

TECH TIPS

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Checking Airflow (ESP)



Checking Airflow is an important and often overlooked aspect of an A/C start up or service call. Why is it that when we receive a call regarding refrigerant charge, we always ask about airflow? Without proper airflow, a system can not work at its rated capacity or efficiency. It is also important to remember that the manufacturer's charging charts are based on a model system which has 400 cfm per ton of air across its coil. If we can not first confirm that proper airflow is present then any charging chart we may use will be inaccurate.

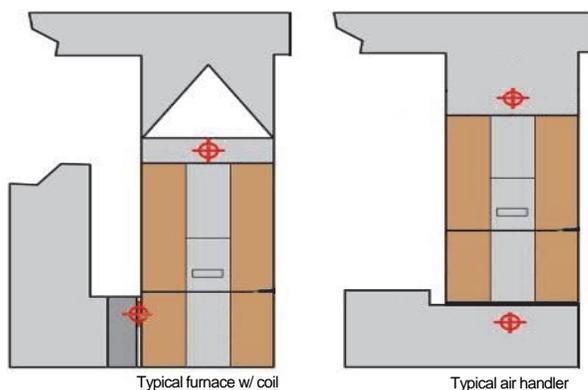
There are various ways of checking airflow. Let's look at one of the easier and more popular methods.

Total External Static Pressure (total ESP) and Blower Performance Data

Manufacturers publish blower performance charts in their installation manuals. These charts can be used to set up and confirm airflow. A static pressure reading is required and should be taken with an incline manometer, Magnehelic, digital manometer or some other type of pressure gauge capable of reading down to at least 0.1" W.C.

Total external static pressure is the pressure that the blower motor is working against. It is the sum of the positive (supply) pressure and negative (return) pressure. If a blower is subjected to pressure in excess of its maximum ESP rating; it will fail to deliver the required airflow. A unit's maximum ESP can be found on the name plate or in the installation manual.

To measure total ESP, two pressure readings are required. The placement of the manometer probes is dependant upon the type of equipment being serviced. Illustrated below are the correct positions for a typical furnace and air handler.

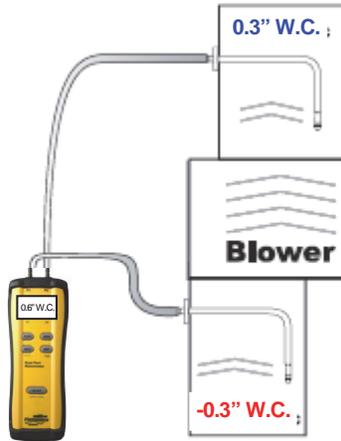


Furnace probe positions should be on the return between the filter and blower and on the supply side between the furnace and coil (if present). If there is no access between the furnace and coil, an alternate position for the supply side probe is through the high limit cut out.

Air Handler probe positions should be in the return before the filter rack and in the supply plenum.

A differential pressure gauge such as a Magnehelic and many digital manometers are outfitted with two ports and will read direct ESP. Alternatively, the two readings may be taken individually and then added together. When adding the pressures together the negative pressure is treated as though it was

a positive number. Example: Supply pressure = 0.3" W.C., Return Pressure = -0.3" W.C., Total ESP = 0.6" W.C.



Once we have determined the total ESP we can consult the blower performance chart to determine the CFM being delivered.

Blower Performance

Model	Motor HP	Blower Size	Temp Rise	Blower Speed	CFM @ ext. Static Pressure - in. W.C.							
					.20	.30	.40	.50	.60	.70	.80	.90
FURNACE MODEL "A"	1/3	10 x 8	35-65	High	1518	1446	1368	1297	1219	1122	1003	834
				Med/Hi	1340	1298	1234	1182	1101	1018	903	752
				Med	1099	1084	1060	1019	952	883	783	709
				Low	942	935	896	868	829	760	651	553

Here we can see that this furnace blower set to high speed can deliver 1200 CFM at 0.6" W.C. – enough for three tons of air conditioning. At 0.9" W.C. the same blower can only deliver 800 CFM – only enough for 2 tons of air conditioning. Typical (properly designed) residential duct systems will be designed with total ESP around 0.3" - 0.6" W.C. (.1" Supply, .1" Return, .1" Registers/Grilles, .2"-.3" Wet Coil). Air handler total ESPs will range from .3" - .4". Furnace and coil applications will be .5" - .6".

High total ESP can be attributed to: dirty coils, dirty filters, high efficiency filters, closed/blocked supply and return registers/grills/dampers and undersized or restricted duct work.

Now that we know how to confirm air flow using static pressure, we can feel more confident when charging and consulting the manufactures charging tables. Total ESP should be checked during start up, and the blower motor speed set accordingly. It should also be checked before attempting to adjust or diagnose the refrigerant charge. If a technician overcharges the system to compensate for poor airflow, hi pressure faults may occur.

If you have any questions regarding this TECH TIP, please feel free to contact me at the office at 800-830-0853, mobile phone 610-241-5839 or via email at austindillon@americanairdist.com.

Thanks!

Austin

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