昇陽國際半導體股份有限公司
Phoenix Silicon International Corporation

設備採購安全規範
Equipment Procurement Safety Regulations

項目 Item	安全規格說明 Safety Specification Description
1. 一般要求事項 General Requirements	1.1 所有【用電設備、機台及附屬設備(以下簡稱本設備)】，應設有緊急停止按鈕(以下簡稱 EMO)之設計(非 EMS)，EMO 啟動應能使電源被中斷，EMO 設置請參閱下列要求： 1.1.1EMO 外觀應為紅色且具中英文標示。 1.1.2 位置應明顯且人員可易觸碰，大小可用手掌根啟動，按鈕周圍可適當圍住以避免誤動作 1.1.3 EMO 設置高度介於 84cm~164cm 間，距離至少 3m 以內。 1.1.4 EMO 之電路必須是硬體型式(Hardware-based)裝置，採常閉接點方式(B 接點)，復歸時必須是手動。 1.1.5 EMO 啟動時，設備內所有危害性電壓及大於 24 伏特電力應消除，但下列項目可例外： 1.1.5.1 非危害性電壓(24 伏特)可維持電力。 1.1.5.2 安全元件(如偵煙器、氣液體等洩漏偵測器、壓力量測元件等)由非危害電源供應者可保持通電。 1.1.6 斷路器、插座及電力供應導體端子應有明顯標示，EMO 啟動後電力供應端應加以隔離或圍阻防止人員不經意觸碰。 All electrical equipment, machines, and auxiliary equipment (hereinafter referred to as "the equipment") must be equipped with an emergency stop button (hereinafter referred to as "EMO") design (not EMS). Activating the EMO must interrupt the power supply. The installation of the EMO should comply with the following requirements: • The EMO must be red in appearance and labeled in both Chinese and English. • The EMO must be positioned in a clearly visible and easily accessible location. It should be large enough to be activated using the base of the palm. A protective guard may be installed around the button to prevent accidental activation. • The EMO must be installed at a height between 84 cm and 164 cm and should be within 3 meters of the operator. • The EMO circuit must be a hardware-based system using a normally closed contact (B contact) configuration. Resetting the EMO must be done manually. • When the EMO is activated, all hazardous voltages and power above 24V inside the equipment must be removed. However, the following exceptions apply: -Non-hazardous voltage (24V) may remain powered. -Safety components (such as smoke detectors, gas/liquid leak detectors, pressure measurement devices, etc.) powered by a non-hazardous power source may remain operation. • Circuit breakers, outlets, and power supply conductor terminals must be clearly labeled. After EMO activation, the power supply terminal must be isolated or shielded to prevent accidental contact.
	1.2 設備具物理性、化學性、生物性及人因性等風險，需於明顯且適當位置張貼對應危害之危害警語(具中英文)。 The equipment with physical, chemical, biological, or ergonomic risks, corresponding hazard warnings (in both Chinese and English) must be posted in clear and appropriate locations.
	1.3 設備之噪音量應小於 80 dBA，若超過需設置護罩、護圍或採其他可降低噪音之設計。 The noise level of the equipment should be less than 80 dBA. If it exceeds this limit, protective covers, enclosures, or other noise-reducing designs should be implemented.

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2. 設備材質及通風排氣 Equipment Materials and Ventilation & Exhaust	2.1 設備使用有機溶劑其容器、外殼等須採用金屬等不可燃材質。 The equipment using organic solvents, containers, enclosures, and other components must be made of metal or other non-combustible materials.
	2.2 設備使用有機溶劑其容器、外殼若使用到塑膠材質(例如視窗、透明蓋板)，須符合 FM 4910 認證(防火安全塑料)；機台內部塑膠材質元件亦同。 If the equipment using organic solvents includes plastic materials (e.g., windows, transparent covers) for containers or enclosures, they must comply with FM 4910 certification (fire-safe plastics). The same requirement applies to plastic components inside the machine.
	2.3 設備設置之排氣設備裝置，若排氣風量具連鎖裝置(以壓差偵測器裝設)，需警報驅動以利提醒排氣關閉，壓差偵測器需設定上下界限值以利區別有無異常情況。 If the equipment's exhaust system is equipped with an interlock mechanism (using a differential pressure detector), an alarm must be triggered to alert users in case of exhaust shutdown. The differential pressure detector must be set with upper and lower limits to distinguish abnormal conditions.
	2.4 設備局部排氣的設置應指派或委託經中央主管機關訓練合格之專業人員設計，並依法規要求製作局部排氣裝置設計報告書，完成設置後，應實施原始性能測試，並法規要求之原始性能測試報告書 The design of localized exhaust systems must be assigned to or commissioned by a professional who has been certified through training by the central competent authority. A localized exhaust system design report must be prepared in compliance with regulations. After installation, an initial performance test must be conducted, and an initial performance test report must be completed as required by law.
	2.5 設備使用有機溶劑其排氣管路材質須採不鏽鋼製軟管或硬管，若用酸鹼化學品則排氣管路應為耐腐蝕材質。 If the equipment uses organic solvents, the exhaust duct material must be made of stainless steel flexible or rigid piping. If acidic or alkaline chemicals are used, the exhaust ducts must be made of corrosion-resistant materials.
	2.6 設備未使用化學品但具加熱功能需設置一般排氣。 If the equipment does not use chemicals but has a heating function, a general exhaust system must be installed.
3. 安全連鎖、防護 Safety Interlocks and Protection	3.1 設備可開啟之門、蓋板或視窗等具夾、捲、壓、撞擊等安全風險之虞，需有安全連鎖裝置並與主機台連動停止運轉功能，復歸時採手動復歸方式，觸發安全連鎖時不可衍生其他危害。 The doors, covers, or windows of the equipment that pose safety risks such as pinching, entanglement, crushing, or impact must be equipped with safety interlock mechanisms that stop the main machine operation when triggered. Resetting must be done manually, and activating the safety interlock must not introduce any additional hazards.
	3.2 設備的安全連鎖裝置啟動時需具聲光效果以警示人員，經工安單位評估為高風險設備時將為必要條件。 When the safety interlock is activated, it must provide both audible and visual alerts to warn personnel. If assessed as high-risk equipment by the occupational safety unit, this requirement becomes mandatory.
	3.3 安全連鎖裝置必須為硬體裝置如繼電器 Relay 所構成，非韌體裝置如 ROM、IC 或軟體裝置如 PLC、PC 所構成，經工安單位評估為高風險設備時將為必要條件。 The safety interlock device must be composed of hardware devices such as relay relays, and non-firmware devices such as ROMs and ICs or software devices such as PLCs and PCs, which will be necessary when the unit is assessed as high-risk equipment by safety department.

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	3.4 設備具機械手臂若開啟外蓋、門、視窗或蓋板等有接觸之虞時須具安全連鎖裝置使機械手臂需停止動作；若人員需要於機械手臂作業位置共同作業則須符合法規中人機協作之要求。 The equipment with a robotic arm, if opening covers, doors, windows, or panels could lead to physical contact, a safety interlock must be installed to stop the robotic arm. If personnel need to work alongside the robotic arm in its operational area, the equipment must comply with human-robot collaboration regulations.
	3.5 設備具加熱功能需具過溫保護裝置或其他同等功能之設計並可執行定期測試。 The equipment with heating functions must have an over-temperature protection device or a design with an equivalent function, and it must support periodic testing.
	3.6 設備具加熱、低溫功能之設備需有不致使人員接觸而受傷害之安全設計。 The equipment with heating or low-temperature functions must be designed to prevent personnel from accidental contact and injury.
	3.7 設備具捲、夾、切、割傷風險之設備機台需有不致使人員可直接接觸之安全防護(例如護罩、護圍等)。 The equipment that presents risks of entanglement, pinching, cutting, or slicing injuries must have protective measures (such as guards or enclosures) to prevent direct contact by personnel.
4. 化學品與危害預防 Chemicals and Hazard Prevention	4.1 設備使用危害性氣體(如毒性、腐蝕性、自燃性及爆炸性氣體)需符合下列要求 4.1.1 可偵測該危害氣體之偵測器 alarm 警示功能設置，偵測到洩漏時需連動關斷供應端並驅動警報。 4.1.2 偵測器之設置位置需讓人員在查看讀值時可與現場明顯區隔之位置。 The equipment using hazardous gases (such as toxic, corrosive, pyrophoric, and explosive gases) must comply with the following requirements: • The gas detector with alarm functionality must be installed to detect leaks. Upon detection, it must automatically shut off the gas supply and trigger an alarm. • The detector's installation location must allow personnel to check readings while being clearly separated from the hazardous area.
	4.2 設備使用窒息性氣體需增加氧氣偵測器且需具 alarm 警示功能，並清楚說明其採樣位置。 The equipment using asphyxiating gases must have an oxygen detector with an alarm function and must clearly specify the sampling location.
	4.3 設備使用化學品時，化學品放置點內外皆應設置承漏設施且至少能承接 1.2 倍的洩漏量。 When using chemicals, spill containment measures must be installed both inside and outside the chemical storage area, with a capacity of at least 1.2 times the potential spill volume.
	4.4 設備使用化學品時，供應點位、管路區及承漏盤須設置漏液 sensor 並具 alarm 警示功能，偵測到洩漏時需連動關斷對應的閥件並驅動警報。 When using chemicals, the supply points, piping areas, and spill containment trays must be equipped with leak sensors with alarm functionality. Upon detecting a leak, the system must automatically shut off the corresponding valves and trigger an alarm.
	4.5 設備使用易燃性、可燃性液體或低閃火點(如異丙醇、丙酮等)之化學品，需設置具獨立電源之 CO2 滅火系統且火警偵測及滅火系統不可中斷運作；其排氣管路需設置自動 damper，damper 在機台 CO2 消防系統啟動時須能連動關閉；但易燃性、可燃性液體或低閃火點之化學品經稀釋後液體經測試為不燃燒者可不需設置自動 damper。

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	If the equipment uses flammable or combustible liquids or low flash point chemicals (e.g., isopropanol, acetone), the following requirements must be met: • The CO_2 fire suppression system with an independent power source must be installed. • The fire detection and suppression system must remain continuously operational without interruption. • The exhaust duct must have an automatic damper, which must close when the CO_2 fire suppression system is activated. • However, if the flammable or combustible liquid or low flash point chemical is diluted and tested to be non-combustible, an automatic damper is not required.
	4.6 設備有使用化學品時，需有偵測到高液位(HH)時可連鎖關斷製程液體供應之功能。 The equipment using chemicals must have high liquid level (HH) detection, which should be interlocked to shut off the process liquid supply when triggered.
	4.7 易燃、可燃液體之承漏盤應採金屬等不燃材質，非金屬材質時需符合 FM4910 之安全材質。 Spill containment trays for flammable and combustible liquids must be made of metal or other non-combustible materials. If a non-metal material is used, it must comply with FM 4910 fire safety standards.
	4.8 設備內設有化學品及特氣類管路需於 PSI 廠內完成測漏並檢附合理數據或資料。 The equipment containing chemical and specialty gas pipelines, leak testing must be conducted within the PSI facility, and reasonable test data or documentation must be provided.
5. 電器設計 Electrical Design	5.1 設備下列位置需設置非導電性或是接地導電之防護實體屏障： 5.1.1 電氣源附近上下周圍及有墜落物碰撞會造成短路或電弧之位置。 5.1.2 設備元件因失效而造成設備內液體流入電器元件之位置。 5.1.3 主斷路器電線側的上方之位置。 5.1.4 所有低壓以下，人員維護時可能會與未絕緣帶電部分接觸之位置，高壓及超高壓則不適用。 The following areas of the equipment must be equipped with non-conductive or grounded conductive protective physical barriers: • Around the electrical power source (above, below, and surrounding), as well as locations where falling objects may cause short circuits or arc faults. • Areas where liquid may enter electrical components due to component failure. • Above the main circuit breaker's wiring side. • Locations below low voltage levels where personnel may come into contact with uninsulated live parts during maintenance. (Not applicable to high and ultra-high voltage systems.)
	5.2 設備於含水或其他導電度高之潮濕場所、金屬板上或鋼架上等導電性良好場所，需設置高靈敏高速型(額定靈敏度電流 0.1 秒以內)的漏電斷路器，漏電斷路器之額定電流，不得小於該電路之負載電流。 If the equipment is installed in wet environments or locations with high electrical conductivity (e.g., on metal panels or steel frames), a high-sensitivity, high-speed leakage circuit breaker (with a rated sensitivity response time of ≤ 0.1 seconds) must be installed. The rated current of the leakage circuit breaker must not be lower than the circuit's load current.
	5.3 設備設置之斷路器應設有過電流保護元件，若僅一組則應有能量阻斷(如上鎖 lockout)之設計。 The equipment's circuit breaker must be equipped with overcurrent protection components. If only one circuit breaker is installed, it

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	must include an energy isolation mechanism (such as a lockout design).
	5.4 設備有使用易燃性氣體/蒸氣時，需使用防爆電器元件(1.5 m 內)且該防爆電器須取得型式檢定合格。 If the equipment use flammable gases or vapors, explosion-proof electrical components must be used within 1.5 meters of the hazard zone. These components must have certified explosion-proof approvals.
	5.5 設備之過電流保護設計(如保險絲、無熔絲開關)須考慮下游端最大負載容量，避免選擇過大的安全係數，以確保異常時能有效跳脫，預防災害事故發生。 The overcurrent protection design of the equipment (e.g., fuses, circuit breakers) must be selected based on the maximum downstream load capacity, avoiding excessive safety margins. This ensures that protection devices trip effectively under abnormal conditions, preventing hazardous incidents.
	5.6 設備需加熱任何液體時，需具備在低液位(LL)時可連鎖中斷製程液體繼續加熱之功能。 If the equipment heats any liquid, it must have an interlock function that automatically stops the heating process at low liquid levels (LL) to prevent overheating.
	5.7 設備之電氣箱設計位置應使線路可以側進或下進方式進入設備內，若設置防止液體流入措施者則不在此限。 The electrical cabinet design must allow wiring to enter from the side or bottom. If liquid ingress prevention measures are in place, this requirement does not apply.
	5.8 屬 UPS 設備者應取得國際安全認證，如 IEC-62040、UL 1778 認證或 CE 認證等。 If the equipment had UPS that must be obtain international safety certifications, such as IEC-62040, UL 1778, or CE certification.
6. 地震防護 Seismic Protection	6.1 設備會使用酸、鹼及有機等危害性生產物質(HPMs)，設備重心必須能承受作用於設備載重 94%的水平負荷力以防止傾倒；無危害性生產物質之設備，設備重心必須能承受作用於設備載重 63%的水平負荷力以防止傾倒。 If the equipment uses hazardous production materials (HPMs) such as acids, bases, or organic chemicals, its center of gravity must be able to withstand 94% of the equipment's weight as a horizontal load force to prevent tipping. If the equipment does not contain HPMs, its center of gravity must be able to withstand 63% of the equipment's weight as a horizontal load force to prevent tipping.
	6.2 設備具危害性生產物質(HPMs)之管路容器需可承受 0.8 g 內地震無傾倒、移位或破裂洩漏之虞。 Seismic Resistance of HPM Pipelines and Containers Pipelines and containers that handle HPMs must be able to withstand seismic forces up to 0.8 g without tipping, shifting, breaking, or leaking.
	6.3 設備屬生產、製程用設備機台須設置防震腳座或防震基座。 Production and process equipment must be equipped with anti-vibration footings or bases.
7. Local Scrubber 相關要求 Local Scrubber Relevant Requirements	7.1 設有 Local Scrubber 其 inlet 端與 outlet 端檢測出之物種，處理效率應達到 95%以上。 The treatment efficiency of the Local Scrubber must be at least 95%, based on the detected species at the inlet and outlet.
	7.2 僅在 Local Scrubber outlet 端檢測出物種，視為 Local Scrubber 處理產生之副產物，若為腐蝕性或毒性氣體，檢測出之平均濃度小於 1/2TWA，最高濃度需小於 2 倍 TWA；若為燃燒/可燃性氣體，檢測出之平均濃度小於 1% LEL，最高濃度不得大於 5% LEL。 If detected species are only found at the outlet, they are considered byproducts of the Local Scrubber process.If these byproducts are corrosive or toxic gases, the detected concentrations must meet the following limits: • Average concentration: ≤ ½ TWA (Time-Weighted Average).

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	• Peak concentration: ≤ 2× TWA. If the byproducts are combustible or flammable gases, the detected concentrations must meet the following limits: • Average concentration: ≤ 1% LEL (Lower Explosive Limit). • Peak concentration: ≤ 5% LEL.
	7.3 處理效率無法達到 95%時，設備商應提出說明及改善計畫，與使用者、工安單位溝通後，以書面紀錄確認。 If the Local Scrubber cannot achieve 95% efficiency, the supplier must provide an explanation and an improvement plan. This plan must be communicated with the user and safety personnel, and a written record of confirmation must be established.
	7.4 處理效率確認之量測，除非使用者與供應商另有約定，否則由 PSI 洽第三方執行，若主機台所搭配 Local Scrubber(同廠牌同型號)已有檢測過則免進行檢測。 Unless otherwise agreed upon by the user and supplier, PSI must arrange a third party to conduct the efficiency verification test. If the same model and brand of Local Scrubber has already undergone testing with the same main equipment, retesting is not required.
	7.5 Local Scrubber 處理效率之計算方式如下所示：處理效率 A=1-(Massout/Massin)。 Treatment efficiency (A) is calculated as follows: A=1−(Massout / Massin)
	7.6 供應商應提供 Local Scrubber 操作條件及安全裝置之書面說明資料。 The supplier must provide written documentation detailing the operating conditions and safety devices of the Local Scrubber.
8. 其他 Others	8.1 設屬動力衝剪機械、手推刨床、木材加工用圓盤鋸、動力堆高機、研磨機、研磨輪、防爆電氣設備、動力衝剪機械之光電式安全裝置、手推刨床之刃部接觸預防裝置、木材加工用圓盤鋸之反撥預防裝置及鋸齒接觸預防裝置等皆須取得型式檢定。 The following equipment must obtain type certification: 1. Power-driven punching and shearing machines 2. Hand-fed surface planers 3. Circular saws for woodworking 4. Powered industrial trucks (forklifts) 5. Grinders and grinding wheels 6. Explosion-proof electrical equipment 7. Photoelectric safety devices for power-driven punching and shearing machines 8. Blade contact prevention devices for hand-fed surface planers 9. Kickback prevention devices for circular saws used in woodworking 10. Saw blade contact prevention devices for circular saws used in woodworking
	8.2 設備使用放射性物質或可發生游離輻射之設備應依〝放射性物質與可發生游離輻射設備及其輻射作業管理辦法〞之規定取得登記備查或許可證。 The equipment that uses radioactive materials or emits ionizing radiation must comply with the regulations outlined in the Regulations for the Management of Radioactive Materials and Radiation-Emitting Equipment and Operations.such equipment must obtain registration for record-keeping or an operating permit as required by the law of Taiwan.
	8.3 設備屬中古機台交付前請完成下列除汙事項：

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	8.3.1 移除機台內附屬鋼瓶、氣體、化學品並請將槽體及管路清洗乾淨。 8.3.2 清空所有液體管路內之化學品並將管路做吹淨。 8.3.3 氣體系統管路與閥件以抽真空或排氣方式吹淨。 8.3.4 機台之孔洞或管路開口須以管帽或塞子堵住盲封。 8.3.5 出廠包裝前須進行配電盤內縫隙異物檢查及各線路孔須堵住封閉。 Before delivering used equipment, the following decontamination steps must be completed: • Remove all attached gas cylinders, gases, and chemicals from the equipment. Clean tanks and pipelines thoroughly. • Empty all liquid pipelines of chemicals and purge the pipelines. • Vacuum or purge gas system pipelines and valves to ensure they are free of residual substances. • Seal all openings, holes, and pipeline ports using caps or plugs. • Before packaging for shipment, inspect the electrical panel for foreign objects and seal all wiring holes properly.
	8.4 設備商須提供安裝及維護手冊，內容須包含：維修保養前的準備工作、維修前後的人員通知、設備安全停復機順序、能量隔離裝置使用位置與方式、上鎖與標示程序(含次系統)、危害能量已去除及隔離之確認方式。 The equipment supplier must provide an installation and maintenance manual, which must include the following: 1. Preparation work before maintenance and servicing. 2. Notification procedures before and after maintenance. 3. Safe shutdown and restart procedures. 4. Location and usage of energy isolation devices. 5. Lockout and tagging procedures (including subsystems). 6. Verification methods to confirm hazard energy removal and isolation.