PCO2 - Quality Incident Protection

Frequently Asked Questions (FAQ's)

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What is a PCO2?

The PCO2 is a static adsorption bed constructed from specially selected adsorbents to remove trace contamination from CO_2. It is designed as a **quality incident protection device** (i.e. it will treat 'out-of-specification' CO_2 to return it back to specification (within the limits of the specification)).

The PCO2 is not designed to constantly purify poor quality CO_2; i.e. not allowing the beverage producer to lower the incoming CO_2 specification.

Why do I need a PCO2?

CO_2 is produced from a wide variety of processes with differing contaminants. Some of these remain in the gas after treatment at the gas recovery plant. There have been some publicised incidents where poor quality gas passed all the way through the supply chain and into the beverage. To prevent a repeat occurrence of these **quality incidents,** the bottlers are starting to fit in-line, on-site protection, in addition to tightening controls at the CO_2 suppliers.

What is a quality incident?

This is where a delivery of out-of-specification CO_2 has been made to the plant or where CO_2 has been contaminated on-site during the production process.

What is the specification for beverage CO_2?

ISBT (International Society of Beverage Technologists) & **EIGA** (European Industrial Gas Association) both have International recommended standards. In these standards, Potential Contaminants are named with a Critical PPM limit of acceptance.

Total Volatile Hydrocarbons (as Methane)

Total Aromatic Hydrocarbon

Acetaldehyde

Total Sulphur (excluding SO2, as S)

When is the 6th Stage Sterile Gas Filter Required?

A 6th Stage HIGH FLOW BIO-X Sterile Gas filter should be installed at point of use when -

- **Source of CO_2 is unknown.**
- **CO_2 has been produced from a fermentation process.**
- **When live bacteria and other micro-organisms are known to exist.**

How much contamination will the PCO2 protect against?

The PCO2 purifier will treat CO_2 with up to **10 times** the ISBT / EIGA levels of the named contaminants for a specified quantity of processed CO_2 gas.

How do I know when we have had a quality incident?

Many plants will find this very hard to observe if they do not have a CO_2 analyser or gas inspection process on site. Most plants take the QA certificate from the gas supplier as their goods inwards inspection. To improve monitoring of gas quality, several plants are starting to purchase on-line CO_2 analysers in addition to purifiers.

What can I expect to see when plants have analysers fitted?

In the most cases, the gas will be clean and have very low levels on monitored contaminants. Under these conditions there will be very little difference between inlet and outlet concentrations. In the event of a contamination spike, the purifier will remove it.

Should I change my elements after a Quality Incident?

Yes, always.

Who needs a PCO2?

All producers and bottlers of beverage products:-

- **Soft drinks**
- **Beer**
- **Carbonated water**

How does the PCO2 work?

The three layered adsorbent bed adsorbs contamination as it flows through. The three materials preferentially adsorb differing contaminants thus providing effective protection against a wide spectrum of potential contaminants.

Can the cartridges be regenerated?

No, although some companies may claim to be able to recover adsorbents and regenerate them, we are trying to remove contaminants to parts per billion levels and any trace residues may inhibit future performance. Additionally, many industrial processes for regenerating adsorbents may actually add contamination to the PCO2 cartridges.

Where should I install the PCO2?

The purifier treats vapour phase CO_2, so it has to be installed downstream of the vaporiser (evaporator), with a maximum approach temperature of 40°C.

Some plants have installed the purifiers close to the carbonator, while others have chosen a central point close to the evaporator for complete site treatment. The Parker PCO2 is suitable for either option.

The PCO2 is also suitable for external installation.

Is the PCO2 designed for gas or liquid CO_2?

Gaseous CO_2 only.

What happens if liquid CO_2 enters the PCO2?

Liquid CO_2 (which can be as cold as –78°C) boils off rapidly on contact with the aluminium surfaces and then the vapour passes at great speed through the adsorbent bed. Condensation, even ice, may appear on the exterior surfaces of the PCO2. The internal rubber seals and inlet filter may become damaged due to the intense cold.

Always service the purifier, replace cartridges, filters and seals immediately.

How should I size the PCO2?

The plant operators need to identify their **peak** demand for CO_2 (typically the capacity of the evaporator). This is usually measured in lbs/hr or kgs/hr as all bulk CO_2 deliveries are ordered by mass. This is the figure to use when selecting a PCO2 purifier unit.

What are the risks of installing Non Genuine Parker cartridges and elements?

The use of Parker genuine parts is essential in minimising risk. Genuine Parker elements and cartridges are specially designed and tested to operate to the maximum quality standards of the original design build. Counterfeit parts are typically substandard and manufactured from poor quality non-conforming materials. Failure to use genuine Parker parts may result in:

- Increased contamination in process streams
- Spoilage and potential recall
- Compromised consumer safety
- Audit failure
- Voided warranty
- Manufacturing Downtime

Parker cannot provide support for non-original manufactured parts used with our PCO2 systems and is not responsible for loss of revenue or quality concerns resulting from non-compliance.

Can I over-size the PCO2 and extend the working life?

NO. The people asking this question usually have no on-site CO_2 contamination monitoring and want to reduce their running costs. The PCO2 is an insurance against the occurrence of quality incidents and therefore has to be properly maintained in order to be effective. Additionally, the cost of an 8000 lb/hr service kit is twice that of the 4000 lb/hr kit offering no cost saving.

How do I change adsorbent cartridges?

Simple - remove the top manifold, exchange the pre-charged cartridges, and replace the top manifold. Full details can be found in the User Guide.

When do I change adsorbent cartridges?

PCO2 Mark 1 units supplied before July 2019, **every 6 months**, or after a **'quality incident'**, whichever comes first. For Next Generation units supplied after July 2019, adsorbent cartridges will require exchange after a **maximum of 12 months'** usage or after a **'quality incident'**, whichever comes first.

When do I change filter elements cartridges?

For PCO2 Mark 1 units, every **6 months**. For Next Generation units, it is recommended that filter exchange is undertaken every **12 months**.

It is advised that the filter cartridges are changed during the same planned maintenance schedule that the adsorbent cartridges are replaced. Replacing the cartridges during the same period will reduce downtime and the amount of time that the PCO2 system is exposed to atmosphere and potential contamination.

What is the shelf life of un-used replacement cartridges?

Currently 2 years in original packaging (a heavy gauge laminated plastic bag). A label indicates manufacturing date.

What filtration should I use?

HIGH FLOW BIO-X sterile gas membrane filters should be used to ensure sterility of the gas and protect finished product quality. HIGH FLOW BIO-X is validated as a 0.2 micron sterilizing grade filter in liquids through ASTM F838-05 and 0.01 micron in gas through full retention to an aerosol challenge of MS2 phage. This ensures the filter will guarantee the sterility of your process in the worst-case scenario where the filter may be subjected to bulk liquid due to a process problem.

Is PCO2 FDA approved?

Materials of construction have independent verifications to comply with FDA Code of Federal Regulations title 21 CFR.

What is the approval status of PCO2?

All models of the PCO2 system meet full CE approval including accreditation to the European Pressure Equipment Directive (PED). The USA does not require pressure vessel approvals.

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