

# YES 5 Vacuum Oven



## 1.1 Introduction

NUFAB's YES – 5 oven is a vacuum convection oven which can be used to cure polyimide films on only Silicon and quartz/glass substrates in an O<sub>2</sub> and H<sub>2</sub>O free environment. Any other substrate or materials must be approved by the staff before use.

The oven has a single set-point temperature range of 20°C to 300°C. In addition, down to 40 mTorr vacuum is attainable.

Only trained and approved (qualified) users may use this tool.

## 1.2 Features and Specifications:

<b>Temperature range</b>	20°C – 300°C
<b>Temperature Controller</b>	Single set point PID
<b>Atmosphere</b>	vacuum
<b>Maximum Substrate size</b>	400 mm
<b>Resolution</b>	±0.5 °C
<b>Max vacuum</b>	40 mTorr

## 1.3 Applicable Documents

a) Operation manual available at NUFAB's training website

## 1.4 Safety

- a) Do not use any unapproved materials. Only polyimide on silicon, quartz or glass is allowed. Any other materials must be approved by the staff.
- b) Do not open oven panels, high voltages are present.
- c) It is connected to a vacuum pump.
- d) Do not smell or inhale the materials, they might be toxic.
- e) Interior and outer surfaces of the oven are hot during both operation and standby. Use proper protection to avoid scalding.

### 1.4.1 Personal Protective Equipment (PPE) required

Heat resistant gloves, safety glasses.

## 1.5 Operating Procedure

- a) Activate the equipment in FOM.
- b) Turn on the pump by the I/O switch on the pump under the table.  
(Figure 1)
- c) Set the temperature to 260 °C by pressing “\*” and “↑” or “↓” buttons on the temperature controller. (Figure 2)
- d) Wait at least 30 min for temperature to stabilize. This warm up period is required to prevent solvent damage to the pump.
- e) Break the vacuum
  - e. 1) Turn the key to horizontal direction
  - e. 2) Press “RESET” button
  - e. 3) Press “PRG” button on the process controller
  - e. 4) Go to step 10 by using “STEP ↑” or “STEP ↓” buttons
  - e. 5) Press “RUN” button
- f) Load your sample(s)
  - f. 1) Open the chamber door by releasing the latch
  - f. 2) Line the shelf with Al foil
  - f. 3) Place your sample(s) on the shelf
  - f.4) Close the door



Figure 1: Vacuum Pump



Figure 2: Control Panel

g) Running the recipe

- g. 1) Turn the thumbwheel to "1"
- g. 2) Turn the key to vertical position
- g. 3) Press Reset button
- g. 4) Press Start Button and observe the vacuum gauge. (If the needle does not move within 2 minutes inform staff)
- g. 5) The process will take 1h 10m
- g. 6) When finished, it will keep purging with N<sub>2</sub> with a buzzer sound until you press Reset button
- g. 7) Remove your sample(s)

h) Pump the chamber after done. Chamber should be pumped down to avoid moisture.

- h. 1) Turn the thumbwheel to "0"
- h. 2) Press Reset button
- h. 3) Press Start button

i) Set the temperature to 200 °C by pressing "\*" and "↑" or "↓" buttons on the temperature controller

j) Wait at least 30 min

k) Turn off the pump by the ON/OFF switch on the pump

l) Deactivate the equipment in FOM

1.6 Recipe

Step	Command	Output	Explanation	Remarks
1	IF A > 3		IF start button pressed goto step 11	
2	GOTO 1			
3	IF E > 11		IF thumbwheel odd goto step 11	
4	IF C > 30		IF thumbwheel even goto step 30	Start button, thumbwheel configuration check
10	H 99:59	O1	Purge with N2	Purging the chamber
11	L = 0003		set loop counter to 3	
12	S 20:00	O2	Pump for 20 seconds	
13	IF B > 12		IF baratron > 100 bar goto step 12	
14	M 01:00	O1	Purge with N2 for 1 minute	
15	L > 12		IF L is not zero goto step 11, L = L -1	Dehydration pump/purge sequence (3 times)
16	M 01:00	O2	Pump for 1 minute	
17	IF D > 16	O2	IF baratron > 10 bar goto step 16	High vacuum pump down (<10 bar)
18	M 52:00	O2	Process for 52 minutes	Process
19	L = 0002		set loop counter to 2	
20	M 01:15	O1	Purge with N2 for 1 minute 15 seconds	
21	S 20:00	O2	Pump for 20 seconds	
22	IF B > 21		IF baratron > 100 bar goto step 21	
23	L > 20		IF L is not zero goto step 20, L = L -1	After process pump/purge sequence (twice)
24	S 05:00	O1, O0	Purge with N2, sound buzzer for 5 seconds	
25	H 99:59	O1	Purge with N2	Purge
30	M 20:00	O2	Pump for 20 minutes	
31	GOTO 1			Pump and return to initial state