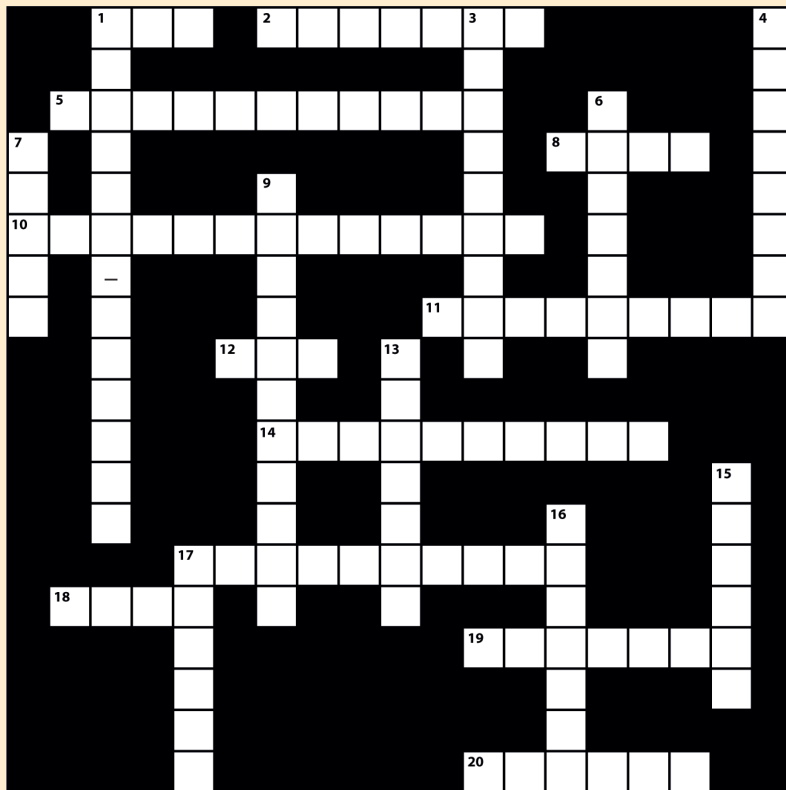


# Take the HVAC CHALLENGE™

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

## ▶ Thermodynamics and Refrigeration Cycles



### ACROSS

- The initial point at which liquid formation begins, or the temperature of saturated vapor at a given pressure.
- This measures the molecular disorder of a thermodynamic system.
- This type of refrigerant cycle is a special case of a multi-staging cycle signifying the number of times the driving heat is used in the cycle.
- This is the mechanism that transfers energy across the boundaries of systems with differing pressures.
- With this type of working fluid, the sorbent temperature does not vary with loading over small ranges.
- This is a liquid at its saturation temperature and pressure.
- This is the benefit of a refrigeration cycle (useful refrigerating effect) divided by the required energy input to operate the cycle (net energy supplied from external sources).
- This type of refrigeration cycle plot embodies the vapor-liquid equilibrium of both the refrigerant and the sorbent and is plotted on linear pressure-temperature

coordinates with a logarithmic shape.

- These cycles have one or more of the four basic exchangers (generator, absorber, condenser, evaporator) present at two or more places in the cycle at different pressures or concentrations.
- This type of substance has a homogeneous and invariable chemical composition.
- This type of stored energy is caused by the motion of molecules and/or intermolecular forces.
- This has the capacity for producing an effect and can be categorized into either stored or transient forms.

### DOWN

- A multistage refrigerant cycle formed by coupling the absorbers and evaporators of two single-effect cycles into an integrated single hermetic cycle.
- This type of stored energy is caused by attractive forces existing between molecules or the elevation of a system.
- A term used to describe the prime energy

- provided to the high temperature generator being used twice in a double-effect cycle.
- In this thermal cycle, the heat flows are into the cycle.
- This is a process or a series of processes wherein the initial and final states of the system are identical.
- A working fluid in the vapor phase as a pure refrigerant neglecting condensables.
- This is a change in state that can be defined as any change in the properties of a system.
- This is the point at which vapor begins to form.
- In this thermal cycle, the heat flows are out of the cycle.
- This plot (enthalpy vs. concentration) is used to assist thermodynamic calculations and to solve the distillation problems that arise with volatile absorbents.

To brush up on the facts behind this month's clues, refer to Chapter 1 ("Thermodynamics & Refrigeration Cycles") in the **2005 ASHRAE Handbook – Fundamentals**.

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