

## Chapter 6 Review Questions

### *Controls and Accessories*

#### Instructor's Answer Sheet

1. Commercial refrigeration thermostats that sense the box air temperature have a temperature swing of about how many degrees?

**b. 5°**

2. Why does a thermostat that senses coil temperature prevent frost build-up on a medium temperature evaporator?

**b. Once the tstat is satisfied, any buildup of frost on the evaporator must be melted before the tstat will restart the compressor.**

3. What is the primary purpose of the cap on a service valve stem?

**c. To prevent dirt from damaging the packing when the valve is opened**

4. What are two troubleshooting procedures that can be performed by back-seating the suction service valve?

**a. Check reed valves and high back pressure overloading.**

5. What will happen if the compressor is started with the discharge service valve front seated?

**c. The valve plate gasket will be damaged, or even injure the technician.**

6. With both service valves front seated what is the basic procedure for replacing a semi-hermetic compressor?

- **Unbolt the service valves from the compressor**
- **Remove the old compressor**
- **Set the new compressor in place**

- **Re-bolt the service valves**
- **Pull a vacuum on the new compressor**
- **Back seat the service valves**
- **You're ready to start it up.**

7. What controls the pump down solenoid?

**a. Thermostat**

8. Describe the pump down sequence.

- **When the thermostat is *satisfied* (has reached its temperature setting) the power to the solenoid is interrupted.**
- **The plunger falls and the seat blocks the flow of liquid.**
- **The compressor continues to run, pumping refrigerant out of the evaporator and suction lines, and into the high side of the system.**
- **When the suction pressure drops to the low pressure control cut-out, the compressor stops.**
- **When the tstat calls for refrigeration the solenoid is energized.**
- **The plunger is lifted up into the solenoid coil, opening the valve.**
- **The refrigerant flows through the valve, through the evaporator, and into the suction line.**
- **he suction pressure rises.**
- **When the pressure reaches the low pressure control cut-in, the compressor starts. The system is back in the refrigeration mode.**

9. What will happen if the pump down solenoid is installed backward?

- **c. The system will not pump down and the compressor will not shut off.**

10. What is the primary function of a hot gas bypass valve?

**a. Maintains a minimum suction pressure at the compressor.**

11. What is the primary function of a CPR valve?

**b. Prevents compressor overload during hot pull-down.**

12. What is the primary function of an EPR valve?

**c. Keeps pressures up in the evaporator.**

13. What does "ZP" stand for on a Sporlan TEV?

**a. A freezer valve that limits the pressure to the compressor.**

14. List the steps required to determine the maximum suction pressure a compressor can handle, and to also set a CPR valve.

- **Front seat the suction service valve.**
- **Start the compressor when the evaporator is warm.**
- **Open (backseat) the suction service valve slowly and watch the compressor amperage.**
- **When the compressor is drawing RLA note the suction pressure.**
- **This is the maximum pressure the compressor can handle and is also the CPR valve setting.**

15. Two cases are installed on one compressor. One is a 35° display case and the other is a 50° display case. Which case would require an EPR?

**a. The higher temperature case.**

16. What are three uses for a low-pressure control?

**a. Prevents damage due to loss of refrigerant, temperature control, and shuts off compressor after pump-down.**

17. What are three concerns when setting a low pressure control for safety or for pump down?

**a. Short cycling, compressor overheating, and low ambient preventing control from cutting in.**

18. If the minimum winter design temperature in your town is 0°, what would the low pressure cut-in and cut-out be for a walk-in refrigerator using R22 in an outdoor condensing unit?

**b. 20 psig cut-in and 1 psig cut-out**

19. The same as question 18, but set the low pressure control for a walk-in freezer using R404A in an outdoor condensing unit.

**c. 20 psig cut-in and 5 psig cut-out.**

20. The same as question 18, but set the low pressure control for a walk-in refrigerator using R404A in an outdoor condensing unit.

**c. 60 psig cut-in and 40 psig cut-out**

21. Assume you replace a low pressure control that acts as the temperature control on an R22 reach-in refrigerator that maintains 38°. It is a Friday evening and the factory is closed, so you cannot get any information on settings. At what pressure cut-in and cut-out would you set the low pressure control?

**b. 66 psig cut-in and 33 psig cut-out**

22. What would be the high pressure control cut-out for an outdoor R404A refrigeration unit?

**c. 475 psig**

23. What is the function of an oil separator?

**a. Separates oil from the discharge gas**

24. If a system has an oil separator do you still need to slope and trap the suction lines for oil return? Why or why not?

**b. Yes, some oil still gets into the piping.**

25. What are the two pressures an oil safety control must monitor?

**b. Crankcase pressure and oil pump discharge pressure**

26. Below what minimum net oil pressure will the oil safety control start its delay timer?

**b. 10 pounds**

27. How long must the oil remain below its minimum pressure before the oil safety control trips?

**c. 120 seconds**

28. Will the oil safety control trip if the compressor goes out on internal overload, and why?

**a. Yes, it will trip because there is power to the control, but no oil pressure.**

29. What can you do to prevent nuisance tripping of the oil failure control from electrical problems like "brownouts" (low incoming voltage)?

**b. Install a current sensing relay.**

30. Describe how a CSR (current sensing relay) works.

**Refer to Figure 6-15, the oil failure control wiring diagram. The CSR is connected in series to the common leg of the oil safety control. The**

normally open set of contacts inside the CSR is represented by the switch in the wire from L1 to the common side of the timer. One of the power wires feeding the compressor is fed through the hole in the middle of the box. In Figure 6-15 this is represented by what looks like a doughnut around the leg of L1 between the contactor and the compressor. As long as the compressor is running the magnetic field around the wire energizes the current sensing relay, closing the contacts.

If the compressor's overload trips for any reason, the compressor will stop, and the magnetic field around the wire will collapse. This allows the relay contacts to open the circuit to the timer, preventing the control from timing out and tripping the manual reset. As a result, the compressor will restart on its own when the overload problem is corrected. The customer will not have to wait for someone to reset the control, and the tech will not have reason to suspect an oil problem.

31. After manually resetting an oil safety control, what electrical and refrigeration checks should be made to determine the cause for the control to trip?

**Electrical diagnosis:**

- **Check voltage to the contactor.**
- **Check voltage across the contacts of the energized contactor for signs of pitted contacts. (Zero volts is perfect, more than 5% of line voltage indicates a problem.)**
- **Check voltage at the compressor on start up.**

- **Check the compressor amperage.**

**Refrigeration system diagnosis:**

- **Monitor the net oil pressure, and oil level, through a complete cycle.**
- **On a freezer, check the oil level just before the system goes into defrost.**
- **Look for evidence of a flooded start or floodback to the compressor.**
- **Look for abnormally high or low suction pressures.**
- **Check for short cycling.**

32. The entire refrigerant charge of a system should only fill what percentage of the receiver? Hint: It is the same percentage of maximum fill for a recovery cylinder.

- a. 80%**

33. What is the service valve called on the outlet of the receiver?

- a. King valve**

34. What is the service valve on the outlet of the receiver used for?

- a. To pump the system down for repairs and to check liquid pressure.**

35. What is the primary function of an accumulator?

- b. To protect the compressor from floodback after a hot pull down.**

36. If the accumulator is sweating should it be insulated? Why or why not?

- a. No, because it needs to boil off the refrigerant.**

37. The primary desiccant (usually silica gel) in a filter-drier is designed to remove what system contaminant?

- d. Moisture**

38. Why do systems that operate fine all winter suddenly develop a moisture problem in the system when the weather turns warm?

**a. Because the filter-drier was saturated with moisture when it was cool, but released some of the moisture when the filter-drier warmed up.**

39. Does a filter-drier trap debris and contaminants the first time they try to pass through it?

**b. No**

40. Once contaminants are trapped in the filter-drier can they be released back into the system?

**a. Yes**

41. On a medium temperature system, what is the maximum pressure drop across its permanent suction filter-drier before it must be replaced?

**b. 2 psig**

42. If a suction filter is installed temporarily to clean up acid after a burn-out, what is the maximum length of time before it must be removed?

**c. Three days**

43. Can suction filter-driers be used to remove system moisture?

**a. Yes.**

44. According to TROT, what is the maximum temperature drop across a liquid line filter drier before it requires replacement?

**b. 3°**



45. How would you check to see if a filter-drier has reached its moisture removal capacity?

**b. Check the sight glass moisture indicator.**

46. What is the best procedure for replacing a sweat drier, and why?

**b. Cut it out, because the heat from a torch will release the moisture into the system.**

47. A Sporlan filter-drier is a C052; what is its cubic inch desiccant capacity, and pipe size, and is it flare or sweat connections?

**c. 5 cubic inches, 1/4" pipe, flare.**

48. If you see a sight glass bubbling, should you add refrigerant immediately? Why or why not?

**c. No, the system may have just started, or there may be a low load.**

49. What is a heat exchanger used for?

**b. It subcools liquid to prevent flash gas before the TEV.**

50. Should a vibration eliminator be parallel or perpendicular to the compressor crankshaft, and why?

**b. It should be parallel, because the corrugated tubing inside will crack if it compresses like a bellows, but will not if it twists as the compressor rocks.**