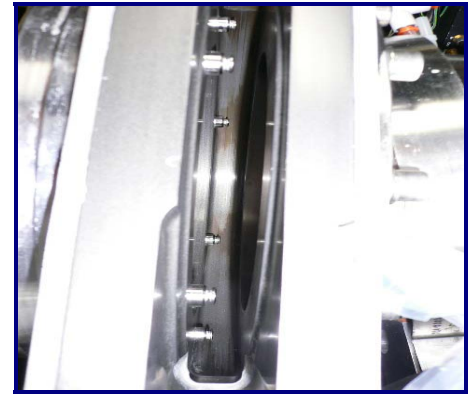


**BEFORE**



**AFTER**

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## VACUUM CHAMBER PM TECHNIQUE VAT Series 65 Pendulum Valve In-Place

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### **OBJECTIVE:**

TO EFFECTIVELY PM THE VAT SERIES 65 PENDULUM VALVE IN A TIMELY MANNER, WHILE MOUNTED IN PLACE, MINIMIZING EQUIPMENT DOWN TIME AND IMPROVING TOOL PERFORMANCE

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**Vacuum Chamber:**

LAM 9600 METAL ETCH, OR EQUIVALENT

**Vacuum Chamber Process Residue:**

PROCESS INDUCED RESIDUE

**Vacuum Chamber Components:**

VAT SERIES 65 PENDULUM VALVE

**Old Procedure:**

Currently **NOT ABLE** to effectively clean in place

**New Procedure:**

Foamtec International VAT Valve PM Kit, liter DI water and IPA

**Vacuum Chamber Products:**

**VAT Valve PM Kit**

**PM Kit P/N: [HT4500-LAM23-2](#)**

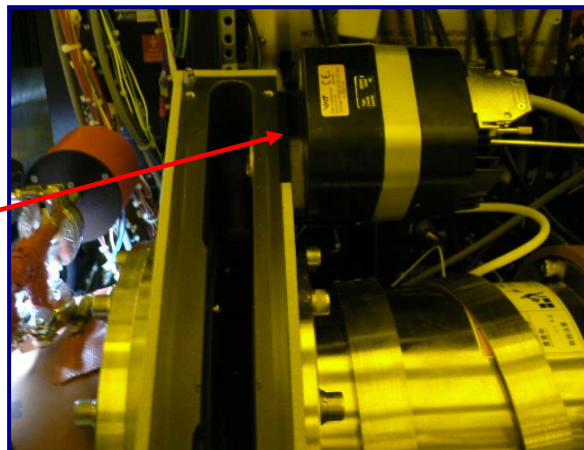
- (2) FT831 handles w/inserts for head
- (2) Rounded heads for handle w/hook
- (2) 280D Grit ScrubPAD sets w/loop to attach to head
- (2) UltraSOLV<sup>®</sup> Foam sets w/loop to attach to head
- (2) MiraWIPE<sup>®</sup> sets w/loop to attach to head
- (2) 280D Grit ScrubTIP<sup>®</sup> w/lollipop head to attach to handle
- (1) [HT1712-10](#) 12" UltraSOLV<sup>®</sup> Swabs
- (1) [HT1790-5](#) 5.5" UltraSOLV<sup>®</sup> Swab with angle
- (2) [HT4528D-10-1](#) 280 Grit Diamond ScrubPAD
- (1) [HT4536D-10-1](#) 360 Grit Diamond ScrubPAD
- (1) [HT4580D-10-1](#) 800 Grit Diamond ScrubPAD
- (1) [HT4754](#) UltraSOLV<sup>®</sup> Sponge
- (1) [PT4369](#) FirmWIPE<sup>®</sup> Disk
- (1) [HT5790S-25](#) MiraWIPE<sup>®</sup>

**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE:**

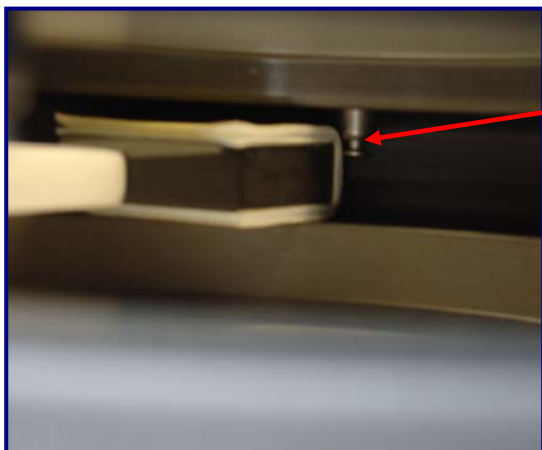
View "How to" instructional videos on <http://www.foamtecintlwcc.com/flash/>

- Step 1:** Using proper procedures and **safety guidelines** properly shutdown and vent entire Metal ETCH Chamber
- Step 2:** Reduce ETCH chamber heaters to recommended settings
- Step 3:** Must perform Foamtec International's LAM Metal ETCH Chamber Cleaning Technique to ensure the Metal ETCH Chamber does not contaminate the VAT valve
- Step 4:** Ensure to leave pendulum valve stepper motor attached to valve body for the initial portion of PM procedure (See Fig 1)

**Fig 1:** Pendulum valve stepper motor remains in place

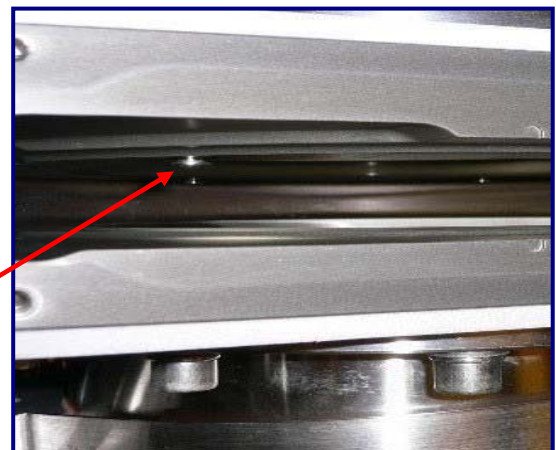


- Step 5:** Disassemble and remove all other VAT valve assemblies
- Step 6:** Actuate the pendulum valve stepper motor and retract the sealing ring pins to provide room for cleaning the back portion of the VAT valve (See Fig 2 & 3)



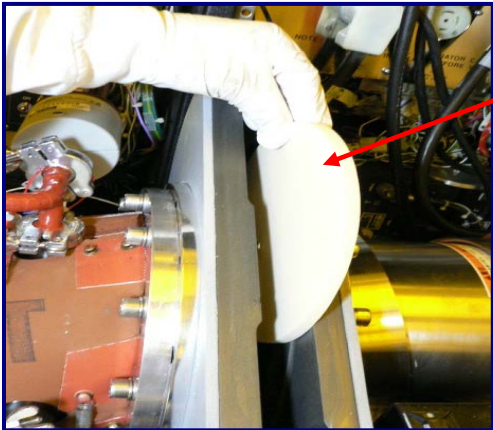
**Fig 2:** Sealing ring pin extended

**Fig 3:** Sealing ring pin retracted



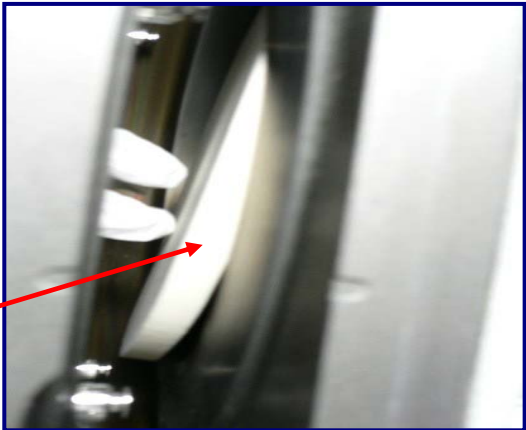
**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**Step 7:** In order to protect turbo pump during the VAT valve PM, take the [PT4369](#) FirmWIPE® Disk and properly place over pump (See Fig 4 & 5)

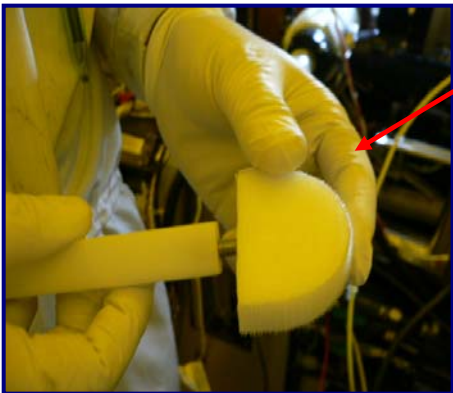


**Fig 4:** [PT4369](#) FirmWIPE® being put into place

**Fig 5:** [PT4369](#) FirmWIPE® protecting turbo pump

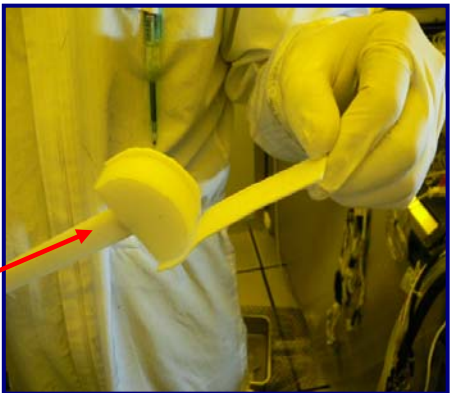


**Step 8:** Take FT831 handle and attach one of the rounded heads with hook to the end of the handle and attach a set of UltraSOLV® Foam Wipes to the head (See Fig 6 & 7)

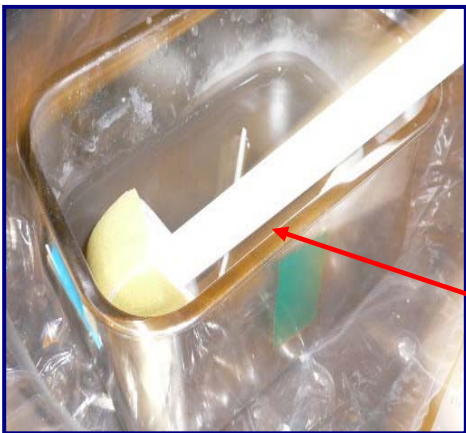


**Fig 6:** Rounded head with hook attached to handle

**Fig 7:** UltraSOLV® Foam Wipes attached to head

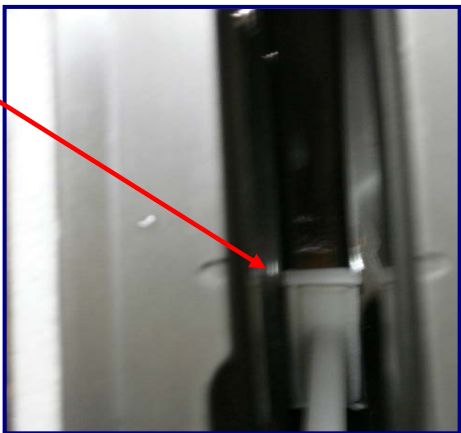


**Step 9:** In a small bucket of DI water moisten the foam wipes attached to the handle head and ring-out excess water (See Fig 8). Then proceed to perform a pre-wipe on the inner portions of the VAT valve (See Fig 9)



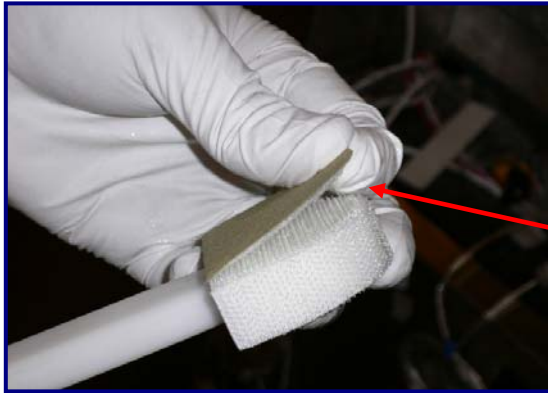
**Fig 9:** Pre-wipe inner portions of VAT valve

**Fig 8:** Dampen UltraSOLV® Foam Wipe in DI water



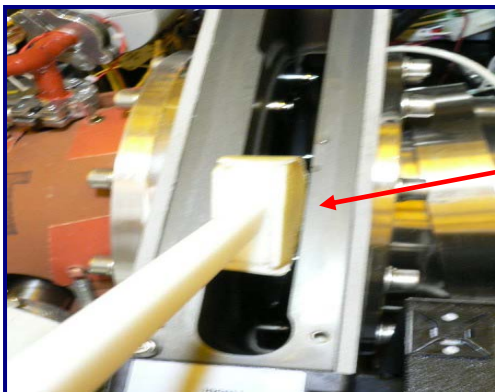
**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**Step 10:** Take the second FT831 handle and attach another circular head and attach a set of 280 Grit Diamond ScrubPADs to the circular head (See Fig 10)

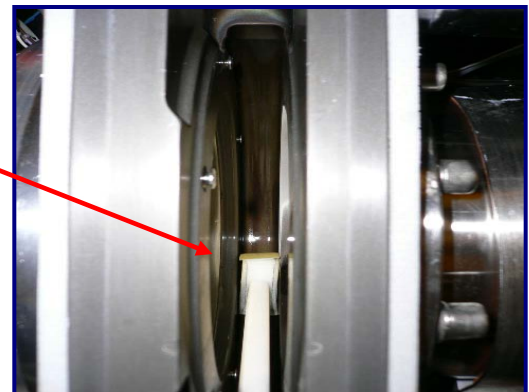


**Fig 10:** ScrubPAD attached to second rounded head

**Step 11:** Dampen the 280 Grit Diamond ScrubPAD with DI water and begin to scrub the inside of the VAT valve, concentrating on the heavy buildup deep in the back of the valve (See fig 11 & 12)



**Fig 11 & 12:** ScrubPAD scrubbing inside of VAT valve



**Step 12:** Alternate between using both handles; scrubbing the deposition with the ScrubPAD while wiping the loose deposition off with the UltraSOLV<sup>®</sup> Foam Wipe

**Step 13:** Continue to moisten the ScrubPAD and UltraSOLV<sup>®</sup> Foam Wipes with DI water, as necessary, to help scrub and remove the deposition from the VAT valve

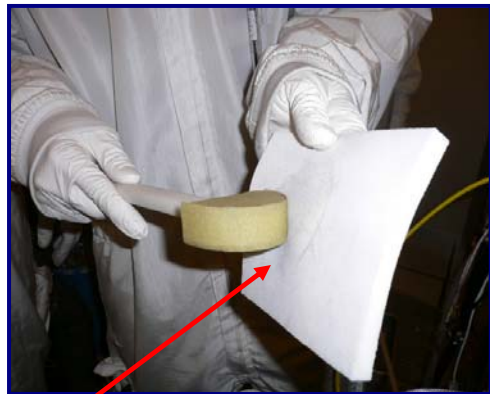
**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**Step 14:** Dampen the [HT4754](#) UltraSOLV<sup>®</sup> Sponge in DI water and ring-out excess water from sponge (see Fig 13)



**Fig 13:** Dampen [HT4754](#) UltraSOLV<sup>®</sup> Sponge in DI water

**Step 15:** Remove deposition buildup from ScrubPAD by pulling ScrubPAD across dampened UltraSOLV<sup>®</sup> Sponge, as necessary (See Fig 14 & 15)

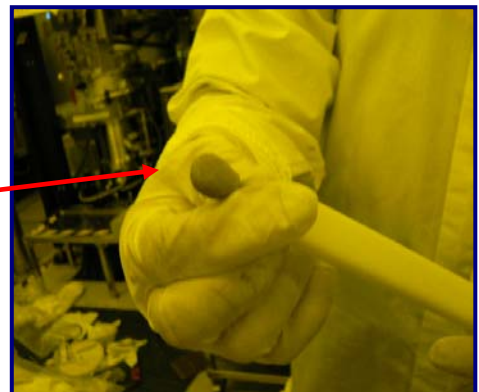


**Fig 14 & 15:** Unloading Diamond ScrubPAD onto UltraSOLV<sup>®</sup> Sponge

**Step 16:** Having sufficiently cleaned the deep areas within the VAT valve, remove the circular head with the 280 Grit Diamond ScrubPAD and insert the 280 Grit Diamond ScrubTIP<sup>®</sup> on the FT831 handle (See Fig 16 & 17)



**Fig 16 & 17:** FT831 handle w/280Grit Diamond ScrubTIP<sup>®</sup> attached



**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**Step 17:** Finish scrubbing the rest of the VAT valve using the 280 Grit Diamond ScrubTIP<sup>®</sup>, reaching the tight areas throughout the valve, using the same technique described above (See Fig 18)

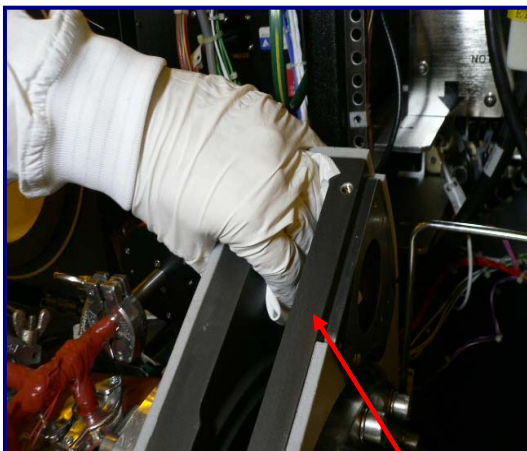


**Fig 18:** Scrubbing the tight areas throughout VAT valve

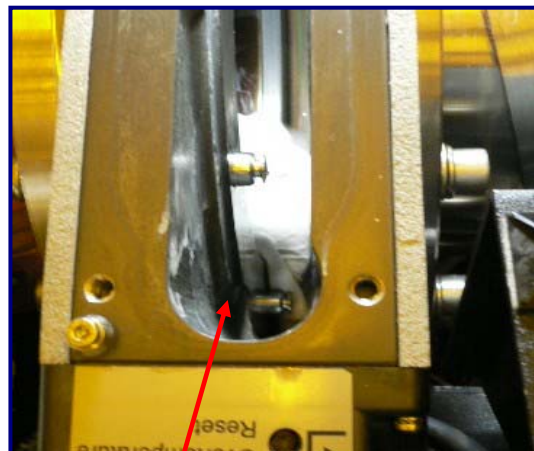
**NOTE:** REMEMBER TO USE THE HANDLE WITH THE UltraSOLV<sup>®</sup> FOAM WIPES TO REMOVE DEPOSITION FROM THE VAT VALVE, AS NECESSARY

**Step 18:** When Diamond ScrubPAD and ScrubTIP<sup>®</sup> become worn, replace with second set of ScrubPAD and ScrubTIP<sup>®</sup> within PM Kit

**Step 19:** Dampen a [HT4528D](#) ScrubPAD with DI water and proceed to scrub all areas throughout VAT valve that can be reached by hand (See Fig 19). If design permits, reach through the transition manifold by hand to scrub some of the remaining areas in the back of the VAT valve (See Fig 20)



**Fig 19:** Scrubbing areas throughout valve by hand



**Fig 20:** Reaching the back of VAT valve by reaching through transition manifold and scrubbing with 280D Grit ScrubPAD

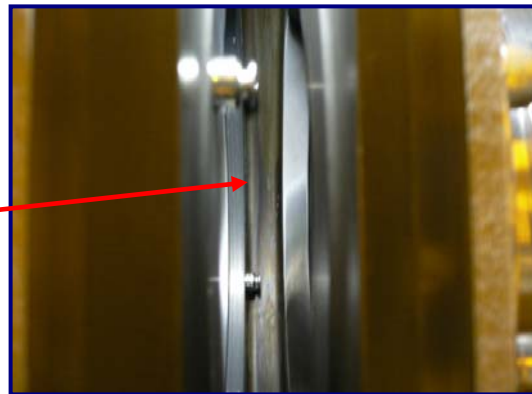
**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**NOTE:** REMEMBER TO UNLOAD ALL SCRUBPADS AS NECESSARY WITH [HT4754 UltraSOLV® SPONGE](#)

**IMPORTANT**

**DO NOT SCRUB THE TURBO PUMP SEAL UNLESS PLANNING TO REMOVE AND REPLACE TURBO PUMP. JUST WIPE WITH IPA & MIRAWIPES® DURING FINAL WIPE PORTION OF PROCEDURE (SEE FIG 21)**

**Fig 21:** Turbo pump seal, "DO NOT SCRUB" unless replacing turbo pump

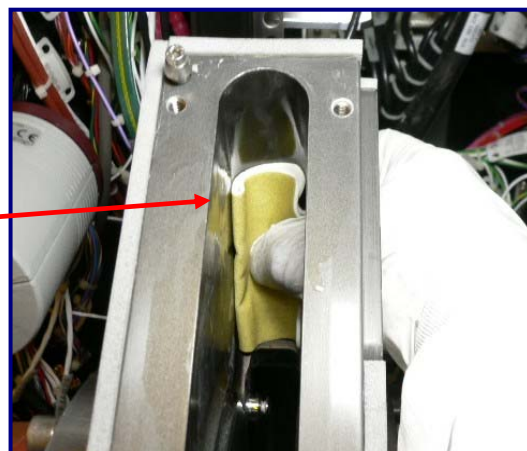


**Step 20:** Take moistened [HT4754 UltraSOLV®](#) Sponge and wipe out VAT valve as necessary to remove deposition during scrub process

**Step 21:** Using proper procedures and **safety guidelines**, disassemble and remove pendulum valve stepper motor

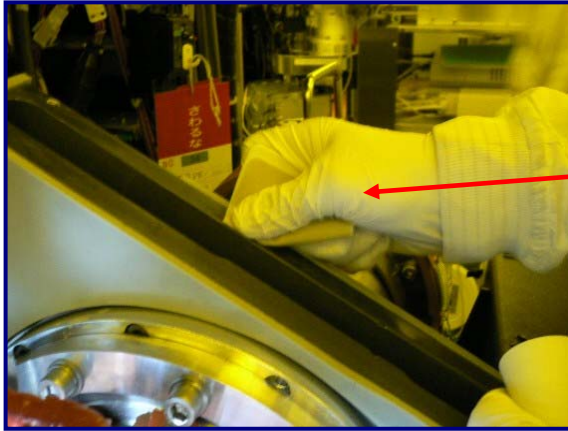
**Step 22:** With pendulum valve stepper motor removed, reach in with Diamond ScrubPAD to scrub area next to where the stepper motor was attached and wipe with UltraSOLV® Sponge (See Fig 22)

**Fig 22:** 280 Grit Diamond ScrubPAD scrubbing area next to stepper motor



**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**Step 23:** Using same technique as described above, moisten [HT4536D](#) 360 Grit Diamond ScrubPAD and proceed to scrub the outer sealing surface of VAT valve (See Fig 23)



**Fig 23:** 360D Grit Diamond ScrubPAD removing deposition on outer sealing surface

**Step 24:** Using same technique as described above in step 22, moisten [HT4580D](#) 800 Grit Diamond ScrubPAD and **polish** VAT valve sealing surface

**Step 25:** Replace small bucket of DI water with fresh DI water and proceed to rinse out [HT4754](#) UltraSOLV<sup>®</sup> Sponge to prep the VAT valve for Final IPA Wipe Procedure

**Step 26:** Use fresh DI water moisten [HT4754](#) UltraSOLV<sup>®</sup> Sponge and proceed to wipe down as much of the VAT valve as can be reached. Continue to rinse out sponge as necessary

**REPLACING PENDULUM VALVE STEPPER MOTOR:**

**Step 27:** Take [HT1790](#) UltraSOLV<sup>®</sup> Swabs and dampen with IPA. Proceed to wipe the stepper motor seals free of vacuum grease (See Fig 24)

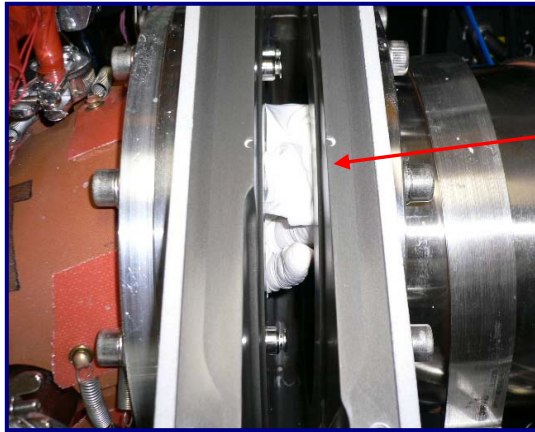


**Fig 24:** UltraSOLV<sup>®</sup> Swab cleaning stepper motor seals



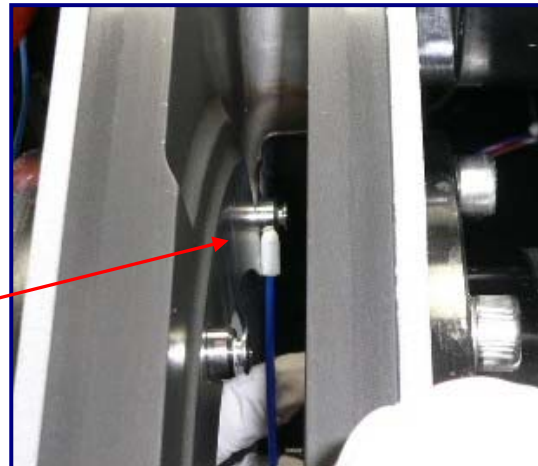
**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**Step 28:** Apply IPA to MiraWIPE® and effectively wipe out stepper motor seals (See Fig 25)



**Fig 25:** MiraWIPE® with IPA wiping out seals

**Step 29:** Take [HT1712-10](#), 12" UltraSOLV® Swab and dampen with IPA and proceed to wipe guide pins as much as possible (See Fig 26)

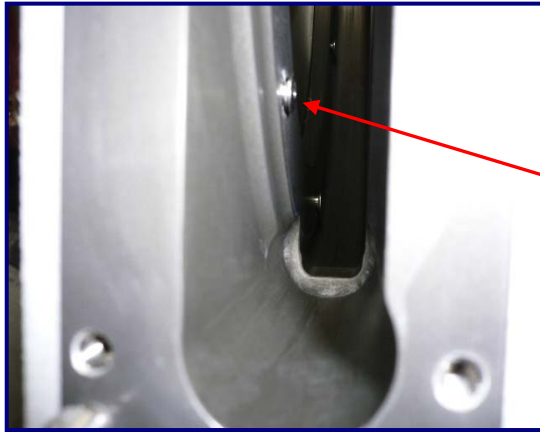


**Fig 26:** UltraSOLV® Swabs wiping guide pins

**Step 30:** Using proper procedures and guidelines to replace pendulum valve stepper motor back into VAT 65 Pendulum Valve

**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

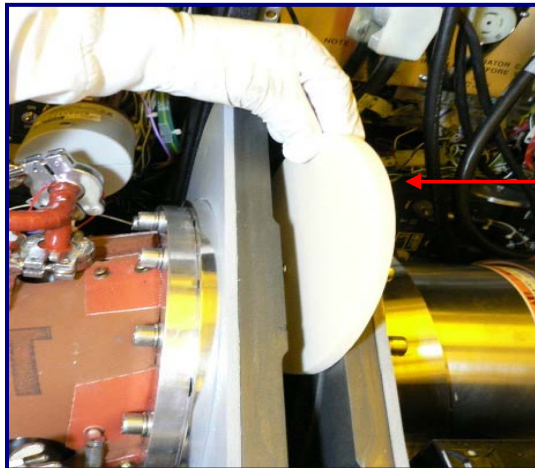
**Step 31:** Actuate pendulum valve stepper motor to retract guide pins (See Fig 27)



**Fig 27:** Pendulum valve guide pins retracted

**!!!! IMPORTANT !!!!**

**REACH INTO VAT VALVE AND REMOVE [PT4369](#) FirmWIPE® DISK THAT WAS PUT INTO PLACE TO PROTECT THE TURBO PUMP (SEE FIG 28)**



**Fig 28:** [PT4369](#) FirmWIPE® being pulled out of place

**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**FINAL IPA WIPE PROCEDURE:**

**VERY IMPORTANT NOTE**

**THE USE OF HT5790S MiraWIPES® DURING THE FINAL WIPE PROCEDURE IS A CRITICAL STEP TO EFFECTIVELY REMOVE PARTICLE DEFECTS FROM LAM 9600**

**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 IPA Wipe the most **CRITICAL STEP** of the PM procedure (See Fig 29a & 29b)



**Fig 29a:** Current fab wiper after completely wiping chamber

**Fig 29b:** 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**

This important step must be effectively followed in order to achieve the maximum efficiency of tool recovery and performance. Continue to wipe-down all of the affected PM areas within the VAT valve, repeating until MiraWIPES® no longer remove deposition

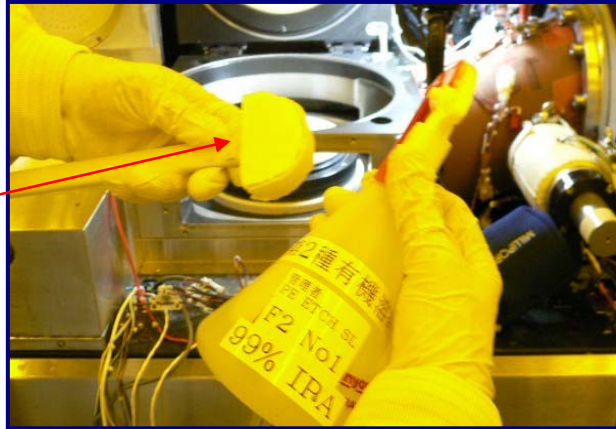
Ensure to wipe down all parts, o-rings and o-ring grooves that are placed back into the VAT valve using additional IPA dampened HT5790S MiraWIPES®

**Step 32:** Remove UltraSOLV® Foam Wipes from circular head attached to FT831 Handle and replace with MiraWIPES®

**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

**Step 33:** Dampen MiraWIPES<sup>®</sup> attached to FT831 handle with IPA (See Fig 30)

**Fig 30:** MiraWIPES<sup>®</sup> attached to FT831 handle, soaked w/IPA

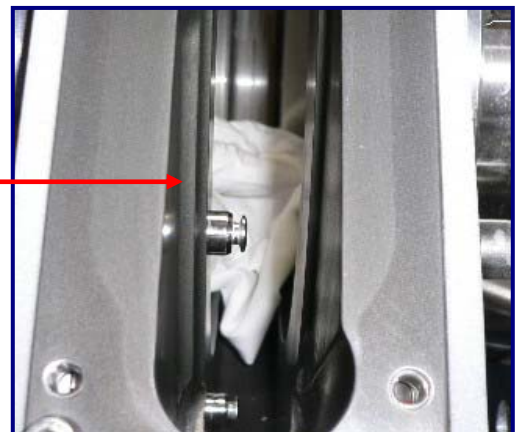


**Step 34:** Using FT831 handle w/MiraWIPES<sup>®</sup>, proceed to reach into the VAT valve and wipe out as much of the VAT valve as possible. Replace the set of MiraWIPES<sup>®</sup> attached to the handle with a clean set of MiraWIPES<sup>®</sup> as they become excessively dirty

**Step 35:** Take [HT5790S](#) MiraWIPE<sup>®</sup>, fold into quarters and dampen with IPA. Reach into the transition manifold and wipe out as much of the VAT valve as possible. Concentrate on tight areas that the VAT valve handle may not be able to effectively reach. Also concentrate on effectively wiping the top edges of turbo pump (See Fig 31 & 32)



**Fig 31 & 32:** MiraWIPES<sup>®</sup> wiping VAT valve



**Step 36:** Dampen the [HT1712](#) UltraSOLV<sup>®</sup> Swabs with IPA and wipe all edges and tight corners throughout VAT valve. Replace UltraSOLV<sup>®</sup> Swab as necessary and repeat process

**LAM 9600 METAL ETCH VAT VALVE PM PROCEDURE (CONT'D):**

- Step 37:** Continue to wipe out VAT valve by wrapping a clean [HT5790S](#) MiraWIPE® around circular head at the end of the FT831 handle. Then moisten w/IPA and reach into VAT valve to continue wiping all internal structures of VAT valve
- Step 38:** Dampen [HT5790S](#) MiraWIPE® and effectively wipe down all sealing surfaces within the VAT valve

**NOTE:** The entire MiraWIPE® Final Wipe Procedure steps are the most important steps in the VAT Valve PM Procedure. It is **ESSENTIAL** to perform these steps with the MiraWIPES®, as the MiraWIPES® are the key element to IMPROVE TOOL RECOVERY and REDUCE PARTICLES

**FINAL STEPS:**

- Step 39:** Using remaining products, such as [HT4528D](#) & [HT4536D](#) ScrubPADS, effectively clean all the remaining parts to be placed back into the VAT valve (valve bonnet, pendulum valve, sealing ring...)
- Step 40:** Ensure to take an [HT5790S](#) MiraWIPE® and dampen w/IPA and wipe down all parts being placed back into VAT valve
- Step 41:** Take an [HT5790S](#) MiraWIPE® and wipe down Metal ETCH Chamber ENTIRELY prior to closing and placing under hi-vac

**TOOL RECOVERY:**

- Step 42:** Follow proper tool recovery guidelines as outlined by LAM Research Corporation