Pulse-Jet Baghouse Overview & Common Problems

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Utility Hot Gas Market APC Trends
In the past 5 years, the trend is moving to Pulse Jet collectors (approximately 60% of applications):
• Felt used for under 400°F (205°C)
• 3:1 - 4:1 Air-to-Cloth ratio
• 3 – 6 year filter life
• Smaller housing footprint

Hot Gas Pulse Jet Design Trends

<table>
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<tr>
<th>Pressure</th>
<th>Cage Type</th>
<th>Maximum Length</th>
<th>Fabric Selection</th>
<th>Relative Energy Usage</th>
<th>Issues</th>
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<td>High Pressure / Medium Volume</td>
<td>25 – 50 PSI</td>
<td>16 – 19 feet</td>
<td>Felt</td>
<td>High wearing Penthouse restrictions</td>
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<tr>
<td>Medium Pressure / Medium Volume</td>
<td>15 – 25 PSI</td>
<td>22 – 25 feet</td>
<td>Fiberglass with PTFE membrane</td>
<td>Fair</td>
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<tr>
<td>Low Pressure / Low Volume</td>
<td>&lt; 15 PSI</td>
<td>22 – 27 feet</td>
<td>Fiberglass</td>
<td>Fair</td>
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Air-to-Cloth Ratios:
- 3:1 - Fiberglass
- 3.5:1 - Fiberglass with PTFE membrane
- 4:1 - Felt

Fabric Selection Considerations
• Baghouse Operating Temperature
• Abrasion Resistance Needed
• Resistance to Cleaning Energy
• Gas Stream Chemistry
• Air-to-Cloth Ratio

Commonly Used Filtration Fabrics
Pulse Jet & Low Pressure - High Volume
- Woven fiberglass – 25%
- PPS (Polyphenylene Sulfide) – 60%
- Acrylic – 10%
- Others – 5%
  - P84
  - ePTFE Membrane applied to the above substrates
  - Pleated Filter Elements (PFEs)

Fabric Characteristics & Suitability for Power Generation Applications

- Sensitive bag-to-cage fit
- Fair with chemical or acid-resistant finishes
- Must oversize bag for shrinkage for temperatures above 450°F (232°C)
What is ePTFE Membrane?
A microporous membrane laminated to traditional filtration fabrics.
The PTFE membrane consists of a web of overlapping fibrous strands that form millions of air passages, much smaller than the particulate, for an extremely porous filter surface. Because the membrane is slick, bag cleaning is more complete with less energy.

Why is ePTFE gaining popularity for filtration?
- Enhanced fine particulate collection
- Superior clean-down of the filter
- Lower differential pressure
- Resistance to moisture in the gas stream
- Longer bag life

ePTFE membrane vs. coatings
Coated filtration medias allow for much larger voids in the fabric while reducing clean fabric permeability as much as 25%
Membrane provides a microporous web structure that traps submicron particulate while maintaining consistently higher airflows

Solutions with pleated elements
Increase surface filtration area... by as much as 2–3 times
Lower differential pressure... increased airflow
Lower emissions... double filtration efficiency

Solutions with BHA ThermoPleat® technology:
Shorter Filters are installed out of the inlet gas stream:
Reduces abrasion to bottom of filters.
Provides for a large drop-out zone.

Typical pulse-jet collector
Clean-on-Demand system

High-Low set points at no greater than 1” apart...
Ideal is no more than 0.5”
Incorrect pulse cleaning sequence

Correct pulse cleaning sequence

Common Inlet Design
- Inlet baffle directs airflow down into hopper.
- Collected material can swirl upward, causing heavier than design grain-loading.
- Narrow hoppers and nearby bag bottoms may experience abrasion damage.

Improved design
- Enlarged inlet reduces velocity.
- "Ladder Vane Baffles" more evenly distributes airflow, reducing uneven grainloading and turbulence.
- The baffles are simple and economical to install.

Blowpipe manifold/bag seam alignment
Blowpipe alignment

2° Allowed

Blowpipe misalignment

Less than 1/4 inch (6.35 mm)

Six ways dust gets to clean air plenum

- Hole in bag
- Snapband
- Leak around a weldment
- Clean too soon
- Not cleaning
- Air leaks at door seal

Inspection and maintenance procedures

**Daily Maintenance**
1. Check pressure drop
2. Check cleaning system
3. Check all valves and dampers
4. Check dust removal
5. Check emissions
6. Do a daily walkthrough