BNL-221289-2021-TECH

NSRL-TN-14-001

Foil Cleaning for the SEC

M. Sivertz

March 2014

Collider Accelerator Department

Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC), Nuclear Physics (NP) (SC-26)

DISCLAIMER

Foil Cleaning for the SEC

Needed:

- SEC with adjustable leak valve with ¼" Swagelok fitting and cap, roughing vacuum port.
- Roughing pump
- Vacuum gauge (Granville-Phillips Convection gauge)
- Bi-polar HV supply (0-300 V, 0-10mADC, Bertan Model 323)
- Argon cylinder, with regulator, flow meter, and ¼" Swagelok fitting.

Foil Cleaning Procedure

1) Connect vacuum pump to SEC and rough down to better than 10 millitorr.
2) Open Argon cylinder. Adjust regulator to a few pounds on pressure (>5 psig).
3) Verify flow through flow meter and/or gas coming out of tubing to purge line.
4) Take cap off leak valve.
5) Install Argon tube to needle valve input, purging joint.
6) Open leak valve to a setting of 00065.
7) Wait for the chamber pressure to stabilize at ~500 millitorr.
8) Set HV polarity to POSITIVE (screw on top of module).
9) With voltage setting at 0, turn on HV supply.
10) Carefully raise the voltage to ~250 volts.
11) Check the current delivered. It should be ~4.8mA (current limited).
12) Allow it to clean for ~15 minutes.
13) Turn off HV.
14) Switch polarity to NEGATIVE.
15) Repeat steps 9-13.

Observations

- Reducing the Argon pressure causes the current draw to drop until about 60 mTorr when the glow discharge shuts off. At pressures of ~100 mTorr, there is a light bulb-shaped glow that extends all the way up the vacuum pipe.
- Increasing the pressure above 500 mT causes the Bertan HV supply to trip off with an over-current failure. Shutting the supply off and turning it back on restets the failure.

Mike Sivertz

Here are some images of the glow discharges produced in the SEC.

Figure 1: Glow discharge during Argon sputter cleaning of SEC (2 foils only) with positive high voltage applied.

Figure 2: Glow discharge with negative HV.