

FRACTIONAL LEAKAGE

1. Duct Preparation

- a. Inspect air distribution systems for major leakage sites and significant accumulation of debris
- b. Remove all debris and significant dust and dirt (>1/8 inch deep) in air distribution system using a NADCA approved duct cleaning method
- c. Ensure adequate structural support for new and existing ductwork, including structural integrity of all mechanical duct joints and transitions per SMACNA standards.
- d. Temporarily remove or protect from aerosol particles building controls, fire and smoke sensors as recommended by manufacturer.
- e. Temporarily disable fire alarms and notify appropriate authorities.
- f. Temporarily isolate air-moving equipment and block off air inlets and outlets, and other devices and appurtenances as recommended by the manufacturer.
- g. Protect occupied spaces from aerosol particles using manufacturer procedures.
- h. All work shall be done in a substantial and workmanlike manner by factory trained technicians.

2. Duct Sealing

- a. Repair all major leakage sites greater than ½ inch across using mastic and fiberglass mesh tape per SMACNA standards
 - i. Mastic and fiberglass mesh tape shall meet UL 181 standards.
- b. Seal existing ductwork from the inside using automated aerosolized sealant injection.
 - i. Manufacturer: AeroSeal, LLC
 - ii. Application must be performed by a manufacturer approved service provider
 - iii. Sealant shall comply with UL Outline Scope 1381
 - iv. Sealant must cure with 2 hours with no VOC off-gassing thereafter
 - v. Sealant shall remain elastic after curing
 - vi. Sealant shall be deposited substantially at areas of leakage only
- c. Provide pre-sealing, post-sealing and sealing profile reports for all duct sections sealed.
- d. Repair all injection and test holes in existing ductwork using patching plates sealed tight per SMACNA standards.
- e. Any injection ports in duct board shall be made and repaired using pumpkin-cuts
- f. Any insulation (internal or external) shall be replaced on the patching plate.

3. Duct Testing

- a. Provide pre-sealing and post-sealing leakage profile reports indicating percentage reduction of leakage for supply, return and exhaust ductwork and shafts.
- b. Use manufacturer calibrated blower fan box with digital manometer to measure leakage before and after sealing.



- c. Following completion of air handling unit installations, duct repairs, and duct sealing, test all ductwork to insure that the air distribution system is properly sealed.
 - i. The supply ducts shall have air losses of less than 3% of the total air flow volume measured at the fan or air-moving device.
 - ii. The return ducts shall have air losses of less than 3% of the total air flow volume measured at the fan or air-moving device.
 - iii. The exhaust ducts shall have air losses of less than 5% of the total air flow volume measured at the fan or air-moving device.
 - iv. Ducts shall be leak tested at a static pressure that is as close as possible to the system average operating static pressure. Duct test pressure should not exceed the lesser of the duct static pressure construction class, the duct system design static pressure or 2.5 in. w.g.

4. Duct Reassembly and Cleanup

- a. Reinstall building controls and smoke detectors.
- b. Enable fire alarms and notify appropriate authorities.
- c. Remove blocking, reinstall grills and registers, and enable air handling fans.
- d. Cleanup sealant residue that may have adhered to surfaces in occupied areas as recommended by the Manufacturer.
- e. All work shall be done in a substantial and workmanlike manner by factory-trained technicians.

5. Warranty

- a. The Contractor shall warrant that the aerosol sealant application will be free from defects for a period of 3 years from date of the sealing application. If defects should occur during this period, the Contractor shall repair or replace the defective duct seals, including the direct labor costs for performing the repair or replacement, at no additional cost to the Owner.



SMACNA LEAKAGE CLASS

1. Duct Preparation

- a. Inspect air distribution systems for major leakage sites and significant accumulation of hubris or debris. Remove all debris and significant dust and dirt (>1/8 inch deep) in air distribution system using a NADCA approved duct cleaning method.
- b. Ensure adequate structural support for new and existing ductwork, including structural integrity of all mechanical duct joints and transitions per SMACNA standards.
- c. Temporarily remove or protect from aerosol particles building controls, fire and smoke sensors as recommended by manufacturer.
- d. Temporarily disable fire alarms and notify appropriate authorities.
- e. Temporarily isolate air-moving equipment and block off air inlets and outlets, and other devices and appurtenances as recommended by the manufacturer.
- f. Protect occupied spaces from aerosol particles using manufacturer procedures.
- g. All work shall be done in a substantial and workmanlike manner by factory trained technicians.

2. Duct Sealing

- a. Repair all major leakage sites greater than ½ inch across using mastic and fiberglass mesh tape per SMACNA standards.
 - i. Mastic and fiberglass mesh tape shall meet UL 181 standards.
- b. Seal existing ductwork from the inside using automated aerosolized sealant injection.
 - i. Manufacturer: Aeroseal, LLC
 - ii. Application must be performed by a manufacturer approved service provider
 - iii. Sealant shall comply with UL Outline Scope 1381
 - iv. Sealant must cure with 2 hours with no VOC off-gassing thereafter
 - v. Sealant shall remain elastic after curing
 - vi. Sealant shall be deposited substantially at areas of leakage only
- c. Provide pre-sealing, post-sealing and sealing profile reports for all duct sections sealed.
- d. Repair all injection and test holes in existing ductwork using patching plates sealed tight per SMACNA standards.
- e. Any injection ports in duct board shall be made and repaired using pumpkin-cuts
- f. Any insulation (internal or external) shall be replaced on the patching plate.

3. Duct Testing

- a. Following completion of air handling unit installations, duct repairs, and duct sealing, test all ductwork to insure that the air distribution system is properly sealed.
 - i. The supply ducts shall have air losses equal to or less than the Leakage Class indicated in Table 1.
 - ii. The return ducts shall have air losses equal to or less than the Leakage Class indicated in Table 1.
 - iii. The exhaust ducts shall have air losses equal to or less than the Leakage Class indicated in Table 1.



The SMACNA Leakage Class (CL) is determined using the following relationship:

$$C_L = F/p^{0.65}$$

Where:

CL = Leakage Class, which is the permissible leakage rate in CFM per 100ft² of duct surface

F = Leakage Factor, CFM per 100ft² of duct surface. Varies with s.p.

p = Duct static pressure, in. w.g.

Duct Static Pressure Construction Class	1/2 in., 1 in. 2 in. w.g.	3 in. w.g.	4 in., 6 in., 10 in. w.g.
Seal Class	A*	A*	A*
Sealing Applicable	Transverse Joints, Seams, and all Applicable Duct Wall Penetrations	Transverse Joints, Seams, and all Applicable Duct Wall Penetrations	Transverse Joints, Seams, and all Applicable Duct Wall Penetrations
Leakage Class			
Rectangular Metal	16	8	4
Round Metal	8	4	2
Flexible Ducts	8	N/A	N/A
Ductboard	8	N/A	N/A
Masonry	8	N/A	N/A

4. Duct Reassembly and Cleanup

- a. Reinstall building controls and smoke detectors.
- b. Enable fire alarms and notify appropriate authorities.
- c. Remove blocking, reinstall grills and registers, and enable air handling fans.
- d. Cleanup sealant residue that may have adhered to surfaces in occupied areas as recommended by the Manufacturer.
- e. All work shall be done in a substantial and workmanlike manner by factory-trained technicians.

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