aeroseal®

homeseal™ CONNECT

4.0

User Manual

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2 TABLES AND FIGURES

Refer to the manual for diagnostic information, aerosol sealing techniques, troubleshooting, repairs, and maintenance. Specifications subject to change without notice.

3 PRODUCT INTRODUCTION

3.1 PRODUCT OVERVIEW

The Aeroseal duct sealing system is based upon a patented process for injecting sealant particles into ducts to seal leaks. The patented aerosol injection machine aerosolizes the sealant, evaporates the water in the sealant, and pressurizes the duct system with air that carries the particles to the leaks.

In a properly prepared duct system, the only outlets for the aerosol-laden air are duct leaks. The sealant particles travel to the leaks, attach to the wall at the leaks and then to each other, thereby reducing the size of the duct leaks until they are sealed.

The HomeSeal machine utilizes a patented high-pressure small-angle nozzle with isolated compressed air heating.

3.1.1 PROPRIETARY INFORMATION

All information in this manual is proprietary and is designed to be used by the Dealer providing duct sealing services. Unauthorized release or use of the Technical Manual constitutes a violation of the sublicense agreement.

3.2 QUICK REFERENCE GUIDE

This Quick Reference Guide quickly identifies the steps to perform a residential seal. Please visit the Aeroseal Support Site for more information.

Quick Reference Guide

New to the work site? Use the Quick Reference Guide to set it up for the first time!

Day of the Job

- **Walk-thru** with homeowner and obtain permission to access all rooms for seal preparation.

Site Prep

- **Perform** a Pre-Sealing Combustion Air Zone Safety Test if necessary.
- **Turn off** HVAC system.
- **Stage** the equipment.
- **Cut** injection point.
- **Isolate** HVAC system.
- **Attach** layflat.

Seal Process

- **Set up** sealing equipment.
- **Connect** the laptop computer.
- **Perform 5Fs**: fog it, find it, feel it, fix it, finish it.

Clean Up and Departure

- **Clean** nozzle.
- **Remove** blocking and isolation materials.
- **Turn on** HVAC system and restore home to working order.

3.3 SAFETY

Table 1. Safety Symbols

	**DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	**WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	**WARNING** indicates a potential Electric hazard
	**NOTICE** indicates important information that if not followed, may cause damage to equipment.
	Personal protective equipment required: Gloves
	Personal protective equipment required: Dust Masks
	Personal protective equipment required: Respirator

3.3.1 HOMEOWNER SAFETY PRECAUTIONS

The Dealer is responsible for assuring the safety and well-being of the homeowner and the contents of their houses on all jobs. The dealer should:

- Keep homeowners away from areas where high sealant concentrations may exist.
- Ensure that pets, pregnant women, and people with breathing difficulties are not at home during the injection process.
- Use the provided scrubber fan to ventilate areas that may be exposed to escaping sealant spray.
- Cover homeowner property that might be exposed to high overspray concentrations like attics or basements.
- Keep homeowners away from work areas near ladders, in attics, or in tight workspaces.

- Prevent accidental sealant spills by using a tarp under equipment. If a spill occurs, clean up immediately using Buckeye cleaner or other equivalent solvent(s).
- Use a liquid-tight tarp under the aerosol injector to prevent liquid sealant spills onto finished floors. The tarp should extend at least 6 feet from the injector under the lay-flat tubing.
- Take care when removing the lay flat tubing from the injector to assure that any potential liquid sealant in the tubing or machine does not spill over to homeowner's floors.
- Maintain the equipment following the maintenance schedule.

3.3.2 TECHNICIAN SAFETY PRECAUTIONS

The safety of technicians while performing the sealing work should be always assured. Aeroseal recommends that proper respiratory protection should be worn at all times when in spaces with high aerosol concentrations (e.g. during the injection process in attics, basements or crawl spaces with significant duct leakage) and that technicians be provided with skin protection (gloves) for use with the solvent, and fiber masks or cartridge respirators with organic/particulate canisters for use in duct zones such as attics or basements. Additional recommended safety precautions include:

- Do not overreach when using tall ladders during the diagnostic or sealing process.
- Use only approved electrical connections for the injector machine, including GFCI pigtails if needed.
- Use scrubber fans to ventilate areas where sealant material may escape from leaky duct sections.
- Place walking boards across ceiling joists to prevent stepping through the ceiling when working in an attic.
- Wear protective glasses when removing register grilles.
- Wear liquid-tight gloves when using solvents.
- Wear respiratory protection when working in areas with sealant particles in the air.
- Sensitive individuals or individuals regularly submitted to high sealant particle concentrations should wear cartridge respirators with organic/particulate canisters.

3.3.3 SAFETY PROCEDURES

Operation of the Aeroseal equipment can be hazardous due to mechanical and electrical components. Only trained personnel should operate and service the equipment.

When working on the HSC 4.0, observe standard precautions, on tags, and labels attached or shipped with the equipment. Follow all safety instructions, local and national codes.

 CAUTION: ELECTRICAL HAZARD

There are several safety features in the software and hardware to control the sealing process. In case of an emergency the operator should unplug all three power cords into the machine. These safety procedures include:

- The air heaters in the 14-inch diameter heater cylinder are wired through Snap-disk thermostats that cut power to the individual heater circuits if the temperature at the Snap disks reach approximately 93°C.
- The nozzle is fitted with a thermostat that cuts out at approximately 165°C.
- The software provides alarms and warning if the discharge temperature exceeds 65°C.

It is recommended that the operator:

- Do not open any electrical control panel or the heater cylinder while power is applied. Electric shock is possible.
- Use only grounded electrical circuits and cords.
- Use cords with Ground Fault Circuit Interrupters (GFCIs) pigtails.

THE SEALING MACHINE SHOULD NOT BE OPERATED IF THERE IS SEALANT MATERIAL ON THE HEATER-CYLINDER HEATERS OR INSULATORS

4 HARDWARE & SOFTWARE SET UP

4.1 COMPONENTS

4.1.1 FANBOX

The fanbox contains:

- Nozzle assembly
- Air outlet/layflat connection point
- Luggage handle for carrying
- Rear/fixed carrying handle
- Single axle wheels

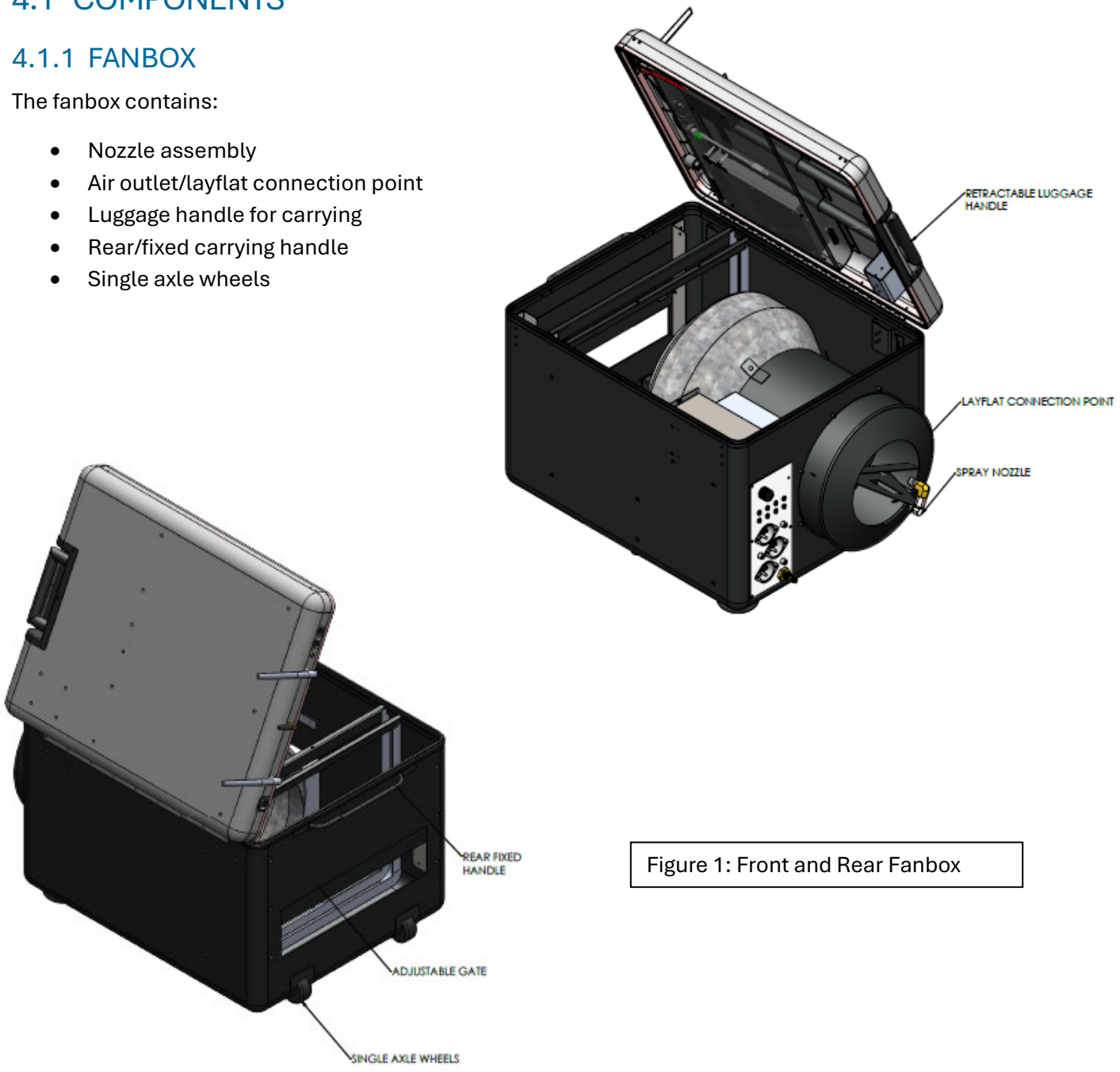


Figure 1: Front and Rear Fanbox

The front panel includes:

- Fan control knob
- Amber-relay lights
- Green and red component lights
- 15A poppers/breakers
    - Main = 3 amps
    - H1 = 13 amps
    - H2 = 13 amps
- Compressed air inlet
- Heater coils 1 and 2

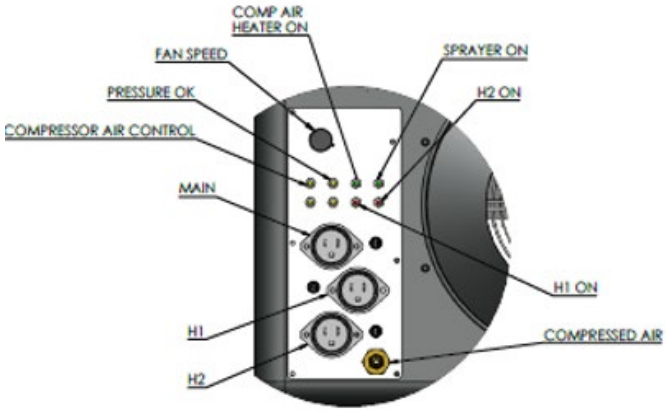


Figure 2: Fanbox Front Panel

The fanbox lid includes:

- (2) Wifi antenna
- Temperature sensor
- Humidity sensor
- GMS antenna
- USB-B bulkhead
- Outside pressure reference
- Reference pressure
- Duct pressure
- Negative fanbox pressure
- Manometer
- Internet status indicator
- Power indicator
- RMS board
- 16-pin port bulkhead to RMS board

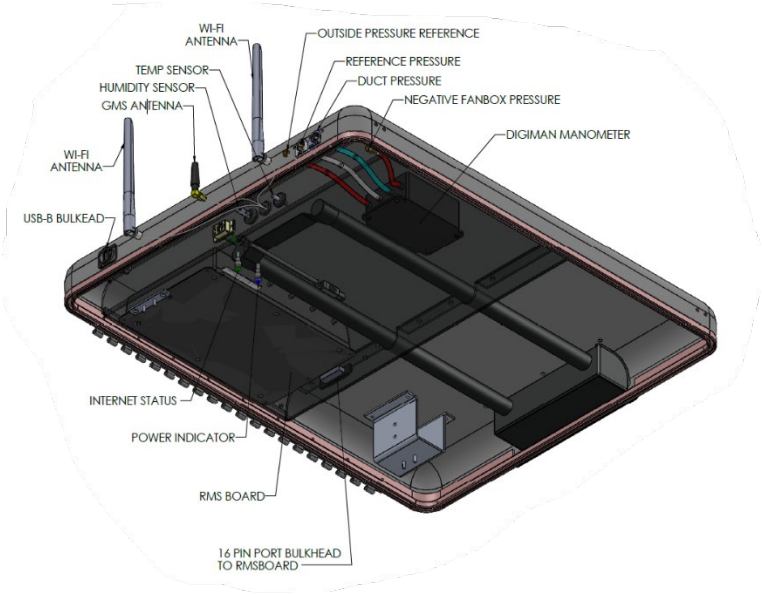


Figure 3: Lid components

The interior includes:

- Inlet gate
- Fanbox filter
- Flush/water jug
- Fan
- Pump head
- Nozzle heater
- Heater cylinder

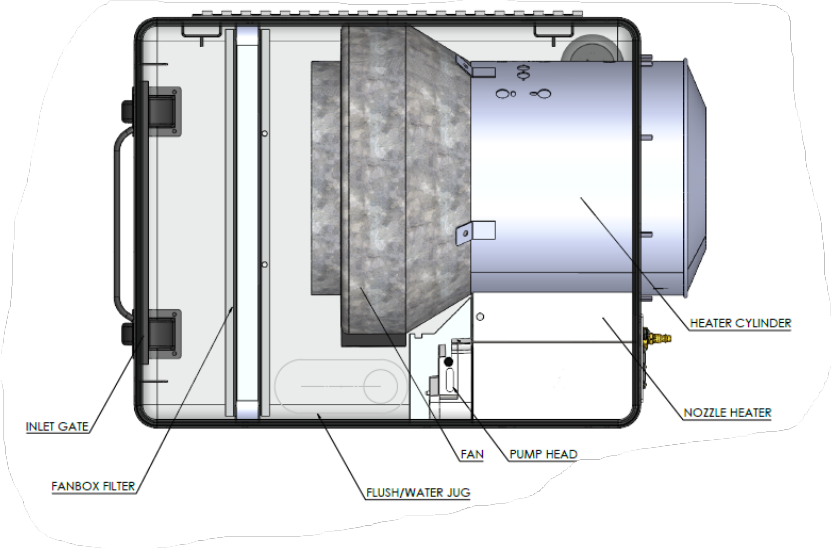


Figure 4: Fanbox interior

4.1.2 COMPRESSOR

HSC 4.0 requires a continuous duty compressor with at least 90 psi pressure and maximum 125 psi. Flow – 6.5 SCFM @100 psi, with oil and moisture filters and an output pressure regulator.

4.1.3 LAYFLAT

Layflat is the clear plastic sheeting that runs from the fanbox to the duct system. The layflat is attached to the fanbox using the foam lined clamp.

4.1.4 LT SEALANT

LT duct sealant is a safe, non-toxic, low VOC acrylic polymer. It is heated and aerosolized by the HSC equipment and sprayed into the duct system. The sealant seals gaps up to 5/8" size. Any opening larger than 5/8 should be manually repaired.

Sealant is mold and mildew resistant, warrantied for 10 years and is used my other industries like paint and medical devices. It is advisable to take conservative precautions when in use. For more information see Section 4.4.6.

4.1.5 SCRUBBER FAN

The HomeSeal Connect 4.0 includes a free-standing 1500cfm fan in a box covered with (5) Merv14 filters. The fan is used to "inhale" airborne particles from the air. Place the scrubber fan near the inlet gate of the fanbox if used in areas of heavy overspray and fogging. Ideal places include living spaces or where homeowners keep personal items.

4.1.6 WYE KIT

A Wye Kit is intended to split the flow of aerosolized sealant into two streams to deal with tricky situations. See APPENDIX C: Wye Kit for additional information.

4.1.7 SUPPLY KIT

The basic supply kit that ships with HSC 4.0 includes:

- 1 bottle of all-purpose cleanber
- 1 roll of 36" layflat tuning
- 18 rolls of blue duct mask
- 3 sheets of corrugated plastic
- 8 pieces of closed-cell foam
- 1 bottle of fog juice
- 1 fog machine

An upgraded kit provides an additional roll of layflat tubing, 24 rolls of duct mask, and six sheets of corrugated plastic.

The parts kit includes cleaning tools, spray nozzles, flush tubes, spare sealant filter screens and nozzle tools.

4.1.8 RECOMMENDED TOOLS & MATERIALS

Tools

- (3-4) 50 FT 12/3 extension cords
- Power strip with surge protection
- Step Ladders: 8 ft. & 10 ft. and step ladders
- Sturdy folding table 6 ft.-10 ft.
- (2-3) 25' – 35' tape measures
- (2) Cordless ratcheting screw guns/drivers
- ¼" and 5/16" magnetic driver attachments
- Sheet metal snips: Reds & Greens (right & left-handed)
- (2) Step bit, drill bits
- (2-3) Strong flashlights
- (2-3) Razor utility knives
- Standard set of hand tools
- Shop-vac, broom & dustpan, clean-up materials
- 20" Box fans (optional)
- Malco hole cutter (optional) 2"-20"

Safety Equipment

- Ground Fault circuit interrupters (GFCIs) for all circuits
- Particulate masks (double-strap type)
- Work gloves

- Kevlar Sleeve
- Eye protection

Supplies

- 5/16” Hex head, self-tapping sheet metal screws (at least ¾” in length)
- White-head register/grille/diffuser screws
- (2-3) Rolls of plastic sheeting (.31 mil rolls)
- Sheet metal for injection hole patching (~26 gauge)
- ¼” Zip Screws
- (2-3) Roll-Mastic tape: 3” width (HardCast 1402/1403 recommended)
- Bucket of Duct Mastic -with application brushes
- (2 rolls) 3” Foil HVAC tape (3m cold-weather tape recommended)
- Painter’s tape (blue or green)
- Floor runners / canvas drops, shoe covers
- Box of low-lint shop towels (for cleaning nozzle assembly)

4.2 JOB SITE

Worksite

1. Perform a home walk-through:
   - Greet the homeowner and introduce team
   - Explain that a theatrical fog test will be used prior to injecting sealant so that any areas of overspray/damaged ductwork will be identified.
   - Verify number and sizes of registers in the home to be blocked.
     Use shoe covers and/or floor protection. (Look out for pets, infants, people with allergies).
2. Check for combustion appliances inside the home and determine if a Combustion Area Zone (CAZ) test is required.
3. Turn off HVAC. Deenergize the HVAC equipment attached to the duct system being sealed at the disconnect switch or circuit breaker.

4.3 EQUIPMENT SET-UP

Bring in all equipment necessary for the seal (HSC, extension cords, compressed air hose, blocking/masking materials, layflat, etc.)

Table 2. HSC 4.0 Set-Up Components

Quantity	Item
1	Jenny Brand Portable Air Compressor 115 V, 1.5 hp, Single Phase, 6.5 CFM @ 100 psi, 8-gallon tank, at least 125 psi cut-out
1	Desiccant Dryer

3	Standard Extension Cords 12 Gauge, 120 V US Plug, 50 Ft.
1	Laptop with Aeroseal software installed and configured by the factory
1	HomeSeal Connect 4

4.4 PREPARATION

4.4.1 BLOCK DESIGNED OPENINGS

Block all openings, like registers and grilles, in the envelope.

1. With the blade knife, cut the closed-cell foam ½" larger than the boot or space to be blocked. The foam expands and creates a tight seal.
    a. Boots: Insert the foam flush with 100% of the edges touching all four sides
    b. Larger Plenum or Trunk Lines: Add support to avoid bowing or collapsing lines during the seal.
2. Use medium-duty duct mask or roll mastic tape to do the following:
    a. Fully cover hard floor registers
    b. Apply around edges of carpet floor registers. Be sure to tuck in around the openings to create a barrier
    c. Fully cover the entire area around drywall registers. Apply mask over the entire diffuser area.

Note: Reopen dampers when finished.

4.4.2 SUPPLY AND RETURN

For the supply side of the duct system, the aerosol injection point is typically just downstream of the evaporator coil. Return side injection typically occurs upstream of the fan at the return plenum, or sometimes through the filter grille opening.

Careful inspection of the return system should be used to determine which end of the system is most appropriate for injecting sealant material. Return systems with multiple grilles are often best sealed by injecting near the plenum, whereas systems with one or two Filter Grilles are often best sealed by injecting at a Filter Grille.

4.4.3 FIND THE BEST LOCATION AND CUT INJECTION POINT

Choose injection technique (flange, wye, direct plenum) and position the HSC nearby. Measure out 36" layflat to connect the fanbox to the chosen injection technique while ensuring an 8 ft straight section is present immediately after the fanbox flange. Options / injection methods include:

- **Flange**: Cut into duct to create an 80 sq in round hole suitable for furnace isolation access. Attach flange to opening. Tape inside of plenum opposite of opening.
- **Wye**: Select two adjacent registers and connect layflat to the Wye kit.
- **Direct plenum**: Strap down or tape layflat to direct plenum access. Select an injection point near the HVAC equipment with the largest flange it can accommodate.

4.4.4 ISOLATE HVAC EQUIPMENT

Isolate HVAC using appropriate blocking material/technique (foam block, corrugated plastic, sheet metal, tape, etc.) to ensure no airborne sealant enters the equipment. Make sure the material makes a tight seal, holds internal pressure, and does not allow sealant to pass.

4.4.5 ATTACH LAYFLAT TO DUCT SYSTEM

Once the Aeroseal equipment is set up near the injection site:

- Attach 36" plastic layflat between the fanbox and injection point(s). Allow a minimum of 8' straight and level before any turns or connections. This allows for the proper dehydration of the airborne sealant prior to entering the ducts.
- Take care with the roll to avoid damaging the material.

Note: To avoid any low temperature or high humidity issues, as well as disturbing the layflat, it is recommended to bring the fanbox inside the home.

4.4.6 SET UP HSC 4.0

4.4.6.1 ELECTRICAL POWER REQUIREMENTS

Identify and connect extension cords to three separate electrical circuits.

The HSC 4 requires three separate electrical circuits, each with the capacity to run 1500 Watts of power. The standard plug size for the three fanbox inputs are NEMA 5-15 (3-prong 120 V outlets).

An alternative to using three separate outlets is to use 240/120 adapter plugged into 240 V utility outlet.

A generator like a NorthStar c13000s commercial-grade portable generator with electric start with 13,000 surge watts and 10,500 rates watts is a good source of external power.

CAUTION: Use ground fault circuit protection when using household electrical outlets.

4.4.6.2 Compressed Air

Connect compressed air to the air compressor. Ensure air compressor is on and providing 100 psi at the fanbox gauge.

4.4.6.3 Manometer & Pressure

Connect the pressure (blue) tube between the fanbox manometer and the furthest register/opening of the system being sealed.

- Measures and monitors positive duct pressure
- Calculates and monitors leakage throughout testing and sealing
- Placed into ducts at the furthest point from the injection point

Ensure clear path with no kinks, restrictions or damage to the tubing.

The two most important pressure inputs used to calculate leakage are:

- Fanbox pressure (Negative)

- Duct pressure (Positive)

It's critical to have the inlet gate match between the fanbox and the software screen setting. The software can calculate the pressure drops over the entire duct system by comparing the inlet gate/fanbox pressure to the duct pressure at the oppositive end of the duct system.

When the fanbox is used outside of the home envelope, do the following:

- Connect an additional tube to the reference pressure port on the fanbox
- Run the reference tube inside the home envelope to a calm area

Windy conditional may cause a disturbance at the reference pressure and/or ambient pressure ports which may cause software alarms, delays, and inaccurate readings. Best practice is to bring the fanbox into the home envelope to avoid these issues if at all possible.

4.4.6.4 Sealant

LT-Duct Sealant is an acrylic-polymer solution.

- Safe/non-toxic (low VOC)
- Water soluble in liquid state
- Used in other industries like paint and medical devices
- Mold and mildew resistant due to its antimicrobial properties
- Test/warranty for 10 years
- Conservative precautions recommended when solution is aerosolized

Ensure a full gallon of sealant is placed into the fanbox, the sealant tubing is laced through the peristaltic pump in the proper orientation, and the sealant tube tip protrudes just beyond the nozzle tip.

DO NOT STORE SEALANT IN FREEZING TEMPERATURES OR EXTREME HEAT. THIS WILL RENDER YOUR SEALANT USELESS. Optimal temperatures are 40°F to 120°F.

LT sealant used in HomeSeal equipment does not require any special mixing. The equipment pumps undiluted sealant through special Master flex tubing. Sealant that has any lumps or coagulation should not be used. The steps are:

1. Inspect the sealant gallon for any signs of coagulation.
2. Replace the bottle cap with the sealant pick-up tube assembly.
3. Place the sealant jug in the HomeSeal box and connect the tubing from the sealant pump to the pick-up tube. Note: the pump tubing should be kept on the "blind" screw inside the HomeSeal box when the sealant container is not in use.

Do not place the sealant jug in the fanbox until you are ready to seal.

4.5 LAPTOP & AEROSUITE

4.5.1 WINDOWS UPDATES

Just like with all computers, Windows occasionally needs to perform updates. It is recommended to check for Windows updates once a week.

4.5.2 AEROSUITE UPDATES

4.5.3 CONNECT LAPTOP TO FANBOX WIFI ROUTER

1. Turn on fanbox to power the WiFi router.
2. Find available WiFi networks.
3. Select the fanbox ID.
4. Connect to the WiFi.

The laptop should stay close to the fanbox/router. If the laptop is out-of-range of the WiFi:

- At 20 seconds, the laptop has a clang sound. Regular operation can be resumed if connection is restored within 10 seconds.
- At 30 seconds, the laptop has a boat horn sound. The fanbox enters safe mode: fan on, pump off, compressed air off. Press START to resume operation.
- The laptop has a connection tone when it is back in range.

4.5.4 CONNECTIVITY & SYNC

After connecting to the Wifi network, log into AeroSuite using the Case ID for both username and password.

- Basic information about the system can be found in the **Settings** > **Registry** section of AeroSuite.
- For **Profile**, dealers enter their company information and logo.
- **About** identifies the software version, Aeroseal contact information, and the **Check for Updates** button. It is recommended to check for software updates frequently.
- **Component Checks** can be performed to ensure the equipment is in good operating condition.
- **Sync** is a critical function of AeroSuite. Per the licensing agreement, users must sync their systems every month. AeroSuite will prompt users to sync if more than 30 days has passed since the last sync.

5 OPERATIONS

Aeroseal HomeSeal Connect 4.0 is intended for dealers and technicians trained in the use and maintenance of the sealing equipment.

5.1.1 BEST PRACTICES

During the preparation phase, consider the following best practices:

- Use ground fault protection when using household outlets
- Ensure ducts are thoroughly inspected
- Use a fog machine with high-density liquid to find leaks before sealing
- Take care not to push or pull sealant into the fanbox during sealing.

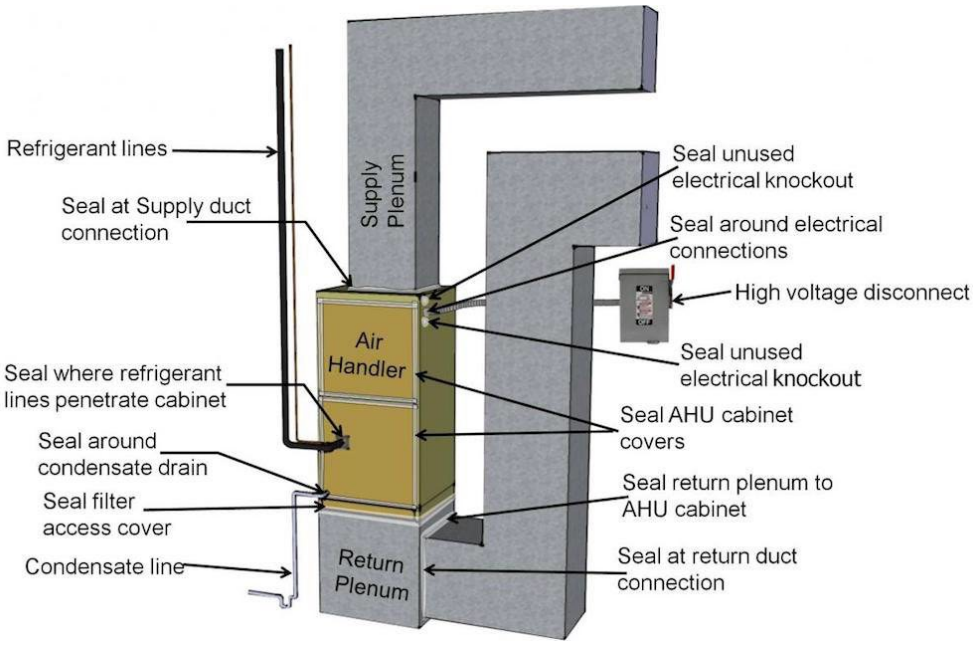


Figure 9. Seals in Ductwork

5.2 AEROSUITE SOFTWARE OPERATION

After the worksite has been thoroughly prepared, the seal event is managed directly from the AeroSuite software.

To start a new job in AeroSuite, follow these steps:

1. Click **New Job**
2. Select the type of job being performed: **Residential Retrofit** or **Residential New Construction** (RNC).

CUSTOMER INFORMATION

3. Complete all the fields in the **Customer** screen.
4. Click **Save**.

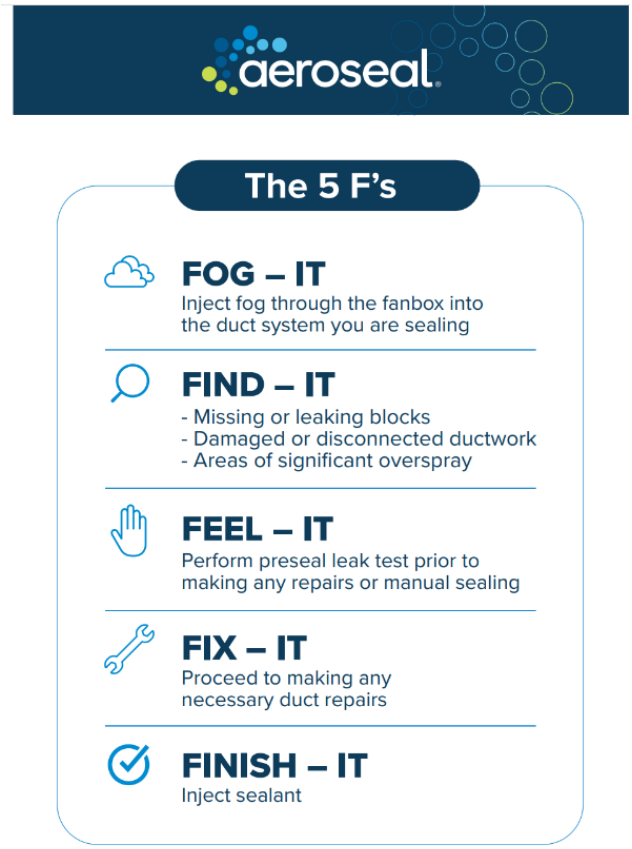
ADDITIONAL INFORMATION

5. In the **Additional Info** screen, type notes and upload photos.
6. Click **Save**.
7. Watch the Combustion Area Zone (CAZ) video and check the **Acknowledge** box.

SYSTEM

8. In the **System** screen, type the system and seal event details.
9. Click **Save**. The new job with details displays.
10. Select the seal event and click **Next** to proceed to the PreSeal screen.
11. Follow The 5 F's to prepare the jobsite for a sealing event.

5.3 5F's OF SEALING OPERATIONS



5.3.1 FOG IT: Inflate layflat/Perform fog test

The use of a fog machine to test blocked areas is an effective way to reduce errors and overspray during a seal event. Most sealing problems are due to poor seals at registers or HVAC equipment isolation.

Using the manual fan control knob, increase the fan speed just enough to ensure no twists/disconnects in the layflat are present. Avoid collapsing the layflat more than 50% of its internal diameter.

Using the fog machine, inject fog through the gate in the back of the machine to saturate the duct system to identify missed blocking, large holes, disconnects.

5.3.2 FIND IT: Search for fog in home

Using the fog as an indicator, visually determine where any missed/leaking blocks, duct damage/disconnections larger than 5/8", and/or areas of significant overspray are present. Fix any missed/leaking designed openings and use a scrubber fan as appropriate. (Add definition of defined openings into training materials)

5.3.2.1 SCRUBBER FAN SYSTEM

CAUTION: LIFT HAZARD

To minimize the risk of overspray in occupied spaces, use the provided high-volume, high-efficiency scrubber fan.

NOTE: Always use PLEATED FILTERS SPECIFICALLY DESIGNED TO CAPTURE SMALLER PARTICLES (MERV-14 Ultra Allergen or better).

1. Face the outlet of the scrubber in a direction where it is not blowing away from the homeowner's property or walls to avoid situations where small particles pass through the filters and be blown out of the fan outlet. If the fan outlet discharge is within 15 feet of any items or walls, those items or walls should be covered with a protective tarp to prevent any sealant from sticking to them.
2. Although the high-flow scrubber fan is fitted with small-particle filters should provide an acceptable environment, it is recommended that technicians wear N95 NIOSH approved dust mask when working in areas of high overspray concentration. The sealant is non-toxic and there should be no alarm to the homeowner, but the technician working in the presence of high overspray concentration day in, and day out should take the proper preventive precautions to avoid significant inhalation/ingestion of the Aeroseal sealant.

5.3.3 FEEL IT: PreSeal

NOTE: *The PreSeal leak test is recommended prior to making any manual and/or mechanical repairs or hand sealing. This ensures the seal certificate is as accurate as possible.*

Start the pre-seal leakage test using the software following prompts for gate changes.

1. Start the PreSeal on **Gate 2**. If the software suggests a change, adjust to the recommended gate.
2. Click **Start**. The PreSeal test runs. Be sure not to disturb the layflat or manometer tubing during the test.
3. When the PreSeal test is completed, the seal data displays. The data includes the total CFMs and square inches of leakage.
4. Click **Next** to continue to the Seal screen.

5.3.4 FIX IT: Make Necessary Repairs

The results of the PreSeal test may find openings that were overlooking during prep. Repair areas of leakage and block all missed openings.

5.3.5 SEAL

Start the seal and follow any software prompts to seal the duct system. During the seal, perform frequent safety checks throughout the home, looking for missing/loose blocks, areas of significant overspray. Pause the seal to address any concerns that arise.

 CAUTION: DO NOT PUSH OR PULL AEROSOLIZED SEALANT into the fanbox, including electric heaters, bi-metal over-temperature protection switches.

 CAUTION: Use ground fault circuit protection when using household electrical outlets.

 Click **EMERGENCY STOP** at any time to stop the seal event.

1. Begin the Seal on the same gate setting as the PreSeal leak test.
2. During the warm-up, the system tests the nozzle for overheating.
3. If there are no problems, the dialog box states System Spraying.
4. At this time, look through the layflat and check that the spray cone looks good from the nozzle tip.
5. Watch the Leakage graphline to track the sealing progress.
6. When the leakage area is at or below 5 sq. in., the dialog box indicates proceeding with the Flush/Cool Down. **Note**: The seal can stop at 5 sq. in. If additional sealing is necessary, follow the Low Seal Protocols until 3 sq. in. At this time, the seal process must stop.
7. Click **Stop**. The seal event does not stop until Stop is clicked.

5.3.6 MINIMIZE OVERSPRAY

For residences that have a high risk of overspray (panned returns) use a conservative approach and lower the sealant injection rate initially (pausing pump periodically).

5.3.7 FLUSH COOLDOWN

Unplug both heater cords. Replace the sealant jug with the flush jug and proceed to the Flush/Cooldown screen. Open the lid of the fanbox during flush and cooldown. After completion of cooldown, close the fanbox lid.

1. Unplug the H1 and H2 cords from the fanbox.
2. At the **Flushing Time** field, select the numbers of minutes for the flush. The minimum is 2 minutes.
3. Click **Start**.

4. Once both flush and cooldown are complete, ensure the cylinder temperature is below 130 degrees before proceeding.
5. Click **Next** to continue to the PostSeal screen.

5.3.8 FINISH IT: Perform post-seal leakage test

Start post-seal leakage test. Continue to Certificate screen to view, print, and save the certificate.

1. With the gate set at the same setting during the seal, click **Start**. If the software indicates a gate change, adjust the gate to the recommended level.
2. When the PostSeal is completed, a message displays in the dialog box. Additionally, the PostSeal and Improvement data displays.
3. Click **Next** to proceed to the **Certificate** screen.

5.3.9 PRINT CERTIFICATE

From the **Certificate Option** field, select **Basketball**, **Bar Graph**, or **Line Graph** for the homeowner's certificate.

Print the certificate.

All homeowners shall be provided with a printed or electronic copy of the Certificate of Completion generated by or verifying the sealing job. After selecting Certificates in the Aeroseal Software Program on the certificate screen, place a blank sheet of paper into the printer and press print. Be sure to give the printed certificate to homeowner and provide a brief explanation of the results.

Note: Before you print out the homeowner sealing certificate, make sure that all Homeowner details (like name and address) are correct. After printing, all fields get locked, and you will NOT be able to make any further changes to the certificate.

5.3.10 CLEAN UP

Clean nozzle assembly

Proper cleaning and maintenance will greatly reduce the risk of nozzle overheating and is critical for proper sealant droplet formation in the ducts.

Clean the nozzle after every seal. It is critical to follow cleaning procedures to ensure that there are no obstructions in key components of the injection system. For more information, see 6.2 CLEANING PROCEDURES.

Remove blocking and isolation/Return equipment to vehicle

Disconnect power from HSC, remove layflat, and pack out equipment to vehicle. Take appropriate steps to remove isolation of HVAC and patch holes as needed.

Restore home to working order

Return power to the HVAC system and ensure proper operation of equipment. Return any smoke alarms/security systems to their original condition and remove all trash.

6 MAINTENANCE

6.1 ROUTINE MAINTENANCE SCHEDULE

Table 4. HSC 4.0 Maintenance Table

	EVERY SEAL	DAILY	MONTHLY	DURATION
CLEAN NOZZLE ASSEMBLY	X	X	X	15 MINS
INSPECT SEALANT CONDITION	X	X	X	1 MIN
DRAIN COMPRESSOR AIR TANKS	X	X	X	2 MINS
INSPECT COMPRESSED AIR FILTERS/FITTINGS	X	X	X	2 MINS
CLEAN/INSPECT PUMP & ROLLERS		X	X	5 MINS
INSPECT/REPLACE FANBOX FILTER		X	X	1 MINS
INSPECT/REPLACE AIR SCRUBBER FILTERS		X	X	3 MINS
CLEAN/INSPECT SEALANT BUILDUP ON INLET GATE			X	3 MINS
CLEAN/INSPECT SEALANT BUILDUP ON TUBE FITTINGS ON LID			X	2 MINS
CLEAN/INSPECT SEALANT BUILDUP ON FANBOX BREAKERS			X	2 MINS
LAPTOP: AEROSUITE UPLOAD			X	2 MINS
LAPTOP: AEROSUITE UPDATES			X	2 MINS
LAPTOP: AEROSUITE UPDATES			X	10 MINS

6.2 CLEANING PROCEDURES

Nozzle Cleaning Procedures

Fanbox nozzle

Proper cleaning and maintenance will greatly reduce the risk of nozzle overheating and is critical for proper sealant droplet formation in the ducts.

Clean the nozzle after every seal. It is critical to follow cleaning procedures to ensure that there are no obstructions in key components of the injection system.

Required Tools:

- HSC nozzle assembly
- Air nozzle cleaning brushes
- Dental picks
- Hot (tap) water
- Cleaner
- (2) plastic cups
- Disposable shop towels
- Nitrile gloves

Disassemble

1. Remove fluid line and braided hose.
2. Remove triangle assembly from fanbox.
3. Hold nozzle securely.
4. Twist bottom elbow to separate pieces from sheet metal triangle.
5. Separate Q-rings, loosen nozzle compression nut, separate nozzle, insert tube and ferrule.

Note: This prevents damage to the Q-ring under the nozzle tip (cuts and abrasions on the Q-ring can cause debris to collect inside the nozzle assembly which will block airflow and cause overheating).

Inspection

1. Inspect for build-up on insert tube
2. Visually inspect for an amber color or other residue
3. “Fingernail check” by feeling for any resistance change along the tube.
4. Inspect for build-up in the nozzle ID.
5. Inspect for damage on the Q-rings.

Clean

1. Soak the nozzle in cleaner.
2. Rinse and soak for 2 minutes in hot water, be sure to agitate during soak time.
3. Wipe exterior of all parts with clean shop towels.
4. Clean ALL interior surfaces with small air nozzle cleaning brushes and dental picks.
    a. using brushes reduces the chance of leaving debris/lint inside the nozzle components.
    b. twisting the brush clockwise during insertion and/or use of dental picks into the part can help pull debris to the outside edges where it can be more easily cleaned.
5. Rinse parts in hot water and blow dry (inside/outside) with filtered compressed air.

6. If any surface is still tacky or has smeared adhesive, repeat steps 1-5.

Reinspect

- Inspect critical areas on parts before reassembly.
- Wipe sheet metal triangle with cleaner and a shop towel.
- Rinse and dry.

Reassemble

1. Assemble nozzle.
2. Check for ferrule deformation and cracks (from overtightening).
3. Assemble triangle.
4. Large Q-ring fully installed onto the inlet elbow (push flush to the shoulder on the fitting).
5. Small Q-ring on top of the sheet metal triangle (push flush to the triangle).
6. Hold the nozzle stationery and thread the inlet elbow into it (appx 2 turns).
7. Finish with the nozzle and inlet elbow aligned as shown.

NOTE: The nozzle assembly may not feel fully "tight" when correctly assembled. It should not rattle on the triangle, but over compressing the Q-Rings (3rd turn on the inlet elbow) will create leaks and cause issues with droplet formation.

8. Reinstall onto the fanbox (insert and align fluid tube, connect braided hose).

Nozzle

1. Remove the sealant nut and washer first.
2. Loosen the liquid nut and push the liquid tube back through the nozzle.
3. Loosen the nozzle standpipe lock nut and rotate the nozzle tail toward you about 45 degrees.
4. Remove the compression fitting and the 1/8" tube and ferrule.
5. Notice the burnt sealant on the outside of the 1/8" tube – be sure to remove this old sealant using steel wool before reassembly.
6. Insert 0.142" reamer into the nozzle tip by hand and spin the reamer to remove any baked-on sealant. Blow out the scrapings using compressed air to complete the cleaning. This cleaning will restore your nozzle to like-new condition.
7. Insert 1/8" tube back into the nozzle tip and center the tube while tightening the compression fitting. Do not over-tighten the compression fitting or you will damage the tube.
8. Rotate the compressed air nozzle back in-line with the liquid tube. Slide the liquid tube back into place sticking out approximately 1mm from the nozzle tip and tighten its compression fitting only finger tight. Make use of the alignment tool to get both nozzle and sealant end aligned. Then add ¼ turn to both compression fittings using the supplied adjustable wrench.
9. Replace the cleanout screw and washer. Reamer may be purchased from Aeroseal or online from a machine shop supply company. You will need a 0.142" reamer.

10. Do not soak nozzle tip in cleaner before routine cleaning. This would turn the sealant into jelly and become difficult to remove completely. For best results, wait until the nozzle is dry with no water present. This makes it easier to remove external sealant from the nozzle body.
11. Aeroseal recommends cleaning the nozzles after every 4 or 5 uses.
12. After each use, blow out the sealant and air tube of the nozzle using the blowout tool provided in your maintenance kit. Inside this kit you will also find a small alignment tool and a very small drill bit. These are used to clear the sealant tube and cooling gap on the nozzle prior to next usage. Simply insert the small drill bit into the sealant tube and make sure it is free and clear. Then insert the small alignment tool into the nozzle head over the sealant tube. Make sure the tool can be seen in between the two nuts that tighten the ferrules. Then clean off any sealant residue and dirt.

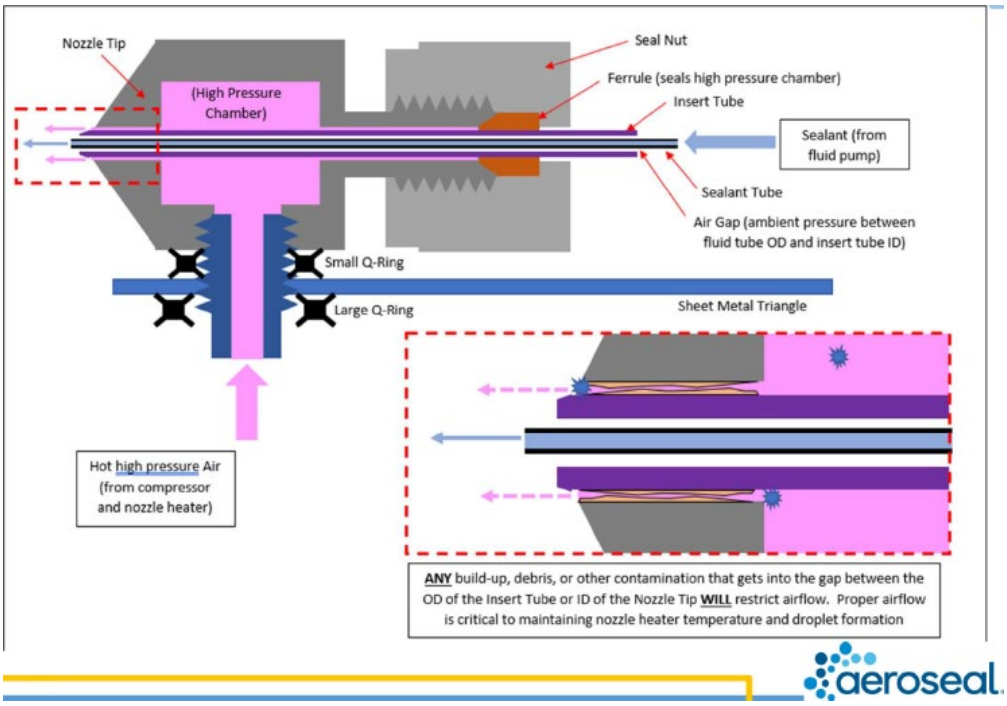


Figure 5. Nozzle cleaning instructions

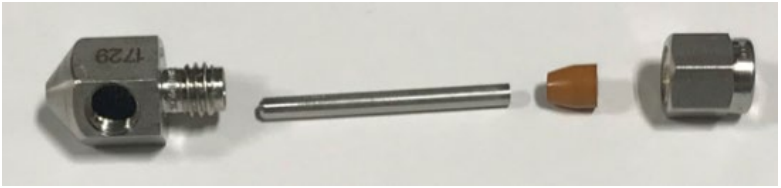


Figure 6: Cleaning Tools

6.3 PARTS & ACCESSORIES

Table 5. HSC 4.0 Parts and Accessories

Item	Minimum Requirements
Dry compressed air	Continuous duty air compressor with at least 90 psi pressure and maximum 125 psi, Flow - 6.5 SCFM @ 100 psi, with oil and moisture filters and an output pressure regulator
Air scrubber	> MERV 13 filtration (3-10 micron particles) capability
Generator (optional)	5 kW / 5.5 kVA (for operating the machine) 10 kW / 12.5 kVA (for operating machine, compressor and accessories)
Oil and moisture filter (recommended)	Desiccant dryer 7 SCFM flow / 125 psi minimum Regenerative dryer with an oil coalescent filter to deliver clean, oil-free, and dry air

6.4 DEALER MAINTENANCE

Table 6. HSC 4.0 Maintenance Information

Task	Instructions
INSPECT SEALANT CONDITION	Clean clogs and loose sealant Ensure breather hole is open Check for clumps of sealant Remove any build up sealant
DRAIN COMPRESSOR AIR TANKS	Follow the manufacturer's instructions for maintaining the compressor
INSPECT COMPRESSED AIR FILTERS/FITTINGS	Follow the manufacturer's instructions for maintaining the compressor
CLEAN/INSPECT PUMP & ROLLERS	Remove any debris
INSPECT/REPLACE FANBOX FILTER	Fanbox filter must be MERV-1 Filter size: 16 x 20 x 1 in.

INSPECT/REPLACE AIR SCRUBBER FILTERS	Scrubber filters must be at least MERV-14 Filter size: 16 x 16 x 1 in.
CLEAN/INSPECT SEALANT BUILDUP ON INLET GATE	Remove sealant build up on gate
CLEAN/INSPECT SEALANT BUILDUP ON TUBE FITTINGS ON LID	Remove sealant build up on tube fittings and ports
CLEAN/INSPECT SEALANT BUILDUP ON FANBOX BREAKERS	Remove sealant build up on breaker connections
LAPTOP: AEROSUITE SYNC	Perform a sync once a month
LAPTOP: AEROSUITE UPDATES	When prompted, update to the latest version of AeroSuite

6.5 SERVICE & REPAIR PARTS

Table 7. HSC 4.0 Service and Repair Parts

Description	Quantity
SCREW, #6 X 2", P, FH, SELF TAP, STEEL, BLACK PHOSPHATE	10
TUBING, 1/8" X 1/4", 70A SOFT, PU, BLUE	1
WASHER, SELF-LOCK, #10 X 1.5", SS	10
FITTING, UNION BARB, 1/8" BARB, PLASTIC	3
TOOL, WRENCH, 6" ADJUSTABLE	2
FITTING, BARB UNION TEE, 1/8" BARB, NYLON	1
TOOL, .142 HSS, STRAIGHT FLUTE REAMER	1
TOOL, POCKET BLOW GUN, 1/4" INLET, 0-120 PSI	1
SCREW, #6-32 X 1/2, P, FH, MS, SS, BLACK OXIDE	1
SCREW, #6-32 X 1", P, FH, MS, SS, BLACK OXIDE	1
NUT, 6-32, NYLON LOCK, SS, BLACK OXIDE	2
ADAPTER, RP-SMA-MALE TO SMA-FEMALE	1

Description	Quantity
ANTENNA, WI-FI ANTENNA - FOR CONNECT PLATFORM	2
ANTENNA, GSM	1
FERRULE, 1/8" X 1/8", VESPEL	1
1.438" NOZZLE TUBING INSERT	1
MAGNETS FOR TRIANGLE MOUNTING PLATE	2
STANLEY SORTMASTER LITE ORGANIZER 11.5" LX2.5" WX8.5" H BLACK YELLOW CLEAR	1
TOOL, WIRE BRUSH KIT	1
SEAL RING, 1/4" ID X 7/16" OD, 3/32", NOZZLE TOP	2
SEAL RING, 5/16" ID X 1/2" OD, 3/32", NOZZLE BOTTOM	2
TOOL, DENTAL PICK SET	1
GROMMET, 11/32" X 1/16" MATERIAL, 1/4" ID	1
ASSEMBLY, DRILL BIT W/COATING	1
PICKUP TUBE	1
FLUID TUBE ASM (HSC 4.0)	2

7 APPENDIX

7.1 APPENDIX A: Job Checklist

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Job Checklist

Sealing Supply Only

Use this checklist when sealing supply only.

TASK		TASK	
☐	1 Arrive on job site/Perform a home walk-thru	☐	11 Search for fog in home [FIND IT]
☐	2 Combustion appliances	☐	12 Perform the pre-seal leakage test [FEEL IT]
☐	3 Turn off HVAC	☐	13 Repair major duct damage/disconnects from Step 11 [FIX IT]
☐	4 Bring in the equipment	☐	14 Seal the duct system
☐	5 Block all registers	☐	15 Perform flush and cooldown
☐	6 Determine and cut injection point/Attach layflat	☐	16 Perform post-seal leakage test/Print certificate [FINISH IT]
☐	7 Isolate HVAC equipment	☐	17 Clean nozzle assembly
☐	8 Set up HSC	☐	18 Remove layflat
☐	9 Open AeroSuite	☐	19 Remove blocking and isolation. Return equipment to vehicle
☐	10 Inflate layflat/Perform fog test [FOG IT]	☐	20 Restore home to working order

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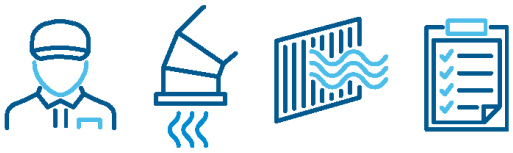
Job Checklist

Sealing Supply & Return



Use this checklist when sealing both supply and return.

TASK

1	Arrive on job site/Perform a home walk-thru	☐
2	Combustion appliances	☐
3	Turn off HVAC	☐
4	Bring in the equipment	☐
5	Block all registers	☐
6	Determine and cut injection point (Supply)	☐
7	Isolate HVAC system	☐
8	Attach layflat (Supply)	☐
9	Set up HSC	☐
10	Open AeroSuite	☐
11	Inflate layflat/Perform fog test [FOG IT]	☐
12	Search for fog in home [FIND IT]	☐
13	Determine and cut injection point (Return)	☐
14	Perform the pre-seal leakage test [FEEL IT]	☐
15	Repair major duct damage/disconnects [FIX IT]	☐
16	Seal the duct system (Supply)	☐
17	Isolate HVAC equipment (Return)	☐
18	Attach layflat (Return)	☐
19	Perform flush and cooldown	☐
20	Perform post-seal leakage test/ Print certificate [FINISH IT]	☐
21	Inflate layflat/Perform fog test [FOG IT]	☐
22	Search for fog in home [FIND IT]	☐
23	Repair major duct damage/disconnects [FIX IT]	☐
24	Repair major duct damage/disconnects [FIX IT]	☐
25	Seal the duct system (Return)	☐
26	Remove blocking and isolation (Supply)	☐
27	Perform flush and cooldown	☐
28	Perform post-seal leakage test/ Print certificate [FINISH IT]	☐
29	Remove layflat from HVAC	☐
30	Clean nozzle assembly	☐
31	Remove blocking and isolation/ Return equipment to vehicle	☐
32	Restore home to working order	☐

7.2 APPENDIX B: SDS

DUCT SEAL LT

Ductseal LT is a stable, non-toxic, non-flammable water-based emulsion of acrylic polymer.

- Water Soluble in liquid state
- Used by other industries
    - Acrylic indoor paints
    - Medical devices
- Mold & Mildew resistant (has anti-microbial properties)
- Tested/Warranty for 10 years
- Conservative precautions are taken when aerosolized

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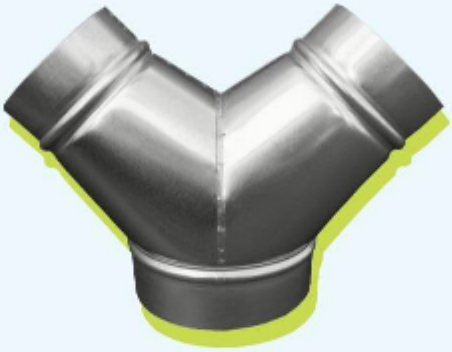
7.3 APPENDIX C: Wye Kit

Wye Kit

The Wye Kit is intended to split the flow of aerosolized sealant into two streams to deal with tricky situations



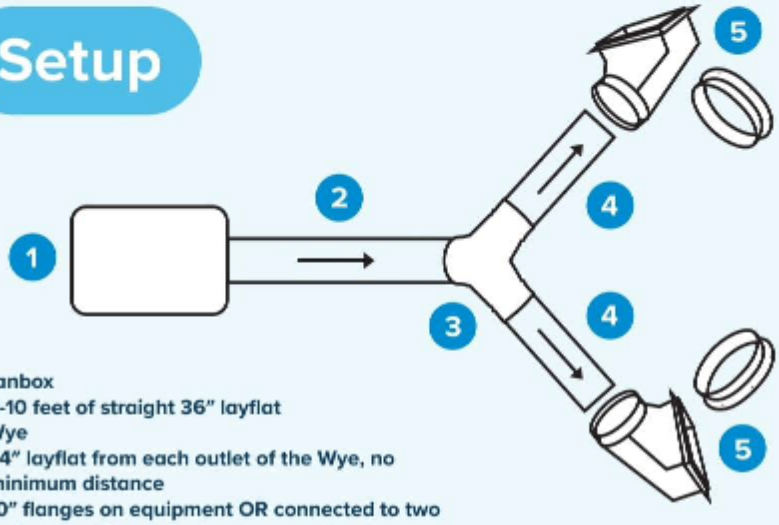
USE 1

Sealing both the supply and return of small HVAC systems at the same time – up to 300 CFM of starting leakage

USE 2

Sealing systems with limited access to the trunk or plenum

Setup



1. Fanbox
2. 8-10 feet of straight 36" layflat
3. Wye
4. 24" layflat from each outlet of the Wye, no minimum distance
5. 10" flanges on equipment OR connected to two registers with reverse boot connections*

*If injecting two different trunks, the Blue Tube "T" must be used to accurately measure pressure from both sides

7.4 APPENDIX D: Periodic Table of HVAC Terms

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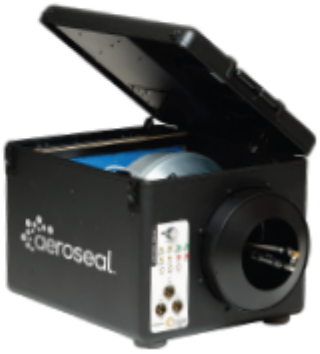
7.5 APPENDIX E: Technical Data Sheet

Technical Data Sheet
HomeSeal Connect 4.0

aeroseal DUCT

SECTION 1: Product Details

Product Name	HomeSeal Connect 4.0
Description	Patented Aeroseal duct sealing system with built in wireless and GSM modules suitable for residential applications. The unitary system includes "Aerosuite" software that controls the machine and provides a user-friendly interface for monitoring sealing process, measuring PreSeal and PostSeal leakages, and printing certificates.
User Interface	Laptop with Aerosuite Software



SECTION 2: Product Specifications

Supply voltage	Single phase, 120 V
Frequency	60 Hz
Power	4000 W (separate circuits may be required)
Communication	USB, Wifi, GSM
Wifi range	200 ft. *Wifi range is dependent on ambient weather conditions, home construction materials*
Operating temperature	40 °F to 140 °F
Storage temperature	-4 °F to 160 °F
Weight	87 lbs.
Dimensions	26" (l) x 21" (w) x 18.5" (h)

225 Byers Road, Miamisburg, OH 45342

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aeroseal DUCT

Sealing range	Up to 1600 CFM_{25} (Pduct > 10 Pa)
Measurement range	15 to 2000 CFM_{25} (Pduct > 5 Pa)
Accuracy	+/- 5%
Fan capacity	500 CFM
Add-on fan capacity	N/A
Fan static (max)	660 Pa
Sealant injection	Single speed pump (58 ccm)

SECTION 3: Other Utilities / Accessories Needed for Aeroseal Process

	MINUMUM REQUIREMENTS
Dry compressed air	Continuous duty air compressor with at least 90 psi pressure and maximum 125 psi, Flow - 6.5 SCFM @ 100 psi, with oil and moisture filters and an output pressure regulator
Air scrubber	> MERV 13 filtration (3 - 10 micron particles) capability
Generator (optional)	5 kW / 5.5 kVA (for operating the machine) 10 kW / 12.5 kVA (for operating machine, compressor and accessories)
Oil and moisture filter (recommended)	Dessicant dryer 7 SCFM flow / 125 psi minimum Regenerative dryer with an oil coalescent filter to deliver clean, oil-free, and dry air

7.6 APPENDIX F: HSC 4 Training Video Catalog

Title	Link
HSC 4.0 Mock Seal Setup	https://youtu.be/qN_f_GZygz8
HSC4.0 Equipment intro and quick connect	https://youtu.be/6o3UJDhlgUw
HSC 4.0 - How to Attach Layflat	https://youtu.be/vPIlsEM4YPo
HSC 4.0 - How to Attach Compressed Air Fittings	https://youtu.be/jcXgqpbhPnY

Title	Link
HSC 4.0 - Setting up Pump Tubing & Operation	https://youtu.be/nbevPgKbLXM
HSC 4.0 - How to Attach Nozzle Assembly	https://youtu.be/8A-mBOpe8XY
HSC 4.0 - How to Set Up Blue Tubing	https://youtube.com/watch/WIU_q-m5OEQ?feature=share

Title	Link
HSC 4.0 - Connecting Power	https://youtube.com/watch/XnBewtezMOE?feature=share
Getting Started with AeroSuite | HSC4.0 AeroSuite Software	https://youtu.be/U3AZh0ANgKQ
HSC 4.0 - How to Clean the Nozzle	https://youtu.be/fhkB7HEGoSI
Blocking and Isolation	https://youtu.be/j5nmwRW4NAY
Ductboard Isolation	https://youtu.be/RqY5NMBfT1Y
WYE Kit Uses	https://youtu.be/C2q4x2QJHCc

Title	Link
Tools and Materials	https://youtu.be/TPsIcsFz8b8
Toe Kick Supply Registers	https://youtu.be/X3B6OexpOFs
Sealing Homes with Panned Returns	https://youtu.be/D-LEdRXPlt8

Title	Link
Manometer Blue Tube	https://youtu.be/M8VcC_SwNnM
Fog Testing SOP	https://youtu.be/LVZRFJm7j6Y
Fan Flow	https://youtu.be/LM8Pm69g0QA
Static Pressure Testing	https://youtu.be/503jA3Adw2M

Title	Link
IR Camera Testing	https://youtu.be/_9BErnLd1qU
CAZ Testing	https://youtu.be/PfEsCTkaPDQ
Anemometer Testing	https://youtu.be/44tN7Ec7pzo

Title	Link
How to do basic checks on your Manometer pressure reading	https://youtu.be/eUPM1MuIkmk
HSC4.0 Nozzle/ Compressed air heater Assembly Replacement	https://youtu.be/DEseLLehhh8
HSC 4.0 Epson Printer set-up	https://youtu.be/7M3uSpBEAR0