

# NRGY 235: Building Energy Efficiency

## Week 8 Quiz



1. Which of the following options ranks hydrocarbon fuel combustion heating system efficiencies from lowest to greatest efficiency value for a given system?
  - a) Burn Efficiency, AFUE, Seasonal Efficiency, SSE
  - b) Seasonal Efficiency, Annual Fuel Utilization Efficiency, Steady State Efficiency, Burn Efficiency
  - c) Annual Fuel Utilization Efficiency, Seasonal Efficiency, Steady State Efficiency, Burn Efficiency
  - d) Burn Efficiency, SSE, AFUE, Seasonal Efficiency
2. Which definition below best applies to Energy Efficiency Ratio (EER)?
  - a)  $EER = \text{Cooling Output} / \text{Electrical Input}$  and has units of  $BTU/(W \cdot h)$
  - b)  $EER = \text{Cooling or Heating Output} / \text{Electrical Input}$  and is unitless
  - c)  $EER = \text{Energy Output} / \text{Energy Input}$
  - d)  $EER = \text{Cooling Output over a Season} / \text{Electrical Input over a season}$
3. How is SEER different than EER?
  - a) SEER is always less than EER
  - b) SEER is an Energy Ratio, whereas EER is a power ratio
  - c) SEER has the same units as EER, but is calculated based on measured performance under more than one set of operating conditions to simulate the approximate average performance over a season of operation
  - d) SEER is always greater than EER
4. If a system has an EER of 10 under certain operating conditions, what is the COP under the same conditions?
  - a) 3.8
  - b) 29
  - c) 44
  - d) COP cannot be determined from EER
5. The combustion efficiency of a hydrocarbon fuel combustion heating system can be measured with a “combustion analyzer”. What are the key parameters that are measured with a combustion

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- analyzer to determine the burner combustion efficiency?
- The temperature rise across the heat exchanger and the input power to the blower fan motor
  - Concentrations of greenhouse gas, nitrous oxide (NO<sub>x</sub>) and sulphur oxide (SO<sub>x</sub>) gases in the flue gas
  - Flue gas temperature, primary combustion air temperature, excess air (O<sub>2</sub>) and carbon monoxide (CO) concentrations
  - The indoor temperature relative to the indoor temperature setpoint over a 4 hour period
6. A Privacy Index of 20 could be related to?
- A Sound Transmission Class of a wall assembly of 40 or more
  - Ceiling materials with a Noise Reduction Coefficient of .9
  - Poor IEQ as related to behavior
  - A sound masking system malfunction
7. There are 5 primary factors of Indoor Environmental Quality. They are Thermal Comfort (Temperature/Humidity), Air Quality, Odor Quality, \_\_\_\_\_, and \_\_\_\_\_?
- Durability and Sound Quality
  - Aesthetics Quality and Accessibility
  - Sound Quality and Light Quality
  - Daylighting and Low Toxicity
8. Which statement below is NOT a valid argument in making a case for or against spending more toward achieving excellent quality in IEQ?
- One potential downside to spending more on achieving better IEQ is that in a work environment occupants tend to be less productive because of energy conservative space temperature setpoints
  - Achieving excellent IEQ is a worthy goal because occupants will be satisfied with the quality of life in a building they spend upwards of 90% of their time in
  - Achieving excellent IEQ is a worthy goal because it will help to protect occupants from health and safety issues of poor IAQ

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- d) One potential downside to spending more on achieving better IEQ is that if ventilation rates exceed code minimums to achieve greater IAQ, then the long term operating costs associated with heating and/or cooling the building could be increased
9. Green Building certifications such as LEED, Green Globes or PHIUS often promote increased/better IEQ. Which among the following options would NOT lead to better IEQ?
- a) Air velocities within the occupied environment, from HVAC equipment, of over 39 fpm
  - b) Low/No VOC finishing materials
  - c) Acoustical design and HVAC design that results in low ambient noise but also high privacy index values
  - d) A high efficiency HVAC system with a high degree of occupant control (e.g. adjustable thermostat in every occupied zone)
10. What are aspects of Passive House comfort principal?
- a) Air velocities of less than 30 fpm
  - b) Radiant temps of less than 7.2 degrees Fahrenheit
  - c) A cooling season indoor sensible temperature of 68 degrees Fahrenheit
  - d) A balanced ventilation system