



Coal Mine Refuge Chambers

The MineARC CoalSAFE International High Seam Range

Designed to provide a refuge or 'safe-haven' for miners trapped in a hazardous or toxic environment.



coalSAFE
INTERNATIONAL HIGH SEAM



MineARC Systems - Built for Safety.

www.minearc.com



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 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
- Guanajuato, 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.

www.minearc.com



Bureau Veritas ISO 9001:2008 Quality Management Systems



MineARC Team Based Risk Assessment Testing



WJE, Inc. Independent Blast and Structural Analysis



WV Office of Miners' Health, Safety & Training Approval



IHST, Inc. Independent Human Testing



Chinese MA Centre Certified

Emergency refuge forms an integral part of an underground mine's wider Emergency Response Plan (ERP). Fires, explosions, rock-falls, flooding and the release of smoke and other forms of toxic gas are the types of incidents that occur all too frequently, despite the high levels of planning and the safety precautions in place.

In these types of emergencies, when evacuation is no-longer safe or practical, emergency refuge is designed to provide a safe and secure 'go-to' area for personnel to gather and await extraction. MineARC Refuges have been successfully used around the world in multiple mine and tunnelling emergencies to save lives.



CS-IHS2-16-IS-48

Refuge chambers should be deployed throughout the mine to create a refuge 'network' accessible to all underground personnel whilst on foot. Depending on the country/region, regulations usually state acceptable 'safe distances' between refuge chambers.

Standard Configurations

In consultation with the world's leading mining companies and regional mining authorities, MineARC Systems has designed and engineered the CoalSAFE International High Seam Refuge Chamber range to suit the underground coal mining environment. Refined over a number of years, the CoalSAFE's intrinsically safe design provides miners with optimum safety features, functionality and performance.

Standard configurations are available based on occupancy – from 12 to 20 people - with each model engineered for maximum durability and manoeuvrability, both above and below ground.



CS-IHS2-16-IS-48

Ultimately CoalSAFE chamber dimensions and rated occupancy can be custom-engineered to site specifications, without compromising on safety or performance.

Special transport configurations include narrow builds specifically tailored for shaft mines or modular builds, allowing a complete refuge chamber to be split into smaller sections before being transported and then reassembled underground.

Standard Models



CS-IHS1-12-IS-48
with airlock
(12 Person)



CS-IHS2-16-IS-48
with airlock
(16 Person)



CS-IHS3-20-IS-48
with airlock
(20 Person)

Custom dimensions and occupancies available. Refuge dimensions are ultimately designed to client specifications. Standard models based on International high seam mine specifications and 48 hour occupancy.

Chamber Exterior - Front

The 'face' of the CoalSAFE Refuge Chamber is designed primarily for easy identification and quick access during an emergency. The reflective signage alerts passers-by to the chamber's location, whilst the interlocking rotating door handles provide simple, straight forward access to the safety of the interior airlock.

The CoalSAFE has been engineered to ensure ease of transport and robust design. Constructed from explosion resistant steel plate with external support wraps and surround package as standard, the refuge can withstand in excess of 5psi overpressure with no permanent damage. Push points, forklift slots and towing and lifting eyes are provided top and bottom on front and rear.



PROTECTED WARNING SIGNALS

- Air powered trumpet siren
- Battery flasher warning light

AIR VENTS

ROTATING HANDLES

- Double locking

12MM PORTHOLE WINDOW

- AS 2208
- Blast resistant upon request

REFLECTIVE SIGNAGE

- Safety & operational
- Optional extra: Multiple languages

SEALING DOOR

- Outward opening
- Vacuum tested seal

SKID BASE

- 250 x 100mm forklift slots
- Front and rear mounted tow points
- Front mounted 25mm steel plate push blocks

Chamber Interior

Inside the MineARC CoalSAFE International High Seam Refuge Chamber, a number of vital systems combine to create a safe, ongoing environment for occupants.

The MARCis is the chamber's innovative, intrinsically safe life-support system; providing both powerless CO/CO₂ scrubbing and airconditioning. Utilising a sequential operating procedure, MARCis can be activated in less than 60 seconds during an emergency.

Carbon Dioxide & Carbon Monoxide Scrubbing

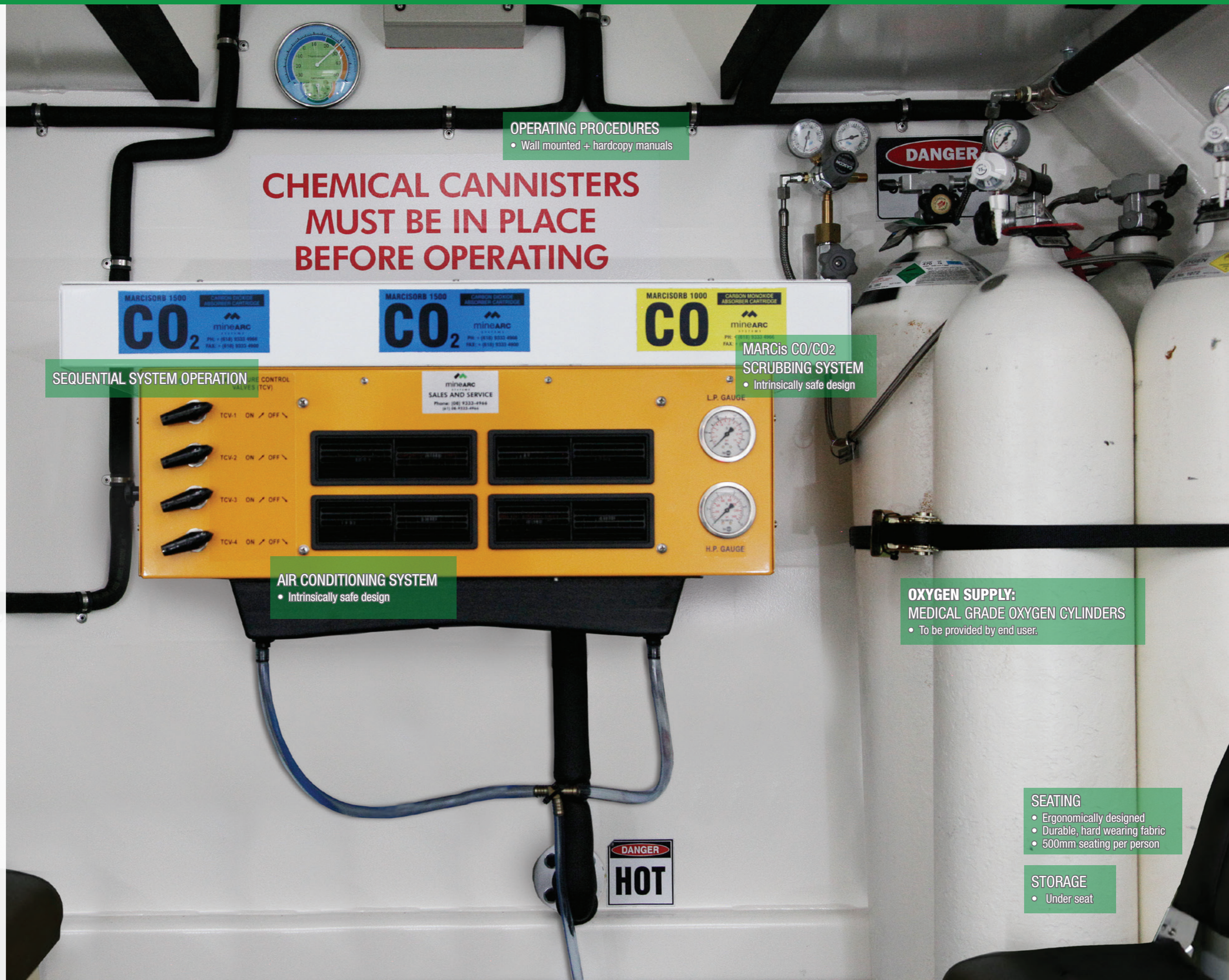
The MARCis Carbon Dioxide (CO₂) and Carbon Monoxide (CO) Scrubbing System does not require any electrical power to operate. The active chemical scrubbing system is designed to clean the air of these harmful gases and toxins that build up over time within a sealed, occupied environment.

MARCISORB CO₂ and CO Chemical Cartridges provide proven chemical scrubbing capabilities and are easy to handle. The cartridges will store efficiently for long periods of time without degradation or requiring any maintenance.

Intrinsically Safe Air-Conditioning

Independent testing has verified that a cooling system is essential for combating the potentially fatal effects of metabolic heat build-up inside the refuge. To maintain the internal atmosphere of the CoalSAFE, the MARCis incorporates a non-electrical air conditioning system that both cools and dehumidifies the refuge.

International regulations state that manufacturers must specify the maximum mine air temperature under which the refuge is designed to operate when fully occupied, whilst maintaining an internal apparent temperature of 35°C.



OPERATING PROCEDURES
• Wall mounted + hardcopy manuals

**CHEMICAL CANNISTERS
MUST BE IN PLACE
BEFORE OPERATING**

SEQUENTIAL SYSTEM OPERATION

**MARCis CO/CO₂
SCRUBBING SYSTEM**
• Intrinsically safe design

AIR CONDITIONING SYSTEM
• Intrinsically safe design

**OXYGEN SUPPLY:
MEDICAL GRADE OXYGEN CYLINDERS**
• To be provided by end user.

SEATING
• Ergonomically designed
• Durable, hard wearing fabric
• 500mm seating per person

STORAGE
• Under seat

Internal Airlock

A major feature of the CoalSAFE is a fully pressurised internal airlock, designed to act as a secure staging area between the outside environment and the enclosed protection of the refuge chamber.

The airlock features a pneumatic flushing system that ensures the out-flow of air; preventing the ingress of contaminants while the door is open for entry.



Integrated into the main shell of the CoalSAFE, the internal airlock provides a seamless entry way into the main chamber, while retaining portability of the unit as a whole. This also ensures coherent structural integrity and protection across the refuge chamber.

The CoalSAFE airlock provides additional storage for items such as first aid equipment, stretchers, human waste disposal, lighting and emergency food rations. It can also be utilised as refuge space for occupants once all personnel have entered the chamber.

MineARC offers a range of airlock options and custom features, dependent on site specifications and requirements.

Cylinder Rack and Storage

High pressure cylinders used to power the CoalSAFE's life support systems are stored securely in cylinder racks integrated into the rear of the refuge chamber.

Note: Cylinders are to be provided by the end user.



Chamber Exterior - Rear



EMERGENCY ESCAPE HATCH

- Inward opening
- Accessible internally and externally
- Neoprene memory seal

PAINT

- AS/NZS 2312:2002
- Sand blasted to 2.5 grit

LIFTING LUGS

REFLECTIVE SIGNAGE

- Safety & operational
- Optional extra: Multiple languages

AIR VENT / CHECK VALVE

SKID BASE

- 250 x 100mm forklift slots
- Front and rear mounted tow points
- Front mounted 25mm steel plate push blocks

CS-IHS2-16-IS-48

Also Available: EnviroLAV Coal Spec Toilet System

The EnviroLAV is the latest innovation in self-contained, portable toilet systems – ideal for the use in underground mining.

Designed to be simple to operate and maintain, the EnviroLAV is a semi-permanent structure that can be used both above and below ground wherever there is access to compressed air. The EnviroLAV requires emptying just once every 12 months, based on standard usage in optimal conditions.

For more information please visit www.minearc.com



Optional Features



Compressed Air Filtration System

The MineARC compressed air filtration system is a dedicated air management unit designed specifically for MineARC Refuge Chambers.

The compressed air system offers a four-stage filtration method, ensuring that contaminants are thoroughly removed and the air entering the chamber is suitable for breathing.

- Four stage filtration: water separation, pre-filter, coalescing and absorption
- Flood protection valve for automatic mine air shut off in the event of water ingress
- Intrinsically safe operation
- Easier installation and faster service time

Thermal Insulation

As an optional feature, the internal walls of the CoalSAFE Refuge Chamber can be fitted with a thermal insulation barrier to help limit external heat transfer to the internal environment, and can withstand temperatures in excess of 500°C.

Blast Protection

MineARC offers two levels of increased blast protection available as an upgrade to the CoalSAFE International High Seam.

Level One: Blast Shield Protection

Structural additions to the chamber in order to provide blast shield protection for susceptible components. This added protection prevents damage to areas of the chamber that either provide life support or components that, if damaged, will compromise the breathing integrity of the chamber (such as the portal window).

Level Two: Blast Rating Upgrade

MineARC utilises highly specialised materials and engineering techniques to build chambers that can withstand the concussive forces of extreme blasts and explosions within heavy industry. Through careful analysis of a site's application and hazard assessment, MineARC can engineer a highly customised refuge chamber or safe haven to meet their specific blast rating requirements.

The CoalSAFE International High Seam Refuge Chamber offers a 5psi blast rating as standard, however can be upgraded to a rating as high as 12psi through the use of additional upright and lateral stiffeners and reinforcement to the chamber walls.

Custom Design

MineARC has the in-house capabilities to custom design a CoalSAFE Refuge Chamber that meets any individual site-specific requirements. Each client's mine layout, transport and handling, emergency response procedures, and risk management needs are thoroughly investigated, in order to provide a unique and flexible solution.

Engineering drawings and models are generated and reviewed in consultation with each client prior to fabrication, ensuring that the product is used to its full potential and that the client's goals and objectives are met.

Feature Summary



Intrinsically Safe

5mm Steel Plate

CO & CO2 Scrubbing

Breathable Air (O2) Supply

Air Conditioning

5 PSI Blast Rating

48hrs Standalone Duration

Gas Monitoring

Standard Features

- Intrinsically safe design
- 5mm steel plate construction
- Blast rating: 5psi
- Source of breathable air (O2) supply:
 - Oxygen cylinder storage
- Powerless CO2 and CO scrubbing
- Pre-packaged chemical cartridges
- Powerless cooling and dehumidifying
- Internal flushing airlock
- Internal and external gas monitoring
- Communication ports
- Cyalume light sticks
- 48 hours standalone duration
- Ergonomically designed seating
- Rear escape hatch with internal/external access
- Viewing porthole
- Lifting lugs, skid base and forklift slots

- Non-slip flooring
- Reflective external signage
- Portable chemical toilet

Optional Features

- Thermal insulation
- Compressed air filtration system
- Blast shield protection (reinforced construction) to withstand percussion blasting
- Blast rating upgrade
- Intrinsically safe strobe light
- Wheel and tow package
- Reinforced attachment points
- First aid kit
- Custom dimensions and transport configurations

Service and Maintenance

MineARC CoalSAFE Refuges are easy to inspect and maintain, requiring minimal preventative maintenance. MineARC Systems has a dedicated service team with the capacity to undertake all your servicing requirements as well as accredited training programs for customers to perform their own servicing.



ONLY USE REFUGE WHEN ESCAPE IS IMPOSSIBLE

DO NOT
OBSTRUCT

6 1 1 1 1 0

20 PERSON
REFUGE

MAA-076

KEEP AIRLOCK DOOR CLOSED UNTIL REFUGE IS FULLY OCCUPIED



HANDLE

LOCK UNLOCK

ROTATE HANDLE SLOWLY


mineARC
SYSTEMS
coalsAFE

GAS MONITOR
STORAGE
BREAK SEAL
IN EMERGENCY

MineARC Systems - Built for Safety.

www.minearc.com


mineARC
SYSTEMS