

晶圓廠 TEL LPCVD- In-situ POLY 爐管PM保養程序

Wafer FAB TEL LPCVD- In-situ POLY Furnace PM Maintenance Procedure

壹、目的

1. Objective

貳、適用時機

2. Suitable time

參、執行規則

3. Rule execution

肆、使用材料

4. Use material

伍、使用設備

5. Facilities

陸、安全事項

6. Safety matters

柒、操作步驟

7. Steps

晶圓廠 TEL LPCVD-In-situ POLY 爐管PM保養程序

Wafer FAB TEL LPCVD- In-situ POLY Furnace PM Maintenance Procedure

壹、目的：

Objective:

使機台維持最佳狀況、降低 DOWN TIME。

To maintain the best condition of the machine, reduce the DOWN TIME

貳、適用時機：

2. Suitable time:

一、大PM：40+-10 run(In-situ 製程 for P7)。

Major PM: 40+-10 run(In-situ Process for P7)。

二、機臺異常須 PM 時。

Machine abnormal must PM

三、更換製程須 PM 時。

Change process need to PM

四、年度歲修須 PM 時。

Annual shut down to be PM

五、遇特殊情況時，在機臺狀況允許下，可適度將 PM 時機 “±值” 放寬至三倍以內作 PM。

In special circumstances, under the machine conditions permit, it is appropriate to PM “±value” relaxed to less than 3 times for PM

參、執行規則：

3. Rule execution:

NO: 3363-0004	VERSION: A	PAGE: 3
---------------	------------	----------------

大PM。

Major PM。

肆、使用材料：

4. Material to use:

IPA (異丙醇)，無塵布，O-RING等。

IPA, wiper, O-ring, etc.

伍、使用設備：

5. Use facilities:

公制六角扳手，活動扳手，十字一字起子，TUBE SLIDER...等。

Metric hex wrenches, wrenches, cross screwdriver, TUBE SLIDER...etc.

陸、安全事項：

6. Safety matters:

一、石英配件易碎，拆裝請小心。

1. Quartz accessories fragile, disassembly, please be careful.

二、MANIFOLD 及外管重量不輕，請注意拆裝之安全。

2. MANIFOLD and the outer tube weight is not light, please pay attention to safety during disassembly

三、當內外管溫度仍高於 150°C (面板顯示)時，請先戴隔熱手套後再抓取內外管，以避免灼傷。

3. When the inner and outer tube temperature is still higher than 150°C (panel display), please wear insulated gloves and then grab the inner and outer tubes to avoid burns.

四、請使用手推車搬運內外管於酸房與機臺之間。

4. Please use a trolley to transport the inner and outer tubing between the acid room and the machine.

五、使用化學品，應穿戴防護器具。

NO: 3363-0004	VERSION: A	PAGE: 4
---------------	------------	---------

5. Use chemicals, wear protective equipment

六、PM 拆下之零件並分解，再拿至震盪槽 CLEAN，震完後管內以 DI 沖洗再以 AIR 吹乾
以上動作有水漬噴濺，必須穿戴護目鏡或防護器具，避免造成眼部傷害。

6. PM remove the parts and disassemble them, then take them to the shock tank CLEAN.
After the earthquake, rinse the tubes with DI and then dry them with AIR.

The above actions are splashed with water and must be worn with goggles or protective gear to avoid eye damage.

七、於PM 時使用 low vacuum clean 零件，必須配戴耳罩避免耳部噪音之傷害。

7. Use low vacuum clean parts for PM and wear earmuffs to avoid ear noise.

柒、操作步驟：

● 大PM保養程序

Major PM maintenance procedure

一、降溫：將208V POWER OFF。

1. Cooling: 208V POWER OFF.

二、將 BOAT 上的 DUMMY WAFER 以 T-BAWL 取下(RUN MODE 下之DUMMY UNLOAD)。

2. Remove the DUMMY WAFER from BOAT with T-BAWL (DUMMY UNLOAD in RUN MODE).

三、將PEDESTAL COVER、PEDESTAL 5-fin取下，用六角扳手將PEDESTAL TABLE 的螺絲鬆開取下 DUST TRAY、T/C PORT、COVER後一同拿至洗管間供酸房人員清洗。

3. Remove the PEDESTAL COVER, PEDESTAL 5-fin, with hexagonal wrench to PEDESTAL TABLE to screw to remove the DUST TRAY, T/C PORT, COVER together after the wash room for the wash room for the staff to clean.

四、使用 VL-800 MANU MODE 下之MAUNAL 或 ADJUST 的 MOTION 5 將 BOAT CLAMP 鬆開後將 BOAT拿至洗管間供酸房人員清洗。

NO: 3363-0004	VERSION: A	PAGE: 5
---------------	------------	---------

4. Use the VL800 MANUAL MODE under the MANUAL or ADJUST MOTION 5 BOAT CLAMP will be released after the BOAT to get to wash room for the acid cleaning room staff.

五、當爐管溫度降至室溫時可進行拆管,其步驟如下:(為促進降溫速度,可將 DOOR SHUTTER 打開。其方法為 MANUAL 或 ADJUST 的 MOTION 3至P02->MOTION 4 至P02)

5. When the tube temperature dropped to room temperature can be dismantled, the steps are as follows: (to promote the cooling rate, can DOOR SHUTTER turn on. MOTION 3 to P02-> MOTION 4 to P02 for MANUAL or ADJUST)

1. 以 "十" 字起子將遮蓋 MANIFOLD 的 PANEL 取下。

1. Removed by "10" screwdriver to cover MANIFOLD PANEL.

2. 以六角扳手鬆開 DOOR SHUTTER 的螺絲後取下 DOOR SHUTTER。

** VL-800 之MOTION 3 及 MOTION 4 均須在 POSITION 2, MOTION 1 不可超過POSITION 2。

** 鬆開螺絲時須用另一隻手扶著 DOOR SHUTTER 防止其掉下。

2. Loosen the DOOR SHUTTER screw with a hexagonal wrench and remove the DOOR SHUTTER.

** For MOTION 3 and MOTION 4 of VL-800, POSITION 2 and MOTION 1 must not exceed POSITION

** When loosening the screws, use the other hand to hold the DOOR SHUTTER to prevent it from falling.

3. 拆 SiH4 /1% PH3 INJECTOR。

Remove SiH4 / 1% PH3 INJECTOR.

4. 拆 PSI 接頭、VACUUM PIPE。

Remove the PSI connector, VACUUM PIPE

5. 拆內管, 步驟如下(所提即的各部位名稱請參考圖二):

Remove the inner tube, the steps are as follows (refer to the name of the various parts of Figure 2):

將MANIFOLD INSTALLATION JIG 放在CAPPING FLANGE上。

將INNER JIG 放在MANIFOLD INSTALLATION JIG 上, 其POSITIONING BLOCK 須對準MANIFOLD INSTALLATION JIG 上的LOCATION GROOVE。

NO: 3363-0004	VERSION: A	PAGE: 6
---------------	------------	---------

將ROTARY HANDLE 轉至 " LOCK " 位置。

檢查 VL-800 MOTION 1 (SET M01 SPD)之速度是否為100，如果不是請改成100。

將 VL-800 MOTION 1 往上升，注意與MANIFOLD INSTALLATION JIG 交接是否平穩，如不平穩請調整之，如果平穩則繼續上升。當MANIFOLD INSTALLATION JIG 接近 MANIFOLD 時請注意 INNER JIG 上的POSITIONING BLOCK 須對準MANIFOLD 上的POSITIONING BLOCK，當B/E上的彈簧稍微壓縮時即停止上升。

將ROTARY HANDLE 轉至" FREE " 位置。

將 VL-800 MOTION 1往下降，速度宜緩慢，可自VACUUM PIPE HOLE 中觀查內管下降情形，當B/E降至接近TUBE SLIDER 時請小心，勿使內管晃動。

B/E 續降至POSITION 1後取下內管、INNER TUBE HOLDER、INNER JIG。

Put the MANFOLD INSTALLATION JIG on the CAPPING FLANGE.

Put the INNER JIG on the MANIFOLD INSTALLATION JIG, the POSITIONING BLOCK MUST aim LOCATION GROOVE on the MANIFOLD INSTALLATION JIG

Transfer the ROTARY HANDLE to "LOCK" location

Check VL-800 MOTION 1 (SET MO1 SPD) speed if 100, if not change to 100.

Move the VL-800 MOTION 1 up and note if the handover to the MANIFOLD INSTALLATION JIG is stable, the whole, if the continues to rise steadily. Note the INNER JIG when MANIFOLD INSTALLATION JIG is close to MANIFOLD INSTALLATION JIG is close to MANIFOLD, on the POSITIONING BLOCK must be aligned MANIFOLD on the POSITIONING BLOCK, when the spring on the B/E is slightly compressed stop rising. Move the ROTARY HANDLE to the FREE position. The VL-800 MOTION 1 to decline, the speed should be slow. Can be observed from the VACUUM PIPE HOLE tube when the B/E decline. Be careful when approaching the TUBE SLIDER. Do not rock the inner tube. B/E continued down to POSITION 1 after the removal of the inner tube, INNER TUBE HOLDER, INNER JIG.

6. 拆N2 INJECTOR。

Remove N2 INJECTOR

NO: 3363-0004	VERSION: A	PAGE: 7
---------------	------------	---------

7. 拆PADDLE T/C(無則將INJECTOR CAP拆下)。

Remove PADDLE T/C (if not, remove the INJECTOR CAP)

8. 拆外管，步驟如下(所提及的各部位名稱，請參考圖三)：

Remove outer tube, the following steps (the names of the parts mentioned, please refer to Figure 3)

將B/E 往上升，與MANIFOLD INSTALLATION JIG 交接時須注意是否平穩，如不平穩 請調整之；如果平穩，則可繼續上升。接近MANIFOLD 時須注意LOCATION GROOVE 要對準MANIFOLD 的 POSITIONING BLOCK，當B/E 的彈簧稍微壓縮時即停止上升。

將MANIFOLD CHILLING WATER BELLOW 快速接頭與機台分離並纏繞於B/E旁，然後鬆開4顆固定 MANIFOLD 的螺絲 (LOCK HANDLE)。

將B/E 往下降，須注意MANIFOLD 是否一同下降，降至POSITION 3 附近時須提防勿使MANIFOLD 碰到BOAT TRANSFER，在與TUBE SLIDER 交接時亦不要引起 太大晃動，當B/E 降至POSITION 1即停住。

鬆開固定外管的BOLT 上的螺絲後取下BOLT，TEFLON RING。

取下外管、O-RING、O-RING HOLDER、MANIFOLD。

Rise the B/E and MANIFOLD INSTALLATION JIG handover should pay attention to whether smooth, if not smooth, please adjust; If smooth, you can continue to rise. When approaching MANIFOLD, be aware that LOCATION GROOVE is aimed at the POSITIONING of MANIFOLD BLOCK, when the spring B/E is slightly compressed to stop rising. Separate the MANIFOLD CHILLING WATER BELLOW connector from the machine and wrap it around the B/E, then loosen the four MANIFOLD screws (LOCK HANDLE). Thee B/E to decline, we must pay attention to MANIFOLD whether together with the decline, down to the vicinity of POSITION 3 to be careful not to make MANIFOLD touch. Hit the BOAT TRANAFER, in connection with the TUBE SLIDER do not cause too much shaking when B/E down to POSITION 1 stop live. Loosen the screws on the BOLT securing the outer tube and remove the BOLT. TEFLON RING. Remove the outer tube, O-RING, O-RING HOLDER, MANIFOLD,

拆下的石英配件須拿至洗管間由酸房人員負責清洗並準備一套以俾進行裝管。

The removed quartz must be taken to the wash room by the acid room staff responsible for cleaning and prepare a set to serve for the tube.

六、將 MANIFOLD、用菜瓜布沾IPA清潔後+用小白布沾IPA清潔，VACCUM PIPING 以IPA 清潔乾淨。

Clean the MANIFOLD, Clean with a melon cloth dipped in IPA + clean with a small white cloth dipped in IPA VACCUM PIPING with IPA.

七、組裝：

Assembly:

1.程序與拆管程序相反，不再贅述，亦請注意安全。

The procedure is the opposite of the demolition procedure.

Injector 安裝手法：如圖解

Injector installation method: as illustrated



2.裝PEDESTAL前須以水平儀檢查 CAPPING FLANGE 邊緣對角四點之水平狀態，若有偏差則須調整至最

NO: 3363-0004	VERSION: A	PAGE: 9
---------------	------------	---------

佳狀態。

Before the installation of PEDESTAL to be level to check CAPPING FLANGE four points on the edge of the horizontal state, if the deviation must be adjusted to the best condition

3.裝完PEDESTAL COVER後，以水平儀檢查其與 BOAT 接合面之水平是否合乎要求，若有偏差則須調整至最佳狀態(參考技資G3363-1010)，再將 BOAT 置上保溫筒並伸入管內檢查是否會刮管，若有刮管之慮則須調整使之不刮管。

After filling the PEDESTAL COVER, check with the level of the level of the BOAT interface with the suitability of the requirements, if the deviation must be adjusted to the best condition (Refer to technology information G3363-1010), then BOAT set the incubator tube and into the tube, if it is necessary to adjust to make it not scrape.

PM 完CHECK及調整 B/E DRIVER VOLTAGE(SPEC RUN/STOP : 0.38+-0.04/0.18+-0.02V)，若異常請更換新品。

4.PM complete CHECK and adjust B / E DRIVER VOLTAGE (SPEC RUN / STOP: 0.38 + -0.04 / 0.18 + -0.02V), if the exception please replace the new

PM 後拆下機臺正面COVER CLEAN CARRIER & STAGE ASSEMBLY & 機台內部周圍環境(COUNT/ORIENT/BODY..)。

After PM remove the COVER CLEAN CARRIER & STAGE ASSEMBLY & machine internal environment surroundings (COUNT/ORIENT/BODY..)

八、調整 BOAT 與 PEDESTAL COVER 承接時晃動的程度至最小後調整BOAT及BOAT LOCK的位置。

Adjust the BOAT and PEDSTAL COVER to undertake when the degree of shaking to a minimum after the adjustment BOAT and BOAT LOCK position

(參考技G3363-1010)

(Refer to technology information, G3363-1010)

九、 測試氣聲：

TEST the sound of air:

1. 將CAP連同PEDESTAL COVER升至P04位置。

NO: 3363-0004	VERSION: A	PAGE: 10
---------------	------------	----------

Increase the CAP to P04 with the PEDESTAL COVER

2.將 MODEL 3200 切換成 MANUAL MODE。

Change the MODEL 3200 to MANUAL MODE

3. 關所有進 TUBE 的 GAS VALVE。

Close all TUBE of GAS VALVE.

4.開 SV，ATM燈熄面後馬上關SV並通N2破大氣。

Open SV, ATM lights off immediately after the off SV and N2 break the atmosphere

5.ATM燈亮起後將CAP緩緩下降，CHECK有管內壓力是否為大氣。

ATM light will slowly drop CAP, CHECK whether the pressure inside the tube for the atmosphere

6.如果有氣往裡吸或是往外噴則調整760TORR SWITCH。

If there is gas inside or outside adjust the spray if 760TORR SWITCH

7.重複動作直至無氣聲為止

Repeat until there is no sound

十、 低溫PURGE：

Low temperature PURGE:

1 將CAP連同PEDESTAL升至 POSITION 4。

Increase the CAP with PEDESTAL to POSITION 4

2 將 MODEL 3200 切換成 MANUAL MODE。

Change the MODEL 3200 to MANUAL MODE.

3 關所有進 TUBE 的 GAS VALVE。

Shut all the GAS VALVE that will enter the TUBE.

4 開 SV 小抽，待管內壓力低於 5 TORR 時再開 MV大抽。

Open SV small pumping, to be under pressure when the tube is less than 5 TORR MV open again

5.將所有 N2 GAS打開。

Turn all N2 GAS on.

NO: 3363-0004	VERSION: A	PAGE: 11
---------------	------------	----------

6. PURGE後即可進行低溫測漏。

After PURGE can enter low temperature leakage.

十一、T-BAWL 傳送CHECK(參考技資G3363-1010)，只需CHECK FORK-5即可。

每次 BPM need clean counter sensor with air gun。

LP 管:每次 BPM clean 一次。

T-BAWL sends CHECK (Refer to technology information G3363-1010), only CHECK FORK-5

Every BPM need clean counter sensor with air gun. LP pipe: once every BPM clean

十二、低溫測漏：

Low temperature leak detection

1. 關所有GAS VALVE直至壓力抽至 0.00 TORR。

Close all GAS VALVE until the pressure reaches 0.00 TORR

2. 關 SV、MV 作測漏，規格為漏率小於0.00 TORR/ 130 SEC

Off SV, MV do leak detection, specifications for the leakage rate is less than 0.00 TORR / 130 SEC

十三、如果測漏不過則請進行抓漏，找出漏處並解決後再作測漏，直至漏率合乎規格。

If leaky, but please carry out leaks, to find the leak and solve the leak after the leak until the rate of compliance

十四、低溫測漏通過即可將208V POWER打開升溫。

Low temperature leak detection can be 208V POWER open to heat up

十五、作升溫PURGE：

For heating PURGE

升溫PURGE方式同低溫PURGE，不同點是 B/E 需連同PEDESTAL、BOAT一起至P04。

Heating PURGE mode with the low temperature PURGE, the difference is that B / E with PEDESTAL, BOAT together to P04

十六、高溫測漏：

High temperature leak detection P04

方法與規格皆和低溫測漏同，如果不過表示有漏須抓漏，直至通過方可進行下一步驟。

Methods and specifications are the same with the low-temperature leak detection, but if there is leakage to be missed, until the next step can be carried out through

十七、將機台內部及四周用LOW VACCUM與IPA 清潔乾淨。

Clean inside and around the machine with LOW VACUUM and IPA

十八、SPM/BPM 請 Check CAP Flow Meter 浮球 動作 & 機台 alarm 功能是否正常。

SPM / BPM should check if CAP Flow Meter floating ball movement & equipment alarm function are normal.



十九、將機台復歸為STANDBY狀態並執行COT程式，通知EA FOLLOW TEST RUN，於記錄本上註明做TEST RUN並簽名。

TEST RUN：即 RUN 一個平常 RUN 貨的 RECIPE 以量測其厚度，PARTICLE。如果均合乎規格即可交給生產線 RUN 貨，大PM保養工作至此完成。

The machine will revert to STANDBY state and the implementation of COT program, notify th EA FOLLOW TEST RUN, in the note on the record to do TEST RUN and signature.

TEST RUN: RUN a normal RUN goods RECIPE to measure the thickness, PARTICLE. If all meet the specifications to the production line RUN goods, large PM maintenance work is complete

二十、機台 TEST RUN 後，設備工程師需於機台 STANDBY 時，確認 PS1 PRESSURE=30TORR。

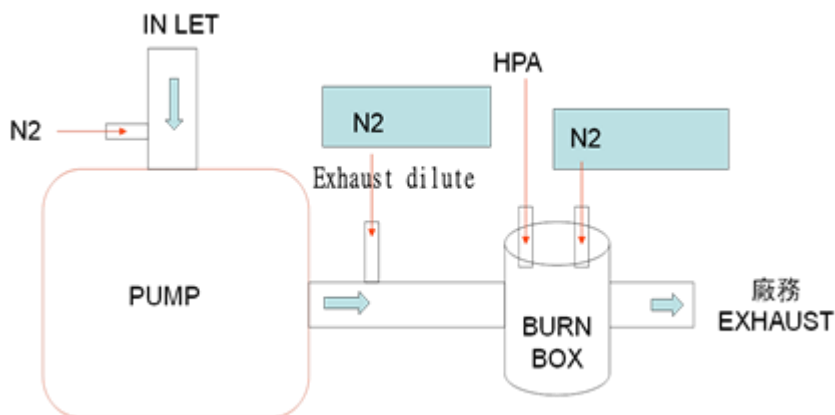
After the machine TEST RUN, the equipment engineer needs to confirm the PS1 PRESSURE = 30TORR when the machine STANDBY.

二十一、歲修期間機台負責全廠 PUMP DOWN SIH4 /1%PH3 GAS 程序步驟如下：

機台 Burn box N2 & HPA FLOW 調整(由 HPA 80 L → 改為 N2 30L + HPA 25L)

During the annual repair period, the machine is responsible for the whole plant PUMP DO SIH4 /1% PH3 GAS procedure as follows:

1. Machine Burn box N2 & HPA FLOW adjustment (from HPA 80 L → to N2 30L + HPA 25L)

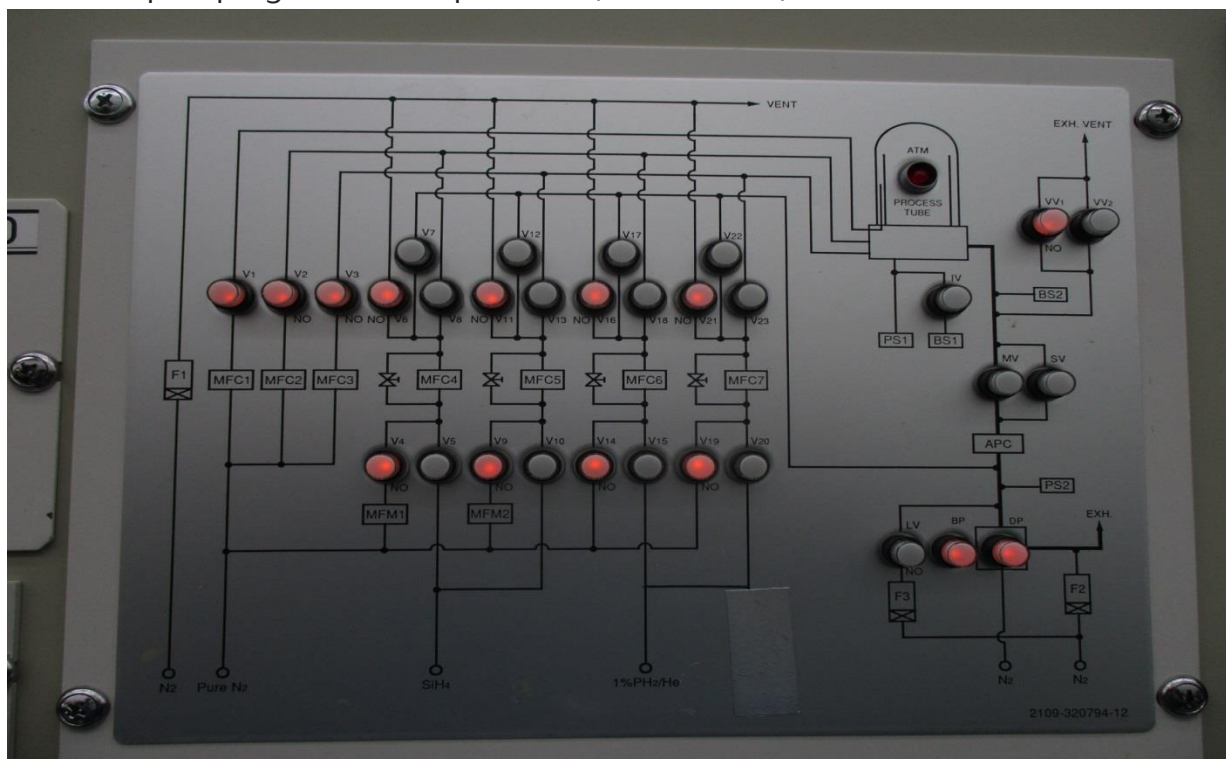


2. 機台 CHAMBE 溫度由 300度升至 620度

Machine CHAMBE temperature rises from 300 degrees to 620 degrees

3. 機台抽真空抽至底壓(<0.01 TORR)

Vacuum pumping to bottom pressure (<0.01 TORR)



NO: 3363-0004	VERSION: A	PAGE: 14
---------------	------------	----------

4. 先行針對 SIH4 MFC(MFC4/MFC5) FLOW SET 200 SCCM,再針對 1% PH3 MFC(MFC6) FLOW SET 10 SCCM
The SIH4 gas MFC(MFC4/MFC5) FLOW SET 200 SCCM, 1% PH3 MFC(MFC6) FLOW SET
5. SIH4氣體管路通至CHAMBER TUBE內之AIR VALVE(V5,V8,V10,V13) OPEN ,
此時開始抽SIH4氣體
The SIH4 gas line leads to the AIR VALVE (V5, V8, V10, V13) OPEN in the CHAMBER TUBE.
At this point the pumping of SIH4 gas starts
6. 抽氣體持續2~3分鐘後, 將SIH4 MFC(MFC4/MFC5) FLOW SET 500 SCCM
After pumping gas for 2~3 minutes, set SIH4 MFC (MFC4/MFC5) FLOW SET 500 SCCM
7. 此機台SIH4必須抽到 CHAMBER PRESSURE等於0.00 TORR , 且SIH4 Regulator指針須至-76kgf/cm2
This machine SIH4 must draw CHAMBER PRESSURE equal to 0.00 TORR, and SIH4 Regulator hands must reach -76kgf/cm2
8. 1% PH3氣體管路通至CHAMBER TUBE內之AIR VALVE(V15,V18) OPEN , 此時開始抽 1% PH3 氣體
The 1% PH3 gas line leads to the AIR VALVE (V15, V18) OPEN in the CHAMBER TUBE.
At this point the pumping of SIH4 gas starts
9. 抽氣體持續2~3分鐘後, 將1% PH3 MFC(MFC6) FLOW SET 10 SCCM
After pumping gas for 2~3 minutes, set 1% PH3 MFC (MFC6) FLOW SET 10 SCCM
10. 此機台1% PH3必須抽到 CHAMBER PRESSURE等於0.00 TORR , 且SIH4 Regulator指針須至-76kgf/cm2
This machine 1% PH4 must draw CHAMBER PRESSURE equal to 0.00 TORR, and 1% PH3 Regulator hands must reach -76kgf/cm2
11. 回報GAS PUMP DOWN OWNER(S500) 已完成
Report GAS PUMP DOWN OWNER (S500) Completed
12. 若完成SIH4/1% PH3 PUMP DOWN ,將機台 SIH4/1% PH3 二次盤 MANUAL VALVE CLOSE, 廠務做SIH4/1% PH3管路N2保壓
If SIH4/1% PH3 PUMP DOWN is completed, set the machine to SIH4/1% PH3 secondary disk MANUAL VALVE CLOSE, and the factory will do SIH4/1% PH3 pipe N2.

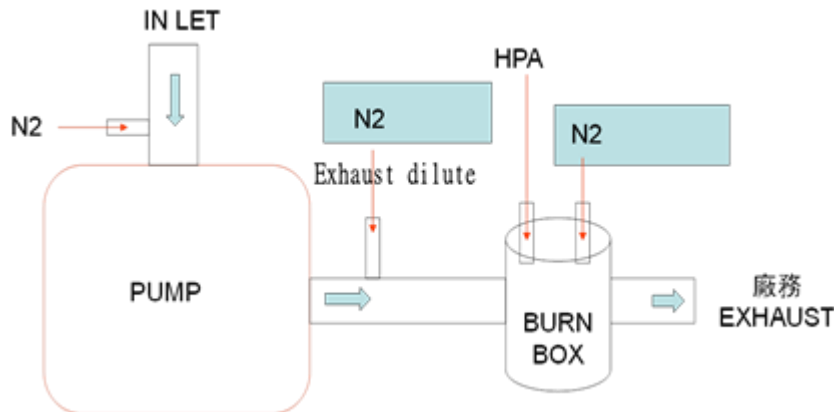
13. 將機台208V POWER OFF , 降溫並持續 PG

Turn off the machine 208V POWER, cool down and keep PG

14. CHAMBER PURGE N2 FLOW SET MFC1/MFC2/MFC3:3L/2L/2L

15. Burn box N2 & HPA FLOW 調整復歸 (由 N2 30L + HPA 25L → 改回 HPA 80 L)

Burn Box N2 & HPA FLOW Reset (from N2 30L + HPA 25L → Back to HPA 80 L



13. 機台必須降溫到200度以下才可以將 110V POWER OFF

The machine must be cooled below 200 degrees to turn 110V POWER OFF

捌、生效與修訂

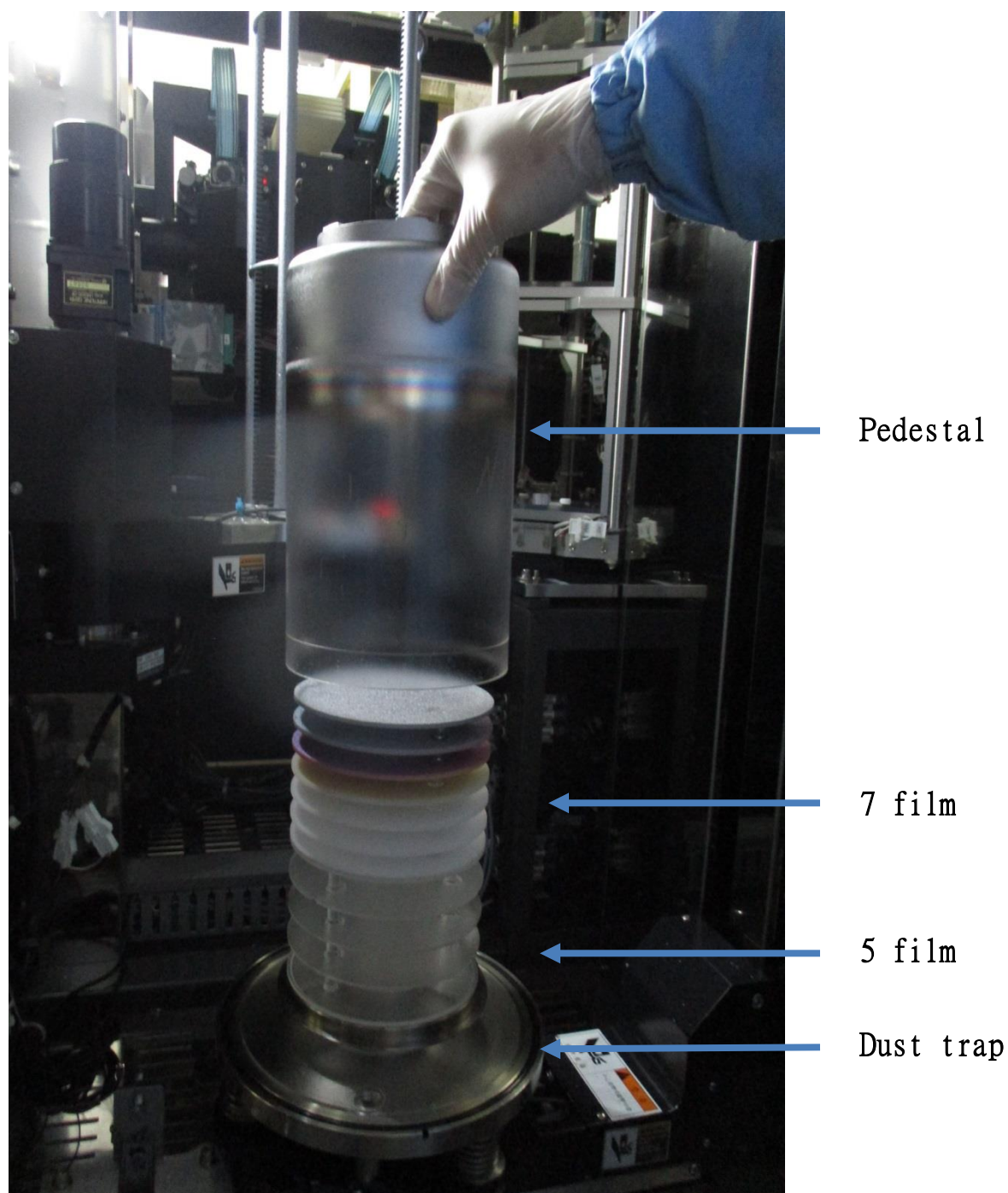
VIII. Effectiveness and revision

本規範之公佈實施及其修訂核准層級皆依會簽/核決/分發依循範例為之。

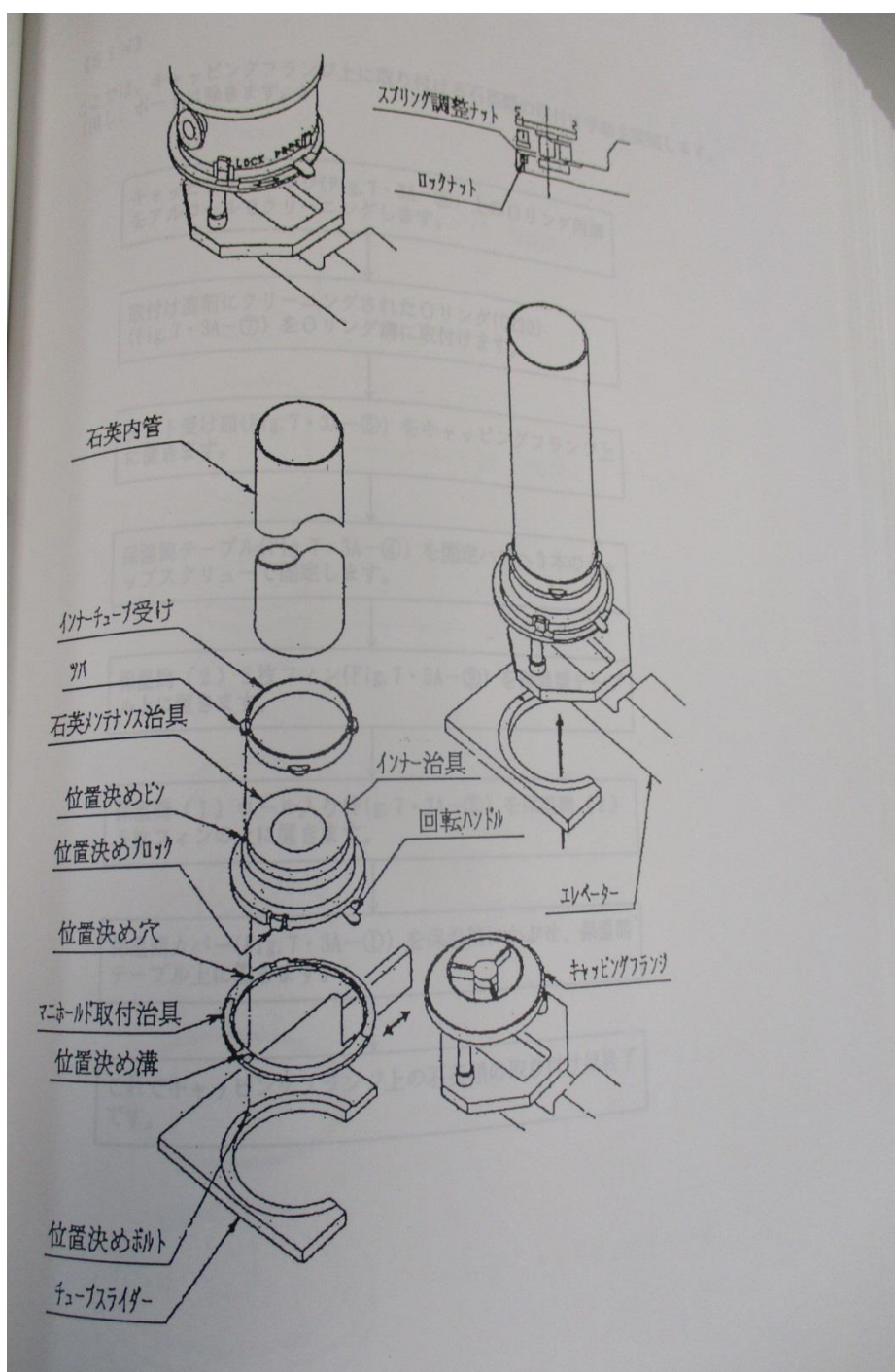
The announcement, implement, revise and approval level of regulations are depend on conference memorandum / approval issues/ distributing are according to criteria examples.

玖、附件

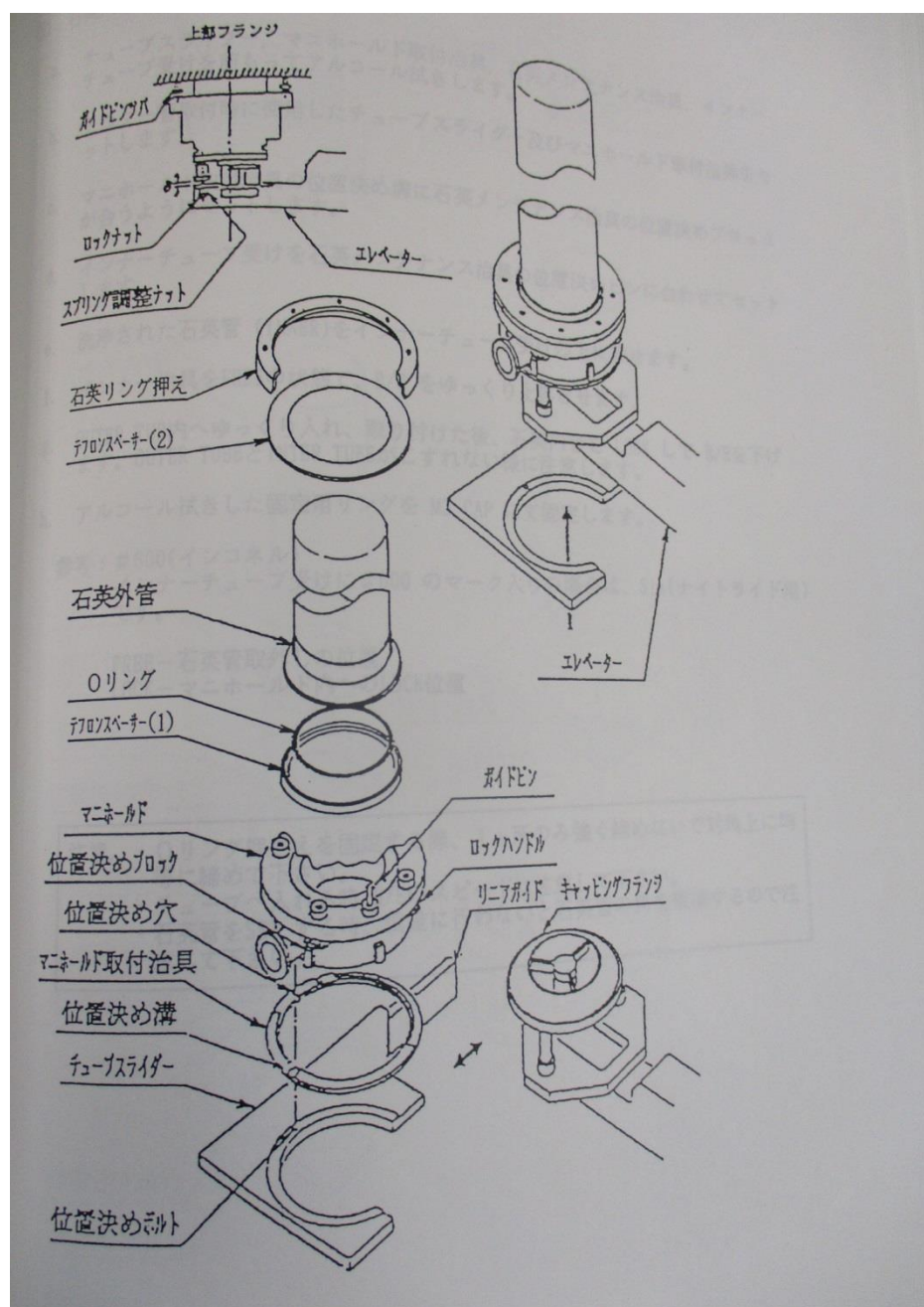
IX. Attachment



圖一(Figure 1)



圖二(Figure 2)



圖三(Figure 3)