# Take the HVAC CHALLENGE™

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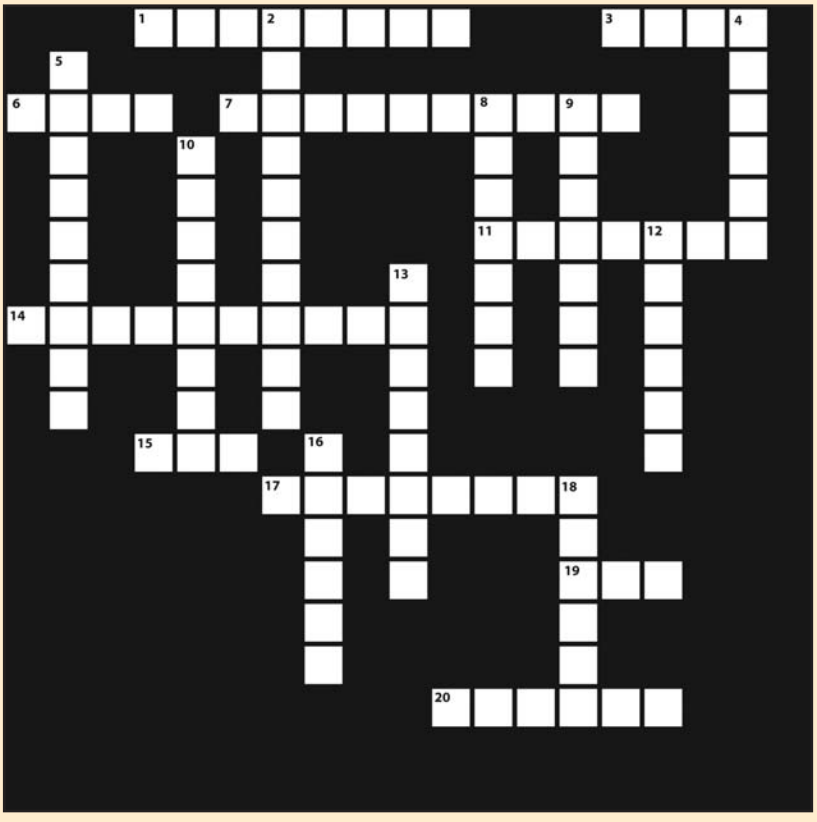
## Panel Heating And Cooling



### ACROSS

1. The thermal resistance of this bare floor material, with no covering, is zero.
3. Electric cables are not generally embedded in this building component, due to possible damage from nails driven by hanging pictures or from building alterations.
6. These types of electric floor panel usually consist of PVC-insulated heating cable woven into or attached to metallic or glass fiber mesh.
7. This electrical cable component is normally made of polyvinyl chloride (PVC), which may have a nylon jacket.
11. This a temperature-controlled surface type of panel.
14. Coils are usually laid in this type of pattern in a panel, although some header or grid-type coils have bean used in ceilings.
15. This (mean radiant temperature) has a strong influence on human thermal comfort.
17. This type of panel can be used with two- and four-pipe distribution systems.
19. When this type of material is used in electric heating cable for floor heating, the concrete is laid in two pours with the first pour being at least 3 in.
20. This is the term used to describe load-sharing HVAC systems that utilize panels that may be used in combination with a central forced-air system or one-zone, reheat, multizone or variable-volume systems, decentralized convective systems, or in-space fancoil units.

### DOWN

2. The heat flux from this natural form of heat transfer occurs between the indoor air and the temperature-controlled panel surface.
4. If the floor surface is porous, air heated or air cooled panels may also be used to satisfy at least a part of this portion of the heat load.
5. This form of heat transfer is transmitted at the speed of light, travels in straight lines, can be reflective, elevates the temperature of solid objects by absorption but doesn't noticeably heat the air through which it travels, and is exchanged continuously between all bodies in a building environment.
8. This type of comfort, as defined in ASHRAE Standard 55, is "that condition of mind which expresses satisfaction with the thermal environment."
9. This is a type of reset control that measures this air temperature, calculates the supply water temperature required for steady operation, and operates a mixing valve or boiler to achieve that supply water temperature for hydronic panel systems.
10. This component of a typical electric panel is generally made of graphite or nichrome wire.
12. This organization's research project RP-1140 successfully demonstrated the use of panel systems for both heating and cooling, in conjunction with a forced-convection system, to economically achieve year-round thermal comfort using both active and passive performance of the building and a ground-source heat pump.
13. These types of panes are generally prefabricated and available in 1- to 6-ft wide by 2- to 12-ft long and 0.5- to 2-in. thick and are constructed with metal, glass, or semi-rigid fiberglass board or vinyl.
16. These types of products are specifically designed for floor heating and can generally be installed 1- to 1.5-in. thick because they are more flexible and crack-resistant than concrete.
18. The thermal conductivity of this typical panel tube material is 225.

To brush up on the facts behind this month's clues, refer to Chapter 6 ("Panel Heating and Cooling") in the *2004 ASHRAE Handbook — Systems and Equipment*.

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## Solution to September's HVAC Challenge™