

Linton

WAFER SORTER

SWI-8008-230



技术协议 Technical Agreement

1. 设备名称：硅片检测分选机

Equipment name: Silicon wafer inspection and sorting machine (wafer sorter)

型号：设备型号 SWI-8008-230

Model: Equipment Model SWI-8008-230

2. 产品描述 Product description

2.1 设备概况： Equipment overview.

硅片检测分选机主要用于对硅片的检测和分类，并提供检测数据及分类汇总数据。可检测的内容包括硅片的平均厚度、TTV、电阻率、线痕、隐裂、可见裂纹、孔洞、脏污、崩边、缺角、边长、倒角长度、对角线长度、直角边长度、垂直度、翘曲等指标，根据检测结果和设置的分类方式，硅片检测分选机可以对硅片进行判断和分类。天准 SWI-8008-230 硅片检测分选机是兼容 166-230mm 硅片分选的新型产品，设计产能 ≥ 6500 片/小时 (210)，多种检测项目配置齐全，指标可以达到或超过同类进口设备。

The wafer inspection and sorting machine(wafer sorter) is mainly used for inspection and classification of wafers, and provides inspection data and classification summary data. The detectable contents include average thickness, TTV, resistivity, line marks, hidden cracks, visible cracks, holes, soiling, chipped edges, chipped corners, edge length, chamfer length, diagonal length, right angle edge length, perpendicularity, warpage and other indexes of silicon wafers. According to the detection results and the set classification method, the wafer sorter can judge and classify silicon wafers. Tianzhun SWI-8008-230 wafer inspection and sorting machine is a new product compatible with 166-230mm wafer sorting, designed for capacity ≥ 6500 wafers/hour (210), with a complete configuration of various inspection items and indicators that can meet or exceed similar competitive equipment.

2.2 名词解释： Explanation of terms.

OK 片：依据质量标准制定的在管控值范围的 A 级产品

NG 片：依据质量标准制定的超出管控值范围的非 A 级产品

过检：指将 OK 片判定为 NG 片

漏检：指将 NG 片判定为 OK 片

重复性：在正常和正确操作情况下，在同一测试环境内，使用同一仪器，在短期内连续对相同样品所做多个单次测试结果。

检出率：使用多张 NG 片，多次测量，检出 NG 的次数/测试总次数。

OK film: A-grade products in the control value range according to quality standards

NG tablets: non-A grade products that are outside the control value range based on quality standards

Over-checking: means the OK film is judged as NG film

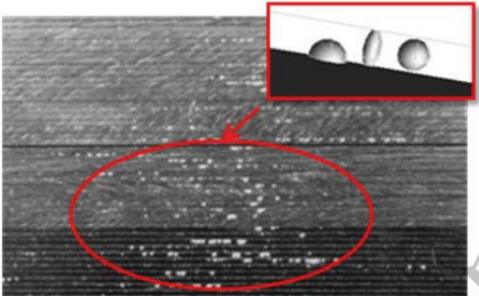
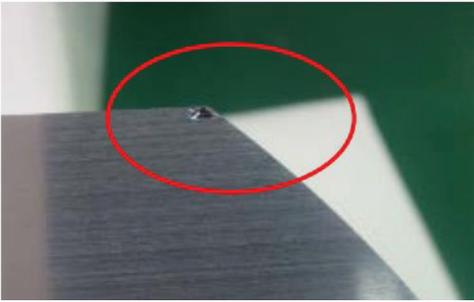
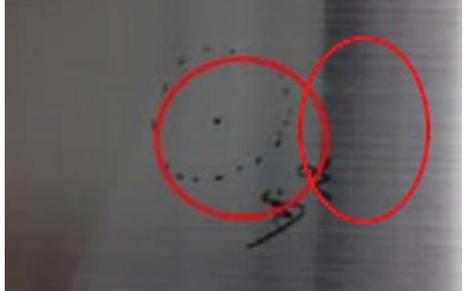
Missing inspection: means the NG film is judged as OK film

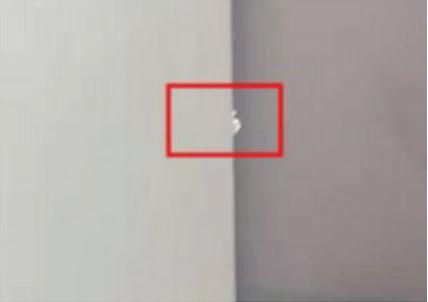
Repeatability: The results of multiple consecutive single tests on the same sample in the same test environment, using the same instrument, over a short period of time, under normal and correct operation.

Detection rate: Using multiple NG slices and multiple measurements, the number of NGs detected/total number of tests.

硅片表面外观缺陷定义如下：

Surface appearance defects of silicon wafers are defined as follows.

<p>缺陷名称 Defect Name</p>	<p>定义 Definition</p>	<p>图示 Illustrations</p>
<p>侧面崩边 Side chipping</p>	<p>硅片前后左右棱边有穿透或未穿透的破损情况 Silicon wafer front and back left and right edges have penetration or not penetration of the broken situation</p>	
<p>表面崩边 (硅落) Surface chipping (silicon drop)</p>	<p>硅片上下表面靠近边缘有不同形态的晶粒脱落呈浅坑未贯穿的形态 (通常也称为硅落) Different forms of grain shedding on the top and bottom surfaces of the wafer near the edges in the form of shallow pits without penetration (also commonly referred to as silicon drop)</p>	
<p>脏污 Soiling</p>	<p>硅片上下表面有异物附着,目视可见灰度不同于周围 There is a foreign substance attached to the top and bottom surface of the silicon wafer, and the visual inspection shows that the gray scale is different from the surrounding area.</p>	
<p>隐裂 (裂纹) Hidden cracks (crazing)</p>	<p>硅片四边、倒角、中部区域有可见或目视不可见的微小裂纹 There are visible or visually invisible micro cracks on the four sides of the wafer, the chamfer, and the middle region</p>	
<p>孔洞 Holes</p>	<p>硅片表面有穿透或未穿透的圆形小孔 Small circular holes on the surface of the silicon wafer with or for penetration</p>	

缺角 (缺口) Missing corner (notch)	硅片四边或倒角长宽大于 1mm 的贯穿形破损 Silicon wafer four sides or chamfer length and width greater than 1mm through the shape of the broken	
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注：计数型测量项目的测试基于正常切割的硅片，二次崩边返磨类的片源不列入验收测试项目。

Note: The testing of counting-type measurement items is based on normally cut silicon wafers, and the secondary chipping and regrinding type of wafer source is not included in the acceptance test items.

3. 技术参数主要 Main technical parameters

3.1 基本参数：Basic parameters.

(a)适用于金刚线切割单晶硅片检测。

Suitable for diamond wire cut monocrystalline silicon wafer inspection.

(b)硅片方宽尺寸满足 166mm-230mm。

The wafer square width size meets 166mm-230mm.

(c)硅片厚度 120 μ m—240 μ m。

Silicon wafer thickness 120 μ m-240 μ m.

(d)电阻率测量范围 0.2-20 Ω ·cm

Resistivity measurement range 0.2-20 Ω -cm

(e)机显产能：7500 片/小时@182；机显产能 \geq 6500 片/小时@210。

Machine display capacity: 7500 pieces/hour @ 182; machine display capacity \geq 6500 pieces/hour @ 210.

(f)碎片率 \leq 0.1%。(去除来料碎片、隐裂造成的影响)

Fragmentation rate \leq 0.1%. (Remove the influence caused by incoming fragments and hidden cracks)

(g)设备开机率 \geq 98% (设备开机率=月设备运行时间/当月计划开机时间)。

Equipment start-up rate \geq 98% (equipment start-up rate = monthly equipment running time / planned start-up time for the month).

(h)设备采用花篮式翻转上料，能匹配使用依据甲方提供花篮图纸设计的 100-120 片层花篮，适应的花篮上下底板间距 520~590mm，花篮底板长宽 215*200mm 到 265*250mm 范围内，其它参照图纸。花篮的长宽高尺寸公差在 \pm 0.5mm 内使用时具有较低故障风险。

The equipment adopts the flower basket type flip loading, can match the use of 100-120 pieces layer flower basket designed according to the flower basket drawing provided by the party, adapt the flower basket upper and lower base plate spacing 520~590mm, flower basket base plate length and width 215*200mm to 265*250mm range, other reference drawings. The flower baskets have low risk of

failure when used within $\pm 0.5\text{mm}$ tolerance of length, width and height dimensions.

(i) 操作员、工程师、管理员按不同权限设置分级密码。

Operators, engineers and administrators set hierarchical passwords according to different permissions.

(j) 中文控制界面，具备自动记录、统计和图表分析功能。

Chinese control interface with automatic recording, statistics and graphical analysis functions.

(k) 设备具有断电或报警触发时的安全停机功能，确保运行参数的安全存储。

The equipment has a safety stop function in case of power failure or alarm trigger to ensure the safe storage of operating parameters.

(l) 下料分类区域实现 13 个下料盒位，其中有 12 个双层下料盒位，1 个单层直流料盒。机台长度约 9m。

The downcomer sorting area realizes 13 downcomer cassette positions, of which there are 12 double downcomer cassette positions and 1 single DC cassette. The length of the machine is about 9m.

(m) 开放数据库，方便 MES 的访问对接。

Open database for easy access to MES interface.

(n) 具备金刚石线切割硅片线痕方向放错的防呆识别功能：当出现线痕方向平行于皮带方向时，硅片直落到直流片盒。

With diamond wire cutting silicon wafer line trace direction misplaced anti-dull identification function: when there is a line trace direction parallel to the belt direction, silicon wafer DC to DC wafer box.

(o) 可以在机台皮带保持运行的条件下，输入下一单硅棒编号，便于快捷启用下一棒单号。

It is possible to enter the next single silicon bar number under the condition that the machine belt is kept running, which facilitates quick activation of the next bar number.

(p) 当下料台所有 A 级片盒满盒后，分选机可以自动停止上料。

The sorting machine can automatically stop feeding when all the A-grade film boxes at the lower feeding table are full.

(q) 设备故障率 $\leq 1\%$ (因设备故障引起的停机)。

Equipment failure rate $\leq 1\%$ (downtime due to equipment failure)

(r) 提供设备说明书、保养手册、备件清单、设备故障及处理方法。

Provide equipment manuals, maintenance manuals, spare parts lists, equipment failures and handling methods.

(s) 设备调试后对甲方员工进行系统培训。

Systematic training for Party A employees after equipment commissioning.

(t) 有 UPS 供电系统，用于相机、光源、传感器、工控机的供电，稳定可靠。

There is a UPS power supply system for the camera, light source, sensor, industrial control machine power supply, stable and reliable.

(u) 分选机具备和前端机械手对接的功能和条件。

The sorting machine has the function and condition to interface with the front-end robot.

(v)机台使用方需要按期进行设备保养，以便保障运行的稳定性。

The machine user needs to maintain the equipment on a regular basis in order to guarantee the stability of operation.

测量系统控制参数见下表 1。

The control parameters of the measurement system are shown in Table 1 below.

检测项目 Test items	检测方式 Detection method	分辨力 (率) Resolving power (rate)	重复性检测偏差/3σ Repeatability detection deviation / 3σ
平均厚度 Average thickness	左中右激光测量 Left-center-right laser measurement	0.1μm	≤1μm
TTV	左中右激光测量 Left-center-right laser measurement	0.1μm	≤3μm
线痕 Thread marks	左中右激光测量 Left-center-right laser measurement	0.1μm	≤4μm
翘曲 warpage	左中右激光测量 Left-center-right laser measurement	0.1μm	≤10μm
平均电阻率 Average resistivity	电学测量 Electrical measurements	0.001Ω·cm	≤均值×5%
边距 Margins	矩阵成像检测 Matrix imaging detection	10μm	≤60μm
直径 (对角线) Diameter (diagonal)	矩阵成像检测 Matrix imaging detection	10μm	≤60μm
倒角 Chamfering	矩阵成像检测 Matrix imaging detection	10μm	≤60μm
垂直度 Perpendicularity	矩阵成像检测 Matrix imaging detection	0.01°	≤0.1°
隐裂 hidden crack	线扫成像检测 Matrix imaging detection	60um	/
孔洞 Holes	线扫成像检测 Matrix imaging detection	60um	/

检测项目 Test items	检测方式 Detection method	分辨力 (率) Resolving power (rate)	重复性检测偏差/3σ Repeatability detection deviation / 3σ
脏污 Dirt	线扫成像检测 Matrix imaging detection	60um	/
表面崩边 Surface chipping	线扫成像检测 Matrix imaging detection	60um	/
侧边崩边 (前后左右) Side chipping (front and back)	线扫成像检测 Matrix imaging detection	30um	/

(表 1) (Table 1)

3.2 设备主要功能介绍 Introduction to the main functions of the equipment

该测量系统由以下模块组成:

- 3D 测量模块 (厚度、线痕、TTV、翘曲)
- 电阻率测量模块
- 尺寸测量模块
- 崩边检测模块 (表面、前后左右)
- 隐裂检测模块 (隐裂、半孔)
- 脏污检测模块 (脏污、穿孔)
- PN 模组

The measurement system consists of the following modules:

- 3D measurement module (thickness, line marks, TTV, warpage)
- Resistivity Measurement Module
- Dimensional measurement module
- Chip detection module (surface, front and back)
- Hidden crack detection module (hidden crack, half hole)
- Dirt detection module (dirt, perforation)
- PN Module

(a)3D 测量模块 3D measurement module

3D 测量采用激光法, 通过上下三对线激光探头 (共 6 个, 每对中一只在硅片上方, 一只在硅片下方) 垂直于刀纹方向进行检测。对单侧的激光来说, 硅片厚度变化造成激光在硅片上 Z 轴的变化, 对应到 CCD 上相对原始位置的变量, 计算出 Z 轴上的距离, 再通过上下两个激光共同得出厚度。总厚度变化值 $TTV = \text{Max 厚度} - \text{Min 厚度}$ 。

线痕是对单个线激光扫描硅片表面, 得出一组高低不同的点, 在 1mm 范围内最高点与最低点的差值。翘曲也是根据线激光扫描得到的表面形态数据进行计算得出。

The 3D measurement is performed by the laser method, by means of three pairs of line laser probes (six in total, one above and one below the wafer in each pair) above and below the wafer perpendicular to the knife pattern direction. For a single-side laser, the wafer thickness variation causes the laser to change in the Z-axis on the wafer, which corresponds to the variable relative to the original position on the CCD, and the distance on the Z-axis is calculated, and then the thickness is derived jointly by the upper and lower lasers. The total thickness variation value $TTV = \text{Max thickness} - \text{Min thickness}$.

Line marks are obtained for a single line laser scan of the silicon wafer surface, yielding a set of points with different heights, and the difference between the highest and lowest points within a 1 mm range. Warpage is also calculated from the surface morphology data obtained from the line laser scan.

(b) 电阻率测量模块 Resistivity Measurement Module

电阻率检测采用涡流法，用探头测量硅片中心区域内的涡流反馈感应量，从而测量电阻率。

Resistivity testing is performed using the eddy current method, where a probe measures the amount of eddy current feedback sensed in the center region of the wafer to measure resistivity.

(c) 尺寸测量模块 Dimensional measurement module

尺寸采用 1200 万高分辨率面阵相机、背光成像，需要对原始标片进行标定。标定好了以后，通过软件分别对各个水平、垂直中边长度、倒角长度、对角线等数据进行测量。

The size is imaged with a 12 million high-resolution surface-matrix camera and backlight, and the original specimen needs to be calibrated. After the calibration, the data such as the length of each horizontal and vertical middle edge, the length of chamfer, and the diagonal are measured separately by the software.

(d) 崩边检测模块 Edge chipping detection module

左右崩边在硅片左右两边各有一套光源和相机，相机的入光线路和光源的出光线路（包括反射）在一个直线上。前后崩边用来检测硅片前后侧边崩边，当硅片进入检测区域，照明单元通过反光镜，将光反射到硅片棱边，传递到其它反光镜，通过镜头传到相机，进行成像。如果在硅片侧面有崩边等，光路经过崩边地方会发生光路的改变，崩边处成像变成黑色区域。这样通过背景对比，就能够识别出崩边的存在。

The left and right chipping edge has a set of light source and camera on the left and right side of the silicon wafer, and the incoming light line of the camera and the outgoing light line of the light source (including reflection) are in a straight line. The front and rear chipping is used to detect the front and rear side chipping of the wafer. When the wafer enters the detection area, the illumination unit passes through the reflector and reflects the light to the wafer prism, which passes to other reflectors and passes through the lens to the camera for imaging. If there is a chipped edge on the side of the wafer, etc., the light path will change through the chipped area, and the imaging at the chipped edge becomes a black area. In this way, the presence of a chipped edge can be identified by background comparison.

(e) 隐裂检测模块 Hidden crack detection module

在硅片下面通过红外光照射硅片，红外光能够穿透硅片，再通过线扫相机扫描成像，这样在硅片上表面会呈现相同亮度，当出现隐裂的时候，光在隐裂位置不能正常穿透硅片，会在硅片上表面形成黑色区域。从而通过亮度差异来进行判断是否为隐裂。表面崩边、孔洞原理和隐裂相同，在有缺陷的部位，红外光穿透会形成不同灰度，从而来判定是否缺陷。

The infrared light penetrates the wafer and is then scanned by a line scan camera, so that the upper surface of the wafer shows the same brightness. Thus, the difference in brightness is used to determine whether the crack is hidden or not. The principle of surface chipping and holes is the same as that of occluded cracks, where the infrared light penetrates the defective part to form a different gray scale to determine whether it is defective.

(f) 脏污检测模块 Dirt detection module

采用多角度光源从硅片上下表面打光，线扫相机位于光源中缝正上方，在硅片匀速的直线运动中采集成像。脏污上在皮带上测，脏污下在接缝的皮带下侧。这种打光方式能够对表面的脏污成像和硅片的背景成像进行很好的灰度区分，通过软件判灰度区间，从而检测出脏污缺陷。

A multi-angle light source is used to strike light from the upper and lower surfaces of the wafer, and a line-scan camera is located directly above the center seam of the light source to capture imaging in the uniform linear motion of the wafer. The dirty top is measured on the upper side of the belt, and the dirty bottom is on the lower side of the belt at the seam. This type of lighting can make a good grayscale distinction between the dirty imaging of the surface and the background imaging of the wafer, and detect the dirty defects by judging the grayscale interval through the software.

3.3 设备运行条件 Equipment operating conditions

序号 No	项目 Item	单位 Unit	内容 Description
1	使用电源 Using the power supply	V	380±5%，五线三相制，6mm ² 80±5%，5-wire 3-phase, 6mm ²
2	额定功率 Power Rating	KW	15
3	使用压缩空气 Use of compressed air	/	最大固体颗粒: 0.1um; 最低压力露点: -20°C; 最大 油雾浓度 0.1mg/m ³ Maximum solid particles: 0.1um; minimum pressure dew point: -20°C; maximum oil mist concentration 0.1mg/m ³
	气压 Pneumatic pressure	MPa	0.6
	气量 Air volume	NL/min	150
	入气管尺寸 (外径) Air inlet pipe size (outside diameter)	mm	10
	接口位置 Interface Location	/	见图纸 See drawing
4	地面承载要求 Ground bearing requirements	KG/m ³	1000
5	环境要求 Environmental requirements	/	温度 20°C~25°C, 湿度 40%~70%, 洁净度≤60000/立 方米 (大于 5um 颗粒数) Temperature 20°C~25°C, humidity 40%~70%, cleanliness ≤60,000/m ³ (>5um particle count)

4. 供货内容 Content of supply

4.1 供货范围; Scope of supply.

硅片检测分选机, 厚度、尺寸、电阻率标片每 5 台机一套 (包含各类 1 片), 线痕参考片 1 片

Wafer inspection and sorting machine, thickness, size, resistivity standard wafer every 5 machines a set (including all kinds of 1 piece), line trace reference piece 1 piece

5. 随机技术资料 Random technical information

设备使用说明书、设备保养手册、电气图纸、外形尺寸图纸、设备故障处理方法

Equipment instruction manual, equipment maintenance manual, electrical drawings, dimensional drawings, equipment troubleshooting methods

6. 设备检测性能验收 Equipment testing performance acceptance

设备检测性能验收所使用的样片，由甲乙双方共同从甲方的生产硅片中随机挑选并确认。

The sample wafers used for equipment testing and performance acceptance shall be randomly selected and confirmed by both parties from Party A's production silicon wafers.

(a) 厚度、TTV、线痕、翘曲检测项目 Thickness, TTV, line marks, warpage testing items

将2片A级硅片放置在设备上，固定测量方向和位置，连续动态测量30次，计算每片 3σ 值，要求重复性检测偏差在“表1”允许的范围内。

Two A-grade silicon wafers are placed on the equipment, and the measurement direction and position are fixed. 30 consecutive dynamic measurements are taken, and the 3σ value is calculated for each wafer, and the repeatability test deviation is required to be within the range allowed in "Table 1".

(b) 电阻率检测项目 Resistivity test items

将2片生产硅片（阻值小于 $3\Omega\cdot\text{cm}$ ）放置在设备上，固定测量方向和位置，连续动态测量30次，计算每片 3σ 值，要求重复性检测偏差在“表1”允许的范围内。

Two production wafers (resistance value less than $3\Omega\cdot\text{cm}$) are placed on the equipment, and the measurement direction and position are fixed. 30 consecutive dynamic measurements are taken, and the 3σ value is calculated for each wafer, and the repeatability test deviation is required to be within the range allowed in "Table 1".

(c) 尺寸检测项目 Dimensional inspection items

将2片A级硅片放置在设备上，固定测量方向和位置，连续动态测量30次，计算每片 3σ 值，要求尺寸相关的边长、对角线长度、倒角长度的重复性检测偏差在“表1”允许的偏差范围内。

Two A-grade silicon wafers are placed on the equipment, and the measurement direction and position are fixed. 30 consecutive dynamic measurements are taken, and the 3σ value is calculated for each wafer, requiring the repeatability of the dimension-related edge length, diagonal length, and chamfer length to be within the deviation allowed in "Table 1".

(d) 隐裂检测项目 Hidden crack detection project

选取20片硅片，每片硅片上有隐裂瑕疵(长度 $>500\mu\text{m}$)。再选取20片无瑕疵的硅片，将这40片硅片在硅片分选机上各测量3遍，测试结束后，统计误判的次数F，计算并得到评估值： $AS = F / 120 * 100\%$ ，该值要求为 $\leq 10\%$ 。

Twenty wafers are selected, each with a hidden flaw (length $> 500\mu\text{m}$). Then 20 wafers without defects are selected and these 40 wafers are measured 3 times each on the wafer sorter. After the test, the number of misclassifications F is counted and the evaluation value is calculated and obtained: $AS = F / 120 * 100\%$, which is required to be $\leq 10\%$.

(e) 孔洞检测项目 Hole detection project

选取10片硅片，每片硅片上有穿孔或半孔瑕疵(孔径 $>100\mu\text{m}$,深度 $>100\mu\text{m}$)。再选取10片无瑕疵的硅片，将这20片硅片在硅片分选机上各测量3遍，测试结束后，统计误判的次数F，计算并得到评估值： $AS = F / 60 * 100\%$ ，该值要求为 $\leq 2\%$ 。

(验证期间，若数量不足，以实际收集到的数量进行测试)

Ten wafers are selected, each with a perforation or half-hole defect (hole diameter > 100 μ m, depth > 100 μ m). After the test, the number of misjudgments F is counted and the evaluation value is calculated and obtained: $AS = F/60*100\%$, which is required to be $\leq 2\%$. (During the validation period, if the number is insufficient, the test will be conducted with the actual number collected)

(f)崩边检测项目 Chipped edge detection project

选取 20 片硅片，每片硅片边缘有一个崩边瑕疵（长宽>150um）的。再选取 20 片无瑕疵的硅片，将这 40 片硅片在硅片分选机上各测量 3 遍，测试结束后，统计误判的次数 F，计算并得到评估值： $AS = F/120*100\%$ ，该值要求为 $\leq 10\%$ 。

Select 20 wafers, each with a chipping defect (length and width > 150um) on the edge of the wafer. Then select 20 wafers without defects, and measure each of these 40 wafers on the wafer sorter 3 times. After the test, count the number of misjudgments F, calculate and obtain the evaluation value: $AS = F / 120 * 100\%$, which is required to be $\leq 10\%$.

(g)脏污检测项目 Soiling test items

选取 20 片硅片，每片硅片上有污点瑕疵（灰度差>20，长宽>300 μ m），再选取 20 片无瑕疵的硅片。将这 40 片硅片在硅片分选机上各测量 3 遍，测试结束后，统计误判的次数 F，计算并得到评估值： $AS = F/120$ ，该值要求为 $\leq 10\%$ 。

Twenty wafers are selected, each with a stain defect (grayscale difference > 20, length and width > 300 μ m), and then 20 wafers without defects are selected. These 40 wafers are measured 3 times each on the wafer sorter, and at the end of the test, the number of misjudgments F is counted and the evaluation value is calculated and obtained: $AS = F/120$, which is required to be $\leq 10\%$.

(h)产能验收 Capacity acceptance

上料处放 2 个满料料篮，去除碎片、叠片、卡片，启动跑片，观察机台软件显示每框的小时产能数据，要求每框都能达到要求的产能。

Put 2 full material baskets at the loading place, remove debris, stacked pieces and cards, start running pieces and observe the machine software to display the hourly capacity data of each frame, and require each frame to reach the required capacity.

(i)碎片验收 Debris acceptance

每天抽查跑片不少于 20000 片，去除来料碎片、隐裂片，统计三天，按照碎片数/跑片总数计算。若跑片不足按实际跑片数计算。

Every day, we randomly check not less than 20,000 running pieces, remove the incoming pieces and hidden lobes, and count them for three days, according to the number of pieces/total number of running pieces. If there are not enough pieces, the actual number of pieces will be counted.

(j)故障率验收 Failure rate acceptance

统计一周因故障造成的停机时间，按照公式：故障率=故障时间/开机时间*100%计算

Count the downtime due to failure in a week, according to the formula: failure rate = failure time / start time * 100% calculation

(k)如一次验收试验未能达到要求，双方要共同分析原因，再尽快安排下次试验。

If an acceptance test fails to meet the requirements, the two sides should jointly analyze the reasons and then arrange the next test as soon as possible.

(l)以上各项标准作为硅片检测分选机的最终验收标准。机台到达现场一个月后，在达到技术指标的情况下，开始进入验收流程，验收在 1 周内完成。若因用户因素，机台到场无法调试运行，两个月后，默认验收完成。

The above standards are used as the final acceptance criteria for the wafer inspection and sorting machine. One month after the arrival of the machine at the site, in the case of reaching the technical indicators, the acceptance process will begin, and the acceptance will be

completed within 1 week. If the machine cannot be commissioned and run due to user factors, the acceptance will be completed by default after two months.

7. 售后服务 After Sales Service

- (1) 卖方在现场为买方员工提供培训，培训包括正常操作、保养维护、校准和异常处理等等，并提供中文版的培训教程。
- (2) 保修期内设备如有故障，买方通知后，应提供 7*24 小时的电话或远程控制服务，如有需要，应在 2 周内到达买方现场(交通、证件允许的情况下)。
- (3) 整机质保 1 年，卖方为买方现有的软件提供终身免费升级服务。质保的范围限于保障机台零部件的正常使用及机台性能满足协议需求，在未得到乙方许可的情况下，对设备进行改造、移机、拆解、使用非乙方部件等行为造成的损失将不在质保范围内。
- (4) 保内卖方备件库响应时间：3 个工作日；超出保内备件库的由卖方空运，最长不超过一个月周，不可抗力因素除外。

(1) The seller provides training for the buyer's staff on site, which includes normal operation, maintenance, calibration and exception handling, etc., and provides training tutorials in Chinese.

(2) In case of equipment failure during the warranty period, the buyer shall provide 7*24 hours telephone or remote control service after notification, and if necessary, shall arrive at the buyer's site within 2 weeks (traffic and documents permitting).

(3) The whole machine is guaranteed for 1 year, and the seller provides free lifetime upgrade service for the buyer's existing software. The scope of the warranty is limited to guarantee the normal use of machine parts and machine performance to meet the needs of the agreement, without the permission of Party B, the damage caused by the transformation of the equipment, moving the machine, dismantling, using non-Party B parts, etc. will not be covered by the warranty.

(4) Seller's spare parts warehouse response time: 3 working days; beyond the warranty spare parts warehouse by the seller's air freight, up to one month weeks, force majeure factors excluded.

8. 本技术协议系采购合同的附件，与采购合同具备同等法律效力。如有冲突，以本协议规定为准。

This technical agreement is an annex to the procurement contract and has the same legal effect as the procurement contract. In case of conflict, the provisions of this agreement shall prevail.

9. 分选机的设计、开发或制造等相关版权、知识产权或权益为乙方所有。

The copyright, intellectual property rights or interests related to the design, development or manufacture of the sorting machine are owned by Party B.

10. 本技术协议未涉及的内容，适用采购合同的约定。

What is not covered by this technical agreement, the agreement of the procurement contract shall apply.

11. 本技术协议一式 2 份，其中甲方 1 份，乙方 1 份，自双方授权代表签字，单位盖章后生效。本技术协议有效期与采购合同期限一致。本技术协议自采购合同生效之日起执行。

This technical agreement is in two copies, one for Party A and one for Party B. It will take effect after the authorized representatives of both parties sign and the unit seals. This technical agreement is valid for the same period as the procurement contract. This technical agreement shall be executed from the effective date of the procurement contract.

12. 机台的安全说明见附 1。

See Attachment 1 for safety instructions for the machine.

甲方 (盖章):

乙方 (盖章):

授权代表 (签字):

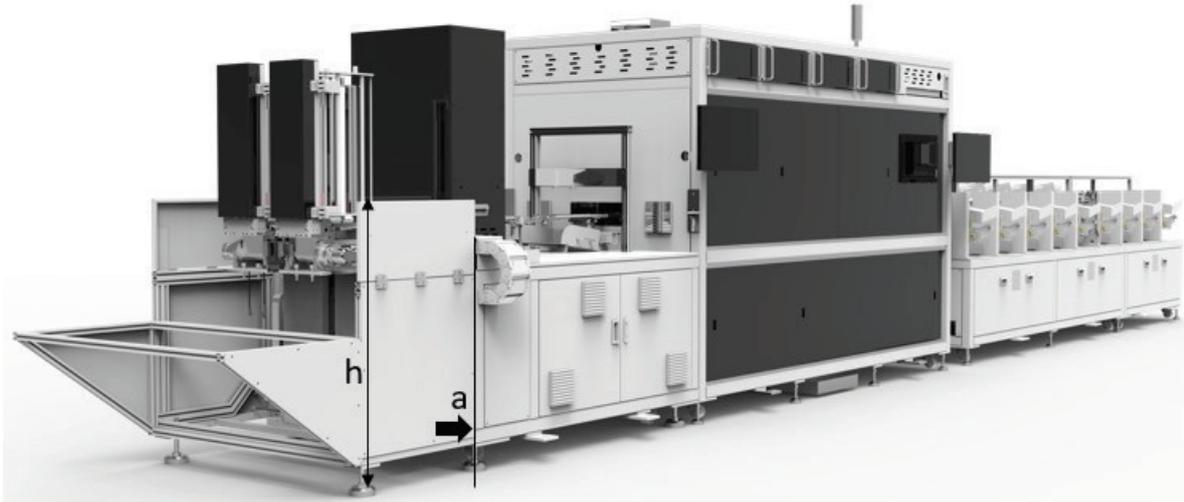
授权代表 (签字):

年 月 日

年 月 日

附 1: 机台安全说明

Attachment 1: Machine safety instructions



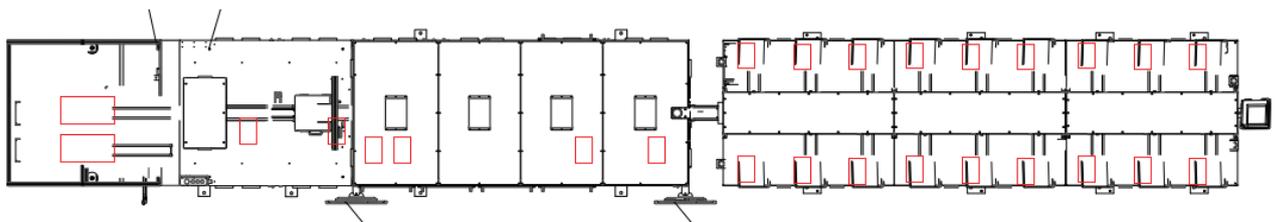
分选机外形图示

Sorting machine shape diagram

1. 机械防护装置及说明 Mechanical guards and instructions

- 1) 机台上料台的升降、平移传动机构使用了防护，可防止人体直接接触。皮带流电机为小功率步进电机，评估风险较低，为了满足传动产品的设计需求，对传动轴、转动轮不采取机构防护措施，只张贴警示标识。具体图示如下：

The lifting and translating drive mechanism of the machine table uses protection, which can prevent direct human contact. Belt streamline motor is a small power stepper motor, the assessment risk is low, in order to meet the design requirements of the transmission products, the drive shaft, rotation wheel does not take institutional protection measures, only the posting of warning signs. Specific illustrations are as follows.



注：红色方框示意张贴标识位置

- 2) 机台配备多组急停开关，分别在上料站两侧，检测站主屏幕、下料站头部和尾部，颜色为红色，急停开关的布局能保障操作人员易于触及且不发生危险。

The machine is equipped with multiple sets of emergency stop switches on both sides of the loading station, the main screen of the inspection station, and the head and tail of the lower station, colored red. The layout of the emergency stop switches ensures that they are easily accessible to the operator and not dangerous.

- 3) 急停开关按下后，能立刻中止设备的一切运动。解除急停后，设备按照正常启动顺序重新启动运行。任何机台重新启动过程中，需要确认人员没有对机台操作、维修等活动。

When the emergency stop switch is pressed, all movements of the equipment can be stopped immediately. After the emergency stop is released, the equipment restarts operation in the normal start-up sequence. Any machine restart process requires confirmation that personnel are not operating, servicing, or other activities on the machine.

- 4) 前后操作屏为外挂式，人员在附近活动时，小心撞伤。

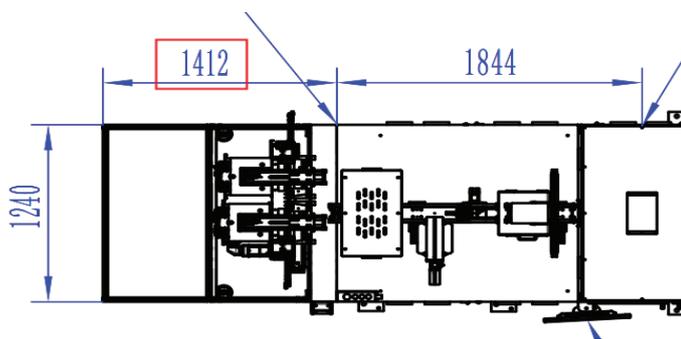
The front and rear operating screens are external, so be careful of bumps and bruises when personnel are moving around.

- 5) 上料台两侧的防护板兼顾安全和维护要求，图示 **h 高度** 约 1.2 米，此处张贴警示标识，运动中人体部位禁止伸入。

The protective panels on both sides of the loading table take into account the safety and maintenance requirements, the figure **h height** of about 1.2 meters, where warning signs are posted, the movement of human body parts are prohibited to reach in.

- 6) 清洗下料防护网建议覆盖到图示 a 处的位置，具体尺寸图示如下：

The cleaning down protection net is recommended to cover the position at a shown in the figure with the following dimensional illustration.



- 7) 机械设计参照《GBT30574-2014 机械安全 安全防护的实施准则》。

Mechanical design with reference to GBT30574-2014 Safety of machinery Implementation guidelines for safety protection

2. 电气安全 Electrical Safety

- 1) 设备具有空开、漏保等元件，能够对操作过程中出现的各类短路、漏电、过载等故障实施安全有效的保护。

The equipment has components such as air switch and leakage protection, which can implement safe and effective protection for all kinds of short circuit, leakage and overload faults that occur during the operation.

- 2) 散热风扇使用阻燃材质风扇。

Cooling fan using flame retardant material fan.

- 3) 上料、检测、下料配电柜 220V 主电路有单独断路器控制。

The 220V main circuit of the loading, testing and discharging distribution cabinet is controlled by separate circuit breakers.

- 4) 机台的光源为触发式光源，在产品经过测量时，有光照发出，非长时间直视下，风险小。检测中需要将检测站门板关闭，减少光照对视觉的干扰，同时张贴警示标识。

The light source of the machine is a trigger light source, when the product passes through the measurement, there is light emitted, non-long time under direct vision, the risk is small. Testing needs to close the door panel of the testing station to reduce the interference of light on vision, while posting warning signs.

- 5) 电气设计参照《GB_50054-2011_低压配电设计规范》，《GB-19517-2009 国家电气设备安全技术规范》，《GB_T 13869-2017 用电安全导则》等标准。

The electrical design refers to "GB_50054-2011_Low-voltage Distribution Design Code", "GB-19517-2009 National Technical Code

for Electrical Equipment Safety", "GB_T 13869-2017 Electricity Safety Guidelines" and other standards.

- 6) 机台主电源切断开关的操作装置应置于电气设备外壳表面，安装在操作基准面上 0.6m~1.9m 间，便于紧急情况下切断电源。

Machine main power cut-off switch operating device should be placed on the surface of the electrical equipment shell, installed in the operating reference surface between 0.6m ~ 1.9m, to facilitate the emergency cut-off power.

- 7) 电气设施主要对机台本身供电，禁止外接电路对外供电，如有需要，必须经过供方评估确认。

The electrical facilities mainly supply power to the machine itself, and external power supply from external circuits is prohibited, if necessary, it must be confirmed by the supplier's evaluation.

3. 警示标识 Warning signs

1. 升降料盒工位翻转机构，检测的主流线电机，检测站推拉门，上料夹篮气缸防夹手等标识；
2. 所有电柜门有防触电标识。
3. 电机、光源等高温部件有防烫伤标识。
4. 启动前机台安全确认标识。
5. 急停标识。

1. the lifting and lowering of the box station turning mechanism, the main stream line motor for testing, the sliding door of the testing station, the anti-pinching hand of the loading basket cylinder and other signs.

2. All electric cabinet doors have anti-electrical shock markings.

3. motor, light source and other high-temperature parts have anti-scald markings.

4. Safety confirmation markings on the machine before start-up.

5. Emergency stop sign.