

SPIN RINSE DRYER (SRD)



STANDARD OPERATING PROCEDURE (SOPs) 2021 (v.1)



NCPRE FABRICATION LAB

CONTACT: SO: Sreejith KP
sreejithanni@ee.iitb.ac.in,
9930837262,

Co So: SandeepK
sandeeo.kumbhar@gmail.com
9969347860

TABLE OF CONTENTS

INTRODUCTION	2
EQUIPMENT CONFIGURATION	2
Instrument Provider	2
Technical Details	2
Processing Fluid Requirements	3
Samples allowed	3
TRAINING PROCEDURE	3
INSTALLED SYSTEM	4
SAFETY PRECAUTIONS	5
CLEANING METHOD	5
OPERATING THEORY	6
STANDARD OPERATING PROCEDURE	8
Section 1.1: Before starting the process	8
Section 1.2: Starting the process	8
Section 1.3: Recipe making	10
Section 1.4: Turn OFF procedure	11
ERRORS TO BE OCCURED	12
List of the errors	12

Introduction:

SPIN RINSE DRYER (SRD)

The Trident™ single bench Spin Rinse Dryers (SRDs) from ClassOne Technology provides state-of-the-art cleaning, rinsing, and drying of wafers after wet processing, for chemical or residue removal without leaving water spots or films. This tool features the capability of spraying Deionized Water (DIW), non-contact N₂ heating followed by N₂ drying to a process chamber that allows the user to rotate their substrates at various speeds to rinse and dry their substrates.

Equipment Configuration:

Instrument Provider:

Manufacturer:

ClassOne Technology,
109 Cooperative Way #10,
Kalispell, MT 59901. USA
Phone (406) 407-7814
Fax (770) 808-8308
www.ClassOne.com

Local Support:

Global Marketing Services
263, 3rd Main, ISRO Layout,
Bangalore – 560078. INDIA
Phone: 91 80 26665684/5 Ext 11
Fax: 91 80 26663255
Email: customersupport@gms-india.com

Technical Details:

Model: 2088,
Sr.no.: SRD- 1088
Electricals: 200-240 VAC, 50/60HZ, 15 Amps
1 Phase- 3 wire (L1, Neutral, Ground)

Processing Fluid Requirements:

DI Water: Tubing Size: 3/8" OD Poly or TFE

Flow: GPM: 1.0 - 2.0

Pressure: 15 – 30 PSIG

Nitrogen: Tubing Size: 1/4" OD Poly or TFE

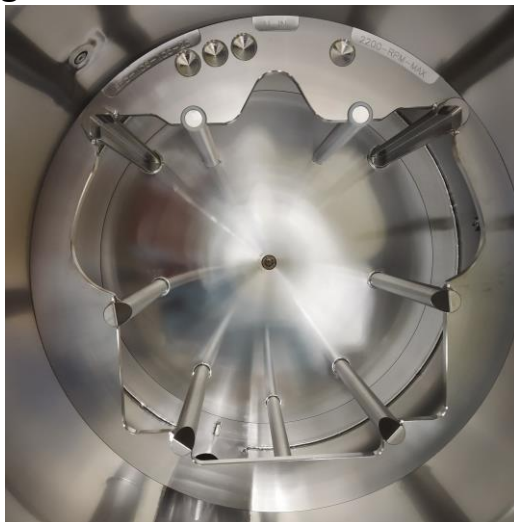
Flow: 2 – 3 CFM; Pressure: 30 – 40 PSIG

CDA: Tubing Size: 1/4" OD Poly or TFE

Pressure: 50 – 60 PSIG

Samples allowed:

5" and 6" Square and Pseudo square wafers as we have only 5" and 6" bowls. As shown in fig.



Training Procedure:

- 1) User must have to receive training from SO/ an Authorized user.
- 2) Three training sessions and one hands-on session for authorization on the tool.

Note:

User must go through the Manual of the SRD thoroughly while having the training.

Installed System



Front View



Back view

SAFETY PRECAUTIONS

Safety Symbols:

		
Electric shock hazard	Bowls are heavy	Hot surface

! *CAUTION: Before removing a side cover always make sure that the equipment is switched off*

WARNING:

- DO NOT APPLY IPA TO THE FRONT ACRYLIC DOOR OR WINDOW. IPA WILL SPIDER-CRACK THE SURFACE OF THE DOOR.
- DO NOT SCOTCHBRITE INTERIOR ELECTROPOLISHED FINISH OF THE BOWL!
- ROTOR IS PRECISION BALANCED. NEVER RUN THE ROTOR WITHOUT A CASSETTE. OBSERVE THE LABEL ON THE ROTOR FOR SPECIFIC CASSETTE SIZE, ORIENTATION (H-BAR IN) AND LOAD REQUIREMENTS.

CLEANING METHOD

- Cleaning procedures should be done only with using dry lint-free cloth.
- Follow the recommended procedure of the Bowl cleaning from Manual.

Operation theory (SRD)

RINSE STEP:

The rinse step is the step that allows enough DI water to flow across the substrates surface to remove any particulates or contaminants from previous chemical steps. Generally the time of this step is dictated by the size of the substrate, but normally the rinse step should be set at 60 seconds at 500 RPM. It is within this range of revolution that you can actually clock the wafers inside the cassette to provide a complete 360 degree cleaning of the product.

PURGE STEP:

The purge step is the step that allows the water to be blown out of the DI manifold. This is very important, so that there is no residual water left in the manifold to drip out during the Dry Step. Time on this step is based solely on the amount of time required to evacuate all the water from the internal DI line and the Rinse manifold. Generally 5 – 10 seconds is plenty of time to achieve this and it can be double checked by observing the DI line when the purge starts and timing how long it takes. In regards to the speed, there is no real magic behind this number, except you would want to utilize this step to ramp up to the speed of the next step, of which I would set the speed at 2000 RPM and will be explained in the next paragraph.

DRY #1 STEP:

This step is very important, not in just drying, but in improving yield results of your product down the line. It is within this step, that we are using the revolving centrifugal force to sling as much water off of the substrates as possible, but unfortunately under the forces of gravity there will always be a droplet of water left within the center of the substrate. It is this droplet of water that we must quickly remove to prevent staining or hazing of the center area, due to the droplet drying. The only way to remove this droplet of water is to drop the speed of the revolution in a short enough time span to allow the droplet to run off of the edge of the substrate and fall off. It is here that the amount of time within this step plays the most important part... depending on substrate size, of which you want to minimize this step to get the bulk of the water off of the

substrate but not too long to possibly cause problems with the center droplet. Generally this time is between 60 – 120 seconds in length, with 60 seconds for smaller diameter substrates under 125 mm (5”) and 120 seconds for 150-200 mm (6 – 8”) diameter. During this step it has been found that the best speed to run is anywhere between 1800 – 2000 RPM (1800 for 200mm substrates). It was a misconception in the years past to run the dry speed up to 2800 RPM (the faster the better), however particle studies have shown that any speed over 2000 RPM is detrimental and creates more particulates than less.

DRY #2 STEP:

This is the “drying” step. It is within this step, that the bulk of the water is off of the substrate and the center droplet of water has aggressively moved and fallen off of the edge of the substrate. It is within this step that the bowl environment will become warm from the use of bowl heaters and N2 heaters to evaporate any remaining droplets caught within the cassette and on the bowl surface. The time on this step can vary according to personal preferences, but generally no longer than 240 seconds is needed to achieve this state of dryness. In regards to the speed, you need to lower the speed below the speed of Dry #1 Step in order to move the droplet of water from the center of the substrate and as a rule of thumb; we generally set this speed to be 100 RPM over the Rinse speed, thus being at 600 RPM.

In summary, to achieve the best performance out of your SRD, the following program should be instituted:

STEP #1	Rinse	60 seconds	500 RPM
STEP #2	Purge	10 seconds	2000 RPM
STEP #3	Dry #1	120 seconds	2000 RPM
STEP #4	Dry #2	240 seconds	600 RPM

STANDARD OPERATIONAL PROCEDURE

The recipe creation and editing is accomplished through the touch screen capability of the front display, allowing the user to input up to four recipe steps (with an optional pre-step) and to create up to 30 recipes that is stored on board.

Section 1.1: Before starting the process:

1. Book the slot
2. Ask facility person to turn ON the PN2 cylinder
3. Verify that the main power is connected and ON
4. Verify that the PN2, DI, CDA pressures are set as per recommendations.
5. Visually check all tubing connections for leaks.
6. Turn the tool main breaker ON (back side of the tool).
7. Turn the controller Power Switch ON (available at front and back side of the tool).
8. Wait for some time to get the screen ON (Operator Control Panel).
9. The Green Signal will blow means system is ready to use.
10. Press the Start Switch on the Operator Control Panel.

Section 1.2: Starting the process

Fig. 1.2.1



Fig. 1.2.2





Fig. 1.2.3

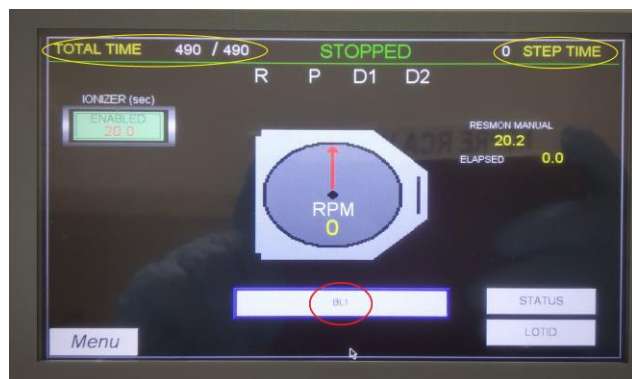
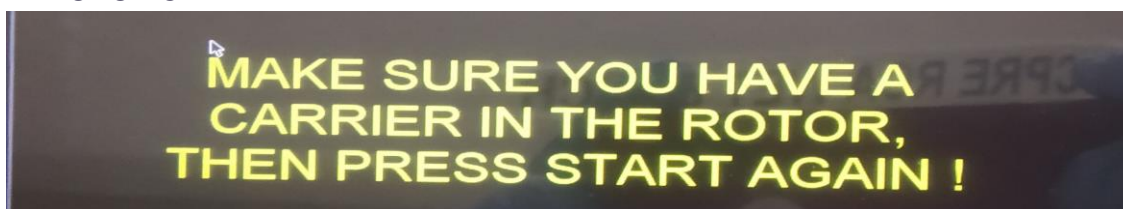


Fig. 1.2.4

1. Once the screen is ON follow the following steps to create the recipe.
2. Press **“PASSWORD”** (Fig. 1.2.1)
3. CLICK on **“ADMIN”** and put the password as **‘2222’** and press enter **‘E’** and **‘Exit’**. (Fig. 1.2.2)
4. Click on **‘LOCALS’** and **‘EXIT’**. It will direct you the main operating screen as follows. (Fig. 1.2.3)
5. By default it will load last run recipe. (Fig. 1.2.4)
 - Recipe name: say BL1
 - Total time: total process time of loaded recipe.
 - STEP time: remaining process time of ongoing recipe.
6. To continue with same loaded recipe connect the Foot switch and open the door of the SRD by pressing it.
7. Insert/ load the wafer carrier into the rotor.
8. Make sure the DI water is ON just before running the process.
9. Press the Start Switch on the Operator Control Panel.
10. Press Start Switch and release, on screen you will get message as follows:



11. After confirming, press the start switch again to RUN the recipe.
12. It will lock the door and process initiates.
13. Once the process is over the system will buzzer the beep alarm. Press **SILENCE** switch to mute the alarm.

14. Press the Foot switch to open the door and unload the carrier carefully.
15. Close the door with peddle switch if you are done with your process.
16. Please contact the SO in case of any issue.

Note:

1. Switch OFF the DI water once RINSE step is over.
2. Please do not leave the place till the process gets over.
3. If system stops working/ malfunctioning while running the recipe please press the STOP switch on the panel. Fig

Section 1.3: Recipe making

Fig.1.3.1

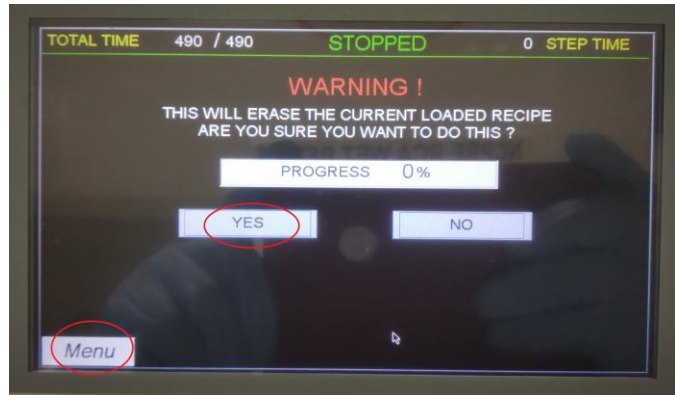


Fig.1.3.2



Fig.1.3.3

Fig.1.3.4



1. Go to 'MENU' on the Operating screen and select 'Recipe' option. It will direct you to following screen (fig.1.3.2)
2. This shows you the current loaded recipe.

3. To make a new recipe click on arrow sign as shown in (fig.1.3.2)
4. Press the **forward Green arrow** to go to a new recipe page. (fig.1.3.3)
5. Put the values accordingly in the steps mentioned. (fig.1.3.3)
6. Once all necessary changes done give the name to the recipe and it will save automatically.
7. Click on the '**Load Recipe**' it will direct you to following window (fig.1.3.4)
8. Click on '**YES**' it will erase old recipe and will download the new recipe. (fig.1.3.4)
9. Click on **MENU > MAIN**. You will go to the Operating Screen.
10. System is ready to RUN.

Section 1.4: Turn OFF procedure

1. Once the process is over, take out the samples and close the door.
2. Switch off the breaker from back side of the tool.
3. Remove the Foot switch and keep it safe.
4. Turn off CDA and N2.
5. Turn OFF the mains.
6. Make a log entry.

Errors to be occurred

While running the process if any listed error occurs will be displayed on the control panel and Red light indicator will blow.

How to clear the errors on the control panel:

MENU > ERRORS > RESET > MENU> MAIN....

List of the errors:

1. N2 Pressure Low

When a N2 failure occurs after 5 Seconds, the process will abort and the N2 Pressure Error will occur in the Alarm Screen. The N2 error can be cleared by increasing the N2 Pressure and then pressing the STOP switch. This alarm is only activated during the Purge and Dry Steps.

2. Door not Closed

When the door is not fully closed the process will not start. And a “Door Not Closed” Error will occur in the Alarm Screen. Close the door completely to start the process.

3. N2 Heat Error

When the heater temperature does not reach a pre-set temperature determined by the auxiliary thermal snap switch within a certain timeframe incorporated in the PLC program, the process will abort and the N2 Heat Error will occur in the Alarm Screen. The N2 Heat Error can be cleared by correcting the heater problem and pressing the Stop Switch to reset the error.

4. Low DI water Flow

If the DI flow is not adequate within five seconds, the process is aborted and a Low DI Flow Error will occur in the Alarm Screen. The Low DI Flow error can be cleared by increasing the flow of DI and pressing the STOP Switch.

5. Bowl Heat Error

When the bowl temperature does not reach a pre-set temperature determined by the auxiliary thermal snap switch within a certain timeframe incorporated in the PLC program, the process will abort and the Bowl Heat

Error will occur in the Alarm Screen. The Bowl Heat Error can be cleared by correcting the heater problem and pressing the Stop Switch to reset the error.