



COMBUSTION APPLIANCE SAFETY INSPECTION FOR GAS OVENS, DIRECT-VENTED, POWER-VENTED AND VENT-FREE APPLIANCES

INDOOR AMBIENT CARBON MONOXIDE (CO)

Ambient CO must be monitored at all times during the test and actions taken as per the table below:

Required Actions in Response to Ambient CO Measurements (from ANSI/BPI-1200, Section 7.3.3.3)

70 ppm or greater	36 ppm-69 ppm	9 ppm-35 ppm
• Terminate the inspection. • Notify the homeowner -occupant of the need for all building occupants to evacuate the building. • Leave the building and the appropriate emergency services shall be notified from outside the home.	• Advise the homeowner -occupant that elevated levels of ambient CO have been detected. • Open windows and doors. Recommend that all possible sources of CO be turned off immediately. • Where it appears that the source of CO is a permanently installed appliance, recommend that the appliance be turned off and advise homeowner – occupant to contact a qualified professional.	• Advise the homeowner - occupant that CO has been detected. • Recommend that all possible sources of CO be checked and windows and doors opened. • Where it appears that the source of CO is a permanently installed appliance, advise the homeowner - occupant to contact a qualified professional.

CO MEASUREMENT IN COMBUSTION APPLIANCES

Direct-Vented and Power-Vented Appliances

1. If the outlet of the exhaust is safely accessible, measure the CO level in the undiluted flue gas on all direct-vented and power-vented appliances (without atmospheric chimneys or vents) at **5 minutes** of main burner operation.
2. Compare the CO measurement with the appropriate CO threshold/s in Table 1.
3. Action levels for CO exceeding the appropriate threshold/s in Table 1: See Table D.1.B.

Unvented Heaters

Category of unvented, self-contained, free standing, non-recessed (except as noted) fuel gas burning appliance for furnishing warm air by gravity or fan without duct connection. Gas hearth appliances listed to ANSI Standard Z21.11.2 include Gas Fireplaces and Fireplace Inserts.

1. With the appliance on, measure CO after **5 minutes** of main burner operation.
2. Compare the CO measurement with the appropriate threshold in Table 1.
3. Actions levels for CO exceeding the appropriate threshold in Table 1: See Table D.1.B.

Gas Log Sets

1. With the appliance off, if gas logs are installed in wood burning fireplaces equipped with a damper, verify that the fireplace damper is in a fixed open position.
2. With the appliance on, measure CO in the firebox (where log sets are installed in wood burning fireplaces) or in the vent (for gas fireplaces) after **5 minutes** of main burner operation.
3. Compare the CO measurement to the appropriate threshold in Table 1.
4. Actions levels for CO exceeding the appropriate threshold in Table 1: See Table D.1.B.

Gas Ovens and Range Tops

Gas ovens must be tested for vented CO and range top burners must be visually inspected. Perform appliance testing procedures following the manufacturer's appliance procedure. In the absence of the manufacturer's appliance procedure, use the following testing procedures and action levels.

1. With appliance off, complete the following visual inspection:
 - a. Check the oven cavity for any stored materials and remove before testing.
 - b. Inspect the oven cavity for cleanliness. If the oven area is dirty enough to adversely impact the combustion process recommend that the oven be cleaned to reduce the possibility of unacceptable emissions.

- c. Check the bottom surface inside of the oven cabinet for air venting that may be present. Any air vent obstruction, such as aluminum foil or silicone liners, must be removed before oven CO testing.
 - d. Check for air blockage at the bottom of the range and drawer and/or broiler compartment under the oven and remove any obstructions before testing.
 - e. Inspect range top burners for cleanliness. If the burners are excessively dirty, recommend that they be cleaned to reduce the possibility of unacceptable emissions.
2. Turn the oven on to a bake temperature of 500°F. Do not turn the oven all the way up to the broil setting or self-cleaning setting.
 3. After **5 minutes** of the oven's main burner operation, place the test probe of a CO analyzing tool into the throat of the oven exhaust vent and measure undiluted CO.
 4. Record the CO measurement once the CO level has become a stable reading.
 5. Compare the CO measurement with the appropriate CO threshold in Table 1.
 6. Actions levels for CO exceeding the appropriate threshold in Table 1: See Table D.1.B.

Table 1: CO Thresholds for Fossil Fuel-Fired Combustion Appliances
(from ANSI/BPI-1200, Section 7.95)

Table 1 CO Thresholds for Fossil-Fuel Fired Combustion Appliances	
Appliance	Threshold Limit
Central Furnace (all categories)	400 ppm air free ⁴
Boiler	400 ppm air free
Floor Furnace	400 ppm air free
Gravity Furnace	400 ppm air free
Wall Furnace (BIV)	200 ppm air free
Wall Furnace (Direct Vent)	400 ppm air free
Vented Room Heater	200 ppm air free
Unvented Room Heater	200 ppm air free
Water Heater	200 ppm air free
Oven/Broiler	225 ppm as measured
Clothes Dryer	400 ppm air free
Refrigerator	25 ppm as measured
Gas Log (gas fireplace)	25 ppm as measured in vent
Gas Log (installed in wood burning fireplace)	400 ppm air free in firebox

Table D.1.B: Action Levels for Carbon Monoxide in Combustion Appliances
(from ANSI/BPI-1200, Annex D)

TABLE D.1 B. ACTION LEVELS FOR CO IN COMBUSTION APPLIANCES	
TEST RESULT	ACTION REQUIRED
Unacceptable CO level	Advise the homeowner/occupant that the appliance should be serviced immediately by a qualified professional Note: If ambient CO levels do not exceed 70 ppm, testing of other appliances and other audit procedures may continue at the discretion of the auditor
Acceptable CO level	No action required

NOTE: The Action Levels in D.1.B above are based on the following criteria:

- CO measured at 5 minutes of main burner operation
- CO level at or below threshold in Table 1 for the appliance being tested is ACCEPTABLE
- CO level exceeding threshold in Table 1 for the appliance being tested is UNACCEPTABLE