General Troubleshooting - Pulse Jet Collectors

In pulse-jet collectors, the cleaning function not only removes the collected dust, it rearranges the remaining dustcake structure on the bag, resulting in a change in differential pressure. In a unit with high upward gas velocities, mechanical separation of the fine submicron dust can occur, creating a dustcake structure that is very dense. A dense dustcake creates a greater resistance to airflow and higher differential pressures.

Pulse Sequence

The pulsing sequence can play an important part in minimizing the re-entrainment of material. Pulsing one row adjacent to another row (sequential order) can cause the fine, submicron material to migrate to the cleaned row. Staggering the order of rows to be pulsed puts distance between the recently cleaned rows and those rows yet to be cleaned, and can improve the dustcake for optimum filtration. A staggered cleaning cycle can also reduce the cleaning frequency, and thereby increase filter life. (See Figure 14)

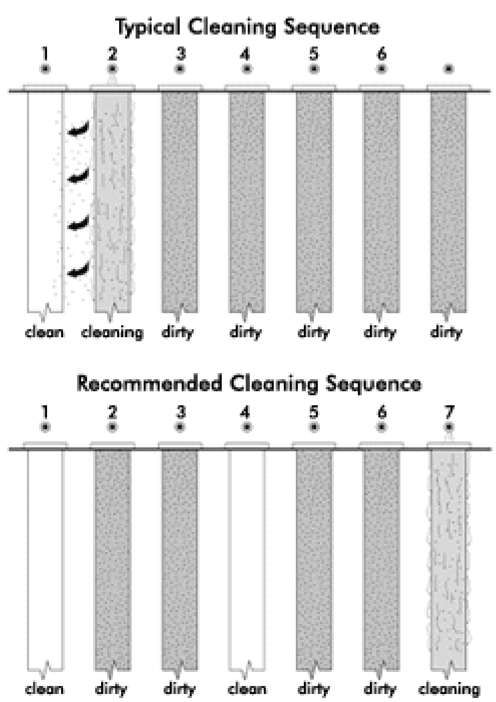

Figure 1. Recommended pulse-jet row sequencing.

Pulse Cycle

The cleaning cycle for standard high pressure, low volume pulse-jet collectors should be adjusted so the pulse duration produces a short, crisp pulse that creates an effective shock wave in the bag. This duration is generally set to fire for 0.10 to 0.15 second, based on the manufacturers recommendations. (Other styles, such as low pressure, high volume pulsing and medium pressure, medium volume, use different settings to operate and should be examined on an individual basis.)

The frequency of the pulse cleaning is also vital to proper dustcake retention. This frequency can vary from 1 to 30 seconds or more and is adjusted by means of a setting on the timer board or PLC. The frequency should be adjusted so that the differential pressure across the collector averages 3-6 in. w.c. (75-150 mm) depending on the type of filter used.

To ensure proper cleaning frequency, an automatic "clean-on-demand" system utilizing a pressure switch such as a Photohelic® gauge can be installed. This type of system automatically steps through a cleaning cycle that starts when the high differential pressure set point is reached and stops when it cleans down to the low differential pressure set point. It can also save on compressed air usage. The range on the high/low differential setting should be 0.5-1.0 in. maximum (12.5 -25 mm).

On pulse-jet collectors, the pulse frequency can be increased. However, the next pulse should not be programmed to fire until the compressed air pressure is regained so the same pulse force is obtained for each row cleaned. The regain of air pressure is dependent on the capability of the compressed air system tied to the baghouse and the size of the compressed air piping run to the header tank. The pipe should be large enough to repressurize the header in a minimum time.

Typically, the feed line should be a 1 in. (84 cm) diameter pipe, depending on compressed air used.

Troubleshooting Pulse-Jet Cleaning Systems

Pulse valve malfunctions are usually caused by diaphragm failure or dirt, oil, and/or moisture getting into the valve body. These problems can be identified by disassembling the valve and inspecting it. Before checking valves, verify that the tubing and fittings between diaphragm (pulse) valves and solenoid valves are not leaking, and that the tubing is connected to the inlet port on the solenoid valve.

Prior to servicing the diaphragm valve, the timer board, and the solenoid pilot valve needs to be checked for proper operation. If it is malfunctioning, refer to the troubleshooting flowchart at the end of this section.

Bag and Cage Damage - Evaluation Summary

Damage	Cause	Solution	Options
Bags have internal abrasion marks along vertical wires.	1. Cage wires are deeply pitted as a result of excessive corrosion. *or* 2. Bag is oversized.	1. Replace with new galvanized steel cage. *or* 2. Replace with new bag that is the correct size.	1a. Use a mild steel cage if chloride and moisture (HCl) are present. *or* 1b. Use an epoxy coated cage.

			or 1c. Convert to stainless steel cages.
Cuts and/or internal damage is noticeable at the bottom of the bag where it contacts with the edge of pan.	Sharp edge on pan.	Use cage with rounded edge pan.	Increase the number of vertical wires to reduce amount of fabric drawn between wires across edge of pan.
Cage body has collapsed; broken welds and bent wires have caused bag wear points.	1. Cage has been weakened by corrosion. *or* 2. Pressure exceeds cage strength. *or* 3. Rough handling by maintenance crews.	1. Replace with standard cage. *or* 2. Change operating conditions to reduce differential pressure. *or* 3. Re-train maintenance.	1. Replace with a coated cage or a stainless cage. *or* 2a. Increase the number of cage rings. 2b. Make cage from heavier gauge wire. *or* 3. Contract maintenance.
Bag failure resulting from excess fabric slack pinch above top ring or below bottom ring.	Cage is tapered or bowed between the ring and the pan (hourglass).	Design cage with minimal taper (larger pan or top).	Change ring spacing to minimize taper or bowing.
Flex line failures between the vertical wires.	Bags are not adequately supported by cages.	Replace with cage providing more support (20 vertical wires and/or closer horizontal ring spacing).	1. Convert from 10 or 12 wire cage to 20 wire cage design. *or* 2. Reduce ring spacing.
Bags are difficult to remove from cages.	Corrosion causes rough surfaces which increase friction between the bag and the cage. (Actual chemical bonding between the cage wire	Replace all cages with new standard cage.	1. Use coated or stainless steel cages. *or* 2. Convert to omni top cages to allow for removal of

	and fabric can occur.)		snapband bags and cages as an assembly.

Can Velocity

Pulse-jet collectors typically clean “on-line” and have inlets below the filters. In this case, can velocity may be a problem (see glossary). Can velocity is most critical when the dust being collected has a light bulk density (<35 lbs per ft 3 (0.55 gr/m 3)). Can velocities that are too high (>150-300 FPM depending on the dust) can cause high pressure drops. One solution is to install PulsePleat ™ filters. Pleated filters have more filter area than traditional bags and the total number of filters used can be reduced. This creates more open area for airflow, thereby reducing can velocity. Changing the inlet to a point above the filter bottoms may also remedy the problem.

Cage Inspections

We recommend thorough cage inspections any time a new bag is installed using the guidelines outlined on the following page. The most common problems are bent and damaged cages that cannot properly support the filter bag. Cages in corrosive environments can eventually rust and pit.

Corroded areas begin to abrade the fabric as it flexes during the cleaning cycle. Cage bottom pans with sharp edges can cause similar damage.

Bag-to-Cage Fit

For proper performance of pulse-jet filters, the fit relationship between the bag and cage is critical. Filters that are too loose or too tight will severely limit collection efficiency and lead to premature physical failure. (See Figure 15)

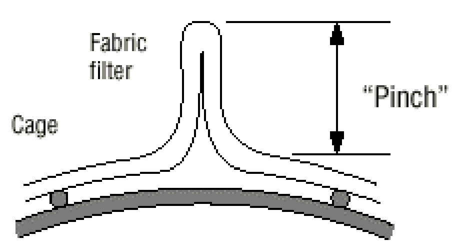

Figure 2. "Pinch" is calculated by subtracting the actual cage circumference from the bag circumference; then dividing the result by 2.

Nominal Recommended "Pinch"

Fabric	"Pinch"	Rec. Cage
Synthetic Needle Felts	0.25-0.75 inches (6.4-19 mm)	Any
Synthetic Needle Felts w ePTFE Membrane	0.0625-0.3125 inches (1.6-7.9 mm)	Any
Fiberglass	0.125-0.375 inches (3.2-9.5 mm)	20-wire
Fiberglass w ePTFE Membrane	0.0-0.1875 inches (0.0-4.8 mm)	20-wire
PPS	0.25-0.5 inches (6.4-12.7 mm)	10-wire
P84®	0.125-0.375 inches (3.2-9.5 mm)	Any
P84® must be sized larger for temperatures over 450° F (232° C) to account for shrinkage.		
Teflon®	0.375-0.625 inches (9.5-15.9 mm)	20-wire
Teflon® must be sized larger for temperatures over 450° F (232° C) to account for shrinkage.		

Pulse-jet Bag Installation

Correct filter bag installation is important to maximize the life of the fabric. The recommended procedure for bags in pulse-jet collectors is to position all bag seams facing the same direction. This can provide a reference point that helps to identify problems that result from inlet abrasion. This can be a useful troubleshooting technique that provides a history on bag failures. Bags with flanges or cuffs that fold over the tops of their support cages should be checked for smoothness around the edge to prevent leakage and bag abrasion. Seam placement on bottom load bags should be 180 degrees from the split or gap in the cage collar. The clamp on these bags should be installed 90 degrees in relation to the seam on the bag and positioned on the groove in the cage. Snapband bags for top access pulse-jet units should be installed with the seams all facing the same direction. This allows for identification of areas where problems are occurring and improved troubleshooting of the unit.