

Portal-Pack[®]

part no.
496040
or
496050

self-contained self rescuer,
60 minute breathing apparatus*

instruction manual
MSHA and NIOSH Approval No. TC-13F-283

WARNING

This manual must be carefully read by all persons who have or will have the responsibility for using or servicing the product. The 60 Minute Portal-Pack[®] Self Rescuer will perform as designed only if it is used and serviced according to the instructions. Otherwise, it could fail to perform as designed, and persons who rely on this product could sustain severe personal injury or death.

The warranties made by Mine Safety Appliances Company with respect to this product are voided if the equipment is not used and serviced in accordance with the instructions in this manual. Please protect yourself by following them. We encourage our customers to write or call MSA for a demonstration of this equipment prior to use or for any additional information relative to use or repairs. Note: See other warnings inside.

Call 1-800-MSA-2222 during regular working hours, or 1-800-MSA-5555 after working hours or during emergencies.

*Approved by MSHA-NIOSH as 60 minute apparatus unit. For more specific details regarding gas life, carefully read the General Information section.

Manufactured by

MSA

MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A. 15230

TAL 797 (L) REV. 9

496295

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PERMISSIBLE ONE-HOUR SELF-CONTAINED
OXYGEN-GENERATING BREATHING
APPARATUS (FOR ESCAPE ONLY)
MINE SAFETY AND HEALTH ADMINISTRATION
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
APPROVAL NO. TC-13F-283



ISSUED TO
MINE SAFETY APPLIANCES COMPANY
Pittsburgh, Pennsylvania, U.S.A.



LIMITATIONS

Approved for respiratory protection during escape only from oxygen deficient atmospheres, gases and vapors at temperatures above -25°F.

CAUTION

Use with adequate skin protection when worn in gases and vapors that poison by skin absorption (for example, hydrocyanic acid gas).

This apparatus shall be discarded after use.

This respirator shall be selected, fitted, used and maintained in accordance with Mine Safety and Health Administration, Occupational Safety and Health Administration, and other applicable regulations.

MSHA-NIOSH Approval TC-13F-283
Issued to Mine Safety Appliances Company — May 15, 1992

The approved assemblies consist of the following MSA part numbers:
496040 self-contained self rescuer; 496050 self-contained self rescuer
in pouch, if carried.

WARNING

- FOR USE ONLY BY THOSE INSTRUCTED FOR TRAINED IN USE OF DEVICE.
- ALL WARRANTIES, EXPRESSED OR IMPLIED, ARE VOID IF THE PROTECTIVE CARRIER KITS ARE NOT USED WHEN WEARING OR CARRYING THE PORTAL-PACK.
- DO NOT OPEN CASE until ready to use. Water vapor, which is present in normal air, will deteriorate the oxygen generating chemical. The case and seals protect the chemical in the canister from water vapor. Opening the case or damage to the case or seals offers the possibility of water vapor leakage, which will reduce or destroy the effectiveness of the unit.
- VISUALLY INSPECT DAILY for damage to the case, if carried. Check to see that the indicators are blue. Do not use if either indicator shows any change to pink.
- USE APPARATUS ONLY ONCE. If the apparatus is used (whatever the period of time) restart performance of a canister is unpredictable. Once the case seals are broken, the unit must be considered expended. See page 7 for disposal recommendations.
- MAINTAIN TIGHT MOUTHBIT AND NOSECLIP SEAL when unit is in use. Leakage of exhaled breath will allow the bag to deflate. When the bag goes flat, no gas is available from the apparatus for inhalation. On inhalation, a tight seal is necessary to eliminate the possibility of inhaling toxic gases.
- AVOID DAMAGING BAG. Although the bag is puncture-resistant, it is desirable to protect it against sharp objects and pressures that would tend to deflate it. Guard breathing tube from puncturing or kinking.
- DO NOT ALLOW ANY COMBUSTIBLE OR FOREIGN SUBSTANCES (gasoline, grease, etc.) to enter the canister or apparatus before use, after use, and when disposing of the apparatus. Combustibles coming in contact with potassium superoxide, which is an oxidizing material, produce a chemical reaction, which may rupture the canister.
- PROTECT EYES, SKIN, clothing and lungs when disposing of apparatus because the solution is caustic. Work in well ventilated area.
- USE ONLY FOR ESCAPE from oxygen deficient atmospheres, at ambient temperatures above -25 degrees F.
- REMOVE MOUTHPIECE AND PINCH-OFF BREATHING TUBE TO VOMIT if sickness occurs. Extreme care must be taken to avoid blockage of flow passages by vomitus. Replace mouthpiece as soon as possible - do not inhale ambient air, which may contain toxic gases.
- STORAGE TEMPERATURE. Do not store at temperature below -25 degrees F or above 100 degrees F. Short term (less than 24 hours) must be limited to temperatures between -40 degrees F and +130 degrees F.
- DO NOT REMOVE THE MOUTHPIECE if you must cough during start-up. A small amount of harmless smoke may come out of the mouthpiece when the candle fires. Keep the mouthpiece in your mouth, don the unit, and escape.

FAILURE TO FOLLOW THE ABOVE WARNINGS MAY RESULT IN SEVERE PERSONAL INJURY OR DEATH.

Portal-Pack Self-Contained Self Rescuer Instruction Manual

INTRODUCTION

This manual provides information for the operation, maintenance, and user training necessary for proper use of the MSA Portal-Pack Self-Contained Self Rescuer. Because the conditions during an emergency are so unpredictable, thorough training and an understanding of unit operation will help the user to properly and quickly don the apparatus.

GENERAL INFORMATION

The Portal-Pack Self-Contained Self Rescuer is a single-use, self-contained closed-circuit breathing apparatus. Its operation is completely independent of the surrounding atmosphere. Once properly donned, the Portal-Pack Self-Contained Self Rescuer will assist a person to escape from an area containing smoke, toxic gases or an oxygen deficient atmosphere. The gas (operating) life during escape is dependent on the demands of the user. This apparatus is approved by NIOSH/MSHA as a one-hour unit, based on the fact that the equipment, when tested on average sized men performing moderate to heavy work, lasted 60 minutes or more. When the user is sitting, resting and relaxed, the life support will continue for 4 to 5 hours. Under certain conditions, such as extremely heavy work loads, the unit may last less than 60 minutes.

The gas life of this unit is dependent on the demands of the user. Factors influencing demand are:

1. The degree of physical activity - how hard the user must work.
2. The physical condition of the user.
3. The user's breathing rate, which can be considerably increased by excitement, fear or other emotional factors.
4. The degree of training or experience with this or similar equipment.
5. The condition of the apparatus.

The training and experience with the unit must be emphasized. The more experience one has with the equipment, the more confidence they will have in its effectiveness. As a result, the user will be more relaxed and the demands on the apparatus will be less. (A training Model of the Portal-Pack is available. See page 6 of this manual for part number information.)

THE UNIT SHOULD BE HANDLED AS IF YOUR LIFE DEPENDED ON IT. IT COULD!

The stainless steel construction of the unit has shock support outside on the external case. It is not indestructible, however, and mistreatment could cause moisture to leak through the case seal. Moisture will shorten the gas life, and excessive leakage may make the unit inoperative. All warranties, expressed or implied, are void if the protective carrier kits are not used when wearing or carrying the Portal-Pack.

TECHNICAL INFORMATION

Size: Height8 inches
Width7 inches
Depth4 inches

Weight: In case5.4 lbs.
as used4.6 lbs.

Bag Volume:15 liters

Gas Life: 1 Hour or more under approval test conditions.
4 Hours or more with user at rest.

Low Limit Operating Temperature:-25°

Operating Characteristics:

Inhalation Temperature: Less than 115°F in a 75°F ambient
CO₂ ConcentrationLess than 1.5%
O₂ ConcentrationGreater than 21%

Resistance to Inhalation: 1.9 inches H₂O maximum when measured at a breathing rate of 40 liters/min.

Field Life: 10 years-Max In Service Life: 8 years in service

PRINCIPLES OF OPERATION

The 60 Minute Portal-Pack Self-Contained Self Rescuer.

1. When pulling the mouth bit away from its stored position, a cord activates an oxygen generating chemical (chlorate candle). The candle produces approximately 10 liters of oxygen over a 2 to 3 minute period. This is sufficient time to fill the system gradually with a supply of uncontaminated gas. Although the bag does not fill instantaneously, the gas supplied allows time for the primary chemical in the canister to become activated.

- As the user breathes on the apparatus, he exhales CO₂ (carbon dioxide) and water vapor. The CO₂ and water vapor react with the KO₂ BED in the canister to produce oxygen and simultaneously remove CO₂ from the breathable gas. The chemical reaction is demand sensitive - the harder the user breathes, the more CO₂ and water vapor are produced and thus, the more oxygen is generated. As the breathing slows or becomes more shallow, the opposite effect occurs.
- Although unlikely, if the candle does not activate and fill the breathing bag with oxygen, it is possible to start the unit by simply breathing into the mouthpiece. This does require that the user remove the nose clip, breath in ambient air and discharge that air into the mouthpiece. Six (6) breaths will activate the primary chemical. The procedure for verifying failure of the candle to function, and discussion of the manual starting method is detailed in the candle failure starting procedure of the operating instructions (page 5).

DESCRIPTION OF APPARATUS

The apparatus consists of the following major components. (see Figure 1).

- Two canister covers constructed of stainless steel.
- Rubber gaskets between the two canister covers are secured by a latch.
- A rubber jacket to protect the canister and act as an insulator when in use.
- A canister containing the chlorate candle and the primary KO₂ (potassium superoxide) bed.
- A breathing bag that forms an oxygen reservoir.
- A breathing tube assembly with a mouthpiece, nose clips, mouthpiece plug, voicemitter and heat exchanger.
- A breathing bag vent valve to automatically prevent buildup of any excess system pressure.
- Goggles to protect the eyes from smoke.
- Pouch and plastic protective end covers to carry and protect the apparatus (if worn or carried).
- A shoulder or neck strap and waist strap.
- Moisture indicators to indicate fitness for use.

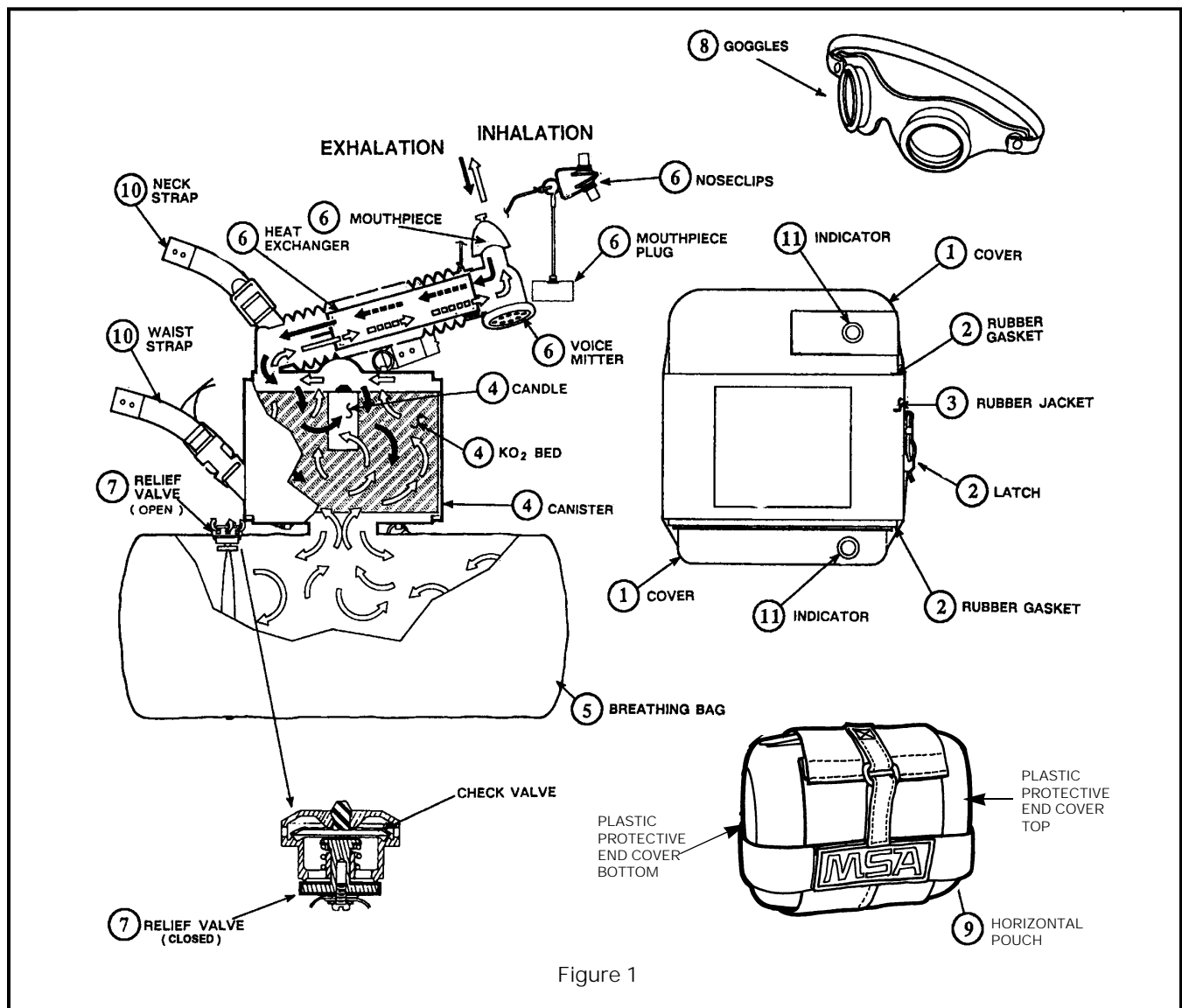
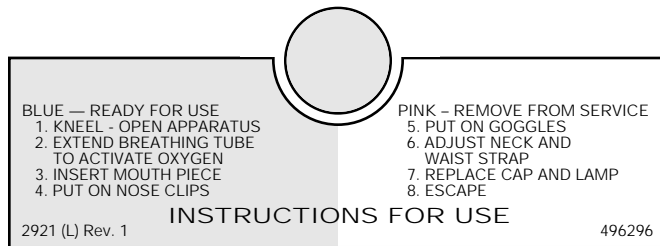


Figure 1

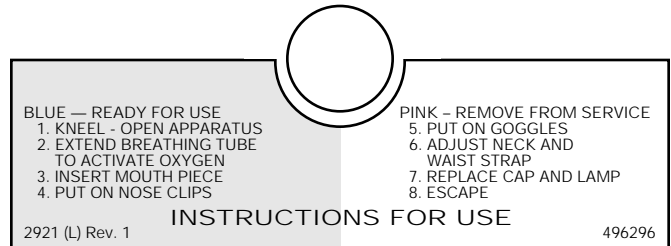
MOISTURE INDICATORS

There are two indicators on the apparatus, one on each cover. They indicate the readiness for use of the apparatus. When viewing the indicator, if it is blue (see Figure 2A) the apparatus is ready to use, if either indicator is pink even with a small amount of blue remaining (see Figure 2B), the apparatus must be removed from service.

NOTE: The instruction label color is for reference only and may not match the indicator due to the effects of environmental exposure and aging of the label.



READY FOR USE FIGURE 2A



REMOVE FROM SERVICE FIGURE 2B

OPERATING INSTRUCTIONS

In an emergency, the unit is to be donned and activated using the 3 + 3 procedure developed by NIOSH/MSHA.

There are three (3) Critical steps:

1. Activate the OXYGEN.
2. REMOVE PLUG, insert the MOUTHPIECE. Inhale through your nose and exhale into the breathing tube three times.
3. Put on the NOSE CLIPS.

These three steps isolate the users' lungs from the toxic atmosphere.

These are three (3) Finishing steps:

4. Put on the GOGGLES.
5. Adjust the STRAPS at the WAIST and NECK.
6. Replace CAP and LAMP and ESCAPE to fresh air.

These six steps prepare the user to rapidly and safely escape from the area.

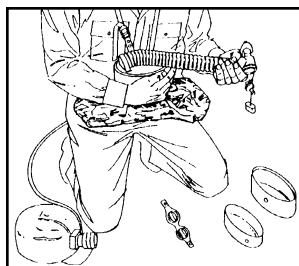
Prepare for 3 + 3 Donning Procedures:

KNEEL and LOOP:

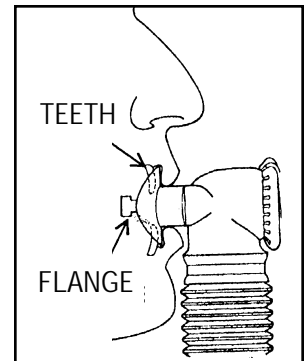
While in a kneeling position, place the Portal-Pack Self-Contained Self Rescuer on the floor in front of you. Remove your cap and lamp, and place it beside you so the light shines on the unit. For carried or worn self-rescuers, remove and discard the plastic protective end covers. Open the unit by lifting the lever on the side of the case. Remove the top and bottom metal caps and LOOP THE NECK STRAP OVER OUR HEAD.

Three critical steps to isolate your lungs:

1. Grab canister with your right hand then grab the mouthpiece with your left hand and extend it fully. You will hear a "POP" sound, this action automatically fires the chlorate candle. Remove the mouthpiece plug.

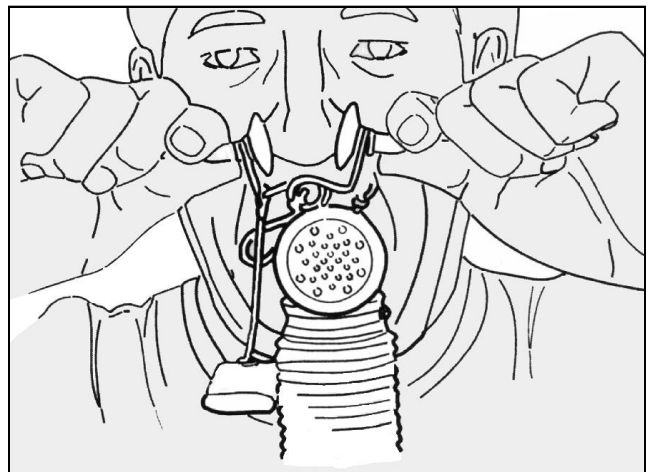


2. Inhale deeply. Immediately insert the mouthpiece into your mouth and exhale into the breathing tube. Inhale through your nose and exhale into the breathing tube for two more full breaths. The flange of the mouthpiece goes between the teeth and the lips. Bite down on the two lugs extending into the mouth to hold the mouthpiece in place. Use your hands if necessary to help unfold the breathing bag.



NOTE: At cold temperature, rubber parts are stiff, but will become more flexible as the unit operates.

3. Apply the nose clips to seal both nostrils and breathe normally.



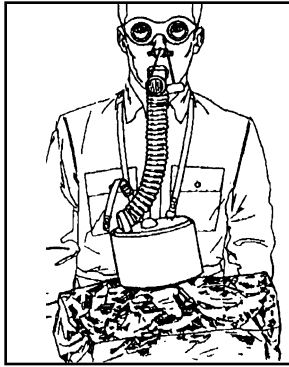
CAUTION

Coughing may occur momentarily, during start-up, due to slight amount of dust.

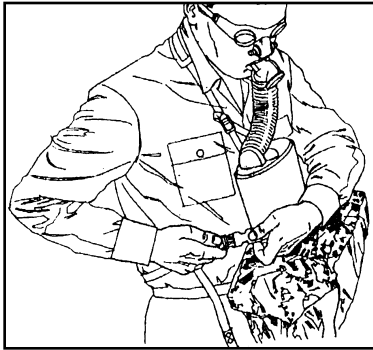
DO NOT REMOVE MOUTHPIECE

Three (3) Finishing steps before escape:

- Put on goggles which are located in the top cover. Adjust the neck strap so the unit is comfortable and there is no undue force pulling or pushing on the mouthpiece.



- Grab the waist strap with your left hand and wrap it around yourself. Fasten the buckle on your right side and adjust it for comfort. DO NOT tighten excessively. This will re-strict your breathing and impede your escape.



- Replace your cap and lamp. Escape to fresh air.

While breathing into the Portal-Pack Self-Contained Self Rescuer, you will experience a slight increase in resistance. Also, during your escape the breathing gas will be dry and warm. All these sensations are normal and indicate that the unit is operating properly. DO NOT REMOVE THE MOUTHPIECE.



Although the unit is provided with a voicemitter which can augment hand signals for communications, you should TALK ONLY WHEN NECESSARY. Too much talking can cause excess saliva to run down the breathing tube, and shorten the life of the unit.

If escape is not feasible, sit down and remain calm. The Portal-Pack Self-Contained Self Rescuer will automatically adjust to your lower demand for oxygen. The unit will last for 4-5 hours.

A decrease in the breathing bag volume indicates the end of gas life for the Portal-Pack Self-Contained Self Rescuer. At the same time there will be an accompanying increase in breathing resistance and breathing gas temperature.

CANDLE FAILURE STARTING PROCEDURE

Although unlikely, should the candle fail to activate, the breathing bag will not inflate. Remember this inflation occurs gradually over a 2 to 3 minute period. The bag does not inflate instantaneously. If the bag does not appear to start inflating properly within the first 30 seconds and there is not enough bag volume to breathe from, follow the starting procedure.

- Remove nose clip.
- Inhale from ambient through nose.
- Exhale into mouth bit.
- Repeat above 6 times with full breath each time.
- Reapply nose clip.
- Breathe normally on the apparatus.
- Continue to escape.

CONDITIONS OF USE

When in storage, units shall be visually inspected every 90 days to ensure the indicators are blue.

When being carried or worn, units shall be visually inspected daily as follows for external damage and to ensure that the indicators are blue.

Damage:

Any unit which has visible external damage at the seal area, has damage to the external case in the form of 1/2 inch or deeper, or has a visible puncture in the case must be removed from service immediately.

NOTE: The plastic protective end covers must be removed for proper inspection.

Indicator:

Any unit which either indicator changes to pink must be removed from service immediately, even if there is a small amount of blue remaining. Any unit in which either indicator changes to pink while being carried during a shift, with no evidence of physical damage, may be carried for the remainder of the shift before taking it out of service.

POUCH USAGE

Protective Carrier Kits, 807078 (horizontal) or 807079 (vertical), are required when wearing or carrying the Portal Pack SCSR. Check the pouch fabric for excessive wear. The plastic covers must also be inspected for damage. If any damage is visible, replace the damaged component.

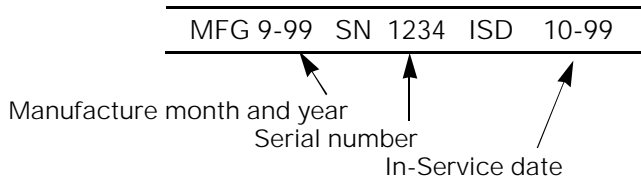
STORAGE TEMPERATURE

Do not store at temperature below -25 degrees F or above 100 degrees F. Short term (less than 24 hours) must be limited to temperatures between -40 degrees F and +130 degrees F.

SERVICE LIFE

The Portal-Pack apparatus from MSA has a total service life of 10 years. Of this, 8 Years may be in service.

The date that each unit or group of units is removed from storage above ground and introduced into the mine environment for use or storage is the In-Service date. The month and year of this date is to be permanently inscribed on the sealing brand by the owner. The location of the In-Service date is to be immediately after the date of manufacture and serial number already present on the brand as shown below. Any unit in Service without an In-Service date will be considered to have been placed in service on the date of manufacture.



SHIPPING INSTRUCTIONS

Because the Portal Pack SCSR contains potassium superoxide and lithium hydroxide, it is classified as a U.S. Department of Transportation Hazardous Material and United Nations Dangerous Good when shipped. Basic shipping data currently used by MSA are as follows:

Proper Shipping Name: Oxidizing solid, corrosive, n.o.s. (Potassium superoxide, lithium hydroxide)
Hazardous Class: 5.1
Subsidiary Risk: 8
UN Number: UN3085
Packing Group: 1
Net quantity of hazardous materials per unit: 0.79 kg

If the unit must be shipped, a trained shipper familiar with hazardous materials regulations must assure that applicable marking, labeling, packaging, shipping paper, placarding and carrier-specific requirements (if any) applicable to the method of transportation are fulfilled. Additional information is available from MSA.

DISPOSAL INSTRUCTIONS

When discarded by United States generator, this unit is a hazardous waste with U.S. EPA Hazardous Waste Numbers of D001 and D005, any applicable state waste

codes and any additional codes that should be applied based on the unique situation of the generator and the conditions of the product's use. The D001 code applies because the potassium superoxide in the canister is a U.S. Department of Transportation oxidizer. The D005 code applies because the candle within the device contains barium. Generators should use this information and any user-specific data to make their own hazardous waste determination in accordance with federal, state, and local regulations.

Contact a permitted hazardous waste management facility for disposal arrangements. A procedure to address safe handling and deactivation of the unit by permitted hazardous waste management facilities is available in the Material Safety Data Sheet (MSDS) for this unit.

WARRANTY INFORMATION

The 496040 (Portal Pack SCSR less pouch) is suitable for storage or cached applications only. If worn or carried, the 496040 must be converted to 496050 which consists of the following:

1. 496040 and one of the following kits,
2. 807078 Horizontal Carrier Kit or
807079 Vertical Carrier Kit

All warranties, expressed or implied, are void if the protective carrier kits are not used when wearing or carrying the Portal Pack SCSR.

GLOSSARY

Ambient - Completely surrounding (on all sides); as the ambient air.

Caustic - Materials that can burn, eat away, or destroy skin and eyes by chemical action. Ph greater than 7.

Deficient - Lacking in necessary amount.

Heat Exchanger - Removes heat from the inhaled gas.

Don - To put on.

Toxic - Poisonous; any substance, solid, liquid, or gas, that tends to impair health, or cause death, when introduced into the body or onto the skin.

Voicemitter - A passive voice transmission device.

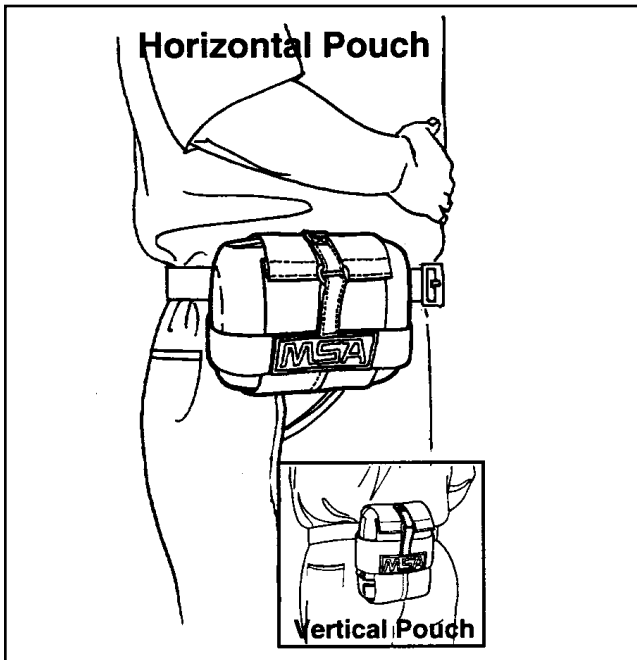
ORDERING INFORMATION

Ordering Information

Part No.	Description
496040	Portal Pack SCSR
803925	Portal Pack Training Model
804187	Disposable Mouthpieces, Pkg. of 10

When wearing or carrying the Portal Pack SCSR, one of the following carrier kits are required:

807078	Horizontal Carrier Kit (fabric pouch with bottom and top plastic protective end covers)
807079	Vertical Carrier Kit (fabric pouch with bottom and top plastic protective end covers)
807074	Plastic protective end cover, bottom only
807075	Plastic protective end cover, top only
807076	Horizontal fabric pouch (only)
807077	Vertical fabric pouch (only)



APPENDIX

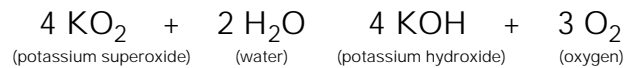
The breathing bag is flat when the unit's external covers are initially removed. The unit itself contains only a small quantity of air. Two chemical sources within the unit release the life-sustaining oxygen.

The first source of oxygen is a cylinder of the chemical Sodium Chlorate, (NaClO₃) which looks very much like a common wax candle. The "chlorate candle," as it is com-

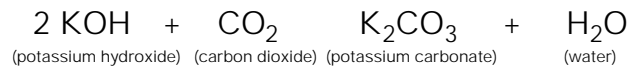
monly known, has added ingredients which allow it to decompose or "burn". In burning, the oxygen in the basic chemical is released and left as a porous cylinder (mainly Sodium Chloride (NaCl) - similar to table salt). To initiate burning, a primer cap is used to ignite a powdered charge; this provides enough energy to start the chemical reaction within the candle which is then self-sustaining. Filters in the candle housing remove any undesirable by-products of the chemical reaction.

The primary function of the candle is to provide an immediate source of oxygen to fill the system including the breathing bag. The candle cannot remove carbon dioxide (CO₂) from the exhaled breath.

The second chemical charge in the canister is potassium superoxide (KO₂). This chemical consists of coarse granules held in place by baffles contained in the canister. The chemical reaction of moisture (water vapor - H₂O) in the exhaled breath with the KO₂ liberates the oxygen. The chemical reaction is:



In addition to this, a second reaction takes place between the potassium hydroxide and the carbon dioxide in the exhaled breath to combine and retain CO₂ according to the following equation:



These reactions are self-regulating; i.e., they respond to the quantity of CO₂ or water available and thus, the device is demand sensitive. The harder the user works the more oxygen is generated and the more CO₂ is removed.

The KO₂ liberates oxygen at a rate slightly faster than it can be consumed which insures adequate supply regardless of work rate. This oversupply would cause an increased system pressure except that an automatic relief valve is built into the breathing bag. The relief valve will vent and then reset; a check valve between the relief valve and ambient prevents any backflow of ambient gases which may be toxic.

The device is NIOSH/MSHA certified as a 60 minute unit when tested according to a regulated work load schedule. If work loads are markedly reduced, e.g., resting, the unit may provide oxygen for 4-5 hours; conversely, if work loads are markedly increased, the useful life will be decreased. The indicators of end of service life of a canister are:

1. Breathing bag does not fill - goes flat.
2. Resistance to breathing increases substantially.

If either of these conditions exist, the user must take whatever measures are necessary to obtain a source of breathable air.