Best Practice – Combustion Appliance Zone (CAZ) Testing

Date: Revised May 2020


Problem or Question: When do you have to do Combustion Appliance Zone Testing?

Discussion:

When vented combustion appliances are present assessment staff should consider the following when determining the correct Combustion Appliance Zone (CAZ) testing requirements:

- Combustion Appliance Zone (CAZ) Testing of vented combustion appliances is a program requirement for all DOE, DOE/LIHEAP leveraged, and LIHEAP only gas units.
- Determine if the gas appliance is considered Sealed Combustion or Atmospheric/Non-Sealed Combustion.
  - Sealed Combustion-All combustion air & exhaust vents are continuously piped from factory connections located on the appliance and terminated to the exterior of the structure.
    - Required combustion test for all Sealed Combustion appliances are listed below and tested under normal operating conditions.
      - CO Air free
      - Efficiency
      - Heat Rise

Examples of Sealed Combustion appliances
Atmospheric/Non-Sealed Combustion—Combustion air is obtained from inside the home’s pressure barrier or an area potentially connected to the building’s pressure boundary such as an attic, crawlspace, exterior closet, etc. and only the exhaust flue piping penetrates to the exterior of the unit.

Atmospheric/Non-Sealed Combustion systems requires two steps within the CAZ testing process:

- **Step 1** is establishing the worst case scenario for the appliance location being tested & requires documentation of CAZ depressurization to ensure appliance does not exceed CAZ depressurization limit
- **Step 2** is to perform all CAZ/Combustion test under the established worst case scenario such as
  - Spillage
  - Draft
  - CO Air free
  - Efficiency
  - Heat Rise (for furnaces only)

Examples of Atmospheric/Non-Sealed Combustion Appliances

- CAZ testing objective:
  - Determine if Atmospheric/Non-Sealed Combustion appliances will safely and properly draft under worst case depressurization conditions
  - Protect the occupant from the hazards of draft reversal (back drafting).
- CAZ testing must be performed for all Atmospheric/Non-Sealed Combustion Appliances when the appliance:
  - Is located or obtains combustion air within the home’s pressure boundary
  - Is located or obtains combustion air from an area that has the potential to be connected to the home’s pressure boundary (Examples of potential connected areas—exterior closets, attics, garages, etc.).
- All flue penetration should be sealed after testing utilizing high temp sealant, plugs, or foil tape.
Type of scenario we are trying to re-create when performing CAZ testing:

“It’s Saturday morning. Mom gets up early and starts a load of laundry. She closes all the bedroom doors (reduces the size of area which could increase depressurization effect of appliances), so not to wake the family. She starts the laundry — that gets the water heater going (now have a vented combustion appliance turning on and exhausting through combustion byproducts through the flue pipe)— and puts last night’s load of wash in the dryer — that gets the dryer going (dryers exhaust to exterior and has potential to depressurize the reduced area). Then she goes into the kitchen and starts frying bacon—turning on the stove exhaust vent (stove exhaust vents to exterior and has the potential to depressurize reduced area even further). It’s winter time, so the furnace kicks on (return air opening or duct leakage can cause even further depressurization of the reduced area). You would test all scenarios described to determine which combination(s) would create the most negative pressure for the appliance location determining “The Worst Case Scenario!” to perform your draft and spillage testing.

- In this situation, does the exhaust gas from the combustion appliance go up the flue or back draft into the home?

Recommendation Summary:
Combustion Appliance Zone (CAZ) Testing is an important test to determine if appliances will vent properly under the most negative house conditions that assessors/inspectors can create within the appliance location. Should CAZ testing reveal an appliance(s) not venting properly (back drafting) staff must either correct the appliance venting or isolate the appliance CAZ zone utilizing one of the methods described in “Isolating the CAZ Best Practice”.

Department Training staff has a variety of CAZ testing documents available to serve as testing resources. Each of the documents walks assessors/final inspectors through the process and assessment documentation for completing the CAZ test. Create/use your own, or choose the one from the Department that works best for you and your staff. Agencies that do not have staff who can perform CAZ testing or have CAZ test questions should contact Department Training Staff to discuss their training needs.