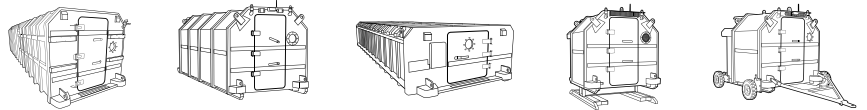


MineARC® Systems

Hard Rock Mine (HRM) Refuges

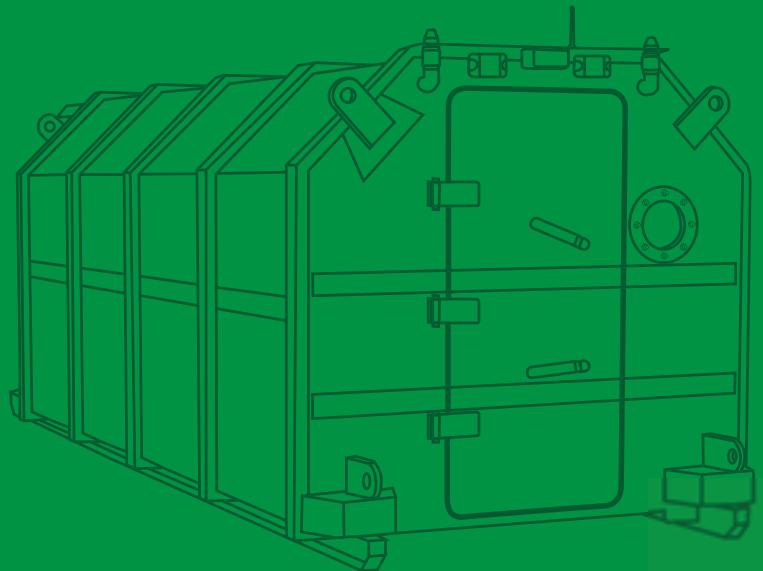
Designed to provide a refuge or 'safe-haven' for miners suddenly trapped in a hazardous or toxic environment.



The world's leading manufacturer of emergency life-saving refuge
Mining Safe. MineARC®.



MineARC® HRM & HRM-PL
Refuges





MineARC® Systems Company Profile

MineARC Systems is the global leader in the manufacture and supply of emergency safe-refuge to the underground mining, tunnelling, and petro-chemical industries.

With over 15 years experience in the industry, our dedication to ongoing research and development has kept us at the forefront of safe refuge technology.

MineARC refuges have been successfully used around the world in multiple mine and tunnelling emergencies to save lives.

MineARC has offices and manufacturing facilities in Perth, Western Australia, Randfontein in South Africa, Santiago in Chile and Dallas in the United States, as well as a strong distribution network worldwide.

MineARC manufactures refuges for operations in over 25 countries around the world.

All MineARC Refuges comply with the highest international industry regulations and guidelines.

MineARC Hard-Rock Refuges are the only refuges in the world to comply in full with the West Australian Department of Consumer and Employment Protection's (DOCEP) *Industry Guidelines*. MineARC Hard-Rock Refuges are also European CE and Australian C-Tick certified.

MineARC is the only refuge manufacturer in the world with an ISO: 9001 quality rating.

www.minearc.com



European CE Certified to Machinery Norms



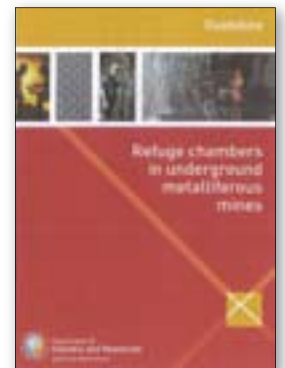
Australian C-Tick Standards: AS4100-1998, AS3570.1-18, AS2208, AS3000, AS1716-15



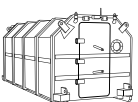
MineARC® HRM Refuge Live Risk Assessment Testing



Bureau Veritas ISO 9001:2008 Quality Management Systems



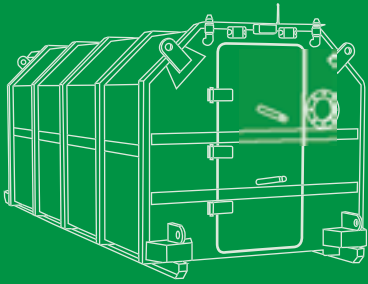
West Australian DOCEP Guidelines for Hard Rock Mines



Configurations

MineARC Hard Rock Mine Refuges are Available in 2 Power Configurations:
(see following pages for power specifications)

- ▶ MineARC Electrically-Powered Hard Rock Mine Refuges (HRM)
- ▶ MineARC 'Powerless' (CO₂ Powered) Hard Rock Mine Refuges (HRM-PL)



Due to internal technology efficiencies, Powerless Refuges (HRM-PL) can accommodate an additional 2 persons.

Model*	Capacity (persons)	Height (m/ft)	Width (m/ft)	Length (m/ft)	Weight (kg/lbs)
4 HRM-PLP	4	1.5 / 5' 0"	1.8 / 5' 11"	1.8 / 5' 9"	1475 / 3212
4 HRM (6 HRM-PL)	4 (6)	2.4 / 7' 9"	2.3 / 7' 6"	3.1 / 8' 2"	2500 / 6700
8 HRM (10 HRM-PL)	8 (10)	2.4 / 7' 9"	2.3 / 7' 6"	3.7 / 12' 1"	3000 / 7800
12 HRM (14 HRM-PL)	12 (14)	2.4 / 7' 9"	2.3 / 7' 6"	4.9 / 16' 0"	3600 / 9300
16 HRM (18 HRM-PL)	16 (18)	2.4 / 7' 9"	2.3 / 7' 6"	6.1 / 20' 0"	4800 / 12500
20 HRM (22 HRM-PL)	20 (22)	2.4 / 7' 9"	2.3 / 7' 6"	7.4 / 24' 3"	6000 / 15700
26 HRM (28 HRM-PL)	26 (28)	2.4 / 7' 9"	2.3 / 7' 6"	9.7 / 31' 9"	7400 / 19210

*Custom sizes available. Refuge dimensions are ultimately designed to client requirements.

Special Transport Configurations Available



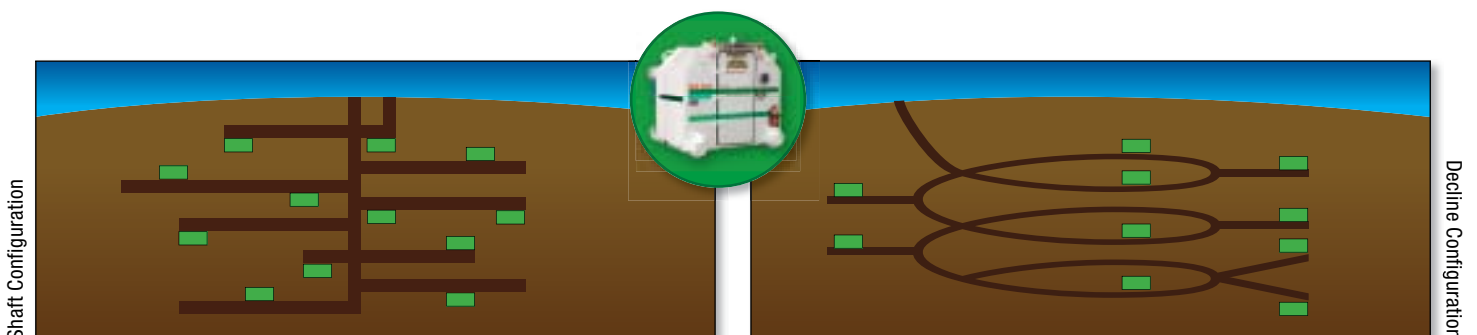
HRM Modular Series
For narrow shaft configurations



4 HRM-PLP (Powerless Portable)
Designed for Single-Entry-Headings

Refuge Chamber Positioning

Refuge Systems form an integral part of an underground mine's wider Emergency Response Plan (ERP). Refuges 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 'safe distance' between refuges.



Decline Configuration

MineARC Systems has built on its vast experience in underground safety to successfully design its electrically powered **HRM** Refuge model.



Construction

The HRM Refuge has been meticulously designed and engineered to ensure ease of transport and a robust design. Constructed from 5mm (1/4") steel plate with external steel support wraps as standard, the refuge also comes equipped with a skid base, lifting lugs and forklift slots to the sides.



CO/CO₂ Scrubbing with DGM

The HRM Refuge uses active chemicals and MineARC's patented electrical Scrubbing System to remove the buildup of harmful CO (carbon monoxide) and CO₂ (carbon dioxide) gases from the air inside the refuge.

The refuge's DGM (Digital Gas Monitor) continuously monitors and alerts occupants to the levels of CO, CO₂ and O₂ (oxygen) within the air.



Oxygen Supply and Air Conditioning

Every MineARC HRM Refuge is equipped with 3 separate sources of air supply. Refuges should be connected to a mine's main air supply, however, should this connection be lost or become contaminated, medical grade oxygen cylinders and oxygen candles will continue to supply breathable air to the refuge for a minimum of 36hrs. Air conditioning is vital to combat the potentially fatal affects of heat-stress; caused by the internal build-up in heat resulting from the occupants own metabolic activity and the external temperature of the mine. All MineARC HRM Refuges are therefore fitted with quality reverse cycle air conditioners.

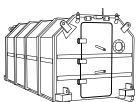


Service and Maintenance

MineARC HRM Refuges are easy to inspect and maintain, requiring minimal preventative maintenance. The HRM refuge has a low ongoing cost of ownership with consumables (such as the active chemicals used in the Scrubbing System) having extended shelf lives.

Battery Back-Up (UPS)

MineARC HRM Refuges are designed to run off a mine's 'mains' electrical power supply, operating indefinitely when connected. However, in the event that mains power is lost, the HRM is equipped with its own UPS (Uninterruptable Power Supply), capable of powering the refuge's internal life support systems for a minimum of 36hrs.





- ▶ **5mm (1/4")** Steel Plate
- ▶ **CO & CO₂** Scrubbing
- ▶ **3 x Air Supply**
- ▶ **Air-Conditioning**
- ▶ **36hrs** Minimum Safe Entrapment



Features Summary

MineARC HRM (Electrically Powered) Refuge

STANDARD FEATURES

- ✓ **5mm (1/4") Steel Plate Construction**
- ✓ **3 Sources of Air (Oxygen) Supply**
- ✓ **Carbon Dioxide (CO₂) & Carbon Monoxide (CO) Scrubbing with Digital Control System**
- ✓ **Air Conditioning & Dehumidifying**
- ✓ **Battery Back-UPS 36hrs Minimum Life Support**
- ✓ Viewing Portal
- ✓ Rear Escape Hatch
- ✓ Fire Resistant Structure
- ✓ Ergonomically Designed Seating
- ✓ Surround Package (reinforced construction)
- ✓ Digital Gas Monitoring (DGM)
- ✓ Lifting & Towing Lugs
- ✓ Forklift Slots
- ✓ Non-Slip Flooring
- ✓ Chemical Toilet
- ✓ Internal & External Fire Extinguishers

OPTIONAL FEATURES

- ✓ Skids Configuration
- ✓ Battery Back-UPS Upgrade to 48hrs
- ✓ External Gas Monitoring (Standard on US Models)
- ✓ First Aid Kit (Standard on US Models)
- ✓ 15 PSI Explosion Proof Construction
- ✓ Separate Air Lock Compartment
- ✓ Step-Down Transformer
- ✓ Receptical Plug (Trailing Cable Connecting Plug)



Using technology first designed for its range of coal mine refuges, MineARC Systems has adapted its standard HRM model to develop a hybrid 'powerless' HRM refuge - the **HRM-PL**. The HRM-PL performs all the same vital life support functions as its electrically-powered twin, but with added **powerless flexibility**.



The MARCis® Powerless CO/CO₂ Scrubbing with Integrated Air Conditioning

The MARCis is the world's first non-electrically powered CO/CO₂ scrubber with integrated air conditioning capability - representing a breakthrough in safe refuge technology. Under normal circumstances the HRM-PL is connected to a mine's main air supply. Mine air automatically flushes the refuge of harmful CO/CO₂ gases and cools the refuge as it passes through a special vortex.

Should mine air be lost, the MARCis is activated - scrubbing the air of CO/CO₂ whilst also cooling and dehumidifying the refuge. Powered by liquid CO₂, the MARCis is easy to operate and features four levels of scrubbing/cooling capacity. To maintain internal oxygen levels, medical grade oxygen cylinders and oxygen candles are activated inside the refuge.



Powerless Flexibility

Electrical HRM Refuges require continuous access to a mine's mains electrical power supply in order to keep the Battery Back-UP charged for use in an emergency.

With the HRM-PL, **no external power supply is required**, meaning the refuge can be placed anywhere in the mine, regardless of access to mains power. Two internal 12 Volt rechargeable battery packs are all that is required to power the refuge's internal/external lighting, comms and siren.

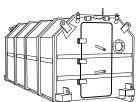


Service and Maintenance

MineARC HRM-PL refuges are easy to inspect and maintain. The MARCis Scrubbing System uses specially designed pre-packaged chemical cartridges that are easy to handle and can store for long periods.

Secure Cylinder Storage

Should mine air supply be lost, the MineARC® HRM-PL refuge uses liquid CO₂ cylinders to power its internal life support systems (The MARCis). The secure cylinder compartment at the rear of the refuge can house enough CO₂ cylinders to power the MARCis for a minimum of 36hrs.





- ▶ **Powerless** Design
- ▶ **5mm (1/4")** Steel Plate
- ▶ **CO & CO₂** Scrubbing
- ▶ **3 x Air Supply**
- ▶ **Air-Conditioning**
- ▶ **36hrs** Minimum Safe Entrapment



Features Summary

MineARC® HRM-PL (Powerless) Refuge

STANDARD FEATURES

- ✓ **5mm (1/4") Steel Plate Construction**
- ✓ **3 Sources of Air (Oxygen) Supply**
- ✓ **Carbon Dioxide (CO₂) & Carbon Monoxide (CO) Scrubbing**
- ✓ **Air Conditioning & Dehumidifying**
- ✓ **Liquid CO₂ Cylinders 36hrs Minimum Life Support**
- ✓ Viewing Portal
- ✓ Rear Escape Hatch
- ✓ Fire Resistant Structure
- ✓ Ergonomically Designed Seating
- ✓ Surround Package (reinforced construction)
- ✓ Gas Monitoring
- ✓ Lifting & Towing Lugs
- ✓ Forklift Slots
- ✓ Non-Slip Flooring
- ✓ Chemical Toilet
- ✓ Internal & External Fire Extinguishers

OPTIONAL FEATURES

- ✓ Skids Configuration
- ✓ Liquid CO₂ Cylinders Upgrade to 48hrs
- ✓ External Gas Monitoring (Standard on US Models)
- ✓ First Aid Kit (Standard on US Models)
- ✓ 15 PSI Explosion Proof Construction
- ✓ Separate Air Lock Compartment





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