

Introduction to Smartseal® System



Welcome to AEROSEAL® training for the SmartSeal equipment. We will now go into an in depth presentation on the equipment, duct seal preparation, sealing and completion.

We have now divided the AeroSeal® training manual into seven segments so that the technician who needs to review a specific area of the training can find it easily. The seven segments are the Introduction, the Equipment, the Equipment Setup, Duct Sealing Process, System Preparation, Running AeroSeal® and Maintaining the Equipment.

Introduction is an overview of the AeroSeal® process. The Equipment segment is information about the pieces of equipment that make up the AeroSeal® system. Equipment Setup shows the way the equipment is powered, connected together and connected to the duct system to be sealed. Ready for sealing describes different applications of duct systems and some of the criteria that needs to be addressed for sealing. Running AeroSeal® describes operation of the computer control with the fan box air intake with the sealant injection rate. Maintaining the Equipment discusses and places emphasis on the injection nozzle, cleaning the nozzle as well as disassembly and replacing the nozzle components.

This segment is the first of the series, the Introduction to the AeroSeal® process.

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Training Agenda



- Day 1: PowerPoint Classroom Training
 - Technical Trainer Reviews Multiple Decks
 - Slide Modules:1-7
- Day 2: OTJ – On the Job Training
- Day 3: OTJ – On the Job Training
- Day 4: OTJ – On the Job Training

Introduction

- Measures Initial Leakage
- Uncovers Issues
- Seals the Ductwork
- Measures Final Leakage
- Reports Leakage Improvement

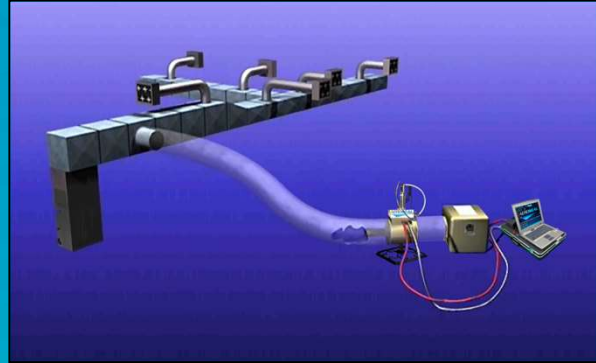
This service-training program introduces AeroSeal's new Smartseal® duct sealing process for commercial duct work and exhaust shafts.

The process is a diagnostic process of air duct sealing, meaning that before the sealing process is performed, the AEROSEAL® process runs a check on the existing duct system and will note the duct air leakage. During the sealing process, the AEROSEAL® process monitors and notes the progress of sealing and reducing the duct leakage.

When the sealing process is completed, a report can be printed indicating the amount of duct leakage before sealing. A graph of the reduction of the duct leakage over the time the duct system was being sealed, and the final duct leakage after sealing.

This is the only process for duct sealing where you can verify to the customer the actual duct leakage with data.

Aeroseal – The System



The AEROSEAL® process internally seals duct leaks in air distribution ducts by injecting a fog of aerosolized adhesive sealant particles into a pressurized air duct system. The duct system will be pressurized because the ductwork will be temporarily isolated/blocked off.

The sealant particles travel through the air duct system looking for openings (pressure differential) that exist throughout the duct system. As the AEROSEAL® aerosolized sealant in the duct system makes a sharp turn (inertia) to exit through a leak, the particles collide with and adhere to the leak edges, effectively sealing it without coating the inside of the ductwork.

Using adhesive sealant particles allows the built-up seal to span leaks as much as 5/8 inch wide, but the most practical opening would be 1/16 to 3/8 inches wide. This and a lot more will be discussed later in the PPT

Ducts Sealed from the Inside

- Sealed from the inside
- More leaks sealed
- Seals all leaks vs. seals leaks found



Aeroseal
'Plug'

The important characteristics of this process are that leaks are accessed from inside the ductwork and not the outside. After the ductwork is installed in a heating or cooling system, access to the outside of the ductwork is denied to areas that are adjacent to structure such as floor joists. This means that more leaks are sealed by this method than by manual methods. Leaks are also automatically found and sealed with this system, whereas in a manual process all leaks must be located to be sealed. Manual methods cannot seal leaks that were not found.

Overview



- SAFETY
- SEALANT SPECIFICATIONS
- SOFTWARE
- EQUIPMENT AND SUPPLIES
- SEALING PROCESS
- OPERATION & MAINTENANCE
- TROUBLESHOOTING

In this program we will try to equip you with the knowledge and material needed to successfully implement the AeroSeal system in a Commercial Application.

We will discuss the following:

Safety

Sealant Specifications

Software

Equipment and Supplies

The Sealing Process

Operation and Maintenance of the equipment

Most Common Error messages – Troubleshooting

Overall Day 1: Slide Modules 1,2,3 (3 hrs)

Break

Unpack all three Pallets, set up equipment & power on (1-2hrs)

Lunch

Slide Modules 4,5,6,7

Plan out for next day

Day 2: Job site # 1

Day 3: Jobsite # 2

Safety

Besides producing a quality product with quality workmanship effectively and efficiently, **the number one concern is SAFETY!**

Top Three Safety Concerns

1. Occupant(s) Safety
2. Technician (your) Safety
3. Equipment Safety

Installation and operation of this equipment can be hazardous due to mechanical and electrical components. Only trained personnel should install, operate and service this equipment. When working on this equipment, observe precautions in the Technical Manual, on tags, and on labels attached to or shipped with the equipment and other safety precautions that may apply. Follow all safety codes. Installation must be in compliance with all local and national codes.

Wear safety glasses and protective clothing.

When working on or around HVAC equipment, disconnect and lockout all electrical power to the equipment and any ancillary equipment. Observe all precautions in literature, on tags and on labels attached to or shipped with the HVAC equipment. If you are unsure about any HVAC equipment precautions, do not hesitate to contact the supplier of that equipment.

Occupant(s) Safety



The dealer shall assure the safety and well-being of the customer and the contents of their organization on all jobs, including, but not limited to:

(Discussion page 10 of Tech Manual)

ANYONE KNOW WHAT
THIS IS?

Figure1: Vapor Barrier



Technicians Safety



Even though the AeroSeal MSDS is practically spotless, it is still the Manufacturers recommendation that all personnel wear respiratory protection in spaces with high aerosol concentration.

(Discussion page 10 of Tech Manual)



Equipment Safety



This should not surprise any technician that our system, like any system, has safety measures in place. These measures are to protect both the equipment and the technician. Refer to the safety section of the manual for details.



Sealant Specification

- Vinyl Co-Polymer Acetate
- Safe
 - UL 181 Tested: Mold Growth
 - UL 723 listed: Smoke and flame Spread
- Longevity Tested
- Conservative Precautions
 - Pregnant, Elderly, Infants

The adhesive is a vinyl polymer and is safe, using the same base material as used in other safe sticky substances. This material has been tested by an outside independent laboratory as well as by Underwriters Laboratory and found to be safe. However, as a conservative precaution, we do recommend that people with chemical sensitivity to vinyl, pregnant women and people with serious medical conditions, leave the building during the sealant injection.

- Cycling test – This experiment alternately blew heated and room temperature air through sample duct connections. The pressure difference across the duct leaks was also cycled
- Baking test – Samples were placed in an oven and held at a steady temperature with no air flow through the test sections
- Aging test – This was the most sophisticated experiment that alternately blew heated and cooled air through the test sections and also cycled the pressure difference across the leaks

The failure criterion is that it lets more than 10% of unsealed flow pass.

All rubber backed tapes failed within 3 days

Premium tape failed completely

Foil backed rubber or vinyl adhesive tapes, clear tape, mastic and aerosol

showed no visible or measurable signs of degradation after two weeks of testing

Obviously, in reality, workmanship is the key to “tightness” of the duct system. The advantage of AeroSeal is that it is almost independent of workmanship.

Sealant Specification

- SDS for Duct Seal
- MSDS for Adherent Remover
- MSDS for Emulsifier
- SDS for Buckeye Cleaner



AEROSEAL SAFETY DATA SHEET	
SECTION 1 - IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY	
Product Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Manufacturer Details: Manufacturer: AEROSEAL Address: 10000 S. 10th Ave. City: Aurora, CO 80013 Phone: 303.733.8800 Fax: 303.733.8800 Email: info@aeroseal.com
SECTION 2 - HAZARD IDENTIFICATION	
Chemical Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None
SECTION 3 - COMPOSITION	
Chemical Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None
SECTION 4 - FIRST AID MEASURES	
Chemical Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None

AEROSEAL MATERIAL SAFETY DATA SHEET	
SECTION 1 - PRODUCT INFORMATION	
Product Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Manufacturer Details: Manufacturer: AEROSEAL Address: 10000 S. 10th Ave. City: Aurora, CO 80013 Phone: 303.733.8800 Fax: 303.733.8800 Email: info@aeroseal.com
SECTION 2 - HAZARDOUS INGREDIENTS INFORMATION	
Chemical Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None
SECTION 3 - HAZARDOUS MATERIALS INFORMATION SYSTEM (HMIS)	
Chemical Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None
SECTION 4 - PHYSICAL/CHEMICAL CHARACTERISTICS	
Chemical Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None
SECTION 5 - FIRE & EXPLOSION HAZARD INFORMATION	
Chemical Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None
SECTION 6 - HEALTH HAZARD INFORMATION	
Chemical Name: Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL Product Name: AEROSEAL	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None

Buckeye Safety Data Sheet	
SECTION 1 - IDENTIFICATION	
Product Name: Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye	Manufacturer Details: Manufacturer: Buckeye Address: 10000 S. 10th Ave. City: Aurora, CO 80013 Phone: 303.733.8800 Fax: 303.733.8800 Email: info@buckeye.com
SECTION 2 - HAZARD IDENTIFICATION	
Chemical Name: Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None
SECTION 3 - COMPOSITION/INGREDIENT INFORMATION	
Chemical Name: Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye Product Name: Buckeye	Physical State: Solid Color: White Odor: None Boiling Point: None Melting Point: None Density: None Flash Point: None Auto-ignition: None Decomposition: None Stability: Stable Reactivity: None Corrosivity: None Acidity/Alkalinity: None Other Hazards: None

Software



The AeroSeal Software Program was developed to automate:

- 1.The diagnosis of duct-system leakage
- 2.The reduction in duct leakage
- 3.The duct sealing process

It records customer information, tracks and controls the sealing process on a minute-by-minute basis, and prints a certificate

General Rules



- Ground fault circuit protection
- No sealant on electric heaters
- Bi-metal over-temperature protection
- Unplug cords if thermostats fail
- Keep power covered
- Duct inspection
- Minimal occupancy
- Use caution with pregnant women
- Use scrubbers
- MSDS sheets available

Although not every aspect of safety can be covered here, we will reinforce some general rules to follow when operating this equipment and performing the sealing process.

Use only grounded electrical circuits and cords and use cords with the wire gauge sufficient to handle loads for the compressor, fan motors and heaters. Unless they are plugged into GFCI receptacles, cords must be fitted with GFCI (Ground Fault Circuit Interrupter) pigtails.

The sealing machine should not be operated if there is sealant material on the heater-cylinder heaters or insulators

The air heaters in the 14-inch diameter Heater Cylinder are wired through bi-metal snap-disk thermostats that cut power to the individual heater circuits if the temperature at the bi-metal disk reaches their target temperatures, 150° F with a 15° F reset value. The heater in the wand is fitted with a thermostat that cuts out at approximately 330° F. The software turns off all the heaters if the temperature of the air leaving the 14-inch cylinder (near the top next to the bi-metal snap disks) exceeds the value specified in AeroSeal.in file (default = 330° F).

Should ALL of these systems fail, unplug the A/C power cords connected to the Heater Cylinder and the Wand.

Do not open any electrical control panel or the heater cylinder while power is applied. Electric shock is possible.

The installer should perform a thorough inspection of the duct system to assure that it can be sealed with the AEROSEAL® system without damage to the duct system or the customer's property.

Occupancy of the building should be kept at a minimum during the injection process, so as to minimize the possibility of accidentally dislodging register seals, or of sensitive individuals being exposed to aerosol particles.

Pregnant women and young children should not be present during the injection process. In addition, ask the customer if they have any respiratory or other health problems. If so, suggest that they leave the premises during the injection process.

AEROSEAL® scrubber fans or AEROSEAL® approved scrubber fans, must be on-site and employed at all sealing jobs. These fans are particularly critical in areas where exposed or partially exposed ductwork allows sealant particles to escape into the space. Scrubber fans are not necessary when sealing new construction at the rough-in stage.

The Right-to-Know Law and OSHA Regulations require that employers and employees be familiar with applicable Material Safety Data Sheets (MSDS) prior to using any chemical product. The MSDS on Duct Seal, available on most Computer Control Cases should be reviewed by installers prior to use. No adverse health effects are expected during normal application of Duct Seal; however, a particle mask

should be worn if it is necessary to be in close contact with spray mist particles. This is to prevent unnecessary entry of sealant particles into the respiratory system.

Strategic Approach



1. Review job requirements (Project Hand-off between Sales and Operations)
2. Occupants and Contents Safety
3. Walk-thru Inspection
 - Smoke Test
 - Internal Camera
4. Blocking
5. Equipment Preparation
6. Injection Points
7. Pre-seal (Pressurization)
8. Minimize Overspray
9. Sealing
10. Post Seal
11. Clean-up and Departure

The due diligence needed in the Commercial Market(s) is extensive and precise. This is an example of a Strategic Approach to be used when addressing a commercial project.

Review Job Requirements



1. Review customer information, work order tasks, and installation instructions with the Sales Engineer

- Scope of Work
- Blocking location and potential issues
- Number and type of filter fans or scrubber fans plus location
- Number of Fans and the Injection Point(s)
- Security Issues
- Accessibility
- Diffuser type(s) plus location
- Crew size and Man-days allocated to project
- Additional Materials needed
- Building Automation, Fire and Safety
- Potential risks, hazards, critical zones, and other safety concerns

2. Review the Mechanical Drawings to Gain Insight

- Potential Injection Points
- Location of all diffusers and grilles noting size and types
- Areas where over-spray could generate
- Location of all critical areas (deemed critical via owner or engineer)
- Location of all critical equipment (deemed critical via owner or engineer)

Proper job handoffs vary from organization to organization. The following steps are best practices to assist organizations in optimizing efficiencies and effectiveness.

Review Job Requirements cont'd



3. Inspect all duct

- Cleanliness
- Large disconnects and/or Openings (Manual Work)
- Location of all BAU/FIS controls

4. Review Installation Material Checklist prior to jobsite

5. Communicate security constraints and/or clearances

6. Insure all pertinent contact information is obtained

- Owners representative
- Sales Engineer
- Building Automation System Contact
- Fire Alarm System Contact
- Building IT Supervisor

Proper job handoffs vary from organization to organization. The following steps are best practices to assist organizations in optimizing efficiencies and effectiveness.

Questions?

This is the end of this slide module. Do you have any questions?