AMAT ENDURA™ PVD DEGAS CHAMBER
3RD GENERATION HEATER

OBJECTIVE:
TO EFFECTIVELY PM THE APPLIED MATERIALS ENDURA™ PVD DEGAS CHAMBER 3rd GENERATION HEATER IN A TIMELY MANNER WHILE IMPROVING TOOL RECOVERY AND EXTENDING THE MEAN TIME BETWEEN CLEANS (MTBC)

Vacuum Chamber:
APPLIED MATERIALS ENDURA™ PVD

Vacuum Chamber Process Residue:
PROCESS INDUCED RESIDUE

Vacuum Chamber Components:
DEGAS CHAMBER HEATER ASSEMBLY - 3RD GENERATION

Old Procedure:
2+ hours using DI water & IPA with 150+ wipes
Recovery time: 24 to 48 hours
Interval: PM Degas Chamber every 2 to 4 weeks

New Procedure:
1 hour using Diamond ScrubPAD, ScrubWRIGHT™ Pen, MiraWIPE® and MiraSWABS®
Recovery time: 24 hours
Interval: ABLE TO EXTEND CHAMBER PM OUT 1.5X to 2X CURRENT INTERVAL

Vacuum Chamber Products:
AMAT ENDURA Degas Chamber PM Kit
PM Kit P/ N: HT4500-DGAS4

- (1) HT9423 CushionPAD 24” X 24”
- (2) HT4536D-10-1 360 Grit Diamond ScrubPAD
- (1) HT4536DW-1 360 Grit Diamond ScrubBELT®
- (1) FTPEN-1 ScrubWRIGHT™ PEN
- (1) HT4754 UltraSOLV® Sponge
- (1) HT1732-5 UltraSOLV® Swabs
- (2) HT1511FC-5 MiraSWABS® (10 MiraSWABS®)
- (1) HT5790S-25 MiraWIPES® (25 MiraWIPES®)
- (1) HT4790-5 UltraSOLV® Wipers (5 wipers)
AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE:

View “How to” instructional videos on http://www.foamtecintlwcc.com/video/

**NOTE:** FOR AN ACCURATE EXPLANATION, THIS PROCEDURE REFERS TO BOTH 1ST & 3RD GENERATION DEGAS HEATER ASSEMBLIES

**Step 1:** Using proper procedures and safety guidelines prepare AMAT Endura™ Degas Chamber for wet clean

**Step 2:** Using proper procedures and safety guidelines remove Degas Heater lift ring from heater assembly (See Fig 1 & 2)

**Step 3:** Properly stage HT9423 CushionPAD on flat workstation and place lift ring on top of CushionPAD (See Fig 3)
AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE (cont’d):

Step 4: Carefully place (6) to (8) standard fab wipers underneath the Degas Heater Assembly to capture any excess moisture (See Fig 4)

Step 5: Stage a hazardous waste bag next to chamber allowing easy access for rinsing out HT4754 UltraSOLV® Sponge and Diamond ScrubPAD with DI water

Step 6: Take HT1732 UltraSOLV® Swab and place into center hole of Degas Heater Assembly to help prevent any moisture from entering into the Degas Heater (See Fig 5)

Step 7: Using DI water, LIGHTLY DAMPEN UltraSOLV® Sponge and HT4536D 360 Grit Diamond ScrubPAD. Ensure items are only lightly dampened and not dripping with DI water (See Fig 6)
**AMAT Endura™ Degas Chamber PM Procedure (cont’d):**

**Step 8:** Using lightly dampened UltraSOLV® Sponge wipe Degas Heater (See Fig 7)

![Image](Image7.png)

**Fig 7:** UltraSOLV® Sponge wiping Degas Heater

**Step 9:** Using lightly dampened 360 Grit Diamond ScrubPAD scrub an approximate 4” x 4” portion of Degas Heater (See Fig 8 & 9)

![Image](Image8.png)

![Image](Image9.png)

**Fig 8 & 9:** Diamond ScrubPAD scrubbing a small portion of Degas Heater

**NOTE:** IT IS COMMON FOR DIFFERENT PROCESSES TO HAVE DIFFERENT LEVELS OF PROCESS INDUCED RESIDUES BUT IMPORTANT TO REMOVE ALL RESIDUE FOR EFFICIENT TOOL PERFORMANCE (See Fig 10a & 10b)

![Image](Image10a.png)

![Image](Image10b.png)

**Fig 10a:** Degas Heater after scrub with 360 Grit Diamond ScrubPAD

**Fig 10b:** Degas Heater before scrub with 360 Grit Diamond ScrubPAD
**AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE (cont’d):**

**Step 10:** As loosened deposition builds up on Degas Heater, take lightly dampened HT4754 UltraSOLV® Sponge and wipe the Degas Heater free of residue (See Fig 11 & 12)

![Fig 11: UltraSOLV® Sponge wiping loose residue on surface of Degas Heater](image1)

![Fig 12: Deposition pulled off of surface of Degas Heater](image2)

**Step 11:** Using the same technique described above, continue to scrub the remaining areas of Degas Heater (See Fig 13)

![Fig 13: Scrubbing the remaining areas of Degas Heater](image3)

**Step 12:** As ScrubPAD begins to load up with deposition, pull across dampened UltraSOLV® Sponge to unload ScrubPAD (See Fig 14, 15 & 16)

![Fig 14: ScrubPAD loaded with deposition](image4)

![Fig 15: Pull ScrubPAD across UltraSOLV® Sponge](image5)

![Fig 16: Unloaded ScrubPAD](image6)
**AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE (cont’d):**

**Step 13:** Continue to rinse UltraSOLV® Sponge with DI water as sponge begins to load up with deposition (See Fig 17 & 18)

![Fig 17: UltraSOLV® Sponge loaded with deposition](image1)

![Fig 18: UltraSOLV® Sponge free of deposition after rinse in DI water](image2)

**NOTE:** ENSURE TO RING AS MUCH MOISTURE AS POSSIBLE OUT OF SPONGE BEFORE CONTINUING TO WIPE DEGAS HEATER

**Step 14:** Repeat steps 7 - 13, scrubbing the remaining areas of the Degas Heater, ensuring to rinse UltraSOLV® Sponge and unload 360 Grit Diamond ScrubPAD as necessary (See Fig 19)

![Fig 19: Scrubbing the remaining areas of Degas Heater](image3)
**NOTE:**  ENSURE TO CONCENTRATE ON REMOVING THE HEAVY BUILD UP ALONG THE EDGES OF THE DEGAS HEATER (See Fig 20)

![Fig 20: Scrubbing heavy build up along edges of Degas Heater](image)

**Step 15:** When cleaning of Degas Heater is complete, move on to scrubbing the **UPPER REGION** of the Degas Chamber walls using the same technique described above; WIPE – SCRUB – WIPE (See Fig 21, 22 & 23)

![Fig 21: Wiping Degas Chamber wall](image)  
![Fig 22: Scrubbing top portion of Chamber walls](image)  
![Fig 23: Wiping Degas Chamber wall clean](image)

**NOTE:**  **CONCENTRATE ON SCRUBBING ONLY THE TOP PORTION OF CHAMBER WALLS (THE AREAS ABOVE HEATER)**  
**DO NOT ALLOW DI WATER TO RUN BELOW HEATER**
AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE (CONT’D):

Step 16: Ensure to target all areas within chamber above heater assembly (See Fig 24 & 25)

Step 17: Ensure to reach into the slit valve and scrub the top and bottom areas of this region (See Fig 26 & 27)

Step 18: Rinse out the HT4754 UltraSOLV® Sponge with DI water and wipe the entire chamber in preparation for inspection step. One HT4536D 360 Grit Diamond ScrubPAD should be able to complete the initial Degas Heater and chamber scrub (See Fig 28)
**AMAT ENDURA™ Degas Chamber PM Procedure (cont’d):**

**Step 19:** When entire Degas Chamber has been scrubbed, saturate a single HT5790S MiraWIPE® with DI water and wipe throughout the entire Degas Chamber (See Fig 29, 30, 31 & 32)

![Wiping throughout entire Degas Chamber with MiraWIPE® using DI water](image1)

**Fig 29, 30 & 31:** Wiping throughout entire Degas Chamber with MiraWIPE® using DI water

![Single MiraWIPE® after wiping entire Degas Chamber with DI water](image2)

**Fig 32:** Single MiraWIPE® after wiping entire Degas Chamber with DI water

**NOTE:**

THE MICROFIBER CHARACTERISTIC OF THE MiraWIPE® WILL APPEAR NOT TO ABSORB DI WATER. DI WATER MUST BE WORKED INTO THE TIGHT MICROFIBER IN ORDER TO SATURATE IT. THIS CHARACTERISTIC IS WHAT MAKES THE MiraWIPE® MORE EFFECTIVE IN REMOVING PARTICLES

**Step 20:** After wiping entire chamber with MiraWIPE® and DI water, do a thorough INSPECTION of the entire Degas Chamber looking for areas containing process buildup that may have been missed during initial scrub (See Fig 33 & 34)

![Process build-up on the edge of heater missed during initial scrub of Degas Chamber](image3)

**Fig 33 & 34:** Process build-up on the edge of heater missed during initial scrub of Degas Chamber
**AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE (cont’d):**

**Step 21:** Moisten second HT4536D 360 Grit Diamond ScrubPAD with DI water and scrub off the process buildup **missed** during the initial scrub of Degas Chamber (See Fig 35 & 36)

![Second 360 Grit Diamond ScrubPAD scrubbing buildup missed on initial scrub of Degas Chamber](image1)

**Step 22:** Put HT4536DW-1 360 Grit Diamond ScrubBELT® onto the FTPEN-1 ScrubWRIGHT™ Pen and, using the same technique as diamond ScrubPAD, scrub the edges and tight corners throughout the Degas Chamber (See Fig 37, 38 & 39)

![ScrubWRIGHT™ Pen scrubbing edges and tight areas throughout Degas Chamber](image2)
**NOTE:** ENSURE TO ROTATE THE 360 GRIT DIAMOND ScrubBELT® AROUND THE ScrubWRIGHT™ PEN AS YOU SCRUB TO PREVENT STRAINING A SINGLE AREA ON THE ScrubBELT® CAUSING IT TO BREAK

**Step 23:** Lightly dampen the ScrubBELT® with DI water (See Fig 40 & 41)

![Fig 40 & 41: Lightly dampening ScrubBELT® with DI water](image1)

**Step 24:** Continue using the ScrubWRIGHT™ Pen and clean all of the tight grooves along the top of Degas Heater Assembly (See Fig 42 & 43)

![Fig 42 & 43: ScrubWRIGHT™ Pen cleaning tight grooves along top of Degas Heater](image2)

**NOTE:** THE COMPLETION OF THIS STEP MAY TAKE SOME EXTRA TIME, AS THESE GROOVES PROBABLY HAVE NOT BEEN EFFECTIVELY CLEANED DURING PREVIOUS PM'S. AS THIS STEP IS PERFORMED MORE FREQUENTLY, THE PM WILL BECOME EASIER

![Fig 42 & 43: ScrubWRIGHT™ Pen cleaning tight grooves along top of Degas Heater](image2)

**NOTE:** CONTINUE TO USE UltraSOLV® SPONGE TO UNLOAD 360 GRIT DIAMOND ScrubBELT®, BUT USE MiraWIPE® DAMPENED WITH DI WATER TO WIPE OFF THE DEPOSITION FROM THIS DETAILED WORK DONE ON DEGAS HEATER
AMAT Endura™ Degas Chamber PM Procedure (cont’d):

Step 25: Use ScrubWRIGHT™ Pen to clean the three lift ring inserts along edge of the Degas Heater Assembly (See Fig 44, 45, 46 & 47)

**IMPORTANT NOTE**

THE USE OF HT5790S MiraWIPES® AND HT1511FC MiraSWABS® DURING THE FINAL WIPE PROCEDURE IS A CRITICAL STEP TO EFFECTIVELY REMOVE PARTICLE DEFECTS FROM DEGAS CHAMBER

**NOTE:** Figure below shows how much more deposition the Foamtec International MiraWIPE® can remove from a critical surface compared to the standard fab wiper, making the MiraWIPE® FINAL WIPE PROCEDURE the most CRITICAL STEP of the PM procedure (See Fig 48a & 48b)

**MiraWIPE® are the KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY.**
**AMAT Endura™ Degas Chamber PM Procedure (cont’d):**

**Step 26:** Once scrubbing all the process buildup throughout Degas Chamber is complete, saturate the HT5790S MiraWIPE® with IPA and perform a complete chamber wipe down (See Fig 49, 50 & 51)

![Fig 49, 50 & 51: IPA saturated MiraWIPE® wiping out entire Degas Chamber](image1)

**Step 27:** Replace deposition saturated MiraWIPE® with a fresh MiraWIPE® as necessary, and continue wiping Degas Chamber until MiraWIPE® is no longer able to remove process film from chamber

**Step 28:** During final wipe procedure of PM, use HT1511FC MiraSWABS® saturated with IPA and wipe deposition out of all the hard to reach areas, concentrating on the grooves on the top of the heater assembly (See Fig 52 & 53)

![Fig 52 & 53: MiraSWABS® cleaning out tight areas and grooves along top of heater assembly](image2)

**NOTE:** IMPORTANT TO USE MiraWIPES® ALONG WITH THE MiraSWABS® AS THE SWABS WILL PULL LOOSE DEPOSITION OUT ON TOP OF THE HEATER ASSEMBLY
**AMAT Endura™ Degas Chamber PM Procedure (cont’d):**

*MiraWI PES® and MiraSWABS® are the KEY STEPS for DEFECT REDUCTION and IMPROVED TOOL RECOVERY*

**DEGAS CHAMBER HEATER LIFT RING CLEANING PROCEDURE:**

**Step 29:** Place lift ring on protective workstation in preparation for lift ring scrub (See Fig 54)

![Fig 54: Degas Heater lift ring placed onto protective workstation](image)

**Step 30:** Using the same technique as described above scrub entire lift ring (See Fig 55 - 58)

![Fig 55 - 58: Scrubbing Degas Chamber lift ring on workstation](image)
AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE (cont’d):

NOTE: IF LIFT RING HAS NOT BEEN REMOVED AND CLEANED BEFORE, THEN IT WILL REQUIRE AN ADDITIONAL 360 GRIT DIAMOND ScrubPAD TO EFFECTIVELY REMOVE THE PROCESS BUILDUP (See Fig 59)

Step 31: When scrub of lift ring is complete, saturate HT5790S MiraWIPE® with IPA and perform a complete lift ring wipe down (See Fig 60 & 61)

Step 32: Prior to placing the clean lift ring back into the Degas Chamber, vacuum out the Degas Chamber using a certified fab vacuum (See Fig 62 & 63)

NOTE: NEVER ALLOW THE TIP OF THE VACUUM TO RUB ANY PORTION OF THE CHAMBER
**AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE (cont’d):**

**Step 33:** After vacuuming Degas Chamber, perform a complete wipe of the chamber using additional IPA saturated MiraWIPES® (See Fig 64, 65 & 66)

![Fig 64, 65 & 66: IPA saturated MiraWIPES® wiping down Degas Chamber](image1)

**Step 34:** Place an IPA saturated MiraWIPE® underneath the heater, then remove the **HT4536DW-1 ScrubBELT®** from the **FTPEN-1 ScrubWRIGHT™ Pen** and using the pen as a tool on top of the MiraWIPE®, wipe underneath the Degas Heater the best you can (See Fig 67 & 68)

![Fig 67 & 68: FTPEN-1 guiding a saturated MiraWIPE® beneath Degas Heater](image2)
**AMAT ENDURA™ DEGAS CHAMBER PM PROCEDURE (CONT’D):**

**LIFT RING REPLACEMENT PROCEDURE:**

**Step 35:** Replace the Degas Chamber by following AMAT’s recommended lift ring replacement procedure (See Fig 69 & 70)

![Fig 69 & 70: Replacing lift ring back into Degas Chamber (1st & 3rd generation shown)](image1)

**Step 36:** Ensure to align the lift ring in accordance with AMAT’s recommendation using the Degas Chamber Lift Ring Alignment Fixture (See Fig 71 & 72)

![Fig 71 & 72: Aligning to Degas Heater lift ring using AMAT’s alignment fixture (1st & 3rd generation shown)](image2)

**Step 37:** When the lift ring has been properly reinstalled into the Degas Chamber, perform a final wipe using an IPA saturated MiraWIPE®

1. Make sure to wipe all pump ports, slit valves and o-ring surfaces
2. Wipe the top reflector plate with a freshly IPA saturated MiraWIPE®
AMAT ENDURA™ Degas Chamber PM Procedure (cont’d):

**Step 38:** To complete an effective final wipe procedure of PM on the 3rd Generation Degas Heater Assembly, fold the HT4790 UltraSOLV® Foam Wiper into quarters, lightly dampen with IPA and pull across entire surface of Degas Heater Assembly (See Fig 73 & 74)

![Fig 73 & 74: HT4790 UltraSOLV® Foam Wiper cleaning surface of heater assembly](image)

**NOTE:** THE USE OF THE HT4790 UltraSOLV® FOAM WIPER WILL GREATLY REDUCE BACKSIDE PARTICLE PROBLEMS (SEE FIG 75)

![Fig 75: Particles removed by using HT4790 UltraSOLV® Foam Wiper on surface of heater assembly](image)

**Step 39:** Close Degas Chamber and bring it back to production using AMAT’s recommended recovery procedure

![COMPLETED DEGAS CHAMBER SCRUB](image)