

Pulse jet valve solution

Technology

Pulse jet filtering is a process developed for the effective removal of solids from the surface of a filter element. The process is typically undertaken whilst the filter is in operation, without interrupting the process flow.

Full forward flow is maintained at all times through bundle of filters, while groups of filter elements are blown back sequentially by directing a high pressure pulse of filtered clean gas into the throat of each element. The pulses last between 0.1 and 1.2 seconds, at more than two times the process pressure. During this period, the flow to the elements being cleaned is reversed momentarily by a high-pressure jet pulse. The impact of the shock wave set up by the reverse pulse, effectively breaks, and removes the accumulated cake from the surface of the filter.

Pulse jet filtering technique can be used in high temperature, high solids content, chemically aggressive and highly active environments, and over a wide range of pressures from vacuum condition to high pressure condition. This provides filtration down to very fine levels, with continuous operation and consistent pressure loss.

Applications

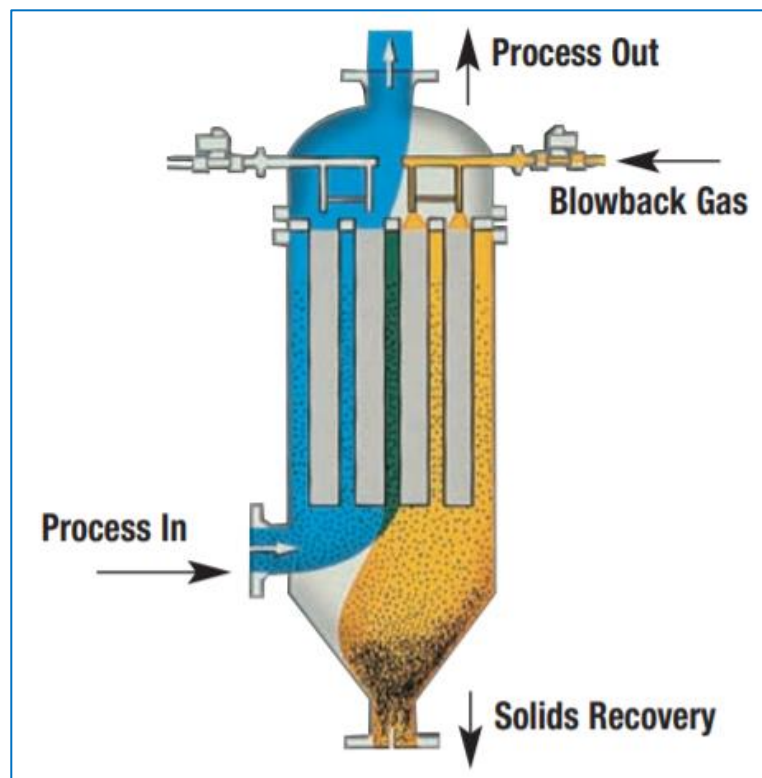
- Process gas
- Dryers
- Fluidised bed
- Fuel production
- Milling systems
- Mixers/blenders
- Pneumatic conveying systems
- Super-heated steam.



High speed camera captures images of the filter element during the cleaning



- A. The filter element loaded with solid particles
B. The particles are removed from the surface by the pulsed jet action.
C. The particles are carried away;
D. The particles begins to settle;
E. The particles fall to the bottom of the vessel leaving a clean filter element.



Sample application – Refinery site

Line size	4"
Valve size	3" Full port
Pressure	Class #1500
Connection	Raised faced ANSI flange
Media	Syngas, Gas/Vapor
Flow	44.5 Kg/Sec
Cv (normal)	850
Valve inlet pressure	115 bar
ΔP (normal)	67 bar
ΔP (shut off)	115 bar
Operating Temperature	209 deg. C
Max. Temperature	260 deg. C
Max. Pressure	130 bar

Valve stroke definition:	Close-Open-Close
Total stroke time:	0.45 to 1.2 sec (adjustable)
Valve cycle:	One stroke every 180 second
Minimum instrument air pressure:	4.5 bar

The challenge

- 18 automated valves per filtration unit, each valve controls one metallic filter element.
- Automated valve solution that delivers maximum energy by rapid impact of a gas pulse.
- A severe service application comprises of high cycle, high differential pressure, and elevated temperature.
- All 18 automated valves shall comply with 300,000 cycles maintenance free.

Microfinish solution

Valve

Size 3" DN80 Full port, trunnion mounted, fire safe to API 607 and ISO 10497, and raised faced flanged Class 1500

Design standards	API 6D, ASME B16.34, ISO 17292
Body/tail piece	Carbon steel A105 (A350 LF2 optional)
Ball	Stainless steel 410
Stem	17-4PH NACE MR0175
Seat	Carbon Filled PEEK

Stem packing certified to ISO 15848-1 and API 641 for low emission.

Valve trim designed with a safety factor of two (2) as per API 6D requirement.

Actuator

Quarter turn (90 degree) double acting modified for high flow, fast acting operation.

Control elements

$\frac{3}{4}$ " solenoid 5/2 pilot valve, air operated.

$\frac{1}{4}$ " EX-Proof 24 VDC solenoid valve controls the air to the pilot 5/2 valve.

$\frac{1}{4}$ " needle valve used for smooth adjustment of opening hold up time.

$\frac{3}{4}$ " stainless steel compression fitting and tubing

Total stroke time Close-Open-Close **0.32 second**

Main features

- Fast acting
- Full bore, high flow
- Accurate and smooth rotation
- Rigid construction
- Simple time adjustment
- Ex-Proof Solution
- Light weight
- Low profile

