

Pressure Swing Adsorption (PSA) Frequently Asked Questions

Q. What effect does the PSA unit have on the outlet air quality?

A. The outlet air is chemically pure, all volatile and toxic compounds are removed. The concentration of oxygen is slightly enhanced, but not significantly, and the humidity is very low, typically -30°C dewpoint.

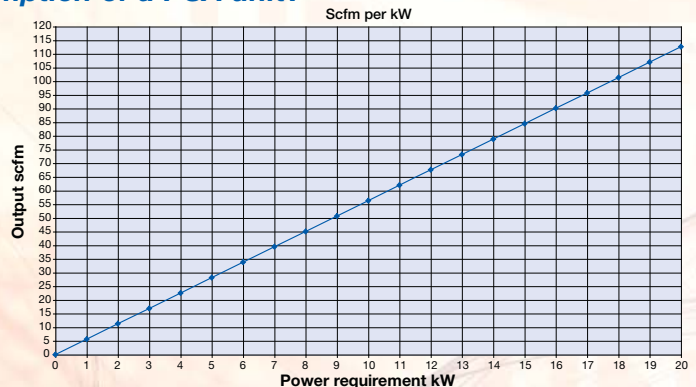
Q. Does the dry air cause problems to the occupants of the protected area?

A. Although breathing dry air will cause mild dehydration, the enclosed environment will gain moisture from exhaled breath and sweat, and the occupants will drink water as required to make up any tendency towards dehydration, so equilibrium will be reached and the air will be of an acceptable quality.

NB: The dry air provided by the PSA unit is similar to that experienced in cold climates, and causes no physiological problems provided sufficient drinking water is available.

Q. What is the power consumption of a PSA unit?

A. The unit itself requires only a few amps to drive the electrically operated solenoid valves; however there is an inherent power requirement to produce compressed air. This depends on the rated or full-load capacity (FLC) of an air compressor.



The FLC can be estimated by applying a typical performance index of 4.2 SCFM per brake horsepower (BHP). This equates to 5.63SCFM per kW.

Q. What is the air volume output of a PSA unit?

A. This depends on the supply to the unit. The PSA unit requires around 2.5 bar for optimum performance, and this will be supplied at atmospheric pressure at the outlet. Air output is normally quoted in volumetric terms, either standard cubic feet per minute (SCFM) or litres per minute.

Std cubic feet/minute	Cubic metres/minute	Cubic metres/hour	Litres/minute	Litres/hour
25	0.71	42	708	42,475
50	1.42	85	1,416	84,951
75	2.12	127	2,124	127,426
100	2.83	170	2,832	169,901
125	3.54	212	3,540	212,376
150	4.25	255	4,248	254,852
175	4.96	297	4,956	297,327
200	5.66	340	5,663	339,802
300	8.50	510	8,495	509,703
400	11.33	680	11,327	679,604
500	14.16	850	14,158	849,505
1000	28.32	1,699	28,317	1,699,011

This is in a useable condition at atmospheric pressure and overcomes the problem of calculating volume for pressure changes.

Q. Does the PSA unit absorb or adsorb contaminants?

A. The unit employs Pressure Swing Adsorption (PSA) as a principle.

Adsorb refers to a situation where molecules become attached to the surface of a medium, which is invariably specific to chemical reactions. It does not occur as a word in ordinary language, outside of its scientific meaning.

Absorb refers to a situation where something is taken into a medium, and disappears as a consequence, e.g. a sponge absorbs water.

Q. What air supply does a PSA unit require?

A. The supplied air should ideally be at 2.5 bar pressure, and certainly above 2 bar, with any free water from the compressor removed. The flow rate will obviously depend on the required output.

Q. Does the PSA unit require maintenance?

A. Not on a regular basis. The unit has valves which are shut in the power (including air pressure) off situation. This ensures that atmospheric contaminants such as organic compounds and water cannot adsorb onto the bed under storage conditions. The unit is self regenerating when running, and a high temperature back flush (so called "+T" cycle) is only required if there is a requirement to fully clean the beds to their original production condition, for instance during prolonged storage. The beds are self cleaning and will remove any adsorbed contaminants during subsequent operation in clean air. There are no mechanical parts requiring regular maintenance.

Q. What maintenance is required on ancillary components?

A. This will be advised by the manufacturer of the air conditioning unit, typically oil level checks, coalescer draining and element changing will be required at some point.

Q. Will the PSA unit protect against chemicals that carbon filters will not?

A. Yes, the PSA unit will remove all chemicals with a boiling point between -84°C and +250°C, & most toxic industrial chemicals and materials, known collectively as TICs and TIMs. These include chlorine, ammonia and similar industrial chemicals.

For further information on Pressure Swing Adsorption technology, contact Pall.



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