

Perkin Elmer 2380 Atomic Absorption Spectrometer

Updated June 2, 2008

Burner Flow Spoiler or Impact Bead Installation

1. With gas flows to the burner shut off, remove the four knurled screws from the burner end cap and separate the end cap from the burner chamber. (It is not necessary to disconnect the hoses from the end cap.)
2. Remove the unwanted plastic flow spoiler or impact bead, if present, from the burner. The impact bead is held in the end cap by two O-rings. Grasp the stem of the bead and pull it straight out from the end cap. The flow spoiler is wedged into the burner chamber and can be dislodged, if stuck, by pushing sideways on one of the vanes.
3. If the flow spoiler is to be used, install it by pushing the spoiler in until it is firmly seated by pressing it in the center with your index finger. Note that one of the vanes must point downward at the key. See figure 9-1A in Instructions: Model 2380 Atomic Absorption Spectrophotometer, page 9-2.
4. If the impact bead is needed, install it by grasping the stem of the bead and press it firmly through the two O-rings until it bottoms in the seat. Note that the installation will be easier if the stem of the bead is moistened with water. Carefully rotate the bead stem as necessary to center the bead on the orifice of the nebulizer. See figure 9-1B on page 9-2 in the manual.
5. Replace the end cap. Make sure the end cap O-ring is properly seated in the end cap groove. Tighten the four knurled end cap screws in the sequence top screw, bottom screw, right-hand screw, left-hand screw until they are in all the way, but not tight. Then tighten them finger-tight in the same order.

Burner Head Installation

1. Select the appropriate burner head for the analysis. Use the “Analytical Methods for Atomic Absorption Spectrophotometry” by Perkin Elmer to determine which burner head is appropriate for the element you are testing. Below are a couple of general guidelines.
 - a. The flow spoiler should be used when sample composition varies greatly or there are high levels of dissolved solids.
 - b. The impact bead offers improved performance if the matrix is relatively simple and the sample does not contain high levels of dissolved solids.
2. Open the door of the burner compartment and position the burner head on the burner, engaging the slot in the burner head with the projecting pin inside the burner.
3. Tighten the knurled locking ring securely.
4. Slip the loops in the hold-down cables into the clips provided on either side of the burner assembly.
5. Push the safety interlock pin fully into the interlock hole at the right of the burner compartment. The flame will not ignite unless this pin is fully inserted.

Standard Lamp Mount

1. Position the lamp so that it is held by the two springs in the lamp mount. The light-emitting portion should be located in the plane defined by the axes through the centers of the two lamp alignment knobs (i.e., the lamp should be centered, approximately in the lamp mount). Perkin-Elmer Intensitron lamps are correctly positioned when the alignment knobs on the mount are

centered between the two mica wafers in the lamp. Perkin-Elmer Electrodeless Discharge Lamps should be positioned with the connector end 7 cm from the plane through the centers of the alignment knobs.

2. Open the lamp compartment door, loosen the front and rear hold down screws and push the lamp holder against both stops (black, knurled-head screws) in the lamp compartment floor. The front stop must seat in the V-shaped notch in the base of the mount. Secure the mount with the front and rear hold down screws.
3. Turn the LAMP control fully counterclockwise.
4. Plug in the lamp connector.

Lamp Alignment

1. Switch POWER on.
2. Make the following control settings:
 - a. SIGNAL – LAMP
 - b. BG CORRECTOR – AA
 - c. GAIN – Fully counterclockwise
3. Turn the LAMP control until the LAMP/ENERGY display shows the proper lamp current, as given on the lamp label for “continuous” operation. (The source lamp in the spectrophotometer is continuously powered with D.C.) For an EDL, select the lamp power on the external power supply unit as described in the EDL Power Supply instructions.
4. Set the SIGNAL control to SET UP. Set the SLIT control to the setting appropriate for the element of interest. Adjust the COARSE ADJUST wavelength control to obtain the correct setting on the WAVELENGTH counter for the element of interest. (See the Analytical Methods book for the slit and wavelength settings for the element of interest).
5. Turn the FINE ADJUST wavelength control slowly to obtain a maximum reading on the LAMP/ENERGY display. Use the GAIN control to adjust the maximum reading to 75. If the gain should become too high, an over-range reading of EE will be obtained.
6. Turn the two alignment knobs on the lamp holder to maximize the LAMP/ENERGY display reading. Again, use the GAIN control to make the maximum reading 75.
Note: As the lamp warms up, the displayed value may increase slightly.
7. Close the lamp compartment door.

Setting Up and Igniting the Flame

1. Switch the spectrophotometer on.
2. Verify that the flow spoiler or impact bead is installed in the burner chamber, that a suitable burner head is installed and that the drain is properly connected. Ensure that the burner head safety interlock pin is correctly installed. When the installation is satisfactory, the DRAIN light indicator will come on.
3. Check to see if water is present in the loop in the tubing between the burner apparatus and the drain.
4. If there is a hood flow issue (Air HD light is off), make sure the exhaust tube is pulling in air. Do this by going into room 244 and checking to make sure the hoods are switched on. The switch should be on “Occ” for Hoods 244-06-S and 244-07-S.
5. Set the acetylene tank output pressure to 69 kPa (10 psig). Important: Change the acetylene tank if the tank pressure falls below 520 kPa (75 psig).
6. Set the air supply pressure to between 400 kPa and 700 kPa (60 to 100 psig).

7. Press AIR/C₂H₂ to select the desired gas combination. The light to the left of the key will light.
8. Press CHK OXIDant and set the displayed digits to the desired value using the OXIDANT knob.
9. Press the CHK FUEL and set the displayed digits to the desired value using the FUEL knob.
10. Press FLAME ON/OFF to ignite the flame. An automatic sequence starts the gases flowing for a predetermined period before ignition occurs.
11. Repeat a couple of times until the flame is lit.
12. If flame doesn't light, hit the "Flame On/Off" button. Light a match and manually light the flame. If an error message appears, hit the "Override" button.
13. After flame ignition, allow the burner head to warm up. The flame should appear uniform and stable throughout its length. If it is not, cleaning of the burner or burner head may be required.

Flame Gas Flow Adjustment

1. Once the flame is ignited, the fuel and oxidant gas flows may be adjusted if desired. With air/acetylene, a fuel-lean (oxidizing) mixture gives a blue, hot flame; a fuel-rich (reducing) mixture gives a yellow, cool flame.

Flame Shutdown Procedure

1. When the analyses are complete, and before shutting down the flame, aspirate water for a few minutes.
2. Press FLAME OFF to extinguish the flame. The system follows a predetermined shutdown sequence to extinguish the flame safely.
3. Close the acetylene and air cylinder valves. Then press CHK OXID and CHK FUEL long enough to depressurize the acetylene and air lines.

Normal AA Flame Mode of Operation

1. Refer to the Analytical Methods book for the procedure to be followed for the element of interest. Settings for the slit width, wavelength, gas flow, etc., are given for most elements in most matrices.
2. Make the following control settings:
 - a. POWER – ON
 - b. SIGNAL – ABSorbance
 - c. MODE – CONTinuous
 - d. RECORDER – ABSorbance
 - e. BG CORRECTOR – AA
3. Install the flow spoiler or glass bead and the appropriate burner head.
4. Set up the gas flows for the burner head in use. (Refer to Section 8 or Appendix I for more information).
5. Make sure the following controls are set as indicated below:
 - a. SIGNAL – LAMP
6. Make sure that the LAMP control is turned fully counterclockwise and install the lamp for the element of interest. Set the LAMP current control so that the LAMP/ENERGY display shows the "continuous" D.C. rating shown on the lamp label. For an Electrodeless Discharge Lamp, set the power to the prescribed value as described in the EDL instructions.

Important: Always turn the LAMP current control fully counterclockwise (current off) before changing lamps, otherwise excessive current may be applied inadvertently, possibly resulting in permanent damage to the lamp.

7. Set the SIGNAL control at SET UP. Select the required slit width (from the Analytical Methods book) using the SLIT control. The ALT settings are normally used only with an HGA graphite furnace.
8. Set the COARSE ADJUST for the correct setting on the WAVELENGTH counter for the element of interest (as specified in the Analytical Methods book).
9. Peak the wavelength setting by turning the FINE ADJUST slowly to obtain a maximum reading on the LAMP/ENERGY display. Use the GAIN control to adjust the maximum reading to 75. If the gain should become too high, an over-range reading of the EE will be obtained.
10. Turn the two alignment knobs on the lamp holder to maximize the LAMP/ENERGY display reading. Again, use the GAIN control to make the maximum reading 75. Close the lamp compartment door.

Note: As the lamp warms up, the displayed value may increase slightly.

11. Set the SIGNAL control to ABSorbance. Lower the burner assembly using the burner vertical adjustment knob and press AZ. Raise the burner until the main display starts to indicate slight absorbance (the burner head is starting to interfere with the beam), then lower the burner again slightly. This is the optimum position for most analyses.
12. Light the flame by pressing FLAME ON. If ignition does not occur the first time, press FLAME ON again until the flame is established. If a nitrous oxide/acetylene flame is being used, wait 15 seconds for the system to switch over from the initial air/acetylene flame to the nitrous oxide/acetylene flame.
13. Aspirate a standard that gives an absorbance of approximately 0.2 absorbance units and adjust the horizontal and rotational adjustment knobs until a maximum absorbance figure is obtained.
Note: Burner adjustment is normally performed only when a burner head is changed.
14. Aspirate a blank and press the AZ key. Proceed to the analysis of your samples.