Chuck Cleaning Wafer (CCW)

Stage Clean®

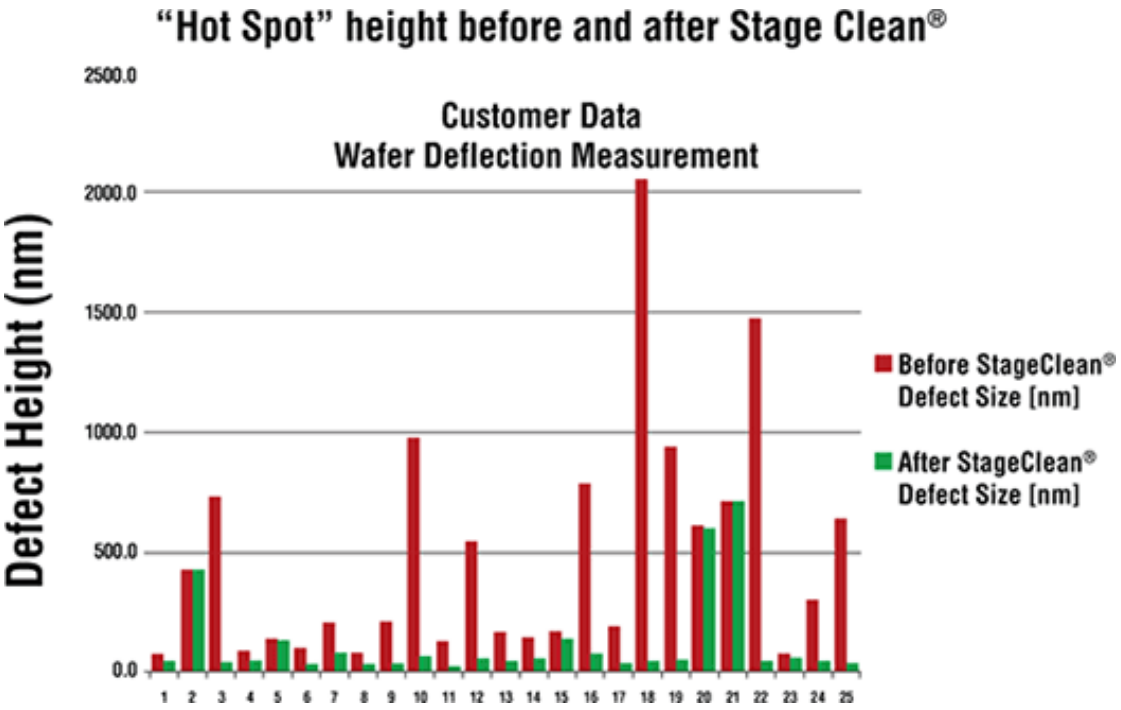
Eliminate Lithography Hot Spots with No Downtime

Device manufacturers must continually drive smaller feature sizes to keep pace with consumer demands. The most critical device fabrication step is photolithography, the patterning step that creates the small features of the device. Particles on lithography tool chucks cause “Hot Spots” – areas where the wafer is not completely flat against the chuck. The historic method to remove the killer particles is to shut down the tool and either manually wet clean the chuck, or use some type of tool to break down the particles. Both procedures interrupt critical tool availability and create downtime for up to two hours of lost production. The most advanced lithography tools have automated measurement capabilities to identify “Hot Spots” and will shut down the tool until the problem is addressed by an operator.

Stage Clean was developed to remove and trap the loose debris that accumulates on the wafer chuck. Stage Clean is a highly cross-linked polymeric material that is mounted on a silicon wafer, and the wafer is run polymer-side down through the tool. This unique cleaning material does not have any outgassing as measured against ASTM E595 standard, nor is it observed to transfer any metallic or organic material as tested by TXRF and XPS analysis.

The cleaning action of the polymer occurs when the wafer is clamped on the vacuum chuck. The compliant polymer not only removes defects from the top surface of the chuck, but also from crevices in the chuck, prevents those defects from getting on the backside of wafers.

Stage Clean has been evaluated on multiple lithography tools. In the customer application below, the Stage Clean wafer was run after an error in focal height was observed. The process was done 25 times and the red bars show the height error prior to Stage Clean™, and the green bars are post Stage Clean™. For more than 70% of the tests, the error was reduced and the tool was put back in production.



The maximum benefit from Stage Clean can be achieved when the wafer is cycled regularly as part of a preventative maintenance procedure. This can be scheduled during other qualification tests such as flatness or contamination checks.

Stage Clean® is registered trademark of International Test Solutions.

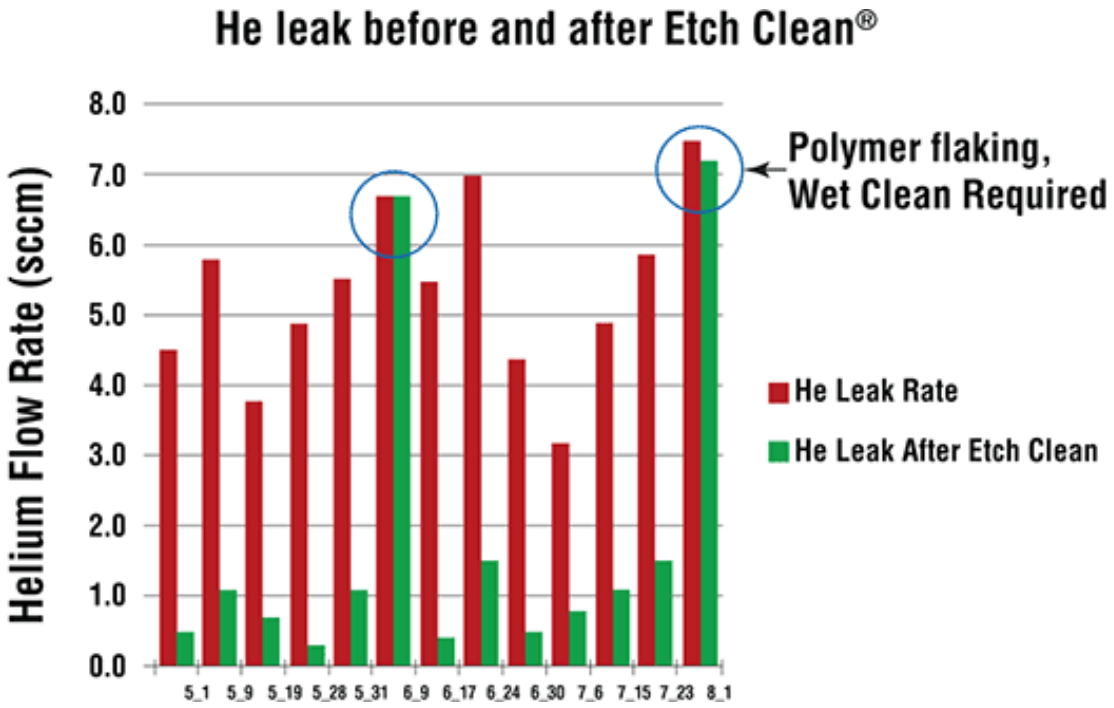
ETCH CLEAN®

Eliminate ESC Helium Leaks without Opening Chamber

Advanced etch processes are very sensitive to contamination, so chamber wet cleans are regularly scheduled to ensure minimal contamination. These wet cleans always result in extended tool downtime, so device manufacturers try to maximize time between wet cleans as much as possible. However, particles on the electrostatic chuck (ESC) may cause high backside helium leaks, forcing early wet cleans and unplanned downtime. Typical wet clean recovery time for such an unscheduled event can be as long as eight hours or more.

Etch Clean® was developed to remove and trap the loose debris that accumulates on the wafer chuck. Etch Clean is a highly cross-linked, very sticky polymeric material that is mounted on wafers that are cycled through the process tool. This unique cleaning material does not have any outgassing as measured with thet ASTM E595 standard, nor is it observed to transfer any metallic or organic material as tested by TXRF and XPS analysis.

Etch Clean was evaluated on over a three-month period and cycled through the tool whenever the ESC helium leak exceed specification. In the graph below, this the red bars show the helium leak rate prior to Etch Clean, and the green bars are post Etch Clean. Better than 75% of the time, the helium leak was fixed without opening the chamber and the tool was put back in production immediately.



The maximum benefit from Etch Clean can be achieved when the wafer is cycled regularly as part of a preventative maintenance procedure. The Etch Clean process can be scheduled after wet clean or during other routine test procedures.

Etch Clean® is registered trademark of International Test Solutions

WAFER PROBER CLEAN®

Cleaning of vacuum chucks at Accretech/TSK, SEMICS, Electroglas, TEL Wafer Prober

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