AIRFLOW TECHNICAL EVALUATION FORM

United Technologies
Climate | Controls | Security

Distributor: _____ Job Site Reference: _____
Dealer: _____ Installation Date: _____
Technician's Name: _____ Fail Date: _____

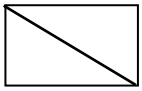
MODEL INFO	Model #	Serial #	ELECTRICAL INFO
Outdoor/Package Unit:			Control Voltage:_____ Vac
Indoor Unit:			Supply Voltage:_____ Vac Φ____
Air Cleaner:			3 Phase (Φ) Voltages: T1→T2_____Vac
Thermostat:			T1→T3_____Vac T2→T3_____Vac
Electronic Air Cleaner:			
Humidifier:			

DUCT SIZE

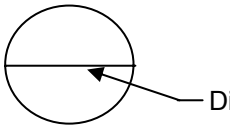
SQUARE DUCT Area = h x w
Height (h): _____ in
Width (w): _____ in

ROUND DUCT Area = $\pi \left(\frac{d}{2}\right)^2$
Diameter (d) = _____ in
$\pi = 3.14$

Cross Section Area of Square Duct: **h x w = _____in²**



Cross Sectional Area of Round Duct: $\pi \left(\frac{d}{2}\right)^2$ **=_____in²**

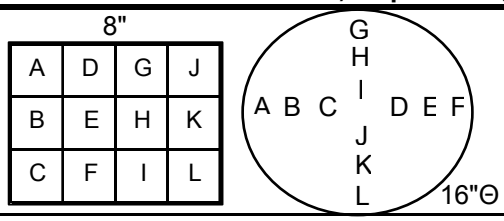


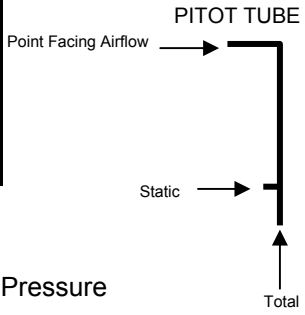
*Traversing The Duct

NOTE: If using a Hot Wire or a Vane Anemometer, skip to filling out table in step 3.

Pressure Method "Pitot Tube"

1. Divide your duct into equal sections taking your measurements approximately every two inches. Refer to duct diagrams to the right for examples. Take pressure measurements at letter designations.





2. Using your pitot tube and the equation to the right find the Velocity Pressure at each point and record them below.

Velocity Pressure = Total Pressure - Static Pressure

A = _____ w.c.	D = _____ w.c.	G = _____ w.c.	J = _____ w.c.	M = _____ w.c.
B = _____ w.c.	E = _____ w.c.	H = _____ w.c.	K = _____ w.c.	N = _____ w.c.
C = _____ w.c.	F = _____ w.c.	I = _____ w.c.	L = _____ w.c.	O = _____ w.c.

3. Convert your recorded Velocity Pressures above into Velocity by using the equation to the right and recording in the table below.

$$\text{Velocity} = 4{,}005\sqrt{\text{Velocity Pressure}}$$

A = _____ ft/min.	D = _____ ft/min.	G = _____ ft/min.	J = _____ ft/min.	M = _____ ft/min.
B = _____ ft/min.	E = _____ ft/min.	H = _____ ft/min.	K = _____ ft/min.	N = _____ ft/min.
C = _____ ft/min.	F = _____ ft/min.	I = _____ ft/min.	L = _____ ft/min.	O = _____ ft/min.

4. Add all the Velocities together and divide by the number of measurements to get an Average Velocity. (Use calculated Velcoities from the table in step 3.)

Average Velocity = _____ft/min.

5. Multiply your Average Velocity by your Cross Sectional Duct Area to get your Airflow in cfm.

$$\text{CFM} = \frac{\text{Cross Sectional Area } (\text{in}^2) \times \text{Average Velocity (ft/min)}}{144}$$

cfm = _____ft³/min

† Temperature rise is equal to the supply air temp. minus the return air temp. at steady state operation. The supply air temp. should be measured away form the line of sight of the heat exchanger.

*In small ducts or where traverse operations are otherwise impossible, an accuracy of ±5% can frequently be achieved by placing Pitot tube or Anemometer in center of duct. Determine velocity from the reading, then multiply by 0.9 for an approximate average velocity.

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ELECTRIC HEAT TEMP RISE METHOD

1 PHASE

$$CFM = \frac{(Volts)(Amps)(3.413)}{1.08(\Delta T)}$$

Volts = _____ Amps = _____

†Sup. Air Temp. ____°F - Ret. Air Temp.____°F = ΔT

cfm = _____ft³/min

3 PHASE

$$CFM = \frac{(Volts)(Amps)(5.91)}{1.08(\Delta T)}$$

Volts = _____ Amps = _____

†Sup. Air Temp. ____°F - Ret. Air Temp.____°F = ΔT

cfm = _____ft³/min

TEMPERATURE VS. ENTHALPY

Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB
40	15.23	**48**	19.21	**56**	23.84	**64**	29.31	**72**	35.83	**80**	43.69
41	15.7	**49**	19.75	**57**	24.48	**65**	30.06	**73**	36.74	**81**	44.78
42	16.17	**50**	20.3	**58**	25.12	**66**	30.83	**74**	37.66	**82**	45.9
43	16.66	**51**	20.86	**59**	25.78	**67**	31.62	**75**	38.61	**83**	47.04
44	17.15	**52**	21.44	**60**	26.46	**68**	32.42	**76**	39.57	**84**	48.22
45	17.65	**53**	22.02	**61**	27.15	**69**	33.25	**77**	40.57	**85**	49.43
46	18.16	**54**	22.62	**62**	27.85	**70**	34.09	**78**	41.58		
47	18.68	**55**	23.22	**63**	28.57	**71**	34.95	**79**	42.62		

INDOOR COIL (EVAPORATOR)

	ENTERING	LEAVING	DIFFERENCE
W.B.			
Enthalpy			Δh = Btu/LB

EVAPORATOR CAPACITY

BTUH = 4.5 x cfm x Δh

OUTDOOR COIL (CONDENSOR)

	ENTERING	LEAVING	DIFFERENCE
(Air) D.B.			ΔT = °F

CONDENSOR CAPACITY

BTUH = 1.10 x COND. Cfm x ΔT

Due to varying field condidtions, a tolerance of 10% must be expected when comparing test data to actual performance.

OTHER METHODS TO CHECK AIRFLOW

Belt Driven Blowers

Blower Speed = _____rpm
Dimater of Pulley = _____in
Of Turns = _____Open
Static Pressure = _____ w.c.

Refer to Product Data Sheets for rpm vs static Presssure airflow charts.

Total External Method

Ret. Static + Sup. Static = Total External Static

Use the Total External Static in conjunction with the "Blower Performance" data in the Product Specification Sheets or the unit's "Tech Label".

NOTE: 350-400 CFM PER TON

Furnace cfm = $\frac{\text{btu output}}{1.08(\Delta T)}$

NOTES

INDOOR DRY BULB ADJUSTMENT

Use equations below in conjunction with unit's "Tech Label" information for total and sensible capacities @ indoor dry bulbs other than 80°F entering coil.

Sensible Capacity at Indoor db LOWER than 80°F = $\left((\text{MBh x S/T}) - \frac{(80\text{-Indoor db}) \times 835 \times \text{Indoor cfm}}{1000}\right)$

Sensible Capacity at Indoor db HIGHER then 80°F= $\left((\text{MBh x S/T}) + \frac{(\text{Indoor db-80}) \times 835 \times \text{Indoor cfm}}{1000}\right)$

† Temperature rise is equal to the supply air temp. minus the return air temp. at steady state operation. The supply air temp. should be measured away form the line of sight of the heat exchanger.

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