

Test Report

Report Number: BBS13HD240800120A

Product Name: Horizontal Laminar Flow Cabinet

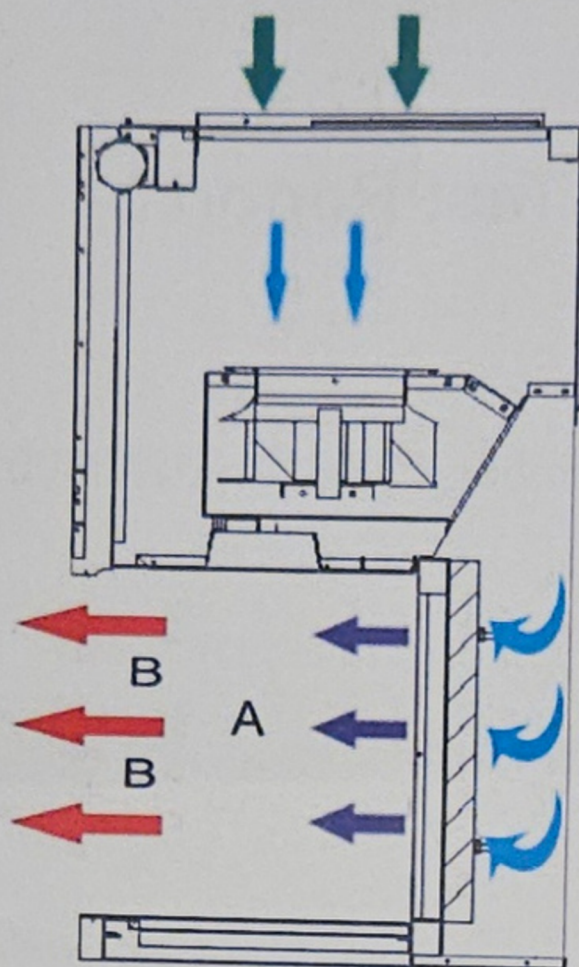
Product Model: BBS-H1300

Test Person: 02

Test Date: 2024.10.22

Audit: 03

1. Airflow Pattern:



- Room Air
- Contaminated Work Chamber Air
- HEPA Filtered Air
- Pre-filter Filtered Air
- A Protected Area
- B Un-protected Area

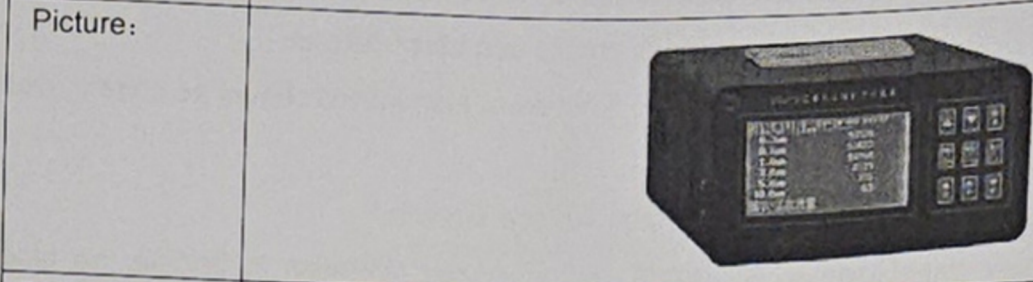
2. Appearance and structure

<p>Inspection requirements :</p>	<p>a) Cabinet spraying parts surface should not have obvious pitting, flow mark, leakage besmear, dew green, orange peel, cracks and other defects</p> <p>b) Text and graphic symbols with the function of instructions should be correct, clear, regular and firm</p> <p>c) Welding should be firm and welding surface smooth</p> <p>d) Display panel display is normal, button switch operation is flexible, no block, function accurately;</p> <p>e) Front operation window opening and closing is very light, any position within the scope of the trip does not produce stuck phenomenon; should not have obvious around or before and after shaking phenomenon</p>			
<p>Inspection methods :</p>	<p>a) Visual inspection: To check cabinet spraying parts appearance</p> <p>b) Visual inspection: To check cabinet label, pad pasting and other symbol marks</p> <p>c) Visual inspection: To check cabinet welded surfaces</p> <p>d) Start running, to check each switch function through visual inspection and manual inspection e</p> <p>e) Manual opening and closing the front window twice, to check the front window operation mouth through visual inspection</p>			
<p>Inspection results:</p>	<p>a)</p>	<p>Pass</p>	<p>Inspection conclusions :</p>	<p>Qualified</p>
	<p>b)</p>	<p>Pass</p>		<p>Qualified</p>
	<p>c)</p>	<p>Pass</p>		<p>Qualified</p>
	<p>d)</p>	<p>Pass</p>		<p>Qualified</p>
	<p>e)</p>	<p>Pass</p>		<p>Qualified</p>

3. Cleanliness

Instrument: Laser Dust Particle Counter

Model: CSJ-D

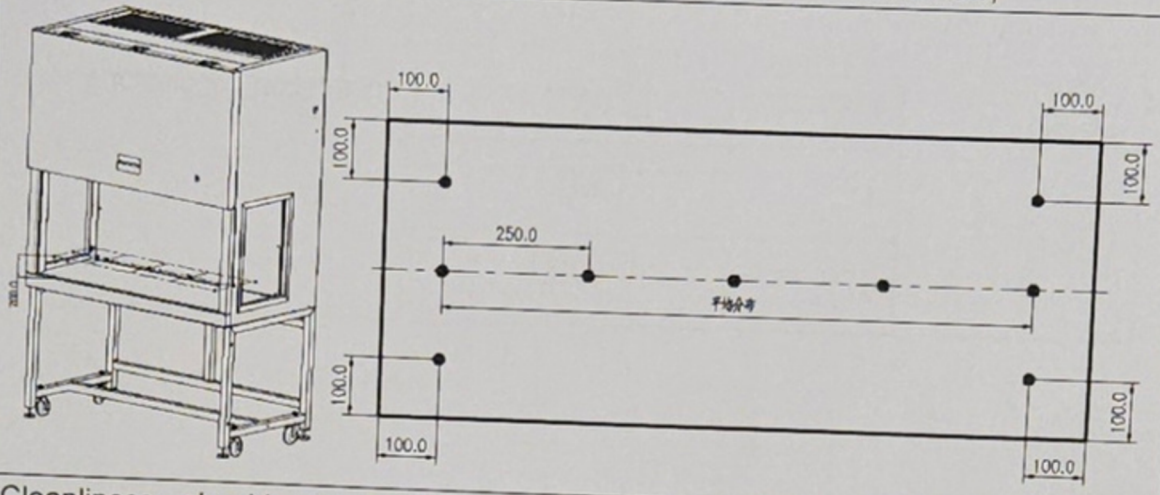


Parameters:
 Application range: Grade 100~300,000
 Particle diameter channels: 0.3、0.5、1、3、5、10 (um)
 Sampling cycle: 1~10mins
 Number of sampling point : 2~7
 Number of sampling time: 2~9
 Sampling quantity : 2.83liter/min
 Self-cleaning time : ≤10mins

Inspection methods :

1. Glass rise to the highest position, you can direct detect if there is no window operation mouth
2. 200 mm above the work surface, the distance between test area boundary and laminar flow cabinet inner wall and manipulative incision is 100mm
3. Set the sampling points in the test area four corners and along the center line of the test area, Number of sampling points within the test area shall not be less than 5
4. Each sampling point sampling frequency shall not be less than 3 times, each time sampling amount should be not less than 5.66 L;
5. Particle counter sampling mouth should be opposite direction airflow;

Distribution map:



Performance index: Cleanliness should meet the requirements of Class 100 : Clean bench workspace $\geq 0.5\mu\text{m}$ Number of dust particles $\leq 3520/\text{m}^3$; $\geq 5\mu\text{m}$ Number of dust particles $\leq 29/\text{m}^3$


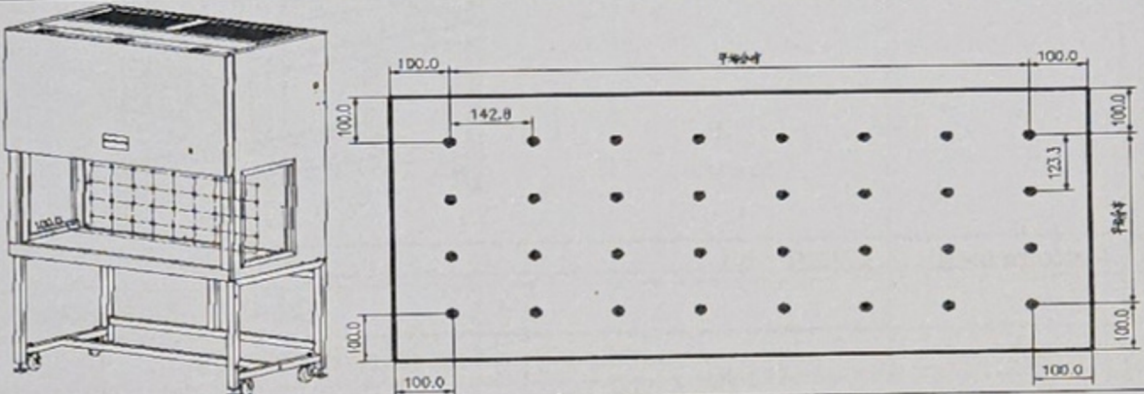
Inspection results:

0 /m³


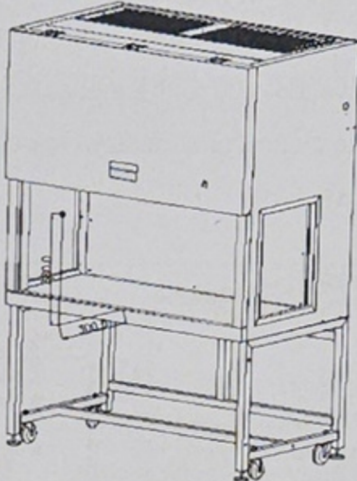
Inspection conclusions:

Qualified

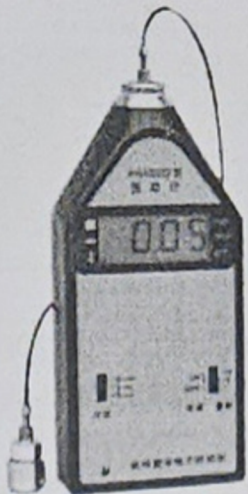
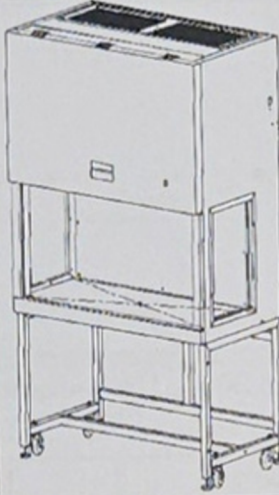
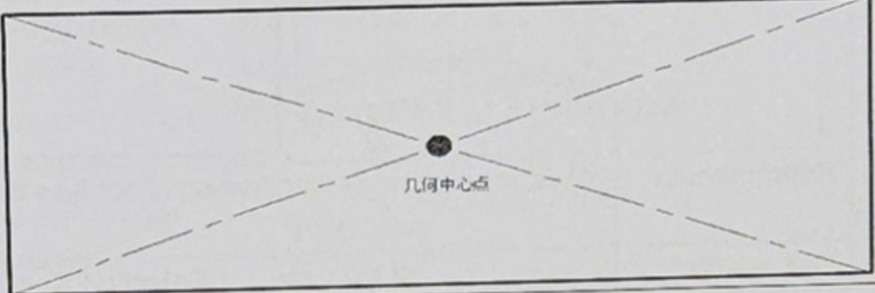
4. Airflow speed

Inspection Instrument	Air Flow Anemometer		
Model:	TSI9535		
Picture:			
Specification:	Indication range: 0~30m/s; Accuracy: $\pm 3\%$ or $\pm 0.015\text{m/s}$; Resolution: 0.01m/s		
Inspection Method	<p>Set the clean bench airflow velocity to lowest value stipulated by the manufacturer, according to the following ways in the diffuser side before 100 mm vertical plane to determine the position of measurement point, multipoint measurement through the plane of the horizontal airflow velocity:</p> <p>a) measurement point equidistant distribution, form a square lattice is not greater than 150 mm x 150 mm, the test point should be at least 3 rows, each row should be at least seven points;</p> <p>b) Distance from test area boundary to Laminar flow cabinet operating hole should be 100 mm;</p> <p>c) Put the anemometer probe accurately position in each measurement point by using clamp, then begin to measure. Record all the measured value of the measurement point and according to the measured value to calculate the average;</p> <p>d) Set the clean bench airflow velocity to peak which manufacturer stated , repeat the above test steps.</p>		
Drawing:			
Performance index	Airflow velocity of Laminar flow cabinet work zone: Average of 0.30m/s~0.50m/s		
Inspection result:	0.44 m/s	Inspection conclusion:	Qualified


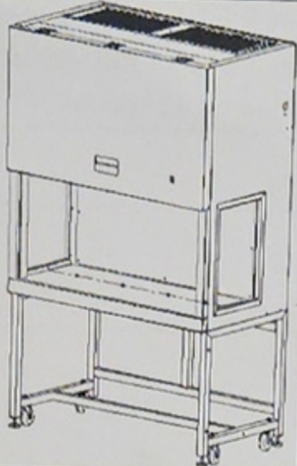
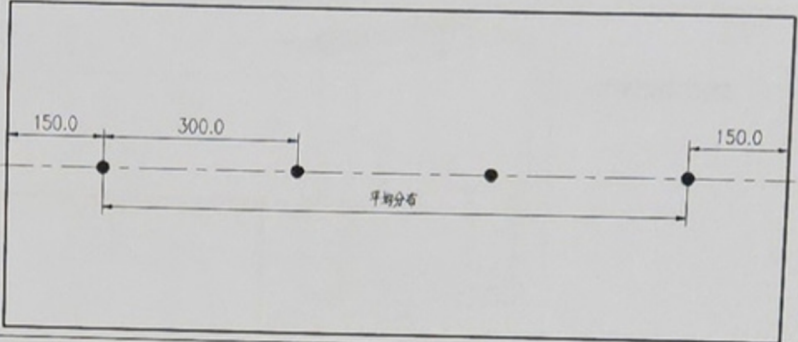
5. Noise

Inspection Instrument:	Digital Sound Level Meter		
Model:	HS5633		
Picture:			
Specification:	<p>1.Measurement range:</p> <p>1) Low range L: 40dB—100dB;</p> <p>2) High range H: 70dB—130dB。</p> <p>2.Frequency range: 31.5Hz~8kHz</p> <p>3.Frequency weight: A weighting;</p> <p>4.Display features: digital automatic display, cycle time is 1 time/s, resolution is 0.1 dB;</p> <p>5. Time weighting feature: F (fast)</p>		
Inspection method:	<p>a) Set the sound level meter to an "A" weighting mode;</p> <p>B) Open the clean bench fan and Fluorescent lamp, then measure noise in the center of the front of the clean bench level to 300 mm and 380 mm above the work surface.</p>		
Drawing:			
Performance Index:	≤65dB (A)		
Inspection result:	63.4 dB (A)	Inspection conclusion:	Qualified

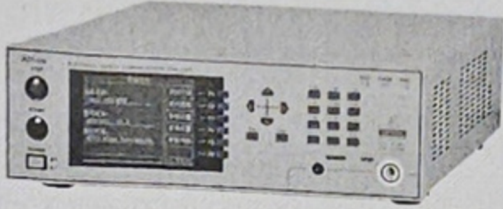
6. vibration

Testing equipment:	Vibrometer		
Model:	AWA5933		
Photo:			
Parameter:	<p>1. Sensor: piezoelectric accelerometer, charge sensitivity 3pC / m.s²; Frequency range: 10Hz ~ 5000Hz; Weight: 20g</p> <p>2. Frequency range: 10Hz ~ 1000Hz</p> <p>3. Measuring range: vibration acceleration a (peak) 0.01 ~ 199.9 m / s² Vibration intensity Sev (rms velocity) 0.01 ~ 199.9 mm / s Amplitude s (peak - peak) 0.1 ~ 1999 μm</p>		
Detection method:	<p>a) with clips, screws, magnets with a thin film Vaseline gel or double-sided tape of vibration analyzer sensor element fixed to the geometric center of the work surface;</p> <p>b) measuring overall vibration amplitude clean bench of normal working hours;</p> <p>c) Close fan of the clean bench, to determine the background vibration amplitude;</p> <p>d) subtracting the background vibration amplitude of the vibration intensity from the total, the net amplitude of the vibration of the clean bench.</p>		
FIG distribution:			
Performance:	Amplitude ≤ 5 μm (rms)		
Test results:	3 μm	Detection Conclusion:	Qualified

7. Illuminance

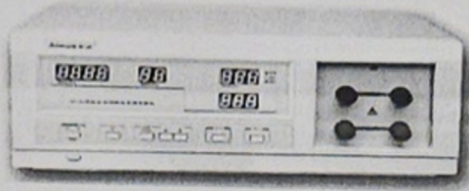
Testing equipment:	Illuminometer		
Model:	TES1330A		
Photo:			
Parameter:	<p>1. Measuring range: 20/200/2000/20000 Lux 2. Overload display: Highest digit of (1) is displayed 3. Resolution: 0.1 Lux 4. Accuracy: $\pm 3\%$ rdg $\pm 0.5\%$ f.s (<10,000 lux). $\pm 4\%$ rdg ± 10dgts (> 10,000 lux) (Base on standard color temperature 2856K lamp correction)</p>		
Detection method:	<p>a) on the work area, the work surface along the line of centers set both the inner wall illuminance measurement points, the distance between the measuring points is not more than 300mm, 150mm is a minimum distance of the side walls; b) Turn off the lights of the clean bench, from one side of the measurement points successively in the background illuminance measurements. Average background illumination should be $110\text{lx} \pm 50\text{lx}$; c) turn on the lights of the clean bench, start the fan, and in turn from the side of the measuring point illuminance measurement of clean bench.</p>		
FIG distribution:			
Performance:	Work zone average illumination of not less than 300lx. Light should be uniform, soft, to avoid glare		
Test results:	831 lx	Detection Conclusion:	Qualified

8. Dielectric strength


Detecting instrument:	Comprehensive test instrument for electrical safety performance		
Instrument Type:	AN9635HS		
Instrument Picture:			
Instrument Parameters:	AC voltage withstand testing		
	Rated output capacity		
	AN9635HS:200VA(5000V/40mA), Short circuit current is greater than 200mA; AN9636HS:500VA(5000V/100mA), Short circuit current is greater than 200mA;		
	Output voltage setting	Range, precision	
	100~5000V, $\pm(2\% \times \text{Set value} + 5 \text{ characters})$		
	Output frequency setting	Range, precision	
	50Hz or 60Hz, $\pm 0.1\% \times \text{Set value}$		
	Alarm current setting	Upper Limit, precision	0.10~40.00mA(or 100.0mA), $\pm(2\% \times \text{set value} + 5 \text{ characters})$
		Lower limit, precision	0.000~9.999mA, $\pm(2\% \times \text{Set value} + 5 \text{ characters})$
	Time setting	Testing time range	0.5~999.9s(0, infinite time)
		Lift time range	0.1~999.9s
		Slow down time range	0.1~999.9s
		Time setting accuracy	$\pm(0.2\% \times \text{setting} + 1 \text{ characters})$
	Measuring gauge	Voltage range, precision	0.01~5.00kV, $\pm(1.5\% \times \text{read value} + 1 \text{ character})$
		frequency range, precision	50Hz or 60Hz, $\pm 0.1\% \times \text{read value}$
Current range, precision		0.10~100.0mA, $\pm(2\% \times \text{read value} + 2 \text{ characters})$	
time frame, precision		0.1~999.9s, $\pm(0.2\% \times \text{read value} + 1 \text{ character})$	
Output voltage waveform, distortion rate, adjustment rate		sine wave, less than 2%(Pure resistive load), less than $(2\% \times \text{set value} + 5V)$ (From no load to full load)	
Initial voltage setting		$(0\% \sim 50\%) \times \text{Output voltage setting value}$	

	Current compensation setting	0.000~ 40.00mA,automatic、 manual	
	ARC Detector	1~9class,9class means most sensitive,0means close	
Testing method:	Connect the pen clip of high voltage (red)and low voltage (black) to the measured electrical LN end and the metal shell, press the start button, test lamp light. Test the high pressure at the specified time, if there is no audible and visual alarm, the high voltage test qualified, conversely, the test product is not qualified.		
Performance index:	Dielectric strength: Between live parts and metal housing in the AC voltage 1390V, continuous 5S does not breakdown.		
Test result:	Pass	Detection conclusion:	Qualified


9. Grounding resistance

Detecting instrument:	Grounding conducting resistance tester		
Instrument Type:	AN9613B		
Instrument Picture:			
Instrument Parameters:	<p>Test current(Allowable error: ±5%): (5~30)A (5~10)A: (0~600)mΩ;</p> <p>Measuring range: (11~25)A : (0~300)mΩ; (26~30)A: (0~200)mΩ (5~25)A: ±2.5%;</p> <p>Maximum allowable error: (25~30)A: ±5%</p> <p>Resolving power: 1 mΩ</p>		
Testing method:	Connect the test line to the instrument constant current output and output measurement end, then connect the other end of test line to measured object ground strap and metal shell, press the start button, the instrument start to test, output indicator light, the display window display the measured resistance value. Then press the stop button, instrument returns to standby state. If the measured value of ground resistance is greater than 0.1Ω,The buzzer will issue a "beep - beep -" intermittent alarm ,at the same time, the alarm indicator light and the grounding resistance measurement value display window value flashing, indicating that the test result is not qualified.		
Performance index:	The resistance value between the metal surface and grounded power plug≤0.10Ω		
Test result:	0.042 Ω	Detection conclusion:	Qualified

10. Airflow patterns

Product:	Airflow Tester		
Model:	QMY-1S		
Picture :			
Specification:	External Size: 100×55×230 (mm×mm×mm) Power Supply: AC 220V 50HZ Consumption: 25W Ultrasonic Frequency: 1.7Mhz		
Test Method :	a) Adjust the airflow rate of Laminar Flow Cabinet to the specified minimum . b) along centerline of work surface height, at the position of 300mm inside operating port, move smoke generating device from one side to another side of laminar flow cabinet. c) 150mm in front of diffuser device, 150mm from the top, move smoke generating device from one side to another side of laminar flow cabinet. d) At the position of 159mm above work surface height and 300mm inside operating port, move smoke generating device from one side to another side of laminar flow cabinet. e) Adjust the airflow rate of Laminar Flow Cabinet to the specified maximum, repeat the above steps.		
performance index:	Airflow in the work zone of laminar flow cabinet should be outward, should not produce vortex and circumfluence, and no dead.		
test results:	Pass	test conclusion:	Qualified

11.Hepa filter integrity

product :	Aerosol Photometer, Aerosol Generator
Model:	ATI TDA-2I、TDA-6C ATI 2I Portable Photometer, ATI 6C Portable Photometer
Product picture:	
Product Specification:	<p>Aerosol Photometer:</p> <p>Data Range: From 0.0001% to 100%, automatic LCD display</p> <p>Auto Zero: Automatic zero, under the mode of "clear", set up Zero by pressing the key of "0%" when the sample flow goes through the internal Ultra Pure Filter.</p> <p>Or set up Zero by automatically setting up the downstream reading of the filter to zero and then pressing the key of "0%".</p> <p>Dynamic Range: Up to 600 microgrammes per liter</p> <p>Sensitivity : 1% of readings for readings between 0.01% to 100%</p> <p>Repeat Ability: 0.5% of readings for readings between 0.01% to 100%</p> <p>Alarm: User selectable audible, visual, and vibratory alarms notify the user when the user defined set point is exceeded.</p> <p>Aerosol Generator :</p> <p>Aerosol Output Range: 50-2000cfm(1.4-56.6 m³/min)</p> <p>Aerosol Concentration: 100 ug/L @ 2,000cfm(about 56 m³/min) 10 ug/L @ 2,000 cfm(about 56 m³/min)</p> <p>Particle PAO, DOP, multi disperse, DEHS(DOS), Paraffin</p>
Test Method:	<p>The scanning detection of filter proceed by the following steps:</p> <ol style="list-style-type: none"> Adjust the airflow rate of Laminar Flow Cabinet to the specified maximum of effective rate. Remove the diffuser device and protective lid of filter (if any). Place Aerosol Generator and lead aerosol in Laminar Flow Cabinet, as a result, according to the manufacturer's instructions, produce even-distributed HEPA filter upstream airflow. When the lead-in position of aerosol is not specified by manufacturers, ensure that the lead-in aerosol distribute uniformly in the airflow of Laminar Flow Cabinet. Open Aerosol Photometer, adjust as Instructions.

- d) Test the upstream airflow of HEPA filter containing aerosols to testify that the RLS intensity of the aerosol is at least equal to the RLS intensity produced by $10\mu\text{g/L}$ DOP.
- If it is a linear scale (0~100 index), adjust the readings to 100;
 - If it is a logarithmic scale, the readings of the upstream airflow concentration will be adjusted to a degree that corresponds to a concentration of over 1×10^4 (using the instrument calibration curve);
- e) Photometer probe in the downstream of the filter does not exceed 25 mm from the filter surface, and move at a scan rate of less than 50mm/s to make sure that the probe scan the entire downstream side of the filter and the edge of each combination filter sheet. Scan route should be slightly overlapping. Check carefully the entire filter periphery, the connection of Combined filter sheets and frame and seals between the filter and other parts.

performance index:	The connection of HEPA filter and the frame of laminar flow cabinet work zone should not exceed 0.01%. at any point.	
Test Result:	Pass	test conclusion: Qualified