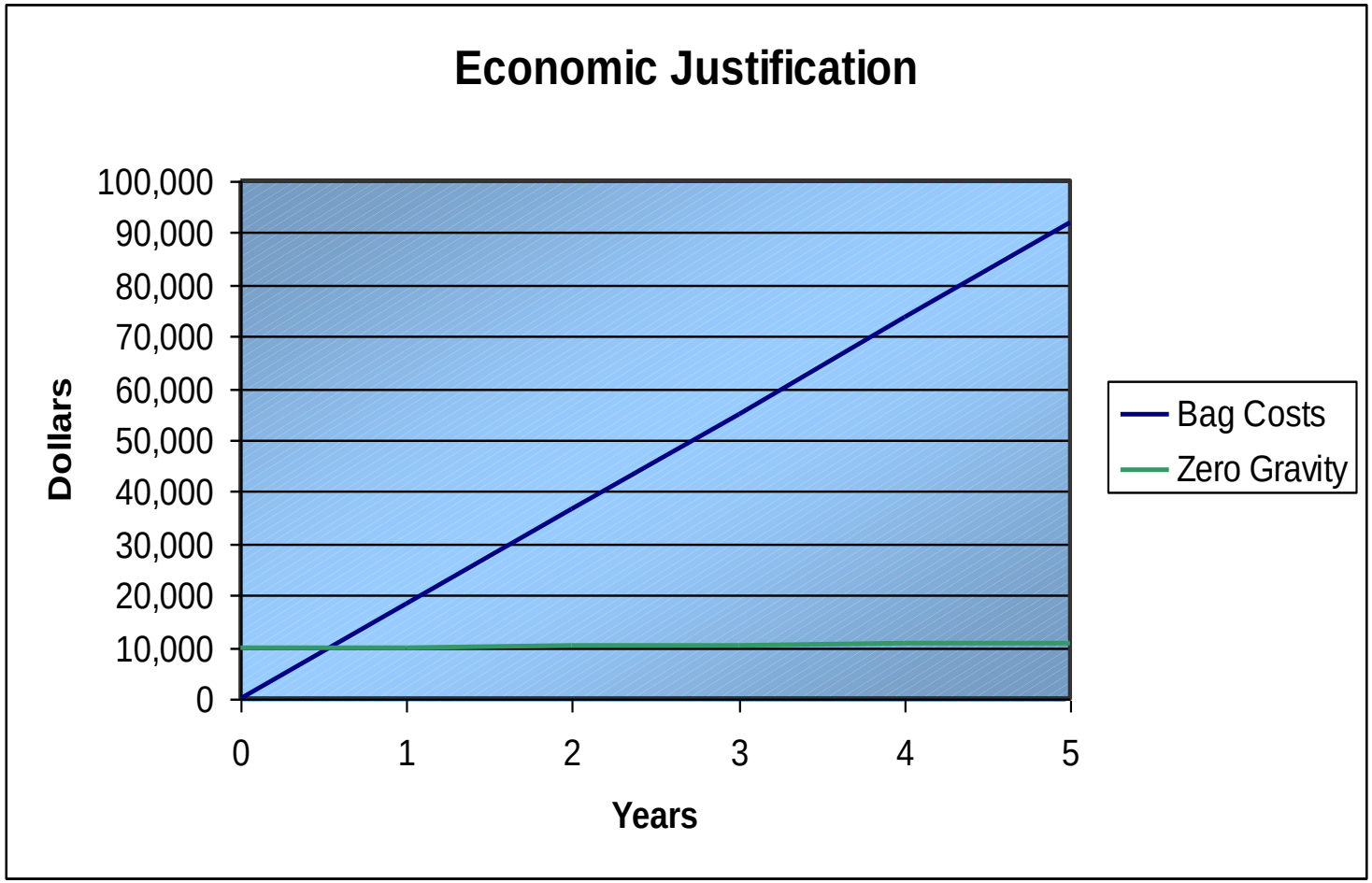

8 month Payback

Sand Filters

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Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS

Drawbacks

- Significant Footprint Required
- Excessive Backwash Volumes (3 – 5 x Flow Rate)
- Full Flow Filtration Prohibitively Expensive
- Channeling or Tunneling
- Threat of Bacterial Growth

Sand Filters

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Threat of Legionella Bacteria

Department of Health and Social Security - Code of Practice

“Sand filters are often considered problematic in cooling systems that are used on the premises of health care facilities.”

“When encountering sand filtration systems in health care facilities the systems should be closely monitored for organism contamination.”

“A non-sand media type of filtration should be substituted.”

Hydrocyclones

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Drawbacks

- No Removal Threshold
- Inability to Remove Less Dense Particles
- Liquid Loss Through Backwash Not Dependent on Loading
- Operation Requires Constant Pressures

Filter Element

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Features

- 316 Grade Stainless Steel
- Absolute Micron Ratings, 20-400
- Fully Interchangeable Between Products
- Wound With Variable Pitch, Precision Gaps

Filter Element

Filter Element

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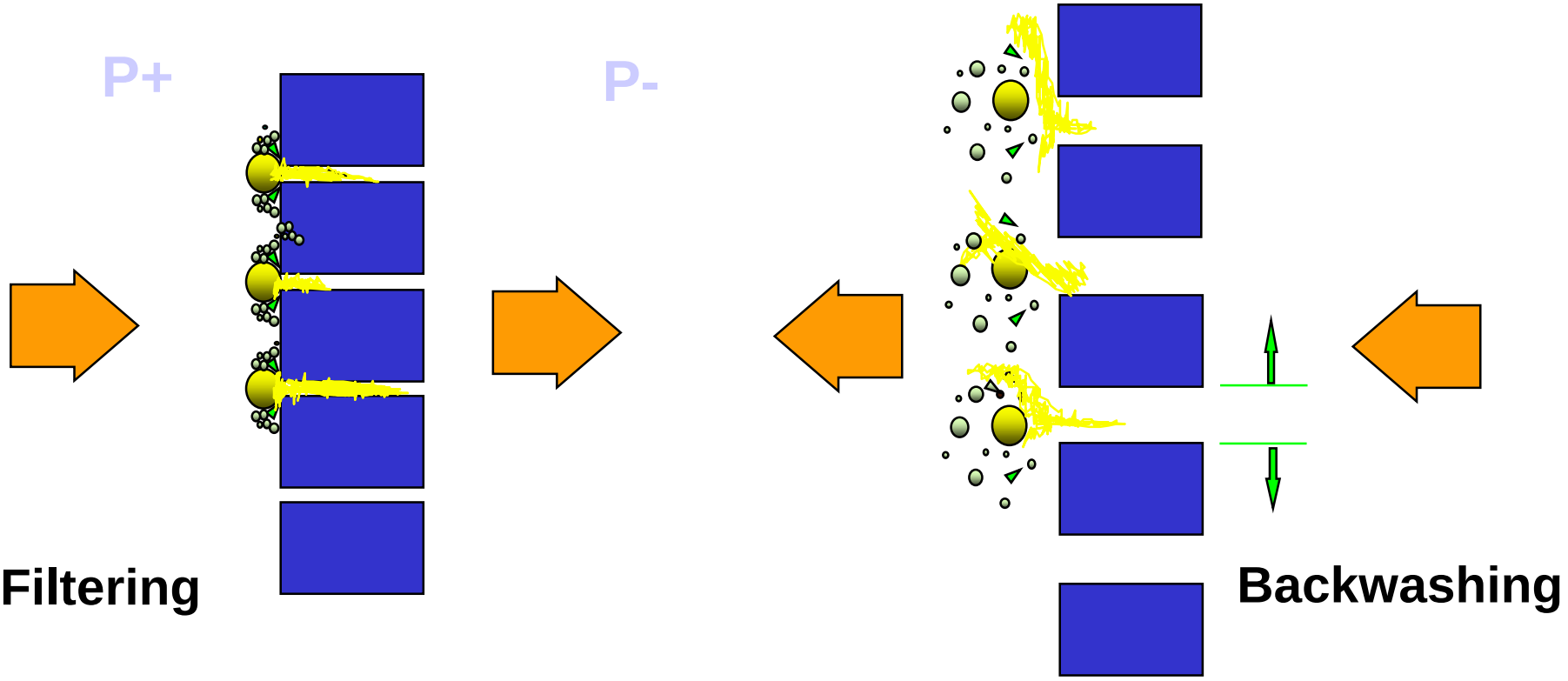

Filter coil opens. Liquid flows across coil causes shimmering affect. 100% clean with each and every backwash.

Zero Gravity Filtration

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ZERO GRAVITY FILTERS

Features

- Stainless steel 316 Filter Element
- Uninterrupted Flow during B/W
- Fully Auto, Self-Cleaning
- Compact Design
- Precision Engineered Gap

Benefits

- Eliminates Disposable Media
- Increases System Up-Time
- Saves Labor
- Saves Valuable Floor Space
- Ensures Efficient Particle Retention

Zero Gravity Filtration

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ZERO GRAVITY FILTERS

Features

- Minimal Moving Parts
- 100% Clean on Backwash
- Modular Design

Benefits

- Reduces Maintenance and Operating Costs
- Provides 24/7 Operation
- Allows:
  - On-site Expansion
  - Flexibility of Controls and Operation
  - Fully Interchangeable micron sizes

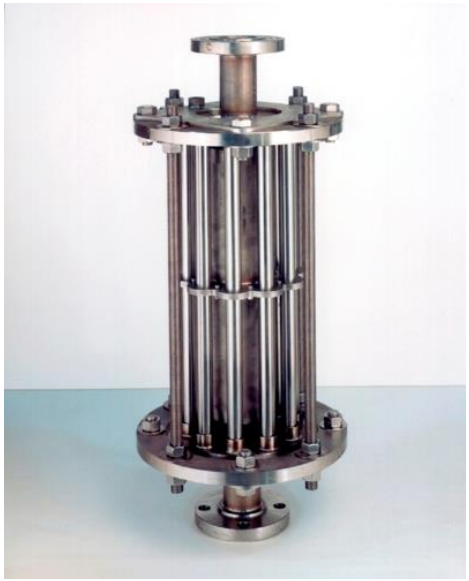
Product Line

The Most Advanced, Automatic,
Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS

EASYCLEAN

Maggie



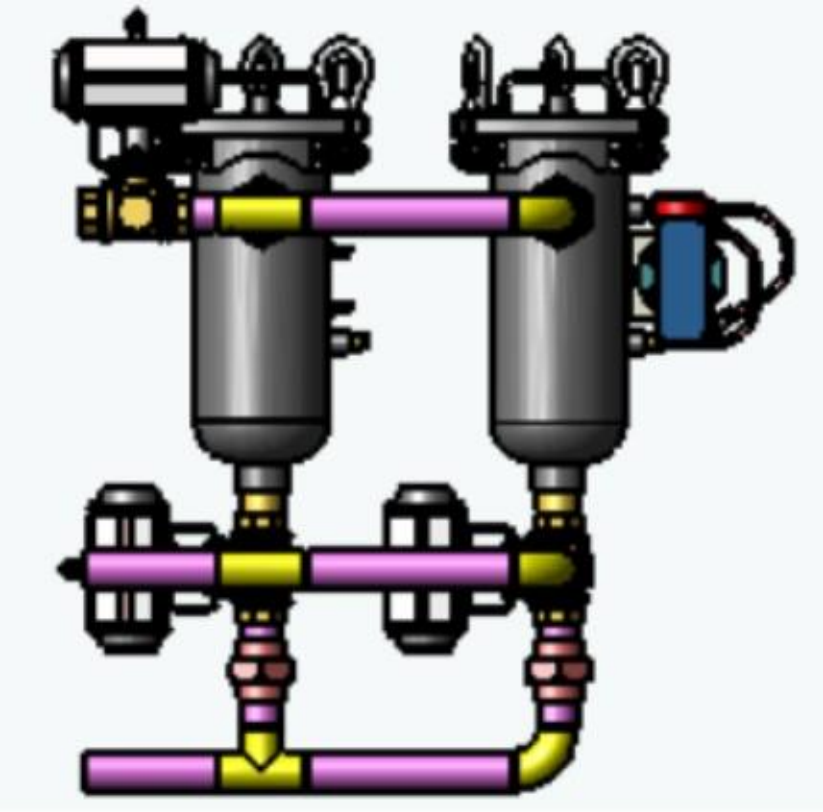
SYSTEM 2000

PHOENIX

EasyClean

The Most Advanced, Automatic, Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS



Duplex Automatic

- Modular Design
- External Backwash Capabilities
- Automatic Filtration at Low Flow, Low Micron
- Cast Iron, 304 or 316 SS Construction
- Minimal Moving Parts

EasyClean

The Most Advanced, Automatic,
Non-Disposable Liquid Filtration System

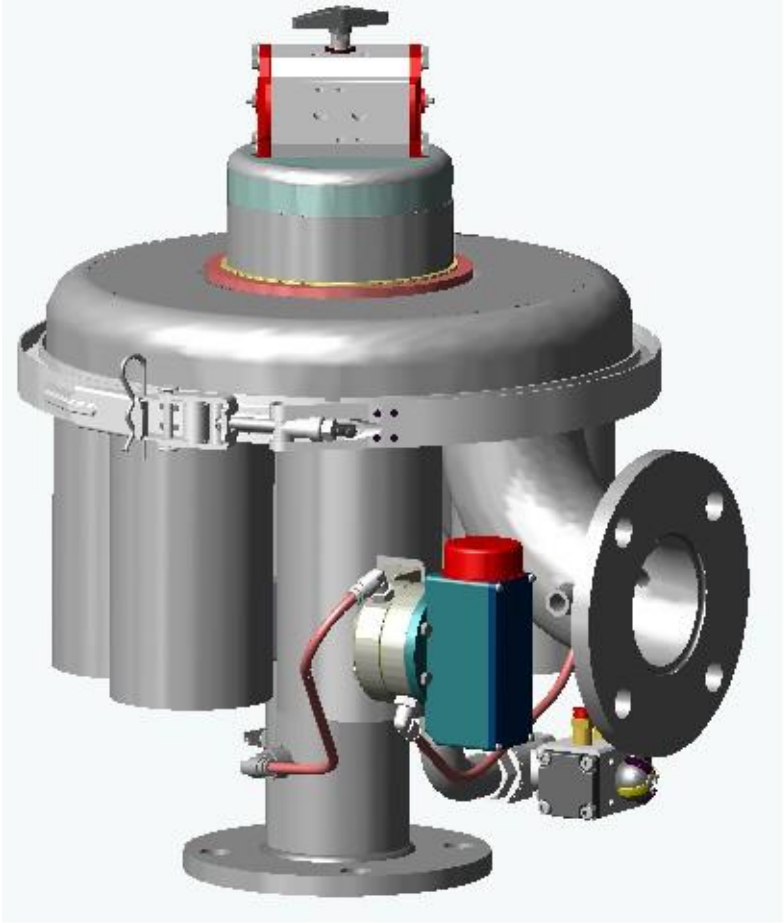
ZERO GRAVITY FILTERS

Easy Access to Filter Element

Phoenix

The Most Advanced, Automatic, Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS



Pneumatic Phoenix

- Two Models Available
  - Pneumatic & Electro-Pneumatic
- Compact Size
- All SS Construction
- Flow Rates up to 175 gpm
- Minimal Moving Parts
- Low Operating Costs

Phoenix

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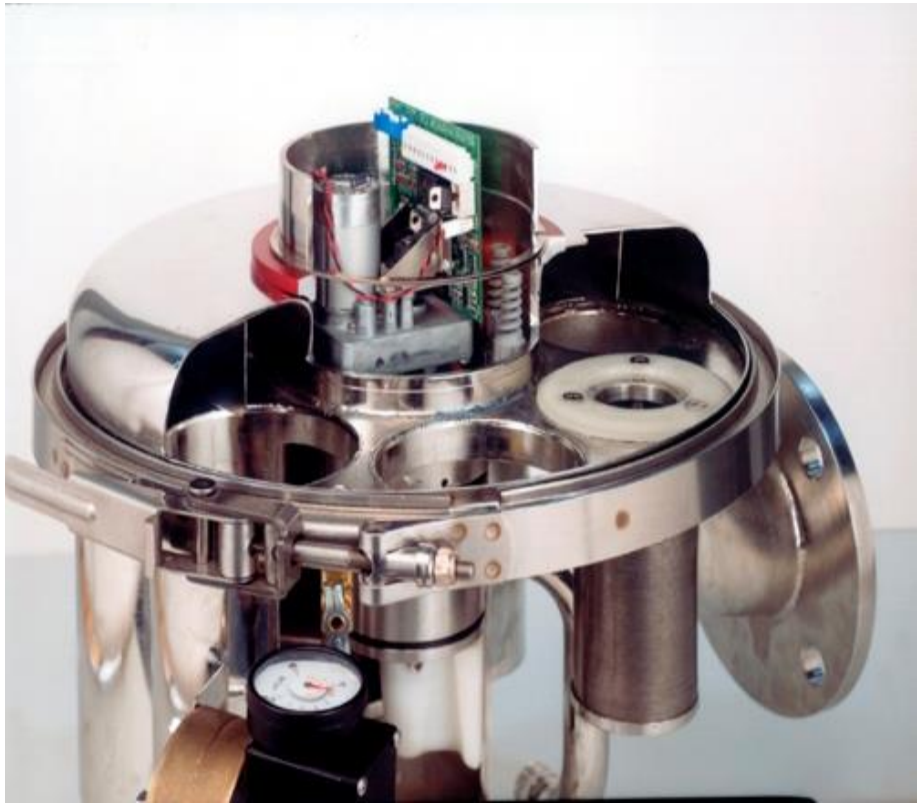

Electro Pneumatic Operation

Pneumatic Operation

System 2000

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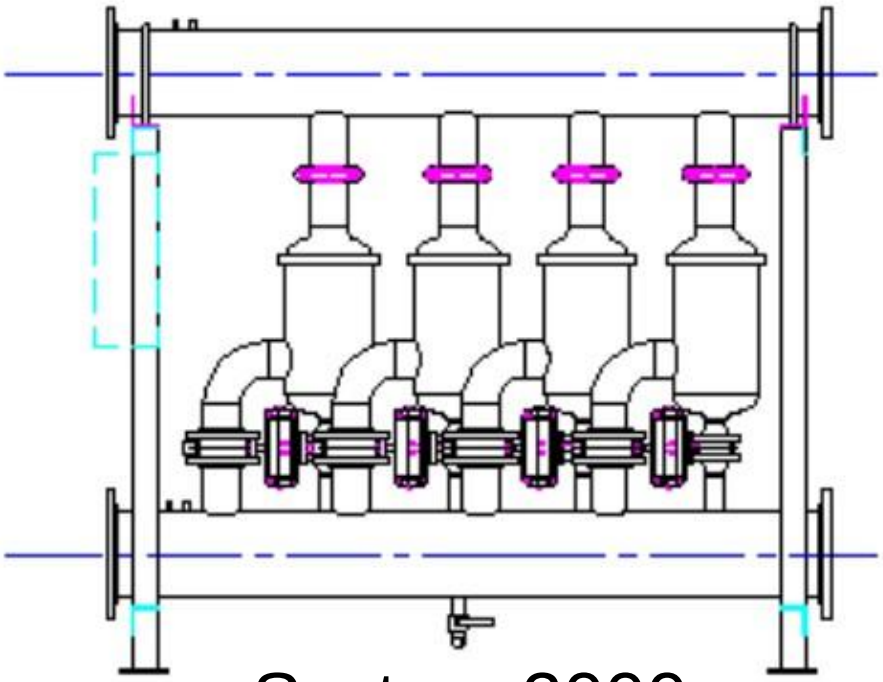

System 2000

4-Pod

- Modular Design Allows On-Site Expansion
- Simple and Reliable Backwash Procedure
- ‘Pod’ Encourages Sedimentation
- Built to Customer Specifications, Quick Delivery
- Stainless or Carbon Steel Manifolds

System 2000

The Most Advanced, Automatic,
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System 2000, 4” Model

System 2000, 2” Model

System 2000

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7 elements per pod

Easy Access to Filter Elements by Removing Cage Plate

Cage Plate Installed in Pod

HVAC Filtration

The Most Advanced, Automatic,
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- Cooling Towers (Full Flow and Side Stream)
- Chilled Water
- Condensing Cooling Water
- River Intake Water

HVAC Filtration

The Most Advanced, Automatic,
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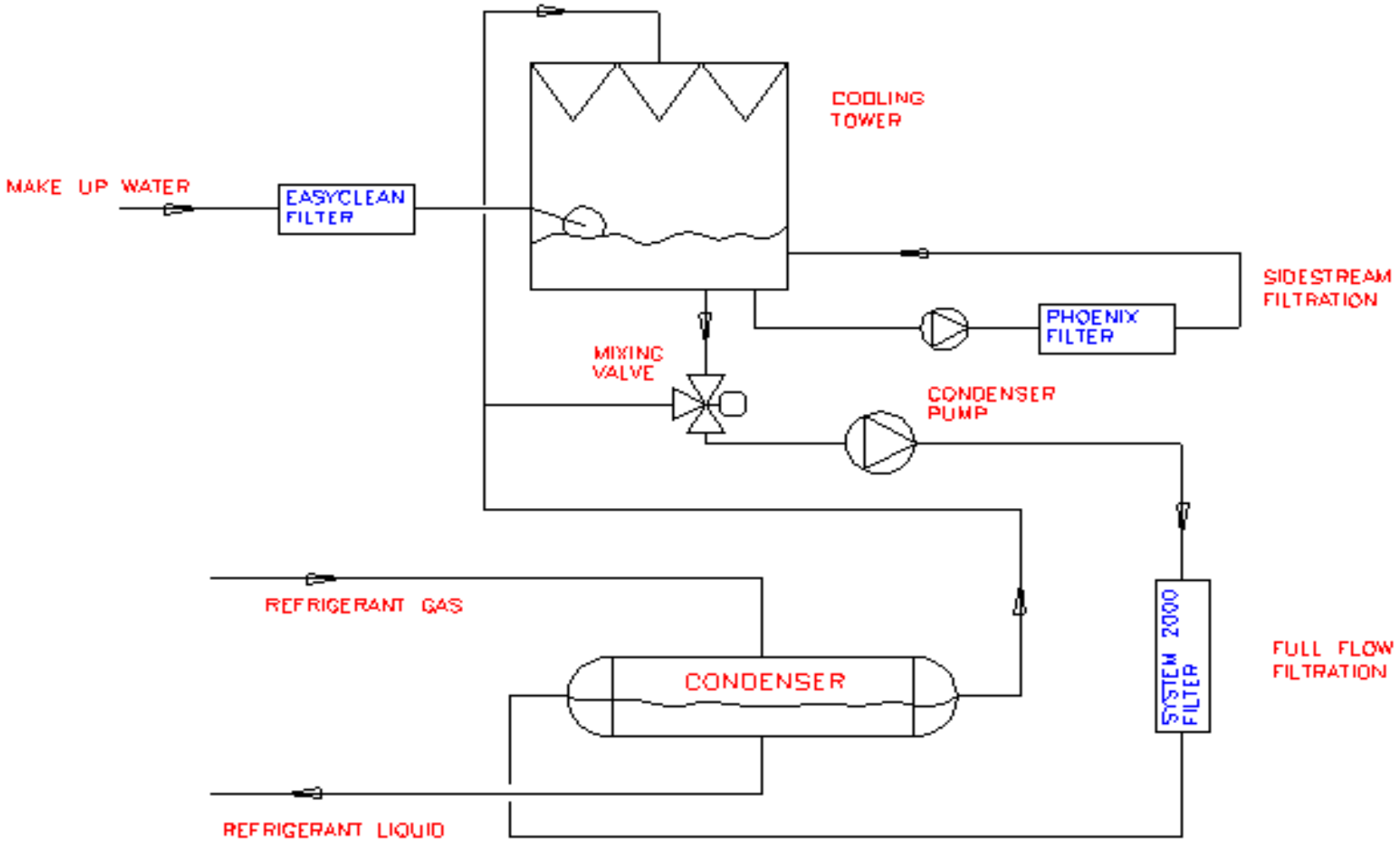
ZERO GRAVITY FILTERS



Cooling Tower

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Full Flow Filtration of Cooling Tower

Cooling Tower

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Non-Disposable Liquid Filtration System

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Cooling Water Used For Juice Pasteurazation

Cooling Tower

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Non-Disposable Liquid Filtration System

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Protection of Inter-Stage Coolers on Air Compressors

Cooling Tower

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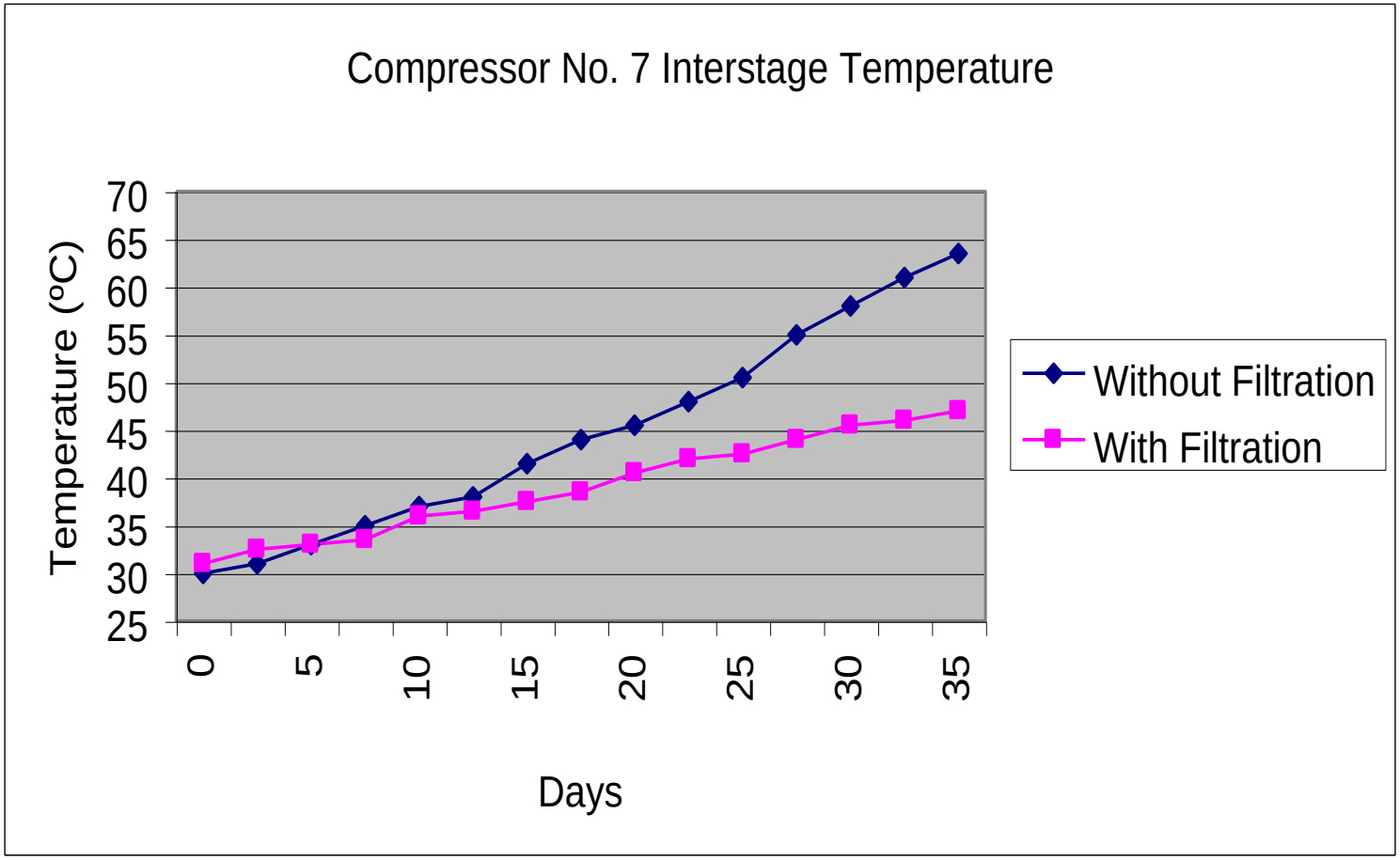

Protection of Inter-Stage Coolers on Air Compressors

Cooling Tower

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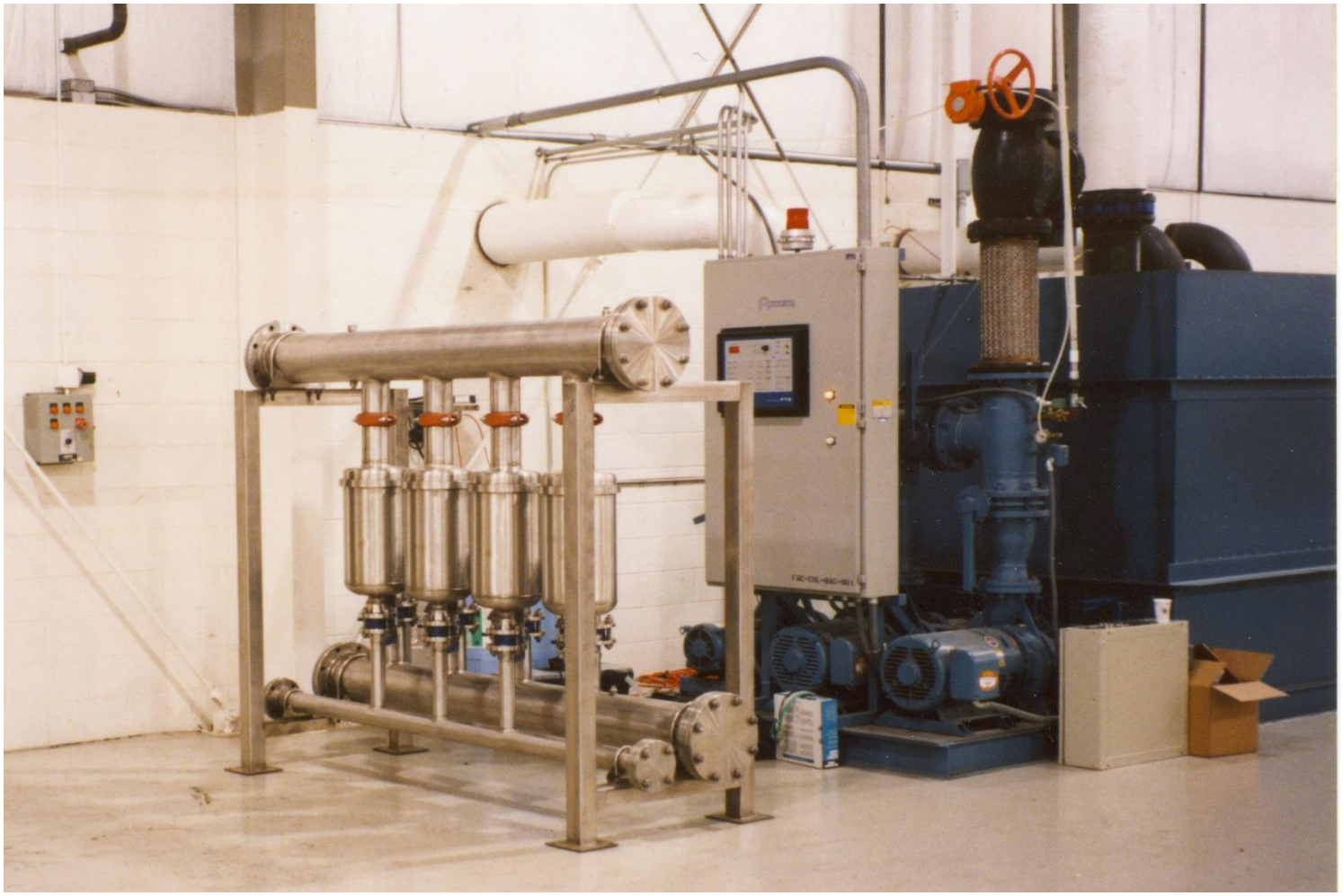

Full Flow Filtration - Process Cooling Water

Cooling Tower

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Full Flow Filtration - Protect Heat Exchanger

Cooling Tower

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Side Stream Cooling Tower
Phoenix/Pump Combo

Cooling Tower

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Non-Disposable Liquid Filtration System

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Trial - Side Streaming Cooling Tower

HVAC Filtration

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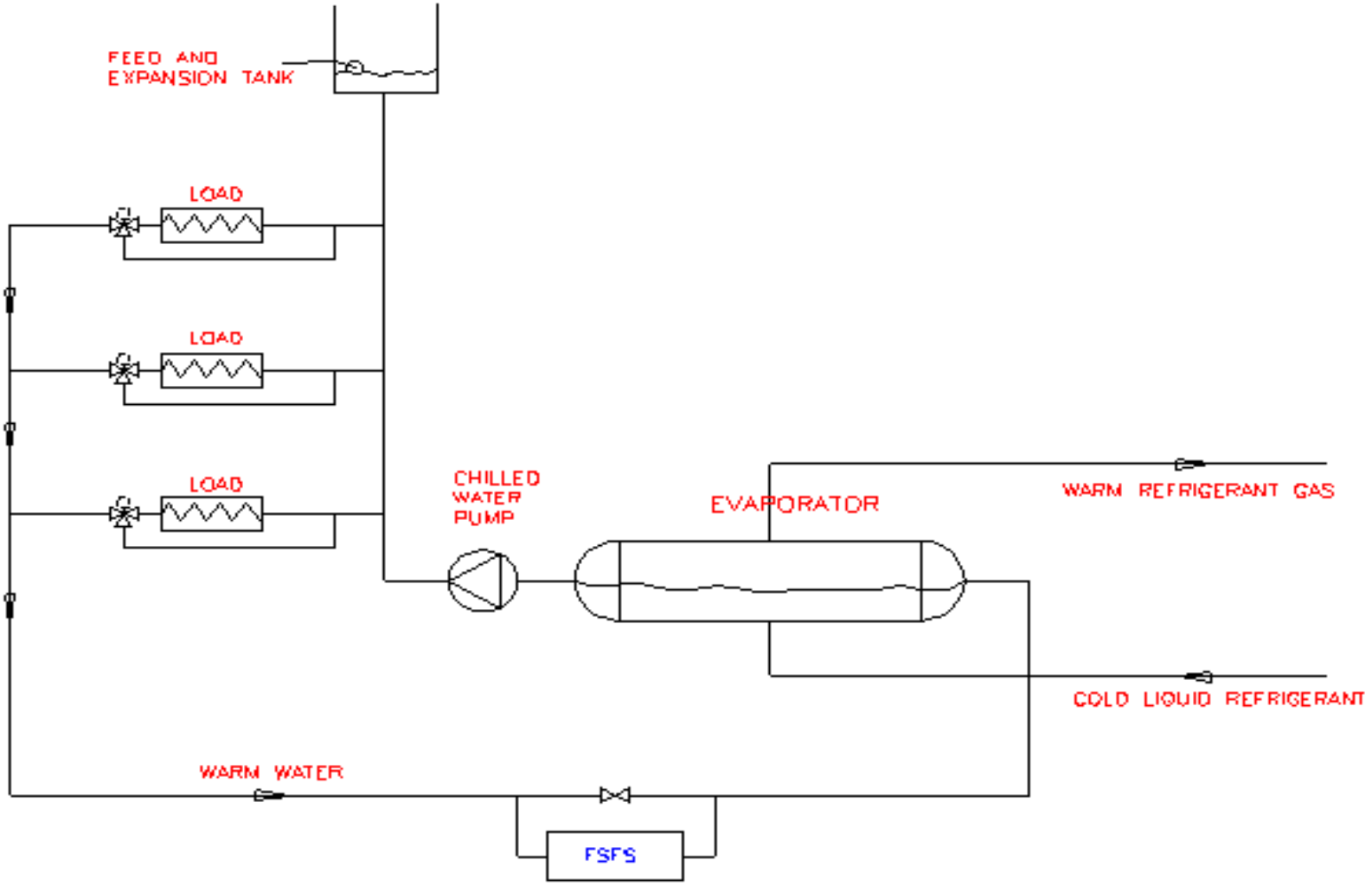
Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS



Chilled Water

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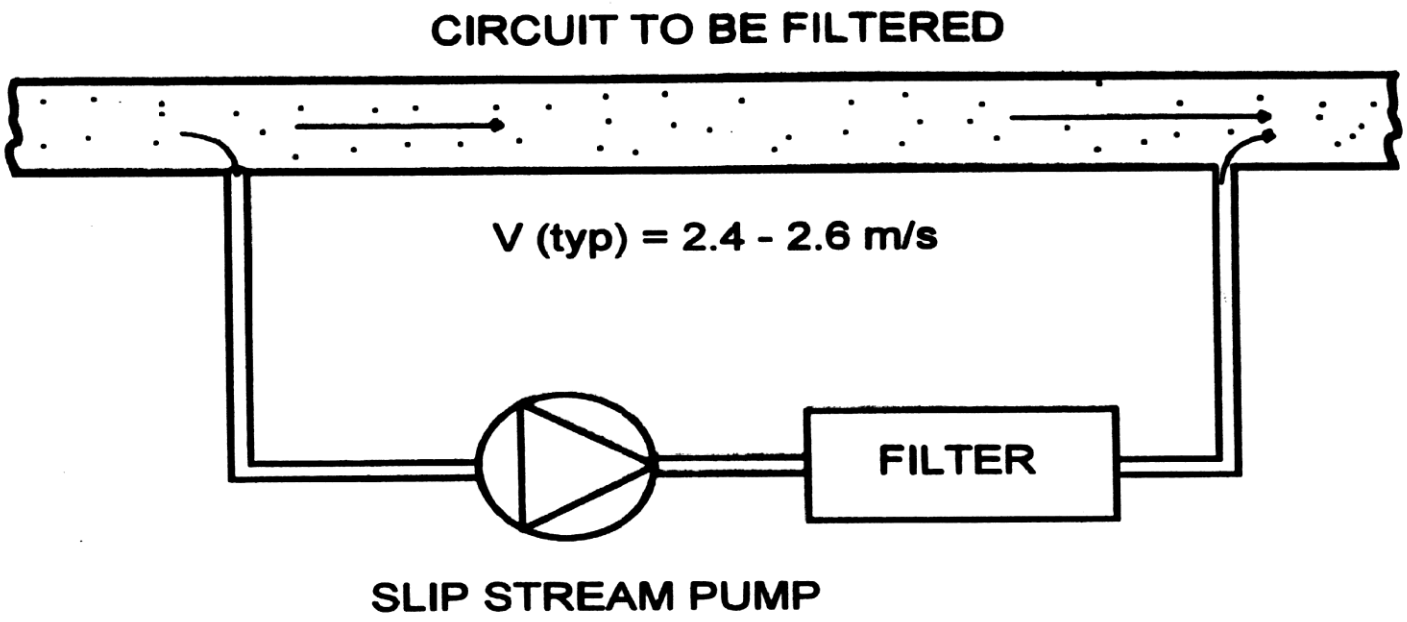

Chilled Water

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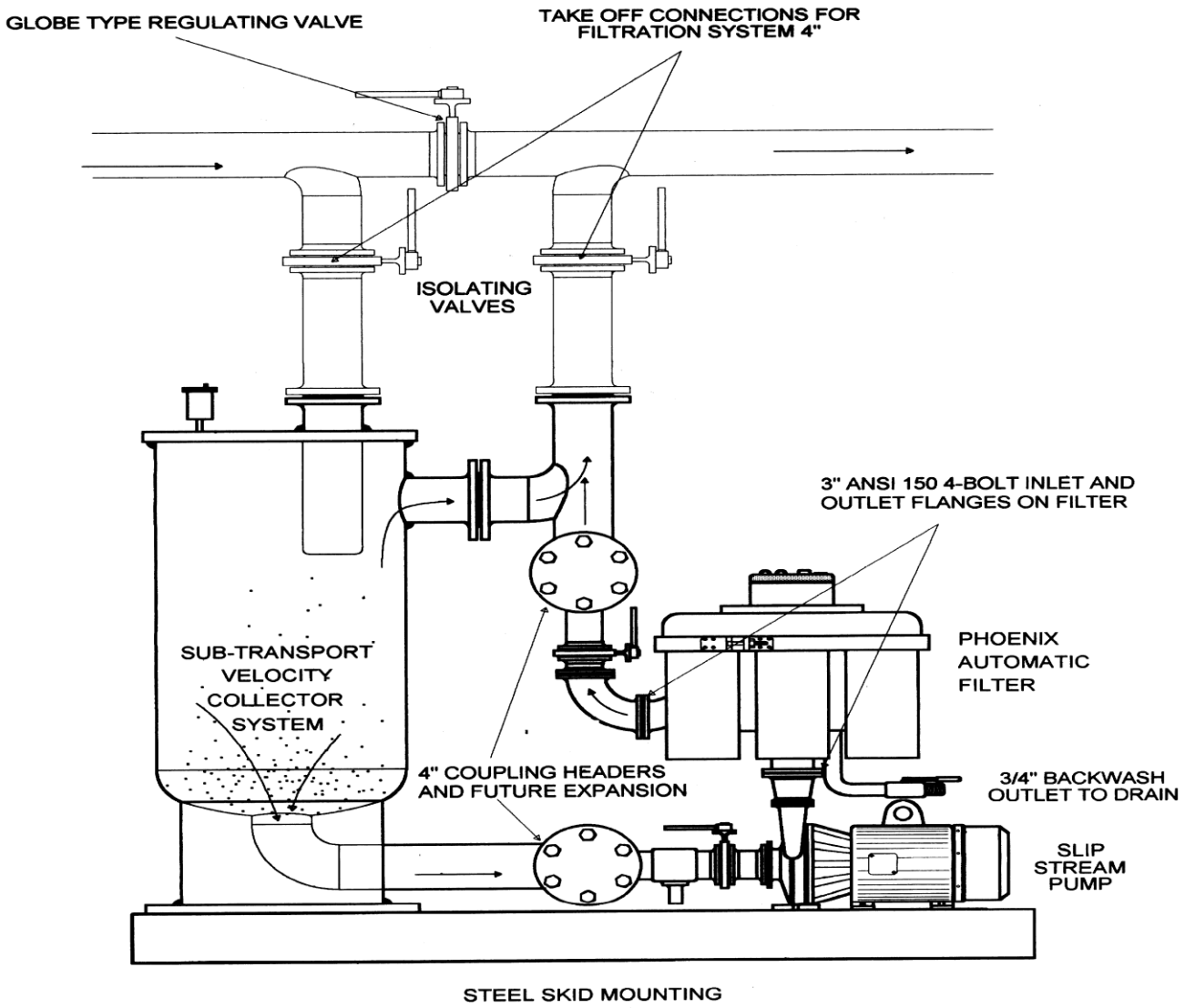

Chilled Water

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Side Streaming
Closed Loop System

Chilled Water

The Most Advanced, Automatic,
Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS

Forced Sedimentation Filtration System (FSFS) using Phoenix Filter

Chilled Water

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Chilled Water - Closed Loop System

Case Study

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Assume:

- 1,100 gpm recirculating rate of the cooling tower
- In-line plate heat exchanger used for process cooling
- 2 cycles of concentration

Case Study

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Benefit: Increase Efficiency of PHE

Assume $.035 per KWH energy costs

Assume filtration improves Delta ‘T’ across PHE by 1 degree F

Requires 161 KW to raise 1,100 gpm by 1 degree F

Annual Energy Savings = $49,363

Case Study

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ZERO GRAVITY FILTERS

Benefit: Increase System Up-Time

Unscheduled downtime of the process costs $10,000 per hour

Fouling of the PHE, causes 4 hours per year of downtime

Proper Filtration Maintains Heat Efficiency

Annual Cost Savings = $40,000

Case Study

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ZERO GRAVITY FILTERS

Benefit: Reduce Chemical & Water Use

Assume increased cycles from 2 to 4

Evaporation at 1.2% = 19,000 gallons per day

Blowdown at 2 cycles = 19,000 gallons per day

Blowdown at 4 cycles = 6,333 gallons per day

Water usage no filtration = 38,000 gallons per day

Water usage with filtration = 25,333 gallons per day

Water Savings = 12,667 per day at $.52/cubic meter

Annual Water Savings = $9,161

Case Study

The Most Advanced, Automatic, Non-Disposable Liquid Filtration System

ZERO GRAVITY FILTERS

Benefit: Reduce Chemical & Water Use

Assume 200 ppm chemical usage

Assume $2 per pound chemical cost

Chemical at 2 cycles = 38 pints per day chemicals

Chemical at 4 cycles = 12.5 pints per day chemicals

Chemical Savings = 25.5 pints = 25.5 pounds

Annual Chemical Savings = $18,615

Case Study

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Benefit: Reduce PHE Maintenance Costs

Assume 40 plates

Assume $75 per plate to have cleaned and maintained

Assume 16 hours to disassemble and reassemble

Annual Cost Savings = $3,400

Case Study

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ZERO GRAVITY FILTERS

Benefit: Total Cost Savings

Increase Efficiency of PHE:	$49,363
Increase System Up-Time:	$40,000
Annual Chemical Savings:	$18,615
Annual Water Savings:	$ 9,161
Reduce PHE Maintenance Costs:	$ 3,400
Total Cost Savings:	**$120,539**