



封測機台安全白皮書

感謝

封測機台安全白皮書為產與學(包含使用者,供應商,研究單位共同合作完成編撰的成果,

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7.16 Safety and Hygiene Specifications for Automated Handling Systems 自動化搬運系統安全

1、Purpose 目的：

This security baseline is intended to establish a set of functionally based equipment security baselines

本安全基準意在建立一套以功能性為基礎的設備安全基準

2、Range 範圍：

Applicability-ASE Investment Holdings' packaging, testing semiconductor products and electronics factory equipment

適用性-日月光投控旗下封裝、測試半導體產品及電子廠設備

3、Reference Standards and Security Benchmarks 參考標準與安全基準

1. Occupational Safety and Health Act. 職業安全衛生法。
2. Occupational Safety and Health Facilities Regulations. 職業安全衛生設施規則。
3. Hazardous Chemical Labeling and Communication Rules 危害性化學品標示及通識規則。
4. Hazard Prevention Standards for Certain Chemical Substances. 特定化學物質危害預防標準。

5. semi s2 guide to safety standards for semiconductor equipment and materials.semi s2 半導體設備和材料安全標準指引。

6. Safety Standards for Mechanical Equipment and Appliances 機械設備器具安全標準

7. Measures for the use and management of safety signs and verification marks 安全標示與驗證合格標章使用及管理辦法

4、Explanation of terms 名詞解釋

1. General packaging and testing machine: machine for wire bonding/wire bonding/ball planting/heat sink planting/testing/inspection... or a machine without a large internal mechanism.一般封測機台: 進行打線/焊線/植球/植散熱片/測試/檢驗...等製程機台或是內部無大型機構的機台。

2. High-risk machines: Process machines for baking/sealing/die-cutting/stamping/plating/etching/etc. or equipment that uses chemicals or has a larger mechanism inside 高風險機台: 進行烘烤/封膜/沖切/沖壓/電鍍/蝕刻/等製程機台或是有使用化學品的設備或內部有較大型的機構或有齒輪等..容易造成人員嚴重受傷的機構設備。

3. Bumping process machine: All production equipment of the Bumping process (inspection and or the same type of machine is classified as a general packaging and testing machine)Bumping 製程機台:凡是 Bumping 製程的生產設備(檢驗及或同型機台歸類到一般封測機台)

4. Automated handling equipment: all substrate (chip) transfer equipment, industrial robots and industrial robot systems, unmanned transport vehicles (UTVs)自動化搬運設備設備: 凡基板(晶片)傳送設備、工業機器人及工業機器人系統、無人搬運車輛(UTVs)

5. Physical barriers: block or isolate by means of partitions or shields 物理性障礙物: 以隔板或屏蔽的方式進行阻擋或隔離

6. High risk chemicals: TMAH, HF, concentrated sulfuric acid 高風險化學品: TMAH、HF、濃硫酸


5、Precautions 注意事項

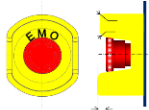

本基準安全設計等級依一般封測設備、高風險設備、Bumping 製程設備及自動化設備(獨立章節)，三種類型機台有所不同要求

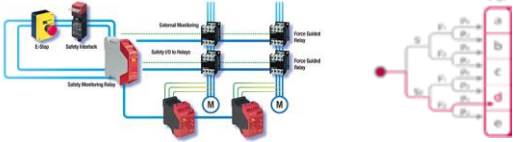
6、Documentation provided to users 提供給用戶的文件


7、Contents of Safety Standards 安全基準內容

7.1	Safety protection and emergency shutdown 安全防護及緊急停機	
Item	Standard 標準	Machine type 應符合設備類型
7.1.1	All equipment safety interlocks are designed. When the safety function is activated, the equipment or related ancillary equipment will automatically be placed in a safe state (such as: stop operation), and there will be alarm sounds and warning lights to alert personnel immediately.	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台

	<p>所有設備安全連鎖裝置設計，當安全功能啟動時，設備或相關附屬設備會自動置於安全的狀態（如：停止作動），並且有警報聲響與警示燈使人員立刻得到警示。</p>		<p>Bumping machine Bumping 廠區機台</p>
7.1.2	<p>The machine equipment should be equipped with a fail-safe (FAIL-SAFE) safety interlock device. When the safety device is abnormal or the equipment fails to operate, it will also be in a safe position. 機台設備應設置失效也安全(FAIL-SAFE)的安全連鎖裝置，當安全裝置異常或設備故障不能操作，亦會使其在安全位置。</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.1.3	<p>When interlock function start, need manual return or restart every interlock device then return equipment normal operate. 當安全連鎖裝置被觸動，每一個連動之安全連鎖裝置應經由手動復歸或重新啟動，方可將設備恢復正常運轉，不可自動復歸。</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.1.4	<p>The safety interlock device cannot have a function that can disable the function of the safety protection device (eg: machine control interface settings or software or By pass key device). If the maintenance mode operation is unavoidable, the safety device still needs to be turned off. When switching to the maintenance mode, it must be in the low-speed mode (<50mm/s). Once it leaves the low-speed maintenance mode, all safety interlock functions should automatically reset. 安全連鎖裝置不可有能將安全防護裝置功能關閉的功能(如：機台控制介面設定或軟體或 By pass key 裝置)。若因維修模式作業無法避免，仍需將安全裝置關閉，當切換於維修模式時，須為低速模式(<50mm/s)，一但離開低速維修模式時，所有安全連鎖功能應自動復歸。</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.1.5	<p>The safety interlock device and the machine should be fixed with special bolts (for example: star bolts), and special tools are required to remove the safety device. 安全連鎖裝置與機台鎖固需使用特殊螺栓(例:星形螺栓)進行固定，需使用特殊工具才可將安全裝置拆除。</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.1.6	<p>All machine EMOs must be FAIL-SAFE lines, which can turn off all power of the equipment, but only the safe voltage of EMO 24V</p>		<p>Assembly machine 一般封測機台</p>

	<p>continues to supply power. The design of EMO should ensure that it does not start the main power supply, and the wiring of the operating system of EMO equipment should be wired Connection method, the EMO circuit should be restarted manually instead of automatically recovering. When restarting the EMO, the power supply of the equipment should not be recovered at the same time.</p> <p>所有機台 EMO 必須是 FAIL-SAFE 線路，可以關閉設備之所有電源，但只有 EMO 24V 之安全電壓繼續供電，EMO 之設計應確保其不使主電源起動，EMO 設備的操作系統之接線應為有線接法，EMO 線路應需手動重新起動而不得自動恢復，當重新起動 EMO 時不應同時使設備電源恢復。</p>	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.1.7	<p>The emergency power-off button EMO should be red and mushroom-shaped, with clear Chinese and English marks, and a switch protective cover whose background color is yellow to avoid accidents caused by accidental activation; the height of the EMO button and the switch protective cover The difference is within 3mm, and the distance from the button to the cover should be at least 2.5 cm. It is necessary to ensure the EMO can be pressed effectively and enable activation by the heel of palm.</p> <p>緊急斷電按鈕 EMO 應均為紅色及蕈狀，且有清楚的中英文標示，並有開關保護罩其背景色是黃色，以避免被誤碰而起動之意外；</p> <p>EMO 按鈕與開關保護罩的高度相差 3mm 以內，</p> <p>按鈕到護蓋之距離應至少為 2.5 公分</p> <p>須確保人員手掌後跟有效按壓並啟動 EMO 按鈕。</p>	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
	 	Bumping machine Bumping 廠區機台
7.1.8	<p>The location of the emergency stop button (EMO) should be easy to see and touch by personnel in the operation and maintenance area. There must be (EMO) within 3 meters of the personnel operation and maintenance area, and the UPS power supply can be cut off and any power supply can be stopped.</p> <p>緊急停機按鈕(EMO)設置位置應使操作及維修區域人員容易看到及接觸，人員操作、維護處的 3 米內必須要有 EMO，並可切斷 UPS 電源，停止任何電源供應</p>	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.1.9	<p>Physical barriers should be installed in the mechanism where the machine may cause harm due to inadvertent contact.</p> <p>應在機台可能因不注意的接觸會導致危害的機構宜裝置物理性障礙物。</p>	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台

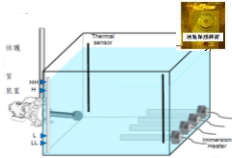
7.1.10	<p>If there is a mechanical arm inside the machine, a safety interlock device should be set up. When the personnel is repairing inside, the mechanical arm cannot be operated, or a second protective device should be set up to prevent the mechanical arm from colliding with the personnel.</p> <p>機台內部若有機械手臂應設置安全連鎖裝置，當人員於內部維修時，機械手臂無法進行作動，或是設置第二道防護裝置防止機械手臂碰撞到人員。</p>	<p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.1.11	<p>Machine safety devices must use components certified by ISO 13849, and the safety element circuit must be an independent circuit, and must be connected to safety relays or safety PLCs, not to machine process relays or PLCs.</p> <p>機台安全裝置皆須使用 ISO 13849 驗證過的元件，且安全元件迴路須為獨立迴路，並皆需連接安全繼電器或安全 PLC，不可接於機台製程繼電器或 PLC。</p> 	<p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.1.12	<p>It should be equipped with emergency shutdown (EMO) and emergency shutdown (EMS), double emergency switch design, and the color needs to be distinguished, when it is started, the equipment can be placed in a safe shutdown or shutdown state, and there will be no danger to people and workshops. facility any more hazards.</p> <p>應設有緊急關機(EMO)及緊急停機(EMS)，雙重緊急開關設計，且顏色需進行區分，當其起動時可使設備置於安全的停機或關斷狀態，不會產生對人及廠房設施任何更多的危害。</p>	<p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.1.13	<p>The emergency stop button (EMO & EMS) should be placed so that the personnel in the operation and maintenance area can easily see and touch it. There must be (EMO & EMS) within 3 meters of the personnel operation and maintenance area, and it can cut off the UPS power supply and stop any power supply.</p> <p>緊急停機按鈕(EMO&EMS)設置位置應使操作及維修區域人員容易看到及接觸，人員操作、維護處的 3 米內必須要有(EMO&EMS)，並可切斷 UPS 電源，停止任何電源供應</p>	<p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.2	Process exhaust ventilation system 製程排氣通風系統	
Item	Standard 標準	Machine type 應符合設備類型
7.2.1.	For all equipment using hazardous substances, if the abnormal exhaust may cause harm, the equipment should have an exhaust flow	Assembly machine 一般封測機台


	<p>interlock device, such as: flow (pitot tube) or static pressure switch.</p> <p>對於所有使用危害性物質的設備，設備應有排氣流量的連鎖裝置，當排氣異常需連動停止危害性物質的持續供應。如:流量(皮托管)或靜壓開關。</p>		<p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.2.2	<p>The exhaust flow interlock and alarm devices must be reset manually.</p> <p>排氣流量連鎖及警報裝置皆須為手動復歸。</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.2.3	<p>All machine equipment exhaust pipes must be made of non-combustible materials (metal materials or certified non-combustible materials)</p> <p>所有機台設備排氣管路需使用不燃材質 (金屬材質或經認證之不燃材質)</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.2.4	<p>Exhaust systems and supply lines for incompatible substances should be separated to avoid fire and explosion caused by incompatible exothermic reactions.</p> <p>不相容性物質排氣系統及供應管路應分開，避免發生不相容放熱反應導致火災與爆炸。</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.2.5	<p>Any air ducts transporting flammable substances should not be connected to exhaust systems that may generate flames, sparks, or hot substances, such as grinding, welding, ovens, etc.</p> <p>任何輸送可燃性物質的風管不可銜接可能會產生火焰、火花、或熱物質製程之排氣系統，例如研磨、焊接、烤箱等製程。</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.2.6	<p>If the process air duct may generate static sparks due to friction, the air duct should have conductivity or grounding protection, and the grounding resistance provided by it should be less than 1.0 ohms.</p> <p>若製程風管有可能因摩擦產生靜電火花，則風管應有導電性或接地防護，其提供之接地電阻應小於 1.0 歐姆。</p>		<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p>


		Bumping machine Bumping 廠區機台
7.2.7	If the process equipment uses pyrophoric gas or gas with high toxicity and inhalation risk, a Local Scrubber should be installed for front-end exhaust gas treatment. 製程設備使用自燃性氣體或毒性高危害人體吸入性風險之氣體，應設置 Local Scrubber 進行前端尾氣處理。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.2.8	The location and opening area of ventilation should be included in the design scope to prevent hazardous chemical gases, vapors or odors from escaping into the working environment. 通風換氣設置之位置、開口面積應納入設計範疇，避免危害性化學氣體、蒸氣或異味逸散至工作環境中。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.2.9	If the exhaust system of the process tank such as electroplating/etching fails to operate, the power supply of the chemical tank should be automatically cut off, or the exhaust system should be connected to UPS or emergency power supply. 電鍍/蝕刻等製程槽體之排氣系統若無法運轉時需自動切斷化學槽之電源，或排氣系統應連接 UPS 或緊急電源。	High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.2.10	The air extraction pipeline of the process machine should be equipped with a differential pressure gauge or a device for monitoring the air extraction system. When the air speed is too low, it will alarm and stop the machine heating and chemical supply. 製程機台抽氣管路應加裝壓差計或監測抽氣系統的裝置，當風速過低警報並停止機台加熱與化學品供應。	Bumping machine Bumping 廠區機台
7.3	Wet process equipment 濕製程設備	
Item	Standard 標準	Machine type 應符合設備類型
7.3.1	For equipment using chemicals in the process, the tank material must be designed to match the characteristics of specific chemicals to avoid chemical reactions caused by material incompatibility. 製程中有使用化學品的設備，其槽體材質須配合特定化學品之特性設計，以避免材質不相容性引發化學反應。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台


		Bumping machine Bumping 廠區機台
7.3.2	<p>For equipment that uses flammable or flammable chemicals in the process, the main structure of the equipment and the material of the tank (excluding equipment components or pipes, etc.) When the fire broke out, the disaster spread.</p> <p>製程中有使用可燃性或易燃性化學品的設備，其設備主體結構與槽體材質(不包含設備零組件或管路等)應為耐燃材質或是不燃材質(如：不鏽鋼)，以避免火災發生時，災情擴大。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
	 <p>FM 4910 Products 従来材(PVC) conventional PVC plate 従来材(FRPP) conventional FRPP plate</p> <p>発火せず、炭化 21秒後発火し、煙多い 38秒後発火し、煙多い</p> <p>Don't ignite but Charred Ignited and Burned Ignited and Burned</p> <p>FM 4910, FPI<6, SDI<0.4</p>	
7.3.3	<p>The machine motor needs to have an overcurrent protection chain, and there should be a display or warning message after the motor stops, so as to accurately grasp the operation status of the equipment.</p> <p>機台馬達需有過電流保護聯鎖，馬達停機後應有顯示或警告訊息，以確實掌握設備運作狀況。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.3.4	<p>The chemical tank needs to be set with L/LL/H/HH liquid level alarm messages, and if it is too low or too high, it has the function of interlocking shutdown or stopping the supply of medicine.</p> <p>化學品槽體需設置 L/LL/H/HH 液位警報訊息，並且過低及過高有連動停機或停止供藥的功能。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
		
7.3.5	<p>Containers used to store pressurized hazardous product materials must be used in accordance with the marked ratings. Mechanical joints must be sealed so that personnel will not be harmed even in the event of leakage.</p> <p>用來儲放加壓危害性製品物料的容器，必須按照所標註的額定規格使用。機械式的接頭，必須加以密封，即使有外洩狀況發生時，人員也不會受到傷害。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.3.6	<p>Compatible chemicals should be used for single-machine equipment tanks. If incompatible chemicals need to be used, at least double protection devices should be provided, and each tank should be equipped with a joint control design for leakage prevention and leakage detection, and it must be ensured that the steam in the process will not be incompatible and cause a fire.</p> <p>單一機台設備槽體應使用可相容的化學品。若需使用不相容之化學物，應至</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>

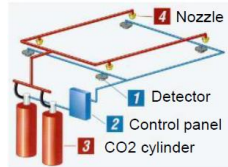
	少有雙重防護裝置，各槽體增設防洩槽與洩漏偵測連動控制設計，當有任一化學品洩漏，停止化學品持續供應及製程生產作業，並且須確保製程中的蒸氣不會有不相容造成起火的狀況。	
7.3.7	All chemical supply pipelines must be pressure tested, and normal pressure supply pipelines must be pressure tested for at least 24 hours. If it is a pressure supply pipeline, it must be at least 1.5 times the working pressure. Pressure testing for 48 hours, high risk hazard The chemical line should be a double casing design. 所有化學品供應管路皆須做壓力測試，常壓供應管路至少需進行 24 小時保壓測試，若屬壓力供應管路至少須為工作壓力 1.5 倍 48 小時之保壓測試，高風險危害性化學品管路需為雙套管設計。	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.3.8	Chemical pressure tanks have appropriate overpressure protection and pressure relief devices. 化學品壓力桶槽有適當的過壓保護及壓力釋放裝置	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.3.9	The whole equipment needs to be equipped with a leak-proof groove and a joint control of leak detection. 整體設備需設置防洩槽與洩漏偵測連動控制，當偵測到化學品洩漏時，停止化學品持續供應。	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.3.10	Corrosive chemicals use acid and alkali resistant material anti-drainage tank; flammable or flammable chemicals use stainless steel material anti-drainage tank. 腐蝕性化學品使用耐酸鹼材質防洩槽；可燃或易燃性化學品使用不銹鋼材質防洩槽。	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.3.11	The liquid level sensor must automatic shutdown heater when liquid level below set up safety operate level. If use inner or extra heater that sensor level should install above the heater 5 centimeters.	High risk assembly machine 高風險封測機台

	<p>濕製程機台若有加熱器，最低液位偵測器位置需高於加熱器，並且當最低液位偵測觸發時，可自動切斷加熱元件電源，另重新啟動被中斷電之電源應為手動重置。若使用內嵌式或外附式加熱器，設定最低液面應高於加熱器 5 公分以上。</p>		<p>Bumping machine Bumping 廠區機台</p>
7.3.12	<p>If there is equipment using flammable or flammable chemicals in the process, the main structure of the equipment and the material of the tank should be certified flame-resistant or non-combustible materials (such as stainless steel) to avoid the continuous expansion of the disaster when a fire occurs. Equipment components need to use high temperature, acid and alkali resistant materials.</p> <p>製程中有使用可燃性或易燃性化學品的設備，其設備主體結構與槽體材質應為認證的耐燃材質或是不燃材質(如：不鏽鋼)，以避免火災發生時，災情持續擴大，另外設備零組件需使用耐高溫，耐酸鹼的材料。</p>		<p>Bumping machine Bumping 廠區機台</p>
7.3.13	<p>Machines and equipment that use risk chemicals such as TMAH or HF that have experienced fatal cases in the industry must be equipped with a leak detection linkage control, which can be linked to shut down the supply of hazardous chemicals in the process.</p> <p>使用 TMAH 或 HF 等業界曾發生死亡案例風險化學品之機台設備需裝有洩漏偵測連動控制，並可連動關閉製程中之危害化學物質之供給。</p>		<p>Bumping machine Bumping 廠區機台</p>
7.4	Heating equipment 加熱設備		
Item	Standard 標準		Machine type 應符合設備類型
7.4.1	<p>The heating system needs to have an over-temperature protection device to alarm and stop heating when the operating temperature is exceeded.</p> <p>加熱系統需有一道過溫保護裝置，於超過作業溫度時警報及停止加熱。</p>		<p>Assembly machine 一般封測機台</p>
7.4.2	<p>If the process uses flammable or flammable chemicals and its over-temperature protection device, the set temperature should not exceed the auto-ignition point and the set temperature should not exceed the operating temperature by more than 10°C. The detection temperature should be less than 7 cm away from the electric heating wire. If the temperature exceeds the set temperature, it should be able to automatically stop heating.</p> <p>如果製程使用可燃性或易燃性化學品其過溫保護裝置，設定之溫度不得超過自燃點且設定溫度不得超過作業溫度 10°C 以上。偵測溫度距離電熱線需 < 7</p>		<p>Assembly machine 一般封測機台</p>

	公分。溫度若超過設定溫度時應能自動停止加熱。	
7.4.3	<p>Baking equipment, wet process heating equipment and molding machine need to have two temperature protection devices, the first is over-temperature protection, the second is over-temperature protection device, the temperature controller of the over-temperature and over-temperature protection devices and the Circuit breakers and other component circuits must be independent from the process temperature control circuit to ensure that when a single over-temperature protector fails, there is another group that can stop heating. The heater power supply should be manually reset by personnel before heating can continue.</p> <p>烘烤設備與濕製程加熱設備與封膜機台需有兩道溫度保護裝置，第一道為過溫，第二道為超溫保護裝置，其過溫與超溫保護裝置之溫度控制器及斷路器..等元件迴路，皆需與製程溫控迴路獨立，以確保單一超溫保護器故障時，還有一組可以停止加熱，加熱器電源應由人員手動復歸，才可繼續加熱。</p>	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
		
7.4.4	<p>The heater must be equipped with a current protection device such as a fuse-break switch or circuit breaker with an appropriate load. The rated current capacity of the fuse switch or circuit breaker must match the heater to be protected.</p> <p>加熱器須搭配具適當負載的熔絲斷路開關或電路斷路器等電流保護裝置，熔絲開關或斷路器之額定電流容量要符合所保護的加熱器。</p>	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.4.5	<p>To heat flammable chemicals, a VOC concentration sensor should be installed inside the machine, and the concentration alarm value should be set at 25% of the lower limit of explosion. If the concentration is too high, the heater will be shut off and an alarm will be issued.</p> <p>加熱可燃性化學品，機台內部應設置 VOC 濃度感測器，濃度警報值設定於爆炸下限值之 25%，若濃度過高將連鎖關斷加熱器及發出警報。</p>	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.4.6	<p>The junction box of the heater of the wet process heating equipment should be made of flame retardant material to avoid the expansion of fire.</p> <p>濕製程加熱設備加熱器之接線盒應為阻燃材質，以避免火災災情擴大。</p>	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台

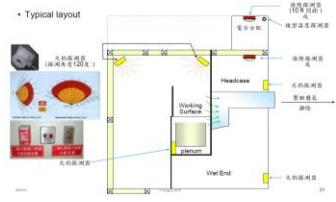
7.4.7	<p>For heated chemical tank, an additional temperature sensor must be installed in the tank, and the power supply of the heating element will be tripped/turned off when the temperature is too high.</p> <p>加熱式化學槽，槽內須另加裝一溫度感測器，並於過溫時跳脫/關閉加熱元件電源供應。</p> 	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.4.8	<p>The electrical contact point of the electronic immersion heating element should be designed for corrosion resistance and high temperature resistance. A temperature interlocking device should be set at the heater contact point. The position of the heater wire contact point must not be in the equipment processing area.</p> <p>電子浸入式加熱元件之電氣接點應需為抗腐蝕耐高溫設計，於加熱器接點處設置溫度連鎖裝置，當異常高溫時，停止加熱器持續動作。</p>	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.4.9	<p>For electronic immersion heating elements, the position of the wire contacts should not be in the equipment process operation area, and a smoke detector should be installed near the wire contacts to cut off the power supply of the heater.</p> <p>電子浸入式加熱元件，其電線接點位置不可於設備製程作業區域，並且於電線接點位置附近需設置偵煙探測器，連動切斷加熱器之電源供應。</p>	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.4.10	<p>All high-risk equipment heating equipment must have two temperature protection devices, the first is over-temperature protection device, the second is over-temperature protection device, and its power circuit breaker/switch (such as: MC/SSR), loop, Sensors, controllers (eg: thermostat/EGO).. etc. must be designed independently and cannot be in the same group as the process temperature control to avoid over-temperature protection or over-temperature protection when the process temperature control switch is abnormal. No loop trip to stop heating.</p> <p>所有高風險封測機台加熱設備需有兩道溫度保護裝置，第一道為過溫，第二道為超溫保護裝置，且其電力斷路裝置/開關(如:MC/SSR)、迴路、偵測元件(Sensor)、控制器(如:溫控器/EGO)..等皆須為獨立設計不能與製程溫控為同一組，避免製程溫控開關異常時候，過溫保護或超溫保護無法進行迴路跳脫停止加熱</p>	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.4.12	<p>The temperature detection position of the heater over-temperature protection device should be parallel to the heater or in direct contact with the heater. If the temperature exceeds the set temperature, it</p>	High risk assembly machine 高風險封測機台


	<p>should be able to automatically cut off the heating power of the machine.</p> <p>加熱器過溫保護裝置的溫度偵測位置，需與加熱器平行或直接接觸加熱器。溫度若超過設定溫度時應能自動切斷機台加熱電源</p>	<p>Bumping machine Bumping 廠區機台</p>
7.4.13	<p>The circulating windmill in the oven equipment should be equipped with a device to monitor the current value of the windmill motor, and will send a report when there is an abnormality.</p> <p>烤箱設備內循環風車應具備監測風車馬達電流值之裝置，並且有異常時會發報。</p>	<p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.5	Special gas 特殊氣體	
Item	Standard 標準	Machine type 應符合設備類型
7.5.1	<p>All machine equipment using special gases should be installed with a gas detection system, and gas leakage detectors should be installed in the following areas: 1.) At the exhaust pipe of the Gas Box of the machine equipment 2.) Machine-side environmental detection Test 3.) Gas valve distribution box (VMB) 4.) Gas supply end, when gas leakage is detected, the gas supply of the machine can be automatically shut down and has a warning function.</p> <p>所有使用特殊氣體之機台設備應安裝氣體偵測系統， 下列所述區域需設置氣體外洩偵測器：</p> <ol style="list-style-type: none"> 1.)機台設備之 Gas Box 的排氣管路處 2.)機台端環境偵測 3.)氣體閥門分配箱(VMB) 4.)氣體供應端，當偵測到氣體洩漏可立即自動關閉該機台設備之氣體供應且有警示提醒功能。 	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
		
7.5.2	<p>Equipment that uses toxic gases needs to have an exhaust design, and before the machine cavity needs to be opened for maintenance, it can ensure that there is no residual gas inside the machine.</p> <p>使用毒性氣體的設備需有排氣設計，並且於維護保養需開啟機台腔體前，能確保機台內部已無殘餘的氣體</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.5.3	<p>All process hazardous gas supply systems should be provided with an over-flow protection valve or an over-flow switch (except inert gas) and connected to an emergency shut-off valve (ESOV) located as close as possible to each cylinder outlet (CGA cylinder valve). threaded connection).</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p>

	所有製程有害氣體供應系統都應設置過流量保護閥或過流量開關(惰性氣體除外)·並連接至緊急關斷閥(ESOV)·ESOV 的位置應儘可能鄰近每個鋼瓶出口(CGA 氣瓶閥的螺紋接口)。	Bumping machine Bumping 廠區機台
7.5.4	The process uses special gas, and its gas supply pipeline needs to be designed with double sleeves. 製程使用特殊氣體·其氣體供應管路接需為雙套管的設計	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.5.5	All machines and equipment using special gas should be equipped with seismic detectors. When the earthquake is 80 gal, the gas supply should be stopped. The seismic detectors should be installed in the building or the gas supply side, and at least 2 groups should be installed with double start protection. Mechanism that stops the gas supply when both sets of seismometers are triggered simultaneously. 所有使用特殊氣體之機台設備應安裝地震偵測儀·當地震 80gal 需連動停止氣體供應·地震偵測儀設置於當棟建築物或氣體供應端·並且需至少設置 2 組並且為雙重起動保護機制·當兩組地震儀同時觸發時·停止氣體供應。	Bumping machine Bumping 廠區機台
7.6	Automatic fire suppression systems 自動滅火系統	
Item	Standard 標準	Machine type 應符合設備類型
7.6.1	The chemicals used in the fire suppression system must not cause secondary hazards or contamination of the clean room. 滅火系統之藥劑不可以造成二次危害或無塵室的污染。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.6.2	Fire detection and fire suppression systems must be equipped inside equipment which uses flammable or flammable chemicals (except for dispensing/compounds). 使用可燃性或易燃性化學品的設備內部皆須設置火警偵測與滅火系統(點膠/化合物不在此限)	High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
		
7.6.3	When the fire detection system equipped inside the equipment is activated, it should emit a sound of at least 85 dB and a visible signal	Assembly machine 一般封測機台

	<p>from the equipment.</p> <p>設備內設置的火警偵測系統啟動時應該在設備端發出可聽到至少 85 分貝聲響及可見到的訊號</p>	<p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.6.4	<p>A backup power supply that can maintain the fire detection and automatic fire suppression systems for 24 hours shall be provided, and the function of the fire detection system shall remain uninterrupted when the EMO is activated.</p> <p>須提供可以維持火災偵測自動滅火系統操作 24 小時之備用電源，且火警偵測系統於 EMO 啟動時，功能應維持不可被中斷。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.6.5	<p>Fire detection and automatic fire suppression systems of machines shall be provided with manual activation device.</p> <p>機台火災偵測自動滅火系統須設有手動啟動裝置</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.6.6	<p>Extinguishing agents should be approved by an authorized testing laboratory. There should be an alarm setting to remind people to leave if the spraying of chemicals may causes risk to people.</p> <p>滅火藥劑應該有授權的測試實驗室認可。若藥劑噴放對人可能滋生風險時，應有警報提醒人員離開</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.6.7	<p>The installation of the fire suppression agent pipeline should be composed of anti-corrosion components, designed to avoid the accumulation of water. Also should be designed to be easy for inspection of pipelines design, install and test. The pipelines should be able to withstand the high pressures generated by the release of fire extinguishing agents.</p> <p>火災滅火藥劑管線的安裝應該為：火災滅火藥劑管路應該由防蝕元件構成，設計上避免有水累積位置，應設計成容易執行機械檢查管線的設計、安裝及測試應可承受滅火藥劑噴放所產生的高壓力</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.6.8	<p>The equipment manufacturer should provide detailed maintenance and testing procedures for the fire suppression system of each equipment (including testing frequency and testing special equipment items).</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine</p>

	設備商應該提供每個設備之滅火系統的詳細維護及測試程序(包含測試頻率與測試特殊設備項目)	高風險封測機台 Bumping machine Bumping 廠區機台
7.6.9	<p>The function of the extraction and exhaust system must be maintained during the discharge of the CO2 fire extinguishing system in the radiation protection space, the calculation followed NFPA12, and the protection calculations should be provided.</p> <p>CO2 滅火系統全區放射防護空間噴放期間抽排氣系統功能須維持，計算需依據 NFPA12 進行計算，並提供相關之防護計算書</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.6.10	<p>The fire detection system should be equipped with a manual isolation function to facilitate regular testing and maintenance of the equipment.</p> <p>火警偵測系統應設置手動隔離功能，以利設備定期測試及保養作業。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7	Electrical Design 電氣設計	
Item	Standard 標準	Machine type 應符合設備類型
7.7.1	<p>Machine equipment shall be designed to minimize the possibility of electric shock during maintenance, repair, modification, correction or adjustment.</p> <p>Removable non-conductive and non-explosive covers should be used for exposed live circuits parts and terminals to protect personnel from accidental contact.</p> <p>機台設備設計應使在保養、修理、修改、校正或調整時達最少觸電的可能性。暴露之帶電線路、零件和端子應有可移式非導電和非爆性蓋子保護人員，避免意外接觸。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.7.2	<p>The machine should be equipped with a grounding wire, and the leakage current on the surface of the equipment should not exceed 3.5mA from any point on the surface of the equipment maintenance cover, and the current measured between the relevant control and the grounding terminal. The measure of electric resistance between any</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p>



	<p>measuring point of the grounding wire of the machine equipment, and the grounding conductor of the main equipment shall be equal to or less than 0.1 ohm. Grounded conductors and terminals to the relevant ungrounded conductors and terminals shall be compatible in rated current and comply with NEC regulations.</p> <p>機台應設有接地線，設備表面漏電電流由設備保養蓋之表面任何一點，及相關控制到接地端子間量測電流，均不得超過 3.5mA。在機構內之機台設備接地線任何量測點，與主設備接地導體間之量測電阻等於或小於 0.1 歐姆，接地導體及接線端子到相關不接地導體及端子在額定電流上應相容，並符合 NEC 規定。</p> 	<p>Bumping machine Bumping 廠區機台</p>
7.7.3	<p>All electrical components and circuits must comply with the latest electrical regulations EC (ELECTRIC CODE) of the country where the product is used. Dangerous electrical and electronic components (which may increase the risk of electric shock, fire or injury when they fail) must be listed or recognized by an international certification testing laboratory, or use other protective or sealing devices tested by internationally recognized laboratories.</p> <p>所有電氣組件及線路必須遵照使用國之最新電氣規章 EC(ELECTRIC CODE)，危險的電氣電子零組件(失效時會增加觸電，火災或受傷的危險)，必須經國內外認證測試實驗室登列或認可，或使用其他經國際認可實驗室之保護或密封裝置試驗。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.7.4	<p>In order to avoid short circuits or other electrical hazards due to misconnection of wires, The wire ends of electrical wiring of power circuits, control circuits, control circuits, the electric wiring of grounding and grounding conductors (neutral wires) should be color coded as specified by the applicable industry standard.</p> <p>為避免電線因錯接產生短路或其它電氣危害事件，電力迴路、控制迴路、控制電路、接地及接地導體(中性線)的電氣配線，應該在電線的頭尾兩端依照適用的工業標準的規定顏色加以編碼。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.7.5	<p>All 208/120V main circuit protection devices shall be capable of withstanding at least 10,000 RMS symmetrical short-circuit current at the input terminals of 208/120V; for all 480/227V circuit protection devices shall be capable of withstanding at least 14,000 RMS symmetrical short-circuit current.</p> <p>所有 208/120V 之主電路保護裝置，其 208/120V 的輸入端子上應至少能承受 10,000 RMS 對稱安培短路電流；對於所有 480/227V 電路保護裝置應至少能承受 14,000 RMS 安培對稱短路電流。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>

7.7.6	<p>The rated current capacity of the fuse switch or circuit breaker of the overcurrent protection device should be in line with the protected electric heater.</p> <p>過電流保護裝置之熔絲開關或斷路器之額定電流容量要符合保護的電熱器。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.7.7	<p>In order to avoid fire caused by power overload, the circuit should be equipped with a No Fuse Breaker (also called molded case circuit breaker).</p> <p>為避免電力過負載引發火災，電路應設置無熔絲過電流保護裝置。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.7.8	<p>After the equipment is installed, list the machine serial number, supply voltage, phase number, frequency, circuit loop, short-circuit current capacity and full-load current of the equipment or its industrial control panel in a clearly visible place.</p> <p>設備安裝完成後將機器序號、供應電壓、相數、頻率、電路迴路、設備或其工業控制盤的短路電流容量及全載電流，列在清楚可見之處。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.7.9	<p>All machines must be designed with a No Fuse Breaker (also called molded case circuit breaker).</p> <p>所有機台皆須設計漏電斷路器。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.7.10	<p>When the Emergency Off (EMO) is pressed, the main circuit breaker of the equipment or the circuit breaker of the main circuit is opened, the power output from the UPS should be interrupted.</p> <p>當按下緊急關閉電源(EMO)、設備主斷路器或主要電路的斷路器被打開時，應中斷 UPS 輸出的電力</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.7.11	<p>The UPS should be placed in the main power box, and if it cannot be complied with, it must be isolated from other equipment systems.</p> <p>UPS 應置於主電力箱內，若無法符合則必須要與其他設備系統隔離。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine</p>


		高風險封測機台
		Bumping machine Bumping 廠區機台
7.7.12	The output of the UPS must be marked with the content "UPS output, the voltage is XX volts", and certificate of manufacture, specifications, service life and daily inspection and maintenance method manuals are required. The manual should clearly describe its location and wiring. UPS 輸出端需有標示,內容為"UPS 輸出,電壓為 XX 伏特"。並且需有出廠資料、相關規格、使用年限與日常查檢保養方式說明書。手冊中內應明確描述其位置及線路。	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.7.13	After the electric control box door is opened, the inside of the box must be powered off. Otherwise, tools should be used to open the electric control box. An abnormal alarm or visual device should be set. If the door of the electric control box is equipped with an interlocking device, the interlock can be by-passed during maintenance. Once it returns to the normal state, the software-controlled interlock must automatically reset. 電控箱門開啟後箱內必須要斷電,否則應該要用工具才能開啟電控箱,需設置異常警報或視覺裝置。若是電控箱門有設置互鎖連動裝置,維修時可將此互鎖 by-pass,一旦回到正常狀態時軟體控制之互鎖必須自動復歸	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.7.14	If there is a motor/blower inside the machine or ancillary equipment, it needs to be designed with heat dissipation function. 機台或附屬設備內部若有設置馬達/鼓風機等,其需有散熱功能之設計	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.7.15	Choose the lithium/nickel battery passed the IEC/ISO/SAE/CNS/UL safety certification. 鋰/鎳電池選用 IEC/ISO/SAE/CNS/UL 安規認證通過	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.7.16	The main electrical control box of the machine should be equipped with a cooling fan. 機台電氣主控制箱應加裝冷卻風扇。	High risk assembly machine 高風險封測機台

		Bumping machine Bumping 廠區機台
7.8	Ergonomics 人體工學/人因工程	
Item	Standard 標準	Machine type 應符合設備類型
7.8.1	In the design stage of the machine, the ergonomics principle should be incorporated into the design, and the ergonomics performance capability and limit should be taken as the core, and to set up the hardware design due to the work needs. 機台在設計階段時，應將人因工程原理納入設計，並以人因績效能力和極限為核心，設置因工作需求的硬體設計	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.8.2	Personal injury should be given priority; Serious damage to equipment should be given second priority. 應優先考量可能導致人員受傷的問題；可能導致設備嚴重受損的問題則應屬第二優先考量	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.8.3	When repairing or maintaining the entrance and exit, unless the fence or cover is completely removed, it should be opened and supported by a structure during maintenance. It should not be designed to be supported by humans. 維修或保養出入口，除非圍欄或護蓋完全拆下，否則保養時應開啟並有結構進行支撐，不可設計由人工支撐	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.8.4	The access opening cover should be provided with a handle or other device for personnel to open the cover, and the handle should be able to be held by the whole hand. 出入口護蓋應設置把手或其他裝置供人員開啟護蓋，其把手應可讓整支手握住	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.8.5	The height of the Video display/screen (excluding touch screen) from the center to the floor, the highest is 168 cm, and the lowest is 132 cm.	Assembly machine 一般封測機台

	影像顯示器/螢幕(不包含觸控式螢幕) 中心位置至地板的高度，最高 168cm 最低 132cm	High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.8.6	The height of the touch screen from the center to the floor, the highest is 147cm, and the lowest is 91cm. 觸控式螢幕中心位置至地板的高度，最高 147cm 最低 91cm	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.8.7	Touchscreens with height less than 104-122 cm should be tilted upwards <30 degrees. 高度於 104~122cm 的觸控式螢幕向上傾斜角度應 <30 度	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.8.8	Touchscreens with height less than 104 cm should be tilted upwards <45 degrees. 高度小於 104 的觸控式螢幕向上傾斜角度應 <45 度	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.9	Earthquake Protection 地震保護	
Item	Standard 標準	Machine type 應符合設備類型
7.9.1.	The following equipment must be equipped with anti-vibration fixed feet or anti-vibration device to prevent movement and tipping during an earthquake. 1.) Bumping process production equipment 2.) Automation equipment of customer special requirements 3.) Equipment of customers special request 下列機具設備須裝設防震固定腳或防震支撐，以防地震時會發生移動與傾倒。 1.) Bumping 製程生產設備。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台

	<p>2.) 自動化設備。</p> <p>3.) 客戶特殊要求設備。</p>	
7.9.2	<p>All accessories of the machine equipment and their matching parts should be capable of resisting the expected displacement of the equipment and surrounding structures during an earthquake, and these positions should be clearly marked on the supporting frame of the equipment.</p> <p>機台設備的所有附件及其搭配之機件應有能力抵抗地震時設備及週遭構造物預期的移位。這些位置應很清楚的標示在設備的支撐骨架上。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.9.3	<p>The supplier shall provide the user with the following data:</p> <ol style="list-style-type: none"> 1. The complete infrastructure plan has the same elevation, section and section details as the infrastructure component entities. 2. The physical dimensions of each foot: width, length, height. 3. The form of the foot and its position on the architecture frame 4. The weight distribute on each foot. 5. The weight and the position of the center of mass of each independent structural module 6. Acceptable fixed position on the equipment frame <p>供應商應提供使用者下列資料(DATA)：</p> <ol style="list-style-type: none"> 1. 完整的基礎骨架規劃與基礎骨架組件實體相同的正面、切面與斷面詳圖。 2. 每個腳座的物理尺寸:寬度、長度、高度 3. 使用腳座的形式及其在基礎構架上的位置圖 4. 分配在每支腳座的重量。 5. 每個獨立結構模組的重量及質量中心位置 6. 設備構架上的可接受固定位置 	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.9.4	<p>The seismic design of machinery and equipment should at least conform to the seismic design of the building where the equipment is located, and the horizontal seismic force (Fph) or 0.5G (490gal) horizontal acceleration of the floor where the equipment is located should be designed, and the seismic calculation book or seismic inspection results should be provided.</p> <p>機具設備耐震設計最小應符合設備所在建築物耐震設計，再依設備所在樓層設計水平地震力(Fph) 或 0.5G (490gal) 之水平加速度，並需提供耐震計算書或耐震檢核結果。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.10	Mechanical Design 機械設計	

Item	Standard 標準	Machine type 應符合設備類型
10.1	<p>The mechanical surface and maintenance area of the machine equipment (including the area where the outer cover is removed) must not have sharp edges and corners, all sharp edges must be rounded, and sharp corners must be chamfered.</p> <p>機台設備之機構表面與維修區域 (含外蓋拆除之區域) · 不可有銳利邊與角 · 所有銳利邊須磨圓 · 銳利角須倒角</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.10.2	<p>If the lift-up door cover design of the gas spring/cylinder is used, the gas spring/cylinder can only be used as a buffer mechanism, not as a support mechanism, and a steel structure must be provided to support and prevent the door sheet from sliding down.</p> <p>若使用油/氣壓桿的上掀門蓋設計 · 其油/氣壓桿僅可作為緩衝機構 · 不可作為支撐機構 · 必需設置鋼性結構進行門片支撐預防門片滑落。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.10.3	<p>For the equipment designed to use gas spring/cylinder to lift the door cover, its supporting structure must meet the following conditions:</p> <ol style="list-style-type: none"> The rigidity of the supporting structure must be able to bear the weight of the door. The support structure must have multi-stage functions, which can be supported at any position when the upper flap is opened or closed. <p>使用油/氣壓桿上掀門蓋設計之設備,其支撐結構必須符合下列條件:</p> <ol style="list-style-type: none"> 支撐結構之鋼性必須可承受門片重量。 支撐結構必須有多段式功能 · 達到上掀門片開合時開到任何一位置皆可進行支撐 	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.10.4	<p>If the support mechanism adopts circular or straight ratchet design, finite element analysis of nonlinear structure shall be required. Its related design can refer to the following ways to design:</p> <ol style="list-style-type: none"> The ratchet material must be forged steel or the same material. The ratchet setting must be able to withstand more than 1 times the load of the door. The height of the ratchet teeth must be 0.75 times the thickness of the top of the ratchet teeth. To prevent the ratchet teeth of the ratchet check ratchet plate 	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p>

	<p>(ratchet lock plate) from breaking and failing due to improper operation, the check ratchet plate must be designed with multiple teeth and must have at least 4 teeth or more.</p> <p>5. The ratchet support mechanism should be equipped with a handle and an unlocking lever for ratchet release and unlocking, and the unlocking lever and the handle should not have sharp edges and angles.</p> <p>6. If setting the straight ratchet, the setting direction should be parallel to the gas spring/cylinder.</p> <p>支撐機構若有選用圓形或直式棘輪設計，須要求進行非線性有限元素破壞分析。其相關設計並可參考以下方式進行設計</p> <ol style="list-style-type: none"> 棘輪材質須為鍛剛材質或同等材質 棘輪設置必須可承受門片荷重 1 倍以上 棘輪齒高須為棘輪齒頂厚的 0.75 倍 預防棘輪止回棘板(棘輪鎖板)的棘齒，因操作不當造成斷裂失效，故止回棘板需為多齒設計且至少須有 4 齒以上 棘輪支撐機構應設有把手與解鎖桿進行棘輪釋放解鎖，解鎖桿與握把設置不可有銳邊銳角 若設置直式棘輪設置方向應與油壓/氣壓桿平行 	<p>Bumping machine Bumping 廠區機台</p>
7.10.5	<p>The latch design of the side-opening safety door of the equipment shall meet the following requirements:</p> <ol style="list-style-type: none"> L-shaped detachable door latch cannot be used, only the pin hinge can be used, as shown in the picture. fixing point of the detachable door latch should be able to bear 1.5 times the weight of the door. If it is fixed by welding method, it must be fully welded. There must be a safety design to prevent the door latch from breaking or abnormally causing the door to fall. The door latch must not be dislocation. <p>設備側開式安全門的門鎖設計，應符合下列要求： 不可使用 L 形可拆式門鎖，僅能使用公母頭固定 pin 絞鍊，如圖示</p>  <p>2.可拆式門鎖之固點應可承受門片重量的 1.5 倍，若焊接工法進行固定須為滿焊</p> <p>3.須有防止門鎖斷裂或異常造成門片掉落之安全設計</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>

	4.門門軸不可有洗溝之狀況	
7.10.6	If the temperature of the machine surface is higher than 60°C, a safety anti-scalding fence should be installed to prevent personnel from being scalded. 若機台表面溫度會>60°C，則應裝設安全防燙圍籬，避免人員燙傷	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.11	Ionizing Radiation 游離輻射	
Item	Standard 標準	Machine type 應符合設備類型
7.11.1	The machine itself and its outer cover should be shielded from the correct material and thickness, and the interlock device should be installed. 機台本身與其外蓋應選用正確材質與厚度形成屏蔽，並裝設安全連鎖裝置。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.11.2	When operating and maintaining machine equipment, ionizing radiation must be limited to a minimum dose. (Safety shields, interlocks or other safety protection devices should be set up). 當機台設備進行操作及保養時，游離輻射射線必須限制至最低量。(應設置安全防護屏蔽、安全連鎖或其它安全防護裝置)。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.11.3	The radiation dose rate at 5 cm of the shielded outer surface of the machine should be less than 5 μSV/hr, and the original manufacturer should provide the machine catalog and the factory radiation test results. 其機台屏蔽外表面 5 公分處其輻射劑量率應≤5 μSV/hr，且原廠應提供機台型錄和出廠輻射測試結果。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.11.4	If additional administrative control of radiation exposure limits is required, it must be specified in the operation and maintenance	Assembly machine 一般封測機台

	<p>manual.</p> <p>若需要另以行政管理之方式控制輻射曝露限制量時，則必須在操作保養手冊中詳細說明。</p>	<p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.11.5	<p>The equipment nameplate indicates the necessary information such as radiation type, maximum tube voltage, current, etc.</p> <p>設備銘牌標示輻射種類、最大管電壓、電流...等必要資訊</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.12	Laser 雷射	
Item	Standard 標準	Machine type 應符合設備類型
7.12.1	<p>The equipment should be designed to avoid personal laser injury under normal operation, and at the same time, minimize the risk of maintenance or other operations. Exposure risks should be controlled in the following ways:</p> <ol style="list-style-type: none"> 1. Engineering control (box/shielding/interlock). 2. Software control (warning signs/personal operating procedure standards/personal protection). <p>設備設計時,應避免在正常操作下發生人員雷射傷害，同時應將維修或其他作業風險降到最低。暴露風險應以下述方式加以控制:</p> <ol style="list-style-type: none"> 1.工程控制(箱體/屏蔽遮蔽/連鎖裝置) 2.軟體控制(警告標示/人員作業程序標準/個人防護) 	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.12.2	<p>Equipment manufacturers should provide the following information in each operation and maintenance manual.</p> <ol style="list-style-type: none"> 1. Description of possible laser hazards during operation, maintenance and service and methods to minimize the hazards. 2. Certification procedures: the scope of laser control and the scope of hazards should be included. 	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p>

	<p>3. Personal protective equipment must be worn.</p> <p>4. Instructions for use of the actual machine: the location of the built-in laser source and the contact points of personnel in the laser product should be written on the document provided to the user.</p> <p>設備商應提供以下資訊於各項操作及保養手冊。</p> <p>1.操作、保養、服務過程中可能發生的雷射危害說明及使危害降至最低的方法。</p> <p>2.辨認程序：需包括雷射控制範圍及危害範圍大小。</p> <p>3.必須配戴個人防護具實機使用說明</p> <p>4.內建雷射源的位置及雷射產品內的人員接觸點應寫在提供給使用者的文件上</p>	<p>Bumping machine Bumping 廠區機台</p>
7.12.3	<p>All removable operator panels also have interlocks or require special tools to remove</p> <p>所有可拆卸式操作面板也有安全連鎖或需要特殊工具才能拆卸</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.13	Noise and vibration 噪音與震動	
Item	Standard 標準	Machine type 應符合設備類型
7.13.1	<p>When the sound pressure value of the equipment is higher than 70dBA, the manufacturer should provide evaluation data, including: sound pressure value, evaluation equipment, calibration equipment, test conditions and results.</p> <p>設備之音壓值高於 70dBA 時，製造商應提供評估資料，包括：音壓值、評估設備、校正設備、測試條件和結果。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.13.2	<p>When the sound pressure of the equipment exceeds 75dBA, the manufacturer must provide the sound pressure and the location of the sound source in addition to the above information.</p> <p>設備音壓值超過 75dBA 時，製造商除了提供上述資訊外，還須提供音壓值及音源位置。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.13.3	<p>Equipment shall prevent or control vibration exposure to surrounding areas at or below (800 micrometers/sec or rms for production areas, 400 micrometers/sec or rms for office areas) and 120 dB transient</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly</p>

	(pulse) sound pressure level. 設備應防止或控制振動曝露量影響周遭區域等於或低於(生產區 800 micrometers/sec or rms · 辦公室區 400 micrometers/sec or rms) 準 · 以及 120 分貝瞬時性(脈衝)音壓位準	machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.13.4	When setting up high-vibration equipment, it should be considered to avoid affecting other surrounding production lines and office areas. The sequence of vibration control is: 1. Engineering control (reduce vibration source, absorb vibration, isolate vibration, reduce vibration, etc.). 2. Administrative controls (warning signs, operating procedures, etc.). 高振動設備設置時 · 應先考量避免影響周圍其它生產線及辦公室區域 · 振動控制的順序為： 1. 工程控制 (降低振動源、吸振、隔振、減振等)。 2. 行政控制 (警告標示、操作程序等)。	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.13.5	For equipment noise measurement, the simulated operation mode should be as close as possible to the actual user equipment operation mode and operation position in user experience, and the best simulated real position of the operator relative to the machine should be used for measurement. The general benchmark is that the microphone should be measured at 1 meter from the equipment, and the measurement height is 1.2 meters to simulate the sitting posture of the operator; the height of 1.5 meters above the ground has simulated the standing posture of the operator; for the nearest wall or objects that reflect noise, it should be keep a distance of 3.5 meters. 設備噪音量測 · 應模擬作業模式盡量跟真實使用者設備作業模式及用戶經驗中的操作位置相近 · 採取操作人員相對於機台的最佳模擬真實位置進行量測 · 一般基準是麥克風應該於設備 1 米量測 · 量測高度 1.2 米以模擬坐姿的作業人員；離地高度 1.5 米已模擬立姿的作業人員；對於最近的牆面或是會反射噪音的物體 · 應該保持 3.5 米距離。	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.14	User Manual Notices 使用手冊告示事項	
Item	Standard 標準	Machine type 應符合設備類型
7.14.1	Manufacturers should attach materials, including: appearance drawings, operation manuals, product catalogs, safety standards or photocopies of type inspection documents. 廠商應檢附資料 · 包含:外觀圖、操作手冊、產品型錄、維護保養手冊、安全標準或型式檢驗文件影印本	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台

7.14.2	<p>If there is any hazard in the machine equipment that cannot be eliminated by safe design, it should be clearly marked in the operation manual and maintenance manual.</p> <p>機台設備如有任何危害無法以安全設計方式消除時，應於操作手冊及維護保養手冊中清楚明確的標註</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.14.3	<p>The circuit diagram of the interlock device/its operation method and EMO function and its hardware assembly should be clearly explained in the operation and maintenance manual.</p> <p>安全連鎖裝置線路圖/其操作方法與 EMO 作用及其硬體裝配應清楚的在操作與保養手冊中詳細說明。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.14.4	<p>If administrative control of radiation exposure limits is required, it must be specified in the operation and maintenance manual.</p> <p>若需要以行政管理之方式控制輻射曝露限制量時，則必須在操作保養手冊中詳細說明。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.14.5	<p>The minimum overcurrent rating of electrical components such as main switches should be indicated in the facility installation and maintenance manual.</p> <p>主開關等電氣組件之最低過電流額定值應在設施安裝及保養手冊上標明。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.14.6	<p>The key failure points that may occur on the hardware surface or the places where there will be failures are described or annotated in detail with text or graphics.</p> <p>硬體面可能會發生的關鍵失誤點或會故障的地方以文字或圖面詳細敘述或註解。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine 高風險封測機台</p> <p>Bumping machine Bumping 廠區機台</p>
7.14.7	<p>The words "CAUTION", "WARNING" and "DANGER" should be clearly marked in the user manual.</p> <p>使用手冊中對於“注意(CAUTION)”、“警告(WARNING)”及“危害(DANGER)”等標示文字應明顯標示。</p>	<p>Assembly machine 一般封測機台</p> <p>High risk assembly machine</p>

		高風險封測機台
		Bumping machine Bumping 廠區機台
7.14.8	If hazardous chemical substances are used in the machine equipment, it is necessary to indicate the location of the sampling point where the detection equipment is recommended to be set up in the relevant documents and manuals. 機台設備若使用危害化學物質，需在相關文件手冊上註明建議設置偵測設之採樣點之位置。	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.14.9	UPS needs to have factory data, relevant specifications, service life and daily inspection and maintenance method manual. The manual should clearly describe its location and line. UPS 需有出廠資料、相關規格、使用年限與日常查檢保養方式說明書，手冊中內應明確描述其位置及線路	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.14.10	<i>The new process equipment should provide the new process equipment hazard basic information table, the equipment interlock list and the new process equipment hazard risk identification table (if there are other risk considerations, the occupational safety unit may request the agent or equipment manufacturer, and other original manufacturers must also be provided. more detailed supporting information).</i> 新製程設備應提供新製程設備危害基本資訊表、設備安全聯鎖清單及新製程設備危害風險鑑別表(若有其它風險考量下，職安單位可要求代理商或設備商，另須提供其它原廠更詳細之佐證資訊)。	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台
7.15	Safety Lockout-Tagout and Hazard Warning Signs 安全上鎖掛牌與危害警告標示	
Item	Standard 標準	Machine type 應符合設備類型
7.15.1	All electrical, chemical, temperature and mechanical physical, chemical, ergonomic and other injuries should be posted on the equipment with obvious hazard icons and labels in both Chinese and English. All chemical hazards should be posted in accordance with the hazardous chemical labeling and general rules For other hazard labels, please follow SEMI S1, ANSI Z535, IEC 417, CNS9328 Z1024 or other regulations.	Assembly machine 一般封測機台
		High risk assembly machine 高風險封測機台
		Bumping machine Bumping 廠區機台

	所有電氣、化學、溫度及機械之物理性、化學性、人因工程等傷害應在設備上張貼明顯危害圖示及中英文標示，所有化學危害應依危害性化學品標示及通識規則貼上標示，其他危害標示請遵循 SEMI S1，ANSI Z535，IEC 417，CNS9328 Z1024 或其他規定。	
7.15.2	Machine equipment shall be installed with Lockout/Tagout-related lockout design/marks that require controllable hazard energy, and user lockout/markout procedures and instructions for installation and lockout devices must be provided, which are listed as part of the installation and maintenance instructions. 機台設備需安裝符合需有可控制危害能量之 Lockout/Tagout 相關上鎖設計/標示，並需提供使用者上鎖/標示程序及安裝與上鎖裝置說明，並列為安裝保養說明的一部份。	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.15.3	Work that may result in exposure to hazardous energy sources (including electrical energy, chemicals, cold/heat motion, pressurized containers, etc.) should be provided with a lockable energy isolation device 可能造成接觸危害性能源來源的工作(含電能、化學物質、冷/熱動、加壓容器等)，應該提供可以上鎖的能量隔離裝置	Assembly machine 一般封測機台 High risk assembly machine 高風險封測機台 Bumping machine Bumping 廠區機台
7.16	Safety and Hygiene Specifications for Automated Handling Systems 自動化搬運系統安全設計	
Item	Standard 標準	
7.16.1	Industrial Robot 工業機器人	
7.16.1.1	After the machine is shut down, the movable mechanism must be in the stopped state. 機台關機/停機(Shut Down)後，可移動式機構必須於停止狀態。	
7.16.1.2	Equipped with a remote control device (teach controller), the operation control is the highest. 配備遙控裝置(教導控制器)，其操作控權為最高。	
7.16.1.3	The manual operation must be at low speed (below 250mm/sec); however, when the non-uniaxial robot is manually operated, it can only perform inch (single-point) control, and cannot be set to continuous (continuous) control. 手動操作時必須為低速(250mm/sec 以下);但是手動操作非單軸式 Robot 時，只能做吋動(單點)控制，不可設定為連動(續動)控制。	
7.16.1.4	The power supply, control panel or door of robot or automation equipment must have a lockout & tagout design. 機器人或自動化設備的電源、控制盤或門等必須有(Lockout&Tagout)設計。	
7.16.1.5	The fixed control panel should have a switch status indicator for switching between automatic and manual.	

	固定式控制盤應有切換自動、手動的開關狀態指示燈。
7.16.1.6	Robots or automation equipment must be equipped with a display to show the operating status. 機械人或自動化設備必須安裝顯示器，顯示操作狀態。
7.16.1.7	If the industrial robot can be controlled remotely, it must be able to prevent the robot from being controlled/activated from the other end at the same time (for example: a key-operated switch or a design with the same function). 若工業機器人能夠被遠端控制，必須能防止機械人由另一端同時控制/啟動(例如:設計由鎖匙操作切換開關或相同功能之設計)。
7.16.1.8	Robots or automation equipment should be designed to stop the automation equipment immediately when the rated load, maximum speed and maximum range of motion are reached. 機械人或自動化設備應設計為，當達到額定負載、最高速和最大可動範圍時立即將自動化設備立即停止。
7.16.1.9	Industrial robots and industrial robot systems should be designed in accordance with ANSI/RIA 15.06 or ISO 10218. 工業機器人及工業機器人系統應依循 ANSI/RIA 15.06 或 ISO 10218 設計
7.16.1.10	Industrial robots or related drive mechanisms, moving parts and mechanical arms should be equipped with safety guardrails and enclosures to cover all dangerous areas. Safety guardrails must be constructed of steel, iron or other solid materials. (The compliance of collaborative robots is not limited to this). 工業機器人或相關驅動機構、移動部份和機械手臂等四周需設置安全護欄、護圍進行所有危險區域包覆，安全護欄..等須以鋼、鐵材料或其他堅固材料構築，護圍、護欄高度至少 90 公分以上; 所有危險區域包覆，安全護欄..等須以鋼、鐵材料或其他堅固材料構築。(協同式機器人遵行不在此限)
7.16.1.11	Safety doors should be set up in the area of industrial robots or related driving mechanisms, and safety doors or windows should have safety interlocks. When they are opened, the mechanical movement can be stopped immediately, and special tools are required to release the interlocks. 工業機器人或相關驅動機構區域應設置安全門，且安全門或窗戶應有安全連鎖，當它們被打開時，可立即停止機械移動，需特殊工具才可將連鎖解除。
7.16.1.12	Robotic automation equipment should have collision avoidance sensor design. (There is a clear and independent safe working space; when there is a fence for isolation, this limit is not applicable). 機械人自動化設備應有防撞感應器(sensor)設計。(有明確獨立安全作業空間；當有圍牆作隔離，不在此限。
7.16.1.13	If the mechanical arm or moving mechanism of the equipment is not covered and isolated, area detectors should be provided, such as safety gratings, pressure-sensitive floor mats, etc. When a foreign object is detected or a person enters the dangerous area, the interlock stops

	<p>the mechanical movement.</p> <p>若設備之機械手臂或移動機構未包覆隔離，則應提供區域偵測器，例如：安全光柵、壓力感應地墊等。當偵測到異物或人員進入危險區域時，則連鎖停止機械移動。</p>
7.16.1.14	<p>EMO protection should be designed for areas where adjustment/teaching/maintenance is performed.</p> <p>進行調校/教導/維護等作業之區域應設計 EMO 保護。)</p>
7.16.1.15	<p>EMO should be set on the teach controller.</p> <p>教導控制器上應設置有 EMO。</p>
7.16.1.16	<p>The distance between emergency stop EMO is $\leq 3m$.</p> <p>緊急停止 EMO 位置之間距$\leq 3 m$。</p>
7.16.1.17	<p>When the robot transfers the material inlet and outlet, after pressing any EMO, the robot and the material inlet and outlet should stop the transfer operation immediately.</p> <p>當機器人對出入料口進行傳送工作，按下任一個 EMO 後，機器人與出入料口應立即停止傳送作業。</p>
7.16.1.18	<p>When the emergency stop switch (EMO) is pressed, the control loop should be retained (for example, the PLC loop retains Data to avoid loss of parameters).</p> <p>當緊急停止開關 (EMO) 被壓下後應該保留控制迴路 (如 PLC 迴路保留 Data，避免參數喪失。</p>
7.16.1.19	<p>The seismic design and installation method of the industrial robot should be able to withstand at least 0.5g of seismic load, and provide the seismic calculation book.</p> <p>工業機器人防震固定設計及安裝方法應至少能承受 0.5g 之地震負荷，並提供防震計算書。</p>
7.16.1.20	<p>If the robot is installed in a place where the vapor of flammable liquid, combustible gas, combustible dust, etc. stays or the explosive dust accumulates, and there is a risk of fire and explosion, the electrical equipment should be classified according to the dangerous area, with explosion-proof suitable construction for the area.</p> <p>設置之機器人於易燃液體之蒸氣、可燃性氣體、可燃性粉塵等滯留或爆燃性粉塵積存之場所，而有火災爆炸之虞者，其電氣設備應依危險區域劃分，具有適合該區域之防爆性能構造。</p>
7.16.1.21	<p>Robots or automation equipment install displays to show operational status.</p> <p>機械人或自動化設備安裝顯示器，顯示操作狀態。</p>
7.16.1.22	<p>The Teaching Box is designed with Dead-man-key design.</p> <p>Teaching Box 設計有 Dead-man-key design(三段式開關)。</p>
7.16.1.23	<p>Operation right transfer: The main and auxiliary control panels can only be controlled by a single control (can not be controlled at the same time), such as, designed in the form of a key.</p> <p>操作權移轉：主、副控制盤，僅能單一操控(不能同時操控)設計，如：以鑰匙形式設計</p>
7.16.1.24	<p>The air pressure unit system is equipped with a non-return valve, and a pressure relief valve which must be able to release the pressure when there is no power supply should be installed.</p> <p>氣壓單元系統加裝逆止閥，且應裝設當沒有電源時必須能釋放壓力的洩壓閥。</p>
7.16.1.25	<p>When the EMO is pressed (when the power is removed), the robot should keep the power off (maintain suction or clamping) to prevent the robot from flying or dropping the objects it is</p>

	holding due to abnormal or emergency stop.當 EMO 按下後(動力移除時) , 機械人應為斷電保持(保持吸著或夾合)狀態持續 , 防止機器人因異常或緊急停止時避免將所持物件飛落、掉落而引發危害。
7.16.1.26	When using the teaching controller in a safe space or performing other operations, the robot cannot operate when it is switched to the automatic operation mode. 在安全防護空間內使用教導控制器時或進行其他作業時 , 機械人被切換至自動操作模式時仍無法進行作動。
7.16.2	OHT 空中行駛無人搬運車輛
Item	Standard 標準
7.16.2.1	If a person is trapped, when the EMO of the manually controlled aerial automatic guided vehicle is activated, the vehicle should be able to release the brakes, so that the trapped person can get out of the trap. - Automatic guided vehicle should provide manual movement capabilities so that the operator can operate the vehicle in the event of a problem. In the event of a problem, the operator should be allowed to manually operate all functions of the vehicle, including travel and loading/unloading. 若有人員受困時 , 當手動控制空中無人搬運車輛之 EMO 啟動後 , 該車輛應能釋放制動器 , 讓受困人員可以脫困。 無人搬運車輛應提供手動移動功能 , 以便操作員可在發生問題時操作車輛。發生問題時 , 應允許操作人員手動操作車輛的所有功能 , 包括行駛及裝載/卸載。
7.16.2.2	When manually operating the vehicle mode, ensure that the operator can only move the vehicle (use a hold to run switch) while the switch is held down. 手動操作車輛模式時 , 應確保操作員只有於持續按住開關時才能移動車輛(使用制動型開關(hold to run))。
7.16.2.3	The automatic guided vehicle should be interlocked with the equipment, for example, according to the needs of the semiconductor process equipment, automatic loading port, storage station, foundation conveyor belt and automatic storage system to confirm that the load is properly fixed, and the automatic guided vehicle and each conveying element will not conflict with each other. 無人搬運車輛應與設備連鎖 , 例如 , 依據半導體製程設備、自動上貨口、儲貨站、地基輸送帶及自動倉儲系統之需要以確認負荷固定妥善 , 及無人搬運車輛與各傳送元件部會相互衝突。
7.16.2.4	When an unsafe condition occurs when the equipment is loading and unloading, it should be able to detect and indicate the condition immediately, and the power of all loading equipment will be stopped immediately (the unmanned vehicle system cannot be automatically reset). 當設備於上下貨時發生不安全狀況 , 應能即時偵測出及指示該狀況 , 且所有裝貨設備的動力皆立即停止(無人搬運車輛系統不可自動復歸)。

7.16.2.5	<p>Vehicles should be equipped with non-contact proximity sensor to ensure that the moving vehicle will not hit people or other obstacles (the vehicle should be able to detect people within an appropriate distance while driving, and slow down, before approaching people. stop immediately).</p> <p>車輛應配備非接觸式接近感知偵測，以確保行駛中的車輛不會撞到人或其他障礙物(車輛於行駛時應於適當之距離內能偵測到人員，且減速進行，於接近人員時能立即停車)。</p>
7.16.2.6	<p>The vehicle must be equipped with a traveling obstacle detector. The effective detection range must be greater than the braking distance at the maximum speed. When an obstacle is detected within the detection range, the brake must be activated immediately to avoid collision of the wafer cart.</p> <p>車輛須裝設行進障礙物偵測器，有效偵測範圍須大於最高車行速度時之煞車距離，當偵測範圍內偵測到有障礙物時須立即啟動煞車，避免晶片車碰撞。</p>
7.16.2.7	<p>The wafer cart must be equipped with a descending detector, which will immediately stop the ascending/descending of the wafer cassette when it detects people or objects in the descending space.</p> <p>晶片車須裝設下降偵測器，當偵測下降空間內有人或物品時，則立即停止晶片匣升/降。</p>
7.16.2.8	<p>There should be no dangerous parts such as sharp edges or protrusions on the vehicle body.</p> <p>車體不可有尖銳邊緣或突出物等危險部位。</p>
7.16.2.9	<p>Vehicles should be designed with electrical leakage protection devices.</p> <p>車輛應有漏電防護裝置之設計。</p>
7.16.2.10	<p>The transmission rail must have facilities to avoid accidental electric shock, such as insulation protection.</p> <p>輸電軌須有避免人員誤觸感電之設施，如絕緣保護等。</p>
7.16.2.11	<p>The unmanned aerial vehicle should be equipped with emergency shutdown (EMO), and ensure that the operation and movement of the vehicle can be stopped immediately when the EMO is activated, including driving and loading/unloading operations. EMO shall be activated immediately after the following actions: a.) Press the EMO button on the control panel of the UTV system; b.) Press the EMO button on the fixed position on the wall.</p> <p>空中無人搬運車輛應配備緊急關斷(EMO)，並確保 EMO 啟動時可立即停止車輛的操作和移動，包括行駛與裝載/卸載操作。EMO 應於下列動作後立即啟動：a.) 按下 UTV 系統控制盤上的 EMO 按鈕； b.) 按下牆面固定位置上的 EMO 按鈕。</p>
7.16.2.12	<p>If there is an arm travel axis, its travel trolley can be controlled remotely. It must be possible to prevent the trolley from being controlled/started by the other end at the same time, and when the arm on the travel trolley is switched to the manual adjustment mode, its trolley cannot be controlled or activated at the same time.</p> <p>若設有手臂走行軸，其走行台車能夠被遠端控制，必須能防止台車可由另一端同時控制/啟動，且當走行台車上手臂切換於手動調校模式時，其台車無法同時被進行控制或作動</p>

7.16.2.13	<p>The button of the EMO of the aerial automatic guided vehicle should be installed in a position that is easily accessible by personnel.</p> <p>-Example 1. Near the control panel or operation monitor (including a hand-held vehicle remote control)</p> <p>-Example 2. Near the process equipment carrier interface or workstation</p> <p>-Example 3. The wall of the working area of the aerial automatic guided vehicle</p> <p>空中行駛車輛 EMO 的按鈕應安裝在人員容易接近使用的位置。</p> <p>-舉例 1. 控制盤或操作監視器(包含手持式車輛遙控器)附近</p> <p>-舉例 2. 製程設備承載介面或工作站附近</p> <p>-舉例 3. 空中行駛車輛作業區的牆壁</p>
7.16.2.14	<p>Sensing Device Deactivation Indication -When the non-contact proximity sensor of the automatic guided vehicle does not work, the vehicle should have a warning light on.</p> <p>感知裝置停用指示-無人搬運車的非接觸式近接感知裝置無法作用時，車輛應亮起警示燈。</p>
7.16.2.15	<p>Function Abnormal Alarm -When the automatic guided vehicle functions abnormally, the vehicle should light up the warning light and sound the alarm to remind the relevant personnel.</p> <p>功能異常警報-無人搬運車功能發生異常時，車輛應亮起警示燈並發出警音，以提醒相關人員。</p>
7.16.2.16	<p>Manual operation indicator -The automatic guided vehicle should light up the manual operation indicator when it is manually operated. Manual operation refers to any means of controlling the vehicle other than automatic operation.</p> <p>手動操作指示燈-無人搬運車在手動操作時應亮起手動操作指示燈。手動操作指除自動操作以外任何控制車輛的方式。</p>
7.16.2.17	<p>Start Alarm -The aerial automatic guided vehicle should sound an alarm when the lifting gear is active (up or down).</p> <p>起動警報-空中行駛車輛應在起重機構活動時(上升或下降)發出警音。</p>
7.16.2.18	<p>Mechanisms to avoid vehicle collisions should be provided in areas where multiple AGVs operate at the same time and should comply with the following conditions: a.) The distance between the vehicle in front and the vehicle behind. b.) The point in time when one line of vehicles meets another. c.) The two sides should maintain a safe distance to avoid collision.</p> <p>應在同時有多輛無人搬運車操作的區域內提供避免車輛碰撞的機制，須符合下列條件: a.) 前車與後車的距離 b.) 一列車輛與另一列車輛交會的時間點。 c.) 兩輛側邊應保持避免碰撞的安全距離。</p>
7.16.2.19	<p>The EMO button installed on the structure should not be more than 3 meters away from the place where the operator often works, and it should be easy to access and press.</p> <p>安裝在結構體上的 EMO 按鈕與作業人員時常作業地點距離不得超過 3 公尺，且要易於接近及按壓。</p>
7.16.2.20	<p>If the AGV is equipped with an oil storage tank (eg gear box), its structural design should ensure that the vehicle does not leak oil.</p> <p>若無人搬運車輛內部配備儲油槽(例如：齒輪箱)，其結構設計應確保車輛不會漏油。</p>

7.16.2.21	<p>The type and amount of lubricating oil used for the skid rails of aerial vehicles should ensure that there is no danger of vehicle dripping or personnel slipping.</p> <p>用於空中行駛車輛滑軌的潤滑油在種類和用量上均應確保不會造成車輛滴油或人員滑倒的危險。</p>
7.16.3	The ground walking Automatic Guided Vehicle (AGV) 地面行駛無人搬運車輛
Item	Standard 標準
7.16.3.1	<p>If a person is trapped, when the EMO of the AGV is manually controlled, the vehicle should be able to release the brakes so that the trapped person can get out of the trap.</p> <p>--The AGV shall provide manual movement so that the operator can operate the vehicle in the event of a problem. In the event of a problem, the operator should be allowed to manually operate all functions of the vehicle, including travel and loading/unloading.</p> <p>若有人員受困時，當手動控制地面無人搬運車輛之 EMO 啟動後，該車輛應能釋放制動器，讓受困人員可以脫困。無人搬運車輛應提供手動移動功能，以便操作員可在發生問題時操作車輛。發生問題時，應允許操作人員手動操作車輛的所有功能，包括行駛及裝載/卸載。</p>
7.16.3.2	<p>When manually operating mode, ensure that the operator needs to keep holding the switch to move the vehicle (use a hold to run switch).</p> <p>手動操作車輛模式時，應確保操作員需持續按住開關才能移動車輛(使用制動型開關(hold to run))。</p>
7.16.3.3	<p>If the AGV has a hand-held remote control, it should provide EMO or emergency stop function, so that the operator can stop the vehicle and protect himself or others.</p> <p>地面行駛無人搬運車輛若有手持式遙控器應提供 EMO 或緊急停止功能，以便操作員停住車輛，保護自身或他人安全。</p>
7.16.3.4	<p>The AGV shall be interlocked with the equipment. For example, according to the needs of automatic loading ports, storage stations, foundation conveyor belts and automatic storage systems to ensure that the load is properly fixed, and that the unmanned vehicle and the various conveying elements do not conflict with each other.</p> <p>無人搬運車輛應與設備進行連鎖機制。例如，依據自動上貨口、儲貨站、地基輸送帶及自動倉儲系統之需要以確認負荷固定妥善，及無人搬運車輛與各傳送元件不會相互衝突。</p>
7.16.3.5	<p>When the equipment is unsafe when loading and unloading, it should be able to detect and indicate the situation immediately, and the power of all loading equipment will be stopped immediately (the system of the AGV cannot be automatically reset)</p> <p>當設備於上下貨時發生不安全狀況，應能即時偵測出及指示該狀況，且所有裝貨設備的動力皆立即停止(無人搬運車輛系統不可自動復歸)</p>
7.16.3.6	<p>The AGV should be equipped with non-contact proximity sensing detection to ensure that the AGV in motion will not hit people or other obstacles (the vehicle should be able to detect people within an appropriate distance while driving. And decelerate that can stop immediately when approaching people).</p> <p>地面行走式無人搬運車輛應配備非接觸式接近感知偵測，以確保行駛中的無人搬運車輛不會撞到人或其他障礙物(車輛於行駛時應於適當之距離內能偵測到人員，且減速進行，於接近人員時能立即停車)。</p>

7.16.3.7	<p>If the AGV detects that it will collide with other vehicles or obstacles, it should automatically slow down and stop before it occurs. When the non-contact proximity sensor fails/faults (for example, the AGV turning at a small angle), the vehicle should slow down and issue an alarm to inform the personnel that the sensors not working.</p> <p>若地面行駛無人搬運車輛偵測到將碰撞其他車輛或障礙物，應在其發生前自動減速停止。非接觸式接近感知偵測失效/故障時(例如無人搬運車輛正在小角度轉彎)，車輛應減速並發出警報告知人員感應裝置無法作用。</p>
7.16.3.8	<p>The body of the AGV shall not have dangerous parts such as sharp edges or protrusion.</p> <p>地面行走式無人搬運車輛的車體不可有尖銳邊緣或突出物等危險部位。</p>
7.16.3.9	<p>In addition to non-contact proximity sensor, the AGV should also be equipped with contact-sensor. The shape and structure of the sensor should not bring risks to people or objects around the vehicle.</p> <p>地面行走式無人搬運車輛除了非接觸式接近感知亦應配備接觸式感知偵測，感知偵測器形狀與結構不可為地面行駛車輛周圍的人員或物品帶來風險</p>
7.16.3.10	<p>After contact sensor is activated for a collision, ground vehicles cannot automatically restart until the system is manually reset.</p> <p>接觸式感知偵測因碰撞啟動後，地面行駛車輛在手動重置系統前不可自動重新啟動</p>
7.16.3.11	<p>The ground walking AGV shall be designed with electrical leakage protection devices.</p> <p>地面行走式無人搬運車輛應有漏電防護裝置之設計。</p>
7.16.3.12	<p>The location of the EMO button installed on the ground walking AGV should be easy to see and use by personnel from the vehicle.</p> <p>安裝於地面行駛車輛上的 EMO 按鈕位置應要讓人員從車輛的容易看見和使用。</p>
7.16.3.13	<p>The ground walking AGV should be equipped with EMO and ensure that the operation and movement of the vehicle, including travel and loading/unloading operations, can be stopped immediately when the EMO is activated. EMO should be activated immediately after: a.) pressing the EMO button on the UTV; b.) pressing the EMO button located on the vehicle work area.</p> <p>地面行駛無人搬運車輛應配備緊急關斷(EMO)，並確保 EMO 啟動時可立即停止車輛的操作和移動，包括行駛與裝載/卸載操作。EMO 應於下列動作後立即啟動：a.) 按下 UTV 上的 EMO 按鈕；b.) 按下於車輛作業區域位置上設置的 EMO 按鈕</p>
7.16.3.14	<p>Once EMO is activated, the vehicle should not be moved on its own power until the emergency has been cleared and the system has been manually reset. The system should not reset itself or restart itself.</p> <p>EMO 一旦啟動，在緊急狀況排除並以手動方式重置系統之前，不應讓車輛以其自有之電力移動。系統不應自動重置或自行重新啟動。</p>
7.16.3.15	<p>Function Abnormal Alarm -When the AGV functions abnormally, the vehicle should light up the warning light and sound the alarm to remind the relevant personnel.</p> <p>功能異常警報-無人搬運車功能發生異常時，車輛應亮起警示燈並發出警音，以提醒相關人員。</p>

7.16.3.16	<p>Manual operation indicator -The AGV should light up the manual operation indicator when it is manually operated. Manual operation refers to any means of controlling the vehicle other than automatic operation. (manual/pause-yellow light, automatic-green light, abnormal/faulty-red light)</p> <p>手動操作指示燈-無人搬運車在手動操作時應亮起手動操作指示燈。手動操作指除自動操作以外任何控制車輛的方式。(手動/暫停-黃燈, 自動-綠燈,異常/機故-紅燈)</p>
7.16.3.17	<p>Sensing Device Deactivation Indication -When the non-contact proximity sensor device of the AGV does not work, the vehicle should have a warning light on</p> <p>感知裝置停用指示-無人搬運車的非接觸式近接感知裝置無法作用時，車輛應亮起警示燈。</p>
7.16.3.18	<p>Start Alert -If the ground walking AGV is stopped or restarted, the siren should sound before starting.</p> <p>起步警示-若地面行駛車輛在停止狀態或重新啟動，應在起步前發出警報音響。</p>
7.16.3.19	<p>Driving Alerts -The ground walking AGV should sound continuously or intermittently while driving (straight/turning/rotating).</p> <p>行駛警報-地面行駛車輛在行駛時(直行/轉彎/旋轉) 應持續或間歇警報音響。</p>
7.16.3.20	<p>Speed of Ground Vehicles—Ground vehicles designed to operate in "work vehicle and personnel coexistence areas" shall be equipped with a variable speed setting mechanism. In the area where operating vehicles and personnel coexist, the maximum speed of the vehicle shall not exceed 60 meters per minute. If the speed of the vehicle exceeds 60 meters per minute, a special operation area should be set up to isolate it from personnel.</p> <p>地面行駛車輛的行駛速度-設計於地面行駛車輛的行駛速度-設計於“作業車輛與人員共處之區域”內行駛的地面行駛車輛應配備變速設定機制。建議新增: 作業車輛與人員共處之區域內，車輛最高速度不可大於每分鐘 60 公尺。若車速超過每分鐘 60 公尺，則應設置專用作業區域，與人員做好隔離。</p>
7.16.3.21	<p>A mechanism to avoid vehicle collision should be designed in an area where multiple AGV operate at the same time, and compliance the following conditions: a.) The distance between the vehicle in front and the vehicle in the rear b.) The time point when one row of vehicles meets another row of vehicles c.) The sides of the two vehicles should maintain a safe distance to avoid collision</p> <p>應在同時有多輛無人搬運車操作的區域內應設計避免車輛碰撞的機制，須符合下列條件: a.) 前車與後車的距離 b.) 一列車輛與另一列車輛交會的時間點 c.) 兩車輛側邊應保持避免碰撞的安全距離</p>
7.16.3.22	<p>If the AGV has to operate together with building structures such as automatic doors or elevators, the vehicle should be able to communicate with the building structure to ensure the safe opening and closing of automatic doors</p> <p>若無人搬運車輛須與自動門或升降機等建築結構體共同操作，車輛應能與建築結構體通訊，以確保自動門的安全開啟和關閉</p>
7.16.3.23	<p>If the AGV is equipped with an oil storage tank (eg gear box), its structural design should ensure that the vehicle does not leak oil.</p>

	若無人搬運車內部配備儲油槽(例如齒輪箱)·其結構設計應確保車輛不會漏油。
7.16.3.24	The EMO button installed on the structure should not be more than 3 meters away from the place where the operator often works, and it should be easy to access and press. 安裝在結構體上的 EMO 按鈕與作業人員時常作業地點距離不得超過 3 公尺·且要易於接近及按壓
7.16.4	Collaborative Robot 協作機器人
Item	Standard 標準
7.16.4.1	After the machine is shut down, the movable mechanism must be in the stop state. 機台關機/停機(Shut Down)後·可移動式機構必須於停止狀態
7.16.4.2	The operation control of machine equipped with a remote control device (teaching controller) must be the highest. 配備遙控裝置(教導控制器)·其操作控權為最高。
7.16.4.3	The manual operation must be at low speed (below 250mm/sec); however, when the non-single-axis Robot is manually operated, it can only perform inch (single-point) control, and cannot be set to continuous (continuous) control. 手動操作時必須為低速(250mm/sec 以下);但是手動操作非單軸式 Robot 時·只能做吋動(單點)控制·不可設定為連動(續動)控制。
7.16.4.4	The power supply, control panel or door of the robot or automation equipment must have a Lockout & Tag out design. 機器人或自動化設備的電源、控制盤或門等必須有(Lockout&Tagout)設計。
7.16.4.5	The fixed control panel shall have a indicator for switching between automatic and manual. 固定式控制盤應有切換自動、手動的開關狀態指示燈。
7.16.4.6	Robots or automation equipment must be equipped with a display to show the operating status. 機械人或自動化設備必須安裝顯示器·顯示操作狀態。
7.16.4.7	If the robot can be controlled remotely, it must be able to prevent the robot from being controlled/activated at the same time from the other end (for example: a key-operated toggle switch or a design with the same function). 若機器人能夠被遠端控制·必須能防止機械人由另一端同時控制/啟動(例如:設計由鎖匙操作切換開關或相同功能之設計)。
7.16.4.8	Robots or automation equipment should be designed to stop the automation equipment immediately when the rated load, maximum speed and maximum range of motion are reached. 機械人或自動化設備應設計為·當達到額定負載、最高速和最大可動範圍時立即將自動化設備立即停止。
7.16.4.9	The design of the collaborative robot system should comply with the national standard CNS 14490 series, the international standard ISO 10218 series or its equivalent standards. 協作機器人系統的設計應符合國家標準 CNS 14490 系列、國際標準 ISO 10218 系列或與其同等標

	準之規定。
7.16.4.10	A protective stop command is issued if the collaborative robot works or sets out of any parameter limits. 協作機器人作業或設定若超出任何參數限界，即發出保護性停止命令
7.16.4.11	Robots designed for cooperative operation shall be provided with visual indication devices during cooperative operation. 為協同操作所設計之機器人，應提供協同操作時之目視指示裝置
7.16.4.12	When designing the robot, each axis should be able to be moved without a drive source in emergency or abnormal situations, and the movement of each axis should be performed by one person as much as possible. 設計機器人時，應使各軸能在緊急或異常情況下無須驅動源就能被移動，移動各軸盡量由一人即可執行
7.16.4.13	The distance between positions of emergency stop EMO is less than 3m. 緊急停止 EMO 或 EMS 位置之間距 ≤ 3 m。
7.16.4.14	EMO protection should be designed for areas where adjustment/teaching/maintenance is performed. 進行調校/教導/維護等作業之區域應設計 EMO/EMS 保護。
7.16.4.15	EMO should be set on the teach controller. 教導控制器上應設置有 EMO 或 EMS。
7.16.4.16	When the robot transfers the material load and unload, after pressing any EMO, the action should stop immediately. 當機器人對出入料口進行傳送工作，按下任一個 EMO 後，機器人與出入料口應立即停止傳送作業
7.16.5	Warehousing/Wafer Warehousing 倉儲/晶圓倉儲
Item	Standard 標準
7.16.5.1	Emergency Machine Off must be set on the outside and inside of the automatic storage 自動倉儲外部與內部皆須設置緊急停止按鈕
7.16.5.2	The robot stops when a person is in the co-working space. 當有人員位於協同工作空間內時，機器人即停止。
7.16.5.3	In the storage area equipped with automatic sprinkler equipment, the shelf laminates must use grid panels or honeycomb panels with pore design to avoid affecting the protective function of automatic sprinkler equipment. – The robot stops when a person is in the coworking space. – The height of the storage rack must not affect the operation and use of lighting and fire-fighting equipment. – The shelf should have design and facilities for fixing and preventing dumping. A very early smoke detection system (VESDA) and sprinkler system should be provided. 設有自動撒水設備的倉儲區，貨架層板須採用具有孔隙設計之隔柵板或蜂巢板，避免影響自動灑水

	<p>設備防護功能。</p> <ul style="list-style-type: none"> - 當有人員位於協同工作空間內時，機器人即停止。 - 倉儲料架之高度不可影響照明、消防設備作動、使用。 - 料架應有固定、防止傾倒之設計、設施。 <p>應有極早型偵煙系統 (VESDA) 與撒水系統設置。</p>
7.16.6	Continuous transmission power equipment 連續式傳輸動力設備
Item	Standard 標準
7.16.6.1	<p>After the machine is shut down, the movable mechanism must be in the stopped state.</p> <p>機台停機後，可活動機構必須處於停止狀態</p>
7.16.6.2	<p>If the robot is installed in a place where flammable liquid vapor, combustible gas, combustible dust, etc. stay or detonate dust accumulates, and there is a risk of fire and explosion, the electrical equipment should be classified according to the dangerous area and have an explosion-proof structure.</p> <p>機器人於設置易燃液體之蒸氣、可燃性氣體、可燃性粉塵等滯留或爆燃性粉塵積存之場所，而有火災爆炸之虞者，其電氣設備應依危險區域劃分，具有適合該區域之防爆性能構造。</p>
7.16.6.3	<p>If the monitored rate exceeds the established rate limit, a protective stop command is issued.</p> <p>若監控速率超出既定速率限制，即發出保護性停止命令。</p>
7.16.6.4	<p>The air pressure unit system is equipped with a check valve, and a pressure relief valve that must be able to release the pressure when there is no power supply should be installed.</p> <p>氣壓單元系統加裝逆止閥，且應裝設當沒有電源時必須能釋放壓力的洩壓閥。</p>
7.16.6.5	<p>When the EMO is pressed (when the power is removed), the robot should keep the power off (maintain suction or clamping) to prevent the robot from flying or dropping the objects it is holding due to abnormal or emergency stop.</p> <p>當 EMO 按下後(動力移除時)，機械人應為斷電保持(保持吸著或夾合)狀態持續，防止機器人因異常或緊急停止時避免將所持物件飛落、掉落而引發危害。</p>
7.16.7	General rule 通則
Item	Standard 標準
7.16.7.1	<p>The safety circuit and the control circuit must be configured independently. The safety relay is used on the safety circuit, and the lines of the safety circuit must be distinguished by using different colors.</p> <p>安全迴路與控制迴路須獨立配置，安全迴路上使用安全繼電器，安全迴路之線路須使用不同的顏色以供區分。</p>
7.16.7.2	<p>When the machine is out of the maintenance state, all safety interlocks should be reset automatically.</p> <p>機台跳出維修狀態時，所有安全連鎖應自動復歸。</p>
7.16.7.3	<p>During maintenance, the relevant safety interlocking device should be able to maintain the interlocking function.</p>

	維修時，相關的安全連鎖裝置應可維持連鎖功能。
7.16.7.4	The design of the machine ground wire diameter must comply with domestic electrical 機台接地線徑設計需符合國內電工法規。
7.16.7.5	For the electrical connector connected to the robot, in order to avoid hazards such as falling off/separation/breakage during movement, the connector should be selected as a "rotary connector" to avoid expected separation. 機器人所連結之電氣接頭,為避免運動過程中脫落/分離/斷裂...等危害,該接頭應選用"旋轉接頭"以避免預期性之分離。
7.16.7.6	Electrical connectors should use number management or color management or other fool-proof management to avoid mobility hazards caused by mis-plugging 電氣接頭應使用編號管理或顏色管理或其他防呆管理,以避免插接錯誤而造成之移動性危害
7.16.7.7	The noise of workplace greater than 85 dBA should be configured with personal protective equipment. 工作環境噪音大於 85 dBA，應要求使用個人保護裝備。
7.16.7.8	Residual hazards should be marked with warning signs, and corresponding signs and nameplates should be attached to the gas and electrical contacts. 殘留危險需貼警告標示，氣、電接點應貼相對應之標示，並貼銘牌。
7.16.7.9	When engaging in robot operation, in order to prevent personnel other than workers from accidentally touching or operating the start switch without authorization, mark each switch as "in operation" or lock the control panel cover is needed. 從事機器人操作作業時，為防止從事作業勞工以外人員誤觸或擅自操作起動開關、切換開關等，應在各開關處標示「作業中」或在控制面盤蓋上鎖。
7.16.7.10	Usage information should include warnings about gravity and additional hazards that may arise when the brakes are released, and warning signs should be posted near the brake controls. 使用資訊應包括對於重力和剎車裝置釋放時可能導致額外危險的警告，警告標示應貼在制動控制裝置附近
7.16.7.11	The bend radius of the active trunking should follow the wire supplier's recommendations and should be at least 6 times the outer diameter of the cable. 活動線槽的彎曲半徑應遵照線材供應商的建議，且至少是電纜外徑的 6 倍以上。
7.16.7.12	When using collaborative robots, they should comply with the national standard CNS 14490 series, international standard ISO 10218 series or their equivalent standards, and conduct assessments on the following items in accordance with regulations, and prepare safety assessment reports for retention: 1. Robot operation or process brief for collaborative work 2. Safety management plan. 3. Safety Verification Report or Declaration of Conformity. 4. Commissioning test safety procedures and reports.

	<p>5. Start-up safety procedures and reports.</p> <p>6. Automatic check plan and execution log sheet.</p> <p>7. Emergency Response Plan.</p> <p>使用協同作業之機器人時，應符合國家標準 CNS 14490 系列、國際標準 ISO 10218 系列或與其同等標準之規定，並依照法規就下列事項實施評估，製作安全評估報告留存：</p> <ol style="list-style-type: none"> 1.從事協同作業之機器人運作或製程簡介。 2.安全管理計畫。 3.安全驗證報告書或符合聲明書。 4.試運轉試驗安全程序書及報告書。 5.啟始起動安全程序書及報告書。 6.自動檢查計畫及執行紀錄表。 7.緊急應變處置計畫。
7.16.7.13	<p>If the automated transport system is required to pass through a smoke barrier, it shall be designed to keep the original function or replanning for a smoke barrier in other way and shall be approved by the fire authority.</p> <p>若自動化運輸系統需通過防煙垂壁，其防煙垂壁應進行設計以維持其原本之功能，或以其他方式規劃期防煙區劃，並須經消防主管機關認可</p>
7.16.7.14	<p>If the automated transportation system needs to pass through the firewall of the building, the traversal of the firewall should be standardized and designed to keep the fire prevention time of the firewall.</p> <p>若自動化運輸系統需穿越建築物之防火牆，防火牆的穿越應加以規範並經過設計，維持防火牆之防火時效</p>
7.16.7.15	<p>A very early smoke detector should be set up in an automated warehouse. When a fire is detected, an alarm will be triggered and shipments to the wafer warehouse should be stopped.</p> <p>自動化倉儲內應設置極早期偵煙探測器，當偵測到火災時觸發火警警報並停止貨品持續運送至晶圓倉儲</p>
7.16.7.16	<p>The battery should choose lithium iron phosphate battery with safer thermal stability and certified by ANSI/UL. If it cannot be selected due to hardware design, the material of the structure of the Automatic Guided Vehicle should be non-flammable. The charging area should be independent fire compartment and no flammable objects are allowed around.</p> <p>電池應選用熱穩定性較安全之鋰鐵電池並經過 ANSI/UL 驗證合，如因硬體設計因素無法選用，無人搬運車輛結構之材質因選用不燃材質，電池充電之環境應為獨立防火區劃且周遭不可放置可燃物品。</p>
7.16.7.17	<p>The use of battery-related equipment requires voltage and temperature monitoring. There should be designed power breaker to reduce the risk of abnormal conditions.</p> <p>使用電池相關設備需有電壓監控與溫度監控，且於異常狀況連動停止電源供應機制。</p>
7.16.7.18	<p>When using lithium batteries, batteries and chargers should comply with domestic and international electrical safety regulations. The charging system should have protection</p>

	<p>functions such as over-temperature protection, output reverse connection protection, overload, output short circuit, and self-software detection. To avoid the risk of electric shock and fire, only use accessories sold and recommended by the original factory, and other unknown accessories are not allowed. Non-trained qualified personnel are not allowed to dismantle spare parts.</p> <p>使用鋰電池，電池與充電器應符合國內、國際之電氣安規。充電系統應有過溫保護、輸出反接保護、過載、輸出短路、自我軟體檢測等保護功能。為避免觸電和火災風險，僅能使用原廠銷售和建議的配件，不可使用其他不明配件。非訓練合格人員不得任意拆換零配件。</p>
7.16.7.19	<p>The working position of operation, maintenance and troubleshooting operations with a height difference of more than 1.5 meters should be designed with devices that can enable personnel to get up and down safely.</p> <p>機台之操作、保養和故障排除作業的工作位置，超過 1.5 公尺以上之高度差者，應設計有能使人員安全上下之裝置。</p>
7.16.7.20	<p>The following safety elements must use the safety type of international certification specified in Annex.</p> <p>i. Safety Door Switch ii. Safety Light Curtain iii. Safety Relay Unit</p> <p>下列安全元件必須使用附表一所規範國際認證的安全型式：</p> <p>i. 安全門開關 ii. 安全光柵 iii. 安全繼電器單元 iv. 安全繼電器 v. 緊急停止開關</p>
7.16.7.21	<p>There must be a protective cover at the conveyor belt or equipment gear.</p> <p>傳輸帶或設備齒輪處皆須有防護蓋進行遮蔽</p>
7.16.7.22	<p>The trolley running axis track area, personnel maintenance area and operation area need to be designed with safety fence partitions and maintenance door safety interlocking devices. If there is no independent safety fence, photoelectric safety devices are required for protection.</p> <p>台車走行軸軌道區域,人員維修保養區域與作業區域,需有安全安全圍籬隔板及維修門安全連鎖裝置設計，若無獨立安全圍籬，則需有光電式安全裝置進行防護</p>
7.16.7.23	<p>For large equipment (equipment that allows staff to operate, maintain and troubleshoot more than 2 meters from the floor), appropriate safety devices (such as work platforms, fences or personal protective equipment, etc.) should be provided to prevent personnel from falling. The operating platform must be equipped with guardrails, and the guardrails should have appropriate strength.</p> <p>對於高大設備 (可使工作人員於距地板 2 公尺以上進行操作、保養和故障排除的設備)，應提供合適的安全裝置 (如工作平台、圍欄或個人防護具等)，以防止人員墜落。作業平台必須設置護欄，護欄應具有適當之強度。</p>

7.16.7.24	<p>If there is a blind spot in the travel axis area of the trolley, and people are not easy to be seen inside, the travel area must have safety detection. When personnel are in any area inside, the automatic mechanism in that area must stop. (If there are two ways of protections in the running axis area, it is not necessary to set up)</p> <p>台車走行軸區域,若有死角,人員在內部不易被看到,則該走行區域皆須有安全偵測,當人員在內部任何區域,則該區域自動機構皆須停止(走行軸區域如已設有兩道防護則無需設置)</p>
7.16.7.25	<p>Cables should not be placed under chemical pipelines or containers. If the situation cannot be avoided, the cable should be properly covered.</p> <p>電纜線不可配置於化學管路或容器之下方。如果前述情形無法避免,電纜線應適當包覆。</p>
7.16.7.26	<p>Every organization of the automation equipment should have signs of prohibition, warning and attention to various hazards (descriptions in Chinese and English).</p> <p>自動化設備各處機構應設有禁止、警告及注意各項危害標示(中英文字樣說明)。</p>
7.16.7.27	<p>All automated moving mechanisms must be designed with safety interlocking devices. When the safety interlocking is activated, the parts that have immediate hazards to personnel and equipment should be immediately shut down or stopped in a safe position, and a signal will be issued to warn the operator.</p> <p>所有自動化可動機構皆須有安全連鎖裝置設計,且當安全連鎖作動,對人員及設備有立即危害的部份應立即關斷或停止於安全位置,並發出訊號警告操作人員。</p>

Annex I 附件 1.

	Item	Conformity of Standards	Component Maker Reference
A	Safety Door Switch	IEC 60947-5-1 (EN 60947-5-1) ISO 14119 (EN1088)	OMRON / EUCHENR / STI
B	Safety Light Curtain	IEC 61496-1 (EN 61496-1) IEC 61496-2 (EN 61496-2)	OMRON / STI / BANNER
C	Safety Relay Unit (Safety Monitor Relay)	ISO 13849-1 (EN 954-1)	OMRON / Pilz / Telemecanique
D	Safety Relay (Force Guided Relay)	EN 50205	OMRON / HENGSTLER
E	Emergency Stop Switch	IEC 60947-5-1 (EN 60947 - 5 -1) ISO 13850 (EN 418)	OMRON / Moeller / FUJI