



COMBUSTION SAFETY TEST PROCEDURE FOR VENTED APPLIANCES

- 1. Measure the Base Pressure.** Start with all exterior doors and windows 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 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, the 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 outside. 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 reentered 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 Level Tables.

RANGES AND OVENS*

1. Remove any items/foil in or on oven/range top
2. Make sure self-cleaning features are not activated
3. Test oven in vent sleeve, before dilution air
4. **100 ppm to 300 ppm** as measured you must install a carbon monoxide detector and recommendation for service must be made to the consumer.

Greater than 300 ppm as measured—the unit must be serviced prior to work. If greater than 300 ppm after servicing, exhaust ventilation must be provided with a capacity of 25 CFM continuous or 100 CFM intermittent.

**Continually monitor ambient CO levels during test*



COMBUSTION SAFETY TEST ACTION LEVELS

CO Test Result*	And/ Or	Spillage and Draft Test Results	Retrofit 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 worst 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
>400 ppm	And	Passes	Stop work: Work may not proceed until the system is serviced and the problem is corrected
>400 ppm	And	Fails under any condition	Emergency: Shut off fuel to the appliance and have the homeowner to call for service immediately

*CO measurements for undiluted flue gases at steady state

CAZ DEPRESSURIZATION LIMITS

Venting Condition	Limit (Pascals)
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 damper commonly vented with water heater	-5
Individual natural draft boiler, furnace or domestic hot 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

ACCEPTABLE APPLIANCE SPILLAGE PERIODS

Appliance Type	Spillage Test Period (minutes)
Water Heater, Gravity Furnace, Boiler	1.0
Space Heater	1.0
Forced Air Furnace	1.0

ACCEPTABLE DRAFT TEST RANGES

Outside Temperature (degree F)	Draft Pressure Standard (Pa)
<10	-2.5
10-90	$(T_{out} \div 40) - 2.75$
>90	-0.5