



Essex PB&R Corporation

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ESSEX PB&R SCU (Self Contained Unit)



TECHNICAL DATA PACKAGE



GENERAL INFORMATION

Intended Use: The Essex PB&R SCU is a self-contained, portable, protective breathing device designed to safeguard the wearer (passenger or crewmember) from the effects of smoke, carbon dioxide, harmful gases, and oxygen deficiency while managing or escaping an in-flight fire, smoke or fume emergency.

The SCU improves the wearer's ability to see in smoke-filled compartments, protects the head and face from melting or dripping plastics and shields the head against brief exposure to heat and flame. The purpose of this manual is to ensure that future users of the SCU understand its components and function, performance limitations, operating procedures, and usage precautions needed in order to use it properly and safely.

BENEFITS:

- * Lightweight
- * Durable & Tear Resistant
- * 360° Visibility
- * Good Communication
- * Quick Donning
- * One Size – No Adjustments
- * Duration up to 20 and up to 60 minutes
(see **pages 8 and 9**)
- * Easy to Wear
- * Leaves Both Hands Free
- * Isolation from Toxic Smoke
- * Protects from Oxygen Deficient Atmospheres
- * Heat/Flame Resistant

PERSONAL PROTECTION

The SCU offers the wearer a high level of protection:

- * Isolation from toxic gases and smoke (protection factor over 260)
- * **Universal** protection against **most** toxic gases, toxic mists, and an oxygen deficient environment
- * Protects any adult within the 5th percentile female to the 95th percentile male population
- * Protects the head from dripping plastic material of up to 390° F
- * Hood material can withstand a 1000°C (1,832°F) flame for 5 seconds without burning through



USAGE AND COMMUNICATION

The unique construction of Essex PB&R's SCU allows the user to:

- * Don and doff the unit in less than 10 seconds
- * Wear it comfortably with both hands free for unrestricted movements
- * Carry on a normal conversation with another person wearing an SCU up to a distance of 4 yards
- * Use the telephone or megaphone
- * Read an exit sign at a distance of 5 yards.

PRODUCT DESCRIPTION - COMPONENTS

Hood Material

The SCU hood is multi-layer construction of polyimide and PFA films that are heat and flame resistant, lightweight, rugged, allow 360° field of view and good communication.

A thin layer of aluminum metalizing has been deposited on a portion of the hood to provide additional heat and flame protection.

Anti-fog coating has been applied to the hood interior. This coating will provide adequate vision capability for its intended use, and minimize fogging and/or condensation during operation.

Oxygen Cylinder/Valve

The oxygen cylinder contains 18.0 liters of Aviator Grade oxygen in accordance with SAE standard AS 8010 and MIL-0-27210 for breathing oxygen purity. The cylinder pressure is 3,000 psi.

The oxygen cylinder has been tested to an internal hydrostatic pressure of 2.7 times its working pressure. It is designed to vent if exposed to pressures in excess of 1 ½ times its working pressure. Even at excessive temperatures, as in direct flame, the cylinder will vent its contents safely, without fragmentation.

The cylinder is connected to a valve that allows controlled release of the oxygen after activation.



Neck Seal

The neck seal is made from a highly elastic silicone rubber to fit neck sizes within the 5th percentile female to 95th percentile male population, without requiring any adjustment or special fitting. Individuals who fall outside of this range are still afforded a measure of protection.

The neck seal is also designed to prevent the buildup of excessive hood pressures by venting if the internal hood pressure becomes too great. This very effective seal allows a typical protection factor of over 260 even under high workload conditions. Protection factor is a measure of efficiency of the neck seal and is defined as the concentration of any gas outside the hood divided by the concentration inside the hood.

CO₂ Absorbers (Scrubbers)

Panels of Lithium Hydroxide (LiOH) scrubbers are mounted inside around the bottom of the hood. The scrubbers have sufficient capacity to provide adequate safety by keeping CO₂ concentrations below 4% on average and below 7% peak level.

Packaging

The SCU is sealed in a sturdy, easy-to-open Mil-Spec barrier pouch. There are two packaging options, a durable fabric soft pouch, and a standard box.

Statement of Warranty for Self-Contained Unit (SCU)

Essex P. B. & R. Corp. warrants that: (1) The Essex Self-Contained Unit (SCU) (hereinafter referred to as the “unit”) will remain free from defects in material and workmanship, whether patent or latent, for up to the replace by date which is a period of ten (10) years and six (6) months from the date of manufacture when properly stowed in containers supplied or approved by Essex P. B. & R. Corp.

For those units equipped with a humidity indicator, the loss of vacuum in the inner packaging does not render the unit unserviceable. Units with barrier pouches that have lost vacuum remain serviceable as long as the humidity indicator remains blue. Although if a unit is found to have a damaged barrier pouch, e.g. cut, puncture or other damage, the unit should be pulled from service and sent back for repair at the customer’s expense.

The liability of Essex P. B. & R. Corp. for any defect in any unit, and the sole and exclusive remedy of the buyer, shall be limited to the repair or replacement of the defective unit, or a refund of the original purchase price (pro-rated in proportion to the ten (10) year and six (6) month warranty) at the sole discretion of Essex P. B. & R. Corp.



The obligation to repair, replace, or provide a pro-rated refund shall terminate ten (10) years and six (6) months after the date of manufacture of the unit.

This warranty is in lieu of all other warranties and representations, expressed or implied, and all other obligations and liabilities of Essex P. B. & R. Corp. Correction of defects, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of Essex P. B. & R. Corp. whether based on warranty, tort, contract or otherwise. Under no circumstances shall Essex P. B. & R. Corp. be liable for any punitive, special, incidental or consequential damages.

This warranty shall not apply to any unit that has been stowed in an unauthorized container, which has been repaired or altered by anyone other than Essex P. B. & R. Corp., or which has been subject to misuse due to negligence or accident, or the failure to use the unit in accordance with the Product's Manual supplied by Essex P. B. & R. Corp.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY, NON-INFRINGEMENT, OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATION ON THE PART OF ESSEX P. B. & R. CORP.

USAGE AND FUNCTION DESCRIPTION

The SCU hood is operated by tearing off the red strip to open the package, removing the hood from the package and unfolding it, donning it and then pulling the activation cord by the red ball. Pull in a firm, steady motion, down and away from the bottle. The ball and lever will pull free from the oxygen system when activated properly. It is important to pull the ball until the lever pulls free from the oxygen system. As the flow of oxygen begins, the hood will start to inflate and an audible "hissing" sound should be heard. The oxygen will continue to dispense into the hood for approximately 8 minutes and then stop. This is normal, you still have ample time available if you are waiting for the aircraft to land or waiting to be rescued. The hood acts as an oxygen reservoir for a limited time according to your workload. For a summary of duration's for different workloads, please see **Pages 8 and 9**.

Donning

After taking the hood out of its package and unfolding it, hold it with the neck seal towards you with the cylinder at the bottom. Then place your hands inside the neck seal hole with palms facing each other. Spread your hands and stretch the neck seal wide open. Place the hood over your head starting from the back of your head (the cylinder will now be in front). Make sure the neck seal is pulled down as far on your neck as

possible. **Immediately** pull the red ball and cord with your right hand while holding the cylinder with your left.



- NOTE :**
- 1) **When unfolding the hood, do not shake it to inflate it, as this could trap toxic gases inside prior to donning.**
 - 2) **For spectacle wearers, it is recommended to slip the hood over the back of the head first, then pull the neck seal opening forward and down, stretching it to clear the glasses and avoid dislodging them.**
 - 3) **Hair, jewelry, etc. must be tucked inside of the SCU to ensure a proper seal. Make sure shirt collars are on the outside of the neck seal.**



Oxygen Activation

The valve connected to the oxygen cylinder has a lever with a cord attached to it. A red ball is attached to the end of the cord. The action of pulling the cord and removing the lever allows a pin in the valve to pierce the sealing diaphragm of the cylinder and start the flow of oxygen. The lever must be pulled completely free of the valve to start the flow of oxygen.

A nozzle in the valve controls oxygen flow. Flow is accompanied by an audible hiss. It is important to listen for this hiss when the hood has been activated and observing the hood starting to inflate. If the hiss is not heard, the hood does not start to inflate, and the lever has been pulled free of the oxygen valve, the hood should be removed to avoid danger of suffocation and another unit should be donned.

WARNING: The SCU is an escape device only. Once the hood is donned, the wearer must exit the area where the hazard exists. As soon as he/she is away from the danger area, the hood must be removed.

Doffing

As soon as you are out of the danger zone, take the hood off by opening the neck with both hands (close to the chin is the easiest place to start) and slipping it over the head. You must also remove the hood when the concentration of oxygen reaches dangerously low levels. This is indicated when the hood film collapses around your face.

Disposal

The SCU is designed for one-time use only, and should be discarded after wearing. Care must be taken to ensure the safe disposal of the CO₂ (LiOH) Scrubbers, according to local hazardous waste regulations.

DURATION OF PROTECTION

As stated earlier, the duration of protection offered by the SCU depends on the level of work being done while wearing it. The more work, the higher the oxygen consumption and carbon dioxide production, and the shorter the effective time of protection. Duration also depends on body weight. In general, heavier persons will have a reduced protection period.

WARNING: Two signs are indicative of oxygen and CO₂ concentrations which limit the duration of protection. They can be used by the wearer to judge when the protection time has ended and the hood must be taken off. They are:



- 1. An increase in carbon dioxide concentration to a level in excess of 6 - 7% will cause a feeling of high anxiety and suffocation. As soon as you feel these symptoms, get out of the danger area and remove the hood.**
- 2. The reduction in oxygen concentration caused by oxygen consumption will cause the hood to collapse around the head. As soon as you feel the hood start to collapse against your face, get out of the danger area and remove the hood.**

NOTE: Due to the many possible workload needs that may arise in escaping from toxic environments, only general guidance can be given to help assess the duration of protection. The user has the responsibility to determine for themselves the suitability of using the SCU for their particular application.

Typical workload scenarios to illustrate the performance of the SCU for an average 165 lb. Person:

1. Waiting for the aircraft to land or to be rescued (17 minutes) and then escaping from the danger zone during 3 minutes at moderate workloads like a level walk (80 Watts). The total duration is 20 minutes.
2. Sitting waiting to be rescued. The total duration is up to 60 minutes.

INSPECTION

Inspection of the SCU is essential for proper maintenance. Visual inspection confirming that the “Replace-by-Date” has not been exceeded, and the humidity indicator is blue are all that is necessary. If a unit is found with a pink humidity indicator, it must be removed from service and returned to Essex for evaluation. Follow the specific **humidity indicator** inspection for your particular model of SCU listed below:

MR-10010N: Open the carrying pouch and carefully remove the unit until the humidity indicator is clearly visible. After inspection, place the unit back in the carrying pouch and secure the pouch closed by resealing the Hook and Loop closure.

MR-10011N: Carefully cut the clear tape on the bottom of the white box. Do not attempt to cut the red tear strip tape on top of the box. Carefully remove the unit until the humidity indicator is clearly visible. After inspection, place the unit back in the box, and secure the box closed with clear acrylic tape or equivalent.



SPECIFICATIONS

Time Duration

Typically 20 minutes depending on workload level and body weight. Up to 60 minutes for a person waiting to be rescued.

Typical Workload Profile Examples (For a 165 lb. Person)

17 minutes seated followed by 3 minute evacuation up to 20 minutes

Sitting waiting to be rescued up to 60 minutes

Source of Breathable Air

Bottle of 100% Aviator's Grade Compressed Oxygen. Bottle has overpressure protection to prevent rupture

Carbon Dioxide Control: Patented passive scrubbers

Donning Time (maximum): 10 seconds

CO₂ (max avg.): 4 %

CO₂ (maximum): 7%

O₂ (minimum value): 18%

O₂ Activation: Manual

Shelf Life: 10-years 6-months from the Date of Manufacture

Sizing/Fitting: Fits 5th to 95th percentile adults without adjustment

Visibility: Able to read exit sign at 5 yards with maximum misting

Oral Communications: Effective at 4 yards

Inside Hood Temperature: 104°F max @ 68°F ambient

Operating Temperature Range: 5°F to 120°F



Stowage Temperature Range:	-20°F to 185°F	
Operating Altitude:	Sea level to cabin pressure altitude of 10,000 feet.	
Stowage Altitude:	Sea level to 40,000 feet.	
Thermal Resistance:	-Radiant Heat	1.0 BTU/sq. ft. for up to 60 seconds
	-Dripping Thermoplastic	390°F
	-Transient Flame	1800°F for 5 seconds
Protection Factor (typical):	260 @ 80 Watts	
Size (vacuum pack):	Durable Fabric Soft Pouch:	7 ½ inches x 2 inches x 9 ½ inches
	Standard Box:	8 inches x 10 inches x 2 ¼ inches
Weight:	Barrier Pouch alone - 1½ lbs. Durable Fabric Soft Pouch with unit - 2 lbs. Standard Box with unit - 2 lbs.	

TRAINING UNIT

The SCU is designed for use by trained personnel or individuals under their supervision. To facilitate training, a special training hood is available.

The SCU training hood looks and feels the same as an active hood. It is made of similar materials and is donned/doffed in the same way. However, unlike the active SCU, it is designed to be used more than once and is different from the active unit in the following points:

- * Its oxygen cylinder is empty and the valve is non-functional. Therefore, when pulling the ball and cord, **no hiss** will be heard, nor will the hood inflate. It is important to mention this point in training sessions.
- * Ventilation holes are provided to prevent suffocation due to lack of oxygen. Of course, it offers no protection to the wearer against the outside atmosphere.
- * CO₂ scrubbers have been replaced with non-functional scrubbers.



- * It contains no hazardous chemicals and therefore can be disposed of normally after multiple uses.

WARNING: Active Essex SCU's can be used for training purposes, but are for one-time use only. They can serve in real-life trials or performance tests, but must not be used for multiple training cycles.

CLEANING OF TRAINING UNIT

Periodic cleaning of the training hood is all that is needed to keep them in working order. Use a 50/50 mixture of alcohol and water to moisten a cotton cloth. Wipe all inside and outside surfaces, let dry.