Petrochemical Safe Havens

The MineARC ChemSAFE Range

Designed to provide a 'safe-haven' for personnel in the petrochemical industry, suddenly trapped in a hazardous or toxic environment.

AirBANK Pressure System

ChemSAFE
Standard Design 12-Person
PS-SD2-12-SIV-12

The world's leading manufacturer of emergency life-saving refuge
MineARC Systems is the global leader in the manufacture and supply of emergency safe refuge solutions for the mining, tunneling, chemical processing and disaster relief industries.

With over 18 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 five international locations including:

- Perth, Western Australia
- Johannesburg, South Africa
- Dallas, Texas
- Santiago, Chile
- Beijing, China
- Barcelona, Europe

This allows MineARC to provide 24 hour service and engineering support to our expanding list of clients in over 40 countries across the globe.

All MineARC Refuge Chambers and Safe Havens comply with the highest international regulations and recognized ‘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
ChemSAFE
Safe Havens
The MineARC ChemSAFE Portable Range
MineARC understands that emergency response requirements differ depending on a site’s processing conditions, location of personnel, dangerous goods inventory and a host of other important factors.

Within the petrochemical industry, the common practice of modifying existing site buildings to function as shelter-in-place safe havens can often prove a timely and costly exercise, resulting in a non-flexible solution as site requirements shift over time. Building modification can also prove ineffective, with numerous air entry and exit points to consider, not to mention costly blast proofing if required.

In response, MineARC has developed a fully sealed, transportable and cost effective alternative to site building modification – the MineARC ChemSAFE Range.

MineARC ChemSAFE Safe Havens offer a safe and secure ‘go-to’ area for multiple personnel in the event of a toxic chemical release, fire, explosion or other hazardous emergency response scenario.
ChemSAFE Standard Design

- Configurations

The ChemSAFE Standard Design (SD) Safe Haven has been continuously refined to offer the latest in safe refuge technology, providing occupants with optimal safety features, functionality and performance.

As MineARC’s original and most requested design, the safe haven has been meticulously engineered to ensure ease of transport and a robust exterior. Constructed from 6.4mm (1/4”) steel plate with external steel support wraps as standard, the safe haven comes equipped with a skid base, lifting lugs and forklift slots to the sides. The steel structure can be further reinforced to withstand up to 12psi overpressure blast.

Standard configurations are available based on occupancy – from 8 to 30 people.

Features

- Series IV Scrubbing System with pre-packaged CO₂ chemicals
- Blast rating: 5psi
- iVAN voice prompt system
- Aura-FX Digital Gas Monitoring System
- Positive Pressure Flushing System
- Air conditioning and dehumidifying
- Internal lighting / external warning lights and siren
- Communications connection
- 12 hr minimum backup power supply (UPS)
- Internal or external vestibule

Standard Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Occupancy (persons)</th>
<th>Height (m/inch)</th>
<th>Width (m/inch)</th>
<th>Length (m/inch)</th>
<th>Weight (kgs/lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS-SD1-08-SIV-12</td>
<td>8</td>
<td>2.21 / 87&quot;</td>
<td>2.25 / 89&quot;</td>
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<td>4.80 / 189&quot;</td>
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<td>2.21 / 87&quot;</td>
<td>2.25 / 89&quot;</td>
<td>6.02 / 237&quot;</td>
<td>6350 / 14000</td>
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<td>20</td>
<td>2.21 / 87&quot;</td>
<td>2.25 / 89&quot;</td>
<td>7.23 / 285&quot;</td>
<td>7031 / 15500</td>
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<td>PS-SD5-26-SIV-12</td>
<td>26</td>
<td>2.21 / 87&quot;</td>
<td>2.25 / 89&quot;</td>
<td>8.44 / 332&quot;</td>
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<td>PS-SD6-30-SIV-12</td>
<td>30</td>
<td>2.21 / 87&quot;</td>
<td>2.25 / 89&quot;</td>
<td>9.64 / 380&quot;</td>
<td>8618 / 19000</td>
</tr>
</tbody>
</table>

Custom dimensions and occupancies available. Safe haven dimensions are ultimately designed to client specifications.
The ‘face’ of the safe haven is designed primarily for easy identification and quick access during an emergency.

The strobe lighting, warning siren and reflective signage alert passers-by to the safe haven’s location, while the rotating door handles provide simple, straightforward access to the safety of the interior.

An additional feature of the ChemSAFE Standard Design range is a fully pressurized vestibule, providing added protection against the ingress of smoke and other harmful toxins. Vestibules are available as either an internal or external feature of the safe haven. See further on for additional information.

The rear of a MineARC ChemSAFE Standard Design houses important electrical and backup power supply systems. A secure floor-to-roof cabinet provides greater protection for these systems, unlike more basic designs.
The base of the cabinet contains the safe haven’s UPS (Uninterruptible Power Supply) battery backup system. The UPS is a failsafe system that can power the safe haven’s internal life support systems for a minimum of 12hrs, should mains power become cut-off.

Emergency shelter should always be considered within the broader context of an entire emergency response/management plan and in conjunction with a range of other important design and safety factors. MineARC engineers are on hand during the entire design process to ensure the best possible safety solution is delivered for each and every project. Virtually all aspects of the ChemSAFE’s design can be customized by MineARC engineers, including; dimensions, structural integrity, volume, occupancy, and minimum entrapment durations.

MineARC can also engineer the safe haven to double as a control room, workshop area or office space. See further on for additional information.
**ChemSAFE Standard Design - Interior**

- **GUARDIAN REMOTE MONITORING & DIAGNOSTICS SYSTEM**
- **CAMERA**
- **SERIES IV DIGITAL CONTROLLER INTERFACE**
- **CIRCUIT BREAKERS**
- **BATTERY UPS ISOLATION SWITCH**
- **OXYGEN SUPPLY #2: BREATHABLE OXYGEN CYLINDERS**
  - Minimum capacity 303ft³ (8,580L)
  - Breathable oxygen cylinders quoted separately.
- **OPERATING PROCEDURES**
  - Wall mounted + hardcopy manuals
- **SEATING**
  - Ergonomically designed
  - Durable, hard-wearing fabric
- **NON-SLIP FLOORING**
  - Raised, removable
- **OPTIONAL: AUTOMATED OXYGEN DELIVERY SYSTEM**
- **FIRE BLANKET UNDER SEAT**
- **OPTIONAL:**
  - AUTOMATED OXYGEN DELIVERY SYSTEM

*Breathable oxygen cylinders quoted separately.*
Inside a MineARC ChemSAFE Standard Design Safe Haven, a number of vital life-support systems combine to create a safe, ongoing environment for occupants.

Systems include: air (oxygen) supplies, air conditioning and dehumidifying, positive pressure systems, electrical and communications, gas detection and CO2 absorption (referred to as ‘scrubbing’ systems).

The digital controller interface is the operational hub of the safe haven. From here, all power, lighting and scrubbing systems can be managed with the push of a button.

i.V.A.N.

Exclusive to MineARC, iVAN (Intelligent Voice Audio Navigation) represents a breakthrough in safe-refuge technology. iVAN is the on-board navigation assistant that guides occupants through operational procedures.

Air Conditioning

Air conditioning is vital to combat the potentially fatal effects of heat stress. A continuous build up in heat is caused by the occupant’s metabolic activity, as well as any ambient (external) heat affecting the safe haven internal temperature.

Optional: Automated Oxygen Delivery System

The MineARC Automated Oxygen Delivery System (AODS) is designed to maintain a safe, breathable atmosphere within the safe haven.

Once the system is activated, the AODS disperses metered amounts of oxygen supplied by a compressed oxygen cylinder. The AODS maintains oxygen levels between 18.5% and 23% inside the safe haven without any required operator involvement.

*Image shows custom unit. Some features do not apply to standard model.
The ChemSAFE Utility Design (UD) Safe Haven has been continuously refined to offer cost effective solutions for toxic gas protection. The Utility Design is equipped with the latest in safe refuge technology, providing occupants with optimal safety features, functionality and performance.
ChemSAFE Utility Design
- Configurations

The Utility Design features a narrow construction for space restricted applications, while still providing ample internal space for a range of occupancies - from 8 to 30 people. Constructed from robust 4.75mm (3/16") steel plate, the safe haven's portable design features lifting lugs and forklift slots, allowing easy manoeuvrability around site.

Features

- ELV Scrubbing System with pre-packaged CO2 chemicals
- Breathable air (O2) supply
- Aura-FX Digital Gas Monitoring
- Positive Pressure Flushing System (PPFS)
- Air conditioning and dehumidifying
- Internal lighting / external warning lights and siren
- Communications connection
- Internal or external vestibule

The steel structure is fully sealed, offering 0% air change per hour (ACH) for long term occupancy in a toxic gas release.

PS-UD1-08-ELV (8 Person)
PS-UD2-12-ELV (12 Person)
PS-UD3-16-ELV (16 Person)
PS-UD4-20-ELV (20 Person)
PS-UD5-26-ELV (26 Person)
PS-UD6-30-ELV (30 Person)

Standard Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Occupancy (persons)</th>
<th>Height (m/inch)</th>
<th>Width (m/inch)</th>
<th>Length (m/inch)</th>
<th>Weight (kgs/lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS-UD1-08-ELV</td>
<td>8</td>
<td>2.24 / 88&quot;</td>
<td>1.86 / 73.25&quot;</td>
<td>3.73 / 147&quot;</td>
<td>2,720 / 6,000</td>
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<tr>
<td>PS-UD2-12-ELV</td>
<td>12</td>
<td>2.24 / 88&quot;</td>
<td>1.86 / 73.25&quot;</td>
<td>4.34 / 171&quot;</td>
<td>3,040 / 6,700</td>
</tr>
<tr>
<td>PS-UD3-16-ELV</td>
<td>16</td>
<td>2.24 / 88&quot;</td>
<td>1.86 / 73.25&quot;</td>
<td>5.55 / 219&quot;</td>
<td>3,580 / 7,900</td>
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<tr>
<td>PS-UD4-20-ELV</td>
<td>20</td>
<td>2.24 / 88&quot;</td>
<td>1.86 / 73.25&quot;</td>
<td>6.77 / 266&quot;</td>
<td>4,170 / 9,200</td>
</tr>
<tr>
<td>PS-UD5-26-ELV</td>
<td>26</td>
<td>2.24 / 88&quot;</td>
<td>1.86 / 73.25&quot;</td>
<td>7.98 / 314&quot;</td>
<td>4,710 / 10,400</td>
</tr>
<tr>
<td>PS-UD6-30-ELV</td>
<td>30</td>
<td>2.24 / 88&quot;</td>
<td>1.86 / 73.25&quot;</td>
<td>9.19 / 362&quot;</td>
<td>5,300 / 11,700</td>
</tr>
</tbody>
</table>

Custom dimensions and occupancies available. Safe haven dimensions are ultimately designed to client specifications.
An optional feature of the ChemSAFE Utility Design is a UPS (Uninterruptible Power Supply) battery backup system, contained within a secure rear cabinet. The UPS is a failsafe system that can power the safe haven’s internal life support systems for a minimum of 12hrs, should mains power become cut-off.
SIREN & STROBE LIGHTING
- 112 dBa motion activated
- Green & red LED

LIFTING LUGS (Not pictured)
- Top of safe haven

EMERGENCY ESCAPE HATCH
- Inward opening; accessible internally & externally
- Neoprene memory seal

AIR CONDITIONING CONDENSER
(Not pictured)

OPTIONAL: BATTERY UPS
(Not pictured)
- 12hr emergency backup power supply
- Further options available
Inside a MineARC ChemSAFE Utility Design Safe Haven, a number of vital life-support systems combine to create a safe, ongoing environment for occupants.

Systems include; air (oxygen) supplies, air conditioning and dehumidifying, positive pressure systems, electrical and communications, gas detection and CO2 absorption (referred to as a scrubbing system).

**Control System**

The controller interface is the operational hub of the safe haven. From here, all power, lighting and scrubbing systems can be managed with the push of a button.

MineARC’s ELV (Extra-Low-Voltage) System comes as standard with the ChemSAFE Utility Design. The ELV Control System is installed in conjunction with optional UPS battery backup that can power the system for a minimum of 12hrs, should mains power be cut off.

**Air Conditioning**

Air conditioning is vital to combat the potentially fatal effects of heat stress. A continuous build up in heat is caused by the occupant’s metabolic activity, as well as any ambient (external) heat affecting the safe haven internal temperature.

**Optional: Automated Oxygen Delivery System**

The MineARC Automated Oxygen Delivery System (AODS) is designed to maintain a safe, breathable atmosphere within the safe haven.

Once the system is activated, the AODS disperses metered amounts of oxygen supplied by a compressed oxygen cylinder. The AODS maintains oxygen levels between 18.5% and 23% inside the safe haven without any required operator involvement.

*Custom two-aisle seating arrangement shown in image.
INVERTER

- Raised, removable

MARCISORB CO2 CARTRIDGES

- Pre-packaged, no chemical handling

SEATING

- Ergonomically designed
- Durable, hard wearing fabric

COMMUNICATION PORTS

AIR CONDITIONING SYSTEM

- R410a refrigerant cooling
- Mitsubishi Split System

STORAGE

- Under seat + cabinet

AURA-FX DIGITAL GAS MONITOR

NON-SLIP FLOORING

- Raised, removable
Safe Haven
Blast Rating Upgrade

An optional feature of the ChemSAFE Safe Haven is blast rating upgrade up to 12psi.

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

- Increased blast rating to client specification
- Additional 4” x 2” (100mm x 50mm) upright stiffeners
- Additional lateral stiffeners
- Fully enclosed rear housing for componentry protection

Third Party Verification

MineARC has the engineering capabilities to perform in-house blast analysis calculations on all safe havens. In addition, third party testing has been performed by professional blast engineers, in accordance with ASCE: Design of Blast-Resistant Buildings in Petrochemical Facilities (2nd).

As part of their in-depth analysis, third-party blast engineers developed building damage level (BDL) curves in order to test the performance of MineARC Safe Havens, taking into consideration the orientation of the unit with respect to the explosion source. Blasts that can impact either the long or short side of the structure, as well as both sides at an angle were tested.

The results of these studies show that MineARC’s blast resistant structure can withstand a long-duration, free-field blast load of up to 12psi for 200ms, while sustaining no greater than a 'Moderate Building Damage Level' (BDL 2.0). See table opposite for BDL breakdown.

In addition to building damage curves, blast engineers also calculated the occupant vulnerability (OV); the percentage of safe haven population that could sustain fatal injuries at different levels of building damage. In the case of MineARC’s BDL of 2.0, the corresponding OV is proven to be negligible. Refer to table opposite for full OV breakdown.

<table>
<thead>
<tr>
<th>Building Damage Level (BDL)</th>
<th>Summary of Potential Damage</th>
<th>Occupant Vulnerability (OV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 (Minor)</td>
<td>Walls sustain the onset of visible damage. Repairs are necessary for cosmetic reasons only.</td>
<td>Negligible</td>
</tr>
<tr>
<td>2.0 (Moderate)</td>
<td>Localised damage. Building can be repaired and reused.</td>
<td>Negligible</td>
</tr>
<tr>
<td>2.5 (Heavy)</td>
<td>Widespread building damage. Building repair may not be practical.</td>
<td>5%</td>
</tr>
<tr>
<td>3.0 (Major)</td>
<td>Walls facing the blast fail, others have compromised integrity. Building repair is not practical.</td>
<td>50%</td>
</tr>
<tr>
<td>4.0 (Collapse)</td>
<td>Primary and secondary structural members fail or sustain major damage. Building collapse.</td>
<td>100%</td>
</tr>
</tbody>
</table>
CO₂ Scrubbing

The ChemSAFE safe haven uses active chemicals and MineARC’s patented scrubbing system to remove the build up of harmful CO₂ gas from inside the safe haven. The system continuously monitors and alerts occupants to internal and external levels of CO₂, O₂ and other gases within the air. Gas monitoring systems can be customized to on site standards.

The safe haven’s scrubbing system uses pre-packaged MARCISORB CO₂ absorber cartridges. MineARC’s MARCISORB cartridges provide superior scrubbing capacity, are easy to load, safe to handle, and can store for long periods.

Additional Scrubbing Options

MineARC offers various additional scrubbing solutions, designed to remove a range of breathing contaminants and atmospheric hazards from within the safe haven.

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Product</th>
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<tbody>
<tr>
<td>Ammonia, Amines</td>
<td>High-grade impregnated activated carbon for removal of airborne ammonia and amines</td>
</tr>
<tr>
<td>Radioactive Iodine</td>
<td>High-grade impregnated activated carbon for removal of radioactive methyl iodide</td>
</tr>
<tr>
<td>VOC</td>
<td>High-grade virgin activated carbon for organic vapor adsorption</td>
</tr>
<tr>
<td>Acid Gases</td>
<td>High-grade impregnated activated carbon for removal of acid gases</td>
</tr>
<tr>
<td>Mercury</td>
<td>High-grade impregnated activated carbon for removal of airborne mercury vapor</td>
</tr>
<tr>
<td>Aldehydes</td>
<td>High-grade impregnated activated carbon for removal of aldehydes</td>
</tr>
<tr>
<td>HCN, Cl₂, H₂S</td>
<td>High-grade impregnated activated carbon for removal of acid gases including arsine, phosphine and hydrogen cyanide</td>
</tr>
<tr>
<td>Multi-gas (VOC, Acid Gases, Ammonia, Aldehydes, Inorganic gases)</td>
<td>High-grade impregnated activated carbon for removal of a wide spectrum of airborne gases and vapors</td>
</tr>
<tr>
<td>CBRN contaminants</td>
<td>High-grade impregnated activated carbon for removal of a wide spectrum of CBRN contaminants</td>
</tr>
<tr>
<td>Military agents</td>
<td>High-grade impregnated activated carbon for removal of a wide spectrum of military agents</td>
</tr>
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</table>
Safe Havens
Vestibules

MineARC ChemSAFE Standard Design with custom engineered external vestibule for 20 persons per entry.
Safe Haven Vestibules

MineARC external vestibules are more suited to scenarios where direct access from an existing building door frame to the safe haven is required. The vestibule can be custom-made to measure, ensuring an air-tight access point for facility personnel to move safely between on-site buildings and the safe haven during an emergency without the risk of exposure to external atmospheric hazards.

MineARC external vestibules may also be retro-fitted to pre-existing safe havens upon request.

MineARC offers a range of internal and external vestibule solutions designed to suit a wide variety of applications and entry requirements.

An optional feature of both the internal and external vestibule is a door activation locking system; enforcing that one door is locked shut at any one time during entry. This ensures no chance of accidental exposure to the external atmosphere whilst the main safe haven door is open.

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

Internal Vestibules

MineARC internal vestibules provide a neat, fully integrated airlock solution.

Designed as a structural modification to the ChemSAFE shell, the internal vestibule provides a seamless entry way into the main safe haven, while retaining portability of the unit as a whole. This also ensures coherent structural integrity and protection across the safe haven.

External Vestibules

MineARC external vestibules are more suited to scenarios where direct access from an existing building door frame to the safe haven is required. The vestibule can be custom-made to measure, ensuring an air-tight access point for facility personnel to move safely between on-site buildings and the safe haven during an emergency without the risk of exposure to external atmospheric hazards.

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MineARC System Intelligence

GuardIAN Remote Monitoring & Diagnostics System

MineARC’s GuardIAN Remote Monitoring and Diagnostics System is an exciting new development in safe haven technology. GuardIAN enables real-time monitoring; providing confidence that an operation’s fleet of safe havens are emergency ready at all times.

GuardIAN is an on-board system that continuously monitors all vital safe haven operating systems. During standby mode GuardIAN checks for component faults and monitors safe haven usage or entry to the chamber.

GuardIAN’s secure online interface is hosted on an internal server within the safe haven so that no client software installation is required. The responsive webpage is easily accessible from any computer, tablet or smartphone and features a summary of your entire safe haven fleet and overall operational status, with the ability to drill down to a detailed report of each chamber.

GuardIAN is a standard feature of the ChemSAFE Standard Design.

Reduces Operational Costs:

- Reduced servicing time
- Real-time troubleshooting, reducing maintenance staff down-time
- Advanced maintenance planning
- Extended calibration periods for gas monitoring
- Reduced gas sensor replacement costs
- Extended sensor life
- Faster and easier sensor replacement
- Reduction in replacement parts due to theft
- Reduced service kit costs
- Streamlined purchasing process

Improves Operational Safety:

- Operational communication during emergency use
- Direct video and gas monitoring for evacuation planning
- Greater system automation for reduced risk of human error
- Centralized diagnostics and analysis of entire MineARC Safe Haven fleet via computer, tablet or smartphone
- Programmable push email notifications for important safe haven events
- Voice prompting gas monitoring for chemical change-out and oxygen regulation
- Increased monitoring ensures all critical components remain in the safe haven
- Reduced ‘out-of-service’ time for all safe havens
- Eliminates safe haven misuse
GuardIAN Live Video Monitoring and VOIP Video Phone

Live video streaming can greatly assist in evacuation planning during an emergency; providing the capability to determine the capacity of the safe haven and monitor the well-being of occupants. Internal video monitoring is provided by a remote controlled, motion activated GuardIAN IP camera. When activated, the camera will send out a live, recorded stream of the interior of the safe haven. External video monitoring is also available as an optional upgrade to the GuardIAN System.

To assist occupants during an emergency or safety drill, GuardIAN also equips your safe haven with a VOIP video phone. This facilitates face-to-face communication between the safe haven and the incident command; improving the psychological well-being of safe haven occupants during an emergency, providing assistance to perform any difficult or technical procedures and facilitating face-to-face trouble shooting for service staff in order to reduce the need for multiple visits during a maintenance run.

GuardIAN System Monitoring, Event Logging and Fault Diagnostics

MineARC’s Series IV Digital Controller links directly to GuardIAN, streaming real-time system data to a surface control room(s). Data includes automated system checks, battery fault logging, system diagnostics, internal and external temperature measurements, and system actions such as scrubber activation.

System faults, events and scheduled service notifications can be sent to designated personnel as email alerts; notifying them of upcoming service requirements, potential emergencies or mal-use as they occur.

Aura-FX Digital Gas Monitoring Diagnostics

MineARC’s new Aura-FX Digital Gas Monitoring System is a proprietary fixed gas monitoring unit, designed specifically for use in MineARC refuge chambers and safe havens. A vast improvement on current digital gas monitors (DGMs) on the market, Aura-FX provides a safe haven specific solution to gas monitoring. Aura-FX has the ability to individually monitor up to 7 gases via a series of user-friendly, digital screens. Audible voice alarms will prompt occupants to replace scrubbing chemicals or adjust oxygen supply levels in the safe haven as required.

When utilized as part of the MineARC System Intelligence network, Aura-FX provides real-time gas monitoring data and analysis via the GuardIAN dashboard.

Aura-FX is a standard feature of the ChemSAFE Range.
ChemSAFE
Control Rooms

MineARC can custom engineer safe havens that can withstand the hazards and events commonly associated with the dangers of working in control rooms located within the process area of a facility. The design includes a dedicated work space that provides ergonomic visual display units (VDU) for the operators to continue to control the facility safely in an emergency situation.

In a heightened event situation, the operators can concentrate on their units of responsibility without having to be concerned about external hazards and/or contamination of the control room environment.

MineARC has a multitude of designs and configurations available that will meet the requirements of each individual site’s emergency operations procedures, whether it be an explosion, toxic release or weather related.

Features

- Built-in, anchored workspace with recessed keyboard tray for operator workstation
- Thru-table monitor stand mounting
- Built-in plugmold multi-outlet distribution
- CPU workstations powered by Safe Haven’s UPS battery backup system
- Turnkey installation
Shelter-in-Place Options

Turn any existing shelter-in-place into a fully functioning safe haven facility
ChemSAFE Sealed Rooms
(Shelter-in-Place)

Intended for facilities that do not have the physical space for a portable Safe Haven; ChemSAFE Sealed Rooms provide a convenient means of protecting personnel from a toxic gas release.

These modular constructed rooms are designed to have minimal air changes per hour (ACH). The incorporation of life support systems such as the MineARC AirGEN and AirMAX ensures occupants remain safe for the entire duration of the emergency.

Features

- Customized modular construction
- ACH < 0.1
- 3” fiberglass reinforced plastic covered gypsum on exterior and interior with a polystyrene center
- Electrical package consisting of lights and outlets
- Integrated MineARC Life Support options
AirMAX Life Support
For Shelter-in-Place

Non-built-for-purpose buildings generally do not meet acceptable leak tightness for shelter-in-place. With ventilation shut down, a typical building can have up to five air changes per hour or higher depending on wind speed. Door operation as people enter can potentially bring additional contaminants from outside the shelter. As contaminated air infiltrates a building, the level of protection provided to the occupants diminishes with time.

A safer and more economical alternative is to seal smaller existing rooms within a larger building. There are cost-effective means to create a “very tight” room (<0.04CFM per square foot of floor space) within a building by using specifically designed components such as clean room ceiling tiles, sealing doors, and vestibules. These tightly sealed rooms, however, cannot be occupied for long periods without the risk of occupants producing a high level of carbon dioxide and dangerously reducing oxygen levels.

The MineARC AirMAX combines two critical life support features. A Positive Pressure Maintenance System (PPMS) to keep toxic gases out and a supplemental oxygen delivery system. Optional Aura-FX Gas Monitoring ensures that external contaminants cannot enter the room, while alerting users to changes in gas levels.

Features
• Mobile design for easy relocation
• Oxygen and compressed air cylinder storage
• Oxygen Delivery System
• Positive Pressure Maintenance System (>0.14psi)
• 120/240V electrical connection
• Optional Aura-FX Gas Monitoring (NH3, CL etc.)

Standard Dimensions

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupancy</td>
<td>&lt;50 Person</td>
</tr>
<tr>
<td>Duration</td>
<td>&gt;4 Hours</td>
</tr>
<tr>
<td>Voltage</td>
<td>120V or 240V</td>
</tr>
<tr>
<td>Depth</td>
<td>36.25in (0.92m)</td>
</tr>
<tr>
<td>Width</td>
<td>25.25in (0.62m)</td>
</tr>
<tr>
<td>Height</td>
<td>76in (1.93m)</td>
</tr>
<tr>
<td>Weight (Est.)</td>
<td>1,100lbs (500kg)</td>
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A critical requirement for any shelter-in-place location is maintaining internal positive pressure in order to prevent the ingress of toxic gases resulting from an accidental release. MineARC’s AirBANK Pressure System offers a simple modular solution; ensuring occupants remain safe inside of a designated shelter-in-place for a specified duration.

AirBANK provides rapid pressurization, which is activated and maintained using the AirBANK CONTROL via a simple HMI touch-screen. MineARC’s integrated Aura-FX Gas Monitor ensures breathable air remains within acceptable limits. Alternatively, rooms can be fitted with supplementary oxygen and carbon dioxide scrubbing systems.

The AirBANK System is designed to store (11) 4,500psi or 6,000psi cylinders, and allows any number of cylinder racks to be daisy-chained as required. Each rack is leak protected by a check valve and electric solenoid, and features a panel mounted gauge to display the high and low pressure level of the unit.

- Stainless steel components throughout
- 71-3/4” [1822.45mm] x 40” [1016mm] x 32” [812.8mm]
- 4,000lbs [907kg]

AirBANK Control

The remote activated AirBANK CONTROL is designed to maintain a life-sustaining environment via a differential pressure device. Contained in a wall-mounted NEMA-Rated enclosure, the unit features an HMI screen that monitors cylinder pressure levels; alarming when levels fall below the acceptable limit.

AirBANK CONTROL features an active by-pass of the system if internal gas levels are not within breathable air limits. The Aura-FX monitors and displays gas levels in real-time, including site-specific toxic gases if necessary.

- Regulated and silenced compressed air output.
- UPS battery backup for power loss.
- 120 or 240V input.
- 15.75” [400mm] x 16.69” [500mm] x 7.87” [200mm]
- 25lbs [11.3kg]
AirBANK cylinder rack housed externally to a 15 person shelter-in-place location to provide four hours of safe haven protection.
AirGEN Scrubbing & Oxygen
For Shelter-in-Place

Depending on the designated occupancy of the shelter-in-place location and its volume, CO2 scrubbing and supplementary oxygen may be required.

Humans consume oxygen and expire carbon dioxide (CO2) as part of normal respiration. In high enough concentrations, CO2 can cause serious injury, leading to a loss of consciousness and eventually death. Removal of CO2 is therefore a vital necessity for any shelter-in-place location, especially where CO2 concentrations exceed one percent over the entrapment duration.

The MineARC AirGEN is a standalone air regenerative system that ‘scrubs’ the air inside of an enclosed location, effectively cleaning it so occupants can rebreathe it. The AirGEN is simple to operate with only a single switch and is powered from its own internal battery supply.

In certain cases, it is necessary to also provide supplemental oxygen. MineARC offers either compressed oxygen cylinders or sodium chlorate (oxygen) candles. The delivery of compressed oxygen cylinders can be automated based on established low and high limits.

**AirGEN Scrubber**

The MineARC AirGEN is compact in size, stores for extended periods, and is easy to operate. The addition of a scrubbing system permits a shelter that is ventilated from the outside to be converted to a fully isolated environment, protected from external hazards.

- Simple single switch operation
- Easy fitment of chemical cartridges
- 18.75” [476mm] x 13.75” [349mm] x 22.6” [570mm]
- 90lbs [41kg]

**Oxygen Supply**

MineARC scrubbers operate in conjunction with breathing grade O2 cylinders. Scrubbers are generally supplied with a primary and backup oxygen regulator as well as Latex Gloves for handling. To safely and securely house the O2 cylinders, MineARC manufactures secured cylinder racks.

- Breathable oxygen cylinders 303ft³ (8,580L)
- Medical grade oxygen regulator with flow selection from 1-30 persons. Supplied with rubber gloves for regulator handling

MineARC’s oxygen candle is a compact source of oxygen that can be easily stored for long periods. The oxygen candle is approved for military use on submarines around the world, and provides 2,600L (92ft³) of pure oxygen upon ignition.

- Includes igniter, stainless steel stand, and Kevlar™ gloves.
Aura-RT series is reinventing digital gas monitoring for industrial sites. The Aura-RT and GuardIAN have been adapted into robust, weather-proof enclosures to allow for reliable gas monitoring and clear alarming even on the busiest sites. The independent Aura-RT, GuardIAN and speaker/strobe enclosures enable maximum flexibility where gas sensing is critical and where personnel can benefit most from displayed information and alarms.

The Aura-RT audible alarms use voice guidance to direct workers of the necessary actions they should take during an emergency. The GuardIAN interface and visual alarms can be custom-configured to assist workers in navigating to the nearest safe haven through displayed graphics or directional lighting to reduce hesitation and confusion in an emergency.

Aura-RT

The Aura-RT Remote has the ability to accurately monitor up to four gases at once via a series of user-friendly digital screens. The Aura-RT Remote provides real-time external gas monitoring data via the GuardIAN dashboard.

- NEMA 4X
- Multi-Gas Sensing: O₂, CO, NO, NO₂
- On-screen gas level monitoring
- On-screen alarm and pre-alarm status
- Alarm-indicating enclosure back-lighting

Speaker/Strobe

The speaker and strobe combination is driven by built-in Aura-RT alarm outputs to provide clear indications during alarm and pre-alarm states. During alarm, the speaker will use voice prompts to announce the alarm and give instruction to those affected. Voice commands can be customized to suit site requirements.

- Remote mounting for best line-of-sight and audible placement near workers
- Audible alarms – Pre-alarm tone and voice-command alarm prompts
- 360° alarm strobe

GuardIAN-Remote

The GuardIAN-Remote enables real-time monitoring that continuously displays gas and alarm status as reported by the Aura-RT. By utilizing the GuardIAN network, each GuardIAN-Remote display has access to information from all connected devices, including Aura-RT Remotes from different locations in the mine. The GuardIAN-Remote will provide confidence that the designated areas of interest are monitored and ready at all times.

- NEMA 4X
- 15” Rugged HMI with MineARC GuardIAN Interface
- 4-hour battery backup supporting Aura-RT Remote, HMI, and Speaker/Strobe
- Alarm-indicating enclosure back-lighting
- Information access to other monitoring locations on GuardIAN Network
MineARC Systems specializes in providing engineering, construction and commissioning of safe havens for existing and new facilities. Our commitment to technical excellence and innovative solutions, drives MineARC to provide the highest caliber “turnkey” execution available. We offer our customers a wide range of specialized services built around our core belief of providing proven safe haven for personnel during an emergency situation. We strive to meet each customer’s exact engineering, procurement and construction requirements and deliver a lump sum turnkey (LSTK) project with minimal impact to an operating facility’s day to day business.

All Aspects of Turnkey Project Execution are evaluated:

- Management
- Design
- Engineering
- Procurement
- Construction
- Testing
- Pre-Commissioning
- Commissioning
- Handover
MineARC foresees playing an active role in the petrochemical, refining & power generation industries, as a turnkey provider offering our comprehensive services. MineARC is contractor management certified with Browz, Avetta and ISNetworld, which connects qualified contractors, organizations and suppliers with expertise solutions.

Also Available: EnviroLAV 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 or electricity. The EnviroLAV requires emptying just once every 12 months, based on standard usage in optimal conditions.

For more information please visit www.minearc.com