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Operators Manual

Spin Chucks

Cost Effective Equipment

Contents

1. Introduction

1.1. Confidentiality Statement

Information supplied is for the use in the operation and/or maintenance of Cee® equipment.
Neither this document nor the information it contains shall be disclosed to others for manufacturing or any other purpose without written authorization from, Cost Effective Equipment, LLC.

1.2. Types of Spin Chucks

- **Circular Vacuum -** For coating/developing/cleaning standard wafers and pieces
- **Recessed -** For coating rectangular substrates
- **Captive -** For developing/cleaning substrates
- **Porous -** For coating/developing/cleaning thin substrates (<250µm)
- **Film Frame -** For developing/cleaning substrates mounted on film frame
- **Custom -** Perimeter vacuum, non-vacuum, multi-substrate

2. Circular Spin Chuck Use

Circular spin chucks are used for processing standard wafers and pieces. With standard-thickness (275-750µm) substrates that are centered properly, a maximum spin speed and acceleration range of 3,000 to 6,000 rpm is recommended. As substrate size increases, the use of a centering device, and/or verification of optimal centering of the substrate, becomes increasingly critical. As thickness increases, the maximum speed and acceleration must be decreased for safe operation. Non-standard substrates and/or processes may require a use of a custom spin chuck.

2.1. Choosing a Chuck for the Substrate

Standard circular vacuum chucks are capable of processing substrates with a diameter up to twice the spin chuck diameter. For example, a 4 inch chuck would be recommended for substrate sizes 5 inches (125mm) up to 8 inches (200mm) in diameter.

Cee® Recommended Sizes for Width of Substrates

Physical Chuck Diameter	Recommended Substrate Size Range
1/8” (0.125”) External O-Ring	3mm-9.5mm/0.125”-0.375”
5/16” (0.312”) External O-Ring	9mm-26mm/0.375”-1.0”
0.75” Circular Vacuum*	25mm-38mm/1.0”-1.50”
1.0” Circular Vacuum*	32mm-50mm/1.25”-2.0”
1.5” Circular Vacuum*	45mm-77mm/2.0”-3.0”
2.25” Circular Vacuum	77mm-127mm/3.0”-5.0”
4.0” Circular Vacuum	125mm-200mm/5.0”-8.0”
6.188” Circular Vacuum	200mm-300mm/8.0”-12.0”

*Compatible with optional external O-ring

2.2. Spin Chuck Removal and Installation

1. If equipped, locate the spin chuck screw (located in the center of vacuum chuck) and remove with a hex key wrench. If the chuck has a porous insert, locate the push pins on the back side of the chuck and use to lift the insert out to access screw.
2. Grasp the spin chuck and gently pull straight up to remove.
3. Place the new spin chuck onto the spin coater shaft and ensure that the spindle pin/key aligns with chuck slot.
4. Use a hex key wrench to secure spin chuck screw in the center of new chuck.

2.3. Substrate Placement and Removal

1. Place the wafer onto the chuck surface.
2. Center the substrate onto the chuck.
3. Start the recipe and follow the on-screen centering step instructions.
4. Once the process is complete, the vacuum automatically turns off and the substrate can be removed.

3. Recessed Spin Chucks

3.1. Choosing a Chuck for the Substrate

Recessed chucks center the substrate when placed correctly placed in the recess and therefore do not require a centering device. Each recessed chuck is designed for specific substrates. Using a substrate that the chuck is ***NOT*** designed for can cause poor coating results, damage to the chuck/equipment, or may cause personal harm.

3.2. Spin Chuck Removal and Installation

1. If equipped, locate the spin chuck screw (located in the center of chuck) and remove with the provided hex key wrench.
2. Grasp the spin chuck and pull up to remove vertically.
3. Place new spin chucks in the same orientation as the old and ensure that the spindle pin/key aligns with chuck slot.
4. Use a hex key wrench to secure spin chuck screw in the center of new chuck.

3.3. Substrate Placement and Removal

1. Place the wafer onto the chuck surface. The recessed section will automatically center the wafer.
2. Start the recipe and follow the on-screen instructions.
3. Once the process is complete, the vacuum automatically turns off and the substrate can be removed. Finger holes are provided to assist in removing the substrate from the recessed area.

4. Captive Spin Chucks

4.1. Choosing a Chuck for the Substrate

Captive chucks center the substrate when placed correctly placed in the captive arms and therefore do not require a centering device. Each captive chuck is designed for specific substrates. Using a substrate that the chuck is ***NOT*** designed for can cause poor results, damage to the chuck/equipment, or may cause personal harm.

4.2. Spin Chuck Removal and Installation

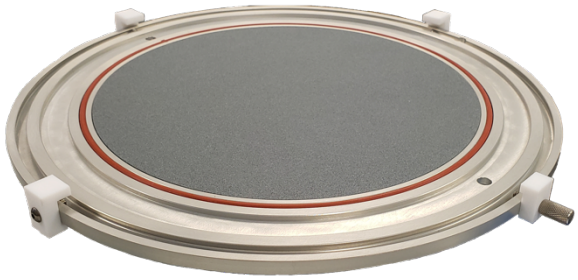
1. If equipped, locate the spin chuck screw (located in the center of chuck) and remove with the provided hex key wrench.
2. Grasp the spin chuck and pull up to remove vertically.
3. Place new spin chucks in the same orientation as the old and ensure that the spindle pin/key aligns with chuck slot.
4. Use a hex key wrench to secure spin chuck screw in the center of new chuck.

4.3. Substrate Placement and Removal

1. Place the wafer onto the chuck surface. The centering arms will automatically center the wafer.
2. Start the recipe and follow the on-screen instructions.
3. Once the process is complete, the vacuum automatically turns off and the substrate can be removed.

5. Film Frame Spin Chucks

Mechanical clamps and a porous insert are combined for spin coating or cleaning thinned substrates that have been taped to film frames. The porous insert ensures complete and uniform backside support while diffusing the vacuum source. This component utilizes both vacuum O-rings and mechanical clamps for securing the outer film frame to the chuck assembly.



5.1. Choosing a Chuck for the Substrate

Film frame chucks are designed specifically for individual substrates and film frames unless otherwise specified. Using a substrate that the chuck is ***NOT*** designed for can cause poor results, damage to the chuck/equipment, or may cause personal harm.

5.2. Spin Chuck Removal and Installation

1. To remove the porous insert, locate the two push pins on the backside of the wafer. Push up on these to lift the ceramic for removal.
2. Locate the spin chuck screw (located in the center of vacuum chuck) and remove with a hex key wrench.
3. Grasp the spin chuck and pull up to remove vertically.
4. Place new spin chucks in the same orientation as old and ensure that the spindle pin/key aligns with chuck slot.
5. Use a hex key wrench to secure spin chuck screw in the center of new chuck.
6. Gently lower the porous insert back into the chuck.

5.3. Substrate Placement and Removal

1. If equipped, loosen the thumbscrew to rotate the mechanical clamp down.
2. Place the film frame with wafer onto the chuck surface and into the mechanical clamps. When placed correctly the mechanical clamps will center the substrate.
3. If equipped, rotate the mechanical clamp upwards and tighten the thumbscrew to secure the film frame.
4. Start the recipe and follow the on-screen instructions.
5. Once the process is complete, the vacuum automatically turns off.
6. If equipped, loosen the thumbscrew and rotate the mechanical clamp downward. The film frame and substrate can then be removed.

6. Porous Chucks

Utilized for thinned substrates and foils, these spin chucks are constructed of a porous insert inside a recessed chuck cavity.

6.1. Choosing a Chuck for the Substrate

Porous chucks are designed specifically for individual substrates unless specified. Using a substrate that the chuck is ***NOT*** designed for can cause poor results, damage to the chuck/equipment, or may cause personal harm.

6.2. Spin Chuck Removal and Installation

1. Remove the porous insert based on type of design.
   a. **Chucks with push pins:** Locate the two push pins on the backside of the wafer. Push up on these to lift the ceramic for removal.
   b. **Chucks without push pins:** Screwdriver slots will be visible on the outside perimeter of the ceramic. Use these to lift the ceramic piece out.
   c. **Chucks with permanent insert:** Chucks 2 inches in diameter and less have a permanent insert. Go directly to step 3.
2. Locate the spin chuck screw (located in the center of vacuum chuck) and remove with a hex key wrench.
3. Grasp the spin chuck and pull up to remove vertically.
4. Place new spin chucks in the same orientation as old and ensure that the spindle pin/key aligns with chuck slot.
5. If equipped, use a hex key wrench to secure spin chuck screw in the center of new chuck.
6. If removed, gently lower the porous insert back into the chuck.

6.3. Substrate Placement and Removal

1. Place the wafer onto the chuck surface.
2. Center the substrate onto the chuck ensuring that the entire porous surface is covered by the substrate.
3. Start the recipe and follow the on-screen instructions.
4. Once the process is complete, the vacuum automatically turns off and the substrate can be removed.

7. Preventative Maintenance

This maintenance manual provides recommended guidelines for maintaining a Cee® spin chuck.

Maintenance Section	Maintenance Schedule
Safety Checks	Before daily tool use
Cleaning	After daily tool use
Mechanical Checklist	See Section Below Details

7.1. Safety Checks

Inspect spin chuck lid for the following defects:

(a) Loose assemblies
(b) Damage to the surface
(c) Dirty surface

7.2. Mechanical Checklist

1. **Spin chuck cleanliness:** If any material has built up on the spin chuck, it can be wiped clean with most organic solvents such as isopropyl alcohol or acetone. For major buildup of material a glass slide can be used to gently scrape the material away. Follow by wiping clean. A dirty spin chuck could cause vacuum errors. See section below on detailed cleaning instructions.
   Frequency - Daily

2. **Spin chuck flatness:** A non-uniform spin chuck can cause vacuum errors. Inspect visually against a straight edge. Small uniformity issues such as a burr can be gently removed with a glass slide. Larger deformations can be removed with fine sandpaper. Contact Cee Customer Support if the above methods are not successful.
   Frequency - Quarterly

7.3. Cleaning

When cleaning the spin chuck, remove it from the equipment to keep solvent from getting into the spin coater vacuum system. It is good practice to use the mildest solvent possible such as acetone or isopropyl alcohol. ***Do not use caustic acids or bases.***

8. Precautions

8.1. Chuck Placement

Align the chuck so that the spindle key engages with the slot of the chuck and slide the chuck onto slide the spindle shaft. If there is resistance, the chuck slot has not been properly aligned with the key. Improper alignment may result in a damaged spindle and vacuum faults.

8.2. Substrate Placement

Ensure placement of the substrate covers all vacuum surfaces. Failure to do so may result in damage to the chuck, equipment, and substrate.

8.3. Maximum Spin Speed and Acceleration

Maximum spin speed and acceleration vary based on weight and size of substrates and chucks. Though the equipment may support higher speeds and acceleration, using higher than the recommended speeds can cause poor results, damage to the chuck/equipment, or may cause personal harm. For more information see the technical document linked below or contact Cee Customer Support.

https://www.costeffectiveequipment.com/service-support/technical-resources/selecting-maximum-speed/