

OPERATION OF BEAMLIN ES-1

The procedure for the operation of the lithography beamline ES-1 is outlined below. The steps for loading a sample, pumping down the exposure station, doing the desired exposure, venting the exposure station and removing the sample are all outlined.

1.) Loading samples:

The sample is placed into the exposure station through the access port on the side of the chamber. Inside the chamber is a mating plate with pins that allow the sample plate to be slipped into position. The access port is opened by removing the clamps. **CHECK** to make sure the chamber is at atmospheric pressure before attempting to load the sample.

2.) System pump down:

Once the sample has been loaded, fasten the access flange, close the vent valve, turn on the large mechanical pump and open the valve between the pump and the exposure chamber. The system should pump down in approximately three minutes. The Baratron gauge in the exposure chamber section will start dropping once the pressure in the chamber is below the upper limit of the gauge (gauge limit 100 – 0.1 Torr – the display on the rack is offset by a factor of 10 (1 volt = 10 Torr)). When the pressure in the exposure station has reached 0.5 Torr (0.05 volts), the gate valve between the exposure station and the beryllium window may be opened.

3.) Opening to the beam:

Before opening to the beam, the beamline status should be checked.

Beamline checklist:

1. Front end ion gauge (log scale) < 1E -9 Torr (3E -10 normal)
2. Gate valve between two mirror chambers open
3. Beryllium window ion gauge < 1E -9 Torr (3E -10 normal)
4. Exposure chamber pumped down below 1 Torr (0.1 volts) both Baratrons
5. Gate valve between Be window and exposure station open

If those conditions are satisfied, the beamline is ready for opening.

To open to the ring, use the SRC controller at the top of the rack and throw the switches in the following order.

1. Valve
2. Radiation shutter
3. Photon shutter

For operation with Helium cooling, these additional steps should be taken at this time:

1. Connect helium tank to the leak/ vent valve.
2. Close valves to mechanical pumps.

3. Slowly open the needle valve while monitoring the Baratron gauges to see when the pressure starts to rise.
4. Let in desired amount of helium (20 Torr/2.0 volts normal, 100 Torr/10 volts maximum) and close needle valve.

4.) Computer scan control:

You are now ready to do an exposure. The x-y stage and a second photon shutter are under operated by the PC next to the beamline. The program to use is called Scanner-- to enter the program, type in SCAN and <ret>. The program has a menu that gives you the options that are possible.

5.) Closing to the beam:

Shutting down the beamline is done in the reverse order of opening the beamline:

1. Close photon shutter (SRC front end controller)
2. Close radiation shutter (SRC front end controller)
3. Close front end valve (SRC front end controller)
4. Close gate valve between Be window and exposure station.
5. Open valve for mechanical holding pump (might already be open)
6. Close valve for exposure station mechanical pump
7. Vent chamber through vent valve using dry nitrogen
8. Loosen clamps on access flange to prevent pressurization of chamber.

Venting the chamber will take approximately 15 minutes. When the chamber is at atmosphere, remove access flange and extract sample. Replace access flange (don't tighten the clamps).