HEAT PUMP

Contractor Commissioning Worksheet

This worksheet is for testing of a ducted air source heat pump with **non-variable speed** compressor.

1 CUSTOMER

NAME (as listed on rebate application)

INSTALLATION ADDRESS

2 CONTRACTOR

INSTALLER NAME

COMPANY NAME

3 NEW EQUIPMENT

MANUFACTURER

AHRI REFERENCE #

OUTDOOR UNIT MODEL #

INDOOR UNIT MODEL #

INSTALL DATE

SEER2

HSPF2

4 RECOMMENDED TRUEFLOW® TEST (see instructions on page 3)

TESTED IN: ☐ Heating ☐ Cooling

FILTER SIZE (16X20 etc.)

1 STAGE/CAPACITY TESTED?

2 TONS TESTED

3 INSERT PLATE SIZE: ☐ 14 ☐ 20

4 NOTE WHERE PLATE INSTALLED: ☐ FILTER SLOT ☐ FILTER GRILLE

5 MEASURE NORMAL SUPPLY OPERATING PRESSURE (NSOP)

6 MEASURE SUPPLY PRESSURE WITH PLATE IN (TFSOP)

7 CORRECTION FACTOR (FOUND IN MANUAL OR $\sqrt{\frac{\#5}{\#6}}$)

8 PLATE PRESSURE

9 RAW FLOW (CFM)

10 CORRECTED FLOW (CFM, **#9** x **#10**)

11 CFM/TON (OR **#10 / #2**)

5 (OPTIONAL) ALTERNATIVE TEST

Record external static pressure (ESP). Use ESP to lookup airflow on manufacturer table (ESP vs total airflow). Divide by tonnage and record CFM/ton. Confirm CFM/ton meets manufacturer requirement. Range is 325-500 CFM/tonn. If not met, change the speed setting.

EXTERNAL STATIC PRESSURE	CFM/TON	CFM/TON MEETS MANUFACTURER REQUIREMENTS:
		☐ Yes ☐ No

7 REFRIGERANT CHARGE VERIFICATION

OUTSIDE TEMPERATURE

Based on outside temperature, complete the applicable section (A) or (B) below.

A Refrigerant charge method when outdoor temperature is **above 65°F**. Must meet manufacturer requirements.

A CONDENSER SATURATION TEMP. (FROM GAUGE °F)	**B** LIQUID LINE TEMP (°F)	MEASURED (°F) SUBCOOLING (**A**-**B**)	MANUFACTURER'S TARGET SUBCOOLING (°F)

B Refrigerant charge method when outdoor temperature is **below 65°F**. Must be at or below chart value (page 4).

SUPPLY DRY BULB TEMP (°F)	RETURN DRY BULB TEMP (°F)	TEMPERATURE SPLIT (°F)

Compare measured temperature split to minimum temperature split shown on page 4 chart for given 'CFM/Ton versus Outdoor Air Temperature' condition. Temp split must be at or above chart value.

8 CONTROL SETUP/CHECKOUT (ALL SYSTEMS)

THERMOSTAT HAS BEEN SET TO LOCKOUT ELECTRIC COILS AT 35°F (OR LOWER)? ☐ Yes ☐ No

6 ACCEPTANCE OF TERMS

I hereby certify that all information on this worksheet is accurate, services have been performed to program requirements. I certify that we have compiled with all the terms outlined in the Chelan County PUD Energy Efficiency Program Contractor Participation Agreement.

SIGNATURE OF INSTALLER

DATE

TRUEFLOW® METER TEST INSTRUCTIONS

1. **Turn on air handler** (by using fan-only switch or by turning on heat/AC). It is best to call for the flow that will be used during most of the year (probably heating). Make sure you know which stage is operating so you will divide the measured flow by the right number of tons. Check size of outdoor unit to get capacity (tons). Record which stage (if multistage compressor) that you test (Box 1) and the tons tested (Box 2). Note TrueFlow plate size (Box 3) and where you will install the TrueFlow (Box 4). Normally you will install the TrueFlow in place of the filter, but you can also install it at a return filter grille if needed.
2. **Place static pressure tap** in supply plenum; drill hole if needed. The hooked end of the tap should face into the air stream. Note it is generally better to place tap at least 6" away from any take-off or turning vane. If this position was used to measure static pressure as part of the external static pressure measurement, the tap does not need to be moved. If the system tested is a manufactured home, access the supply system through the nearest supply register. Temporarily remove the magnet from the static pressure tap, reach down into the supply boot (look out for sharp edges) and toss the tap back toward the furnace. You can also put this tap in another place on the supply side (refrigerant line penetration into air handler cabinet, for example).
3. **Connect other end of hose** (that leads to the pressure tap) to the Input side of the pressure gauge (Channel A). Turn on gauge (if using DG-700 or similar). If using DG-700, switch to inches of water mode by using Units switch. Keep gauge in pressure/pressure mode for all tests.
4. Record normal supply operating pressure (NSOP) on worksheet in (Box 5). If reading is very "jumpy", press the Average key and wait at least 5 seconds for the average value to display.
5. **Remove system filter** and replace with TrueFlow outfitted with any needed spacers. Plate should be positioned so side with labels faces oncoming air flow. Connect plate hoses to Channel B of pressure gauge (if using DG-700); otherwise, connect plate hoses so they will read pressure drop across plate. If TrueFlow is installed on a non-ducted return (on the top/front of the furnace cabinet or on a return grille), you will need to apply a 1.04 multiplier to the raw flow in addition to any Correction Factor.
6. **Look at the pressure** in supply system with TrueFlow installed (TFSOP). This will read from Channel A on the gauge; record on worksheet in (Box 6).
7. **Look at NSOP and TFSOP**. If they differ by more than 3 Pa or 0.02" water, look up a Correction Factor. Use look up table on TrueFlow laminated card to figure any needed correction. Record Correction Factor √(NSOP/TFSOP) on worksheet in (Box 7).
8. **Read pressure across plate**; record on worksheet in (Box 8).
9. **Look up Raw Flow** on laminated card using plate pressure. Make sure you look up the flow for the correct plate (#14 or #20). Record Raw Flow on worksheet in (Box 9).
10. **Multiply Raw Flow** (Box 9) by Correction Factor (Box 7); this is Corrected Flow. Record on worksheet in (Box 10).
11. **Divide Corrected Flow** (Box 10) by Tested Tons (Box 2) to get CFM/ton. Record in (Box 11). If flow is between 325 to 500 CFM/ton, the system meets program specs.

TEMPERATURE SPLIT - CFM/TON VERSUS OUTDOOR AIR TEMP.

R-410A Minimum Expected Temperature Split (Supply - Return)

Outdoor Temp.	CFM/TON															
	300	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450
5	13.0	12.6	12.2	11.8	11.4	11.0	10.8	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.2	9.0
7	13.8	13.4	13.0	12.6	12.2	11.8	11.6	11.3	11.1	10.8	10.6	10.4	10.1	9.9	9.6	9.4
9	14.6	14.2	13.8	13.4	13.0	12.6	12.3	12.0	11.8	11.5	11.2	10.9	10.6	10.4	10.1	9.8
11	15.4	15.0	14.6	14.2	13.8	13.4	13.1	12.8	12.4	12.1	11.8	11.5	11.2	10.8	10.5	10.2
13	16.2	15.8	15.4	15.0	14.6	14.2	13.8	13.5	13.1	12.8	12.4	12.0	11.7	11.3	11.0	10.6
15	17.0	16.6	16.2	15.8	15.4	15.0	14.6	14.2	13.8	13.4	13.0	12.6	12.2	11.8	11.4	11.0
17	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.8	14.4	14.0	13.6	13.2	12.8	12.4	12.0	11.6
19	18.2	17.8	17.4	17.0	16.6	16.2	15.8	15.4	15.0	14.6	14.2	13.8	13.4	13.0	12.6	12.2
21	18.8	18.4	18.0	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.8	14.4	14.0	13.6	13.2	12.8
23	19.4	19.0	18.6	18.2	17.8	17.4	17.0	16.6	16.2	15.8	15.4	15.0	14.6	14.2	13.8	13.4
25	20.0	19.6	19.2	18.8	18.4	18.0	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.8	14.4	14.0
27	20.6	20.2	19.8	19.4	19.0	18.6	18.2	17.7	17.3	16.8	16.4	16.0	15.6	15.2	14.8	14.4
29	21.2	20.8	20.4	20.0	19.6	19.2	18.7	18.2	17.8	17.3	16.8	16.4	16.0	15.6	15.2	14.8
31	21.8	21.4	21.0	20.6	20.2	19.8	19.3	18.8	18.2	17.7	17.2	16.8	16.4	16.0	15.6	15.2
33	22.4	22.0	21.6	21.2	20.8	20.4	19.8	19.3	18.7	18.2	17.6	17.2	16.8	16.4	16.0	15.6
35	23.0	22.6	22.2	21.8	21.4	21.0	20.4	19.8	19.2	18.6	18.0	17.6	17.2	16.8	16.4	16.0
37	24.0	23.6	23.1	22.7	22.2	21.8	21.2	20.6	20.0	19.4	18.8	18.4	18.0	17.6	17.2	16.8
39	25.0	24.5	24.0	23.6	23.1	22.6	22.0	21.4	20.8	20.2	19.6	19.2	18.8	18.4	18.0	17.6
41	26.0	25.5	25.0	24.4	23.9	23.4	22.8	22.2	21.6	21.0	20.4	20.0	19.6	19.2	18.8	18.4
43	27.0	26.4	25.9	25.3	24.8	24.2	23.6	23.0	22.4	21.8	21.2	20.8	20.4	20.0	19.6	19.2
45	28.0	27.4	26.8	26.2	25.6	25.0	24.4	23.8	23.2	22.6	22.0	21.6	21.2	20.8	20.4	20.0
47	29.2	28.5	27.8	27.2	26.5	25.8	25.2	24.6	24.0	23.4	22.8	22.4	21.9	21.5	21.0	20.6
49	30.4	29.6	28.9	28.1	27.4	26.6	26.0	25.4	24.8	24.2	23.6	23.1	22.6	22.2	21.7	21.2
51	31.6	30.8	29.9	29.1	28.2	27.4	26.8	26.2	25.6	25.0	24.4	23.9	23.4	22.8	22.3	21.8
53	32.8	31.9	31.0	30.0	29.1	28.2	27.6	27.0	26.4	25.8	25.2	24.6	24.1	23.5	23.0	22.4
55	34.0	33.0	32.0	31.0	30.0	29.0	28.4	27.8	27.2	26.6	26.0	25.4	24.8	24.2	23.6	23.0
57	34.8	33.8	32.8	31.8	30.8	29.8	29.2	28.5	27.9	27.2	26.6	26.0	25.4	24.8	24.2	23.6
59	35.6	34.6	33.6	32.6	31.6	30.6	29.9	29.2	28.6	27.9	27.2	26.6	26.0	25.4	24.8	24.2
61	36.4	35.4	34.4	33.4	32.4	31.4	30.7	30.0	29.2	28.5	27.8	27.2	26.6	26.0	25.4	24.8
63	37.2	36.2	35.2	34.2	33.2	32.2	31.4	30.7	29.9	29.2	28.4	27.8	27.2	26.6	26.0	25.4
65	38.0	37.0	36.0	35.0	34.0	33.0	32.2	31.4	30.6	29.8	29.0	28.4	27.8	27.2	26.6	26.0