

HVAC Sizing: Cooling (2 hrs)

for SW Ohio, Northern KY & SE Indiana
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2.0 contact hrs for licensed engineers & contractors, also AEE certified energy professionals

Course Description

Most HVAC engineers and contractors rely on various software nowadays to size cooling systems. However, many calculations are simple enough to be done manually and quickly, especially when assessing changes to insulations, airtightness, windows, interior operations and occupancy conditions before proposing replacement cooling equipment. For example, rather than redoing whole-building cooling calculations after noticing such improvements have been achieved, manual quick calculations can estimate how much less cooling load has resulted, thereby allowing replacement of cooling system with smaller output capacity than the older system. This course covers the major factors affecting cooling loads in common residential and small commercial structures. Also covered is the concept of "limited HVAC capacity" as mandated in energy programs like Passivhaus where HVAC capacities must not exceed mandated "BTU/hr per sf of conditioned space" specifications.

Learning Objectives

- Understand basic manual calculations from ASHRAE Handbook Of Fundamentals for sizing cooling systems, covering thermal conduction, air leakage, outside air supply, solar heat gain and heat emitted by indoor electronics and people. ASHRAE's recommended outdoor cooling design temperatures are presented for major cities in Ohio, Kentucky & Indiana. The widely varying preferences for interior cooling temperatures are also discussed.
- Become familiar with widely varying R-values of common insulations and building materials.
- Learn to estimate "total average R" or "R(t)" in insulated assemblies. Calculating R(t) assesses all installed insulations and building materials to allow more accuracy in describing an assembly's thermal properties. Condensation potential is also discussed.
- Understand solar heat gain coefficient (SHGC) ratings in new and old glass and windows types. Learn to use window SHGC ratings and shading factors to estimate or manage solar cooling load.
- Examine humidity-removal loads from outside air leakage and injection during humid Ohio valley summers. Also understand humidity loads associated with common occupant activities.
- When additional cooling capacity seems needed but cannot be easily increased, or when project designers and planners want to avoid expanding cooling equipment or distribution capacity, learn how to advise about how much added insulation, airtightness, reduced outside air intake or solar shading are needed and where.