

TEST BOOKLET
BOC 2010 - Preventive Maintenance & Troubleshooting Principles for
Building Systems
Edition 1.00

TEST INSTRUCTIONS

The BOC 2010 test consist 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 1.00**

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

1. **A good boiler log will provide the operator with data regarding:**
 - A. Combustion Efficiency
 - B. Safety Devices
 - C. Water Treatment
 - D. All of the above

2. **Clogged heating or cooling coils can:**
 - A. Restrict air flow
 - B. Be difficult to diagnose
 - C. Waste energy
 - D. All of the above

3. **Troubleshooting is:**
 - A. Best left to system experts
 - B. Not helped by input from building occupants
 - C. A process to determine the cause of a problem and correct the source of that problem
 - D. None of the above

4. **Sometimes outside help is needed to solve a problem. Outside help can come from:**
 - A. Parts supply-house personnel and/or manufacturers representatives
 - B. Maintenance personnel from other facilities
 - C. Trades contractors
 - D. All of the above

5. **Predictive maintenance:**
 - A. Is the same as preventive maintenance.
 - B. Is performed by monitoring physical things like temperature, vibration and sound
 - C. Must be done by outside contractors
 - D. Cannot prevent breakdowns

6. **Which air filter is considered higher efficiency?**
- A. An air filter with a MERV of “1”
 - B. An air filter with a MERV of “5”
 - C. An air filter with a MERV of “10”
 - D. None of the above
7. **What would a high CO₂ level mean to your building occupants?**
- A. Inadequate outside air flow is being ventilated in the building.
 - B. Too much outside air flow is being ventilated in the building.
 - C. CO₂ has no bearing on the building occupants comfort levels.
 - D. None of the above.
8. **IR Thermal imagers are similar to digital cameras and, in practical terms:**
- A. Are simply, highly technical pinpoint thermometers.
 - B. Aren't very practical, because they are difficult to use within building environments.
 - C. May be thought of as infrared cameras.
 - D. All of the above.
9. **Efficient building operation can increase a facility's (NOI), which is the:**
- A. Net operating income.
 - B. Negative Operating Inconveniences.
 - C. Normal Open Internet Protocols.
 - D. None of the above.
10. **Portable electronic data-loggers are typically:**
- A. Battery-powered.
 - B. Small, and light.
 - C. Easily installed and removed without disrupting building occupants.
 - D. All of the above.
11. **How much can be saved through implementing low-cost O&M improvements?**
- A. O & M doesn't typically save the building owner money.
 - B. Five to twenty percent of annual commercial building utility bills.
 - C. Fifty to seventy-five percent of annual commercial building utility bills
 - D. All of the above

12. **The electronic filtration works on the principle that:**
- A. Particles can be removed by capturing them on filter materials or media fiber.
 - B. Particles pass through an ionizer then collected on flat plates that are oppositely charged.
 - C. Particles are dust or smoke that cannot attract each other electrically, or mechanically.
 - D. None of the above.
13. **The fundamental difference(s) between PM and troubleshooting maintenance can be described as:**
- A. PM is pro-active repair, with regularly scheduled maintenance.
 - B. Troubleshooting occurs normally because there was little or no PM, which means that you normally just wait for the equipment to breakdown before repairs are made.
 - C. Troubleshooting is implemented by following a logical process to determining the cause of a problem and then correcting the source of that problem.
 - D. All of the above.
14. **The benefits of good Preventive Maintenance includes:**
- A. Reduced operating costs and utility costs.
 - B. Efficient building operations, which can increase a facilities net operating income (NOI), which in turn increases its value.
 - C. Reduced equipment down time.
 - D. All of the above.
15. **Life safety maintenance is:**
- A. Is an important type of PM maintenance but not critical maintenance for the typical building facility team.
 - B. The highest level of priority work related to safety, downtime and personnel.
 - C. Not as important as routine equipment Preventive Maintenance.
 - D. None of the above.
16. **Predictive Maintenance Includes:**
- A. Visual and auditory inspection, and vibration analysis
 - B. Testing lubricating oil and analysis, equipment thermography and electrical analysis
 - C. Changing air filters and routine greasing and lubricating of motors and loads.
 - D. Both A and B Above

17. **CMMS is the abbreviation for Computerized Maintenance Management Systems and:**
- A. Cannot be linked to purchasing, engineering, payroll/accounting.
 - B. Will not automatically produce PM work orders without advanced training and investment by the facilities experienced programmers.
 - C. Is an automated system of generating PM work orders, repairs, scheduled maintenance, and can help to manage building equipment inventory.
 - D. None of the above.
18. **Key Performance Indicators (KPI) are benchmark indicators that_____.**
- A. can be used to measure kW/ton on chillers, and combustion efficiency on boilers.
 - B. provide technical information to help predict when equipment needs routine maintenance.
 - C. should be part of the normal maintenance of the building operations team.
 - D. All of the above.
19. **A PM task should be:**
- A. Only once a year on everything in the building
 - B. As frequently as necessary for optimum performance of the equipment.
 - C. Automatically generated by the CMMS system, at least two times a year.
 - D. All of the above.
20. **What is measured, adjusted, and/or reset during a boiler “Tune-Up”?**
- A. Exhaust gas levels and temperature are measured, and then the combustion air and primary gas controls are adjusted for optimum performance.
 - B. Water supply and return temperatures are measured, and then temperatures are reset based on the load in the building and the outside air conditions.
 - C. Carbon Monoxide levels of the flue gases are measured, and then the steam pressure and/or water temperatures are re-adjusted for optimum performance.
 - D. None of the above.