

Duct Evaluation for Existing Retrofit Furnace/Air Handler Installations

- 1) Visually inspect the duct system prior to installation of new equipment.
 - a. Check for any obvious openings in the duct allowing air leakage.
 - b. Check duct system for any obvious design flaws restricting airflow.
 - c. Check for un-insulated ducts installed in unconditioned spaces.
 - d. Check the size of the main supply and return ducts and verify the cross sectional area is adequate to handle the maximum airflow of new system. (700 to 900 fpm)
 - e. Check the number of branch supplies and returns and verify there are enough to handle the total maximum airflow of new system (6" rd 100 cfm, 5" rd 80-cfm etc)
 - f. Inspect all supply registers and return grilles to insure they are free and clear of any obstructions preventing the airflow to and from the duct system.
 - g. Make the necessary corrections to duct system prior to installation of new equipment.

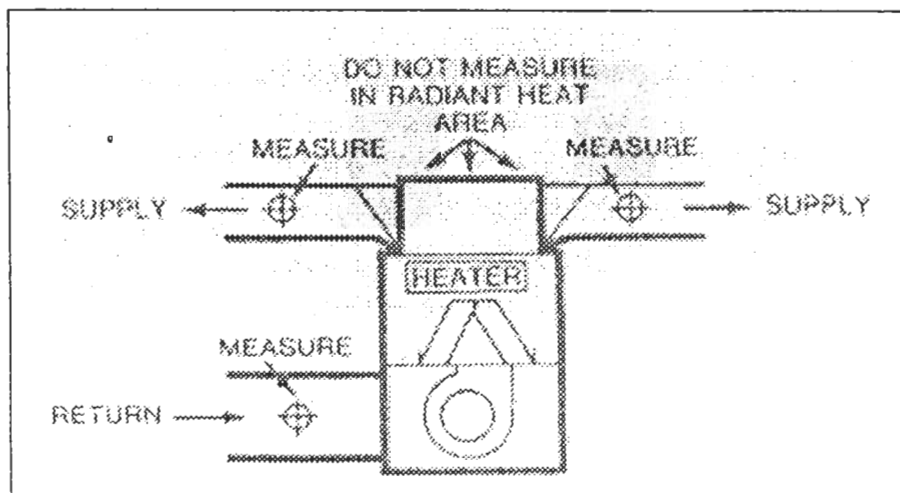
 - 2) If existing condenser and evaporator coil is to remain, thoroughly clean evaporator prior to installing new furnace or air handler.

 - 3) After installation of new equipment verify adequate airflow by measuring total external static pressure (ESP) in the duct system. *Residential equipment (regardless of brand) is designed to handle a total external static pressure of 0.5" wc.*
 - a. All registers should be open and unobstructed.
 - b. Filter should be clean and in place.
 - c. System should be started with the blower speed set to the maximum anticipated blower speed (generally this will be the air conditioning speed set up for 400 cfm/ton) and with heat and cooling locked out.
1. The supply static pressure should be measured with a Magnehelic gauge, inclined manometer or electronic digital manometer at a point immediately above the supply connection of the furnace and prior to the evaporator coil. An acceptable reading would be $0.3 \pm .05$ if evaporator coil is installed and $0.1 \pm$ if no coil installed.
1. If the reading is higher than acceptable, a reading after the coil should be taken. If reading after the coil is $0.1 \pm .05$ then the evaporator coil can be assumed to be dirty/restricted and steps should be taken to clean it. A reading higher than $0.1 \pm .05$ w.c. is indicative of a restricted supply systems and steps should be taken to correct.

- e. The return static should be taken between the filter and the furnace or if this is not possible directly in the blower deck. An acceptable reading for return would be $0.2 \pm .05$.
 1. If the reading is higher than acceptable, a reading prior to the filter should be taken. If the reading prior to the filter is $0.1 \pm .05$ the filter can be assumed to be dirty or too small and should be cleaned or replaced.
- f. In no case should the total of the supply and return static pressures exceed 0.5 ± 0.05 " wc. If the total exceeds this acceptable amount corrections to the duct system are indicated.

2. In addition all Gas, Electric or Oil furnaces should be checked by the Temperature Rise method.
 1. Use the same thermometer for return and supply to avoid thermometer error.
 2. Do not measure in radiant heat area. True air temperature cannot be measured in radiant heat areas.
 3. Measure within six feet of air handler/furnace. Measurement at return and supply grills is inaccurate.
 4. Use average temperature when more than one duct is connected to plenum.
 5. Be sure air temperature is stable before measurement.
 6. Measure downstream from any mixed air source Record temperature difference in return air and supply air (ΔT).
 7. Check the equipment nameplate to see if the (ΔT) is within manufactures recommendations, usually around (35-60 °F) for a gas furnace.

This will insure that the airflow is adequate for the heat exchanger.



Duct Systems

Heating & Cooling Quick-sizing Table

AIRFLOW CFM	SUPPLY OR RETURN ⁽¹⁾ MAIN DUCT SIZE	TABLE A
200	8" RD OR 6" X 8"	
300	9" RD OR 8" X 8"	
400	10" RD OR 10" X 8"	
500	11" RD OR 14" X 8", 10" X 10"	
600	12" RD OR 16" X 8", 12" X 10"	
700	13" RD OR 18" X 8", 14" X 10", 12" X 12"	
800	14" RD OR 22" X 8", 16" X 10", 14" X 12"	
1000	16" RD OR 28" X 8", 20" X 10", 16" X 12"	
1200	17" RD OR 32" X 8", 24" X 10", 20" X 12"	
1400	18" RD OR 28" X 10", 24" X 12"	
1600	20" RD OR 32" X 10", 28" X 12"	
1800	21" RD OR 30" X 12"	
2000	22" RD OR 34" X 12"	
AIRFLOW CFM	SUPPLY BRANCH ⁽¹⁾ DUCT SIZE	TABLE B
80	5" RD	
120	6" RD OR 3-1/2" X 10"	
160	7" RD	
AIRFLOW CFM	RETURN BRANCH ⁽¹⁾ DUCT SIZE	TABLE C
175	STUD WALL 14" X 3-1/2"	
400	PANNED JOIST 14" X 8"	
AIRFLOW CFM	RETURN AIR GRILLE SIZE	TABLE D
200	80 SQ. IN.	
400	160 SQ. IN.	
600	240 SQ. IN.	
800	340 SQ. IN.	
1000	440 SQ. IN.	
1200	540 SQ. IN.	

⁽¹⁾ Air moving device must have available 0.1 inch of external pressure for each 100 equivalent feet of duct system.