

Assorted QCI Tips and Standards Review (6/11/2015)

General Tips for QCI Written Exam

- Review your QCI class notes, the 2-page handout on Roles and Responsibilities between the QC Inspector (that works for an agency) and a 3rd party Inspector, The QCI Standards (listed on the QCI Field Exam Checklist), and this document.
- Build up your confidence by reviewing the material frequently, in small blocks of time each day for several days before the exam.
- Browse through the BPI standards for Building Analyst Professional at http://www.bpi.org/tools_downloads.aspx?selectedTypeID=1&selectedID=2
You will have a printed copy of this document with you by the side of the computer when you take your exam. Reviewing it prior to the exam will help you become familiar with the details that are contained in it.
- Do not rush through the exam. You have 2 ½ hours to take the exam. Take time to carefully read each question. Think about “What am I being asked in this Question?”
- Try to answer each question. If you are unsure, you can mark the question to come back to later. The computer will track which ones you want to go back to.
- What’s The Situation?????? – There are a number of questions on the Exam that deal with a specific type of situation. Be Careful Here!! Read the question carefully, and step out of your shoes (not literally) for a minute. Do not think of yourself as a Weatherization Final Inspector. Instead, consider that you own a contracting business that performs high-quality construction inspections. This is the “Real World”, and your company’s quality, reputation, and future is on the line. What is the best course of action for the situation in the question?
- Remember that this is a national exam, and is based on testing and protocol that is not necessarily the same as the Illinois Weatherization program.
- Look for wording such as “Most Applicable”, “The Best”, “Except For”, “Which is Not”, “Most Important”, “What do You do Next”. These phrases set the tone for the question and will help guide you to find the correct answer.
- Many questions will contain a conditional setup in the first sentence, such as “Working in a File”, “Conducting a File Review”, “During an In-Progress Inspection”, “Spot Check Visit When the Workers are at the Site”, “Post Work (Final Inspection) QCI”, or “Closing/Costing Out a File”. The specific question setup may lead to a specific answer, due to the circumstances.

- For the purpose of the written exam, you should assume that you are a QC Inspector working for a local agency. If the question says “You are a **Third-Party Inspector** working for...”, then that statement changes the roles and responsibilities of what a QCI is allowed to do. Be careful on these questions!
- As a QCI, your primary duties are listed in the Job Task Analysis (JTA) that you were given in class. Look for some key wording, such as “Client Satisfaction”, “Support Positive Work”, “Recommend Training”, “Maintain Professionalism”, “Documentation”, or “Evaluate Installed Measures against Standards or Codes”. You may have several answers that look similar, but they all seem to be decent answers. You want to choose the “**Best, Right**” answer. In some cases, one of the above key words may help you choose the correct answer.
- In situations where multiple answers seem to be good choices, look carefully at the specific wording of each answer to determine the Best one.
- Some of your questions may involve a “Fee for Service” program. That would be a program that would be different from Weatherization. Often operated by a non-WAP agency or utility company, the client would be paying all, or part of the installed measures. Choose your answer accordingly, the situation may be different here, because you don’t deal directly with the contractor.
- Be careful on questions regarding Zone testing. IHWAP measures **Zone WRT Outside**, but most other programs measure **Zone WRT House (inside)**. This flips things around and our reading of Attic Zone WRT Outside @ -5 Pascals, would be the same as a reading of Attic Zone WRT House @ 45 Pascals. Once again, read the question carefully.
- In most cases, The Best answer may involve: Dealing with the Crew Supervisor, Educating the Client, Ensuring Client Satisfaction, or Making Sure the Problem is Corrected.
- You can bring a warm or cold drink with you into the Exam area. If you are starting to feel tired, or overwhelmed, ask the Proctor if you can take a quick break. You can step out of the testing area, stretch, use the restroom, get a drink, or get a breath of fresh air. Remember that the exam clock is still ticking, so keep your break effective, but short.

BPI Building Analyst Professional

- For gas ovens, CO shall be measured at steady state (usually after 5-10 minutes of operation) at the highest setting. When measuring CO on gas ovens, it is recommended to turn on the exhaust hood and open a window to reduce risk of exposure to elevated ambient CO levels.

- Ambient CO levels shall be monitored upon entering the combustion appliance zone and during the test period for all appliances. If ambient levels exceed 35 ppm at any time, stop the inspection.
- Vented appliances, regardless of type, that spill flue gases for more than 60 seconds after startup, fail the spillage test.
- The entire gas/propane line must be examined and all leaks repaired. Particular care should be made in the immediate vicinity of the appliances and at the joints, shutoff valves, and pilot lines. Identify leaks using a gas leak detector and accurately locate the source of the leak using a soap bubble solution.
- Flexible gas lines must be replaced if they are: kinked, corroded or show signs of visible wear, the line was manufactured before 1973 (date is stamped on the date ring attached to the line), or the line has any soldered connections.
- For the Combustion Safety Testing, CO is always measured in the undiluted air stream. In an atmospheric furnace, measure in the combustion chamber. Sealed combustion, condensing systems are not drilled, but measured at the terminus (end/exit) point.

ASHRAE 62.2 (2010)

- To determine the Base Ventilation Requirement, you need to know three things:
 - A. The total Occupiable Square Footage
 - B. The number of Occupants (don't include pets)
 - C. The number of Bedrooms (then add 1)
- The Base Ventilation Rate is then calculated in three steps:
 - A. You need 1 cfm for every 100 square feet of Occupiable Square Footage
Divide the Occupiable Square Footage by 100
 - B. Determine the larger number: the number of Occupants or the number of Bedrooms (plus 1).
Multiply that number by 7.5 cfm.
 - C. Add the cfms from #1 and #2 together. This is the Base Ventilation Requirement.

Example: Your weatherization home has 1,200 Square Feet of Occupiable area (divide 1,200 by 100 to get **12 cfm**). It is occupied by 3 people. It has 3 bedrooms (plus 1). The number of bedrooms is larger (so you would use 4 x 7.5 cfm, or **30 cfm**). Take **12 cfm** (square feet), add **30 cfm** (bedrooms, plus 1), and the correct answer for the Base Ventilation Requirement is **42 cfm**.

Other ASHRAE Ventilation Requirements

- Ventilation needed for a Kitchen – 100 cfm.
- Ventilation needed for a Bathroom – 50 cfm.
- Operable Window in Kitchen or Bathroom counts as 20 cfm reduction.
- A Kitchen Fan that is operational and vented to the outside, can be counted as 50 cfm.

SWS and Other Tips/Standards

- A Blower Door test @ -50 Pascals is about the equivalent of a 20 mph wind pressure on all surfaces of the house.
- The equivalent pressure in 1 inch of water column is about 250 Pascals.
- Ventilation exhaust ductwork must have a minimum rise of $\frac{1}{4}$ " per foot of run and when located outside the building shell, must be fully insulated to a minimum R-8.
- Cellulose insulation used in an enclosed cavity shall be installed at 3.5 pounds per cubic foot or greater density.
- Recessed can light fixtures that are not IC rated and chimneys must be baffled with an effective dam prior to insulating to maintain a minimum 3" clearance to the insulation being installed.
- Single-walled flue pipes require a minimum 6" clearance to insulation or other combustible materials. Refer to NFPA 54 for additional requirements for specific chimney materials. Type B vent, double-walled flue pipes require a minimum 1" clearance.
- Faucet Aerator Standard - 2.2 Gallons Per Minute or less
- Low Flow Showerhead Standard – 2.5 Gallons Per Minute or less
- When metering a Refrigerator for electric usage, you should measure at least 2 hours, without a Defrost cycle.
- To determine the amount of Combustion Air needed for an atmospherically vented gas furnace and/or water heater, **multiply 50 cubic feet of air, for every 1,000 BTUs**. An example of this would be if there was a natural gas water heater (40,000 BTUs) and an atmospheric furnace (80,000 BTUs) that had a total input of 120,000 BTUs, the formula would be 120,000 divided by 1,000 = **120**. **120 x 50 cubic feet = 6,000 cubic feet of Combustion Air required**.
- Loose fill fiberglass or cellulose insulation is not allowed on any cathedral/vaulted roof with a pitch of greater than 6/12.

- Attic Ventilation – If High/Low venting, or a vapor barrier is present, then 1 sq. ft. of net free-vent area (NFVA) is needed for every 300 sq. ft. of attic space. If no high/low vents, or no vapor barrier present, then 1 sq. ft. of net free-vent area (NFVA) is needed for every 150 sq. ft. of attic space.
- Spray Polyurethane Foam (SPF) - Applicators should obtain training from the suppliers of SPF to help assure installation quality and use of all equipment as well as safe handling, use, and disposal of all chemicals used in the process. Spray Polyurethane Foam Alliance (SPFA) also offers additional training and accreditation for high-pressure SPF applicators.
- When applying low pressure 2-component spray polyurethane foam, air purifying masks with an organic vapor cartridge and P-100 particulate filter will be used.
- When applying high-pressure SPF insulation, supplied air respirators (SARs) will be used.
- When entering a crawlspace, or other confined area, **Access** and **Egress** points must be located before beginning the inspection.
- There are **Four** tests that comprise the Combustion Safety Tests (all done under Worse Case Draft conditions):
 - CAZ Depressurization
 - Spillage
 - Draft
 - CO
- Spillage Time Limit is 1 minute
- If ambient CO levels are found to exceed acceptable limits, the family should be evacuated and appropriate actions must be taken for remediation (contact Fire Dept.?)
- Uniform Present Worth (UPW) refers to the amount of years an energy conservation measure will last. You may need to know this to calculate an SIR.
- Any replaced mercury based thermostat will be removed safely and disposed of in accordance with EPA regulations.
- Condensate pumps will be installed, if needed, to ensure proper drainage.
- Heat Pump - All liquid refrigerant lines will be insulated to a minimum of R-4. Suction lines will be insulated to a minimum of R-4 if specified by the equipment's manufacturer.
- Heat Pump - If exposed to sunlight, refrigerant line insulation will be protected from Ultraviolet light degradation in accordance with manufacturer specifications.
- Heat Pump - Refrigerant lines will be installed without kinks, crimps, or excessive bends.

- On a Heat Pump, there should be a minimum of **400 cfm air flow across the A-Coil for every 1 ton of capacity**. A 3-ton Heat Pump should have a CFM flow across the coil of about 1,200 CFM. If it only had 500 CFM of air flow, then something is wrong. It could be caused by a dirty filter, dirty or clogged A Coil, Dirty or clogged blower fan, or undersized or blocked ductwork.
- AC/Heat Pump - **Liquid** lines carry high pressure(warm) liquid and are the smaller of the two lines. **Suction** lines carry low pressure (cool) vapor and are the large insulated lines.
- Heat Pump - Measuring **Superheat** (Fixed orifice/Non-TXV systems) – Measure superheat in the suction line at the outdoor condenser coil. We measure the low side pressure convert it to a temperature(saturation temperature) and then measure the temperature of the suction line and find the difference between the two temps. suction line temp- saturation temp = superheat.
- Heat Pump - Measuring **Subcooling** (TXV systems) – Measure subcooling at the liquid line near the outdoor condenser coil(between the condenser and the metering device). We measure the high side pressure convert it to a temperature(saturation temp) and then measure the temperature of the liquid line and find the difference between the saturation temp - liquid line temp = subcooling
- Heat Pump - Occupants will be educated on proper use of thermostat including: Proper use of setback thermostats for air conditioners and heat pumps; Allowing occupant comfort to determine setback for combustion heating appliances; and, Using emergency/auxiliary heat appropriately.
- Heat Pump – If the weather is extremely cold, and the heat pump is no longer able to keep up, the thermostat will kick on auxiliary/emergency heat mode automatically. The heat pump should not be manually switched over to auxiliary/emergency heat mode.
- HVAC – When measuring draft in flue, drill a test hole in flue pipe 1 foot from draft hood on Natural Draft Appliance, or on Fan Induced Appliance 2 feet from where gases exit the appliance, in straight section of pipe, away from turns or elbows.
- HVAC - Acceptable Oxygen levels for Flue Gas Analyzer combustion testing should be between 4% and 9%.
- HVAC – The Combustion Air Intake Pipe for a 2-pipe system should be installed at least 12” above the average snow line.

- **Outside Air Ventilation Supply Ducts** will be installed in accordance with the following:
 - A minimum of 6 inches from grade;
 - A minimum of 10 feet from contaminant sources or exhaust outlets;
 - Above local snow or flood line;
 - A minimum of 18 inches above an asphalt based roof;
 - Never on a flat roof; and,
 - As required by authority having jurisdiction.
- An Energy/Heat Load calculation from ANSI/ACCA Manual J should be done for every replacement heating system to ensure proper HVAC system sizing.
- HVAC equipment selection will be performed in accordance with ANSI/ACCA Manual S and the manufacturer's specification to ensure the right type of heating and cooling equipment is installed.
- If you're trying to conduct a blower door test on a home with live/hot coals in the woodstove/fireplace, neither a depressurization, or pressurization is a good idea. You should probably come back when the fireplace or woodstove has not been used.
- The National Fenestration Rating Council (NFRC) is the organization that certifies the energy performance of windows and doors.
- There are two basic Duct Pressurization tests used with the Duct Blaster. The **Total Duct Leakage Test** just uses the Duct Blaster to measure the total overall leakage of the duct system, and is the test you will conduct for your QCI Field Exam. The **Duct Pressurization for Leakage to the Outside Test** uses the Blower Door and the Duct Blaster and identifies the actual amount of duct leakage to the outside/unconditioned areas.
- For Manometer setup on a **Duct Pressurization for Leakage to the Outside Test**, the hose setup should be as follows: **Channel A Input** – Hose to ductwork to measure Pressure in ducts, **Channel A Reference** – Open, **Channel B Input** – Hose to Duct Blaster tap to measure cfm flow, and **Channel B Reference** – Open. This is the same Manometer setup you use for the **Total Duct Leakage Test**.
- The HEP QCI Certification is good for 3 years. You need 10 Continuing Education Units (CEUs) per each year, for a total of 30 CEUs. You are responsible for reporting and maintaining your own CEU records.

DOE's Weatherization Regulations

You may need to know some information about DOE and Weatherization regulations. They can be found at www.WAPTAC.org in the Regulations and Guidance section. Here are some basics:

- **10 CFR 440** – These are the actual federal regulations for the DOE Weatherization Assistance Program.
- **10 CFR 600 (aka Part 600)** – These are Weatherization administrative and financial regulations that apply to states and local agencies.
- **Appendix A** – These are the Standards and Specifications for Weatherization Materials.
- **Weatherization Program Notices (WPN)** – DOE uses these Program Notices to inform state and local agencies of Weatherization Policy. Some examples of notable WPNs include:
 - **2011-06** – Health and Safety Guidance
 - **2012-09** – Incidental Repair Guidance
 - **2015-04** – Quality Work Plan Requirement (update to WPN 2014-04). This WPN required the States to create and submit a Quality Work Plan that also required national QCI certification.