



# Multifamily Building Analyst Professional

TESTING KNOWLEDGE LIST



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### **Acknowledgements**

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### **Preface**

This policy and procedures manual was developed under contract for the Building Performance institute, Inc. The manual will be reviewed on a three-year basis and modification may be made at that time or sooner if it is deemed to improve the certification process.

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## 1. Multifamily Building Analyst Professional Testing Knowledge List

### 1.1 Building Science

1. Understand basic heat transfer mechanisms
2. Understand moisture transport mechanisms
3. Understand multifamily building airflow characteristics (single zone, parallel floor, compartmentalization, etc.)
4. Understand and Identify typical multifamily ventilation system design strategies and applications
5. Associate interaction of stack effect and airflows in ventilation stacks
6. Understand air leakage issues related to elevators
7. Define effective R-value
8. Demonstrate how to use the psychrometric chart
9. Understand IAQ pollutant transport mechanisms
10. Understand basic combustion science
11. Understand combustion technologies
12. Understand how heat recovery works for ventilation systems
13. Understand how heat recovery works for domestic hot water systems
14. Identify correct lumen requirements for light levels in different areas of the building
15. Associate relationship between lighting/appliance retrofits with internal gains and heating/cooling loads
16. Be familiar with proper de-manufacturing and disposal procedures for appliances and lighting components
17. Calculate heating (and cooling) degree days
18. Know the heat content of typical fuels
19. Define sensible and latent loads
20. Understand interactivity of energy efficiency measures and predicted savings

### 1.2 Auditing Skills

1. Written communication skills
2. Verbal communication skills
3. Knowledge of and ability to use word processing software
4. Knowledge of and ability to use spreadsheet software
5. Determine who the decision-maker is for the building
6. Determine who has the information needed to provide the data needed to conduct a complete audit
7. List items for pre-interview data collection
8. Demonstrate ability to obtain accurate, appropriate, relevant information from all parties
9. Demonstrate ability to apply LAYER technique during interviews (Listen, Acknowledge, Explore, Respond)

10. Demonstrate ability to communicate information to a variety of audiences (residents, staff, management, etc.)
11. Understand the cultural context of each building's housing environment
12. Understand and apply appropriate confidentiality protections when interviewing people and inspecting living units
13. Obtain and evaluate the existing maintenance schedule and capital replacement schedule
14. Educate building occupants and staff to ensure good decisions and practices are maintained post-audit
15. Determine purpose of audit: energy, IAQ, etc.
16. Identify common elements of an audit document
17. Ability to read and understand operating manuals for mechanical systems
18. Determine appropriate retrofit options based on observed and analyzed data
19. Determine when additional outside expertise is required to complete the inspection, analysis, and/or report
20. Demonstrate ability to accurately collect and record observed data
21. Demonstrate ability to review and analyze data to form logical conclusions
22. Estimate costs of installed measures
23. Estimate labor requirements for installation of measures
24. Predict results of installed measures
25. Prioritize installation of measures unique to multifamily buildings
26. Evaluate cost-effectiveness of measures
27. Evaluate savings opportunities related to demand reduction
28. Evaluate savings opportunities related to fuel switching
29. Determine energy consequences of IAQ control
30. Develop a work scope and project report based on audit results
31. Identify typical multifamily building structural systems and construction types
32. Identify components of multifamily building envelope systems
33. Identify typical multifamily building mechanical systems (heating, cooling, hot water, ventilation)
34. List and define comprehensive list of typical energy savings opportunities for the building type
35. Identify building envelope component assemblies
36. Identify types of unitary heating and cooling equipment (wall furnace, electric furnace, heat pump, wall A/C, etc.)
37. Identify motor types AC/DC
38. Demonstrate ability to develop a full mechanical equipment schedule
39. Demonstrate ability to develop a schedule of existing electrical fixtures and appliances
40. Determine appropriate recommendations for motor replacement schedules
41. Evaluate cost-effectiveness of motor replacement
42. Evaluate cost-effectiveness of advanced technologies for energy savings
43. Evaluate electrical savings for lighting retrofits in all areas of the building (living units, common areas, exterior)
44. Evaluate electrical savings from installation of energy efficient lighting controls

45. Evaluate daylighting opportunities for energy savings
46. Evaluate electrical savings for appliance replacement (refrigerators, window/wall AC units, washers, dryers, etc.)
47. Identify typical metering configurations
48. Determine how the metering configuration impacts the recommendations in the project report
49. Evaluate electrical savings opportunities using electrical use indices
50. Evaluate cost-effectiveness of demand reduction strategies
51. Evaluate opportunities for renewable energy retrofits
52. Demonstrate ability to produce a complete project report (evaluation of existing conditions, scope of proposed work, savings estimates, job cost estimates, other recommendations, etc.)

### **1.3 Inspection and Diagnostic Skills**

1. Select appropriate tools and equipment to perform tasks required for the audit
2. Demonstrate proper use of tools and equipment to perform tasks required for the audit
3. Identification and diagnosis of moisture issues
4. Ability to read blueprints
5. Using blueprints, identify where important airflow paths may be
6. Visual inspection procedures for mechanical equipment (heating, cooling, hot water, ventilation)
7. Inspect condition and effectiveness of ventilation systems
8. Measure flow rates of mechanical ventilation systems
9. Inspect and verify type and condition of insulation in building envelope components
10. Locate building air leakage paths and bypasses contributing to stack effect and/or uncontrolled infiltration/exfiltration
11. Locate airflow communication paths between units
12. Associate elevator location and system design to airflow performance in the building
13. Evaluate when ventilation of elevator shafts may be sealed to improve building performance, energy savings, etc.
14. Window and door inspections for proper fit, operation, and performance
15. Evaluate estimated U-value of windows
16. Evaluate effective R-value of building envelope components
17. Identify locations of thermal bridges in the building envelope
18. Determine retrofit options for thermal envelope improvements
19. Identify mechanical system components and their functions for: hydronic, steam, forced air heating and cooling systems
20. Combustion efficiency testing
21. Determine if combustion equipment is operating within acceptable operating ranges
22. Assess heating plant operation and conditions
23. Understand mechanical system controls and their impact on system performance
24. Identify and assess condition of HVAC distribution systems
25. Identify fire suppression systems

26. Determine if EEM's will compromise operation of fire suppression systems
27. Identify water circulation systems and evaluate potential energy savings
28. Understand pump sizing criteria
29. Identify point of use water saving measures (low flow devices, toilets, clothes washers, etc.)
30. Measure domestic hot water temperature at the point of use
31. Measure light levels using lumen meter

## 1.4 Installation and Analysis Skills

1. Collect utility consumption data (energy and water usage)
2. Graph monthly energy source usage
3. Apply unit-by-unit analysis
4. Apply whole building (or complex) analysis
5. Apply dual fuel analysis
6. Calculate heating, cooling, and base loads
7. Understand weather-dependent results of usage analysis
8. Compare usage analysis results to observed conditions in the building
9. Compare computer model to utility data
10. Know what to do when consumption data is not available or incomplete
11. Understand utility rate structures
12. Identify consumption patterns indicating savings opportunities
13. Establish energy use indices
14. Determine who pays for the utilities in the building
15. Establish fuel and energy load baselines
16. Attribute energy consumption to end uses
17. Establish proper fuel unit costs
18. Calculate heat loss and heat gain
19. Differentiate between bin/DD/hourly analysis
20. Calculate heating and cooling loads
21. Demonstrate ability to collect, prepare, and input data accurately
22. Calibrate the model and verify results are realistic
23. Know typical modeling algorithms
24. Understand how models work and how to troubleshoot
25. Identify existing software tools and their appropriate applications
26. Justify the model against actual consumption
27. Compare the cost of the predicted energy savings against the actual highest unit usage
28. Calculate the estimated energy savings for recommended EEM's
29. Demonstrate life cycle analysis for recommended EEM's
30. Quantify non-energy savings or costs related to recommended retrofits
31. Determine non-economic benefits of measures
32. Understand various cost-effectiveness criteria (BLCC, ROI, SIR, etc.) and when to use them
33. Determine financing options and include benefits in economic analysis

34. Understand economic impacts of demand rates and retrofit strategies
35. Understand inflation and discount factors
36. Document cost-estimates

## 1.5 Health and Safety

1. Visual inspection for health and safety issues in the living units, common areas, and mechanical rooms
2. Personal safety procedures
3. Identify all combustion sources in the building
4. Identify and address health and safety issues that may be impacted by energy saving measures
5. Be familiar with material safety data sheets
6. Comply with OSHA requirements related to the auditor's work
7. Identify types, sources, and health effects of exposure for commonly found contaminants (CO, mold, asbestos, lead)
8. Identify building connections to pollutant sources (garages, commercial use areas, etc.)
9. Recognize IAQ related conditions including chemicals, moisture, mold, etc.
10. Assess IAQ problems and sources
11. Relate the observed IAQ to the building conditions to determine sources and mitigation strategies
12. Identify IAQ contaminant transport paths
13. Know CO detector requirements and applications
14. Combustion safety testing procedures for large systems
15. Evaluate the combustion air supply
16. Assess burner modulation and cycling

## 2. Standards of Reference

All BPI exams are based on a mixture of industry practices, axiomatic<sup>1</sup> concepts, and major standards of references. No singular source exists that could touch upon every aspect for what is considered testable. Conversely, there is no limit to the potential useful material found in print and online.

### Multifamily Building Analyst

- [Technical Standards for the Multifamily Building Analyst Professional](#)

## 3. Contact Information

If you have any questions, comments, or concerns regarding the testing knowledge list please contact BPI's Certification Development department at [certdev@bpi.org](mailto:certdev@bpi.org).

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<sup>1</sup> An axiomatic concept is something implicit that requires no proof or explanation (e.g. – the sum of 2 and 2 is 4, or gravity states that if you drop something, it will fall to a lower level).