



**CBRN Fan-supplied Positive-pressure Breath-responsive Respirator**



**User Instructions**



100423-01 K  
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## **Warning**

Improper use of this respirator may result in personal injury or death. Improper use includes, but is not limited to, use without adequate training, disregard of the warnings and instructions contained herein and failure to inspect and maintain this respirator.

This respirator is not intended for use in atmospheres which are, or may become, Immediately Dangerous to Life or Health (IDLH), in atmospheres where the identity and/or concentration of the contaminant is unknown or in oxygen-deficient atmospheres.

## **Warning (USA)**

Before occupational use of this respirator a written respiratory protection program must be implemented meeting all the local government requirements. In the United States employers must comply with OSHA 29 CFR 1910.134 which includes medical evaluation, training, and fit testing.

## **ABOUT THESE USER INSTRUCTIONS**

These user instructions refer to the following user instructions for components and accessories of the SE40:

- Supplementary manual – SE400 advanced functions (600007)
- SE-shield Tychem F<sup>®</sup> (100184-04)
- SE-shield Encapsulated (100292-02)
- Tychem F<sup>®</sup> Hood (100259-04)
- Breathing hose cover HC-TF (100257-03)
- Foam insert SEA-FI (100287-03)
- GBCO (600010)
- Fit test adapter FTA-400 (100288-03)
- Back pack BP2 (100267-03)
- Exhalation valve shield EVS (201540-03)
- Dual battery adapter DB1 (100273-03)

The above user instructions are supplied with the components. They are also available at The S.E.A. Group website, [www.theseagroup.com](http://www.theseagroup.com)

## DESCRIPTION OF THE SE40



The SE40 is a powered air-purifying respirator (PAPR) designed to give protection from breathing hazards during emergency response to acts of terrorism or natural disasters. It is a high-performance PAPR known as an FPBR (Fan-supplied Positive-pressure Breath-responsive Respirator).

The SE40 has a built-in microprocessor that monitors the user's breathing pattern and adjusts the airflow to ensure continuous positive pressure in the facepiece even during high exertion. Because the SE40 delivers breathing air only when needed, battery power and filtration media capacity are conserved.

### **Positive pressure**

Positive pressure increases breathing protection.

An airtight "face seal" – between the facepiece and the user's face – is critical for good respiratory protection. In practice it is very difficult to maintain a perfectly airtight face seal under all conditions. Even momentary loss of sealing can greatly reduce the level of protection.

By maintaining a slightly elevated air pressure inside the facepiece at all times, any leakage will flow outward, thus preventing inward leakage of contaminated air to the breathing zone.

A conventional PAPR delivers an essentially constant flow of breathing air to the facepiece. During high exertion the user may take very deep breaths that momentarily exceed the delivery rate of the PAPR. At these times the facepiece pressure becomes negative and inward leakage of contaminants can occur.

Because the SE40 "FPBR" is breath-responsive, continuous positive pressure can be maintained at peak inhalation airflows up to and exceeding 350 litres per minute.

Positive pressure reduces breathing resistance.

Because the air in the breathing zone is maintained at a very small positive pressure, the user feels little or no breathing resistance. By reducing the breathing effort and discomfort, he or she has more energy and awareness to do the job at hand.

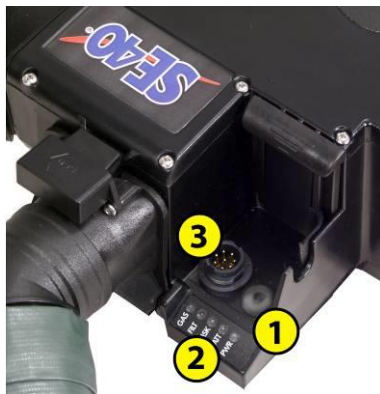
## Main components

A comprehensive list of components is given in section *Components of the SE40*.



1. Fan unit
2. Filtration media
3. Breathing hose with protective cover fitted
4. Facepiece
5. Demand valve
6. Exhalation valves shield
7. Battery(s)
8. SE-Talk speaker unit
9. Back pack

## Features



1. ON/OFF button
2. Status lights panel
3. Communication socket



4. Two threaded connectors for filtration media
5. Third threaded connector permanently plugged
6. Three threaded nuts for attachment to SE-shield protective suits



7. Warning light

## **NIOSH approval (USA)**

The SE40 is approved in the USA by NIOSH for use in CBRN (Chemical, Biological, Radiological and Nuclear) environments, where:

- hazards are known and characterised
- oxygen deficiency is not present

The SE40 is also approved for escape from additional unknown or unexpected hazards, such as a secondary CBRN device.

*Note (USA): The respirator components and filtration media must be used only in the configurations indicated on the NIOSH Approval Labels.*

## **CE approval (Europe)**

The SE40 is approved in Europe to BS 8468-4:2008 for use during rescue, evacuation, escape, hazard containment and decontamination, and similar activities by emergency responders in areas contaminated by CBRN agents. The approval assures conformity with the Essential Health and Safety Requirements of PPE Regulation (EU) 2016/425. Conformity was assessed by INSPEC International Limited (notified body number 0194), 56 Leslie Hough Way, Salford, Greater Manchester, M6 6AJ, United Kingdom.

The CE marking is as follows: **CE 0194**

The manufacturer's Declaration of Conformity can be found at [www.sea.com.au/seshield/docs/std\\_se40\\_eu\\_doc\\_2206.pdf](http://www.sea.com.au/seshield/docs/std_se40_eu_doc_2206.pdf)

The SE40 is a Type 2A device – it is based on a full face mask and is for use by emergency responders that do not need to use optical systems.

The SE40 respirator with 125-CBRN1-CE filter has the following classification:

BS 8468-4:2008 Class 90 TM3P SL

*Note: This filter classification applies only to this standard and this filter/respirator combination. Take care not to confuse these markings with those on a filter or device relating to another European Standard.*

### **Warning**

Failure to choose a respirator equipped with filtration media suitable for the contaminant(s) in the atmosphere or likely to be released in the atmosphere may result in little or no protection and may expose the wearer to substances which can cause serious injury or death.

## **CAUTIONS AND LIMITATIONS**

When using this respirator, observe the following cautions and limitations.

### **Warning**

Failure to observe these Cautions and Limitations may reduce breathing protection and may result in injury or death.

### **Oxygen levels**

- Not for use in atmospheres containing less than 19.5% oxygen.
- This respirator delivers purified ambient air. It does not generate oxygen.

### **Breathing hazards**

- Not for use in atmospheres immediately dangerous to life and health (IDLH) or where hazards have not been fully characterised.

- For entry, do not exceed maximum use concentrations established by regulatory standards.
- (USA) The CBRN PAPR (tight-fitting facepiece) with canister approvals (TC-14G approval labels) may be used for escape from IDLH atmospheres.
- If during use an unexpected hazard is encountered, such as a secondary CBRN device, pockets of entrapped hazard or an unforeseen hazard, immediately leave the area for clean air.
- This respirator provides respiratory protection against inhalation of radiological and nuclear dust particles. Procedures for monitoring radiation exposure and full radiation protection must be followed.
- If you sense any of the following danger signals:
  - smell or taste of contaminants
  - eye, nose or throat irritation
  - breathing difficulty
  - uncomfortably warm breathing air
  - dizziness, nausea or vomitingimmediately leave the contaminated area. Do not remove the respirator until you have reached clean air and after decontamination as required.
- Some CBRN agents may not present immediate effects from exposure, but can result in delayed impairment, illness or death.

### **Explosive atmospheres**

- Contains electrical parts which may cause an ignition in flammable or explosive atmospheres. Do not use in flammable or explosive atmospheres.

### **Exposure to flame**

- Do not use in contact with flame. Do not use for fire fighting.

### **Decontamination**

- Direct contact with CBRN agents requires proper handling of the respirator after each use and between multiple entries during the same use. Decontamination and disposal procedures must be followed. If contaminated with liquid chemical warfare agents dispose of the respirator after decontamination.

### **Dermal (skin) hazards**

- Use in conjunction with personal protective ensembles that provide appropriate levels of protection against dermal hazard. Failure to do so may result in personal injury even when the respirator is properly fitted, used and maintained.

### **Duration of use after exposure to chemical warfare agents**

- Do not use beyond eight (8) hours after initial exposure to chemical warfare agents to avoid the possibility of agent permeation.
- Do not use beyond two (2) hours after initial exposure to liquid chemical warfare agents.

### **Follow these User Instructions**

- Failure to properly use and maintain this respirator could result in injury or death.
- Follow these user instructions and established canister change-out schedules to ensure canisters are replaced before breakthrough occurs.
- Never substitute, modify, add or omit parts. Use only exact replacement parts in the configuration as specified by the manufacturer.

## Compliance with regulations

- (USA) All approved respirators shall be selected, fitted, used and maintained in accordance with MSHA, OSHA and other applicable regulations.
- Use replacement parts in the configuration as specified by the applicable regulations and guidance. Consult the respirator Approval Label (USA) for approved configurations.

## Special instructions apply

- Special or critical user instructions and/or specific use limitations apply. The SE40 is a unique design of respirator. Read the user instructions carefully before donning.

## UNPACKING

The SE40 respirator is delivered in ready-to-use configuration, in its own reusable carry case suitable for transport, handling and storage. It has an outer carton for delivery.

### The carry case contains:

- SE40 respirator fully assembled, consisting of:
  - fan unit SE40
  - breathing hose H20
  - Single-use breathing hose cover HC-TF (plus one spare, optional)
  - facepiece RF3-FP-C
  - demand valve DV3-C
  - exhalation valves shield EVS
  - backpack BP2
  - speaker unit S1A-20
  - dual battery adapter DB1 (optional)
- Up to two (2) batteries B1 (level of charge not assured) (optional)
- Up to four (4) sealed filtration media (optional)
- Battery charger BC3 (optional)
- Power supply PS1 and AC power cable PC-USA for charger (optional)
- Up to two (2) SE-shield Tychem F<sup>®</sup> single-use protective suits S-TYVF<sup>1</sup> (optional)
- SE-shield breathing hose H20-P for use with SE-shield suit<sup>1</sup> (optional)
- Up to two (2) Tychem F<sup>®</sup> hoods H-TYVF (optional)
- SE40 user instructions
- NIOSH Approval Label (USA)
- Prefilters 221 and prefilter holders PFH-T (optional)
- Data cable DC-A-2 for connection to PC (optional)
- CD-ROM containing user instructions and management software (optional)

<sup>1</sup> Component not approved to BS 8468-4:2008.

The SE40 may be delivered with different configurations of these components. Check that all components are received as ordered, and undamaged. After checking, repack components in the carry case in ready-to-use configuration. For correct packing configurations, consult the “how to pack” instructions in the carry case.

The carry case contains a chart showing how to pack the components. When not in use the SE40 should be kept in this condition at all times to ensure the equipment is properly protected.

Filtration media must always be stored in sealed foil packaging and carton.



## FACEPIECE FITTING

### Warning

Failure to perform a facepiece fit test may result in little or no respiratory protection and may expose the wearer to substances which can cause serious personal injury or death.

The SE40 is designed to maintain positive pressure inside the facepiece even under conditions of high workload and stress. However, a quality face seal is essential for optimum protection. This is particularly important in the event that the blower unit stops operating and the SE40 must function as a negative pressure respirator.

A user must pass a Quantitative Fit Test (QNFT) and achieve a fit factor of at least 2000 before being assigned a respirator. This is a negative pressure test; i.e.: with the fan unit disconnected or not operating.

### Quantitative Fit Test

A Quantitative Fit Test (QNFT) gives a numerical measure of facepiece fit.

The user wears a respirator in a test atmosphere while an instrument compares the concentration of the challenge agent in the test atmosphere with that inside the facepiece. The test atmosphere may be air contaminated with an aerosol, vapour or gas. With some instruments ambient air can be used.

The QNFT protocol must be in accordance with appropriate government regulations.

Facepiece fit testing has a number of aims:

1. To assess the suitability of the respirator for each person for use in real situations.  
Due to natural variations in human facial features, no one size or style of full facepiece can be guaranteed to fit everyone. A QNFT, properly conducted, can be used to determine if the respirator is suitable for each user.
2. If the respirator is found to be unsuitable, to determine if the same respirator fitted with the Full Face Mask Insert (SEA-FI) is suitable.  
The Full Face Mask Insert is an adhesive-backed foam strip, inserted behind the face seal, intended to accommodate unusual facial features or small faces. Once again, a QNFT must be performed to determine if this configuration is suitable for each user.
3. To train each user in the correct donning technique that will ensure a good facial fit during future use.

It is extremely important that the donning technique learned by each user during the QNFT is employed in all future use, where fit testing will not normally be available. In particular, the head harness tension used to pass the QNFT should be appropriate for extended use in real situations; if excessive harness tension is needed to pass, the respirator should be considered unsuitable, and should not be used by that person.

### QNFT Procedure

The recommended method for performing the QNFT is with the S.E.A. Fit Test Adapter (FTA-400). Alternatively, a modified test facepiece may be used.

Both methods are described below.

#### To prepare for a QNFT using the Fit Test Adapter FTA-400:

1. Detach the breathing hose from the SE40 facepiece. Do not remove the Exhalation Valve Shield (EVS) from the demand valve

2. Attach the FTA-400 to the facepiece in place of the breathing hose and attach a HE/P100 particulate filter, following the user instructions provided with the FTA-400. The SE40 facepiece is now configured as a negative pressure respirator. The SE40 fan unit is not required for this test
3. Check that the facepiece, demand valve, exhalation valve shield and FTA-400 are complete and correctly assembled
4. Don the respirator in accordance with section *Donning the SE40* step 2 and steps 4 through 9

**To prepare for a QNFT using a test facepiece:**

1. Detach the breathing hose from the SE40 facepiece. Do not remove the Exhalation Valve Shield (EVS) from the demand valve
2. Attach to the breathing hose a modified SE40 test facepiece containing a sampling port connecting to the breathing zone of the facepiece. The test facepiece should be leak tested by a suitable method prior to use.
3. Fully assemble the SE40, including canisters. The SE40 can now be tested, with the blower off, as a negative pressure respirator
4. Don the respirator in accordance with section *Donning the SE40* steps 1 through 9 and step 12

**To perform a QNFT:**

1. Prepare and don the respirator using one of the methods described above
2. An assistant should inspect the fit of the respirator. Check for significant gaps between the rim of the facepiece and the user's face. If significant gaps are visible, consider fitting the Full Face Mask Insert (SEA-FI). Doff the facepiece, fit the Insert in accordance with its user instructions, and don the facepiece as before.
3. Enter the test atmosphere (if required) and connect the test instrument's sampling tube to the sampling port on the FTA-400 or test facepiece
4. Perform an appropriate QNFT exercise sequence and determine the fit factor
  - i. If the fit factor is 2000 or greater, the respirator should be considered suitable for the user. No further testing is required
  - ii. If the fit factor is less than 2000, an observer should check that the respirator is correctly assembled, and properly fitted in accordance with section *Donning the SE40* step 9. The user should check head harness tension and adjust if necessary. Go to step 5 below
  - iii. If during step ii above the observer detects fitting problems which cannot be overcome by adjustment – in particular, visible gaps between sealing rim and the user's face – the Full Face Mask Insert (SEA-FI) may provide a solution. Doff the facepiece, fit the Insert in accordance with its user instructions, and don the facepiece as before. Go to step 5 below
5. Repeat the QNFT and determine the fit factor
  - o If the fit factor is 2000 or greater, the respirator in the configuration tested – with or without Insert as appropriate – should be considered suitable for the user. No further testing is required
  - o If the fit factor is again less than 2000 the respirator should be considered unsuitable and should not be used by that person

*Note: Some "trial and error" is acceptable when carrying out facepiece fit testing. Sound judgement by experienced personnel is essential when assessing the suitability or otherwise of a respirator. Remember that the donning and adjustment method used during testing must be appropriate for subsequent use in real situations.*

## PREPARATION FOR USE

### Donning the SE40

The user must be familiar with and practise the donning and doffing procedures prior to respirator use.

#### Warning

Men should be clean-shaven, and should not have facial hair such as beards or large sideburns. Facial hair can seriously compromise the face seal and result in reduced protection.

*Note: Before donning a respirator for the first time, perform a facepiece fit test per section Facepiece Fitting. SEA recommends that each new (unused) respirator be tested for facepiece fit even if the user is experienced with the respirator.*

*Note: Users who have been approved to use the SE40 only with Full Face Mask Insert (SEA-FI) should check that the insert is correctly fitted and is in good condition prior to donning.*

*Note: Before first use and after maintenance, perform a respirator "Self-Test". Refer section Operation.*

*Note: Users should be well hydrated before donning and using the respirator.*

*Note: When donning the SE40 with an SE-shield protective suit, consult the SE-shield user instructions.*

#### Procedure:



1. Visually inspect the respirator for completeness, correct assembly and lack of damage
2. Put the facepiece neck strap over your neck
3. Put the backpack on your back, fasten and adjust the straps
4. Fully loosen the head harness straps
5. Clear all hair away from your face. A thin elasticised head band may be used, provided it is kept clear of the face seal
6. Holding the facepiece in one hand and the head harness in the other, place your chin in the cup of the facepiece
7. Pull the head harness over and down the back of your head and stroke it down. Clear any hair away from the face seal



8. Tighten the head harness straps in pairs by pulling the free ends backwards. Start with the neck straps, followed by the temple straps and finally the forehead strap
9. Check that the face seal touches the skin all around, especially under the chin cup and at the temples. Try moving the mask to verify that there is no slippage. The straps should be tightened firmly enough to prevent movement on the face during use, but should not be overly tight. Excessive tightness may lead to increasing discomfort during use. Check once again that there is no hair under the face seal
10. Turn on the fan unit by pressing and releasing the button on the speaker unit. Alternatively, press and release the ON/OFF button on the fan unit
11. Perform a User Seal Check \* by pressing and holding the SE-Talk button for more than three seconds, causing the SE40 to run at full fan speed ("Demist mode"). You should not feel any air leakage around the face seal. After 20 seconds the SE40 automatically returns to normal operating mode. If any leakage is evident, correct immediately by restroking the head harness to the back and retighten neck, temple and forehead straps. The straps should be tightened firmly enough to prevent movement on the face during use, but should not be overly tight. Excessive tightness may lead to increasing discomfort during use. Check once again that there is no hair under the face seal
12. Rotate your head and check for comfortable, free movement. Adjust hose swivel at mask end as required.
13. Adjust the level of the speaker unit whilst speaking



14. Check the warning light in front of the mask. It should not be lit. The audible alarm should be silent. If not, investigate. Do not enter a contaminated area until it is resolved
15. Don any outer protective clothing as required. You are now ready to enter a contaminated area.

*\* Note: The User Seal Check is a simple check for gross leakage prior to use. It is not a substitute for a quantitative fit test (QNFT).*

### **Buddy Check**

When entering a contaminated area in groups of two or more, it is good practice to perform a “buddy check”. Pairs of users should visually inspect – but should not adjust – each other’s respirators, checking for things like correct mask positioning, strap tightness, absence of hair in the face seal, correct fitment of battery, hose and hose cover, filters and accessories, etc. Check that the fan unit is operating correctly by observing the status lights panel on the fan unit (refer to section *Operation* for further details).

### **Warning**

If the facepiece has been properly donned and adjusted, detection of contaminant odour or taste, or irritation of eye, nose or throat during use may indicate exhaustion of the filtration media. Return to fresh air immediately without removing the respirator, check facepiece fit and replace filtration media. Used filtration media should be disposed of properly in accordance with state and/or local guidelines for disposal of contaminated material.

(attach CD-ROM here)

## WORKING IN A CONTAMINATED AREA

Before entering a contaminated environment, ensure that the SE40 is suitable for use in that environment. Consult section *Cautions and Limitations*.

For information on the operation of the SE40, see section *Operation*.

- Try to remain relaxed at all times. Breathe normally.
- Do not over-exert yourself if you don't have to. Reducing effort prolongs battery and filtration media life.
- Be aware of the SE40 warnings (facepiece warning light, audible alarm)
- While moving about, take care not to catch the breathing hose or cables on obstacles.
- In the event of a malfunction of the SE40, do not panic. Leave the contaminated area quickly but safely. Do not remove the facepiece from your face until you have reached clean air and have been decontaminated. Remember that even without the blower operating the SE40 continues to function as a negative-pressure APR and gives considerable protection.
- If you sense any of the following danger signals:
  - smell or taste of contaminants
  - eye, nose or throat irritation
  - breathing difficulty
  - uncomfortably warm breathing air
  - dizziness, nausea or vomitingimmediately leave the contaminated area. Do not remove the respirator until you have reached clean air and have been decontaminated.

### **Decontamination**

After exposure in a CBRN environment, the respirator and the user must be decontaminated in order to prevent contamination of clean areas, and to prevent contamination of and injury to the user and other personnel.

Decontamination procedures should be developed as part of the organisation's respirator program and should be appropriate to the hazards involved.

When developing a decontamination procedure, consider the following guidelines:

- The SE40 is water-resistant. It is NOT waterproof! Never submerge the SE40 in water.
- Leave the speaker unit connected to the fan unit. This will protect the connector terminals.
- Do not remove the facepiece or turn off the blower until after initial decontamination.
- After removing the facepiece, do not allow direct water streams inside the facepiece. Water may enter the fan unit through the breathing hose and cause serious damage.
- Do not use compressed air when cleaning. The SE40 contains sensors for measuring facepiece pressure and ambient pressure that may be damaged.
- Filtration media should always be discarded after decontamination in a shower.
- Batteries can be decontaminated in a water shower. After doing so, shake off the water and place it on a dry surface with the contacts downwards. Batteries should be thoroughly dry before recharging.
- The breathing hose is fitted with a single-use chemically resistant cover. This cover should be removed and discarded during decontamination. The breathing hose should be decontaminated after the cover has been removed. A replacement cover should be fitted ready for next use. Consult user instructions supplied with the hose cover.
- Do not disconnect the breathing hose from the facepiece or fan unit during decontamination. If disconnected, water may enter and damage the respirator.

**Note:** Before decontaminating with a high pressure shower, it is advisable to remove the prefilters, which may become waterlogged and block the airflow.

**Note:** If the respirator has been exposed to chemical warfare agents, S.E.A. recommends that the respirator be decontaminated and disposed of in accordance with state and local guidelines for hazardous waste materials.

**Note:** All disposable contaminated material – such as filtration media, prefilters and breathing hose covers – should be disposed of in accordance with state and local guidelines for hazardous waste materials.

After decontamination, the SE40 should be repacked in its carry case as soon as possible to prevent damage or loss of components.

After use, the SE40 should be returned to ready-to-use condition as soon as possible. This normally involves:

- thorough cleaning of external surfaces. Do not use solvents on the SE40
- visual inspection for condition and completeness
- replacement or repair of components as required
- replenishing the SE40 carry case with spare filtration media as required
- recharging of battery(s)
- performing a Self-Test
- ensuring all parts are dry before repacking
- repacking in ready-to-use configuration

## STORAGE AND TRANSPORT

The SE40 is designed to withstand harsh working conditions and inhospitable environments. However, proper storage and transport methods will prolong the life of the respirator and ensure it is always capable of optimum performance.

The SE40 respirator must be stored in ready-to-use configuration, in the carry case provided. For correct packing configurations, consult the “how to pack” instructions in the carry case. Filtration media must always be stored in sealed foil packaging and carton.

When storing or transporting the SE40, keep in mind the following points:

- Store in ready-to-use configuration inside SE40 carry case. Ensure the respirator is packed correctly. See section Ready-to-use Configuration
- Store in clean and dry area
- Store in ambient conditions between –20 and +55°C (–4 and +131°F) and less than 70% relative humidity. Battery may be stored at +55°C no longer than one month. For longer term storage, consult section *Battery care and maintenance*.
- Protect the respirator, components and carry case from potential causes of damage such as sharp edges, heavy weights, abrasives, chemicals and moisture
- Avoid sources of vibration
- Do not store in direct sunlight
- Do not stack SE40 respirators in carry cases more than three units high. Ideally they should be stored in shelving without stacking

### Warning

Batteries in storage do not retain full charge indefinitely. Periodic recharging is necessary to maintain full charge. Consult section *Batteries* for more information on charging and maintaining batteries.

**Note:** Respirators in storage require periodical inspection and maintenance. Consult section Cleaning and Maintenance.

In the USA, OSHA requires that emergency use respirators be inspected at least once per month and before and after use to ensure they are in good operating condition.

## COMPONENTS OF THE SE40

### **Fan unit (SE40)**

The fan unit SE40 contains a centrifugal blower for drawing purified air from the canisters and delivering it under pressure to the facepiece via the breathing hose. It is constructed from rugged ABS plastic.

The SE40 fan unit has two threaded connectors for attachment of filtration media. A third (central) connector is permanently plugged.

The fan unit contains electronics that control the air delivery rate. It also has many advanced functions such as warnings for filter end-of-life and filter missing, logging of important operating data and real-time monitoring of facepiece pressure. It can be connected to a PC for configuring the fan unit parameters and downloading operating data. Consult supplementary manual, *SE400 advanced functions*.

The fan unit model number SE40 is located on the identification label on its underside.

### **Warning**

The plug in the central filtration media connector is permanent. Do not attempt to remove it. Removing the plug will result in damage to the fan unit and will void the warranty.

Each filter position is fitted with an external thread, gasket and nut for connection to SE-shield suits. Consult the SE-shield user instructions for use.

*Note: The SE-shield suit-sealing nuts should remain fitted to the fan unit at all times, even when not used with a suit, in order to protect the threads from damage.*

### **Breathing hose (H20)**

The breathing hose H20 conveys purified air from the fan unit to the facepiece. It also links the facepiece pressure detection, speech microphone and warning light to the fan unit. The flexible hose is made from tough polyurethane.

The breathing hose should remain connected to the fan unit at all times.

The breathing hose model number H20 is located on the attachment to the fan unit, and is not visible when the hose is fitted to the fan unit.

### **SE-shield breathing hose (H20-P)**

The SE-shield breathing hose H20-P is used in place of the H20 when the SE40 is used with SE-shield protective suits. The H20-P directs a small amount of filtered air from the SE40 into the suit, maintaining positive pressure inside the suit. For more information consult section *SE-shield protective ensembles*.

*Note: The H20-P is not approved to BS 8468-4:2008.*

### **Breathing hose cover (HC-TF)**

A single-use Tychem F<sup>®</sup> hose cover (HC-TF) is fitted to the breathing hose to provide maximum permeation resistance against aggressive CBRN agents. The cover should always be fitted with the SE40. The cover should be replaced after each use in a CBRN environment. Contaminated covers should be disposed of properly in accordance with state and/or local guidelines for disposal of contaminated material.

For fitting and removal consult the user instructions provided with the breathing hose cover HC-TF.



## Facepiece

### Facepiece (RF3-FP-C)

The full facepiece RF3-FP-C is available in a single size to fit all faces. It is made from highly chemically resistant halo-butyl rubber. The visor is made from high-clarity polycarbonate with a hard coating for chemical and scratch resistance.

The demand valve regulates the air flow to the facepiece in response to the user's breathing requirements. It is made to S.E.A.'s patented design.



The facepiece can be identified by the markings:

“RF3” on demand valve attachment inside inner mask

“FP” on mask body above visor and “C” on corner of visor

*Note: If a good face fit cannot be achieved for a particular user, the S.E.A. Full Face Mask Insert (SEA-FI) may be fitted to the mask to improve the fit. This should be done in conjunction with a face fit testing program. See section Facepiece Fitting.*

### Demand Valve (DV3-C)

The demand valve DV3-C is attached to the front of the facepiece. It should remain fitted to the facepiece at all times other than for periodic thorough cleaning or if necessary for maintenance.

The demand valve model number DV3-C is located on the outer surface of the housing.

### Exhalation Valve Shield (EVS)

The Exhalation Valve Shield is a one-piece cover that protects the exhalation valves from contamination by external splashing. It is fitted over the demand valve and is held in place by the breathing hose.

The Exhalation Valve Shield should always be fitted to the SE40.

The model number EVS is located inside the part.

### Filtration media

Use only filtration media approved for use with the respirator. (USA) Consult the NIOSH approval label supplied with the respirator and filtration media.

Filtration media are single-use only.

#### To fit the filtration media to the fan unit:

1. Check that the model number on the filtration media packaging is correct and that the use-by date has not expired

2. Check that the sealed foil packaging is intact
3. Cut and tear the foil and remove the filtration media
4. Check the filtration media for damage. Filtration media with visible physical damage should be discarded immediately
5. Check that the threads on the filtration media and fan unit are clean and the gaskets in the fan unit are clean, undamaged and properly seated
6. Screw each of the filtration media into the fan unit and tighten firmly. Spin the filter until it begins to tighten, then turn another 120° or so (slightly more than a quarter turn). Take care not to overtighten. Note that the fan unit gasket has a self-locking design, so the turning resistance will increase steadily as the canister is tightened.

**To remove the filtration media from the fan unit:**

1. Simply unscrew and remove.

## **Batteries (B1)**

The SE40 is powered by one or two rechargeable Nickel Metal Hydride (NiMH) batteries. Batteries can be easily interchanged. If used and maintained correctly a battery will give a service life of up to 500 charge/discharge cycles.

### **Single battery configuration**

When used in single battery configuration, the battery is fitted directly to the SE40 fan unit.

### **Dual battery configuration**

The Dual Battery Adapter is used to provide dual battery configuration for the SE40, giving it extended operating time. See section *Dual Battery Adapter*.

### **Battery operating time**

The operating time of the SE40 when fitted with fully charged battery or batteries greatly depends on the workload of the user, in the same way that a motor vehicle's fuel consumption depends on the load, terrain and manner of driving.

Prolonged periods of high exertion and/or stress will significantly reduce the operating time. In these situations the user can expect a shorter available working time in a contaminated area.

NIOSH has certified the operating time of the SE40 at 4 hours minimum, in both single and dual battery configurations, under standard test conditions (38 litres per minute) when tested on a breathing machine (USA).

### **Warning**

The above operating times are not guaranteed in real situations. Actual operating times may be significantly longer or shorter, depending on working conditions.

*Note: Operating time is affected by the following:*

- *Conditions of use. High breathing rates will result in reduced operating time.*
- *Level of charge of battery(s). Only fully charged batteries should be fitted to the SE40 before use.*
- *Battery condition. Batteries degrade over their working lives. A battery nearing the end of its life will have a reduced capacity. A battery should be replaced when the operating time has reduced significantly.*
- *Battery temperature. Towards the upper end of the operating temperature range of the SE40 (see section Specifications) battery performance diminishes only slightly. At battery temperatures below 5°C (41°F), capacity diminishes sharply. Allow batteries to cool after charging and before use.*

## Low battery warning

The SE40 gives a series of audible and visible warnings as the end of operating time approaches. The first low-battery warning occurs approximately 5 minutes before the SE40 shuts down. The warning time is independent of the operating conditions.

*Note: The SE40 provides full breathing performance at all times until the fan unit shuts down due to low battery level.*

### Warning

Old batteries in poor condition may cause the low battery warning time to be reduced.

## Battery care and maintenance

Batteries in storage do not retain full charge indefinitely. Periodic recharging is recommended to maintain full charge.

Never allow a battery to become fully flat whilst in storage. A fully discharged battery may suffer permanent degradation over time.

Ideally, batteries should be stored in the temperature range 10 to 25°C (50 to 77°F) to minimise degradation during long-term storage.

Batteries in long-term storage should be recharged at least once per year, and preferably every six months, to minimise degradation.

Optimum battery condition is maintained by storing batteries in the Gang Battery Conditioner (GBCO) (not supplied with the SE40 respirator). When stored in the GBCO, batteries receive regular conditioning cycles and are maintained in ready-to-use condition, with close to full charge. Consult the user instructions provided with the GBCO.

### Warning

If handled incorrectly, NiMH batteries can leak toxic electrolyte, and in some circumstances explosion may occur. Be sure to observe the following safety precautions:

- Never disassemble a battery
- Never short-circuit the terminals of a battery. Do not carry or store a battery with other metal objects as short-circuiting may result
- Never heat a battery or dispose of it by fire. Leakage and explosion may result
- Never leave a battery exposed to direct sunlight, or close to a source of heat, for extended periods whilst not in use
- Never immerse a battery in water or other liquid
- The battery is designed specifically for the SE40 and SE400 range of respirators. Do not attempt to use it to power any other equipment.

**To attach the battery to the fan unit:**



1. Check that the contacts on the battery and the fan unit are clean and intact
2. Withdraw the locking slide on the fan unit
3. Press the locking tongue
4. Hook the battery onto the fan unit. The two posts on the fan unit should engage with the sockets on the battery
5. Swing the battery into place and release the locking tongue



6. Push the locking slide back into place
7. Check that the battery is securely fastened

**To remove the battery from the fan unit:**



1. Withdraw the locking slide
2. Press the locking tongue, releasing the battery
3. Push the locking slide back into place

## **Battery charger (BC3)**

The Battery Charger BC3 fully charges a single battery (B1 or later) in five hours.

The charging cycle consists of two phases:

1. Fast charging – battery is charged to approximately 90-95% capacity within two hours
2. “Post trickle charge” – slow charge to reach full capacity.

After charging a battery the charger switches off automatically. Removing a battery and replacing it will restart the charging process.

### **To charge a battery:**

1. Check that the contacts on the charger and battery are clean and intact
2. Connect the charger to the mains AC supply using the power cable and power supply included with the SE40. The charger’s indicator light flashes red/green for about five seconds, then turns off
3. Insert the battery contacts into recess in the charger
4. Snap the battery into place
5. Observe the indicator light. Normally the battery will commence charging immediately.

## **Indicator lights**

| <b>Light</b>                          | <b>Status</b>   | <b>What to do</b>   |
|---------------------------------------|---|---|
| STEADY ORANGE                         | Battery charging normally   | Wait until charged  |
| FLASHING ORANGE                       | Battery temperature too high or too low to commence charging                            | Wait. Charger will automatically wait until temperature normalises    |
| FLASHING ORANGE/RED                   | Battery charge too low to commence charging normally. Charger trying to recover battery | Wait. Charger will “trickle charge” until normal charge can commence. |
| FLASHING GREEN                        | Battery is charged to approx. 90-95% capacity. Battery is being “post trickle charged”  | Use battery now or leave overnight for full charge                    |
| STEADY GREEN                          | Battery fully charged   | Use battery now or put aside after removing from charger              |
| FLASHING RED with battery inserted    | Faulty battery  | Replace battery   |
| FLASHING RED with no battery inserted | Faulty charger  | Return charger to vendor for repair                                   |

## **Battery charger (BC1)**

The SE40 can also be used with the Battery Charger BC1. The BC1 is similar to the BC3 except that it continues to “post trickle charge” indefinitely after initial charging. For this reason, a battery may be left charging overnight to reach full charge, but should not be left on for longer periods as damage to the battery may result.

## **Dual battery adapter (DB1)**

Consult Dual Battery Adapter user instructions (100273-03).

The Dual Battery Adapter is used to provide dual battery configuration for the SE40, giving it extended operating time. Typically, dual batteries give approximately twice the operating time of a single battery.

The adapter is connected to the fan unit at its battery attachment, and provides two battery locations, one on each shoulder strap of the backpack.

### **Warnings**

Failure to observe the following may result in reduced breathing protection:

- Always fit two batteries. Never operate the SE40 with Dual Battery Adapter with only one battery
- Ensure both batteries are fully charged
- Do not remove or replace a battery whilst the SE40 is operating
- Do not place the Dual Battery Adapter on the battery charger or the GBCO. It may cause damage to the batteries, charger or GBCO.

## **SE-talk speaker unit (S1A-20)**

The SE40 is supplied with an SE-Talk speaker unit that provides clear speech output via a microphone mounted inside the respirator. It connects directly to the fan unit.

The SE-Talk is normally mounted on a shoulder strap of the backpack. When the SE40 is used without a back pack, the SE-Talk may be attached to a shirt pocket, or mounted on the SE40 waist belt using the SE-Talk belt attachment (HSE).

The SE-Talk has a single multi-function control for adjusting the speaker output level. The switch can also be pressed to start the SE40. See section *Operation*.

*Note: To ensure clear communication whenever it is needed, the SE-Talk should always be connected while the SE40 is in use.*

*Note: The SE-Talk cannot be switched off. Simply turn the level down fully when not in use.*

### **To use the SE-Talk:**

1. The SE40 should be donned and running normally
2. Turn the level control fully anti-clockwise. Turn it slowly clock-wise while speaking normally, until a clear, strong sound is produced. Do not adjust the level higher than is needed to produce a clear sound. A good starting point is about half way between minimum and maximum levels.
3. Turn the level down to minimum when speech function is not required.

## **Back pack (BP2)**

Consult Back Pack user instructions (100267-03).

The Back Pack BP2 is the recommended harness for the SE40. A waist belt extender WB-EX is available for larger waist sizes.

## **Waist belt (WB1)**

The waist belt WB1 can be used for wearing the SE400 fan unit on the waist. The fan unit may be positioned on either side of the waist. A waist belt extender WB-EX is available for larger waist sizes.

### **To attach the fan unit to a harness:**



1. Slide the clip on the fan unit down over the centre of the attachment on the harness until it snaps home. (Standard waist belt is shown, but the method applies also to back pack)

### **To remove the fan unit from a harness:**



1. Lift the end of the clip away from the fan unit to release it, then lift the fan unit away

## SE-SHIELD PROTECTIVE ENSEMBLES

*Note (USA): NIOSH does not approve protective suits as part of respirator approvals. For this reason SE-shield suits are not NIOSH approved, nor are they approved for CBRN use. SE-shield suits are not approved as protective suits in the USA.*

*Note (Europe): The SE-shield suits are not approved to European standards.*



SE-Shield is a range of SEA personal protective ensembles for use in hazardous environments.

Each SE-Shield ensemble consists of a pressurised protective suit integrated with the SE40. By directing a small amount of filtered air from the SE40 into the suit via SE-Shield breathing hose H2-P, positive pressure is maintained inside the suit. This provides added body protection and perceived cooling without reducing the SE40's high level of breathing protection.

### Configurations

- SE-shield suits should always be used with the SE-shield breathing hose H20-P. Do not use the SE-shield breathing hose without an SE-shield suit fitted
- SE-shield suits should always be used with dual batteries (with the dual battery adapter DB1 and back pack BP2)

### The SE-Shield range

#### SE-Shield Tychem F<sup>®</sup>

- Disposable, light-weight, single-use suit
- Chemically impermeable Du Pont Tychem F<sup>®</sup> material
- Integrated, barrier film polymer gloves
- Integrated sock booties in Tychem F<sup>®</sup>
- Elasticised opening for mask visor
- Protects against particles and gases
- Suitable for domestic preparedness applications, with high permeation resistance to war agents such as mustard gas and Sarin
- Optional disposable, single-use hood for even greater protection

#### SE-Shield HPS

- Reusable, high performance encapsulated suit
- Suit material Trelleborg Trelchem<sup>®</sup> HPS is a combination of Du Pont Viton<sup>®</sup>/butyl rubber coated fabric on the outside and a polymer barrier laminate on the inside
- Impact and chemical resistant transparent PVC visor
- Integrated barrier film gloves with Viton<sup>®</sup>/butyl rubber outer gloves
- Suitable for domestic preparedness applications, with high permeation resistance to war agents such as mustard gas and Sarin



## **SE-Shield VPS**

- Reusable, vapour protective encapsulated suit
- Suit material Trelleborg Trelchem® VPS is a combination chloroprene rubber coated fabric on the outside and a polymer barrier laminate on the inside
- Impact and chemical resistant transparent PVC visor
- Integrated barrier film gloves with Viton®/butyl rubber outer gloves
- Suitable for domestic preparedness applications, with high permeation resistance to war agents such as mustard gas and Sarin

## **SE-Shield PVC**

- Reusable, PVC coated encapsulated suit
- Suit material polyamide fabric coated with PVC on both sides
- Impact and chemical resistant transparent PVC visor
- Integrated, chloroprene rubber gloves
- Suitable for protection against biological agents such as anthrax and smallpox

## OPERATION

### Visible and audible warnings

#### Warning light

The respirator is fitted with a tri-colour warning light which is always visible to the user during use. During any warning condition the warning light flashes in one of the following colours:

- **Red** indicates a critical warning or a mask pressure warning
- **Green** indicates a battery warning or a minor warning
- **Orange** indicates filter conditions

*Note: If multiple warnings occur simultaneously, a red light will always override an orange, and an orange will always override a green. Check the status lights on the fan unit for more information on the warnings.*

#### Buzzer



The fan unit has a warning buzzer which sounds during many warning conditions.

#### Status lights panel



The fan unit has a panel of five status lights which provide additional information about the warning conditions.

#### Warnings label on fan unit

The SE40 fan unit is fitted with a label which summarises the warning conditions likely to be encountered during operation. The label is shown below. More information on the warnings can be found within this manual and in the supplementary manual, *SE400 advanced functions*.

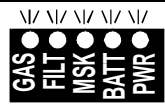



| WARNINGS LABEL |                                       |
|----------------|---------------------------------------|
|                | Mask Pressure Low                     |
|                | Internal Fault                        |
|                | Filters Expired or Faulty             |
|                | Battery Low (momentary warning)       |
|                | Battery Very Low (continuous warning) |
|                | Battery Flat                          |
|                | Self-Test Due                         |
|                | Data Log Full                         |

**To start the SE40:**


1. Check that the respirator is fully assembled and is fitted with a charged battery or batteries
2. Press and release the ON/OFF button on the fan unit. Alternatively, press and release the button on the SE-Talk speaker unit

The SE40 will start and perform an internal self-check, during which the battery charge level will be indicated on the status lights panel. This sequence takes about five seconds.

**Warnings during start-up**

| Lights   | Status   | Condition       | What to do   |
|--|--|-----------------|--|
|   | FIVE steady RED lights   | STRONG charge   | No action required                                     |
|   | THREE steady RED lights  | MEDIUM charge   | Be prepared to change battery during shift             |
|   | ONE steady RED light   | WEAK charge     | Recharge battery or replace with fully charged battery |
|  | PWR flashing GREEN + steady BATT indicator<br>MOTOR DOES NOT START | Battery is FLAT | Recharge battery or replace with fully charged battery |


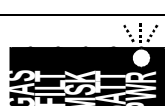
If the SE40 is functioning normally, the PWR status light will be steady green.

| Lights  | Status           | Condition            | What to do    |
|---|------------------|----------------------|---------------|
|  | PWR steady GREEN | All functions normal | Work normally |

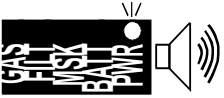
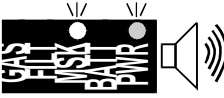
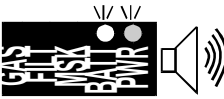


Put on the respirator (see section *Donning*) and breathe normally. After a few breaths it will respond to your breathing.

If you wait longer than one minute before putting on the SE40, it will shut down automatically.

If the SE40 is not running normally, one of the following warnings will be indicated:

| Lights  | Status  | Condition                   | What to do  |
|---|---|-----------------------------|---|
|  | PWR flashing RED<br><b>MOTOR DOES NOT START</b>     | Fundamental operation fault | The SE40 cannot be used. Return to supervisor                     |
|  | PWR flashing RED<br><b>MOTOR RUNS AT FULL SPEED</b> | Secondary operation fault   | The unit can only be used in emergency mode. Return to supervisor |

## Warnings during operation

| Warning light | Status lights and buzzer  | Condition  | What to do   |
|---------------|---|--|--|
| RED           |    | PWR flashing RED.<br>MOTOR SHUTS DOWN!                             | Critical Warning<br>Major fault<br>Keep respirator on your face. Move <b>immediately</b> to safe area **. Return SE40 to vendor for repair.  |
| RED           |    | MSK steady RED, PWR steady GREEN, Continuous buzzer                | Negative pressure in the facepiece. User has momentarily exceeded air flow of SE40, or a respirator fault.<br>If warning continues, move to safe area **. Check equipment to find the cause of the problem |
| GREEN         |    | BATT steady RED, PWR steady GREEN<br>Buzzer sounds once per minute | Low battery power<br>Approx 5 to 10 minutes of operation left *<br>Move to safe area ** Recharge battery, or replace with a fully charged one  |
| GREEN         |  | BATT steady RED, PWR steady GREEN<br>Continuous buzzer             | Very low battery power<br>Approx 2 minutes of operation left *<br>Move quickly to safe area **. Recharge battery, or replace with a fully charged one  |
| GREEN         |  | BATT steady RED, PWR flashing GREEN<br><b>MOTOR SHUTS DOWN</b>     | Battery is FLAT<br>Keep respirator on your face. Move <b>immediately</b> to safe area **   |

\* These times can vary considerably depending on the condition of the battery.

\*\* "Safe area" refers to an uncontaminated area.

### To stop the SE40:

Press and release the ON/OFF button on the fan unit

or

Remove the facepiece from your face. The SE40 will shut down automatically after one minute.

*Note:* The SE40 cannot be turned off using the button on the SE-Talk speaker unit, to prevent accidental shut-down.

### Stand-by mode

If the facepiece is removed from the face, an alarm will sound and the SE40 will enter stand-by mode for one minute.

If the facepiece is refitted within one minute the SE40 will resume normal operation.

If the facepiece is not refitted within one minute the SE40 will shut down automatically.

## **Demist mode**

When set to demist mode the SE40 delivers maximum airflow for 20 seconds before automatically returning to normal operating mode. It can be used for:

- demisting the visor
- performing a quick check of facepiece fit
- inflating an SE-shield suit

To enter demist mode, the SE40 must first be in normal operating mode.

Press and hold for more than 3 seconds the ON/OFF button on the fan unit or the button on the SE-Talk speaker unit.

### **Caution**

Demist mode should not be used repeatedly as it can dramatically reduce battery operating time.

*Note: System monitoring does not function when in demist mode.*

## **Menu mode**

Menu mode allows the user to:

- perform a Self-Test on the SE40 or
- filter life reset (refer to supplementary manual – SE400 advanced functions)

Menu mode is operated using the ON/OFF button on the fan unit while observing the status lights panel.

## **Self-Test**

The Self-Test is a simple, automated test that the user can perform periodically to check the function and calibration of the SE40. It is a test only. No recalibrations or adjustments are performed.

A “Self-Test” should be performed before first use of the respirator and after any maintenance work has been done. Periodic “Self-Tests” can be scheduled to suit the organisation’s respirator program.

The SE40 has a “Self-Test due” warning function. It can be configured to respond in a number of ways. For more information consult supplementary manual, *SE400 advanced functions*.

### **To perform a Self-Test:**

1. The SE40 must be complete, including canisters. Ensure that air can flow freely from the facepiece.
2. With the SE40 off, enter menu mode by pressing and holding the start button for five seconds when the PWR status light will turn steady red.
3. Select and activate Self-Test by following the Menu Mode Sequence (see figure “Menu Mode Functions”). The PWR status light will flash green, indicating that the test is in progress
4. After a moment the fan will run at high speed. When the fan unit beeps while running, hold the facepiece firmly against your face while holding your breath to block the airflow from the facepiece. Hold for two or three seconds until the fan unit beeps again. The test is now complete.

If the test passes, the PWR status light will be steady GREEN. The fan unit will shut down shortly after. The SE40 is ready for use.

If the test fails, the PWR status light flashes GREEN and one or more lights will come on steady RED, depending on the cause of failure:

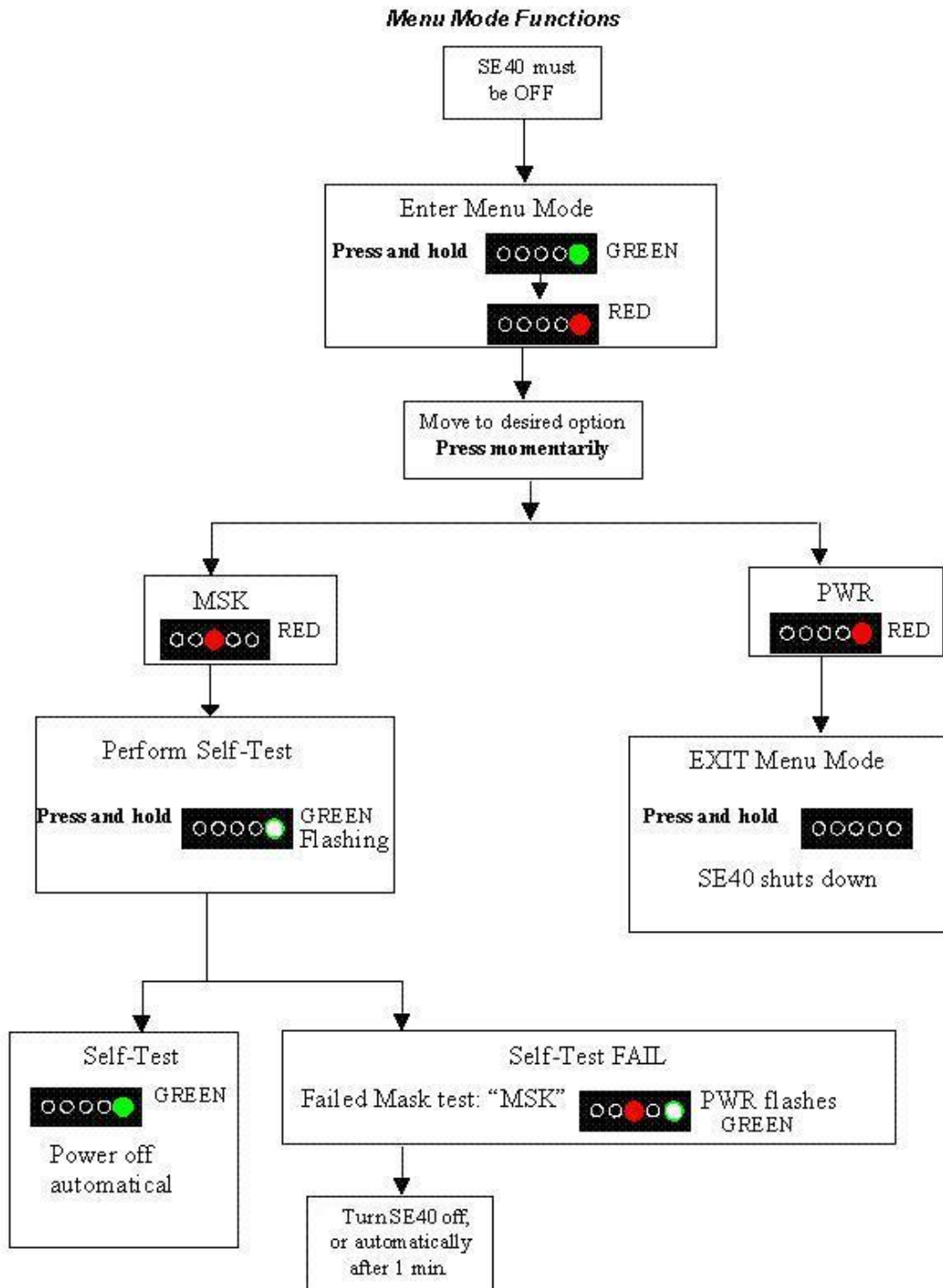
- MSK steady RED indicates a problem with the mask pressure system
- FILT steady RED indicates a problem with the filter pressure system
- GAS steady RED indicates a problem with the air flow measurement system

### Warning

If a Self-Test fails, the respirator should not be used until the problem has been rectified and has again passed a Self-Test. Contact the vendor, S.E.A. or a technician trained in maintenance of the SE40.

*Note:* When the Self-Test encounters a fault, often it will not complete the remaining tests in the cycle. The lights stay on for one minute, or until the ON/OFF button is pressed.

*Note:* If the battery is in poor condition the Self-Test may abort and shut the SE40 down. In such cases the battery should be checked. Consult section Batteries.



## DISASSEMBLY AND REASSEMBLY

The SE40 is supplied fully assembled. When disassembly and reassembly is required, use the following procedures.

### To disconnect the SE-Talk from the fan unit:



1. Turn the collar on the plug anti-clockwise to unlock it
2. Pull the plug from the socket

### To connect the SE-Talk speaker to the fan unit:



1. Insert the SE-Talk plug into the fan unit socket, being sure to align the mating tongue and groove



2. Turn the collar on the plug clockwise to lock it
3. Turn the SE-Talk to minimum level (fully anti-clockwise)

**To detach the breathing hose and EVS from the facepiece:**



1. Squeeze the tabs of the hose fitting between thumb and forefinger of one hand



2. Push the lower part of the hose fitting towards the demand valve, causing the tabs to release
3. Pull the hose away from the demand facepiece



4. Lift the exhalation valve shield EVS from the demand valve, ensuring that the hooks release. For more information consult the user instructions provided with the EVS.



**To attach the breathing hose and EVS to the facepiece:**



1. Place the exhalation valve shield EVS over the demand valve so that the hooks engage with the extension of the demand valve housing
2. Place the shield in position



3. Hook the bottom part of the hose fitting inside the demand valve opening



4. Insert the tabs on the hose fitting inside the facepiece adapter. You may need to guide the tabs.
5. Push the hose fitting in until the tabs snap home.

**To detach the breathing hose from the fan unit:**

*Note: This operation should only be required when changing the breathing hose.*



1. Undo the two cross-recess screws.



2. Remove the retainer.



3. Release the clip by pushing out its upper end
4. Carefully swing the hose attachment away from the fan unit. Disconnect the microphone plug from inside the fan unit opening.

**To attach the breathing hose to the fan unit:**



1. Insert the microphone plug into its jack inside the flow chamber of the fan unit
2. Hook the two pins on the hose fitting into the hinge slots on the fan unit
3. Swing the hose fitting into place and lock into place with the clip
4. Fit the retainer over the latch and fasten with screws. Take care not to over-tighten the screws as the plastic threads may be damaged.

## CLEANING AND MAINTENANCE

### ***Reconditioning after each use***

The respirator should be reconditioned after decontamination and before repacking in ready-to-use configuration.

1. Replace the breathing hose cover if it has been exposed to CBRN agents or if it has been damaged in use. This requires removal of the facepiece from the breathing hose. For fitting and removal consult the user instructions provided with the breathing hose cover HC-TF.
2. If the facepiece has been disconnected from the breathing hose, wash the facepiece/demand valve thoroughly in warm soapy water. Thorough washing is essential before issuing the respirator to a different user. See section *To wash the facepiece*.
3. If the facepiece has not been disconnected from the breathing hose, wipe the face sealing surfaces and internal surfaces with a moistened cloth or with a special face wipe.
4. Wipe all external surfaces with a moistened cloth.
5. Recharge battery(s) as required. See section *Batteries*.
6. Ensure all parts are dry before repacking.
7. Repack in ready-to-use configuration. See section *Unpacking*.

### **Important**

Do not use solvents when cleaning the respirator.

### **To wash the facepiece:**

Leave the demand valve attached to the facepiece. Do not remove the demand valve before washing.

1. Detach the breathing hose and exhalation valve shield from the facepiece. See section *Disassembly and Reassembly*.
2. Wash the facepiece in lukewarm water with a mild detergent. If necessary, use a soft brush. Do not use abrasive materials. Take great care not to scratch the visor as this can impair vision.
3. Alternatively, the facepiece can be placed in a protective bag and machine-washed. Water temperature should not exceed +40°C (104°F).
4. Rinse the facepiece in clean water, shake off excess water and leave to air-dry at room temperature, preferably overnight.
5. Once dry, the visor may be cleaned with a soft cotton cloth.
6. Check that the exhalation valves are in place and in good working order.
7. Reattach the exhalation valve shield and breathing hose to the facepiece. See section *Disassembly and Reassembly*.

### ***Cleaning the demand valve***

The demand valve is normally cleaned while still fitted to the facepiece, as described above. The demand valve should be thoroughly cleaned at longer intervals, typically annually. This task requires the removal of the demand valve from the facepiece.

## Warning

Handle all demand valve parts with extreme care. Damage to any parts will affect the breath response of the respirator. In particular:

- Do not bend or distort the demand valve spring
- Do not tear or puncture the demand valve membrane or exhalation valves

### To remove the demand valve from the facepiece



1. Insert a coin between the demand valve body and the facepiece adapter. While pressing on the latch, twist the coin to release the demand valve
2. Lift the demand valve away from the facepiece

### To thoroughly clean the demand valve:

1. Peel the silicone demand valve membrane away from the housing. The demand valve spring will be released.
2. Peel the membrane away from the piston.
3. Lift the exhalation valve covers away from the housing.
4. Remove the exhalation valves
5. Wash all parts carefully in warm soapy water. Use a soft cloth to remove stubborn grime. Do not use abrasive materials. Take great care not to damage any parts.
6. Rinse all parts in clean water, shake off excess water and leave to air-dry at room temperature, preferably overnight.
7. Inspect both exhalation valve seats. They must be clean, dry and free of dust. There should be no scratches or other damage on the seats. If damaged, replace the demand valve.
8. Inspect the exhalation valves. They, too, must be undamaged, clean, dry and free of dust. If damaged, replace the exhalation valves.
9. Fit each exhalation valve to its seat by pressing the slots in the valves onto the ribs on the housing. Check that each valve rests flat on its seat.
10. Check that the exhalation valve covers are undamaged. Snap them into position.
11. Stretch the membrane carefully around the piston. Check that the inner rim of the membrane engages with the groove in the piston all the way around.
12. With the housing inverted on a flat surface, place the spring in the centre.
13. With the small holes in the membrane and housing aligned, lower the piston and membrane, compressing the spring.
14. Run your fingers around the rim of the membrane so that it engages with the rim of the housing all the way around.
15. Check that the small hole in the top of the membrane aligns exactly with the hole in the housing. Press the piston in and out a few times to be sure it is aligned.
16. If the hole is misaligned, rotate the membrane slightly by sliding its attachment to the housing.

**To attach the demand valve to the facepiece:**



1. Check that the demand valve mechanism is correctly assembled. The membrane should be seated neatly all the way around the piston
2. The piston and membrane should move in and out freely with finger pressure
3. Check that the small hole in the top of the membrane aligns exactly with the hole in the housing. If the hole is misaligned, rotate the membrane slightly by sliding its attachment to the housing (see above).
4. Check that the perimeter of the membrane and the seating surface in the facepiece are clean and free of defects
5. Place the demand valve over its attachment position in the facepiece. Snap the housing into the latch at the base of the facepiece
6. Check that the membrane perimeter is seated properly in the facepiece receptacle
7. With the palms of both hands, push the demand valve into the receptacle, starting at the bottom and “rolling” towards the top, until the top snaps into place

**Important**

A self-test should always be performed after any work involving removal or dismantling of the demand valve.

## SPARE PARTS AND ACCESSORIES

| Part   | S.E.A. order code                                    |
|--|--|
| Fan unit   | SE40   |
| Facepiece with demand valve                          | RF3-FP-C-DV3-C                                       |
| Demand valve only                                    | DV3-C  |
| Breathing hose                                       | H20  |
| SE-shield breathing hose                             | H20-P  |
| Breathing hose cover (single use)                    | HC-TF  |
| Battery  | B1   |
| Battery charger                                      | BC3  |
| Power supply with cable for charger                  | PS1-U  |
| AC power cord for charger (USA)                      | PC-USA   |
| AC power cord for charger (Europe)                   | PC-NE  |
| Power supply (12 V) for vehicle                      | PSV-12   |
| Gang battery conditioner                             | GBCO   |
| Dual battery adapter                                 | DB1  |
| Back pack  | BP2  |
| Waist belt   | WB1  |
| Waist belt extension                                 | WB-EX  |
| SE-talk speaker unit                                 | S1A-20   |
| Data cable   | DC-A-2   |
| Spectacle frames                                     | FSF-T  |
| SEA FF Mask Foam Inserts                             | SEA-FI   |
| Battery lock for fan unit                            | BL   |
| Breathing hose latch kit                             | LKH  |
| Breathing hose latch retainer with screws            | HLR  |
| Breathing hose gasket EPDM, supply end               | GH-20  |
| Threaded nuts for attachment to SE-shield (set of 3) | SSN-46   |
| Suit sealing gaskets EPDM for SE-shield (set of 3)   | SSG-EPDM   |
| Fan unit attachment clip                             | BB   |
| Disposable visor covers (pkt 10)                     | VC   |
| Hard coated polycarbonate visor                      | Return to S.E.A. for replacement                     |
| Natural rubber head harness                          | FHN  |
| Valve discs for orinatal cup (set)                   | FF-V   |
| Valve seats and pins for orinatal cup (set)          | FF-IMVS  |
| Harness buckles with retainers (set of 5)            | FF-B   |
| Neck strap   | FF-NS  |
| Demand valve membrane                                | M-DV   |
| Demand valve piston                                  | IR-DV  |
| Demand valve spring                                  | S-DV   |
| Exhalation valves (pair)                             | EVS-DV2  |
| Exhalation valve covers (pair)                       | EVC-DV2  |
| Exhalation valve shield                              | EVS  |
| Prefilter  | 221  |
| Prefilter holder                                     | PFH-T  |
| SE-shield suits                                      | Contact S.E.A. or consult separate user instructions |

## TROUBLESHOOTING

| Status lights   | Possible causes   | What to do  |
|---|---|---|
| MSK indicator steady RED                                    | a) Leakage in the mask pressure hose system   | <p>Check that the demand valve housing is fitted correctly in the adaptor.</p> <p>Check that the breathing hose is fitted correctly in the demand valve housing.</p> <p>Check that the breathing hose is fitted correctly to the fan housing.</p> <p>Loosen the breathing hose from the fan housing and check that there is no dirt where the pressure hose connects to the fan housing.</p> <p>Loosen the breathing hose from the demand valve and check that there is no dirt where the hose connects to the demand valve.</p> <p>Remove the demand valve housing from the adaptor and check that there is no dirt and that the membrane is correctly located in the groove in the adaptor.</p> |
|   | b) Blockage in the mask pressure hose system  | <p>Remove the breathing hose from the fan unit and the demand valve.</p> <p>Remove the demand valve from the adaptor.</p> <p>Check all openings in the pressure hose system.</p> <p>Check that the holes in the diaphragm and housing line up.</p> <p>Blow carefully with the breath in the pressure hose connection in the lower end of the breathing hose.</p> <p>For more information see section on cleaning and maintenance.</p> <p><b>NOTE: NEVER USE COMPRESSED AIR WHEN DOING THIS, AS HIGH PRESSURE MAY DAMAGE THE PRESSURE SENSORS.</b></p>   |
|   | c) Pressure sensor out of calibration or an internal fault in the SE40 electronics. | Send the unit to nearest SEA service for repair and/or calibration  |
| RED light on Fast Charger as battery is inserted in charger | Battery error   | <p>DO NOT use the battery in the SE40, even if it seems to work.</p> <p>Remove battery, clean contact points and try again.</p> <p>Attach battery to charger with the power off, and then turn on power.</p> <p>Try another battery.</p> <p>If another battery works, there is an internal battery error. Replace battery.</p>  |

## OPERATION IN EXTREME CONDITIONS

The operating range for the SE40 is 0° to +55°C, 0 to 90% relative humidity.

The SE40 will operate in temperatures below 0°C (32°F), but the following temperature effects must be kept in mind when using in such conditions:

- There is potential for icing to affect performance. Take care to ensure the SE40 is functioning properly during use. If abnormal operation – such as lack of response to changes of breathing pattern – is observed, the user should leave the contaminated area immediately. Any malfunctions should be investigated before returning the respirator to service.
- The capacity of the battery can be reduced significantly when used at temperatures below 0°C (32°F).
- S.E.A. does not guarantee the performance of the SE40 when used at temperatures below 0°C (32°F).

## SE-DATA

SE-Data is a comprehensive personal protection management tool, designed to help organisations develop and implement a company-wide personal protections program. It includes an extensive database of hazardous materials.

## IMPORTANT WARRANTY INFORMATION

**The warranty on the SE40 respirator is NULL AND VOID if:**

- The respirator is operated at any time without filtration media correctly attached
- Filtration media are not replaced according to the manufacturer's recommendation, an established change out schedule or when prompted by the respirator's alert functions
- Any disassembly of the respirator other than as described in these user instructions is carried out by any person other than a qualified S.E.A. technician.

## IN CASE OF HEAVY IMPACT

**If the respirator receives a heavy impact, such as being dropped:**

- Check that the filtration media are still firmly attached and tightened correctly
- Perform a Self-Test to ensure the respirator functions properly
- Inspect thoroughly for physical damage. If damaged, contact S.E.A. The unit should also be leak tested.





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