PCO₂ - Quality Incident Protection

Frequently Asked Questions (FAQ’s)
What is a PCO2?
The PCO2 is a static adsorption bed constructed from specially selected adsorbents to remove trace contamination from CO2. It is designed as a **quality incident protection device** (i.e. it will treat ‘out-of-specification’ CO2 to return it back to specification [within the limits of the specification]).

The PCO2 is not designed to constantly purify poor quality CO2; i.e. not allowing the beverage producer to lower the incoming CO2 specification.

Why do I need a PCO2?
CO2 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 publicized 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 CO2 suppliers.

What is a quality incident?
This is where a delivery of out-of-specification CO2 has been made to the plant or where CO2 has been contaminated on-site during the production process.

What is the specification for beverage CO2?
**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 HIGHFLOW TETPOR II Sterile Gas filter should be installed at point of use when -

- **Source of CO2 is unknown.**
- **CO2 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 CO2 with up to **10 times** the ISBT / EIGA levels of the named contaminants for a specified quantity of processed CO2 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 CO2 analyzer 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 CO2 analyzers in addition to purifiers.

What can I expect to see when plants have analyzers 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 vapor phase CO2, so it has to be installed downstream of the vaporizer (evaporator), with a maximum approach temperature of 104°F (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 domnick hunter PCO2 is suitable for either option. The PCO2 is also suitable for external installation.

Is the PCO2 designed for gas or liquid CO2?
Gaseous CO2 only.

What happens if liquid CO2 enters the PCO2?
Liquid CO2 (which can be as cold as -108.4°F (-78°C)) boils off rapidly on contact with the aluminum surfaces and then the vapor 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 CO2 (typically the capacity of the evaporator). This is usually measured in lbs/hr or kgs/hr as all bulk CO2 deliveries are ordered by mass. This is the figure to use when selecting a PCO2 purifier unit.

Can I over-size the PCO2 and extend the working life?
No. The people asking this question usually have no on-site CO2 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?
Every 6 months, or after a ‘quality incident’, whichever comes first.

When do I change filter elements cartridges?
It is recommended that the Filter Elements are changed every 6 months.

What is the shelf life of un-used replacement cartridges?
Currently 1 year in original packaging (a heavy gauge laminated plastic bag). A label indicates manufacturing date.

What filtration should I use?
HIGH FLOW TETPOR II sterile gas membrane filters should be used to ensure sterility of the gas and protect finished product quality. The HIGH FLOW TETPOR II 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.
## Worldwide Filtration Manufacturing Locations

### North America

**Compressed Air Treatment**
- **Filtration & Separation/Balston**
  - Haverhill, MA
  - 978 858 0505
  - www.parker.com/balston

**Finite Airtek Filtration**
- Airtek/donnick hunter/Zander
  - Lancaster, NY
  - 716 686 6400
  - www.parker.com/faf

**Finite Airtek Filtration/Finite**
- Oxford, MI
  - 248 628 6400
  - www.parker.com/finitefilter

**Engine Filtration & Water Purification**
- **Racor**
  - Modesto, CA
  - 209 521 7860
  - www.parker.com/racor
  - Holly Springs, MS
  - 662 252 2656
  - www.parker.com/racor
  - Beaufort, SC
  - 843 846 3200
  - www.parker.com/racor

**Racor – Village Marine Tec.**
- Gardena, CA
  - 310 516 9811
  - desalination.parker.com

**Racor Sea Recovery**
- Carson, CA
  - 310 837 3400
  - www.searecovery.com

**Hydraulic Filtration**
- **Hydraulic Filter**
  - Metamora, OH
  - 419 644 4311
  - www.parker.com/hydraulicfilter
  - Laval, QC Canada
  - 450 629 9594
  - www.parkerfarr.com

**Process Filtration**
- **domnick hunter Process Filtration**
  - Oxnard, CA
  - 805 604 3400
  - www.parker.com/processfiltration
  - Madison, WI
  - 608 824 0500
  - www.sciilig.com
  - Phoenixville, PA
  - 610 933 1600
  - www.parker.com/processfiltration

**Aerospace Filtration**
- **Velcon Filtration**
  - Colorado Springs, CO
  - 719 531 5855
  - www.velcon.com

### Europe

**Compressed Air Treatment**
- **domnick hunter Filtration & Separation**
  - Gateshead, England
  - +44 (0) 191 402 9000
  - www.parker.com/dhfns

**Parker Gas Separations**
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**Engine Filtration & Water Purification**
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**Condition Monitoring Centre**
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  - www.parker.com/hfde

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  - www.kittiwake.com

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  - +55 12 4009 3500
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**Pan American Division**
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