STANDARD MAINTENANCE PROCEDURE - OPTIWET DEVELOPER

Contents

1 PURPOSE

This document explains the preventative maintenance procedure for the OptiWet Developer. It is designed to ensure the safety of lab personnel and the longevity of the tool itself.

2 SCOPE

The procedure applies to those using the OptiWet Developer. It is the responsibility of the technician operating this tool to be familiar with its basic functions, this procedure and all Thinfilm safety rules.

3 SAFETY AND ENVIRONMENT

3.1 POTENTIAL HAZARDS

- Chemical expose Hazard
- Electrical Hazard
- Physical Hazard (Pinch points)

3.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The following Personal Protective Equipment (PPE) is required for this procedure:

- General Clean Room PPE
- Clean Room Gloves
- Safety Glasses
- Chemical Apron
- Face Shield
- Solvent Resist Gloves

3.2.1 PPE MAINTENANCE

- Each operator is responsible for cleaning the PPE that he or she uses.
- Once a week, wipe down both sides of the face shield with an IPA wipe.
- Once a week, wipe down the outside of the apron with cleanroom wipe wetted with DI water.
- Replace the thick green Nitrile gloves once a week. Dispose of these gloves in a hazardous waste container.

3.3 SPECIAL CHEMICAL HANDLING AND STORAGE REQUIREMENTS

- Always transfer AZ 917 MIF Developer in the Fab Chemical cart.
- Empty the Developer bottles and rinse them three times before disposing.
- All solvent should be stored inside the chemical cabinet.
- The day use solvent squeeze bottle should be stored inside the exhaust hood after use.

3.4 SPILLS, ACCIDENTS AND DECONTAMINATION PROCEDURES

- If there are 5 drops on the floor or tables, wipe it up without reporting.
- If there is a 2 -inch diameter spill of material on the floor and table, perform the following steps:
  - Check the pH, and then clean and dispose of the waste in the appropriate waste disposal can.
  - Report it to your supervisor.
- If there is more than a 2 -inch diameter spill of material, perform the following steps:
  - Evacuate immediate area.
  - Report to the Thin Film Incident Command Team.
  - Call 7333 to report.

3.5 WASTE DISPOSAL PROCEDURES

All solvent waste wipes should be disposed of in the solvent waste can (Red).

3.6 SAFETY DATA SHEETS (SDS)

The SDS can be found in the Right to Know Center, located in the copy room. The following SDS are relevant to this procedure:

- Acetone
- AZ 917 MIF Developer
- IPA

3.7 POWER DOWN/POWER UP

3.7.1 POWER DOWN

1. At the system laptop, select Exit (top right) and close the Delfin application. See Figure 1.

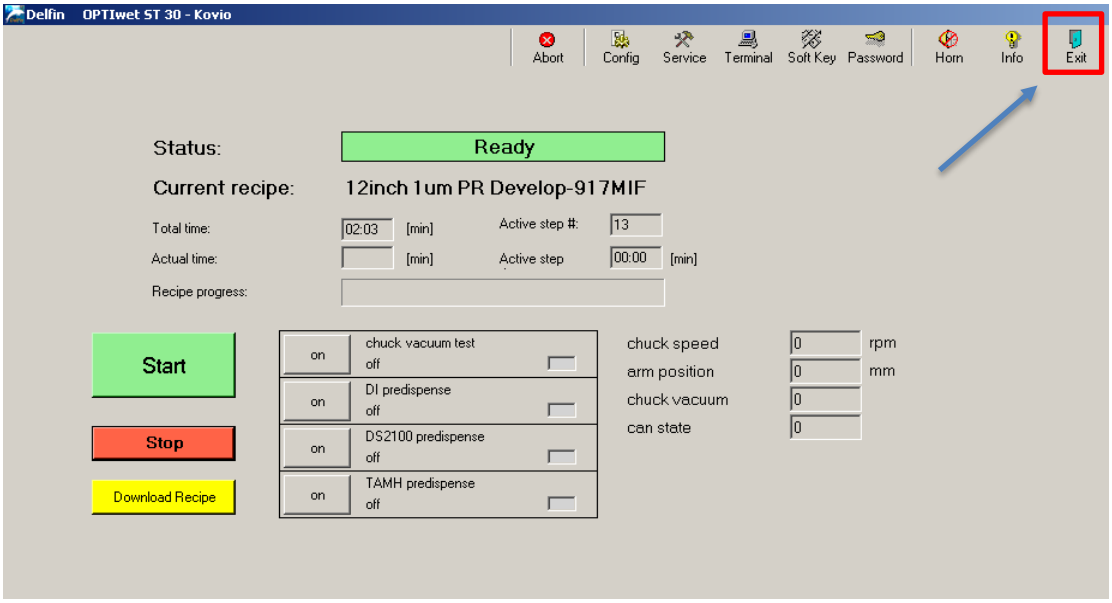

Figure 1: Delfin Application Screen Shot

2. Close the window and shut down the laptop.
3. Open the right side cabinet door.
4. Push the power off button. See Figure 2.
5. Turn off the main power switch. See Figure 2.

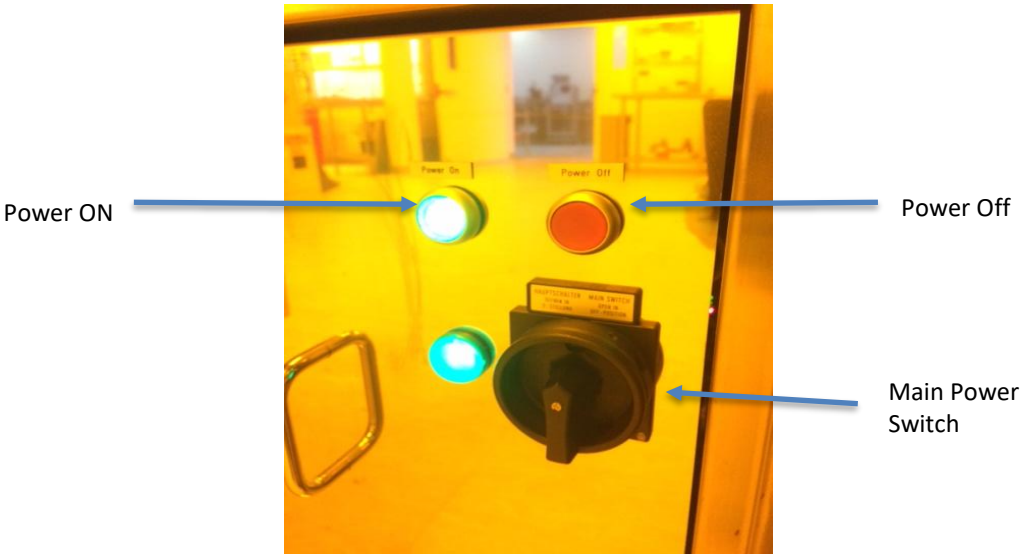

Figure 2: Power Switch Panel

3.7.2 POWER UP

1. Turn on the main power switch. See Figure 2.
2. Push the power on button. See Figure 2.
3. Turn on system laptop.
4. From the system window, click on Delfin Application icon. See Figure 3.

Figure 3: Delfin Application Icon

NOTE: Ensure that the developer door is closed, and that nothing is obstructing dispense arm and chuck.

5. Click the Start button to initiate the system. See Figure 4.

   The dispense arm, cover and chuck will move to the home position

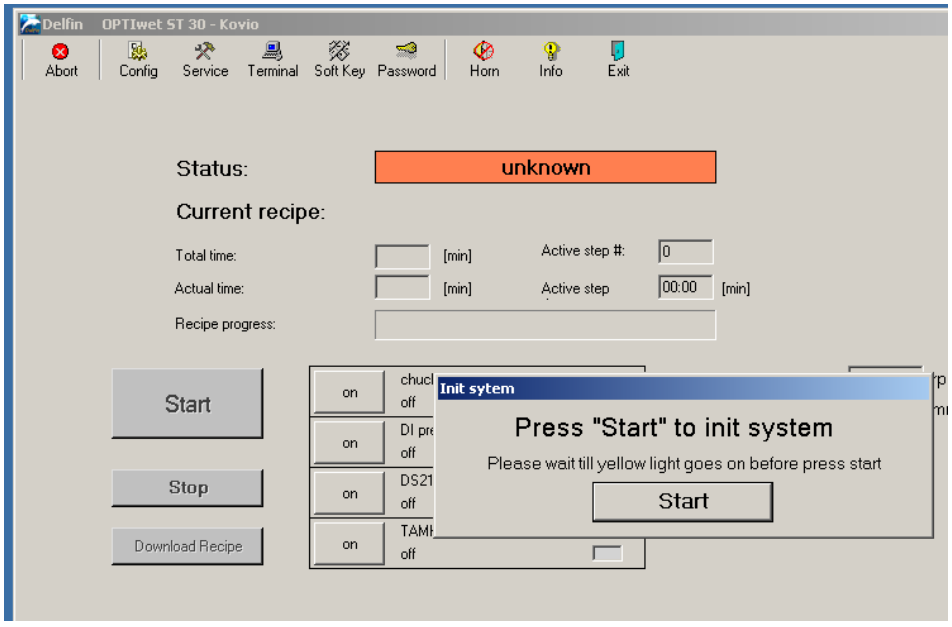

Figure 4: Start Window

The wait status will change from unknown to Ready.

4 APPARATUS MATERIAL AND FORMS

4.1 APPARATUS AND TOOLS

- Metric Allen wrench set
- Screw driver set

4.2 MATERIALS

- Clean room wipes
- Acetone day use squeeze bottle
- IPA day use squeeze bottle

4.3 REQUIRED FORMS AND/OR LOTS

Complete the checklists in the MES system. Those lists are also clarified in this document, and will be used to track any changes in the MES system as well as provide backup data.

4.4 TOOL CONFIGURATION

Facility Connections	**Setting**	**LSL**	**USL**
N2 Pressure	80 PSI	75 PSI	85 PSI
CDA Pressure	90 PSI	85 PSI	95 PSI
DI Water flow	1.75 GPM	1.70 GPM	1.80 GPM
DI Water Pressure	40 PSI	38 PSI	42 PSI
Power Connection	PNL L6 - 15,17,19		
System Settings	**Setting**	**LSL**	**USL**
N2 Pressure	50 PSI	48 PSI	52 PSI
CDA Pressure	85 PSI	80 PSI	90 PSI
Tank N2 Pressure	25 PSI	23 PSI	27 PSI

Tool Configuration Parameters	
Chuck acceleration	20 rpm/s
Arm Home Position	0.0 mm
Arm Velocity	10 mm/sec
Arm Home offset	Neg 11.0 mm
Cover Acceleration	50.0 mm/sec
Arm minimum Position Inside the Process Bowl	160 mm
Arm maximum Position Inside the Process Bowl	530 mm

5 MAINTENANCE SCHEDULE AND CHECKLISTS

NOTE: MES checklists are inserted here as is, and serve as a back-up for the MES system. Please excuse spelling and grammar errors.

5.1 SCHEDULE

- Weekly PM
- Monthly PM
- Developer Fill PM (No MES Checklist). This task is Level 1 PM

5.2 WEEKLY PM CHECKLIST

	Question Type	Order Seq	Chk Item	Type	Domain List	if out range, trigger	Comments
	AnyTime	1	Clean Process Bowl	select	Yes|_No	Put On Hold	
	AnyTime	2	Access door inside cleaned?	select	Yes|_No	Put On Hold	
	AnyTime	3	Nozzle tips cleaned?	select	Yes|_No	Put On Hold	
	AnyTime	4	Wafer chuck and Covered Chuck Lid cleaned?	select	Yes|_No	Put On Hold	
	AnyTime	5	Check/Clean Drip Pan	select	Yes|_No	Put On Hold	
	AnyTime	6	Splash Ring cleaned?	select	Yes|_No	Put On Hold	
	AnyTime	7	Run test sheet and record Flow gauge readinds	select	Yes|_No	Do Nothing	
	AnyTime	8	Record DI water flow gauge reading	double	8|11	Put On Hold	
	AnyTime	9	Record Developer flow gauge Reading	double	4|7	Put On Hold	
	AnyTime	10	Record N2 flow gauge Reading	double	45|55	Put On Hold	

5.3 MONTHLY PM CHECKLIST

	Question Type	Order Seq	Chk Item	Type	Domain List	if out range, trigger	Comments
	AnyTime	1	Clean Media cabinet. Done?	select	Yes|_No	Put On Hold	

	Question Type	Order Seq	Chk Item	Type	Domain List	if out range, trigger	Comments
	AnyTime	2	Verify there are no leaks. Done?	select	Yes|_No	Put On Hold	
	AnyTime	3	Verify that the arm belt can't be roated more than 45 degrees. Done?	select	Yes|_No	Put On Hold	
	AnyTime	4	Record system N2 pressure	double		Put On Hold	
	AnyTime	5	Record system CDA pressure	double		Put On Hold	
	AnyTime	6	Check and adjust Dispense arm centering	input	Yes|_No	Put On Hold	
	AnyTime	7	Check chuck level	input	Yes|-No	Put On Hold	

6 PROCEDURES

6.1 WEEKLY PM

1. Clean the process bowl. To do so, use acetone soaked clean-room wipes to remove resist residue from the Process Bowl. See Figure 5.

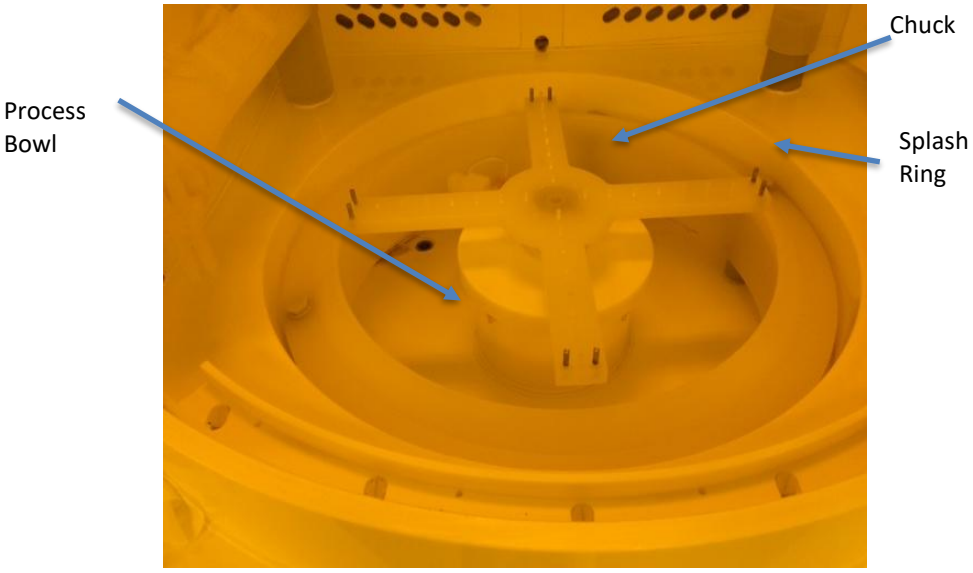

Figure 5: Process Bowl

2. Clean the access door on the inside and outside. See
3. Figure 6.

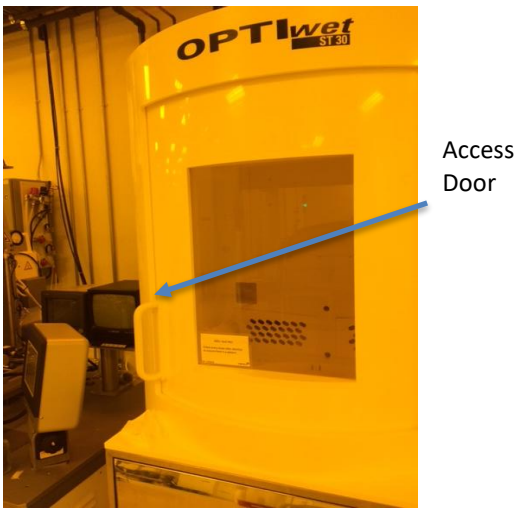

Figure 6: Access Door

4. Clean the dispense nozzle by gently wiping down the dispense nozzles and dispense arm.

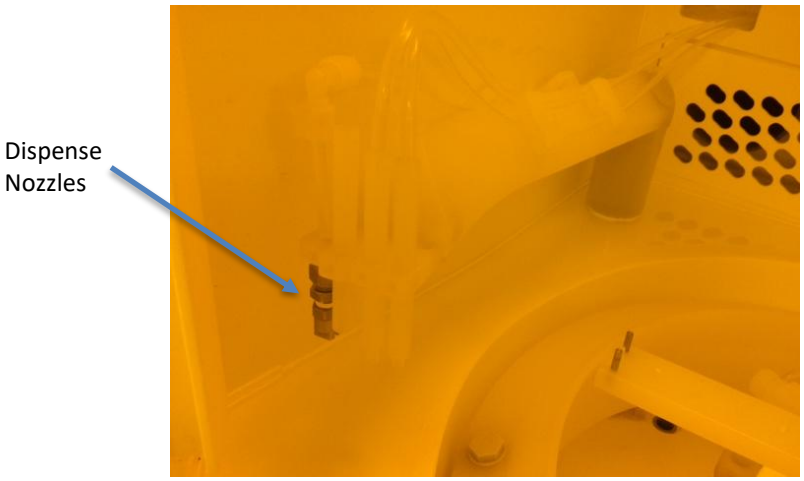

Figure 7: Dispense Nozzles

5. Clean the chuck and cover. See Figure 5.

6. Check and clean the drip pan.
   - Open the bottom cabinet and inspect the drip pan under the system for any liquid residue.
   - If there is any liquid residue, clean it.
   - Inspect for leaks in the chemical or deionized water (DI) water tubing.

7. Check and clean the splash ring. See Figure 5.

8. Run the test plate and record DI water, Developer and Nitrogen flow from the flow gauges. To do so perform the following steps:
   - Load the dummy sheet onto the chuck and close the access door.

- Run the process recipe: 12inch 1um PR Develop-917MIF.
- Open the door next to the access door.

Figure 8: Flow Gauges

- Record the DI water flow in the MES system. Ensure that the DI water flow is at 10 +/- 0.5.
  If flow is out of the range, adjust it and add the comments in the MES system.
- Record the Developer water flow in MES. Ensure that the DI water flow is at 5.25 +/- 0.25.
  If the flow is out of the range, adjust it and add the comments in the MES system.
- Record the Nitrogen flow in the MES system. Ensure that the DI water flow is at 47 +/- 2.
  If the flow is out of the range, adjust it and add the comments in the MES system.

6.2 MONTHLY PM

1. Clean the media cabinet.
   - Open the bottom cabinet doors and clean any wet residue with acetone soaked wipes.
   - Open dispense valves to access the cabinet and clean any wet residue with acetone soaked wipes.
2. Check for any leaks.
   - Inspect all chemical and DI water lines and fittings for any leak.
   - If there is any leak found, repair it.
3. Check the dispense arm belt.
   - Open the bottom cabinet and inspect the dispense arm belt for wear and tightness.
     See Figure 9.

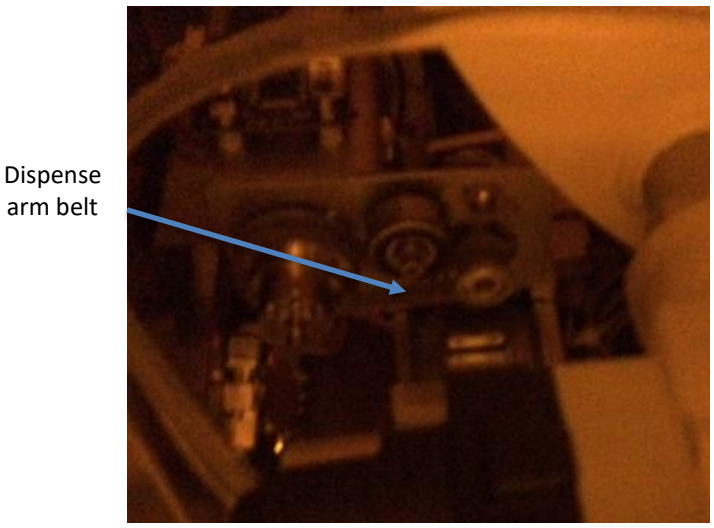

Figure 9: Dispense Arm Belt

4. Record the system N2 pressure.
    - The N2 pressure is set to 50 +/- 2 PSI.
    - If the pressure is not in the range, adjust it and make a note in the MES system.
5. Record system CDA pressure.
    - The CDA pressure is set to 90 +/- 5 PSI.
    - If pressure is not in the range, adjust it and make a note in the MES system.
6. Check and adjust the dispense arm centering.
    - From the top menu, select Service. From the pop-up window, select Analog. See Figure 10.
    - Enter 370.0 at the arm position and then push the Set button. See Figure 10.

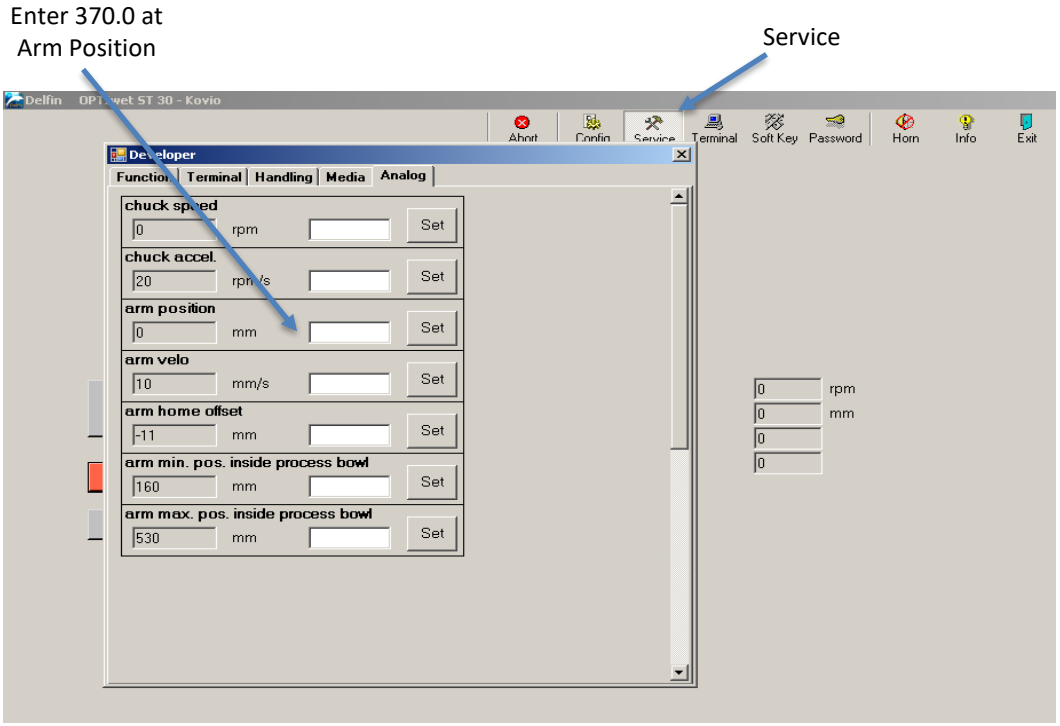

Figure 10 : Analog Page

The dispense arm will move to the center of the chuck.

7. Verify that the developer dispense nozzle is in the center of the chuck.
   - If not, measure how much the mm is off with a foot ruler and record the number.
   - If the arm stops before the center, add the off number to the Arm home offset.
   - If the arm stops after the center, subtract the off number from the Arm home offset.
8. Select Function from the pop-up menu and then select Init so that the arm returns to its home position.
   - Move the arm back to the center and verify that the offset changes are correct.
   - Note the correction number in the MES system.
   - Initiate the system.
9. Check the chuck level. To do so, place the flat 300mm plate on the chuck, and check the chuck level.

   If the level is off, adjust the system legs to level the chuck.

6.3 DEVELOPER FILL PM – LEVEL 1 PM

1. Check the scale display on the wall behind the developer.
2. If the reading is below 30 pounds (lbs), refill the developer.

   NOTE: Use all necessary PPE prior to filling up the developer including the chemical apron, safety glasses, face shield and chemical resistant gloves.
3. Transfer the AZ 917 MIF developer bottle to the OptiWet Developer.

Figure 11: PPE

   - Transfer the AZ 917 MIF Developer bottles from the storage cabinet to the pump chase.
   - Use the Fab chemical cart to transport the AZ 917 MIF Developer bottle as needed from Pump Chase to the OptiWet Developer.
4. Vent the developer canister and open the lid.
   - Turn the valve to the vent position.
   - Rotate the valve until red dot on the valve is at vent position. See Figure 12.
   - Use the T-bar to open canister lid.

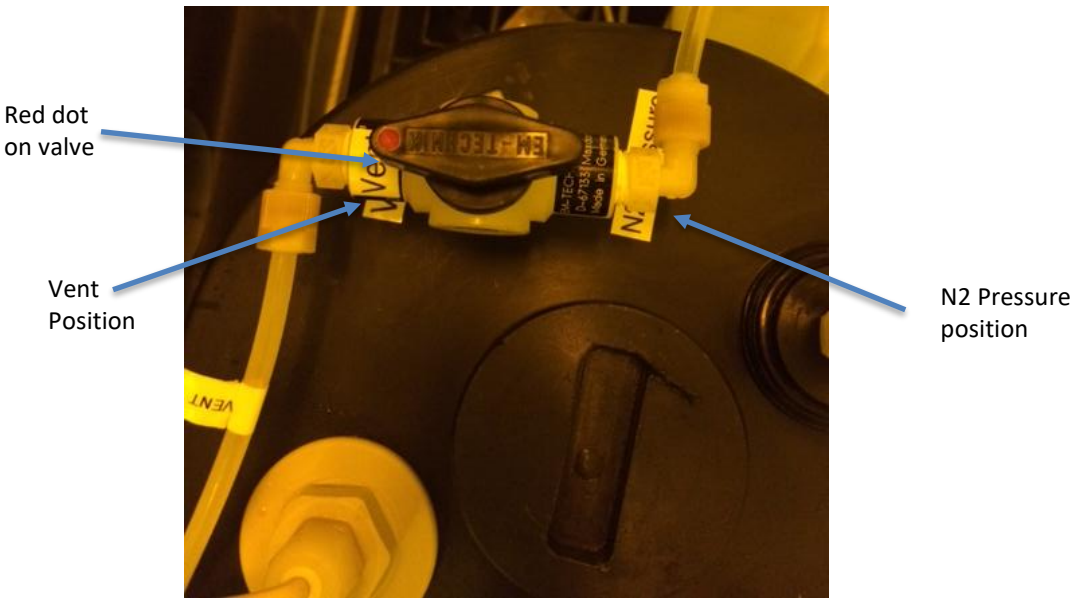

Figure 12: Developer Canister

5. Fill up the developer.

   NOTE: Do not fill developer more than 45 pounds (lbs) to avoid any spillage.

   - Prior to pouring the developer, verify that the bottle label is correct - one more time.
   - Use the funnel to pour the developer into the canister.
   - Carefully pour the developer into the canister and at the same time watch the scale to display.
   - Fill up the canister to 45 pounds and no more than that.
   - Close the lid. Do not overtighten the lid.

6. Pressurize the canister.

   - Rotate the valve 180 degrees, so the red dot on the valve is at N2 pressure position.
   - Ensure that there is no leak at canister lid.
   - If there is any leak, immediately vent the canister and ensure that the lid is completely closed.

7. Discard the bottle.

   - If there is any developer left in the bottle, leave the bottle next to the canister on the secondary container for next refill.
   - Place the empty bottle in to the fab chemical cart and transfer it to the wet bench area.
   - Triple rinse all empty bottles and mark 3x on the bottles prior to discard.

6.4 TROUBLESHOOTING

For troubleshooting, see the instructions at T:\Manufacturing\SPC\FMEA.

REFERENCE DOCUMENTS

Document ID	Comment
No references	

7 TERMINOLOGY

Term	Description
No Terms	

8 DOCUMENT REVISION HISTORY

Revision	Changes made by	Description of change
0.1	Original	Changes will be documented after first version is approved.
1.0		