Take the HVAC CHALLENGE™

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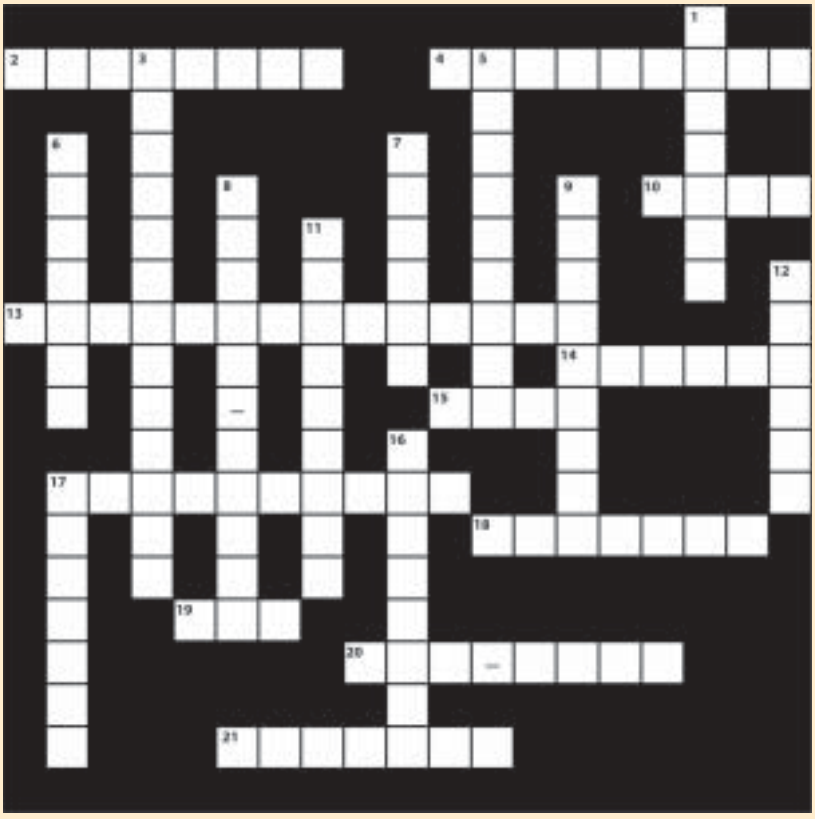
Evaporative Cooling Applications



ACROSS

2. The effectiveness of direct and indirect evaporative cooling depends on this airstream condition.
4. The wet-bulb temperature of this airstream limits indirect evaporative cooling.
10. Direct evaporative coolers are of little use in removing these types of particles because of their greasy surface, which will not adhere to the wet plates or media.
13. Treating air by preheating it and treating it with recirculated water is one way to provide accomplish this process.
14. This type of evaporative cooling reduces the dry-bulb temperature and increases the relative humidity of the air.
15. In a study in Dallas in 1992, it was determined that for an indirect evaporative cooler, this could be 70% higher than that of a conventional air conditioner, and that nearly 12% of the air conditioning capacity can be displaced by the indirect evaporative cooler.
17. Doing this to air increases both the dry-bulb and wet-bulb temperatures and lowers the relative humidity; however, it does not alter the humidity ratio or the dewpoint temperature of the air.
18. This type of air cleaning direct evaporative cooler is effective at removing particles down to about 10µm.
19. In this type of system, a decrease in supply air volume results in lower air velocity through the indirect evaporative cooler, thus increasing equipment effectiveness.
20. This temperature of the entering airstream limits direct evaporative cooling.
21. This extra mechanical refrigeration provides inside design comfort conditions regardless of the outside wet-bulb temperature without having to size the mechanical refrigeration equipment for the total cooling load.

DOWN

1. Direct evaporative coolers used in outside air makeup systems function as coolers and reduce this type of contaminant found in outside air.
3. This is the depression of the dry-bulb temperature of the air leaving the apparatus, divided by the difference between the dry-bulb and wet-bulb temperatures of the entering air.
5. This temperature relates the cooling effects of air motion and relative humidity to the effect of conditioned (cooled) air.
6. Cooling this airsteam of a building with evaporative cooling results in a larger overall temperature difference across a heat recovery heat exchanger and a greater cooling of the supply air.
7. This organization publishes *Standard 55 – Thermal Environmental Conditions for Human Occupancy.*
8. This type of direct evaporative coolers is effective at removing particles down to about 1µm.
9. These types of facilities have one of the most severe environments in which direct evaporative air cooling is applied because heat is produced not only by the processing equipment, but also by steam and water vapor as well.
11. Direct evaporative cooling uses this exchange process of heat.
12. Evaporative cooling can be used to help keep the electrical windings of these devices below their general maximum ambient temperature of 104°F, allowing the equipment to be safely operated without reducing the load.
16. This type of evaporative cooling lowers the air wet-bulb temperature and can produce leaving dry-bulb temperatures that approach the wet-bulb temperature of the secondary airstream.
17. Indirect evaporative cooling effectiveness is the dry-bulb depression in the primary airstream, divided by the difference between the entering dry-bulb temperature of this airstream and the entering wet-bulb temperature of the secondary air.

To brush up on the facts behind this month's clues, refer to Chapter 51 ("Evaporative Cooling Applications") in the *2003 ASHRAE Handbook — Applications.*

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Solution to February's HVAC Challenge™