TEST BOOKLET
BOC 2001B – Building Scoping for Operational Improvement
Edition 2.01

TEST INSTRUCTIONS

The BOC 2001B test consists of 20 multiple choice questions. A period of 1 hour is available for the test, but it will not be strictly timed. This is an open book test. You may use any notes or handout materials of your own. Mark all answers only on the ANSWER SHEET. Make no marks in the TEST BOOKLET.

Select only one answer by circling the corresponding letter on the ANSWER SHEET. Where it appears that two answers may be correct, choose the one better answer. There are no questions that require the circling of more than one choice.

Below are some sample questions:

Example #1: Electric motors typically have an efficiency of approximately.
A. 95% to 99%
B. 78% to 93%
C. 50% to 75%
D. 40% to 48%

Standard motors are approximately 78% to 93% efficient, depending on size. High efficiency electric motors can have very high efficiencies, but even these special motors exceed 95% in only very large sizes. While there are specialized motors that can exceed 95%, this is not typical. The answer should be marked by drawing a circle around letter “B” on the ANSWER SHEET.

Example #2: In the past, asbestos fibers were commonly used in numerous building materials, including which of the following:

A. Pipe Insulation
B. Furnishings
C. Window coverings, such as drapes
D. All of the above.

While all three could have contained asbestos, it was commonly used in only one of these--pipe insulation. The answer should be marked by drawing a circle around letter “A” on the ANSWER SHEET.

Note: In the preceding example question, only pipe insulation was included as a material that commonly contained asbestos. That does not mean that only pipe insulation contained asbestos. It should be understood that the items covered in this test have been chosen to sample the operator's knowledge.

BEGINNING OF TEST
EDITION 2.01

Mark all answers on *only* the ANSWER SHEET. Make *no* marks in the TEST BOOKLET.

1. **What is the main purpose of a building operations map?**
   A. Shows the mechanical room equipment layout and main ducts
   B. Tracks completion of preventive maintenance tasks
   C. Shows which systems are responsible for the majority of energy use
   D. Documents current building uses and operational requirements

2. **Multi-zone systems with mixing dampers and reheat coils are particularly vulnerable to excessive simultaneous heating and cooling. What strategies can be used to minimize energy waste?**
   A. Optimize supply air set points and reset strategies
   B. Change the filters
   C. Adjust fan belt tension
   D. Manually override the mixing dampers

3. **Which of the following is NOT the purpose of a building scoping interview??**
   A. Evaluate overall O&M practices and capabilities
   B. Identify any known issues with equipment
   C. Provide detailed cost estimates for retrofits
   D. Identify existing comfort and maintenance problems

4. **Which of the options below is the best way to look for scheduling problems?**
   A. Walk through the building at night
   B. Interview the building operator
   C. Look at the graphic user interface of the DDC system
   D. Set up trends for space temperatures

5. **A spot measurement in an open office area during your initial walkthrough shows 1,500 ppm of CO_2. Which of the following is NOT a related area to investigate?**
   A. Heating equipment combustion efficiency
   B. Damper failure
   C. Original building design outside airflow assumptions
   D. Ventilation control sensor calibration

6. **One of the problems identified by the building operator is a cold lobby. Which area of investigation should be prioritized in the scoping report?**
   A. Feasibility of installing radiant heating panels in the lobby
   B. Lobby pressurization and envelope integrity around lobby doors and windows
   C. Lobby signage
   D. Lobby lighting controls

7. **During a building scoping interview you learn that the building is partially occupied on Saturdays. What option should you consider to reduce operating costs?**
   A. Schedule the HVAC system to condition the entire building on Saturday regardless of occupancy
   B. Schedule the HVAC system off on Saturday
   C. Schedule unoccupied temperature zones off or to setback/setup temperatures on Saturday
   D. Disable boiler and chiller operation on weekends

8. **The easiest way to save energy is to turn equipment off when not needed. Which of the following may result if equipment operating hours are longer than necessary?**
   A. Extended bearing life on motor driven systems
   B. Reduced energy costs
   C. Shorter equipment life and more frequent parts replacement
   D. Less frequent cleaning of heat exchangers and filters replacement

9. **Which of the following is NOT an example of a critical control sensor?**
   A. Outside air temperature
   B. Heating water supply temperature
   C. Carbon dioxide sensor
   D. Lighting occupancy sensor

10. **What is a condition where a properly calibrated sensor may still cause excessive energy use?**
    A. A sensor for outside air temperature is placed in a location protected from direct sunlight.
    B. A building static pressure sensor that is located near the building entrance.
    C. An individual daylight sensor for harvesting natural lighting is located for each partitioned space such as a private office.
    D. A motion sensor in placed in a corner of the room with a view of each entry point.

11. **Re-setting discharge air temperature up to the highest temp that will still satisfy the worst case zone cooling load offers what benefit?**
    A. Occupants are comfortable, and the number of hot and cold calls is reduced.
    B. Proper ventilation is assured in all occupied zones.
    C. Energy can be saved by not having to unnecessarily re-heat primary air for all the VAV zones that are in heating mode.
    D. Air balancing is achieved for all of the VAV zones in cooling mode.

12. **It might be necessary for the building operator to verify VAV damper minimum positions after initial set up during the balancing or commissioning of the system when:**
    A. Errors are made during installation or adjustments are made by maintenance personnel.
    B. The damper or damper actuator fails.
    C. Changes are made to the space occupancy.
    D. All of the above.

13. **In the heating mode, if the VAV damper minimum position is too high, what would be one of the consequences?**
    A. Energy is wasted re-heating the primary air.
    B. Building becomes over pressurized.
    C. Proper room temperature cannot be maintained.
    D. Indoor air quality will be poor.

14. **When a VAV box is in heating mode, a properly operating VAV damper should go to what position?**
    A. Fully closed to minimize energy waste.
    B. A minimum position sufficient to allow continuous ventilation of the occupied space.
    C. Fully open to maximize ventilation.
    D. 50 percent open to get the right balance of ventilation and energy savings.

15. **In a zoned HVAC system, there is typically one thermostat for each zone. What steps can the building operator take to ensure effective operation of the thermostat?**
    A. Verify the thermostat is installed in a location where it is influenced by internal or external sources of heat and cold.
    B. Make sure it is installed on an exterior wall or near a printer or server.
    C. Verify it is accurate and that the proper heating and cooling set points are in place.
    D. Install a "dummy" thermostat for the occupants to use.

16. **What is the recommended indoor CO2 level in parts per million (ppm) when the outside air damper is at minimum position for ventilation?**
    A. 400ppm.
    B. 1500ppm
    C. 400-700ppm above outside air CO2 levels.
    D. 700ppm.

17. **When using a hand-held CO2 meter to check if the building is being over or under ventilated, what step is not necessary to take to ensure accuracy of the measurement?**
    A. Avoid breathing directly on the CO2 meter during testing.
    B. Take the reading when all economizers are at minimum position.
    C. Take the reading when the building is at or near full occupancy.
    D. Testing at various outdoor humidity conditions.

18. **If an office building that is only occasionally at or near full occupancy, which of the following strategies might be implemented to improve the energy performance of the HVAC system?**
    A. Schedule lighting in the lobby and common areas to shut off after hours.
    B. Ask building occupants to turn off computer monitors when they leave for the day.
    C. Implement demand control ventilation by installing CO2 sensors to vary outside air intake based on demand.
    D. Close the doors to unoccupied office areas.

19. **What area of the building is not essential to visit on a building walkthrough?**
    A. The outside of the building.
    B. The air handlers.
    C. The control room with BAS interface.
    D. Each individual tenant space.

20. **During a building walkthrough, you find cardboard has been taped over several diffusers to block air flow. What might this be an indication of?**
    A. The occupants are uncomfortable with the temperature or air flow in the space.
    B. The space temperature is meeting the occupants' needs.
    C. The lighting in the space is poor.
    D. The system is using less energy to distribute air.

END OF TEST