

WEST VIRGINIA UNIVERSITY

PLASMA PHYSICS GROUP

INTERNAL REPORT PL-053

HELIX-LEIA Pump Down Procedures

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VENTING HELIX/LEIA

- 1.) Close all gate valves by disengaging the interlocks.
- 2.) Turn off all turbo pumps.
- 3.) Leave the backing pumps on while the turbos spin down. (Spin-down takes about 30 minutes.)
- 4.) Once the turbos are at 0 Hz, turn off the backing pumps. (If it's going to be a really short vent (i.e., just swapping one solid flange for one window flange) the backing pumps can stay on.)
- 5.) Bring the chamber up to atmosphere by disconnecting the KF clamp in the roughing pump line and using the valve to leak air into the chamber (do this slowly, in stages, it will take close to an hour).
- 6.) Change/replace whatever flanges, windows, probes, etc. need changing.

PUMPING DOWN HELIX/LEIA

- 1.) Reattach the roughing pump line to the chamber with the KF clamp and make sure the valve is open all the way.
- 2.) Turn on the roughing pump and let it pump the chamber down to 600-800 mTorr. This will take 3-4 hours, if there are no leaks; if it's taking longer, check the tightness/fittings of everything that has been changed.
- 3.) As initial vacuum is established, check the tightness of any bolts/flanges/valves/seals that have been replaced.
- 4.) When the pressure (read at the front pumping station) reaches the 600-800 mTorr range, turn on the backing pumps.
- 5.) Give the backing pumps about 10 minutes to run before proceeding.
- 6.) Start spinning up the turbos.

IMPORTANT: TURN ON THE LIMITERS FOR THE LARGE TURBOS IN THE BACK!

- 7.) When the turbos are spinning close to 200 Hz, CLOSE THE VALVE TO THE ROUGHING PUMP. Turn off the roughing pump.

NEVER, EVER OPEN THE TURBOS TO THE CHAMBER IF THE ROUGHING PUMP LINE IS STILL OPEN!

- 8.) Override the gate valves on the turbos and let the turbo pumps finish pumping down the

chamber.

- 9.) When the pressure reaches the 10^{-4} Torr range, re-engage the interlocks on the gate valves. After re-engaging the interlocks, turn off the overrides. (This should only take 10-15 minutes).
- 10.) The chamber should reach 10^{-6} Torr range within an hour. If the pressure plateaus in the 10^{-4} 's or 10^{-5} 's, check the tightness of everything that was changed; sometimes things that are bolted tightly at atmosphere can be tightened a little more once the chamber has some vacuum. (Sometimes, if a lot of pieces have been changed or the vent was extended, it may take overnight for the pressure to reach the 10^{-6} 's.)
- 11.) Check the pressure the following day to make sure the chamber has reached the 10^{-7} 's. If the pressure is still in the 10^{-6} 's, there is a leak somewhere.

Example Pump-Down Log (10/10/13)

6:03p—Roughing pump on—750 Torr
6:14p—480 Torr
6:22p—390 Torr
6:28p—330 Torr
6:30p—310 Torr
6:39p—240 Torr
6:41o—230 Torr
10:02p—650 mTorr—backing pumps turned on
10:08p—610 mTorr—turbos spinning up
10:11p—550 mTorr—valve to roughing pump closed, roughing pump off, override gate valves
10:16p—430 mTorr
10:23p—110 mTorr
10:24p—2.4 mTorr
10:25p— 7.4×10^{-5} Torr
10:30p— 2.6×10^{-5} Torr
10:34p— 2.0×10^{-5} Torr
10:39.— 1.5×10^{-5} Torr—interlocks engaged, overrides off
10:45p— 1.2×10^{-5} Torr
10:51p— 1.0×10^{-5} Torr
10:53p— 9.7×10^{-6} Torr
11:00p— 8.0×10^{-6} Torr

Example Pump-Down Log (5/21/14)

1:16p—roughing pump on—750 Torr
1:26p—460 Torr
1:31p—390 Torr
1:42p—300 Torr
2:02p—170 Torr
2:36p—67 Torr
3:06p—26 Torr
3:28 p—12 Torr
3:54p—5.2 Torr
4:20 p—2.0 Torr
4:45p—930 mTorr
5:02p—730 mTorr—backing pumps on
5:12p—620 mTorr—valve to roughing pump closed, roughing pump off, turbos spinning up
5:16p—580 mTorr—override gate valves
5:21p—310 mTorr
5:24p—66 mTorr
5:26p— 6.9×10^{-5} Torr
5:30p— 1.7×10^{-5} Torr—interlocks engaged, overrides off
5:35p— 1.2×10^{-5} Torr
5:38p— 9.8×10^{-6} Torr
5:40p— 8.4×10^{-6} Torr
6:02p— 3.9×10^{-6} Torr