

PTCS® Heat Pump Final Exam

Name: _____

Company: _____

1. What is the maximum amount of time you *should* expose an R410a system to the atmosphere?
 - a. 15 minutes
 - b. 5 minutes
 - c. 1 minutes
 - d. 0 minutes
2. It is important to wait at least 15 minutes after system start-up when measuring refrigerant pressures because
 - a. Auxiliary heat requires 15 minutes to warm up
 - b. The system will be at a steady state condition and provide more reliable readings
 - c. Airflow across the coils needs time to achieve 325 cfm/ton
 - d. All of the above
3. What are needed to make sure we have the right charge and no moisture in the lines?
 - a. Use nitrogen when brazing
 - b. A vacuum pump with fresh oil
 - c. A calibrated manifold gauge set with low loss fittings
 - d. All of the above
4. Equipment and wall penetrations must be sealed.
 - a. True
 - b. False
5. Heat pumps are rated for heating capacity at what two outdoor temperatures? _____°F and _____°F
6. The higher the temperature of the balance point, the less strip heat we use.
 - a. True
 - b. False
7. When a heat pump is sized to match the heat loss rate of the house, annual heating energy consumption tends to decrease.
 - a. True
 - b. False
8. How many ounces of refrigerant would you add to a system with a 50 foot line-set (¾" suction line & 3/8" liquid line) when the standard line set length for the heat pump is 15'? _____
9. What is the highest balance point allowed by PTCS for sizing heat pumps in the Pacific NW? _____°F
10. The colder the outside temperature, the less heating capacity the heat pump delivers.
 - a. True
 - b. False
11. You can have non-PTCS Certified coworkers/employees complete the test as long as a PTCS-certified technician checks the acknowledgement box in the online registry.
 - a. True
 - b. False

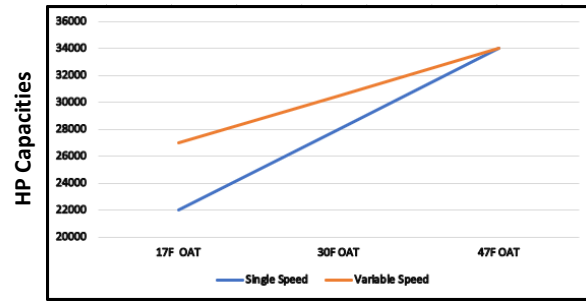
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12. What is the maximum strip heat lockout temperature allowed by PTCS?
- 17
 - 47
 - 30
 - 35
13. Projects entered into the PTCS Online Registry are submitted to utilities automatically without any more work on your part.
- True
 - False
14. When commissioning a system with an outdoor temp of 45 F and an airflow of 370 CFM/ton, what is the target temperature split? (Use Minimum Expected Temperature Split table in your manual on page 78)
- 22.1
 - 23.8
 - 25.4
 - 19.8
15. A project can be entered onto the mobile optimized site using a mobile device without internet access.
- True
 - False
16. Can a technician only certified in PTCS Heat Pumps seal and certify a PTCS duct sealing job?
- Yes, once technicians are PTCS Certified in at least one area they can install and PTCS certify any heat pump or duct sealing job.
 - No, technicians must be certified in each area they do PTCS work in.
17. How do you get a PTCS Technician ID Number?
- Pass the class, submit the BPA Certified Technician Application, and create an online account
 - Pass the class and create an online account
 - Create an online account and submit the BPA Certified Technician Application
 - None of the above
18. What percentage of completed jobs is inspected for Quality Assurance? _____
19. What is the maximum temperature at which the compressor low ambient cut-out may be set to meet PTCS specs (for all-electric systems)?
- 10°F
 - 5°F
 - 17°F
 - 47°F
20. A Commissioning, Controls, and Sizing incentive is offered by some utilities for a heat pump with an HSPF less than:
- 8 HSPF
 - 9 HSPF
 - 10 HSPF
21. The minimum amount of airflow across the indoor coil allowed by PTCS specs is
- 300 CFM/ton
 - 400 CFM/ton
 - 325 CFM/ton
 - Manufacturer's specifications or 325 CFM/ton

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22. Given the information in the graph to the right, a single speed heat pump has a higher capacity at 30°F than a variable speed heat pump.

- a. True
- b. False



23. Communicating fan coils and thermostats will always deliver enough airflow to meet PTCS specifications.

- a. True
- b. False

24. You can determine raw (uncorrected) system airflow by using the TrueFlow plate (14" or 20"), the pressure difference across the plate, and the flow look up table.

- a. True
- b. False

25. NSOP and supply static pressure are needed in the same location.

- a. True
- b. False

26. TFSOP and return static pressure are needed in the same location.

- a. True
- b. False

27. When measuring return static pressure, PTCS requires you to measure on the furnace side of the filter.

- a. True
- b. False

28. What is the maximum recommended external static pressure in Pa and inH2O? _____ Pa _____ inH2O

29. According to the fan curve chart below, airflow _____ with increasing static pressure.

- a. increases
- b. remains the same
- c. decreases
- d. is not impacted by static pressure

FURNACE AIRFLOW (CFM) VS. EXTERNAL STATIC PRESSURE (inH2O)										
MODEL (inH2O)	SPEED TAP	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
*UX2B060A9362A (CFM)	4 – High – Black	1394	1359	1314	1260	1196	1122	1038	945	853
	3 – Med-High – Blue	1250	1232	1202	1160	1106	1040	962	873	771
	2 – Med-Low – Yellow	1102	1092	1069	1034	986	925	852	766	668
	1 – Low - Red	957	944	922	891	853	806	750	686	614
*UX2B080A9422A (CFM)	4 – High – Black	1748	1683	1615	1544	1470	1393	1314	1232	1147
	3 – Med-High – Blue	1375	1367	1347	1314	1268	1210	1139	1056	960
	2 – Med-Low – Yellow	1178	1167	1147	1119	1082	1036	982	919	847
	1 – Low - Red	859	863	856	839	811	772	723	663	592

* - First letter may be "A" or "T"

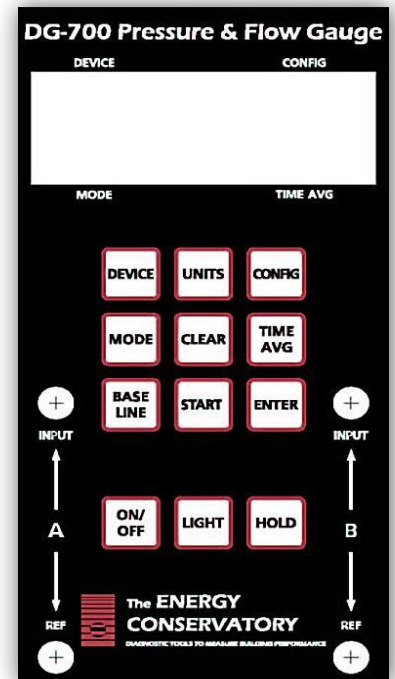
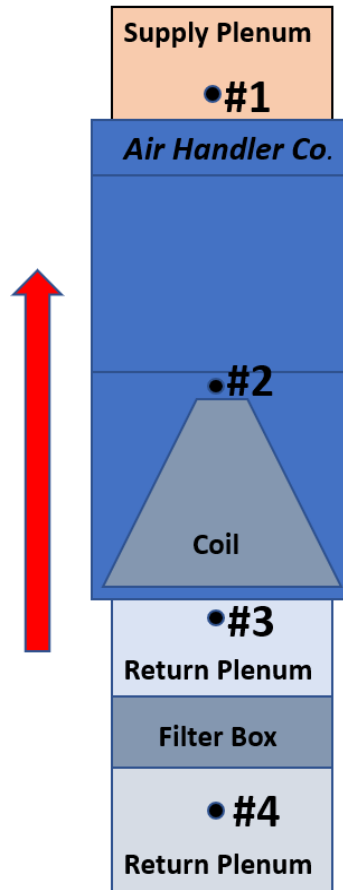
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30. The temp split is measured at the same location the ESP is measured.
- True
 - False
31. What is a more important rating as far as annual heating energy is concerned in the Pacific NW?
- HSPF
 - SEER
 - EER
 - None of the above
32. The PTCS Heat Pump specification provides guidance on:
- Heat Pump installation codes
 - Controls, air flow, and refrigerant charge
 - Optimize simultaneous operation of the compressor and strip heat
 - Sizing, controls, air flow and refrigerant charge
33. What is the correction factor? **NSOP:** 0.40 inH2O, **TFSOP:** 0.36 inH2O: _____
34. What is the raw flow? **Plate pressure:** 0.172 inH2O, #20 plate: _____
35. What is the corrected flow? **NSOP:** 0.32 inH2O, **TFSOP:** 0.36 inH2O, #20 plate, **Plate Pressure:** 0.205 inH2O:
 _____ X _____ = _____

36. Based on the sketch to the right, which combination of locations gives the correct external static pressure measurement for a heat pump:

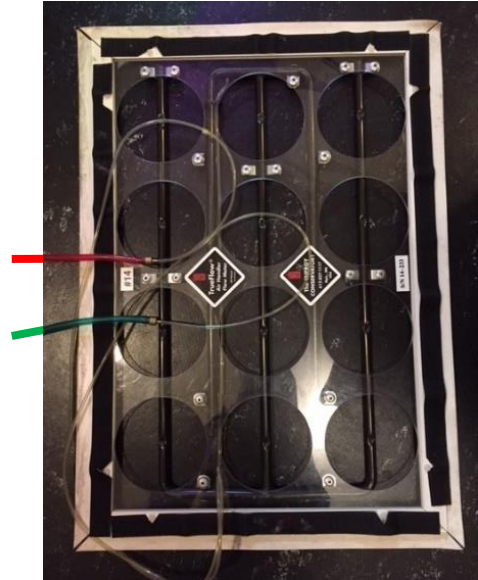
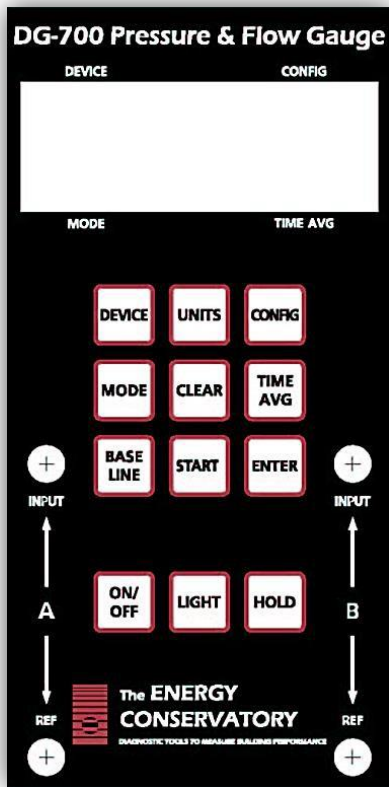
- #1 and #3
- #1 and #4
- #3 and #4
- #2 and #4

37. Draw a line from the number indicating duct location (pictures to the right) to the manometer to show where the supply static pressure measurement would be taken.



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38. Draw lines (extend off of the red and green hoses in the picture) to show where the flow plate connects to the meter.



39. The DG700 meter has two sides. The A side is for measuring _____ . The B side is for measuring _____ & _____ .

Congratulations! You have completed the Final Exam for the PTCS Heat Pump training. Please wait for instructions on how it will be graded. Make sure you hand this in to your trainer prior to leaving the class.

After you pass the exam, please remember to:

- 1) Create an online account, if you have not already, at <https://ptcs.bpa.gov>
- 2) Complete and submit your Certified Technician Application (located at the end of your manual)