Combustion Safety Test Form

ActOnEnergy®

Customer: _____ Contractor: _____

Address: _____ Technician: _____

Phone No: _____ Phone No: _____

Date: Pre _____ Date: Post _____

CAZ (Combustion Appliance Zone) Depressurization Test

Furnace (check one): ☐ Natural draft ☐ Fan assisted ☐ Power vent (plastic venting)

DHW (check one): ☐ Electric ☐ Natural Draft ☐ Power Vent ☐ Orphaned ☐ Flue Liner

Pre	Post		Pre	Post
		Outside Temperature (T-out)		
-2.50	-2.50	Minimum Acceptable Draft (refer to BPI charts)		
		House ambient CO level		
		CAZ ambient CO level		
		Baseline pressure		
		Pressure fans / Dryer on (check doors)		

			Pre	Post
		Pressure with air handler on		
		Pressure recheck door closures		
		Worst Case Depressurization WRT Outside		
		Net change between Baseline & Worst Case	0.00	0.00
		CAZ Depressurization Limit (refer to BPI charts)		

(Test In) ☐ PASS ☐ FAIL

CAZ Depressurization Test: (Test Out) ☐ PASS ☐ FAIL

If CAZ test failed, state reasons for failure:

Describe any actions taken:

Back-draft and CO Testing Results of Atmospherically Vented Appliances

Zero CO detector outside	Pass Spillage Test (Y or N)				Measured CO Level (air free - enter value in ppm)				Draft Test (flue pressure WRT CAZ)			
Appliance	Worst Case		Natural		Worst Case		Natural		Worst Case		Natural	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1: Water Heater												
2: Heating Equip												
3:												
4:												
5:												
6: Gas Oven	* Check burner flame pattern											

☐ Gas leak testing completed ☐ Leaks found ☐ Leaks repaired * Note locations of leaks found and repaired below

Note: There is no need to retest appliances under Natural conditions if they pass under Worst Case conditions. If an appliance cannot be tested, write "NA" on the row and specify reason.

If any appliance failed, state reason for failure:

Describe actions taken (INCLUDE DATES):

Blower Door Test Form

ActOnEnergy®

Customer: _____ Contractor: _____

Address: _____ Technician: _____

Phone No: _____ Phone No: _____

Blower Door and Ventilation Test Results

	Square Footage		Number of Occupants	19	Base N-Factor*
10,000	Building Volume		Number of Stories	0.00	Height Correction Factor
	Number of Bedrooms		Crawl Space		Basement

The climate for Central and Northern IL is zone 2 climate 19 and Southern IL is in Zone 3 climate 22. Each of these shall be corrected for height. See BPI BA Professional Standards P5 for climate zone map.

Number of Stories	1	1 1/2	2	2 1/2	3
Height Correction Factor	1	0.89	0.81	0.76	0.72

Base N-Factor 19 X 0.00 Height Correction Factor = 0.02 Corrected N-Factor

1,000	Initial Blower Door Test (CFM50)	1,000	Final Blower Door Test (CFM50)
6.00	ACH50 = CFM50 x 60 ÷ Volume	6.00	ACH50 = CFM50 x 60 ÷ Volume
315.79	ACHn = ACH50 ÷ Corrected N-Factor	315.79	ACHn = ACH50 ÷ Corrected N-Factor

Comments:

Building Airflow Standard (BAS)

A	58	Ventilation for Building = Volume x 0.35 ÷ 60	Required Ventilation for the home is the greater of **A** or **B**.
B	0	Ventilation for Occupants = 15 CFM x # of Occupants	
	1	BAS = Required Ventilation x Corrected N-Factor	

Final Blower Door Test 1,000 ÷ 1 BAS = 90,226 Percentage of BAS

Percentage of BAS is: (check one)		Action taken: (check one)
	100% or greater ---------->	No required action
	71-100% ---------->	Recommend additional ventilation
	70% or less ---------->	Install additional ventilation

Amount of additional ventilation recommended or installed:

Compliance with ASHRAE 62.2 *Required for HPwES Gold Certificate, provide description

Comments:

*Duct Leakage (Area required only for HPwES Gold Certificate)

Ducts are fully inside the thermal / air boundary

OR

Duct Sealing Performed (HPwES Certificate, if ducts are outside of thermal boundary)

CFM 25 Pre test CFM 25 Post Test

(IHP Gold Cert requires duct leakage rate of ≤10% in homes with ductwork that is partially or fully in unconditioned space)

Comments:

Combustion Safety Test Procedure For Vented Appliances

1 **Measure the Base Pressure.** Start with all exterior doors and window closed and the fireplace damper closed. Set all combustion appliances to the pilot setting or turn off the service disconnect. Combustion appliances include: boiler, furnace, space-heaters, and water heater. With the home in this configuration, measure and record the baseline pressure of the mechanical room with regard to (WRT) outside.

2 **Establish the Worst Case.** Turn on the dryer and all exhaust fans. Close all interior doors that make the CAZ pressure more negative. Turn on the air handler, if present, and leave on if the pressure in the CAZ becomes more negative, then recheck the door positions. Measure the net change in pressure from the CAZ to outside, correcting for the base pressure. Record the "Worst Case Depressurization" and compare to the CAZ Depressurization Limit Table.

3 **Measure Worst Case Spillage, Draft, CO.** Fire the appliance with the smallest BTU capacity first, test for spillage at the draft diverter with a mirror or smoke test, and test for the CO at the flue at steady-state (if steady-state is not achieved within 10 minutes, take the CO readings at the 10-minute mark). If the spillage test fails under worst case, go to Step 4. If spillage ends within 1 minute, test the draft in the connector 1' - 2' after the diverter or first elbow. Fire all other connected appliances simultaneously and test the draft diverter of each appliance for spillage. Test for CO in all appliances before the draft diverter.

4 **Measure Spillage, Draft, CO under Natural Conditions.** If spillage fails under worst case, turn off the appliance and exhaust fans, open the interior doors and allow the vent to cool before re-testing. Test for CO, spillage, and draft under "Natural Conditions." Measure the net change in pressure from worst case to natural in the CAZ to confirm the "Worst Case Depressurization" taken in Step 2. Repeat the process for each appliance, allowing the vent to cool between tests.

5 **Ambient CO.** Monitor the ambient CO in the breathing zone during the test procedure and abort the test if ambient CO goes over 35 ppm. Turn off the appliance, ventilate the space, and evacuate the building. The building may be re-entered once ambient CO levels have gone below 35 ppm. The appliance must be repaired and the problem corrected prior to completing the combustion safety diagnostics. If the ambient levels exceed 35 ppm during testing under natural conditions, disable the appliance and instruct the homeowner to have the appliance repaired prior to operating it again.

6 **Action Levels.** Make recommendations or complete work order for repairs based on test results and the Combustion Safety Test Action Levels Table.

CAZ Depressurization Limits

Venting Condition	Limit (Pa)
Orphan natural draft water heater (including outside chimneys)	-2
Natural draft boiler or furnace commonly vented with water heater	-3
Natural draft boiler or furnace with vent damper commonly vented with water heater	-5
Individual natural draft boiler, furnace, or domestic water heater	-5
Mechanically-assisted boiler or furnace commonly vented with water heater	-5
Mechanically-assisted boiler or furnace alone, or fan assisted DHW alone	-15
Chimney-top draft inducer (Exhausto type or equivalent) high static pressure flame retention head oil burner; Direct vented appliances/Sealed combustion appliances	-50

Minimum Acceptable Draft

Acceptable Draft Test Range = [(T-out ÷ 40) - 2.75]											
Outside Temperature	F	< 10	20	30	40	50	60	70	80	> 90	F
Flue Pressure WRT CAZ	Pa	-2.5	-2.25	-2	-1.75	-1.5	-1.25	-1	-0.75	-0.5	Pa

Combustion Safety Test Action Levels

CO Test Results	And/Or	Draft Test Results	Action
0 - 25 ppm	And	Passes	Proceed with work.
26 - 100 ppm	And	Passes	Recommend that the CO problem be fixed.
26 - 100 ppm	And	Fails at worse case only	Recommend a service call for the appliance and/or repairs to the home to correct the problem.
100 - 400 ppm	Or	Fails under natural conditions	**STOP WORK**: Work may not proceed until the system is serviced and the problem is corrected.
> 400ppm	And	Passes	**STOP WORK**: Work may not proceed until the system is serviced and the problem is corrected.
> 400ppm	And	Fails under any condition	**EMERGENCY**: Shut off fuel to appliance and instruct the homeowner to call for service immediately.