

# Emergency Refuge Chambers



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Strata Safety Emergency Refuge Chambers are complete safety systems designed to provide immediate refuge and breathable air in the event that air quality in the working environment becomes compromised. They are intended to be an alternative option when escape is not possible.



## CONSTRUCTION

Strata Safety’s chambers are purpose-built to customer specifications. They are constructed to withstand harsh underground environments during emergency situations and remain completely airtight. The floor structure is built of 1/4 inch thick (6mm), non-slip floor plate with fully-welded walls along all sides. The entry door is standard 70 inch h x 30 inch w (178 cm x 76 cm) and is fitted with a 24 in x 16 in (61 cm x 41 cm) viewing window made from laminated impact and fire-resistant polycarbonate.



## AIRLOCK

All Strata chambers include an Airlock entry sectioned off by an interior wall and either a secondary steel door or a clear, heavy-duty curtain. This Airlock partition minimizes contaminants entering the chamber when the main access door is opened. There is also an optional purge air system that will completely flush air in the airlock prior to occupants’ entrance into the main chamber.



Person	8	12	16	20	24	30
Length (ft / m)	12 / 3.6	14.5 / 4.4	18 / 5.5	21 / 6.4	25.6 / 7.8	30 / 9.2
Width (ft / m)	7 / 2.2	7 / 2.2	7 / 2.2	7 / 2.2	7 / 2.2	7 / 2.2
Height (ft / m)	7 / 2.2	7 / 2.2	7 / 2.2	7 / 2.2	7 / 2.2	7 / 2.2
Approx. Weight (lbs/kg)	9,040 / 4,100	9,260 / 4,200	11,023 / 5,000	12,125 / 5,500	14,110 / 6,400	17,000 / 7711

Note: Dimensions and weights are based on a 48-hour unit with battery backup, a double door Airlock entry, and a STRATA 24-volt Cooling System.

## BREATHABLE AIR

### PRIMARY SOURCE OF BREATHABLE AIR

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*Mine air connection for an indefinite supply of air.*

Air from the mine's compressor air lines passes through a high-quality air filtration system and silencer to remove any oil, water, odor or organic compounds. The flow of air maintains positive pressure throughout the chamber, and a non-return valve controls the pressure.



## STRATA CARBON DIOXIDE SCRUBBERS

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Self-contained units that remove carbon dioxide from enclosed areas and replenish oxygen levels at controlled rates. The system utilizes compressed oxygen from cylinders and soda lime chemicals to produce full air changes. An Oxygen Flow Meter on the system manifold regulates the amount of oxygen released into the environment, keeping it at safe levels (19.5 – 22%). The Flow Meter is set according to the number of people in the chamber.

## SCRUBBER COMPONENTS:

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- Scrubber Body
- Isolating Switch
- Fans/Finger Guards/Batteries
- Oxygen Cylinder Manifold
- Filter Pads
- Strata Decals and Operating Instructions
- Maintains safe breathable air environment

## SYSTEM COMPONENTS:

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- Water Separator Element
- Coalescer Element (Oil Removal)
- Carbon Element (Odor/Taste Removal)
- Silencer, Muffler, Pre-Set Regulator
- BSP Galvanized Piping
- 2" Non-return Valve
- T-diversion in Airlock to provide purge air system (optional)
- Drying element to eliminate moisture (optional)

## CO DETECTION LINE

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An optional detection line can be incorporated with the filter system and includes a Solenoid to detect CO coming through the main air lines. If CO is detected, an audible alarm is activated and the air is re-routed to exit the chamber.

## SECONDARY SOURCE OF BREATHABLE AIR

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*On board back-up air supply for a minimum of 48 hours.*

All Strata chambers are equipped with compressed oxygen cylinders, soda lime chemicals and an active carbon dioxide scrubber. In the event mine air is lost or unavailable, the back-up air system is activated. Supplies are scalable up to 96 hours.

## CARBON MONOXIDE SCRUBBING

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Strata currently offers co scrubbing solutions for human Produced carbon monoxide using a co catalyst reactor Incorporated into the carbon dioxide scrubber.







## DC BACKUP POWER

Each chamber is equipped with a fully automatic 24-volt, battery backup system. This system consists of a bank of gel, fiber mat, and crush-proof batteries connected via a charging module. In stand-alone backup mode, the batteries will provide power to the air conditioner, the CO<sub>2</sub> scrubber, the lighting systems, any atmospheric monitoring equipment and any installed communication system. The standard duration of battery life supplied is 48 hours (scalable to customer preference).

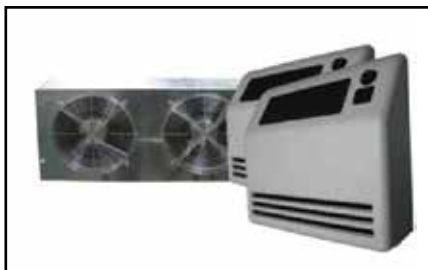
## TRANSFORMER

A step-down transformer included and operates off 220/110 VAC/ 60 Hz. We are able to customize our electrical system to meet any power requirements.



## APPARENT TEMPERATURE COOLING SYSTEM

A complete DC Split Level Air Conditioning System with de-humidifying control is available as an option.



may create a very hazardous environment. In this case, an air conditioning system is highly recommended.

*\*Note:*The amount of heat produced by human occupants, CO<sub>2</sub> scrubbing over a 48-hour period and other site-specific variables



## LIGHTING AND ALARM

Six clear 24-volt LED lights are mounted on the ceiling of the chamber. One red and one blue 24-volt LED light is mounted above the door on the outside

of the chamber for identification and location. These are wired into the Lighting Module Switch & Alarm Kit with manual override.



## SEATING AND STORAGE

Storage facilities are provided under the seats and overhead. The seats are constructed from high-grade materials to provide the most comfort and durability.

## PAINT

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The chamber exterior is painted safety yellow or white (according to customer preference) and the interior is a white finish. The external paint is a Mastic coating in compliance with high-wear resistance codes, and the interior coating is suitable for human occupation according to Occupational Health regulations.

## PRIVATE SANITATION

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A private lavatory area is standard in all chambers. It includes a portable chemical toilet with at least a five-gallon water reserve tank, concealed behind an opaque privacy curtain in the airlock compartment.



## FOOD/WATER

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Four quarts of drinking water is provided per person per day; individually packaged and stored under the seats. Food, in the form of emergency energy bars, is provided for all occupants. 2000 calories per person, per day.

## FIRE EXTINGUISHER(S)

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20-pound ABC dry chemical fire extinguishers are provided in all chambers. Mounted and secured inside the airlock compartment and/or placed beneath the seats.

## EMERGENCY SIDE ESCAPE HATCH

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To protect against possible rock falls barricading the main entrance of the chamber which could potentially trap occupants inside, a 34in x 24in (86cm x 61cm) inward-opening rear escape hatch with a polycarbonate viewing window is provided as a secondary escape route.



## FIRST AID

First aid kits containing supplies to suit the intended number of occupants is mounted on the wall of the main chamber.



## SAFETY AND DIRECTIONAL DECAL PACKAGE

Chambers are fitted with large reflective safety and identification decals, as well as signs on all four sides that include directional arrows indicating the entrance. A red and white reflective band encircles the entire chamber to assist in unit location amid deteriorating conditions.

## HANDLING

As a standard feature, each chamber is equipped with forklift guides, a skid base and lifting facilities for a crane. A crash bar is fitted around the structure to minimize damage during transportation. Special lifting guides and attachments can be supplied as required to lower the unit down a shaft.

## CUSTOMIZATION

The sizes of Strata chambers can be customized and equipped according to specific customer requirements.

A few examples of Strata's offerings:

- Tunneling (reduced width)
- Low profile (reduced height)
- Powerless (air-powered and MSHA approved components)
- Compact and mobile (small, lightweight and wheel packages)



## ATMOSPHERIC MONITORING

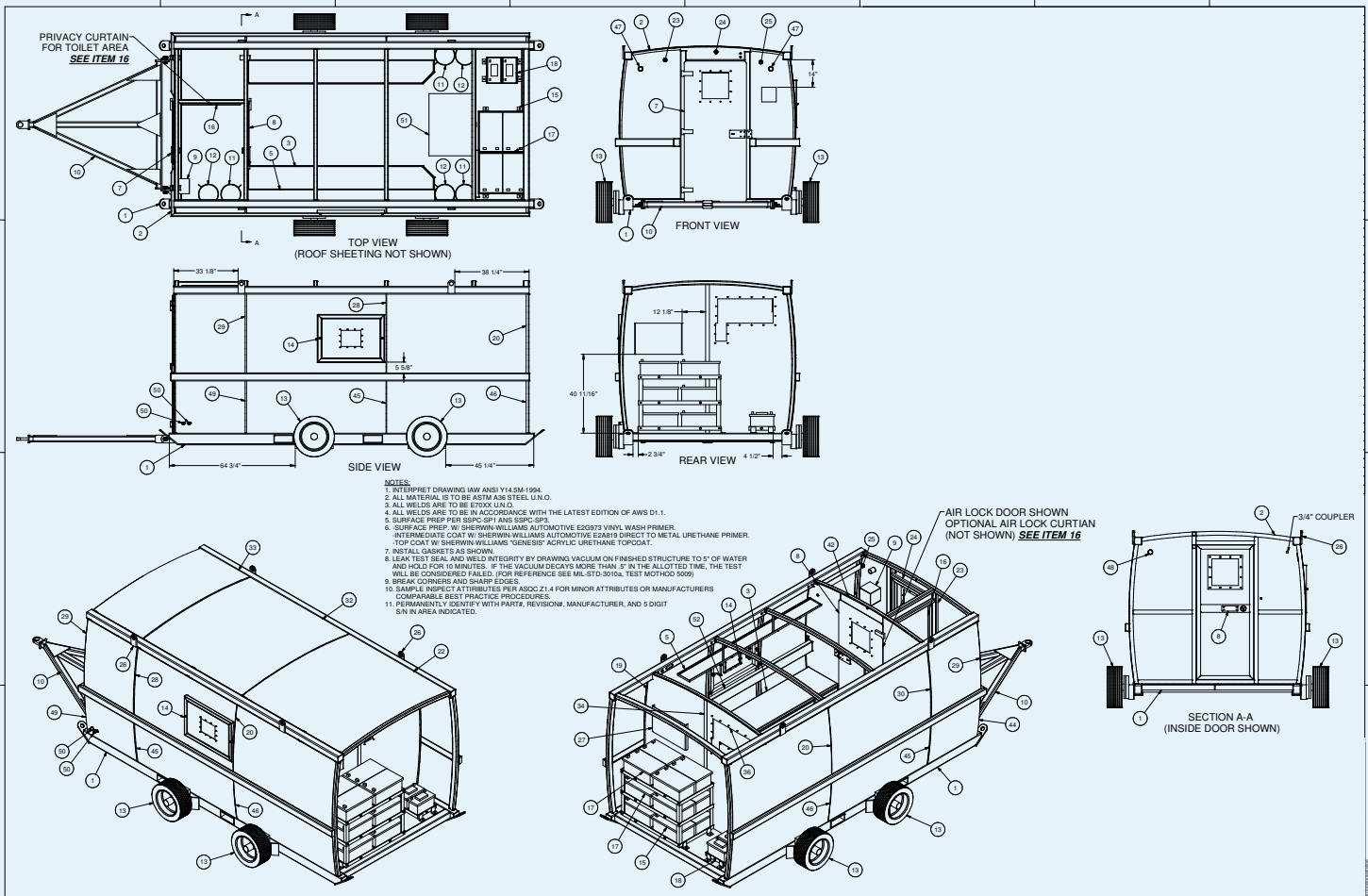
A Programmable Logic Controller (PLC) can be installed to continuously monitor the chamber's internal and external atmospheric conditions. The system monitors the levels of O<sub>2</sub>, CO, CO<sub>2</sub> and temperature; readings are displayed on a control panel mounted on the back wall of the chamber.

Live video feed enables surface personnel to monitor the occupants of the chamber in real time.





# TECHNICAL ELEVATION DRAWINGS



## WHEELS AND TOWING

A wheel and/or tow bar package can be added to facilitate easier mobility. Wheels are made of solid, highly resistant rubber (non-air filled).



# Emergency Refuge Chambers



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