

VACUUM CHAMBER PM TECHNIQUE AMAT CENTURA 200MM HDP DOME SCRUB

OBJECTIVE:

TO PM THE AMAT ENTURA 200MM HDP DOME IN A TIMELY AND EFFECTIVE MANNER, WHILE REDUCING TOOL DOWNTIME, IMPROVING TOOL RECOVERY AND PARTICLE PERFORMANCE

<u>Vacuum Chamber:</u>	APPLIED MATERIALS 200MM HDP CHAMBER
<u>Vacuum Chamber Process Residue:</u>	PROCESS INDUCED RESIDUE FROM HDP/CVD PROCESS
<u>Vacuum Chamber Components:</u>	HDP CERAMIC DOME

Old Procedure: 12+ hours removing and replacing ceramic dome

Recovery time: 24 to 48 hours

Interval: 30,000 wafers

New Procedure: 1-2 hours using Foamtec International *High Precision PM Technique*

Recovery time: <24 Hours

Benefits: Eliminate high cost and reduce tool downtime from having to remove and replace HDP Dome

Vacuum Chamber Products:

AMAT HPD Dome Scrub PM Kit

PM Kit P/N: [HT4500-DOME5P](#)

- (1) [HT9423](#) CushionPAD 24" X 24"
- (2) [HT4528D](#)-10-1 280 Grit Diamond ScrubPAD
- (1) [HT4536DW](#)-1 360 Grit Diamond ScrubBELT®
- (1) [FTPEN](#)-1 ScrubWRIGHT™ PEN
- (1) [HT4754](#) UltraSOLV® Sponge
- (2) [HT1511FC](#)-5 MiraSWABS® (10 MiraSWABS®)
- (2) [HT5790S](#)-5 MiraWIPES® (10 MiraWIPES®)
- (2) [HT4790](#)-5 UltraSOLV® Wipers (10 wipers)
- (1) FT1301 Plastic container w/sealed top (not shown)
- (1) AN-DOME5P Document Application Note



AMAT CENTURA 200MM HDP PM:

View "How to" instructional videos on <http://www.foamtecintlwcc.com/flash/>

Step 1: Using proper procedures and **safety guidelines** prepare AMAT CENTURA HDP Chamber for Dome Scrub PM

Step 2: Properly place AMAT CENTURA chamber cover over the HDP chamber to protect particles from being introduced into process chamber

NOTE: **MAY USE CLEANROOM PLASTIC TO COVER THE HDP CHAMBER IF NECESSARY (See Fig 1). HT9423 CushionPAD PROVIDED IN PM KIT TO COVER HDP PROCESS CHAMBER IF CHAMBER COVER NOT AVAILABLE**

Fig 1: Clean room plastic covering HDP Process Chamber



Step 3: If available, recommend using clean room tape to tape up ports around HDP dome and HDP nozzle to prevent DI water from accumulating in those areas (See Fig 2)

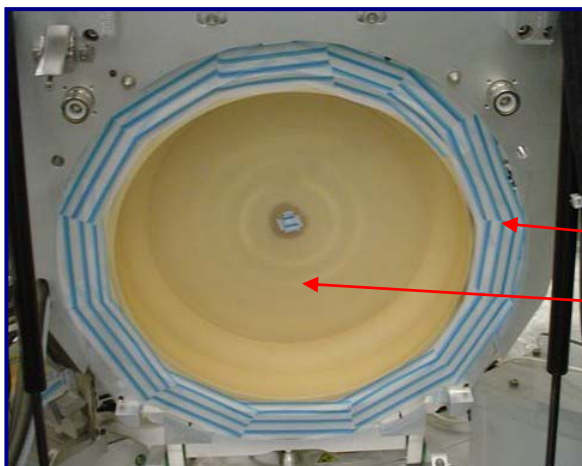


Fig 2: Clean room tape protecting areas around dome and HDP nozzle

AMAT CENTURA 200MM HDP PM PROCEDURE (CONT'D):

Step 4: Properly fill FT1301 plastic container with 12oz of DI water and stage with Foamtec International products next to HDP dome (See Fig 3)

Fig 3: FT1301 filled with 12oz. of DI water and products staged next to HDP dome



NOTE: ErgoSCRUB® w/ ScrubDISK® may be used if desired

Step 5: Using DI water in FT1301 container, moisten [HT4754](#) UltraSOLV® Sponge and begin to wipe out HDP dome to remove any flakes or loose deposition

Step 6: Again using DI water in FT1301 container, moisten [HT4528D](#) 280 Grit Diamond ScrubPAD and begin to scrub a 6" x 6" area around HDP Dome

Step 7: Rinse out UltraSOLV® Sponge in container of DI water. As loosened deposition begins to build up within HDP dome, take the **LIGHTLY DAMPENED** [HT4754](#) UltraSOLV® Sponge and wipe the HDP dome free of residue (See Fig 4)

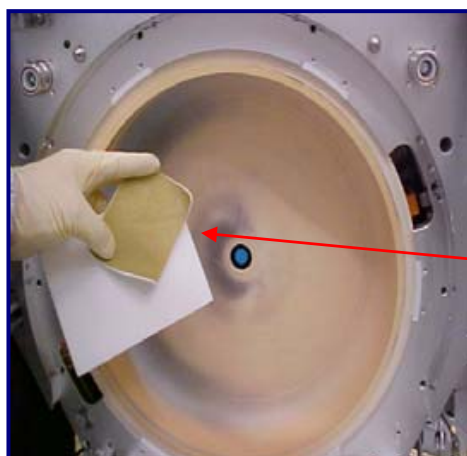


Fig 4: ScrubPAD and UltraSOLV® Sponge cleaning HDP dome

Step 8: Using the same technique described above, continue to scrub the remaining areas of HDP dome

AMAT CENTURA 200MM HDP PM PROCEDURE (CONT'D):

Step 9: As ScrubPAD begins to load up with deposition, pull across dampened UltraSOLV[®] Sponge to unload ScrubPAD (See Fig 5, 6 & 7)



Fig 5: ScrubPAD loaded with deposition



Fig 6: Pull ScrubPAD across UltraSOLV[®] Sponge



Fig 7: Unloaded ScrubPAD

NOTE: EXAMPLE ABOVE SHOWS ScrubPAD LOADED WITH A DARKER DEPOSITION. ScrubPAD WILL NOT APPEAR AS LOADED WITH DEPOSITION, BUT THE UNLOADING PROCESS IS A CRITICAL STEP THAT MUST BE FOLLOWED

NOTE: THROUGHOUT DOME SCRUB, ENSURE TO CONTINUOUSLY RINSE OUT HT4754 UltraSOLV[®] SPONGE IN CONTAINER OF DI WATER (Fig 8 & 9)



Fig 8: UltraSOLV[®] Sponge loaded with deposition

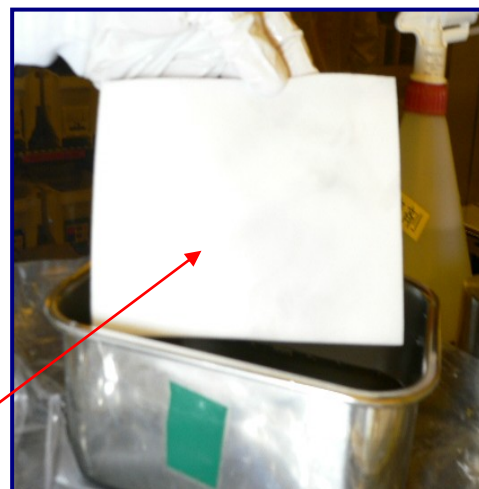


Fig 9: UltraSOLV[®] Sponge free of deposition after rinse in DI water

AMAT CENTURA 200MM HDP PM PROCEDURE (CONT'D):

Step 10: Repeat steps 4 - 9, scrubbing the remaining areas of the HDP dome, ensuring to rinse UltraSOLV[®] Sponge and unload 280 Grit Diamond ScrubPAD as necessary

NOTE: 280 GRIT DIAMOND ScrubPAD WILL BE MORE EFFECTIVE IF KEPT MOIST THROUGHOUT SCRUB PROCEDURE

Step 11: When 280 Grit Diamond ScrubPAD appears to have worn down by not effectively removing deposition, replace ScrubPAD with the second 280 Grit Diamond ScrubPAD, and continue scrubbing using the same technique as described above

Step 12: When completed with HDP Dome Scrub, take [HT4536DW](#) 360 Grit Diamond ScrubBELT[®] and place onto [FTPEN-1](#). Lightly dampen with DI water (See Fig 10 & 11)

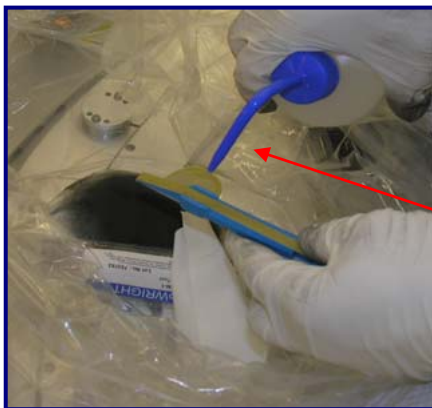
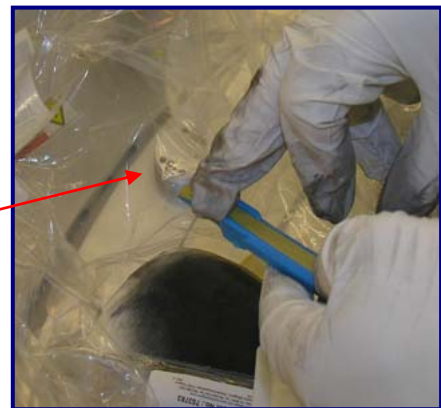


Fig 10 & 11: Lightly dampening ScrubBELT[®] with DI water



AMAT CENTURA 200MM HDP PM PROCEDURE (CONT'D):

Step 13: Using the [FTPEN-1](#) with ScrubBELT[®] concentrate on removing the o-ring stain around the edge of HDP dome (See Fig 12 & 13)

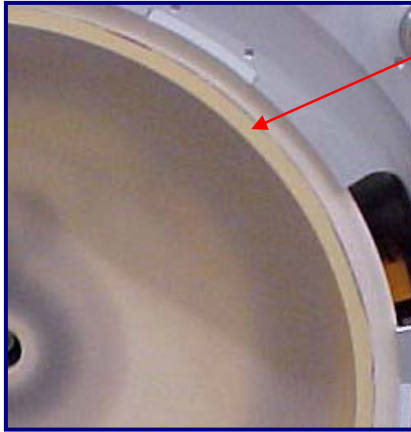


Fig 12: HDP dome seal **before** scrubbing with [FTPEN-1](#)

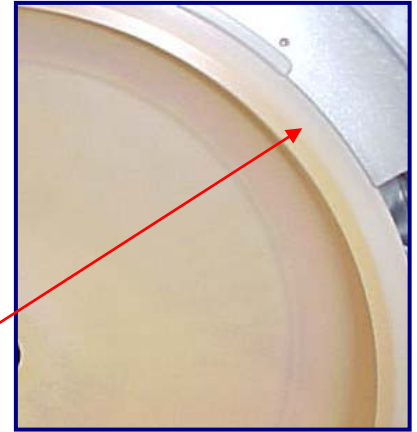


Fig 13: HDP dome seal **after** scrubbing with [FTPEN-1](#)

NOTE: WHEN ScrubBELT[®] APPEARS WORN NEAR EDGE OF [FTPEN-1](#), ROTATE THE ScrubBELT[®] APPROXIMATELY ¼ INCH TO EXPOSE A NEW AREA WITHIN ScrubBELT[®]

FINAL WIPE PROCEDURE PREPARATION:

Step 14: When HDP Dome Scrub is complete and edge of HDP dome is properly cleaned, prep Dome for FINAL WIPE PROCEDURE:

- a.) Dispose of DI water in proper hazardous waste container and replace with fresh DI water
- b.) Rinse out [HT4754](#) UltraSOLV[®] Sponge in fresh DI water and wipe out entire HDP dome
- c.) Continue to rinse out UltraSOLV[®] Sponge until entire dome has been effectively wiped out

AMAT CENTURA 200MM HDP PM PROCEDURE (CONT'D):

Step 15: Take [HT4790](#) UltraSOLV® Foam Wipe, fold into quarters and apply fresh DI water onto the surface (See Fig 14)

Fig 14: Applying fresh DI water to UltraSOLV® Foam Wipe



Step 16: Take lightly dampened UltraSOLV® Foam Wipe and pull across the HDP dome in one direction

Step 17: Turn foam wiper over to expose a fresh side of the foam wiper and repeat step 15 and 16 across another area of the HDP dome

Step 18: Continue to repeat steps 15 – 17 using the remaining UltraSOLV® Foam Wipers, remembering to pull the foam wiper across the dome in one direction effectively wiping all areas throughout HDP dome

Step 19: Remove HDP process chamber cover and any clean room tape used to close up any ports on HDP dome

Step 20: May need to use 280 Grit Diamond ScrubPAD to remove any excess clean room tape from edge of process chamber

AMAT CENTURA 200MM HDP PM PROCEDURE (CONT'D):

FINAL WIPE PROCEDURE:

IMPORTANT NOTE:

THE USE OF HT5790S MiraWIPES® DURING THE FINAL WIPE PROCEDURE IS A CRITICAL STEP TO EFFECTIVELY REMOVE PARTICLE DEFECTS FROM HDP 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 15a & 15b)

Fig 15a: Current fab wiper after completely wiping HDP dome



Fig 15b: Particles picked up using HT5790S MiraWIPES® after completely wiping with current fab wiper

MiraWIPES® are the KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY

Step 21: Once scrubbing all the process buildup throughout HDP dome is complete and the chamber cover has been removed, saturate the HT5790S MiraWIPE® with IPA and perform a complete chamber wipe down

Step 22: Replace the MiraWIPE® with a fresh MiraWIPE®, as necessary, and continue wiping HDP process chamber until MiraWIPE® no longer is able to remove process film from chamber

AMAT CENTURA 200MM HDP PM PROCEDURE (CONT'D):

Step 23: During final wipe portion of HDP process chamber, use [HT1511FC](#) MiraSWABS[®] saturated with IPA and wipe deposition out of all the hard to reach areas, concentrating on all the o-ring grooves and nozzle areas throughout the process chamber (See Fig 16)

Fig 16: What MiraSWAB[®] was able to remove from hard to reach areas throughout HDP process chamber



MiraWIPES[®] and MiraSWABS[®] are the KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY

Step 24: Upon completion of final wipe of HDP process chamber, replace all necessary parts, close chamber and using AMAT's recommended recovery procedure and bring tool back to production