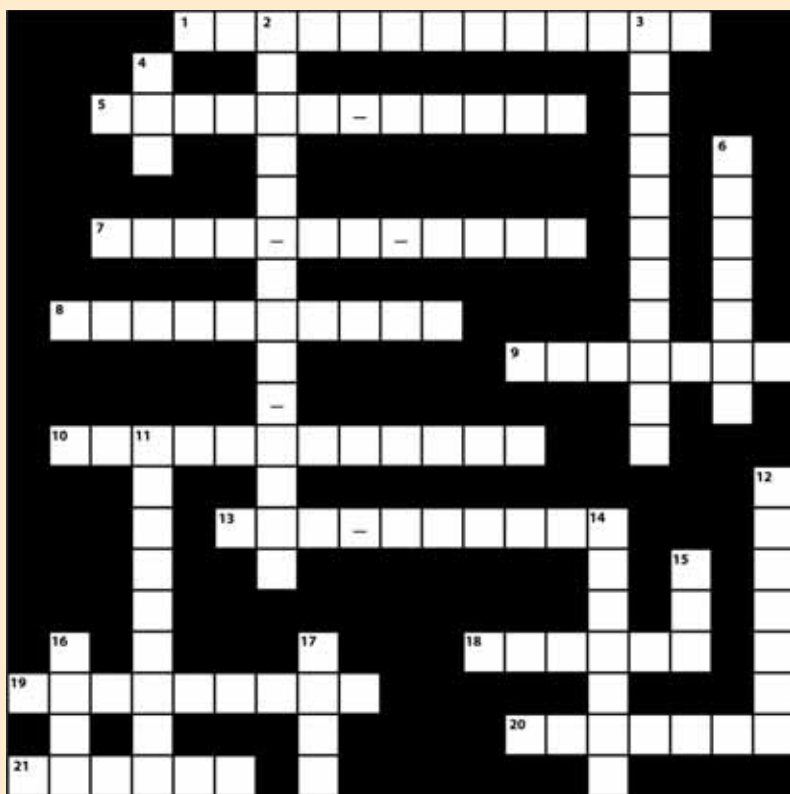


# Take the HVAC CHALLENGE™

BY STEVEN G. LIESCHEIDT, P.E., CSI-CCS, CCPR

## ► Condensers



### ACROSS

1. This is an air cooled finned coil that is usually installed in the discharge airstream of an evaporative condenser.
5. This type of condenser is constructed of plates blazed together to form an assembly of separate channels.
7. These condensers consist of one or more assemblies of two tubes, one within the other, in which the refrigerant vapor is condensed in either the annular space or the inner tube.
8. To ensure operation of expansion valves and other refrigeration components, it is important to avoid allowing this pressure to get extremely low.
9. For low-pressure refrigerants where the operating pressure of the evaporator is less than this pressure, even slight leaks can be a continuing source of non-condensables.
10. These coils utilize a furnace-brazed assembly and a diffusion layer of zinc for corrosion resistance, and they are now being used in residential condensing units and commercial A/C systems.

13. This type of remote condenser is used for refrigeration and air conditioning from 0.5 to over 500 tons.
18. Most refrigeration condensers have this type of thin-walled tube, except if ammonia is used.
19. As recirculated water evaporates in an evaporative condenser, these solids in the makeup water continually increase as more water is added.
20. Refrigeration systems operating below atmospheric pressure and systems that are opened for service may require this to remove air that causes a high condensing pressure.
21. This organization publishes *Guideline 3 - Reducing Emission Of Halogenated Refrigerants In Refrigeration And Air Conditioning Equipment And Systems*.

### DOWN

2. This type of condenser circulates cooling water through one or more continuous or assembled coils contained within the shell.

3. These condensers are often installed in remote locations and may not receive the routine attention of O&M personnel.
4. This organization publishes *Guideline E-1997: Fouling Factors: A Survey Of Their Applications In Today's Air Conditions And Refrigeration Industry*.
6. This factor is a thermal resistance reference to the waterside area of the heat transfer surface.
11. In a refrigeration system, this is a heat exchanger that rejects all the heat from the system.
12. Complete wetting ensures the high rate of heat transfer achieved with wet tubes and prevents this from getting excessive in a condenser.
14. These are controlled in response to either receiver pressure, ambient conditions, or liquid temperatures, and they are also used to control compressor head pressure.
15. This is the total heat removed in desuperheating, condensing, and subcooling the refrigerant and is a term used to rate condensers.
16. Evaporative condensers use condensing coils made from bare pipe or tubing without these, because the high rate of energy transfer from the wetted external surface to the air eliminates the need for an extended surface.
17. This organization publishes the *Standards of the Tubular Exchanger Manufacturers Association*.

To brush up on the facts behind this month's clues, refer to Chapter 35 ("Condensers") in the *2004 ASHRAE Handbook - Systems & Equipment*.

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