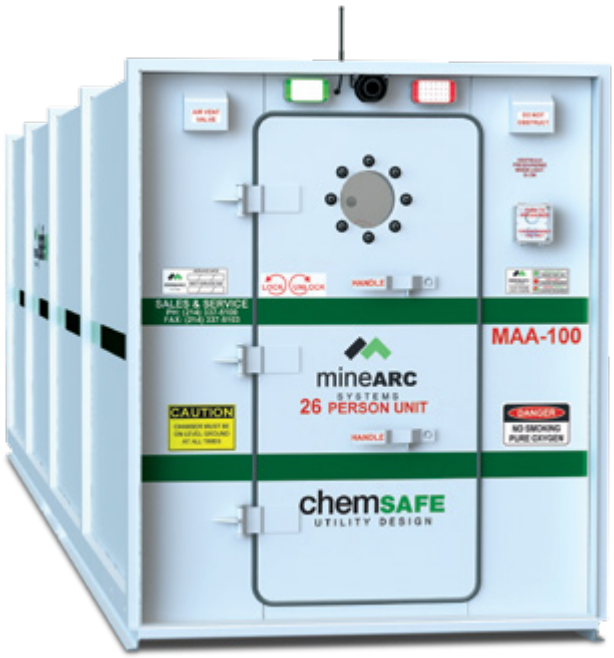
Chemical Safe Havens

The MineARC ChemSAFE Utility Design Range

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



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mineARC SYSTEMS

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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
- Leon, Mexico
- Barcelona, Spain

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

API 753 Management of Hazards Associated with Location or Process Plant Portable Buildings

2009 ASCE Design of Blast Resistant Buildings in Petrochemical Facilities

BakerRisk Blast Assessment Third Party 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

MineARC ChemSAFE Safe Havens

PS-UD5-26-ELV
ChemSAFE Utility Design
26 Person

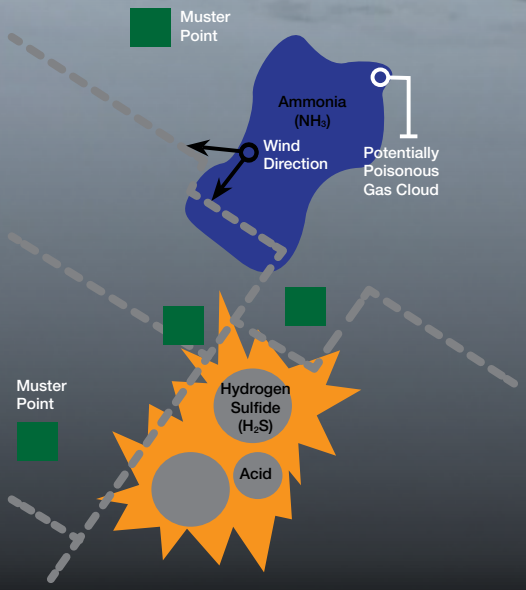
MineARC understands that emergency response requirements differ depending on a site's processing conditions, location of personnel, dangerous goods inventory and a host of other important factors.

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.

Example Facility Hazard Scenario



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**

Standard Configurations

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

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.

PS-UD5-26-ELV

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

Features

- ELV Scrubbing System with pre-packaged CO_2 chemicals
- Breathable air (O_2) 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

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)

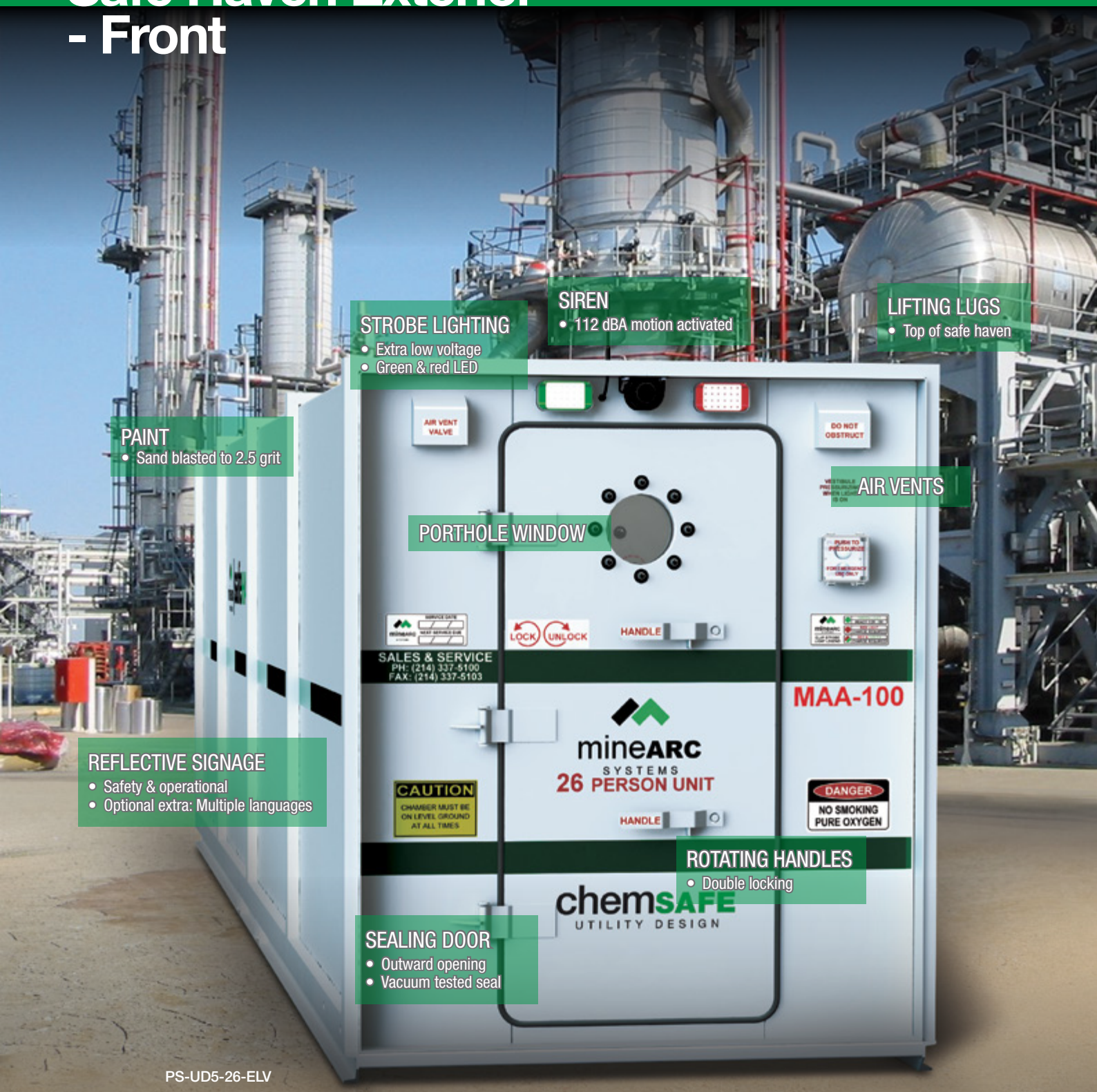
PS-UD6-30-ELV (30 Person)

Standard Dimensions

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

Custom dimensions and occupancies available. Safe haven dimensions are ultimately designed to client specifications.
Indicative weights only. Custom variations will impact final refuge chamber weight.

Safe Haven Exterior - Front



PS-UD5-26-ELV

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, straight forward access to the safety of the interior.

A feature of the ChemSAFE Utility Design range is a fully pressurised 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.

Safe Haven Interior

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 CO_2 absorption (referred to as a scrubbing system).

Model	8-Person	12-Person	16-Person	20-Person	26-Person	30-Person
12 hr	2	2	2	2	2	2

*Oxygen cylinders to be provided by end user.

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 minium 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: AODS

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 when the external fresh air supply has been compromised or is unavailable.

Also Available: ChemSAFE Standard Design (SD)

The **ChemSAFE SD** has been continuously re-engineered and 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. Featuring MineARC's Series IV Scrubbing System, the steel structure can be reinforced to withstand up to 12 psi overpressure blast.

For brochures and further information, visit minearc.com/chemsafe

Gas and Contaminant Scrubbing

CO_2 Scrubbing

The ChemSAFE Utility Design uses active chemicals and MineARC's patented scrubbing system to remove the build up of harmful CO_2 gas from inside the safe haven. The system continuously monitors and alerts occupants to internal and external levels of CO_2, O_2 and other gases within the air. Gas monitoring systems can be customized to on site standards.

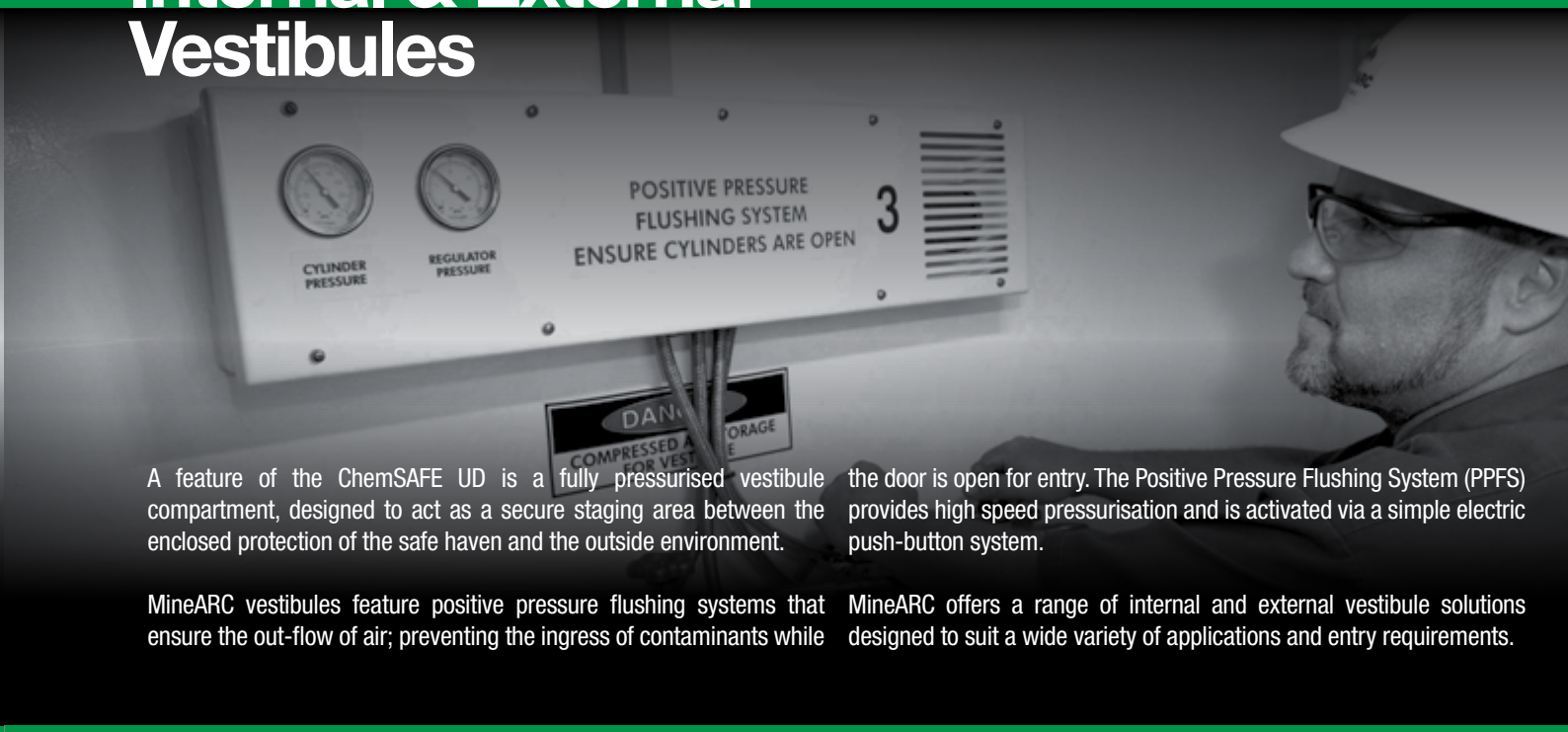
The safe haven's scrubbing system uses pre-packaged MARCISORB CO_2 absorber cartridges. MineARC's MARCISORB cartridges provide superior scrubbing capacity, are easy to load, safe to handle, and can store for long periods.

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.

Contaminant	Product
Ammonia, Amines	High-grade impregnated activated carbon for removal of airborne ammonia and amines
Radioactive Iodine	High-grade impregnated activated carbon for removal of radioactive methyl iodide
VOC	High-grade virgin activated carbon for organic vapor adsorption
Acid Gases	High-grade impregnated activated carbon for removal of acid gases
Mercury	High-grade impregnated activated carbon for removal of airborne mercury vapor
Aldehydes	High-grade impregnated activated carbon for removal of aldehydes
HCN, Cl_2, H_2S	High-grade impregnated activated carbon for removal of acid gases including arsine, phosphine and hydrogen cyanide
Multi-gas (VOC, Acid Gases, Ammonia, Aldehydes, Inorganic gases)	High-grade impregnated activated carbon for removal of a wide spectrum of airborne gases and vapors
CBRN contaminants	High-grade impregnated activated carbon for removal of a wide spectrum of CBRN contaminants
Military agents	High-grade impregnated activated carbon for removal of a wide spectrum of military agents

Internal & External Vestibules



A feature of the ChemSAFE UD is a fully pressurised vestibule compartment, designed to act as a secure staging area between the enclosed protection of the safe haven and the outside environment.

MineARC vestibules feature positive pressure flushing systems that ensure the out-flow of air; preventing the ingress of contaminants while the door is open for entry. The Positive Pressure Flushing System (PPFS) provides high speed pressurisation and is activated via a simple electric push-button system.

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

ChemSAFE Internal Vestibule

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.

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

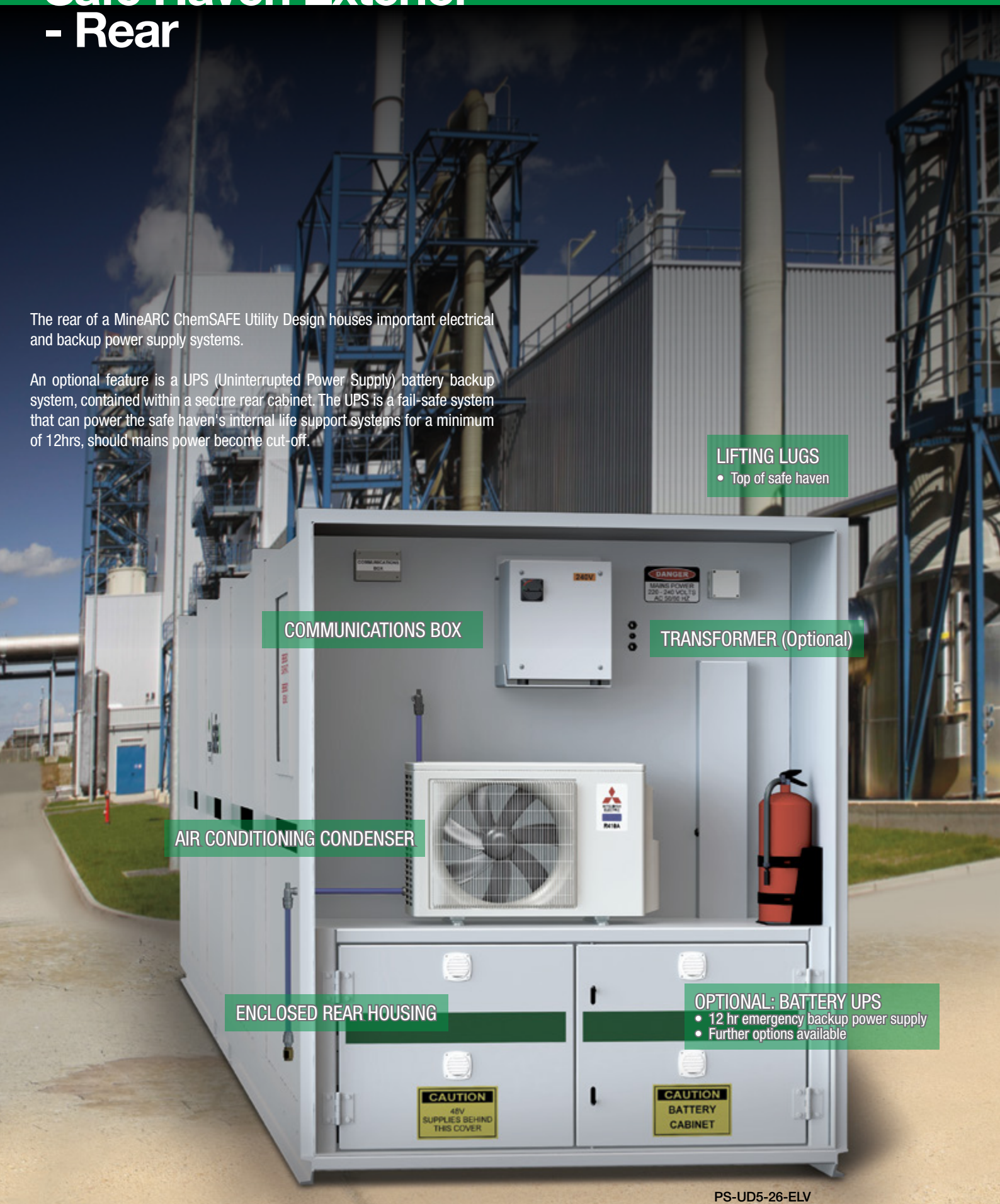
An optional feature of both the internal and external vestibule is a door activation locking system; enforcing that one door is locked shut at any one time during entry. This ensures no chance of accidental exposure to the external atmosphere whilst the main safe haven door is open.

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

Safe Haven Exterior - Rear

The rear of a MineARC ChemSAFE Utility Design houses important electrical and backup power supply systems.

An optional feature is a UPS (Uninterrupted Power Supply) battery backup system, contained within a secure rear cabinet. The UPS is a fail-safe system that can power the safe haven's internal life support systems for a minimum of 12hrs, should mains power become cut-off.



PS-UD5-26-ELV

Feature Summary

PS-UD5-26-ELV

4.75mm (3/16") Steel Plate Construction

Compact, Portable Design

Extra-Low-Voltage (ELV) Controller

Oxygen (O_2) Supply

CO_2 Scrubbing & Aura-FX Gas Monitoring

Air-Conditioning

0% ACH (External Air Change per Hour)

Standard Features

- 4.75mm (3/16") steel plate construction
- Compact, portable design
- Oxygen supply
- Carbon dioxide (CO_2) scrubbing
- Aura-FX Digital Fixed Gas Monitoring
- Pre-packaged chemical cartridges
- Extra-low-voltage control system
- Air conditioning and dehumidifying
- Viewing porthole
- Rear escape hatch with internal/external access
- Ergonomically designed seating
- Lifting lugs and forklift slots
- Non-slip flooring
- Chemical toilet
- External fire extinguisher (optional for non-Australian orders)
- Internal fire blanket

Optional Features

- Positive pressure vestibule (internal 2-person or external 6-person)
- Special dimensions and transport configurations
- First aid kit (standard on US models)
- Step-down transformer
- Remote video camera monitoring
- Battery backup UPS
- Automated Oxygen Delivery System
- Fixed Gas Monitoring
- Thermal insulation/extreme temperature package
- Stainless steel hardware throughout

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