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Cee® Apogee® Bake Plate Accessories Manual

Cost Effective Equipment

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1 Introduction

1.1 Confidentiality Statement

Information supplied is for 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 Warranty

Cost Effective Equipment, LLC warrants to the original purchaser (Buyer) that equipment is free from defects in material and workmanship under normal use and service in accordance with Cee® instructions and specifications. Buyer shall promptly notify Cee® of any claim against this warranty, and any item to be returned to Cee® shall be sent with transportation charges prepaid by Buyer, clearly marked with a Return Material Authorization (RMA) number obtained from Cee® Customer Support. Cee®'s obligation under this warranty is limited to the repair or replacement, at Cee®'s option, of any equipment, component, or part determined by Cee® to be defective in material or workmanship. This obligation shall expire one (1) year after the initial shipment of the equipment from Cee®. This warranty shall be void if:

- Any failure is due to misuse, neglect, improper installation, or accident involving the equipment.
- Any major repairs or alterations are made to the equipment by anyone other than a duly authorized representative of Cee®. Representatives of Buyer will be authorized to make repairs to the equipment without voiding the warranty upon completion of the Cee® training program.
- Replacement parts are used other than those made or recommended by Cee®.

CEE® MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO EQUIPMENT. NO WARRANTY IS MADE AS TO THE MERCHANTABILITY OF THE EQUIPMENT NOR ITS FITNESS FOR ANY PARTICULAR PURPOSE. In no event shall Cee® be liable for consequential loss or damages, however caused. No person or representative of Cee® is authorized to assume for Cee® any liability in connection with equipment or to make any change to this warranty unless such change or modification is put in writing and approved in writing by an authorized representative of Cee®.

This warranty shall be governed by the laws of the state of Missouri, U.S.A.

1.3 Returned Materials

Any materials, parts, or equipment returned to Cost Effective Equipment, LLC must be clearly labeled with a Return Material Authorization (RMA) number. Obtain an RMA from Cee® Customer Support before shipping material.

To obtain an RMA number, contact:

Cee® Customer Support
Telephone ..... +1-573-466-4300
Email ..... *support@costeffectiveequipment.com*
Web Address ..... *www.costeffectiveequipment.com*
Physical Address ..... 6 Industrial Drive; St. James, Missouri 65559

1.4 Model and Revisions

The model and serial number for the Cee® Apogee® Bake Plate are located on the rear panel. Software version information can be found on the About screen. Refer to the DataStream™ Manual for screenshots and a detailed explanation of system software. This accessory manual supplements, and does not replace, the applicable Bake Plate Operations Manual.

1.5 Environmental Considerations

Cee® supports sustainability through durable, serviceable tool designs. Modular components are engineered for maintenance and long-term operation. Process efficiency and material consumption depend on the equipment configuration and the user's application.

Cee® evaluates suppliers and uses recycled materials in components where practical and appropriate for the intended application.

Equipment materials and facility utilities should be reviewed for environmental compliance. Process gases, chemicals, solvents, and wastes used by the customer are subject to the customer's facility controls and applicable regulations.

1.6 General Safety Hazards / Precautions

Read this manual and the applicable Bake Plate Operations Manual before operating, installing, cleaning, or servicing the equipment.

The equipment is heavy. Use appropriate lifting practices and follow facility handling procedures. Observe all warning labels on the equipment.

Sound pressure measurements at 3 ft (0.9 m) from the Cee® Apogee® Bake Plate are listed below. These values are for the measured configuration and may vary with installed accessories and facility conditions:

Standby mode ..... 40 dB(A)

Normal operation..... 40 dB(A)

1.7 Electrical

Hazardous voltage may be present. Disconnect and isolate the electrical supply before servicing. Confirm the equipment is de-energized using facility-approved procedures.

Stored electrical energy may remain after disconnection. Allow sufficient time for discharge and follow the approved service procedure. This equipment must be connected to a properly grounded supply.

1.8 Mechanical

Certain configurations may use compressed nitrogen or clean, dry air (CDA). Isolate and depressurize the relevant supply before disconnecting lines or removing panels. Follow facility compressed-gas procedures.



Ensure all covers and panels are correctly installed before powering up or operating the equipment.



Observe pinch points around the hood hinge and moving lift mechanisms. Open and close the hood using the designated handle; keep hands clear of moving components.

1.9 Thermal



Bake plate surfaces and adjacent components can cause severe burns and may remain hot for an extended period after power is removed. Do not touch or service exposed thermal surfaces until the equipment has cooled to a safe condition. The hood and surrounding components should not be assumed cool solely because the plate temperature is no longer rising. Use thermal-rated PPE and approved wafer-handling tools as required.

1.10 Chemical



Cee® does not prescribe the process materials used with the bake plate. Before introducing a material, review its Safety Data Sheet (SDS), thermal stability, decomposition products, flash point, and compatibility with all surfaces exposed to the material or its vapors.



Flammable or reactive process materials may release hazardous vapors when heated. Eliminate ignition sources and follow the facility-approved exhaust, chemical handling, and process temperature limits.



For configurations with process-gas or vacuum utilities, isolate the applicable supply and relieve stored pressure before servicing any lines or fittings.



Ensure that the required facility ventilation or hood exhaust is operating before heating materials that may emit fumes. Follow the exhaust requirements of the applicable Bake Plate Operations Manual.



Wear PPE appropriate to the hazards identified in the process SDS and facility risk assessment, including eye protection, suitable gloves, and thermal protection when handling hot substrates.

1.11 Lockout/Tagout Procedures and Information

Before servicing, stop all processes, switch off the equipment, disconnect electrical power, and allow the bake plate and associated components to cool to a safe temperature. Isolate and depressurize connected gas or vacuum utilities as applicable. Verify all energy sources have been secured under the facility's lockout/tagout procedure.

The Cee® Apogee® Bake Plate does not include dedicated lockout/tagout (LOTO) hardware for every facility utility. The customer, installer, and end user are responsible for providing suitable LOTO devices and procedures as required by applicable regulations and company policies.

For more information, please contact *Cee® Customer Support*.

1.12 Intended Use of Machine

The Cee® Apogee® Bake Plate is intended for controlled heating of substrates in semiconductor, microelectronics, optical, and related materials-processing applications.

The Cee® Apogee® Bake Plate is not intended for food or medical applications and must not be operated in hazardous or explosive locations.

Only personnel trained in the correct operation and hazards of this equipment, and using suitable PPE, should operate or service the system. Read the applicable Bake Plate Operations Manual and this accessory manual before use.

The Cee® Apogee® Bake Plate is intended primarily for cleanroom or controlled laboratory use. Operation outside a controlled environment may adversely affect substrate cleanliness and process repeatability.

Do not operate in an explosive atmosphere or process materials outside the limits approved for the specific tool configuration.

Normal Operating Conditions

The Cee® Apogee® Bake Plate is designed for indoor use only.

Ambient Temperature.....10°C - 30°C

Relative Humidity.....≤80%

Altitude.....up to 3000 m

Pollution Degree.....2

Overvoltage Category.....II

Permissible Voltage Fluctuations .....208–230 VAC ±10% (verify equipment nameplate)

⚠ Use of the Cee® Apogee® Bake Plate or its accessories in a manner not specified by Cee® may impair the protection provided by the equipment. The host equipment nameplate and applicable Operations Manual govern all installed configuration limits.

2 Available Accessories

Apogee® Bake Plate equipment supports accessories that extend thermal process capability, substrate handling, atmosphere control, vacuum hold-down, and post-bake cooling. Accessory availability and compatibility depend on the specific bake plate model and factory configuration:

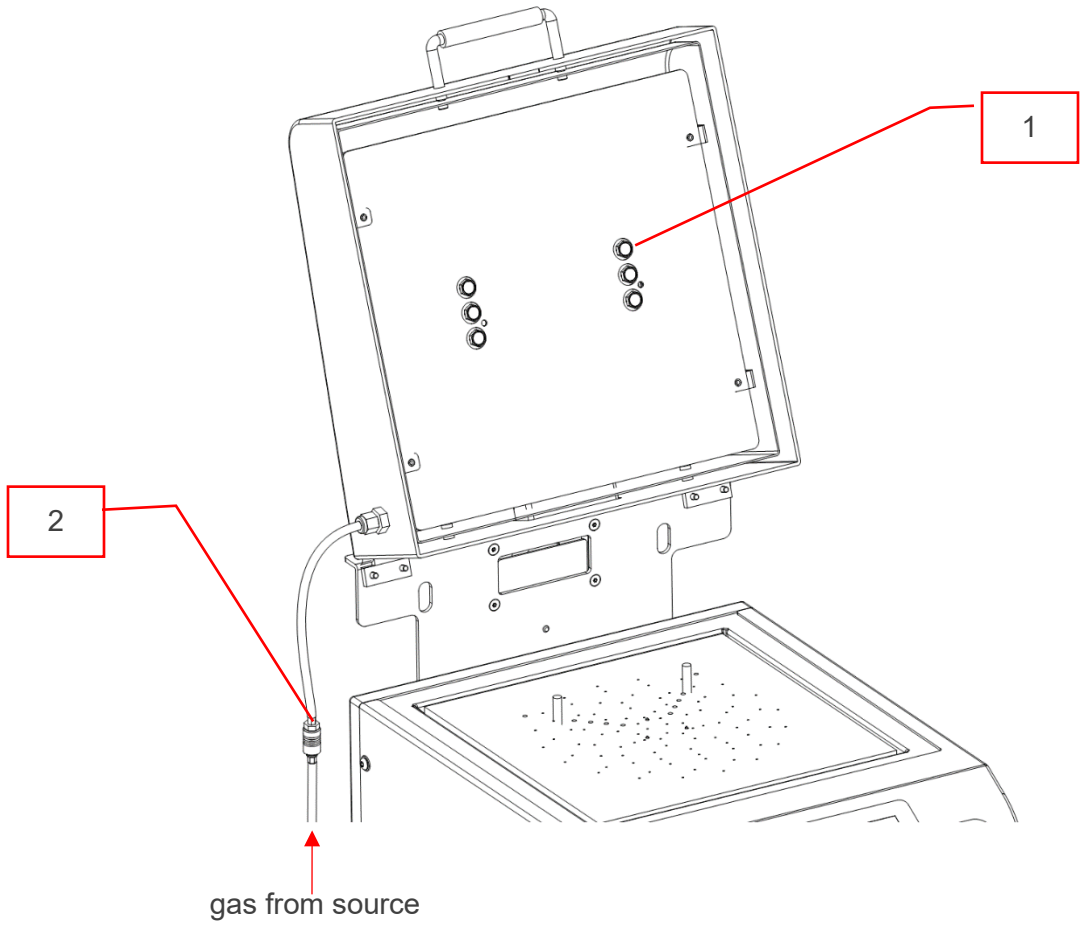
- Inert Gas Purge – Introduces inert gas through hood-mounted diffusers to reduce oxygen concentration in the bake chamber.
- 400°C Option – Factory-installed configuration for higher-temperature processes where permitted by the plate, hood, and substrate-handling components.
- Plastic-Tipped Lift Pins – Substrate-contact options intended to help minimize wafer scratches at compatible temperatures.
- Vacuum Pump – A dedicated, oil-free vacuum source for bake plate configurations requiring vacuum hold-down.
- Hood-Mounted Passive Chill Station – A compact, single-substrate cooling station mounted on the exterior hood.
- One- or Five-Tier Passive Chill Station – Freestanding, passive wafer cooling station for one or five substrates.

For accessory selection, compatibility, or installation questions, contact Cee® Customer Support. All option-specific limits in the following sections are subordinate to the rating of the installed configuration.

3 Inert Gas Purge

3.1 Description

The Inert Gas Purge accessory introduces nitrogen or another compatible inert gas through diffusers installed in the inner hood of the bake plate. The system is intended to reduce oxygen concentration around heated substrates and may help limit oxidation for suitable processes. Oxygen concentration depends on inlet gas purity, flow rate, hood sealing, and exhaust settings; a low-oxygen atmosphere is not guaranteed without measurement. Facility exhaust must remain suitable for all process fumes and gases.



1. inert gas diffusers ..... Gas entry and distribution points within the bake chamber
2. manual slide valve ..... Local on/off control of the purge gas supply

3.2 Utility Requirements

Clean, dry nitrogen or another Cee®-approved inert gas source required

- Gas connection ..... ¼ in barb; 6 ft of ¼ in tubing included
- Maximum inlet pressure ..... 40 psi (confirm for the installed configuration)
- Maximum inlet flow ..... 10 L/min

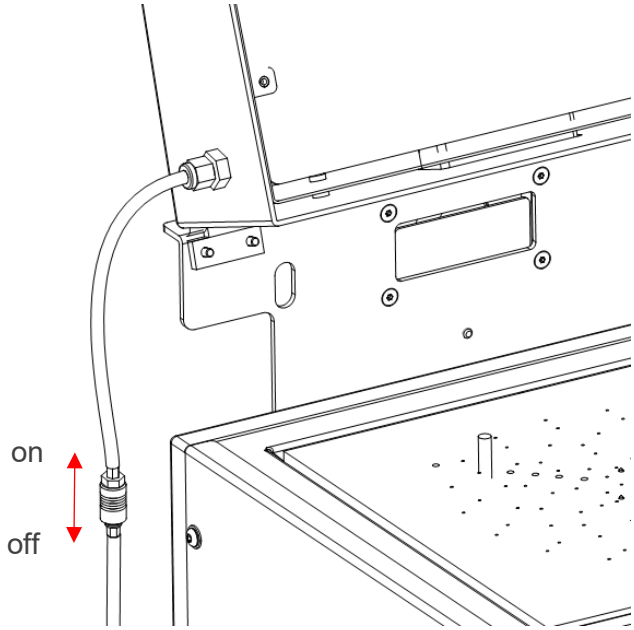
3.3 Installation

The purge diffusers are factory-installed in the bake plate hood. With the gas supply isolated, connect the provided ¼ in tubing to the purge inlet and to an appropriately regulated facility inert-gas source. Secure and inspect the tubing and fittings. Verify supply pressure and flow remain within the limits listed above before enabling purge.

3.4 Operation

Balance hood exhaust and incoming inert-gas flow in accordance with the Bake Plate Operations Manual and the facility's ventilation requirements. Purge gas must not be used to defeat or reduce required capture of hazardous process fumes. Confirm the intended process atmosphere by measurement when oxygen concentration is critical.

For initial process evaluation, the previous bake plate documentation used approximately 30 psi supply pressure and 5 L/min purge flow as a starting point. These are application-specific starting values, not guaranteed settings. The previously cited 100 ppm oxygen result was configuration dependent; verify achieved oxygen concentration with a suitable sensor for each installation.



Slide the valve body to ON to start purge gas flow.

Slide the valve body to OFF to stop purge gas flow.

3.5 Maintenance

Before each use, inspect tubing and fittings, verify the regulated gas pressure and flow, and check manual valve operation. For cleaning, power off the equipment, isolate the gas supply, and allow the bake plate to cool completely. Clean accessible diffuser surfaces only with a solvent approved for the diffuser material and process residue; keep liquid out of the gas passages and dry fully before reuse.

3.6 Specifications and Performance

Gas: nitrogen or other compatible inert gas. Hardware connection: ¼ in barb. Maximum inlet pressure: 40 psi. Maximum flow: 10 L/min. Performance depends on hood/exhaust conditions and must be validated for oxygen-sensitive processes.

3.7 System Checks

With the bake plate cool and process materials absent, verify secure tubing connections, appropriate regulator settings, correct ON/OFF valve operation, and unobstructed purge distribution. Check for leaks using the facility-approved method.

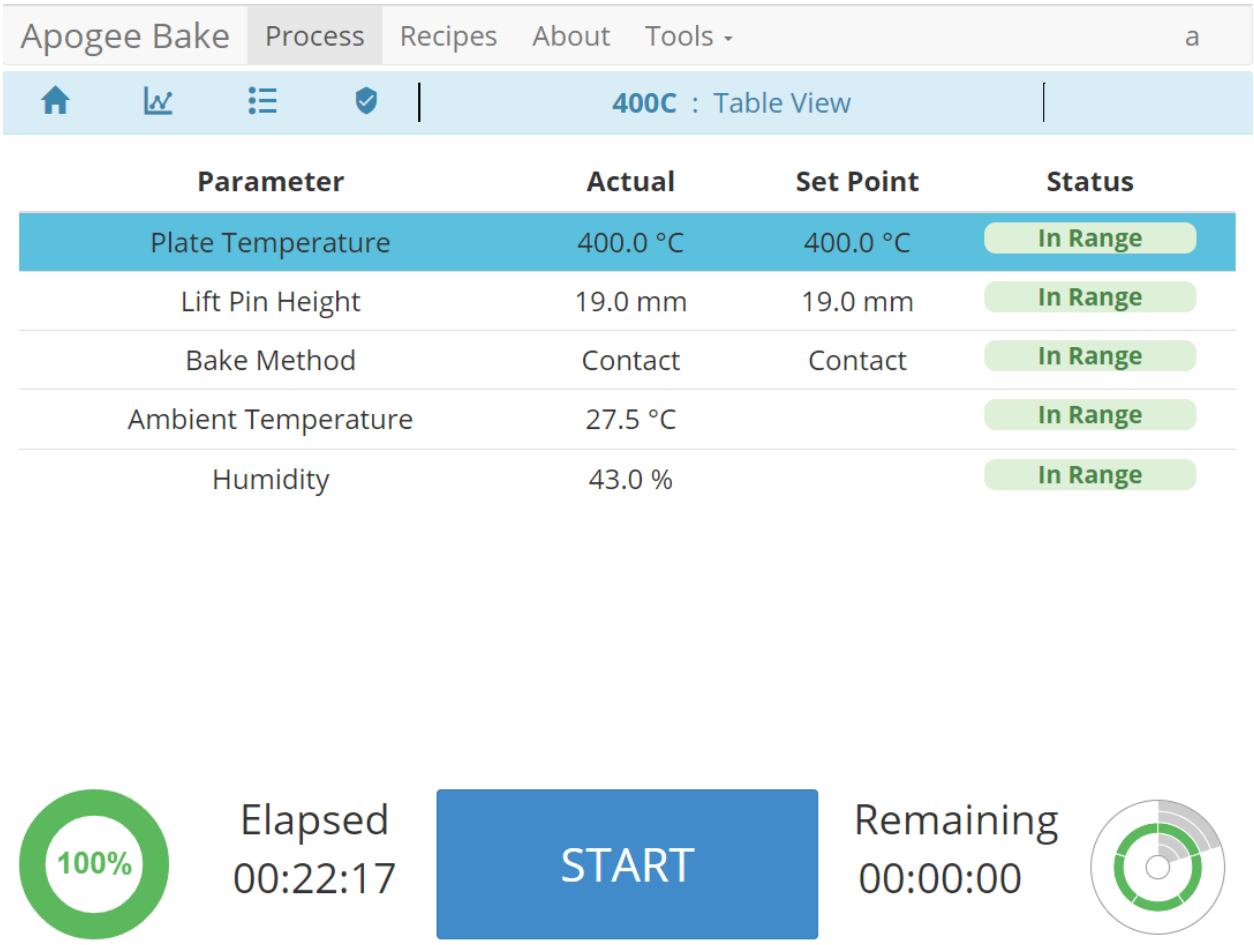
3.8 Safety and Service

Nitrogen and other inert gases can displace oxygen in enclosed spaces. Provide ventilation and follow facility oxygen-deficiency and compressed-gas precautions. Do not operate with damaged hoses, uncontrolled regulator pressure, or inadequate exhaust. For repairs beyond approved cleaning and tubing replacement, contact Cee® Customer Support.

4 400°C Option

4.1 Description

The factory-installed 400°C Option increases the configured maximum bake plate setpoint from 300°C to 400°C on equipped models. It is intended for process materials requiring higher temperatures. The Cool Touch Hood reduces heat transfer to accessible surfaces but does not eliminate burn hazards; follow all hot-surface precautions.



4.2 Utility Requirements

No additional utility connections are identified for the 400°C Option beyond the requirements of the correctly rated host bake plate. Verify the equipment nameplate and facility electrical installation before use.

4.3 Installation

The 400°C Option is configured at the factory. No field installation is required; conversion of a standard 300°C model must not be attempted without Cee® authorization.

4.4 Operation

On an equipped machine, process recipes and permitted manual temperature controls may allow setpoints up to 400°C. Confirm the installed option is enabled and verify that substrate materials, process chemistry, handling tools, lift-pin materials, hood components, and downstream accessories are suitable for the intended temperature. Do not exceed the lowest rated component in the configuration.

4.5 Maintenance

Follow the standard bake plate preventive-maintenance and temperature-verification procedures. Additional attention to heat-exposed components may be appropriate based on cycle frequency and process temperature; contact Cee® if abnormal discoloration, damage, or temperature behavior is observed.

4.6 System and Safety Checks

Before operating above 300°C, confirm the machine is factory-rated for 400°C, inspect the hood and hot-zone components, and verify that all substrate-contact materials are rated for the process temperature. Plastic-tipped lift pins may limit the usable temperature to 200°C or 300°C depending on material; a 400°C-capable plate does not increase these limits.

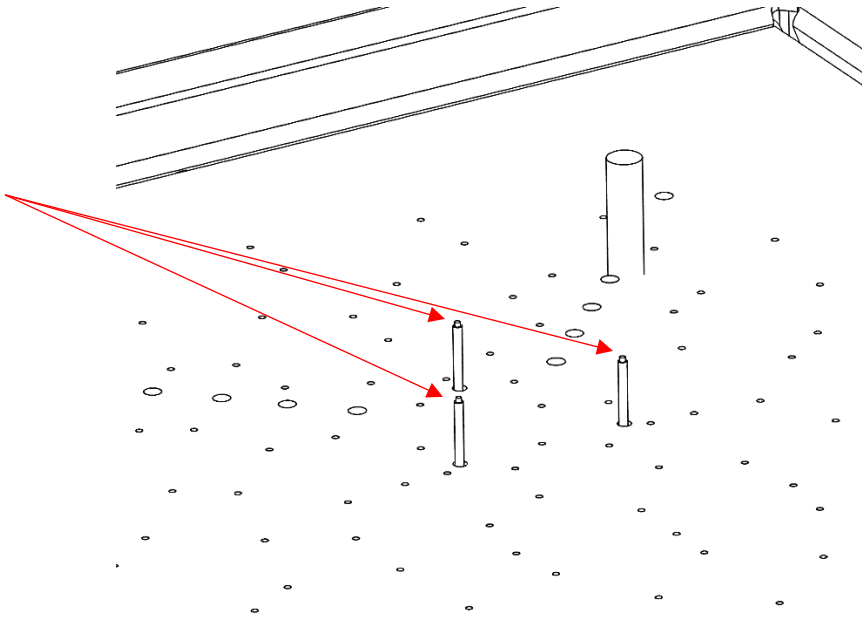
4.7 Service and Repairs

Heating elements, temperature sensors, and overtemperature controls must be serviced only in accordance with Cee®-approved procedures. Do not bypass thermal limits or temperature-related safety functions.

5 Plastic Tipped Lift Pins

5.1 Description

Plastic-tipped lift pins add a protective substrate-contact interface intended to reduce the risk of scratches during wafer loading, lifting, and unloading. Two tip materials are listed for the bake plate: PTFE (commonly sold under the Teflon™ name), rated in this manual to 200°C, and Vespel® polyimide, rated in this manual to 300°C. Actual suitability depends on the supplied tip grade, load, exposure time, and the installed configuration.



5.2 Utility Requirements

No additional facility utilities are required for the lift-pin tips beyond those of the host bake plate.

5.3 Installation

Lift-pin tips are supplied installed as part of the configured equipment. For replacement or conversion to another tip material, follow an approved Cee® service procedure.

5.4 Operation

Observe the following tip temperature limits for the configurations documented here. These are component restrictions, not evidence of automatic software interlocks:

- Vespel® (typically brown or black): maximum process temperature 300°C.
- PTFE / Teflon™ (typically white): maximum process temperature 200°C.

Load the wafer vertically onto the lift pins. Avoid sliding the wafer horizontally across the tips, which can shear or damage the contact surfaces. Never use either plastic tip material in a 400°C process. Where high-temperature operation is required, confirm an appropriate lift-pin configuration with Cee®.

5.5 Maintenance

Before each use, inspect each lift-pin tip for deformation, wear, looseness, discoloration, or contamination. Replace damaged or unsuitable tips following an approved procedure; do not operate with missing or damaged tips.

5.6 System and Safety Checks

Before starting a process, verify the installed tip material and its temperature rating, equal tip height, unobstructed pin motion, and proper substrate support. Do not assume tip color alone establishes material identity; verify the equipment build documentation when uncertain.

5.7 Service and Cleaning

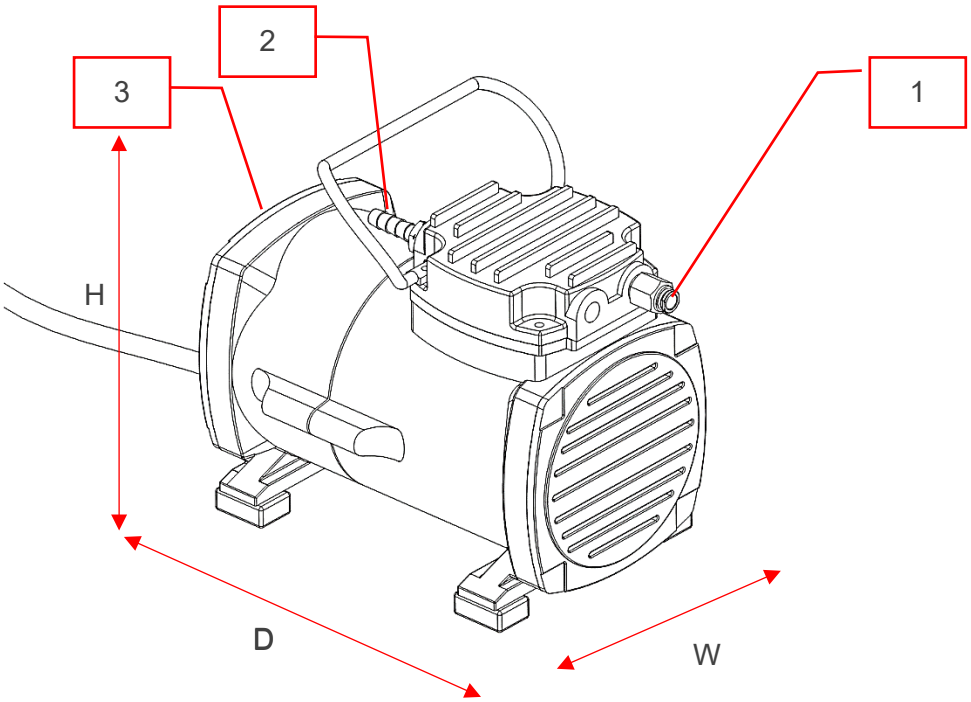
After the plate cools, clean tips only with methods and agents approved for their specific material. Avoid scraping, abrasion, or chemical exposure that may degrade the tip. Contact Cee® for replacement parts and procedures.

6 Vacuum Pump

6.1 Description

The optional oil-free vacuum pump provides a dedicated vacuum source for a single bake plate configured with vacuum hold-down. The pump is designed for laboratory and cleanroom use and incorporates overtemperature protection. It is not a source of compressed gas. Key characteristics include:

- Cleanroom-compatible design
- Oil-free diaphragm design; routine servicing generally not required
- PTFE-coated diaphragm/pump head and FKM valves
- Noise level approximately 50 dB(A)
- Thermal overheat protection
- Available in 110 VAC or 220 VAC configurations
- Rated vacuum level 20–25 inHg; flow up to 20 L/min
- Includes 6 ft of ¼ in vacuum tubing
- 5.5 in (140 mm) W × 9 in (229 mm) D × 8 in (203 mm) H



1. vacuum connection.....Port supplying vacuum to the bake plate
2. on/off switch .....Rocker switch near the power cord

3. pump exhaust.....Outlet through which the pump discharges air

6.2 Utility Requirements

- Electrical..... 110 VAC, 0.7 A max or 220 VAC, 0.3 A max; verify pump label
- Vacuum level..... 20–25 inHg (rated performance)
- Free-air flow ..... Up to 20 L/min (rated performance)

6.3 Installation

1. Place the pump on a stable, level, well-ventilated surface. Maintain at least 3 in (76 mm) of clearance around the pump for cooling and access. Keep the exhaust unobstructed.
2. Locate the vacuum inlet on the bake plate utilities panel. Refer to the equipment utilities label and the applicable Operations Manual.
3. Connect the supplied ¼ in tubing between the vacuum pump supply port and the bake plate vacuum connection. Fully seat tubing over barb fittings or into push-to-connect fittings. Gently pull to confirm proper engagement, and route the tubing without kinks or sharp bends.
4. Confirm the pump's voltage rating matches a grounded, appropriately rated electrical supply, then connect the cord.
5. Switch the rocker switch to ON and verify that vacuum is available at the bake plate.

6.4 Operation

The pump can be controlled using its rocker switch or operated continuously as permitted by the pump rating and the facility's procedures. Thermal protection may interrupt pump operation if it overheats; some configurations may restart automatically after cooling. If repeated shutdown occurs, stop using the pump and inspect ventilation and installation conditions before returning it to service.

6.5 Maintenance

The pump is designed for minimal routine maintenance. Inspect tubing, fittings, power connections, and ventilation openings periodically; keep the pump exterior clean and free of obstructing dust. Follow the pump manufacturer's service requirements.

6.6 Specifications and Clearance

Dimensions: 5.5 in W × 9 in D × 8 in H (140 × 229 × 203 mm). Nominal vacuum: 20–25 inHg. Rated flow: up to 20 L/min. Power: 110 VAC, 0.7 A max or 220 VAC, 0.3 A max. Provide a minimum 3 in (76 mm) of free clearance on all sides. A compressed-air supply pressure specification is not applicable to this vacuum pump.

6.7 System Checks

Following installation, confirm secure tubing, smooth startup, adequate ventilation, and correct vacuum function on the bake plate. If substrate hold-down is unreliable, stop processing and check the tubing and the host tool before restarting.

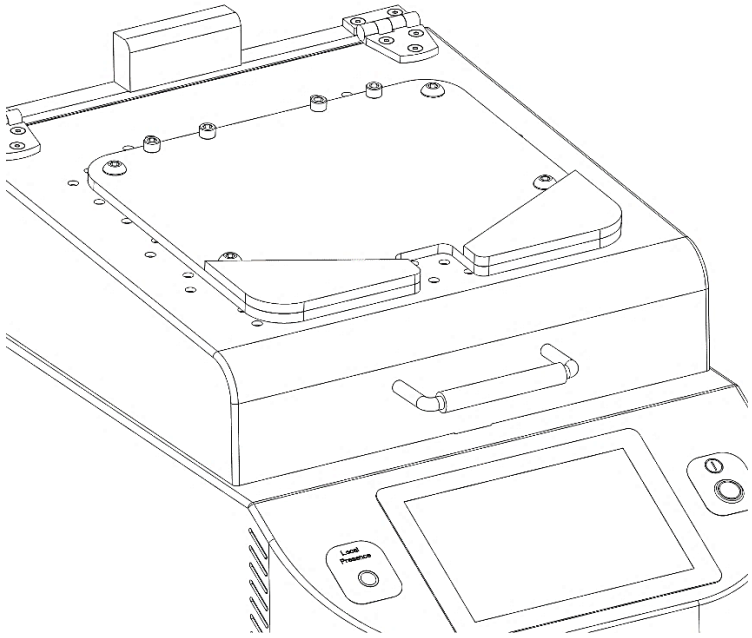
6.8 Safety, Service, and Cleaning

Do not obstruct pump exhaust or operate with damaged wiring, overheating, or unusual noise. Isolate power before cleaning or servicing. Clean external surfaces using compatible materials; do not introduce cleaning liquid into the pump. Contact Cee® Customer Support for repair guidance.

7 Hood Mounted Passive Chill Station

7.1 Description

The hood-mounted passive chill station accommodates a single substrate while minimizing additional bench-space requirements. An access notch permits removal with compatible tweezers or a vacuum wand. The maximum substrate size is governed by the size of the host bake plate and the installed chill-station configuration.



7.2 Utility Requirements

No additional facility utilities are required. The accessory cools passively and does not include active refrigeration.

7.3 Installation

The hood-mounted station is factory-installed. No user installation is necessary. Inspect mounting hardware and the station surface before use.

7.4 Operation

Using appropriate thermal PPE and wafer-handling tools, remove the substrate from the bake plate. Close the hood before placing the substrate on the exterior chill station, then center the wafer on the station. The surface is angled so that the substrate settles toward the front stops. Allow sufficient time for the substrate to reach the temperature required by the next process step; use an appropriate temperature measurement method when temperature is critical. Remove the substrate before opening the hood. Rear stops may limit movement if the hood is opened unexpectedly, but they are not a substitute for the required removal procedure.

7.5 Maintenance

Allow the station and substrates to cool to a safe handling temperature. Remove loose residue using a clean, nonabrasive cloth or approved wipe. For adhered process residue, use a cleaning agent approved for both the station surface and the deposited chemistry, following facility chemical safety procedures. Do not scrape with glass or other hard implements unless that method has been approved for the particular surface finish; scratching may affect substrate contact and cleanliness.

7.6 System and Safety Checks

Before use, confirm the station is securely mounted, clean, and free of damage. Ensure the hood can operate normally without a wafer remaining on the station. Cooling time depends on wafer size, mass, starting temperature, thermal contact, ambient airflow, and the desired final temperature; do not assume a fixed 10-second cooldown.

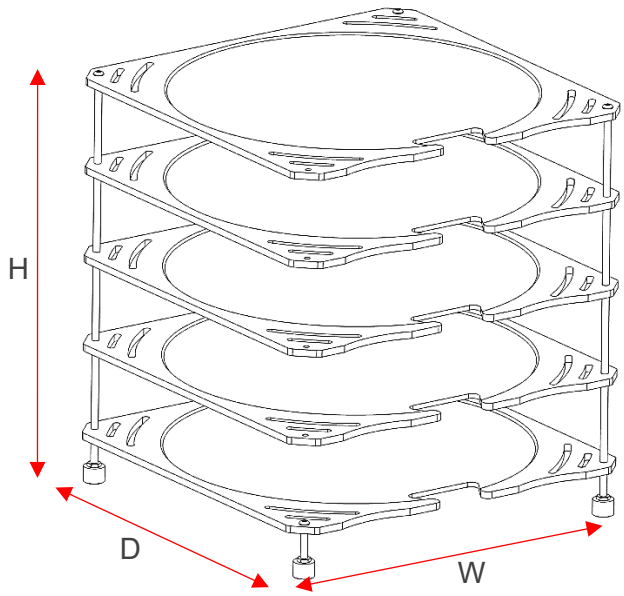
7.7 Service and Repairs

If the station is loose, deformed, damaged, or difficult to clean, discontinue use and contact Cee® Customer Support for approved repair or replacement.

8 5 Tier Passive Chill Station

8.1 Description

The freestanding passive chill station is available with one or five wafer tiers. It is intended for benchtop cooling of substrates after thermal processing. Access notches support removal with suitable tweezers or a vacuum wand. The original design specifies a maximum wafer diameter of 300 mm; verify compatibility with the size and geometry of the substrate being processed.



Five-Tier Chill Station

- 14 in (356 mm) W × 14 in (356 mm) D × 16 in (407 mm) H

8.2 Utility Requirements

No additional facility utilities are required. These stations cool passively and have no active refrigeration.

8.3 Installation

Place the station on a clean, stable, level benchtop able to safely support the station and all intended substrates. Adjust the four threaded feet as needed to prevent rocking. Allow clearance for safe handling and removal of hot wafers.

8.4 Operation

Using appropriate thermal PPE and tools, remove each substrate from the bake plate and place it on an available chill tier. Avoid dragging wafers across support surfaces or placing wafers where they could contact one another. Allow each substrate to reach its required handling or downstream process temperature before removal. Cooling time depends on starting temperature, substrate thermal mass, contact conditions, and ambient airflow; a fixed 10-second cooling time should not be assumed.

8.5 Maintenance

After the station is cool, wipe exposed surfaces with a clean, nonabrasive cloth and a cleaning agent compatible with the station and process residue. Avoid hard scrapers or abrasive tools that may damage the substrate-contact finish. Dispose of contaminated wipes and solvents according to facility procedures.

8.6 Specifications and System Checks

Maximum nominal wafer diameter: 300 mm, subject to geometry and configuration. Five-tier station: 14 × 14 × 16 in (356 × 356 × 407 mm). Before use, confirm the station is level, stable, clean, and undamaged, with adequate access to each tier.

8.7 Safety, Service, and Cleaning

Treat recently loaded substrates and support surfaces as hot. Do not stack wafers directly together or overload any tier. Do not use damaged or unstable stations. Contact Cee® Customer Support for approved parts and repair procedures.

9 Table of Revisions

Doc Rev #	Author	Description of Change(s)	Reviewed/Approved By	Date
WIP	Cee®	Accessory content review; standardized introductory language; improved thermal, gas, vacuum, lift-pin and chill-station safety/operating instructions; corrected cross-references and terminology.	Pending	10/2026
2.1	J. Adams	Updated Apogee™ trademark to Apogee® and intended-use language; various accessory edits (historical summary; original section references were invalid).	B. Waterworth	8/30/2023
2.0	J. Adams	Updated formatting and added technical documentation and revision-history sections (historical summary; original cross-references were invalid).	B. Waterworth J. Strothmann	11/09/2022