



Yield Engineering Systems (YES) Vapor Priming System



These instructions are intended for reference only, and will *not* replace the thorough training required for proper system operation. Contact a clean room staff member with questions or to report a system problem.

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Overview:

The *YES (Yield Engineering Systems) Vapor Priming System* is used to prepare substrates for optimal photoresist/electron beam resist coating. The instrument de-hydrates surfaces and deposits an ultra-thin coating of hexamethyldisilazane molecules from the vapor phase, which bond strongly to silicon oxide surfaces. The methyl groups in the tail portion of the molecule produce a stable hydrophobic surface that is ideal for uniformly applying photoresist.

1. Enable the tool *YES (HMDS) Oven* in **BADGER**

2. **Check vacuum** in main chamber.

The main chamber gauge should indicate pressure < 10 torr.



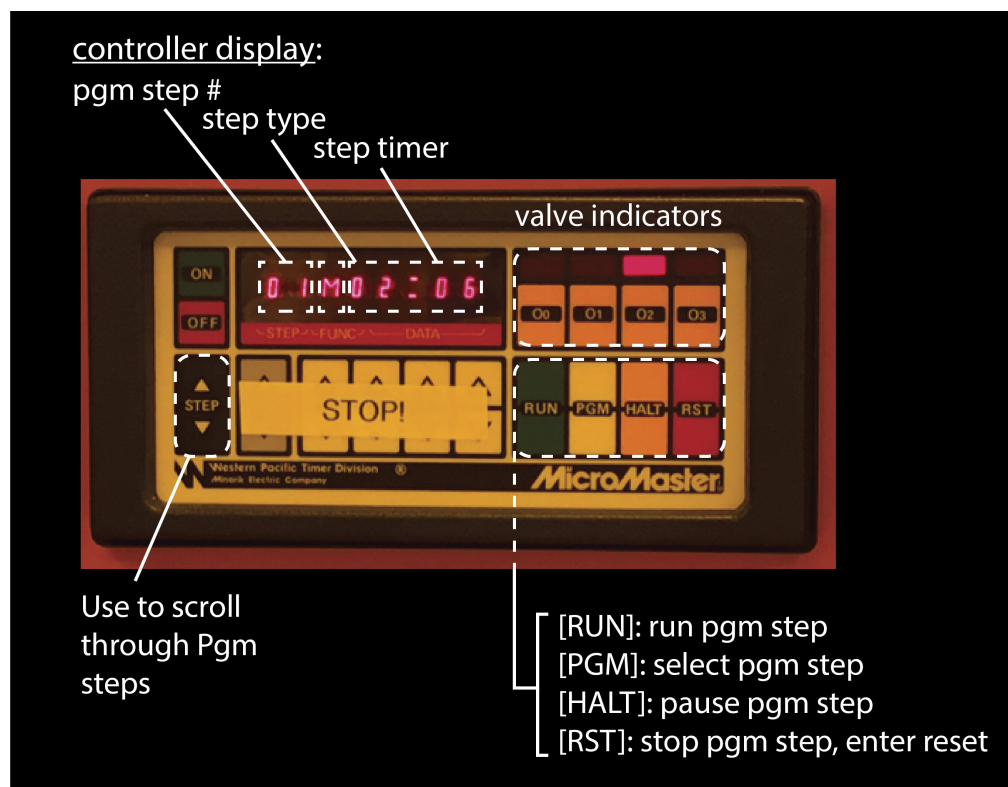
Check the HMDS fill level and vacuum inside the vacuum flask, on the left side of the tool. Pressure inside the flask should be < -85 kPa (-25 in. Hg).

If no HMDS is found in the flask or if the pressure exceeds these guidelines, contact staff.





3. YES Oven Controller operation:



The YES Oven controller performs sequences for chamber pumping, venting, HMDS processing, and HMDS flask filling (staff only).

The following table shows the program and the first step number:

Program name	1 st program step #	Description
Chamber vent	#3	Vents main chamber with N ₂ by opening valve "O1"
Chamber pump	#1	Pumps main chamber by opening vacuum valve "O2"
HMDS prime process	#5	Begins HMDS processing sequence
Chamber and flask pump	Staff-only	Pumps main chamber and vacuum flask by opening vacuum valve "O2" and flask valve "O3"

DO NOT CHANGE PARAMETERS UNDERNEATH DISPLAY!

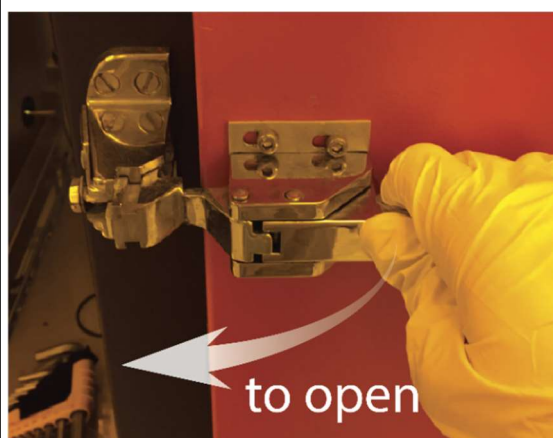


4. Vent the oven using the vent program (Program #3).

- Press [PGM] key
- Use Pgm step selector [STEP] to select **Program #3**
- Press [RUN]

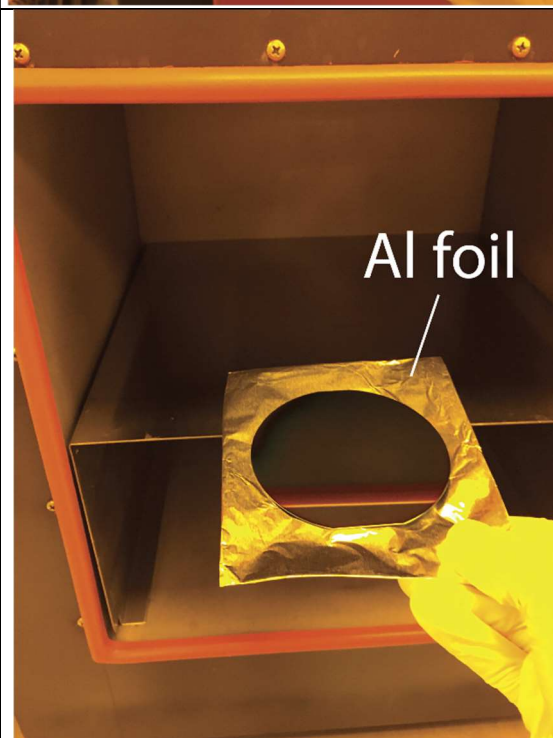
The **O1** valve will open, backfilling the chamber with N_2 . Unlatch the front door to prevent over pressurizing the chamber.

Chamber typically fully vents *before* timer elapses. Door may be opened for loading samples.



5. Load sample:

- Place wafer/samples inside the oven
- Samples may be supported on Aluminum foil, stainless steel or glass/quartz carriers.
- Teflon or other plastic carriers are not allowed.
- HMDS vapor priming is a conformal coating process. Line-of-sight is not required for successful coating.





6. Begin Pre-programmed HMDS process (Program #5):

- If prior vent step timer has not elapsed, press the [RST] key to enter RESET mode.
- Press [PGM] key
- Use Pgm step selector, [STEP], to select **Program #5**
- Press [RUN] – process takes ~ 35 minutes to complete

The following process will now run:

- *Surface dehydration:*
 - Controller perform three cycles of chamber evacuation and N₂ backfill at 155-160°C, thus preparing the surface for reaction with HMDS.
- *HMDS Vaporization:*
 - Once below the HMDS vapor pressure setpoint, the controller pulses open the valve to the HMDS vacuum flask.
 - While open, HMDS vaporizes and molecules fill the chamber in the gas phase.
 - HMDS molecules react with oxide surfaces and form a stable and directional bond.
- *Chamber purge:*
 - Controller pumps the chamber of residual HMDS vapor and performs one cycle of N₂ purge. A final N₂ backfill brings the chamber to atmospheric pressure.

Note: If users would like to change the YES Oven program, please contact staff at cnicleanroom@columbia.edu .



7.	<p>Remove sample from chamber.</p> <ul style="list-style-type: none">• Use caution, as sample will be ~150°C.
8.	<p>Pump down the chamber to leave for the next user (Program #1):</p> <ul style="list-style-type: none">• Close chamber door and latch• If prior vent step timer has not elapsed, press the [RST] key to enter RESET mode.• Press [PGM] key• Use Pgm step selector [STEP] to select Program #1• Press [RUN] and ensure main chamber is pumping down before leaving tool.
9.	<p>BADGER LOGOUT:</p> <ul style="list-style-type: none">• Disable the <i>YES (HMDS) Oven</i> in BADGER when finished.