HIGH PERFORMANCE FILTERS FOR COMPRESSED AIR & GAS

P-2000 SERIES

Value and Performance Through Advanced Technology

PNEUMATIC PRODUCTS
State-of-the-art technologies in filtration medias, engineering design and manufacturing practices are incorporated in the Pneumatic Products P-2000 Compressed Air Filter Products.

The result is a product unmatched in value... *Long element life, high contaminant removal efficiencies and low differential pressure drop at a system price you can afford.*

**THE NEED FOR P-2000 FILTERS**

Contaminants in your compressed air and gas systems dramatically increase your operating cost. Dirt, moisture, oils, hydrocarbons, gases and bacteria aggressively attack, corrode and erode your piping systems, controls, instruments and tools. This causes maintenance and repair costs to escalate dramatically.

Many industries are experiencing a 10 - 17% reduction in maintenance costs as a result of improving compressed air and gas quality.

What does an hour of unplanned down-time on the production line caused by a failed component cost your company?

Air utilized in various processes that contact your product affect your operating costs. Contaminated air can result in increased scrap, rejects and rework.

Reducing the high cost of maintenance, down-time and rejects is essential to achieve “World Class” competitiveness and quality.

**DESIGN CHALLENGES FOR A HIGH EFFICIENCY COALESCER**

There are many end user requirements that challenge a manufacturer to design the ultimate high efficiency coalescer filter element. These challenges include:

- **Design a coalescer effective on a wide range of aerosols, 1 micron to .01 micron** to ensure maximum liquid contaminant removal.
- **Design a coalescer with high liquid removal efficiency consistent throughout the life of the filter element.**
- **Design a coalescer with a low saturated pressure drop to maximize working pressure downstream and reduce electrical utilities.** *Note: 1 psi of pressure drop costs $65.00/year per 100 scfm based on $.07 per kilowatt hour.*
- **Design a coalescer with long life to reduce the cost of maintenance associated with filter element replacement.**
PNEUMATIC PRODUCTS EXCEEDS THE CHALLENGE

P-2000 COALESCING FILTRATION FEATURES

**End-Cap**
- Non-metallic, will not corrode out.
- Complete, total structural support.

**First Stage Drain Layer**
- Poly Foam Wrap - Compatible with all compressor oil types.
- Quickly drains liquid to the bottom of the element to prevent liquid carry-over.

**Second Stage Drain Layer - Re-Entrainment Barrier**
- Unique structure aids in liquid drainage and prevents liquid re-entrainment and carryover.
- Eliminates the need for special media treatments.

**Differential Pressure Gauge**
- Unique carousel movement.
- Color-coded index.
- Visibility top, front and back.
- Instrument quality gauge movement.

**POSI-Lock Snap-On Feature**
- No tie rods - quick and easy to install.
- Non-metallic construction - no corrosion, easy to remove elements.
- Positive O-ring seal - no contaminant bypass while in operation.
- Non-silicone O-rings, compatible with all compressor lubricants.

**High Efficiency Coalescing Media Bonded/Uniform Pore**
- Prevents channeling throughout life of the element, ensures consistent performance.
- Prevents liquid re-entrainment during fluctuating flows and pressures to ensure consistent performance.
- Prevents media migration and contamination downstream.
  - **Maximized Void Volume (Pores)**
    - Lowers saturated pressure drop saving energy.
    - Extends element life to save on replacement costs.
  - **Pleated Media**
    - Offers 6 to 9 times the surface area of “wrapped” or “depth style” elements. Provides longer element life and lower pressure drop.
    - Full-Flow Pleat - Non-pinched, increases surface area and extends element life.
    - Inside-to-out flow design to prevent re-entrainment.

**Sump Area**
- Ample area for liquid collection and draining.
- Connection for automatic drain valve.

**Liquid Presence Indicator**
- Test for liquid and/or pressure in bowl.

**Inside/Outside Support Core**
- Provides structural strength to filtration media, prevents media degradation during fluctuating flows and pressures. Good to 100 psi pressure differential.

**First Stage Drain Layer**
- Poly Foam Wrap - Compatible with all compressor oil types.
- Quickly drains liquid to the bottom of the element to prevent liquid carry-over.

**Second Stage Drain Layer - Re-Entrainment Barrier**
- Unique structure aids in liquid drainage and prevents liquid re-entrainment and carryover.
- Eliminates the need for special media treatments.

**Differential Pressure Gauge**
- Unique carousel movement.
- Color-coded index.
- Visibility top, front and back.
- Instrument quality gauge movement.
Where | Benefits
---|---
Downstream of Aftercoolers & Mechanical Separators | Compensates for cooler/separater inefficiencies.
Downstream of Air Receivers | Removes additional liquids as air cools to ambient.
Upstream of Refrigerant Dryers | Protects system heat exchanger from fouling and improves performance.
Downstream of Refrigerant Dryers | Compensates for system inefficiencies through the heat exchangers and separators.
Upstream of Desiccant Dryers | A characteristic of desiccant dryers is that they remove vapors only. Coalescers remove harmful liquids, aerosols and mist to improve performance and extended desiccant life.
Point-of-Use on Critical Applications | Ensures critical instruments and applications are protected.

**FLOW DIAGRAM FOR COMPRESSED AIR SYSTEMS**

1. Coalescing filters required at these locations.
2. Particulate filters required at these locations.
P-2000 COALESCER PERFORMANCE AND EVALUATION

- Liquid removal efficiency 0.001 ppmw based on 20 ppmw challenge.
- Less than 1.5 psid pressure drop, clean and dry.
- Exceeds ISO 8573 Class I standards for oil content.
- Less than 3 psid pressure drop, clean and saturated.
- Removes liquid aerosols down to 0.01 microns.
- **Note:** Many manufacturers rely on a “DOP” rating for performance criteria. The DOP (dioctylphthalate) technique is outdated.

The DOP test does not measure coalescing efficiency accurately because it examines coalescers under artificial conditions.

- DOP only tests monodispersed dry aerosols; wet polydispersed aerosols are not tested.
- DOP only tests at atmospheric pressure, not at system pressure.
- DOP tests are dry, and coalescers operate in a wet, saturated environment.

The DOP test does not evaluate important considerations for a coalescer. ISO 8573 CLASS I specifies and defines testing measurements required and qualifies a filter’s ability to:

- Coalesce
- Drain
- Minimize re-entrainment
- Establish differential pressure (saturated)

A WORD ABOUT THIS TEST

ISO 8573 - This test specifies purity classes for compressed air with respect to particles, water and oil. For the purpose of assessing purity classes and performance, testing shall be in accordance with ISO standards.

Testing samples are taken for a specified length of time. Measurements are carried out at actual operating flows, temperatures and pressure; results are based on a mean value of all samples taken.
The challenge is to design a particulate filter element that:

- Exceeds ISO 8573 Class II standards for particulate filters.
- Is effective on a wide range of particulate size, 1 micron to 6 microns.
- Has high dirt load capability to maximize element service life.
- Has low pressure drop to maximize working pressure and reduce the cost of electric utilities associated with pressure drop.

### Pneumatic Products Exceeds The Challenge

**P-2000 Particulate Element Features**

**A. POSI-Lock Snap-On Feature**
- No tie rods - quick and easy to install.
- Non-metallic construction - no corrosion, easy to remove.
- Positive O-ring seal - no contaminant bypass.
- Non-silicon O-rings suitable for all applications.

**B. Inside/Outside Support Core**
- Provide structural strength to filtration media.
- Can be used as a coarse coalescer.

**Note:** 0.5 ppmw efficiency as coalescer with 20 ppmw challenge.

**Benefit:** In high dirt load applications, this filter extends life of higher cost high efficiency coalescer when used in series.

**C. High Efficiency Particulate Media**
- **Bonded Fiber Construction**
  - Prevents channeling due to pore size enlargement.
  - Consistent performance.
  - Prevents media migration downstream.
  - No contaminant downstream.
- **Pleated Media**
  - Offers 6 - 9 times the surface area of “wrapped” or “depth-style” elements, longer element life and lower differential pressure.
  - Removal efficiency down to 0.9 micron, (100% absolute).

**Typical particle size distribution downstream of an adsorption bed**

(activated alumina, silica gel, zeolites, or carbon). Particle size distribution measured using a PMS Las-X laser spectrometer.
P-2000 PARTICULATE APPLICATIONS

<table>
<thead>
<tr>
<th>Where</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downstream of desiccant dryers</td>
<td>Prevents instrument air system from being exposed to desiccant dust.</td>
</tr>
<tr>
<td>Pilot air source for dryer controls</td>
<td>Allows clean, dry air for piloting valves and controls on dryers.</td>
</tr>
<tr>
<td>Downstream of adsorbers</td>
<td>Prevents abrasive dust from carbon, desiccant or molecular sieve from entering process or instrumentation.</td>
</tr>
<tr>
<td>Point-of-use applications</td>
<td>With dry air in piping system, prevents scale and other particles from damaging tools, paint lines, instruments and many other applications.</td>
</tr>
<tr>
<td>General purpose coalescer or upstream of high efficiency coalescers</td>
<td>Extends higher cost coalescer element life, or used as a general coalescer with 0.5 ppmw efficiency with a 20 ppmw challenge.</td>
</tr>
</tbody>
</table>

P-2000 PARTICULATE PERFORMANCE

- As a coarse coalescer < 0.5 ppmw on 20 ppmw oil challenge.
- As a particulate filter - 100% absolute removal rating 0.9 micron.
- Less than 1.5 psid pressure drop dry and 3.0 psid saturated when used as a coalescer.

Particulate Afterfilter
- Pleated element design, 6 times more surface area
- Maximum particle passed: **0.9 micron absolute**
- 1 psid initial pressure drop
- Element construction eliminates release of fibers into airstream
- Bonded media prevents channeling and particulate unloading

PDV 100/400 Drain Valves
- Recommended for coalescing filters.
P-2000 FILTER HOUSINGS

SINGLE ELEMENT DESIGN FROM 35 scfm TO 1,200 scfm

- Straight in-to-out flow design for easy installation on dryers or point-of-use applications.
- The bowl is hand-threaded to head - easy element changeout, no special tools.
- POSI-Lock Snap-On Element - Easy to changeout, no contaminant bypass.
- No small pieces to lose or corrode.
- Baked powder coat finish inside and out for a long durable finish that resists corrosion, erosion and chipping.
- Built-in differential pressure gauge to indicate need for element changeout.
  - Easy to read carousel display
  - Color and numeric readings
  - Indicator visible top, front and back
  - Ball bearing movement for instrument accuracy.
- Liquid presence indicator.
- Pressure indicator (whistle-hole) in bowl for safety when changing element.

LARGE FLOW HOUSINGS - 1,600 scfm TO 15,000 scfm

- Non-stacking, multi-cartridge design - easy to install, no special tools, no connecting rods, no element locknuts to corrode or lose.

- **L-Shaped flow** design for lower differential pressure; important on larger flow designs where utilities associated with pressure drop are more critical.
  **Note:** 1 psid of pressure drop per 100 scfm costs $65.00 at $.07 per kilowatt hour.

- Carbon steel design, shot blast and treated with corrosion-resistant primer and a two-part epoxy top coat for a long durable finish.
P-2000 SERIES FILTERS

FLOW RANGES - FROM 35 scfm TO 1,200 scfm

**DIMENSIONS**

<table>
<thead>
<tr>
<th>Flow Rate (scfm)</th>
<th>Coalescer (SU)</th>
<th>Particulate Filter (AF)</th>
<th>H (SU)</th>
<th>H (AF)</th>
<th>L</th>
<th>W</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>In/Out Drain (NPT)</th>
<th>Drain (NPT)</th>
<th>LBS.</th>
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<tbody>
<tr>
<td>35</td>
<td>P2001-35SU1-G8</td>
<td>P2001-35AF1-G8</td>
<td>9.5</td>
<td>10.1</td>
<td>4.4</td>
<td>5.2</td>
<td>6.5</td>
<td>2.0</td>
<td>3.3</td>
<td>1/2</td>
<td>1/4</td>
<td>6</td>
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<td>9.0</td>
<td>2.3</td>
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<td>8</td>
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<td>P2001-100AF1-G16</td>
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<td>1/4</td>
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<td>P2001-150AF1-G16</td>
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<td>7.0</td>
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<td>4.1</td>
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<td>8.1</td>
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<td>32.5</td>
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<td>P2001-400AF1-G32</td>
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<td>58.9</td>
<td>8.1</td>
<td>7.1</td>
<td>37.0</td>
<td>3.8</td>
<td>5.0</td>
<td>2-1/2</td>
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<td>3</td>
<td>1/2</td>
<td>36</td>
</tr>
</tbody>
</table>

* Based on 100 PSIG & 100°F

**MATERIALS OF CONSTRUCTION**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>MATERIAL</th>
</tr>
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<tbody>
<tr>
<td>Vessel Head, Bowl</td>
<td>Aluminum Alloy</td>
</tr>
<tr>
<td>Surface Finish</td>
<td>Baked Powder Coat</td>
</tr>
<tr>
<td>O-Rings</td>
<td>Buna N or Viton* (Optional)</td>
</tr>
<tr>
<td>Support Cores</td>
<td>Stainless Steel or Non-Corrosive Polymer</td>
</tr>
<tr>
<td>Element Materials</td>
<td>Microglass fibers and non-woven polyester;</td>
</tr>
<tr>
<td></td>
<td>glass-filled nylon end caps</td>
</tr>
<tr>
<td>Element Adhesive</td>
<td>Two-part epoxy</td>
</tr>
<tr>
<td>Manual Drain</td>
<td>Brass</td>
</tr>
<tr>
<td>Liquid Presence Indicator</td>
<td>Brass</td>
</tr>
</tbody>
</table>

Maximum operating temperature: 150°F (65°C)
Maximum recommended filtration temperature: 120°F (49°C)
Minimum inlet filtration temperature: 34°F (1°C)
Maximum pressure: 300 psig
### SPECIFICATIONS 1,600 scfm TO 15,000 scfm

#### SELECTION CHART

<table>
<thead>
<tr>
<th>Flow Rate (scfm)</th>
<th>Coalescer (SU)</th>
<th>Particulate Filter (AF)</th>
<th>Max Q per. Pressure psig</th>
<th>Dimensions (Inches)</th>
<th>Connections (Inches)</th>
<th>Approx. Shipping Weight (lbs.)</th>
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<tr>
<td>1,600</td>
<td>P2001-1600SU2-G49</td>
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<td>86.0</td>
</tr>
</tbody>
</table>

* Based on 100 PSIG & 100°F

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### Operating Conditions
- Max. Inlet Temp. 120°F
- Min. Inlet Temp. 34°F
- Max. Ambient Temp. 150°F
- Min. Ambient Temp. 34°F

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### Diagrams
- Models labeled as “SU” and “AF”
- Connections include drain connections and relief valve connections
- Dimensions marked as H, A, B, D, F, J
- Operating conditions highlighted with max and min temperatures

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### Notes
- Based on 100 PSIG & 100°F conditions
- Various models listed for different flow rates
- Dimensions provided in inches
- Connections include flanges and NPT fittings
- Shipping weight approximately indicated for each model
Since 1946, Pneumatic Products has been recognized as a leading supplier of technically advanced products. Our reputation for solving contamination problems is unsurpassed. We are known for solving the most difficult problems for the most demanding industries. Our goal is to maximize your productivity and profitability.

Our reputation for quality and performance is now enhanced with the P-2000 technology and lower life cycle costs for filtration systems and replacement elements. **P-2000 technologies are reducing system and element replacement costs by as much as 40%**.