

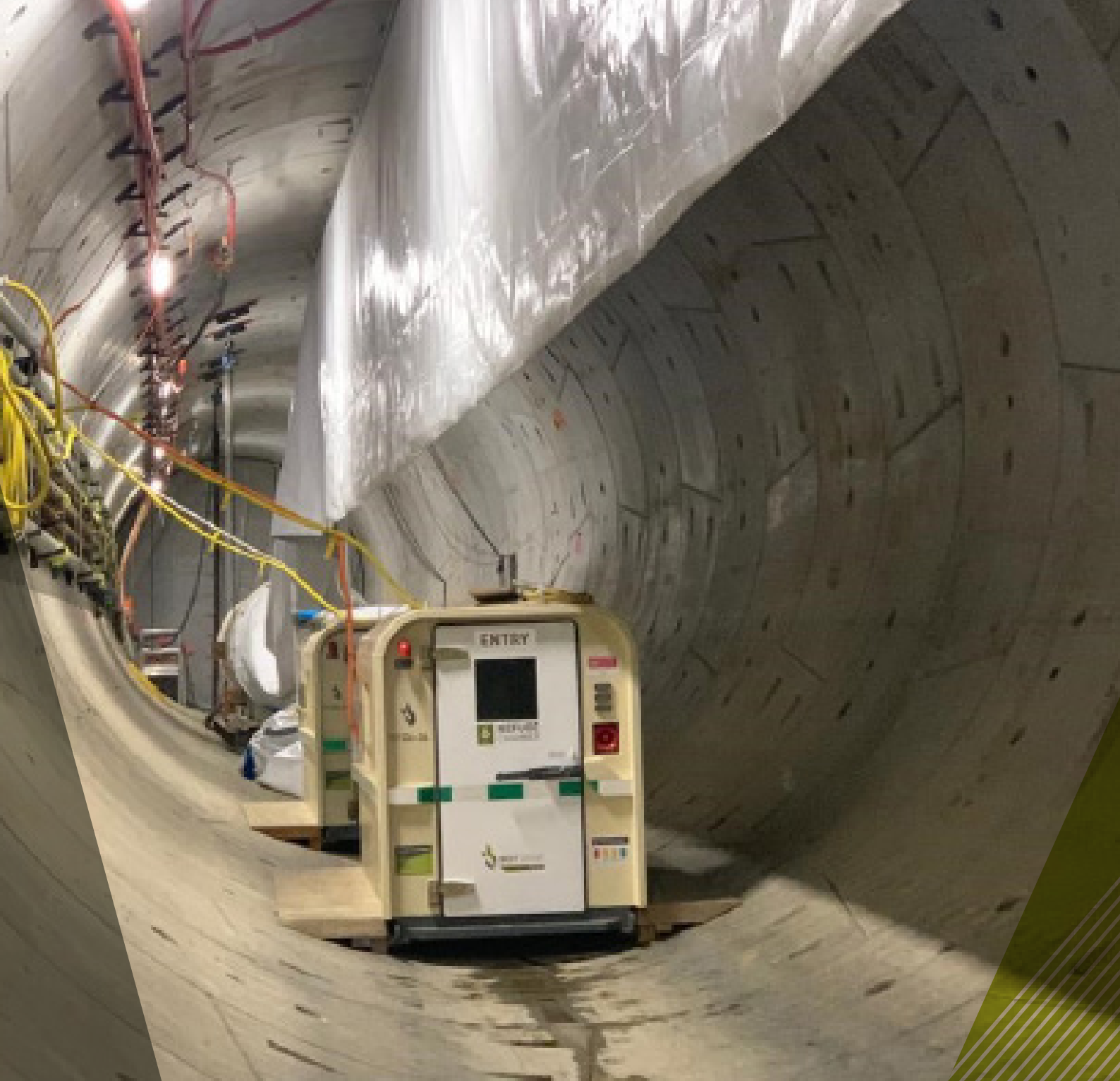


UNDERGROUND REFUGE CHAMBERS



BOST GROUP

Mining





BOST REFUGE CHAMBERS

BUILT BY MINERS, FOR MINERS

Bost Group is one of the leading manufacturers of Equipment for the Underground Mining Operations across the Globe. Our extensive experience in Underground Mining , spanning decades, has allow us to introduce the best technology and practices into our range of Safe Refuge Chambers. We are continually researching and developing our range to meet the requirements of todays International Mining Market. Bost Group is dedicated to Mine Safety and Emergency Management with the employees and operators involved in underground mining at the forefront of our manufacturing and design considerations.

Bost Group supply 2 types or Underground Refuge Chambers which are being used successfully in many Mining applications over the world:

4 - 6 PERSON CAPACITY

PORTABLE REFUGE CHAMBERS

The Bost Portable Refuge Chambers have been specially designed to be used in confined working areas such as development headings yet to be robust & highly portable enough to be moved around the working areas of the mine quickly and efficiently, without the need for permanent external electrical connections.

8 - 30 PERSON CAPACITY

STATIONARY REFUGE CHAMBERS

The Stationary Chambers design has been drawn from 120+ years of underground mining experience, which is unparalleled in the industry today. The Stationary Refuge Chambers are fully compliant with the 2009 Western Australian Guidelines for Refuge Chambers in Metalliferous Mines and have a number of unique features that make them ideally suited to the hard rock mining industry.

BOST GROUP IS A CERTIFIED COMPANY TO THE FOLLOWING ISO STANDARDS:



Occupational Health & Safety Management Systems

International benchmark to assess Occupational Health & Safety Management Systems for organisations.



Quality Management Systems

Ensures our products meet a certain level of quality; reliable, safe, consistent, meet customer expectations, continuously improve and comply with the law.



Environmental Management Systems

Development of policies committed to environmental responsibility; resource, sustainability, pollution prevention, climate change mitigation & minimisation of environmental impact.



Health & Safety Management Systems

An international standard to enable control of health & safety risks, while promoting employee well being and a safe working environment.



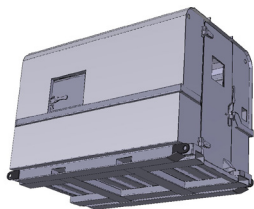
TRANSPORTABLE

The BOST GROUP Refuge Chamber is designed as a highly portable system, easily relocated to active work areas.

Fitted, as standard:

- Robust skid base section
- Towing points (front and rear)
- Fork lift slots (side for larger chambers, front & sides for smaller chambers)
- Lifting eyes on all four corners.

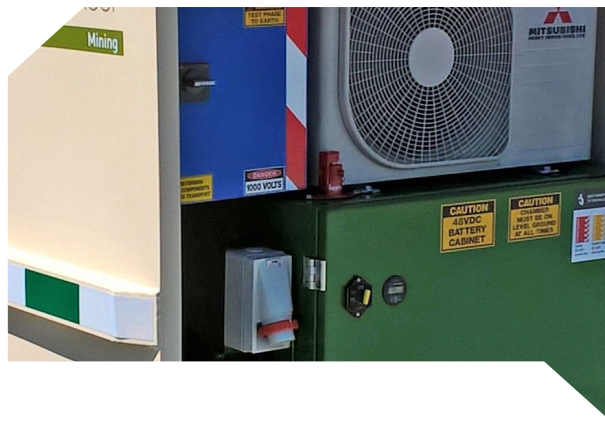
STRUCTURE



The BOST GROUP Refuge Chamber structure is a purpose designed & manufactured steel shell structure, which prohibits the flow of air into the Refuge Chamber once the entry door is sealed.

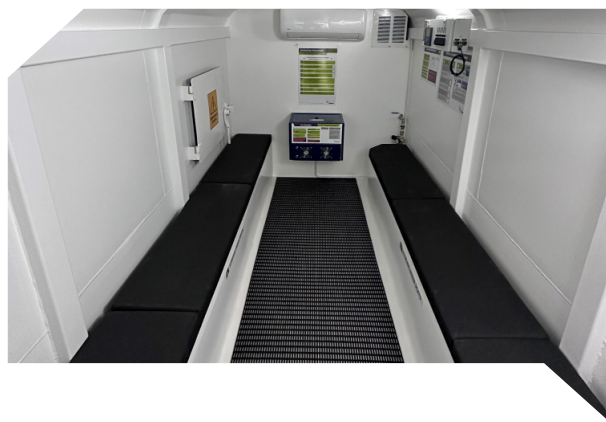
- Check valves at the front of the chamber allow for equalisation of pressure of the chamber from possible higher internal pressure to external pressure, while maintaining a positive internal pressure.
- The steel structures roof and walls are constructed from fully seam welded 6mm steel plate, and the 6mm steel floor plate includes square tubing reinforcement.
- The specially designed Skid Base is manufactured from High Quality Hi-tensile H.D Steel to enable the option of the Chambers to be towed safely and successfully to the allocated position within the Mine.

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POWER

- The BOST GROUP Refuge Chamber, in standby mode, is connected to mains (Mine) power.
- The Refuge Chamber inverter/charger runs on 230 volts AC, 50 Hz, via 3 rounded pin NHP Inlet (Lockable - 250VAC 20Amp).
- The Refuge Chamber can be fitted with an optional 1000VAC Step-Down transformer and Macey disconnect for converting from mine power of 1000VAC to the Chambers power supply of 230VAC.



CAPACITY

The Refuge Chamber has seating for the specified persons identified on the side wall and the Entry Door.

The safe refuge duration is the time that critical life support systems will continue to operate after the mine compressed air and/or mains power supply fails.

- Portable Chambers are available to seat 4 - 6 persons.
- Stationary Chamber range can seat 8 - 30 persons.





BATTERY BACK UP

The Refuge Chamber uses a Battery Backup power source to power the Refuge Chambers electrical systems in the event of a loss of Mains Power. The bi-directional inverter incorporates a float charger which is used to maintain the Battery Backup system at all times so it can supply to the Refuge Chamber in case the "Mains Power" fails or is disrupted.

➤ The Battery Backup consists of deep cycle gel batteries that are maintenance free.

➤ The BOSTGROUP Mining Battery is 12V 170AH designed for critical application where frequent deep discharges are required and minimal maintenance.

➤ The Refuge Chamber incorporates a 48VDC inverter/charger that automatically initiates in the event of loss of Mains Power.

➤ The inverter is connected to twelve x 12VDC batteries in series/parallel connection, with the battery box protected by a 60A MCRB.

➤ The battery box has a double pole, lockable battery isolator to totally isolate the DC power source.

➤ On the front external wall of the chamber are the 3 LED indicators. These indicate battery power available and recharge warning signals.



PROCEDURES

Wall mounted procedures and instructions:

- Operating Procedure
- Air Conditioning Unit
- Refuge Chamber Control Panel
- CO2 Scrubber
- Oxygen Flow Regulator Installation & Operation

Plus hard copy of full operators manual.



ELECTRICAL SYSTEM

➤ All wiring complies with AS 3000-2007. AS/NZ STANDARD

➤ The Refuge Chamber is powered by 220-240V AC, 50Hz or is fitted with an optional transformer to convert incoming power to the required 220-240V AC controller's power.

➤ An RCD is installed to protect equipment.

➤ All incoming power is earthed (grounded) to the Refuge Chambers steel structure.

➤ Mains power supplies the air conditioner and other auxiliary equipment and charges the battery bank through the bi-directional inverter. In the event of a power failure, the inverter supplies high quality Sine wave power to all 230VAC equipment without interruption.

➤ Fully charged Battery Backup provides enough power to operate all equipment for the Refuge Chambers rated safe entrapment duration as specified in the scope of supply.

➤ All lighting operates on 12 volts DC LED lighting. External Red, Amber and Green strobes located to the side of the Refuge Chamber entry door.



AUXILIARY 12VDC CONNECTION

➤ The radio (not supplied by BOST GROUP) and a permanent gas monitor, require 12VDC to operate. On the side of the Refuge Chamber Control Panel, are 2 x 12VDC DT04-2P-L012 socket's. These socket points are to be used for the 12VDC device.



MINE COMPRESSED AIR

➤ BOSTGROUP Refuge Chambers are fitted with a MINSUP socket to enable connection to an external mine compressed air supply.

➤ The compressed mine air feeds into the chamber via an air filter kit located in the front internal section (for the portable chambers) & at the rear (for the static chambers) of the Refuge Chamber.

➤ The incoming air is purified using a flood protection water filter, pre-filter, absorbent filter & coalescing filter, fitted with auto drain for condensate removal. The filter kit includes a check valve to stop the siphoning of air from the chamber should the mine air supply fail for any reason.

➤ Mine compressors used to supply air to the Refuge Chamber should be located on the surface and be oil free to prevent the introduction of carbon monoxide.

➤ The mine air supply can be turned ON/OFF from inside the chamber using the compressed air ball valve.

➤ The mine air is vented from the Chamber through 2inch (51mm) check valves fitted into the front wall of the Chamber above/alongside the Chamber door.

CHEMICAL TOILET

➤ Each chemical toilet has a capacity for 15 litres and is supplied complete with toilet deodoriser.



CO² SCRUBBER UNIT

➤ The CO² Scrubber is a self-contained unit situated in the Refuge Chamber survival space.

➤ The scrubber unit is controlled by the BOST GROUP Mining Refuge Chamber Control System and is designed to provide fast emergency operation of the carbon dioxide (CO²) Scrubber.

➤ The scrubber is designed to clean air in confined spaces where human life needs to be supported over a period of time. The purpose is to remove the CO² from the Refuge Chamber preventing Carbon Dioxide poisoning.

➤ The scrubber unit is used in conjunction with Medical Oxygen cylinders and medical grade flow regulator.

GAS MONITORING SYSTEM

Optional gas monitoring available on request.
3 monitor types:

- Multi Gas Detectors – 6VDC hard wired
- Single Gas Detectors – Battery
- Gas Tubes – User operated for self-evaluation/ checking of gas.

FIRE EXTINGUISHER

➤ The fire extinguisher is either stored under the seats, or on the internal front wall of the chamber. The 2 x portable chambers (4 person & 6 person), have a single 4.5Kg ABE extinguisher, and the larger, static chambers, have a 9Kg ABE extinguisher.

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COMPRESSED OXYGEN CYLINDERS

➤ BOST GROUP Mining Refuge Chambers require medical oxygen cylinders each with a minimum capacity of 8,071L – G3 Cylinder.

➤ The number of cylinders required is based on the Refuge Chambers rated occupancy and minimum safe entrapment duration.

➤ The oxygen breathing rate is based on UK Statutory Limits which specifies 0.5ltrs per minute of oxygen per person.

➤ The number of cylinders required for different emergency-safe refuge durations is listed in the following table:

OXYGEN FOR SCRUBBER	OXYGEN FOR 3RD SOURCE (OPTIONAL)
1 x BOTTLE = 1 x G3 OXYGEN CYLINDER	
4 PERSON = 1 BOTTLE	4 PERSON = 1 BOTTLE (66 HOURS STANDBY)
6 PERSON = 1 BOTTLE	6 PERSON = 1 BOTTLE (44 HOURS STANDBY)
8 PERSON = 2 BOTTLES	8 PERSON = 1 BOTTLE (33 HOURS STANDBY)
12 PERSON = 2 BOTTLES	12 PERSON = 1 BOTTLE (22 HOURS STANDBY)
16 PERSON = 3 BOTTLES	16 PERSON = 1 BOTTLE (16 HOURS STANDBY)
20 PERSON = 4 BOTTLES	20 PERSON = 1 BOTTLE (13 HOURS STANDBY)
30 PERSON = 5 BOTTLES	30 PERSON = 2 BOTTLES (18 HOURS STANDBY)



AIR CONDITIONING SYSTEM

The BOSTGROUP Mining Refuge Chamber incorporates a split system air conditioning unit to combat the potentially fatal effects of heat build-up.

- R410A Refrigerant Gas.
- Kaden 2.6 kwh



STORAGE

The BOSTGROUP Refuge Chamber has under bench seat storage.

Under seat storage includes:

- Soda lime, tub quantities are related to number of specified occupants
- Water, quantity per number of occupants
- Fire Extinguisher
- First Aid Kit
- Fire Blanket
- Stretcher
- Playing cards

STANDARD FEATURES	PORTABLE	STATIONARY
External		
SLIM DESIGN FOR EASE OF LOCATION	•	•
36 HOUR STAND ALONE RUN TIME	•	•
48V BATTERY SYSTEM	•	•
BATTERY BOX ISOLATOR - 2 POLE - LOCKABLE	•	•
VICTRON BATTERY BANK MONITORING	•	•
4 STAGE AIR FILTRATION SYSTEM - FLOOD PROTECTION WATER TAP	•	•
1000VAC BOX - STEP DOWN TO 240VAC	•	•
240VAC CONNECTION POINT - LOCKABLE COVER	•	•
AIR CONDITIONER ISOLATION SWITCH	•	•
RED LED INDICATION FOR LOW BATTERY VOLTAGE & AC POWER LOSS (In Stationary Refuge Chamber only)	•	•
GREEN LED FOR VISIBILITY & LOCATION	•	•
AMBER LED INDICATION FOR CHAMBER OCCUPANCY	•	•
ESCAPE HATCH WITH EXTERNAL HANDLES	•	•
SIREN	•	•
6MM STEEL PLATE CONSTRUCTION	•	•
FULL SEAM WELDING	•	•
ROBUST SKID BASE	•	•
FRONT & SIDE FORKLIFT GUIDES in 4 person Refuge Chamber	•	
SIDE FORKLIFT GUIDES	•	•
REFLECTIVE SIGNAGE - OPERATIONAL & SAFETY	•	•
LIFTING LUGS	•	•
HEAVY DUTY, OUTWARD OPENING, SEALING MAIN DOOR	•	•
VIEWING WINDOW	•	•
FIXED HOUSING & PROTECTION FOR EXTERNAL COMPONENTS	•	•

STANDARD FEATURES	PORTABLE	STATIONARY
Internal		
SPLIT SYSTEM AIR CONDITIONER INCLUDING DE-HUMIDIFIER	•	•
CARBON DIOXIDE SCRUBBER	•	•
MEDICAL GRADE OXYGEN FLOW REGULATOR	•	•
GAS DETECTION SYSTEM TO MONITOR CO, CO2 & O2	•	•
INVERTER CHARGER WITH AUTOMATIC SWITCH OVER TO UPS SYSTEM	•	•
EASY TO OPERATOR SWITCH PANEL	•	•
12VDC CONNECTION POINTS - 2 POINTS GAS & RADIO - 2 PIN DEUTSCH CONNECTOR	•	•
COLOUR SYSTEM MONITOR SCREEN	•	•
OBSERVATIONAL PORTHOLE WINDOW	•	•
INTERNAL LED LIGHTING	•	•
CUSHIONED SEATING	•	•
UNDER SEAT STORAGE	•	•
FIRE EXTINGUISHER	•	•
FIRST AID KIT	•	•
EYE WASH	•	•
STRETCHER	•	•
WATER	•	•
PLAYING CARDS	•	•
PORTABLE TOILET & CHEMICAL	•	•
NON SLIP FLOORING	•	•
OPENING HATCH	•	•
FIRE BLANKET	•	•
MEETS ALL APPLICABLE AUSTRALIAN STANDARDS	•	•
DESIGNED TO WA REFUGE CHAMBER GUIDELINES	•	•

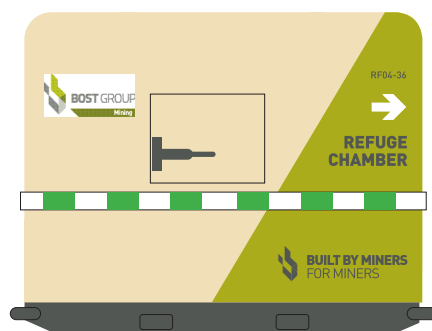


DIMENSIONS

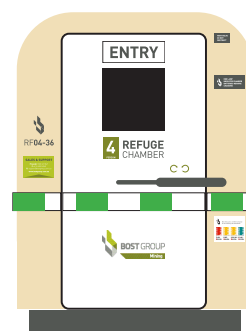
PORTABLE & STATIONARY

DIMENSIONS (PORTABLE MODELS)	HEIGHT (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT (KG)	MINIMUM SAFE ENTRAPMENT (HRS)
4 PERSON (LIGHT WEIGHT)	2200	1500	2615	2,500 (STOCKED)	36
4 PERSON	2200	1500	2615	3,500 (STOCKED)	
6 PERSON	2200	1500	3220	4,000 (STOCKED)	

DIMENSIONS (STATIONARY MODELS)	HEIGHT (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT (KG)	MINIMUM SAFE ENTRAPMENT (HRS)
8 PERSON	2200	2040	4130	5,000 (STOCKED)	36
12 PERSON	2200	2040	5280	6,700 (STOCKED)	
16 PERSON	2200	2040	6000	7,500 (STOCKED)	
20 PERSON	2200	2040	6930	8,000 (STOCKED)	
30 PERSON	2200	2040	9230	9,000 (STOCKED)	



SIDE VIEW



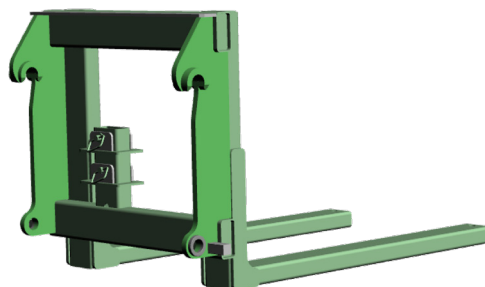
FRONT VIEW

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OPTIONAL CHAMBER INCLUSIONS

OPTIONAL FEATURES	PORTABLE	STATIONARY
EXTENDED BATTERY BACK UP DURATION	•	•
EXTERNAL GAS MONITORING	•	•
1000V STEP DOWN TRANSFORMER	•	•
DIGITAL GAS MONITOR	•	•
60 AMP MACEY OUTLET	•	•
REMOTE ACCESS MONITORING	•	•
REMOTE ACCESS MONITORING CAMERA	•	•
CUSTOM MODIFICATIONS	•	•
IT LIFTING HITCH	•	



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