Compressed Air Management System

The Compressed Air Management System (CAMS) is an improved, dedicated air management unit designed specifically for MineARC Refuge Chambers.

MineARC Systems - Built for Safety. www.minearc.com

mineARC SYSTEMS

Company Profile

MineARC Systems is the global leader in the manufacture and supply of emergency safe refuge solutions for the mining, tunnelling, chemical processing and disaster relief industries.

With over 20 years' experience, our dedication to ongoing research and development is driven by our key focus to continually offer the best and most advanced safety solutions on the market.

Our team of qualified engineers, electrical designers and technical experts form a global network across several international locations including;

- Perth, Western Australia
- Johannesburg, South Africa
- Dallas, Texas
- Santiago, Chile
- Beijing, China
- Barcelona, Spain
- Leon, Mexico

This allows MineARC to provide 24 hour service and engineering support to our expanding list of clients in over 60 countries across the globe.

All MineARC Refuge Chambers and Safe Havens comply with the highest international regulations and recognised 'world's best practice' industry guidelines. Our key focus on quality control and product advancement has meant that MineARC Refuge Chambers have successfully saved lives in multiple real life industrial emergencies around the globe.

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Bureau Veritas ISO 9001:2008 Quality Management Systems

MineARC® HRM Refuge Live Risk Assessment Testing

Australian C-Tick Standards: AS4100-1998, AS3570.1-18, AS2208, AS3000, AS1716-15

Canadian Standards Association (CSA)

United States National Electrical Code (NEC) 2013/14

European CE Certified to Machinery Norms

Compressed Air Management System (CAMS)

MineARC's engineering team have designed an improved, dedicated Compressed Air Management System (CAMS) for refuge chambers. CAMS offers a range of new features aimed at reducing running costs and improving operational safety during an emergency.

Features:

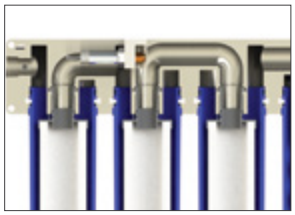
- Easier installation and faster service time
- Flood protection valve for automatic mine air shut off in the event of water ingress
- Air toxicity monitoring and emergency shut off valve
- Optimisation of mine air usage, resulting in considerably reduced operational costs
- Security against over-pressurisation

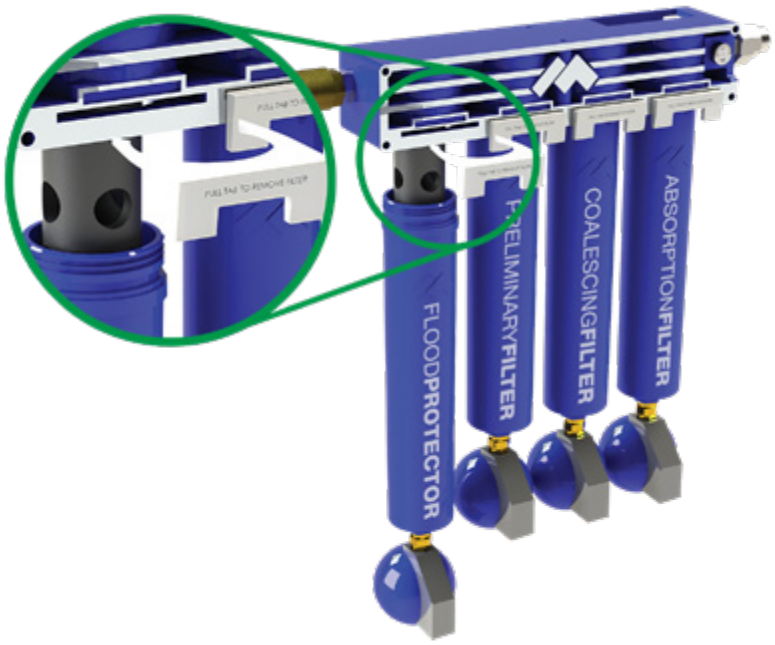
Compressed Air Management System (CAMS)

Practical Benefits

Precision engineered clip-in / clip-out system for filter change over

- The unique CAMS fittings feature MineARC's new quick-release bayonet clipping system.
- This new clipping system for both filter housings and elements means no more screwing in components, and no damaged parts due to wear and tear.
- Service time will be reduced to at least five times faster than the current standard due to quick release fittings.



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Flood Protection

The CAMS flood protection valve automatically shuts down mine air to avoid catastrophic and costly chamber damage in the event of water ingress. Flooding of a refuge chamber occurs regularly due to human error, either by accidently connecting the water supply to the compressed air intake, or when water infiltrates the mine air supply (the Venturi effect).

The flood protection filter consists of a hydrophobic plastic filter body with a stainless steel float ball. During periods of significant water flow, the ball will float to the tapered seat and seal shut. Standard mine water pressure will lock the valve shut until the water source is removed and filter water is released via the auto-drain.

The flood protection valve is a pre-existing stand-alone product that is now available as part of the overall Compressed Air Management System at a fraction of the price.

Gas Toxicity Monitoring

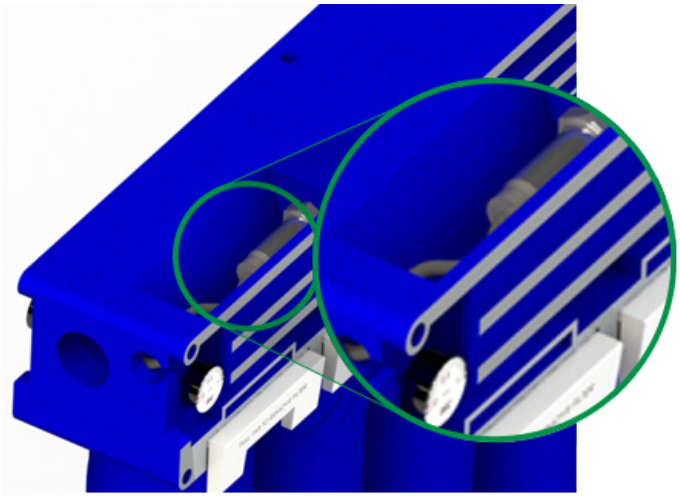
In the case of a mine fire there is a risk that Carbon Monoxide can be drawn through the mine airline, due to a few factors:

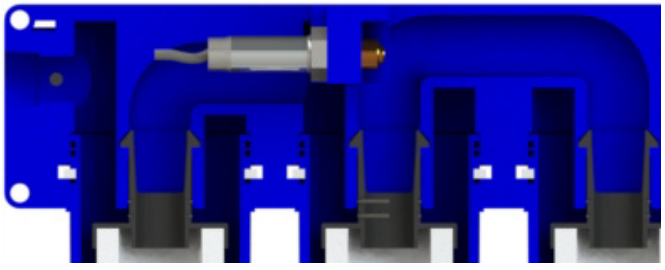
- If the compressor is near a fire, it can draw CO and CO_2 directly into the mine air
- If the airline is compromised, smoke can be drawn into the airflow due to the Venturi effect

CO is a by-product of incomplete combustion, whether that be compression of smoke at the compressor or the burning of plastic lines before rupture.

The gas toxicity monitor automatically diverts mine air if Oxygen levels in the airline fall below a set level (19% oxygen in free air), signifying air contamination.

This system detects compressed smoke bursts, where Oxygen is displaced dramatically, rather than sampling low pressure air for slow release contaminants. MineARC's independent gas monitoring within the chamber will determine slow contaminant build up.





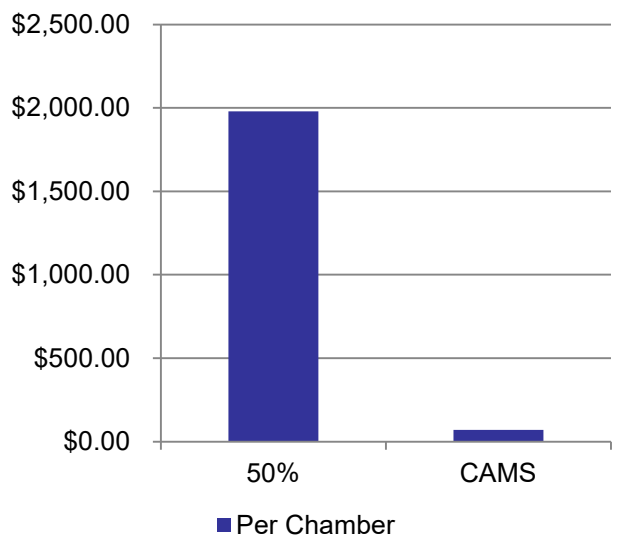
Compressed Air Management System (CAMS)

Compressed Air Management

One of the major operational expenses for any mine is the electrical cost of running mine air and air compressors. MineARC Systems identified that by optimising the flow of air required to maintain an operational refuge chamber, we could give our clients considerable savings.

- Previously, refuge chambers were set to run at 50% flow rate to maintain operational standard.
- The new CAMS has an air pressure sensor and shut off valve, allowing it to regulate air flow into the chamber, automatically emitting periodic 'bursts' of compressed air when the internal pressure drops below 200Pa. This maintains a positive pressure 'seal', ensuring contaminants cannot enter the refuge chamber from the outside.

Compressed Air Savings



Average cost of compressed air usage per chamber, per year

CAMS filter kits optimise efficiency of mine air services and guarantees against over-pressurisation of the refuge chamber. Over a 12 month period this can equate to significant financial savings:

- For our model we used 50% flow rate as our base rate (MineARC's recommended default setting), however your chambers could be set to much higher.
- For electrical cost we used a figure of $0.13/kWh. Your electricity rate may vary to this.

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