AQUA LUNG®

Military & Professional

Survival Egress Air (SEA-4500)

User's Manual

Rev 09/14

COPYRIGHT NOTICE

You can contact a Technical Advisor via e-mail at:

sreilly@aqualung.com
grubin@aqualung.com
jbutner@aqualung.com

Warnings, Cautions and Notes:

Pay special attention to information provided in Warnings, Cautions and Notes that are accompanied by one of these symbols:

A WARNING indicates a procedure or situation that, if not avoided, could result in serious injury or death to the user.

A CAUTION indicates any situation or technique that could cause damage to the product and could subsequently result in injury to the user.

*A **NOTE** is used to emphasize important points, tips and reminders.*

TABLE OF CONTENTS

GENERAL PRECAUTIONS AND WARNINGS

The SEA-4500 is intended for use only as an emergency device to assist a crew member or passenger in making an emergency egress from a submerged aircraft. Due to its limited air volume, it is not intended for use while scuba diving or egressing from depths greater than 45 ft/ 13.5 m.

Before using the SEA-4500, it is important to receive in-water survival training which simulates an emergency egress situation. You must also learn basic principles and techniques for breathing compressed air underwater. Use of the SEA-4500 without proper training is dangerous and can result in serious injury or death.

Visual inspection and factory prescribed service for the SEA-4500 must be performed at least once every two years by a factory trained and qualified service technician. Repair, service and visual inspection must not be attempted by untrained or unqualified personnel.

DO NOT attempt to overfill the SEA-4500 beyond 4500 PSI / 310 BAR at 70ºF/ 21ºC. Doing so may seriously weaken the cylinder and cause it to rupture, resulting in serious injury or death.

DO NOT fill or use the SEA-4500 if it has been exposed to extreme heat exceeding 250° F / 121° C or open flame. Instead, discharge the cylinder completely and return it to a qualified technician for inspection and possible hydrostatic testing.

The SEA-4500 is designated compatible for use only with normal, atmospheric, compressed air (21% oxygen and 79% nitrogen by volume). DO NOT attempt to fill with other gases, including pure oxygen or air which has been enriched with oxygen exceeding 21% in content. Failure to observe this warning may result in serious injury or death due to fire and explosion or the serious deterioration and failure of the equipment.

DO NOT apply any type of petroleum-based lubricant, such as household oil or motor oil to any part of the SEA-4500. The SEA-4500 does not require any lubrication under normal circumstances, except that which is performed during annual inspection and service by a factory trained service technician.

DO NOT apply any type of aerosol spray to the SEA-4500. Doing so may cause permanent damage to certain plastic components, including the second stage housing.

During training exercises, it is important to ensure that the SEA-4500 is always pressurized whenever it is submerged in order to prevent the entrance of water into the system. Whenever the system has been completely emptied of air underwater, it is important to return the SEA-4500 as soon as possible to a qualified technician for visual inspection and any necessary service before attempting to refill it.

It is important to fill the SEA-4500 only with dry, filtered air with a water vapor content that does not exceed -65°F / -53ºC dew point. Excess water vapor in the air can cause ice to form inside the SEA-4500 and interfere with the operation of the system at colder temperatures.

PRODUCT DESCRIPTION

SEA-4500 Components *(Fig. 1)*

- SEA-4500 balanced diaphragm first stage with integral fill port, dial pressure gauge, safety plug assembly, 360 degree swivel and On / Off knob. Black aluminum components are utilized on first stage for a low reflective signature.
- 20 in (50.8 cm) or 27 in (68.6 cm) braided medium pressure (MP) hose with tool free swivel allows for quick and easy exchange of the second stage when needed.
- Ergonomic low volume balanced second stage with indexable mouthpiece allows for variable regulator orientation.
- Light weight composite / carbon fiber cylinder 13 cu. in. or 17.5 cu. in., 4500 PSI / 310 BAR.

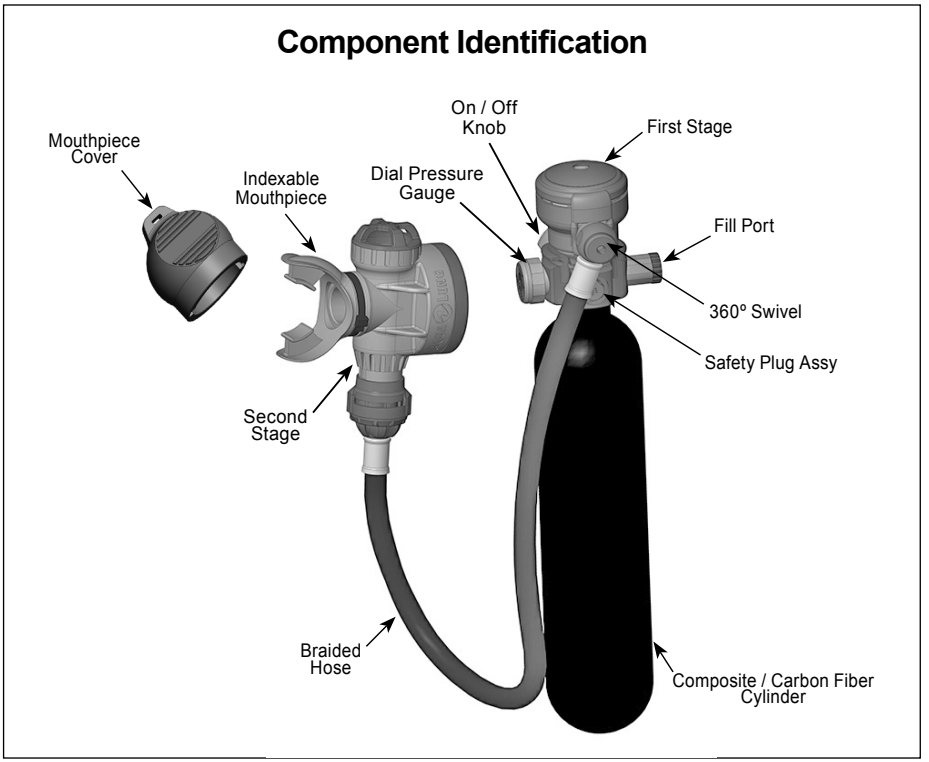


Figure 1

PREPARATION AND SETUP

The purpose of this manual is to familiarize you with the correct setup, filling, inspection and maintenance of the SEA-4500.

The SEA-4500 is packaged fully assembled and ready to use after it has been filled with air. Before using it, however, it is very important to carefully read and understand the procedures outlined in this manual for filling the unit and performing a preflight inspection.

General Filling Procedures

> ***NOTE:*** *The average duration of air supply listed in the* ***Technical Specifications section of this manual*** *is based on a completely full SEA-4500 composite / carbon fiber cylinder, filled to 4500 PSI / 310 BAR with a volume of 13 cu. in. or 17.5 cu. in. of air. It is strongly recommended that the SEA-4500 be filled to 4500 PSI / 310 BAR (cold fill), in order to provide maximum breath volume.*

1. Before attempting to fill the SEA-4500, ensure that the fill adapter and first stage are completely dry – especially in the area surrounding the fill port.

2. The SEA-4500 is configured with a 4500 PSI/ 310 BAR composite / carbon fiber cylinder. Examine the cylinder markings to verify it is rated for a fill pressure of 4500 PSI/ 310 BAR, has a current visual inspection and hydrostatic test date *(Fig. 2)*.

> ***NOTE:*** *The SEA-4500 13 cu. in. or 17.5 cu. in. composite / carbon fiber cylinders require hydrostatic testing every 5 years. (Fig. 2).*

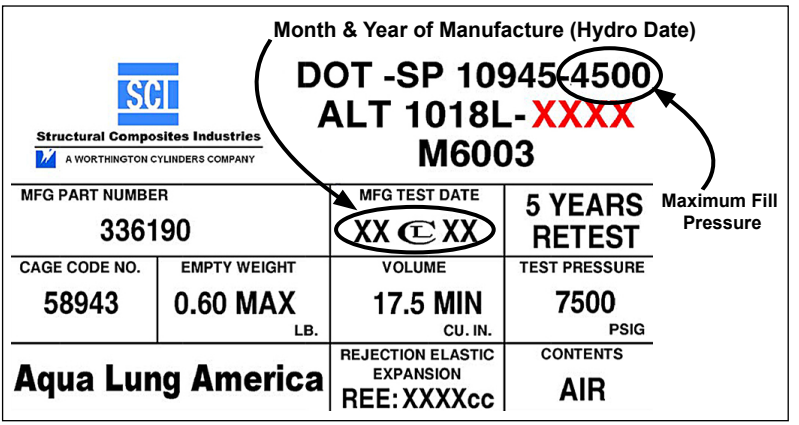


Figure 2

WARNING: DO NOT attempt to fill the SEA-4500 if the cylinder markings indicate that it is assembled with a non standard cylinder rated for a different fill pressure than 4500 PSI / 310 BAR. Doing so may result in rupture or explosion in the event of fire or overfilling. Instead, immediately return the unit to a qualified technician and do not use under any circumstances.

3. Turn the valve handwheel clockwise until it is completely closed. To ensure the valve is closed, check to see if the ***red indicator ring*** is visible in the handwheel *(Fig. 3)*.

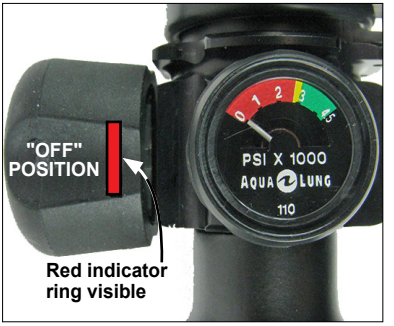


Figure 3

4. Depress the second stage purge button to ensure that the system is completely depressurized.

5. Unscrew the fill port cap from the fill port *(Fig. 4)*.

Figure 4

6. Closely inspect the fill port opening to ensure that no debris, residue or moisture is present.

CAUTION: If moisture is found to be present inside the fill port opening, this indicates that water may have entered the SEA-4500 first stage and cylinder. DO NOT fill or attempt to use the SEA-4500 until it has received complete inspection and any required service by a qualified technician.

WARNING: DO NOT attempt to loosen or remove the first stage hose fitting or safety plug assembly under any circumstances. Doing so could result in a dangerous malfunction of the SEA-4500 which could result in serious injury or death.

Filling SEA-4500 with a HP Fill Adapter

NOTE: *The SEA-4500 system does not include a HP fill adapter. This adapter (PN 102865) may be purchased separately (Fig. 5).*

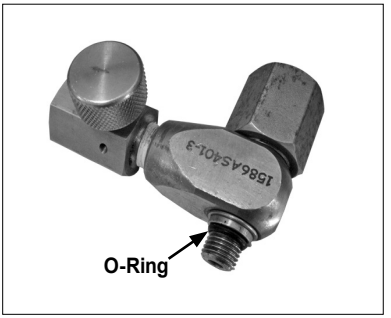


Figure 5

NOTE: *The HP fill adapter (PN 102865) may be used to fill cylinders up to a pressure rating of 4500 PSI / 310 BAR. (Fig. 5).*

CAUTION: Do not attempt to fill the SEA-4500 directly from a compressed air filling station unless you have received the necessary training and authorization to do so. If done incorrectly, this procedure poses certain hazards which may cause severe injury or death.

CAUTION: The SEA-4500 dial pressure gauge is for reference only. Use the fill system gauge to indicate accurate cylinder pressure.

1. Remove the protector cap from the threaded male fitting on the fill adapter. Inspect the fill adapter to ensure that the o-ring is present and seated evenly at the base of the threads. Check the threads of the male fitting, making sure they are clean and not damaged.

2. Fit the threaded male fitting of the fill adapter into the fill port of the first stage and turn the adapter nut clockwise by hand until snug. DO NOT apply a wrench or otherwise overtighten the fill adapter *(Fig. 6)*.

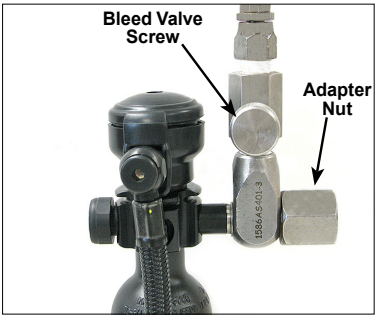


Figure 6

3. Close the bleed valve screw on the fill adapter by turning it clockwise until finger tight.

WARNING: DO NOT attempt to fill the SEA-4500 from a compressor or air supply where the regulated pressure exceeds 4500 PSI / 310 BAR. Doing so may weaken and damage the safety plug assembly and cylinder.

NOTE: *The SEA-4500 will fill with the valve handwheel in the completely closed position (**red indicator ring** visible). In this position the pressure gauge will not register psi. This is not recommended.*

4. While holding the first stage and fill adapter secure, turn the SEA-4500 valve handwheel counter-clockwise until it is completely open. When the handwheel is in the open position, the ***red indicator ring*** is not visible *(Fig. 7)*.

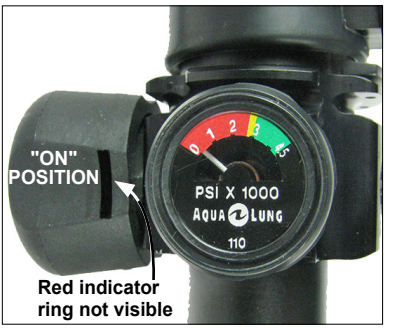


Figure 7

5. Ensure that the SEA-4500 is supported and turn the compressor valve ***very slowly*** counter-clockwise until it is slightly open to fill the cylinder with approximately 500 PSI / 34.5 BAR. Turn the compressor valve shut and wait 45-60 seconds before proceeding to fill the cylinder any further. Repeat this procedure to fill the cylinder ***very slowly*** in small increments of 500 PSI / 34.5 BAR or less, until it is filled to 4500 PSI / 310 BAR. Make sure the dial pressure gauge shows that the cylinder is filling properly.

> ***NOTE:*** *Always fill the cylinder as slowly as possible by turning the handwheel of the supply valve slowly to control the rate of fill. Rapid filling will generate heat and will result in an incomplete fill after the cylinder cools. If the cylinder is warm to the touch afterward, the fill rate was too rapid.*

6. To conserve the limited air supply of the SEA-4500, it is strongly recommended that you perform the following pre-issue inspection of the second stage purge while the SEA-4500 is pressurized and connected to the fill adapter:

a. Briefly depress the purge button to ensure that sufficient airflow is provided to clear the second stage of water.

b. Immediately after releasing the purge button, listen closely to ensure that the second stage does not continue to flow any air.

7. While holding the first stage and fill adapter secure, turn the SEA-4500 valve handwheel clockwise until it stops and the ***red indicator ring*** is visible. Turn the compressor valve completely closed.

8. Hold the second stage purge button depressed until air flow can no longer be heard from the second stage and the MP hose is depressurized.

9. Open the bleed valve screw on the fill adapter to relieve the line pressure.

10. While holding the SEA-4500 cylinder, turn the adapter nut counter-clockwise to loosen and remove from the first stage. Replace protector cap on the threaded male fitting of the fill adapter. Return the fill adapter to its storage location.

11. Thread the fill port cap back into the fill port until finger tight.

Adjusting Mouthpiece Position

The second stage incorporates a position keying feature that enables the user to adjust orientation of the second stage body in relation to the mouthpiece. This unique feature keeps the hose closer to the body and allows for more flexibility in various cylinder-mounting configurations.

The mouthpiece-to-body default position is horizontal which allows the hose to route either to the right or left of the regulator second stage. The mouthpiece boss on the body is hexagonally shaped, which allows the mouthpiece to rotate to six different positions *(Fig. 8)*.

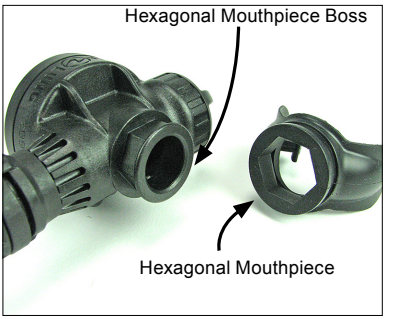


Figure 8

WARNING: The mouthpiece clamp must always be installed before returning regulator to service. Failure to install the clamp will result in mouthpiece separating from regulator body during deployment of regulator.

Changing the SEA-4500 Mouthpiece

1. Mount SEA-4500 cylinder in user preferred position.

2. Remove the black clamp with side cutters and discard *(Fig. 9)*.

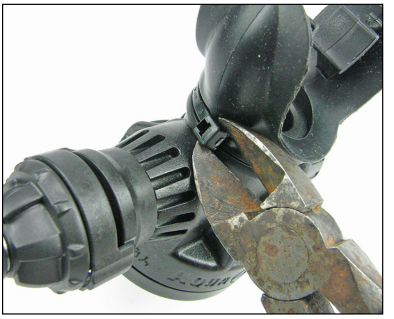


Figure 9

3. Rotate the mouthpiece to preferred position *(Fig. 10)*.

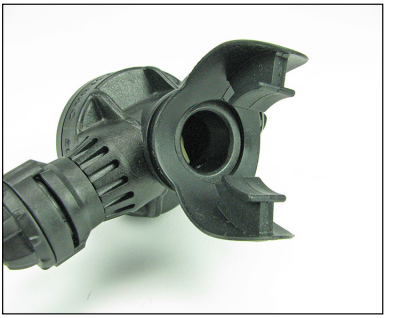


Figure 10

4. Install a new black clamp with the clamp tab positioned in-line with the center of the right bite-tab on the mouthpiece. Since the mouthpiece is of a lower profile design than standard SCUBA-style mouthpieces the clamp tab should be orientated in this manner so that the clamp tab does not interfere with the users lips *(Fig. 11)*.

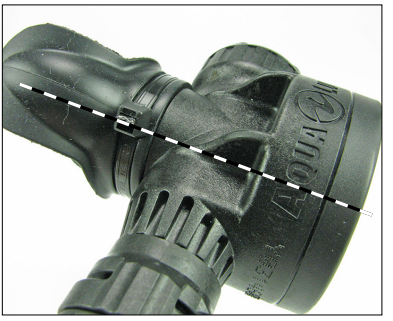


Figure 11

PRE-ISSUE CHECKLIST

Before each use, the unit must be given a thorough visual inspection and functional test by a qualified technician. NEVER use a SEA-4500 which shows signs of damage, leakage or substandard performance until it has received inspection and service from a qualified technician.

1. Carefully inspect the medium pressure hose to ensure it is securely connected into its respective port on the first stage and onto the second stage. Inspect the length of the hose to ensure that it is not blistered, cut or otherwise damaged. Inspect the hose fittings for any signs of corrosion.

2. Visually inspect the entire system for any external damage, such as dents, gouges, cracks or severe external corrosion.

3. While the SEA-4500 valve is completely shut and the system is depressurized, inspect the pressure gauge to ensure that it is securely fastened to the first stage. Closely examine the pressure gauge to ensure that it reads zero *(Fig. 12)*.

Figure 12

CAUTION: If the pressure gauge does not read zero when the valve is shut and the system is depressurized, DO NOT attempt to use the system until it has received inspection and service from a qualified technician.

CAUTION: DO NOT attempt to open the SEA-4500 valve without first checking to ensure that the MP hose and pressure gauge are securely fastened to the first stage.

4. Turn the SEA-4500 valve handwheel counter-clockwise until it is completely open. In the open position, the ***red indicator ring*** is not visible in the handwheel.

5. Closely examine the pressure gauge to determine whether the needle is within the “GREEN ZONE”, indicating that the SEA-4500 cylinder is full *(Fig. 13)*.

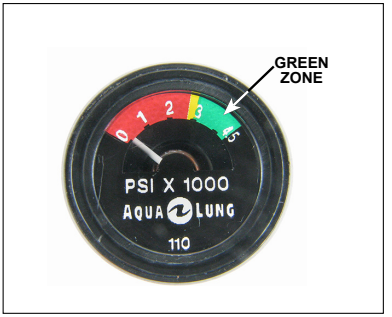


Figure 13

NOTE: *The operational range for composite / carbon fiber cylinder units is 3000 - 4500 PSI (206 - 310 BAR). A 13 cubic inch (63.4 L) composite / carbon fiber cylinder is equivalent to a 1.5 cubic foot (42.5 L) aluminum cylinder when both are filled to 3000 PSI (206 BAR). A 17.5 cubic inch (85.5 L) is equivalent to a 2.0 cubic foot (56.6 L) aluminum cylinder when both are filled to 3000 PSI (206 BAR). Aqua Lung classifies composite / carbon fiber cylinders by floodable volume (cubic inch) and aluminum cylinders by expanded volume (cubic feet). Values in liters are metric expanded capacity.*

6. Immerse the SEA-4500 in water to check for any signs of free flow from the second stage, leakage from the hose, pressure gauge, safety plug assembly, first stage or cylinder neck. If leakage is found, do not attempt to use the SEA-4500 until it has received service from a qualified technician. When complete, remove the water from the SEA-4500 1st & 2nd stages and reinstall the mouthpiece cover.

NOTE: If the second stage purge was checked during the filling procedure, it is not necessary to repeat steps 7 & 8.

7. Briefly depress the purge button to ensure that sufficient airflow is provided to clear the second stage of water.

8. Immediately after releasing the purge button, listen closely to ensure that the second stage does not continue to allow any air flow.

9. Turn the valve handwheel clockwise until it is completely closed. In the closed position, the ***red indicator ring*** is visible in the handwheel.

Provided that these pre-issue inspection requirements have all been met, the SEA-4500 is now ready for use.

PRE-FLIGHT INSPECTION

The pre-flight inspection shall be performed on the SEA-4500 prior to each flight by the air crew member to whom the unit is assigned. Pre-flight procedures are as follows:

WARNING: Strict compliance with pre-flight and post-flight inspections shall be adhered to by all air crew members utilizing the SEA-4500. Any signs of discrepancies shall be reported immediately to maintenance personnel.

1. With the system off, visually inspect the SEA-4500 for signs of damage. Inspect front cover, exhaust cover and fittings for tightness. Inspect for tamper dot (if command uses tamper dot) on front cover. Inspect hose for cuts and blistering. Inspect for contamination, dirt and signs of corrosion.

CAUTION: Do not press the purge button when the SEA-4500 is on. Purging of the SEA-4500 will deplete the pressure below the "GREEN ZONE" and it will have to be topped off by maintenance personnel.

2. Turn the SEA-4500 "ON" by rotating the ON/OFF knob to the left (counter-clockwise), the ***red indicator ring*** should not be visible through the elongated holes on the knob. Ensure that the gauge reads in the "GREEN ZONE". If the gauge does not read in the "GREEN ZONE" report discrepancy to maintenance personnel.

POST-FLIGHT INSPECTION

1. Upon completion of flight, turn handwheel "OFF" (clockwise), so that ***red indicator ring*** is visible through the elongated holes on the handwheel. Depress the purge button to relieve pressure in hose and second stage. Check SEA-4500 for signs of damage and contamination. Report discrepancies to maintenance personnel.

CARE AND MAINTENANCE

It is important to provide the proper preventative maintenance in order to ensure the best possible performance and reliability of the SEA-4500. The following maintenance procedures should be performed routinely after each use of the equipment.

1. After each in-water training session, the SEA-4500 must be cleaned, inspected and prepared for the next use or storage.

2. As soon as possible after training, the SEA-4500 should be soaked thoroughly for at least one hour in warm (not over 120ºF / 49ºC) tap water to loosen and dissolve salt (if used in salt water) and mineral deposits. Before soaking, turn the valve to the “ON” position to pressurize the system. This will best prevent the entrance of moisture into the system through the second stage.

NOTE: Due to the light weight aluminum first stage, the SEA-4500 is not recommended for continuous use in salt water. The aluminum first stage is susceptible to galvanic corrosion and needs to be rinsed thoroughly after use in salt water.

CAUTION: If the SEA-4500 cylinder does not contain air, it is important to ensure that the valve is completely turned to the “OFF” position and the second stage purge button is not depressed while the system is submerged or wet. Moisture may otherwise be allowed to enter the valves and the cylinder, which will require that the system be returned to a qualified technician for inspection and service.

3. After the system has been properly soaked, it is important to rinse the first stage, the second stage mouthpiece and the openings in the second stage front cover with a pressurized stream of water. This will remove the salt and mineral deposits that were loosened during soaking.

4. When it has been properly soaked and rinsed, wipe the system as dry as possible with a clean towel and gently shake the first and second stage to dislodge any water inside them.

5. Check to ensure that the SEA-4500 valve is turned to the “OFF” position and depress the purge button of the second stage to ensure that the system is completely depressurized before storing or transporting.

6. Due to the possibility of fire and exposure to extreme heat, the SEA-4500 must be stored either completely full or completely empty. If the system is exposed to fire while partially filled, the cylinder wall may rupture before the internal pressure becomes great enough to burst the safety plug assembly. For this reason, Aqua Lung recommends that the cylinder be completely emptied and the valves kept shut to prevent the entrance of moisture before storing the system for an indefinite period.

WARNING: DO NOT store the SEA-4500 partially filled. Doing so may prevent the safety plug assembly from functioning properly in the event of fire or exposure to extreme heat. This may cause the cylinder to rupture or explode, possibly resulting in severe injury or death.

7. Store the SEA-4500 completely dry, in a clean equipment box or sealed inside a plastic bag. When possible, avoid storing it where it may be exposed to extreme heat or an electric motor, which produces ozone. Prolonged exposure to extreme heat, ozone, chlorine and ultraviolet rays can cause premature degradation of rubber parts and components and must be prevented.

8. When transporting the SEA-4500, take the necessary precautions to ensure that it is surrounded by a protective cushion to prevent undue shock or impact.

9. Do not use any type of solvent or petroleum based substances to clean or lubricate any part of the regulator. Do not expose the regulator to aerosol spray, as some aerosol propellants attack or degrade rubber and plastic.

INSPECTION AND SERVICE

1. It cannot be assumed that the SEA-4500 is in good working order on the basis that it has received little use since it was last serviced. Remember that prolonged or improper storage can still result in internal corrosion and/or deterioration of o-ring seals and valve springs.

2. It is imperative that you obtain factory prescribed service for your SEA-4500 at least once every two years from a qualified technician, including a visual inspection of the cylinder and complete overhaul of the first and second stage regulators. Your SEA-4500 may require this service more frequently, depending on the amount of use it receives and the environmental conditions it is used in.

3. If the SEA-4500 is used for training purposes in salt water, chlorinated or silted fresh water, it will require complete overhaul and factory prescribed service every three to six months or whenever it is suspected that moisture has entered the system. Use in chlorinated swimming pool water will accelerate the deterioration of most rubber components and require more frequent service than in other typical conditions.

4. DO NOT attempt to perform any disassembly or service of your SEA-4500. Doing so may cause the system to dangerously malfunction. All service must be performed by a qualified technician.

WARNING: Do not attempt to loosen or remove the first stage hose fitting, gauge or safety plug assembly under any circumstances. Doing so could result in a dangerous malfunction of the SEA-4500, which could result in serious injury or death.

OBTAIN FACTORY PRESCRIBED SERVICE FOR YOUR SEA-4500 AT LEAST ONCE EVERY TWO YEARS. YOUR PERSONAL SAFETY AND THE MECHANICAL INTEGRITY OF YOUR SEA-4500 DEPEND ON IT.

WARRANTY INFORMATION

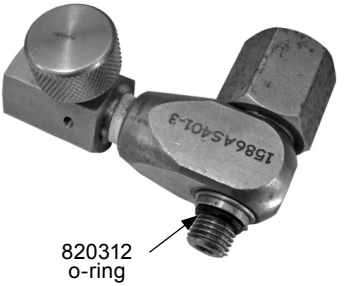
For detailed information on product warranties, please refer to the ***Terms and Conditions Section*** of the ***Aqua Lung Military and Professional Buyers Guide***.

The buyers guide can be viewed or downloaded from the Aqua Lung Military and Professional website at **www.aqualung.com/militaryandprofessional**

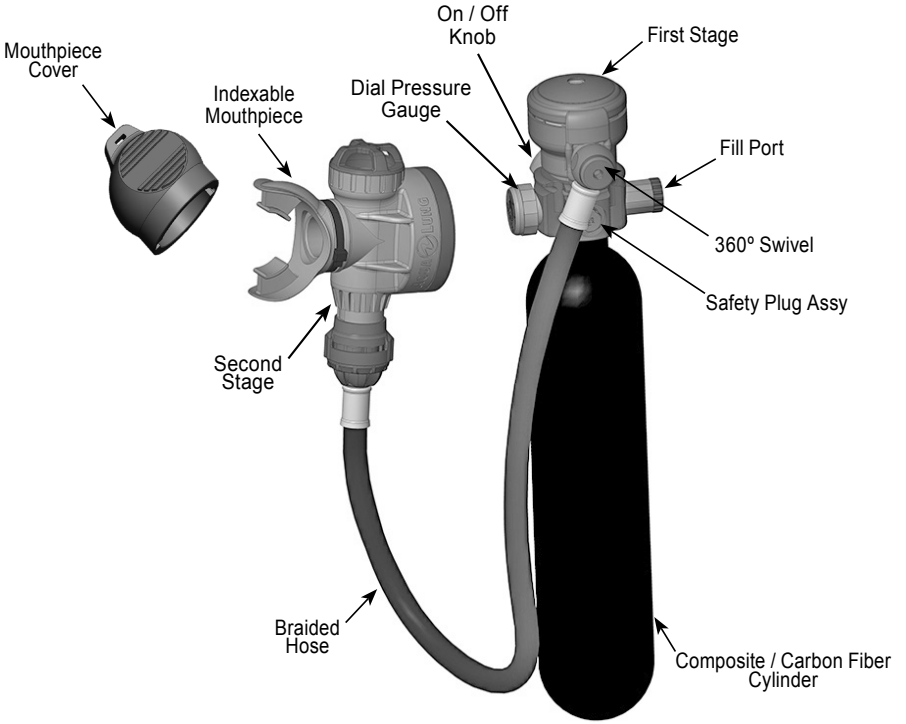
TECHNICAL SPECIFICATIONS

Cylinder Volume	13 cu. in. (floodable volume) 2.24 cu. ft./ 63.4 L (expanded volume) 17.5 cu. in. (floodable volume) 3.02 cu. ft./ 85.5 L (expanded volume)
Cylinder Material	Composite / Carbon Fiber
Cylinder Length with Regulator	13 cu. in. - 11.0 in / 28 cm 17.5 cu. in. - 12.75 in / 32.4 cm
Rated Cylinder Pressure	4500 PSI / 310 BAR
Medium Pressure Hose Length	20 in / 50.8 cm or 27 in / 68.6 cm
First stage Hose Connection	360 degree swivel
Regulator First Stage	Balanced Diaphragm
Regulator Second Stage	Balanced Second Stage
Pressure Indicator	Gauge 0-5000 PSI / 0-345 BAR
Over Pressure Relief	Safety Plug Assembly HP Module Mounted, 7250 PSI / 500 BAR
System Weight	SEA-4500 w/ 13 cu. in. Composite / Carbon Fiber Cylinder Empty 1.57 lb. / 0.71 kg SEA-4500 w/ 17.5 cu. in. Composite / Carbon Fiber Cylinder Empty 1.69 lb. / 0.77 kg
Duration of Air Supply	**Approximate breaths at 20 FSW: 13 cu. in. Cylinder - 23 Breaths 17.5 cu. in. Cylinder - 31 Breaths
**Based on an average breath volume of 1.5 liters at a breathing rate of 10.5 bpm, with a starting supply pressure of 4500 PSI / 310 BAR.	

SEA-4500 PARTS



PN 102865 HP Fill Adapter
4500 PSI / 310 BAR



NOTES

NOTES

Survival Egress Air 4500 (SEA-4500)

User's Manual

AQUA LUNG®

Military & Professional

2340 Cousteau Court • Vista, CA 92081
Phone (760) 597-5000 • Fax (760) 597-4900
www.aqualung.com/militaryandprofessional