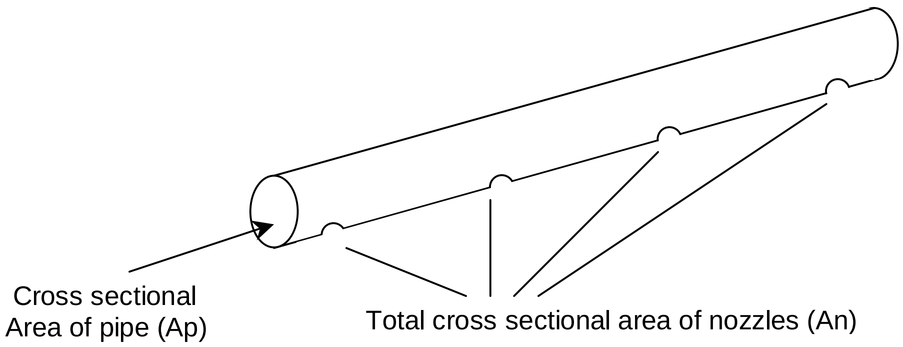
GLOSSARY OF TERMS

Area of Nozzles/Area of Pipe (An/Ap) Ratio:

The ratio used to calculate the total cross-sectioned area of nozzles (along a blowtube) in relation to the cross sectional area of the blowtube.



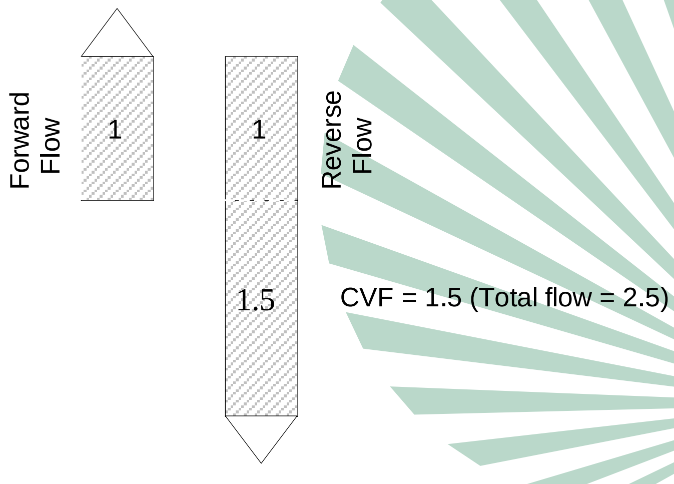
NB: Most reverse pulse filter designers (using drilled holes only) design with a ratio between 40/100 to 80/100. Utilising Go-Co nozzles, this ratio can be effectively increased to 150/100, allowing for more filter area cleared with each diaphragm valve.

Capture Velocity:

The air velocity at any point in front of the hood or at the hood opening necessary to overcome opposing air currents and to capture the contaminated air at that point by causing it to flow into the hood.

Cleaning Velocity Factor (CVF):

The factor used to calculate the nett amount of reverse cleaning flow required to overcome the forward flow in reverse pulse cleaning process. It must be remembered that this factor calculates the cleaning flow in excess of the forward flow.



Coefficient of Entry: The actual rate of flow caused by a given hood static pressure compared to the theoretical flow which would result if the static pressure could be converted to velocity pressure with 100% efficiency. It is the ratio of actual to theoretical flow.

Duct Velocity: A duct requires that a certain velocity be maintained at all points to avoid drop - out of particles. Minimum duct velocity to achieve full suspension at all points is known as the minimum transport velocity.

Dust: Small solid particles created by the breaking up of larger particles by processes such as crushing, grinding, drilling, explosions, etc. Dust particles already in existence in a mixture of materials may escape into the air through such operations as shovelling, conveying, screening, sweeping, etc.

Dust Collector: An air cleaning device to remove heavy particulate loadings from exhaust systems before discharge to outdoors. Usual range: loading 0.003 grains per cubic foot and higher.

Entry Loss: Loss in pressure caused by air flowing into a duct or hood (inches H20).

Footprint: Refers to the room available to configure the layout of the baghouse.

Free Expanding Jet: The angle defined by a freely expanding jet from a nozzle (typically 20°).

Fumes: Small, solid particles formed by the condensation of vapours of solid materials.

Gases: Formless fluids which tend to occupy an entire space uniformly at ordinary temperatures and pressures.

Gravity, Specific: The ratio of the mass of a unit volume of a substance at a standard temperature. Water at 39.2°F is the standard substance usually referred to. For gases, dry air, at the same temperature and pressure as the gas, is often taken as the standard substance.

Hood: A shaped inlet designed to capture contaminated air and conduct it into the exhaust duct system.

Humidity, Absolute: The weight of water vapour per unit volume, pounds per cubic foot or grams per cubic centimetre.

Humidity, Relative: The ratio of the actual partial pressure of the water vapour in a space to the saturation pressure of pure water at the same temperature.

Inch of Water: A unit of pressure equal to the pressure exerted by a column of liquid water one inch high at a standard temperature.

Jet Pump Curve:
Represents the combined knowledge of pressure and flow characteristics of air flow from the header tank through the diaphragm valve, into and along the blowtube and through the nozzle; resulting in "actual" air flow into the filter bag (via venturi or not).

Micron: A unit of length, the thousandth part of 1mm or the millionth of a metre (approximately 1/25,000 of an inch).

Minimum Design Duct Velocity:
Minimum air velocity required to move the particles in the air stream, fpm.

Mists: Small droplets of materials that are ordinarily liquid at normal temperature and pressure.

Plenum: Pressure equalising chamber.

Pressure Drop:
Refers to the pressure drop across the filters. As the amount of solid matter builds up on the outside of the bag or cartridge, the resistance to flow increases, and the volume of air flowing through the filter diminishes, and the differential pressure across the filter bags rises.

Pressure, Static:
The potential pressure exerted in all directions by a fluid at rest. For a fluid in motion, it is measured in a direction normal to the direction of flow. Usually expressed in inches water gauge when dealing with air. (The tendency to either burst or collapse the pipe).

Pressure, Total:
The algebraic sum of the velocity pressure and the static pressure (with due regard to sign).

Pressure, Vapour:
The pressure exerted by a vapour. If a vapour is kept in confinement over its liquid so that the vapour can accumulate above the liquid, the temperature being held constant, the vapour pressure approaches a fixed limit called the maximum or saturated vapour pressure, dependent only on the temperature and the liquid. The term vapour pressure is sometimes used as synonymous with saturated vapour pressure.

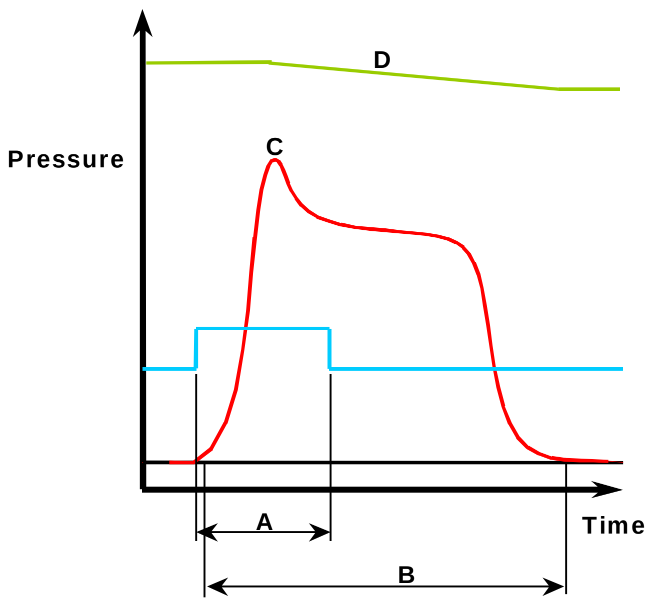
Pressure, Velocity:
The kinetic pressure in the direction of flow necessary to cause a fluid at rest to flow at a given velocity. Usually expressed in inches water gauge.

Slot Velocity: Linear flow rate of contaminated air through slot, fpm.

Smoke: An air suspension (aerosol) of particles, usually but not necessarily solid, often originating in a solid nucleus, formed from combustion or sublimation.

Transport (Conveying) Velocity:
See Minimum Design Duct Velocity.

Vapour: The gaseous form of substances which are normally in the solid or liquid state and which can be changed to these states either by increasing the pressure or decreasing the temperature.



Electrical On-Time (A):
Measured in milliseconds, this is the time from the start of the electrical signal to the solenoid valve to the end of the signal. This signal is normally shorter than the Mechanical On-Time and precedes the opening of the valve. Typical range for Electrical On-Time is 50 to 150 ms.

Mechanical On-Time (B):
Measured in milliseconds, this is the time from the first opening of the valve's diaphragm to the closing of this diaphragm. This is thus the period during which gas flows through the diaphragm valve. The Mechanical On-Time is normally longer than the Electrical On-Time and lags the electrical signal by around 10ms. Typical range for the Mechanical On-Time is between 100 and 300 ms. Longer times than this are achieved by extending the Electrical On-Time. The Mechanical On-Time in combination with the flow efficiency of the valve determines how much air is delivered to the cleaning system during the pulse.

Peak Pressure (C):

This is the highest pressure reached during the pulse, normally in the form of a spike near the beginning of the pulse. It is due to a combination of the flow momentum and the shockwave caused by the diaphragm first opening. This peak pressure is usually followed by a gently sloping pressure plateau when near steady flow is properly established through the valve and cleaning system. The peak pressure spike is transmitted through the cleaning system to the filter material, and is believed to aid the removal of the dust from filters.

Tank Pressure, Operating Pressure (D):

Tank Pressure, or Operating Pressure determines the pressure at which the filters are cleaned - allowing for some pressure drop through the valve and other cleaning system components. The Tank Pressure and the volume of flow delivered by the valve per pulse is an important factor in sizing the tanks. Normally the tanks are sized to ensure that the Tank Pressure does not drop by more than 30% during the cleaning pulse. This ensures that enough pressure is maintained in the tank to support the flow of gas through the valve and the development of a high pressure near steady flow after the Peak Pressure is reached. Proper tank sizing ensures that the filters receive a pulse of near the operating pressure for the duration of the cleaning pulse.

Tanks that are undersized will have a significantly decreasing pressure profile after the Peak Pressure is reached. Thus the filters will receive a diminishing pressure pulse, with an average pressure considerably lower than the Tank Pressure or Operating Pressure.

The Tank Pressure reduces typically in parallel to the pressure reduction during the steady flow period of the pulse.

Header Pressure Drop, Tank Pressure Drop:

This is the difference between the initial tank pressure before the pulse and the tank pressure after the pulse. Normally the tanks are sized to ensure that the Tank Pressure does not drop by more than 30% during the cleaning pulse. This ensures that enough pressure is maintained in the tank to support the flow of gas through the valve and the development of a high pressure near steady flow after the Peak Pressure is reached. Proper tank sizing ensures that the filters receive a pulse of near the operating pressure for the duration of the cleaning pulse.

Valve Air Consumption:

This is the amount of air delivered by the valve during a pulse. Valves with higher flow performance (referred to in terms of Kv or Cv) will deliver a higher rate of flow than lower performing valves, thus drawing more air from the tank for the same Mechanical On Time. High performance valves may thus appear to consume more air from the tank. Air Consumption may be reduced by shortening the Electrical On Time. In this way, a cleaning system can gain the benefits of higher performing valve (such as higher Peak Pressures) while potentially reducing Air Consumption.

Can be calculated using:

$$\frac{V_1 P_1 \left(1 - \left(\frac{P_2}{P_1}\right)^{\frac{1}{\gamma}}\right)}{P_{amb}}$$

where:

V1 = header volume (m^3)

P1 = Initial header pressure (absolute) (Pa)

Pamb = 101325 Pa

P2 = Final header pressure (absolute) (Pa)

? = Ratio of specific heats = 1.4 for air.

This gives air consumption in m^3.

Source: Anonymous (1988), Industrial Ventilation - A Manual of Recommended Practice, 20th Ed, Ohio: American Conference of Governmental Industrial Hygienists, Inc.