surepurity
Limited

carboguard

- CO_2 Vapour Polishing
- Multi Stage Filtration
- For The Food & Beverage Gases Industry

Proudly Made In The UK

THE QUEENS AWARD
FOR ENTERPRISE
INTERNATIONAL TRADE
2022

Sure Purity

the **issue**

Carbon Dioxide (CO_2) is a by-product of many different processes. Each source type can have source specific impurities.

Although these should be removed by the industrial gas supplier during the purification process, small traces can remain. Contamination of perfectly good product through mis-handling in a complex supply chain can also risk quality.

Carbon Dioxide vapour is the only industrial gas used as an ingredient by the beverage industry, it has many uses, but the most important use is for carbonating the beverage, without CO_2 our drinks would simply not sparkle!

Beverage brand owners and manufacturers protect their products and processes by requiring multi-stage CO_2 vapour polishing filtration systems.

Without this protection the finished beverage is at risk of being contaminated. This contamination can result in off-flavours, smells and appearance. The risk to consumer confidence is too great, therefore these systems can often be classed as the last barrier ensuring peace of mind and quality assurance.

The beverage industry and its CO_2 suppliers set voluntary quality guidelines, these are strictly followed to ensure the beverage enjoyed by consumers is 100% safe.

Organisations such as The International Society of Beverage Technologists (ISBT), European Industrial Gases Association (EIGA) and Compressed Gas Association (US & Canada) all produce detailed guidelines and monographs for Carbon Dioxide used in beverage manufacturing. These guidelines then form ingredient specifications that are followed by the beverage industry.

*Biogas upgrading creates a consistent stream of CO_2 which is a result of purification/separation of CO_2 from the primary product Methane. This CO_2 is then purified and sterilized by the carbon capture liquefaction unit.

Before this CO_2 is liquefied carbo**guard** technology can be installed as a final polishing stage. carbo**guard** further reassures food and beverage industry clients that CO_2 from biogas is a safe natural sustainable source of CO_2.

Source Type	Traditional or New	Feed stock	Beverage Grade
Ammonia	Traditional	Gaseous hydrogen	Yes
Chemical Synthesis	Traditional	Various Petrochemicals	Yes
Breweries	Traditional	Fermentation	Yes
Geothermal Wells	Traditional	Well Gas	Yes
Ethanol Fermentation	New	Corn/Maize, Beets, Sugar Cane, Molasses	Varies
Direct Air Capture	New	Atmospheric Air	Yes
* Biogas Upgrading	New	Biogas Reactor	Yes

the solution

carboguard

With its modular design and small compact footprint, carboguard is easy to extend when you need, so only buy what you need today and extend in future.

With 8 models in the range, there is a model to suit every application. Choose between locating your polisher centrally after the vaporiser, you can add a stand-by module for back-up or split the load across two modules, or even consider going smaller and dedicating one to each filling line.

carboguard | benefits

- 12 months service intervals
- Unique COS barrier
- Easy maintenance access - Service within 30 minutes
- Highest levels of protection from a broad spectrum of contaminants
- Quality incident protection up to 10 x greater than ISBT guidelines
- Continuous polishing to protect against trace impurities
- Robust protection with 5 stages as standard
- Optional stage 6 to protect against microbiological cross contamination in breweries or other sources were this is deemed a risk

10X >> Incident protection up to 10 times the allowable limit stated by ISBT and EIGA

pureinnovation

the benefits

Design Advantage

Utilising advanced adsorption technologies in a multiple media arrangement. As opposed to loose fill, carbo**guard** uses a snow storm filling technique to fill our cartridges.
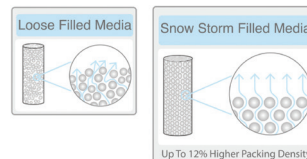
This ensures

- Uniformity
- Equal resistance to flow
- Optimal contact time between gas and media
- No channelling or bed fluidisation
- Greatly reduced media attrition
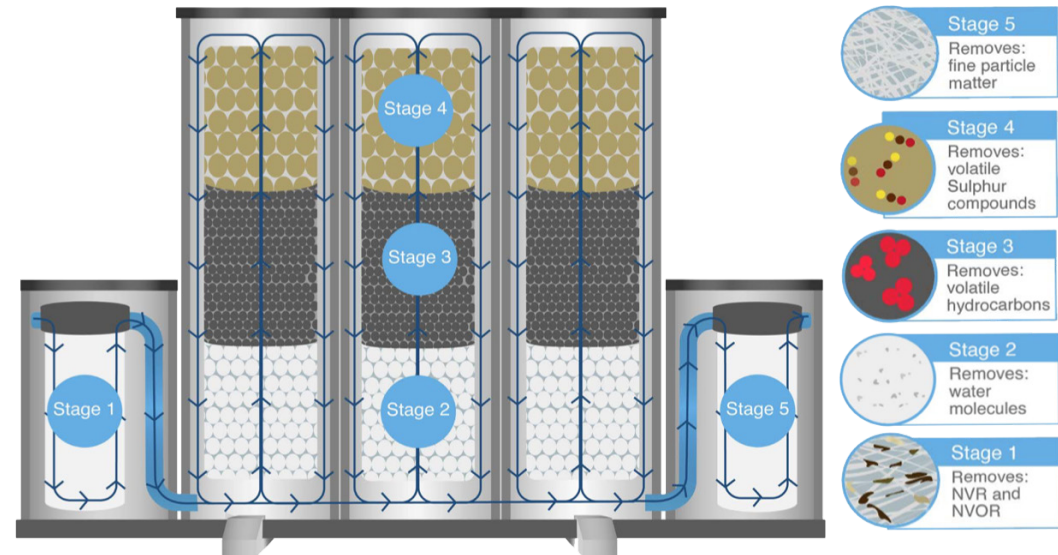- Very low particulates

Maximum Performance With Sustainable Benefits

carbo**guard** utilises our unique media specially developed for this application

- Multi-media cartridge design
- High capacity - 50% more flow than other makes available
- 50% less cartridges - lower carbon footprint
- 53% less media to dispose of
- 50% less cartridges to maintain
- Lowest downtime, averaging 30 minutes maintenance - once per year

Loose Filled Media

Snow Storm Filled Media

Up To 12% Higher Packing Density

Stage 6
Microbiological protection

Stage 6 is an optional extra.
See page 10 for further details

Stage 5
Removes: fine particle matter

Stage 4
Removes: volatile Sulphur compounds

Stage 3
Removes: volatile hydrocarbons

Stage 2
Removes: water molecules

Stage 1
Removes: NVR and NVOR

Stage 1
Stage 2
Stage 3
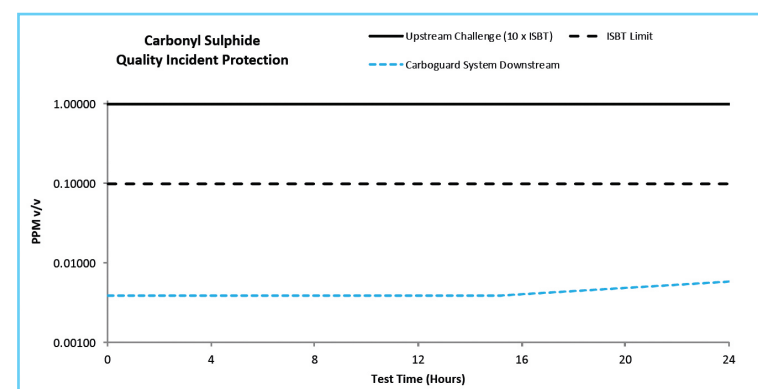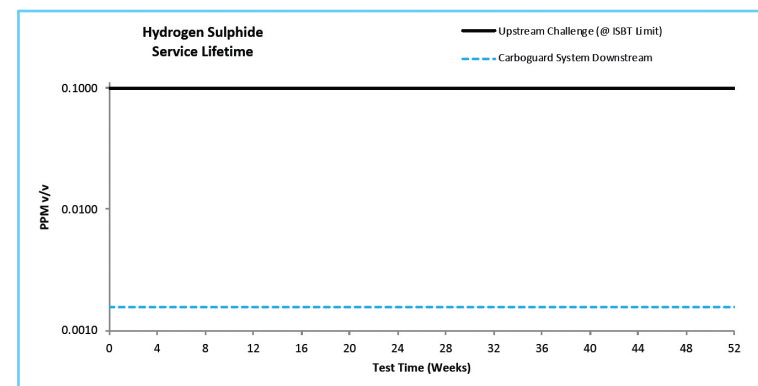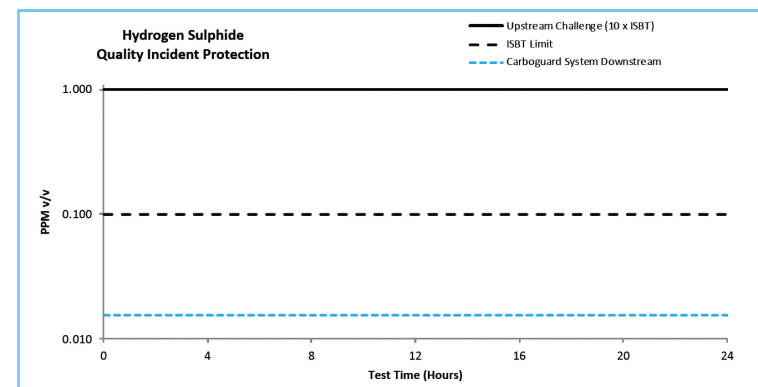Stage 4
Stage 5

pure**innovation**

carboguard

Validation and Approvals

Due to the critical nature of the product and application, a rigorous and thorough performance validation was conducted and verified by an internationally recognized laboratory accredited to ISO17025:2015.

This important step was needed not only to test the design to its limits, but also to demonstrate to potential customers, from large international brands, the effectiveness and unique advantages of carboguard.
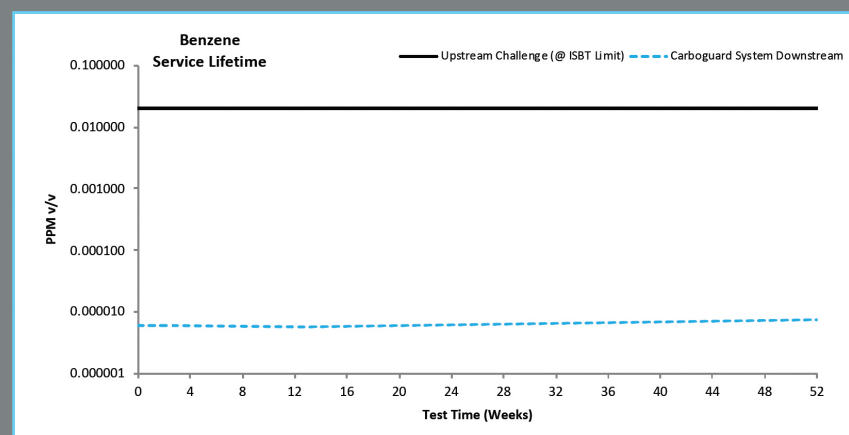
The testing included challenging carboguard with a wide range of impurities, table two shows a selection of key impurities, the unique advantage of carboguard over other multi-stage filters is its ability to reduce levels of Carbonyl Sulphide (COS) to well below ISBT limits.

Hydrogen Sulphide
Quality Incident Protection

— Upstream Challenge (10 x ISBT)
-- ISBT Limit
--- Carboguard System Downstream

PPM v/v

1.000
0.100
0.010

0   4   8   12   16   20   24

Test Time (Hours)

Hydrogen Sulphide
Service Lifetime

— Upstream Challenge (@ ISBT Limit)
--- Carboguard System Downstream

PPM v/v

0.1000
0.0100
0.0010

0   4   8   12   16   20   24   28   32   36   40   44   48   52

Test Time (Weeks)

Carbonyl Sulphide
Quality Incident Protection

— Upstream Challenge (10 x ISBT)   -- ISBT Limit
--- Carboguard System Downstream

PPM v/v

1.00000
0.10000
0.01000
0.00100

0   4   8   12   16   20   24

Test Time (Hours)

carbo**guard**

Performance Guaranteed

- Approved materials of construction independently verified to comply with USA Code of Federal regulations Title 21. (21. CFR.173, 21CFR.175 & 21CFR.177) & (EN 12873-4 2006-6 CEN/TC 164

- Approved as a processing aid for the polishing of CO_2 for use in food and beverage manufacturing

- Approved by international brands for use as a critical quality assurance device to protect against contamination from impurities

**Benzene
Quality Incident Protection**

Upstream Challenge (10 x ISBT)   ISBT Limit
Carboguard System Downstream

PPM v/v

1.00000
0.10000
0.01000
0.00100
0.00010
0.00001

0   4   8   12   16   20   24

Test Time (Hours)

**Benzene
Service Lifetime**

Upstream Challenge (@ ISBT Limit)   Carboguard System Downstream

PPM v/v

0.100000
0.010000
0.001000
0.000100
0.000010
0.000001

0   4   8   12   16   20   24   28   32   36   40   44   48   52

Test Time (Weeks)

carbo*guard*

Operating Parameters

For flows greater than 4000kg/h
please select additional modules to
'multi-bank' together i.e. for 4,800kg/h
please select 2x CG06. Contact Sure
Purity for assistance

Operating Pressure (Nominal)	20.7 barg	300 psig
Operating Pressure (Maximum)	24.1 barg	350 psig
Operating Temperature (Minimum)	(-) 20°C	(-) 4°F
Operating Temperature (Maximum)	40 °C	104 °F

Housing Size	Rated CO_2 Mass Flow @ 20.7barg / 300psig		Approx. Overall Dimensions (L x W x H)		Port Size	Approx. Weight	
	kg/h	Lb/h	mm	inch	inch	kg	lb
CG01	400	882	300 x 220 x 1390	12 x 9 x 55	1	33	73
CG02	800	1764	500 x 220 x 1390	20 x 9 x 55	1	63	139
CG03	1200	2646	700 x 220 x 1390	28 x 9 x 55	1	93	205
CG04	1600	3527	900 x 220 x 1390	36 x 9 x 55	1	113	249
CG05	2000	4409	1100 x 220 x 1390	44 x 9 x 55	1	156	344
CG06	2400	5291	860 x 540 x 1430	34 x 23 x 57	1 ½	160	353
CG08	3200	7055	1070 x 540 x 1430	43 x 23 x 57	1 ½	212	468
CG10	4000	8818	1280 x 540 x 1430	51 x 23 x 57	1 ½	260	574

www.surepurity.com

If minimum operating pressure is below 20bar.g (300psi.g) you must first correct your flow using table 4.

Example 1200kg/h at 20bar.g select model CG03. But 1200kg/h at 17bar.g requires a polisher rated for 1,463kg/h (1200 divided by 0.82 1463) select model CG04

carboguard

Technical Performance

carboguard systems are specifically engineered to operate in an environment that is > 99.9 v/v carbon dioxide gas and are designed to protect beverage production gas against the contaminants detailed in the ISBT quality guidelines for beverage grade CO_2, a selection of which are in table 5. The incident protection offered by carboguard systems includes contamination up to a level of ten times the levels specified by ISBT.

Standard carboguard cartridges are designed to last 12 months in continuous operation, processing beverage grade quality CO_2 (to ISBT/EIGA 70).

Stage 1 Pre & Stage 5 Post filter elements are guaranteed for 12 months of operation and remove dirt/particulates down to 0.01um and oil aerosols down to 0.01mg/m3. Stage 6 removes micro-organisms down to 0.02um (Brevodas pseudomonas) CFU 7 CFU.

Table 4

[bar]	2	3	4	5	6	7	8	9	10
[psi]	29	44	58	72	87	100	115	130	145
Cop	0,14	0,18	0,23	0,27	0,32	0,36	0,41	0,45	0,5
[bar]	11	12	13	14	15	16	17	18	19
[psi]	160	174	189	203	218	232	247	261	276
Cop	0,55	0,59	0,64	0,68	0,73	0,77	0,82	0,86	0,91

Table 5

Contamination Type	Specified Level
Volatile Hydrocarbons (Total) Including:	20 ppmv
Aromatic Hydrocarbon	0.02 ppmv
Cyclic Hydrocarbons	0.02 ppmv
Acetaldehyde	0.2 ppmv
Alcohols	10 ppmv
Other Oxygenates	0.02 ppmv
Carbonyl Sulphide	0.1 ppmv
Hydrogen Sulphide	0.1 ppmv
Moisture	20 ppmv

carboguard

Maintenance

Replace carbo**guard** cartridges every 12 months.
Replace Pre and Post filter elements every 12 months.

Carboguard annual maintenance kits Replace every 12 months.		
Model number	Service kit compromises of	Kit part number
CG-01	1x Carboguard cartridge, 1x pre-filter, 1x post filter	CS-01
CG-02	2x Carboguard cartridge, 1x pre-filter 1x post filter	CS-02
CG-03	3x Carboguard cartridge, 1x pre-filter, 1x post filter	CS-03
CG-04	4x Carboguard cartridge, 1x pre-filter, 1x post filter	CS-04
CG-05	5x Carboguard cartridge, 1x pre-filter, 1x post filter	CS-05
CG-06	6x Carboguard cartridge, 1x pre-filter, 1x post filter	CS-06
CG-08	8x Carboguard cartridge, 1x pre-filter, 1x post filter	CS-08

Stage 6
Microbiological protection

Stage 6, Sterile Housing

Sure Purity is pleased to announce the launch of the Stage Six filter to be used in conjunction with the carbo**guard** 5 stage polishing filter system. The stage 6 is a validated filtration add on used to protect beverages from microbiological contamination caused by cross contamination from CO_2 sources where it can have an elevated level of risk, from sources such as fermentation (bioethanol and breweries) biogas upgrading or other newer unproven carbon capture sources.

It can also protect the end user at the point of use from microbiological contamination caused during the storage, distribution and delivery of CO_2.

CONTACT US FOR MORE INFORMATION

carbo**guard**

Alternatives for Parker domnick hunter

Alternatives for Parker domnick hunter PCO2

Sure Purity manufacturers a range of alternative filters to precisely fit into Parker domnick hunter PCO2 & Mplus Housings. (Mark 1) This gives the same highest performance levels as the carbo**guard** including our unique COS and requires no special tools or modifications.

Replace every 6 months.

Cartridge Only Kit (Stage 2 to 4)			Complete Maintenance Kit Stage 1 to 5			
PDH Housing Reference	Cartridges Included (PDH Equivalent)	Sure Purity Part Number	PDH Catalogue Number	PDH Technical Reference	Includes Alternative Filter Elements	Sure Purity Part Number
PCO2-0	1 x Carboguard (1 x EPCO2)	CK00	MAKPCO2-0-24	606071140	145AA + 145AAR	CX00
			MAKEPC02-0-20	606071180	020AA + 020AAR	CE00
PCO2-1	2 x Carboguard (2 x EPCO2)	CK01	MAKPCO2-1-20	606071110	058AA + 058AAR	CP01
			MAKPCO2-1-24	606071150	145AA + 145AAR	CX01
			MAKEPC02-1-20	606071190	025AA + 025AAR	CE01
PCO2-2	4 x Carboguard (4 x EPCO2)	CK02	MAKPCO2-2-20	606071120	145AA + 145AAR	CP02
			MAKPCO2-2-24	606071160	145AA + 145AAR	CX02
			MAKEPC02-2-20	606071200	030AA + 030AAR	CE02
PCO2-3	6 x Carboguard (6 x EPCO2)	CK03	MAKPCO2-3-20	606071130	220AA + 220AAR	CP03
			MAKPCO2-3-24	606071170	145AA + 145AAR	CX03
			MAKEPC02-3-20	606071210	030AA + 030AAR	CE03
MPlus 4000	6 x Carboguard Max (6 x 606070830)	CK04	MAK-MPLUS4000-24	606071300	220AA + 220AAR	CX04
			MAKE-MPLUS4000-20	606071340	040AA + 040AAR	CE04
			MAK-MPLUS4000-20	606071380	220AA + 220AAR	CX04
MPlus 6000	8 x Carboguard Max (8 x 606070830)	CK06	MAK-MPLUS6000-24	606071310	220AA + 220AAR	CX06
			MAKE-MPLUS6000-20	606071350	045AA + 045AAR	CE06
			MAK-MPLUS6000-20	606071390	220AA + 220AAR	CX06
			MAK MPLUS6000	8 x 606070830	330AA + 330AAR	CP06
MPlus 8000	10 x Carboguard Max (10 x 606070830)	CK08	MAK-MPLUS8000-24	606071320	220AA + 220AAR	CX08
			MAKE-MPLUS8000-20	606071360	050AA + 050AAR	CE08
			MAK-MPLUS8000-20	606071400	220AA + 220AAR	CX08
			MAK-MPLUS8000	10 x 606070830	330AA + 330AAR	CP08
MPlus 10000	12 x Carboguard Max (12 x 606070830)	CK10	MAK-MPLUS10000-24	606071330	220AA + 220AAR	CX10
			MAKE-MPLUS10000-20	606071370	055AA + 055AAR	CE10
			MAK-MPLUS10000-20	606071410	220AA + 220AAR	CX10

carbo**guard**

Authorised Sales and Stocking Distributor

AVAILABLE IN OVER 100 COUNTRIES WORLDWIDE

carbo**guard**
m i n i

Sure Purity New Product

Designed for the trade hospitality industry, carbo**guard** mini uses the same five stage technology miniaturised for the smaller flow rates and point of use/sale applications.

visit our website at
www.**surepurity**.com