

## SIMPLIFIED REFERENCE CELL PROCEDURES

T. Averett, 28-Aug-2020

Cell 757-561-6702

- 1) The Reference Cell Controller chassis is gold-colored, has 2 digital gauges, red and green rectangular buttons, and is located to the left of the target control computer. There is an identical remote panel in the hall.
- 2) There are three operations that can be performed on the reference cell system.
  - a. VENT the cell to atmospheric pressure, 0 psig.
  - b. EVACUATE the cell.
  - c. FILL the cell with  $^3\text{He}$ ,  $\text{N}_2$  or  $\text{H}_2$  to any pressure up to the maximum safe limit, 150 psig.
- 3) There are two gauges on the control panel in the counting house
  - a. Reference cell pressure, 0-1000 psig.
  - b. Reference cell vacuum, 0-1000 Torr. This gauge is inaccurate due to being subjected to overpressure. This means we cannot accurately know the pressure below 0 psig.
- 4) There is one more gauge, located between the roughing and turbo pumps. It reads in Torr or milliTorr. It is only visible on the camera screen in the counting house. You do not need to worry about this gauge. (Experts: It is this gauge that must fall below 5 Torr when evacuating the cell before you can release the red button).
- 5) IMPORTANT NOTES on the accuracy of pressure readings
  - a. The pressure and vacuum readings on the reference cell control panel digital gauges must set to zero by the user as described below. However, the values in EPICS come straight from the Baratron sensors and will not be changed by adjusting the zero on the gauges.
  - b. The zero values tend to drift. Each time, before you fill the cell, you need to zero the gauges.
  - c. If you are taking data, record the pressure on the gauge in the beginning and end of run files, and the HCLOG, for each run.
- 6) OTHER BUTTONS
  - a. There are buttons, labeled "TURBO ON" and "TURBO OFF". These are used by experts to turn the turbo pump on and off from the counting house. If you suspect the turbo is off, call an expert.
  - b. The "REMOTE CONTROL ON" button should be in the UP position. Switching it to the DOWN position gives control to the panel in Hall C. If you do this by accident, just switch it back UP.

## 7) ZEROING THE GAUGES

- a. The pressure gauge reads in psig. To zero the gauge, first VENT the cell (Step 8). Do not evacuate. Set the gauge to 0 (psig) with a screwdriver. Note that it will still read zero if you pump below 0 psig so don't try to set the zero when the cell is evacuated.
- b. To zero the vacuum gauge, VENT, then EVACUATE the cell (Step 9). Wait until the vacuum is near zero Torr and stops dropping. Set the gauge to zero with a screwdriver. Remember this gauge is not accurate due to damage by overpressure.

## 8) VENTING THE CELL from a pressure above 0 psig:

- a. Press and hold the red VENTILATION button until the pressure stops falling.
- b. The pressure may not be 0 psig if the gauge is not properly zeroed.  
(See Step 6 for details on zeroing.)
- c. NOTE: If the cell pressure was initially below 0 psig, pressing the VENT button will backfill the cell with air to 0 psig which is undesirable.

## 9) EVACUATING THE CELL

- a. VENT the cell if pressure is above 0 psig.
- b. Hold the red EVACUATE 5 TORR button until the vacuum gauge reaches < 5 Torr then release.
- c. When you reach < 5 Torr, the button will remain illuminated and evacuation of the cell will continue.
- d. The vacuum gauge may not read 0 Torr if the gauge is not properly zeroed  
(See Step 6 for details on zeroing.)

## 10) FILLING THE CELL

- a. VENT the cell, zero the psig pressure gauge.
- b. EVACUATE the cell, zero the Torr vacuum gauge.
- c. If you are using a different gas than was previously used, you need to purge the system 3 times (except for  $^3\text{He}$  leave this to an expert). Follow this procedure to PURGE:
  - i. Press and hold the green button for the desired gas and watch the pressure increase to around 50 psig.
  - ii. VENT the cell.
  - iii. EVACUATE the cell.
- d. After the evacuation, do not press the VENT button or you will backfill the cell with air.
- e. FILLING: Press and hold the green button for the desired gas and watch the pressure increase to the desired value.
- f. Record the pressure in HCLOG.