

# Emergency Refuge Chambers

For Tunneling





## For Tunneling Applications

Strata 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 has been compromised. They are intended to be an alternative option when escape is not possible.

## Construction

Refuge chambers are purpose-built to withstand harsh environments and designed to isolate people from potentially toxic environments. Chambers for tunneling applications are engineered and constructed specific to each TBM or tunnel specifications. They are narrower and shorter than standard mining chambers and have optional curved walls to suit the diameter of the roadway bore.

## Breathable Air

### PRIMARY SOURCE

Chambers connected to operations main air-compressors have an indefinite supply of breathable air. This air passes through a purifying filtration system before it enters the chamber. Specialized relief valves maintain a safe internal pressure for the occupants.



### BACKUP SOURCE

An on-board backup air supply consisting of compressed oxygen cylinders and the Strata ActiveAir™ carbon dioxide scrubber supplies 12 – 96 hours of breathable air (Scalable to customer preference). Individual flow meters on each cylinder, control oxygen flow rates and soda lime packaged in spill-proof, dust-free cartridges scrubs CO<sub>2</sub>. Strata ActiveAir is equipped with two Strata/Troxel Sentro 1 gas detectors that continuously monitor O<sub>2</sub> and CO<sub>2</sub> levels inside the chamber. Alarms will sound when gas levels rise or fall beyond safe ranges.

A timer on the scrubber, set according to the number of occupants in the chamber, will sound an alarm when it is time to exchange the soda lime cartridges







## Electrical Power

### PRIMARY SOURCE

Chambers connected to the mains power source have an indefinite supply of power to operate the lights, air conditioner, atmospheric monitoring system and carbon dioxide scrubber. A step-down transformer can be customized to meet individual power requirements and power management systems regulate power supply to protect chamber circuits from extreme power fluctuations. All external systems have an IP67 rating.

### BACKUP SOURCE

A fully automatic 12/24-volt battery backup system is standard on all chambers. This system is a bank of gel, fiber mat, and crush-proof batteries independently wired with circuit breakers and connected via a charging module. In stand-alone backup mode, the batteries will provide power for 12 – 96 hours (scalable to customer preference).



## Lighting and Alarm

Clear 12/24-volt LED lights are mounted on the interior ceiling of the chamber. Colored 12/24-volt indicator LEDs are mounted on the outside to notify users of chamber location, occupation and power status. If mains power is lost and the chamber is running on back-up battery power, a red warning light will illuminate.

## Cooling System

Complete industrial grade Mitsubishi high efficiency air conditioners with dehumidifying control are available as needed. \*Note: The amount of heat produced by human occupants & CO<sub>2</sub> scrubbing over an extended period of time, along with other site-specific variables, may create a very hazardous environment. An air conditioning system is highly recommended.



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## Seating and Storage

Interior meets ITA space and volume standards. Padded seating for occupant comfort is constructed from high-grade materials and meet the ITA 500mm spacing standards.

Storage facilities are provided under the seats and optional overhead shelves.

## Food/Water

Six-year shelf life emergency food and water is supplied as required. Minimal quantities to meet government regulations (scalable to customer preference).

## Escape Hatch

A 69cm x 69cm (27.28in x 27.28in) inward-opening escape hatch is provided as a secondary escape route.

## Atmospheric Monitoring & Remote Connectivity (Optional)

Atmospheric Monitoring:  
Gas detection sensors of choice, LED display, AV alarms, control relays, datacomms and direct programming.

- Up to eight channels:
- Harmful gases of choice
  - Temperature
  - Humidity
  - Air flow
  - Pressure
  - Battery voltage
  - Mine power



- Remote Connectivity:
- Wi-Fi access for voice and data streaming
  - Cameras for video

