



WOOLEE ENGINEERING



WOOLEE AIR TECH KOREA



Industrial Clean Room & Equipment



Biologically Clean Room & Equipment

General Catalogue

AIR CONTROL & CLEAN ROOM SYSTEM



WOOLEE ENGINEERING CO., LTD.



WOOLEE AIRTECH KOREA CO., LTD.

CLEAN AIR SYSTEM AREA & CLEANLINESS LEVEL

		Cleanliness Level (Class)				
		M1.5~2.5 (Class1~10)	M3.5 (Class100)	M4.5 (Class1,000)	M5.5 (Class10,000)	M6.5 (Class100,000)
CR Use Process & Cleanliness	ICR	Semi-conduction Industry	Crystallization			
			Wafer Manufacture			
			Diffusion			
			Wafer Processing			
			Photolithographic			
		Liquid Crystal	IC Chip Manufacture			
			Assembly			
			Inspection			
			Surface Cleaning			
			Photolithographic			
	BCR	Electronic Equipment	Color Filter			
			Assembly			
			Magnetic Dram Tape			
			Shadow Mask			
			High Reliable tube			
		Precision Instrument	* Gyroscope Minutia Bearing			
			Parts for Rocket			
			WATVH, Meter, Bearing, Clock, Instrument, Bearing			
			Lens			
			LSI Mask			
	Others	Optical Print	Print Circuit Board			
			Film			
			Precision Print			
			Laundry for Garments			
			Laser Generator			
		Medical Science	Special Operation			
			Special Treatment			
			ICU, CCU, Recovery Room			
			Neonatal Room			
			Clinic Inspection			
	Biohazard	Drugs	Medicine room			
			Critical Area			
			Controlled Area			
			Pathogen Free Animal			
			Antibiotic			
		Food	Normal Medicines			
			Preparation Process			
			Brew, Fermentation			
			Diary Products			
			Food Processing			
	Agriculture & Livestock	Biohazard	Paste			
			Mushroom			
			Artificial Culture			
			Raising			
			Experimenting Pathogen			
			Genetic Engineering			
			Virus Tumor			

 Positive Pressure Clean Room

 Negative Pressure Clean Room

Cleanliness standards for Clean Room

There are various types of cleanliness standards for floating particles in the air. The tables below list representative standards, which are ISO standards, Federal Standards(Fed. Std. 209E) and Japan Industrial Standards(JIS).

■ U.S.A. : Fed. Std. 209E

Class		Class Upper Limit									
		0.1μm		0.2μm		0.3μm		0.5μm		5μm	
		Unit Volume		Unit Volume		Unit Volume		Unit Volume		Unit Volume	
Metric	Imperial	(m³)	(ft³)	(m³)	(ft³)	(m³)	(ft³)	(m³)	(ft³)	(m³)	(ft³)
M1		350	9.91	75.7	2.14	30.9	0.875	10.0	0.283		
M1.5	1	1,240	35.0	265	7.50	106	3.00	35.3	1.00		
M2		3,500	99.1	757	21.4	309	8.75	100	2.83		
M2.5	10	12,400	350	2,650	75.0	1,060	30.0	353	10.0		
M3		35,000	991	7,570	214	3,090	87.5	1,000	28.3		
M3.5	100			26,500	750	10,600	300	3,530	100		
M4				75,700	2,140	30,900	875	10,000	283		
M4.5	1,000							35,300	1,000	247	7.00
M5								100,000	2,830	618	17.5
M5.5	10,000							353,000	10,000	2,470	70.0
M6								1,000,000	28,300	6,180	175
M6.5	100,000							3,530,000	100,000	24,700	700
M7								1,000,000	283,000	61,800	1,750

■ ISO Standards (ISO 14644-1)

Particle size (μm)	Clean Room Class [unit/m³]								
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9
0.1	10	100	1,000	10,000	100,000	1,000,000			
0.2	2	24	237	2,370	23,700	237,000			
0.3		10	102	1,020	10,200	102,000			
0.5		4	35	352	3,520	35,200	352,000	3,520,000	35,200,000
1			8	83	832	8,320	83,200	832,000	8,320,000
5					29	293	29,300	29,300	293,000

* ISO Class 3~8 are equivalent to F.S. 209E Class 1~100,000

■ Korean Standards (KS B 6741)

Particle size (μm)	Clean Room Class [unit/m³]							
	M1	M10	M100	M1,000	M10,000	M100,000	M1,000,000	M10,000,000
0.1	101	102	103	104	105	106	107	108
0.2	2	24	236	2,360	22,600			
0.3	1	10	101	1,010	10,100	101,000	1,010,000	10,100,000
0.5			35	350	3,500	35,000	350,000	3,500,000
5						29	2,900	29,000
Particle Size Range by Class	0.1~0.3	0.1~0.3	0.1~0.5	0.1~0.5	0.3~5.0			

* KS Class 3(M100)~7(M10,000,000) are equivalent to F.S. 209E Class 1~100,000

Design of Clean Room

What is Clean Room?

Room that controls contamination by controlling the concentration of the floating particles in the air within the cleanliness limit specified.

Cautions for Clean Room Design

1. Patterns of Airflow

There are laminar airflow(vertical&horizontal), turbulent airflow, mixed airflow and tunnel airflow types. Select a desired pattern by taking account of each feature, precision, intended use and others.

2. Cleanliness

The cleanliness of clean room is determined by the precision required by the product. The cleanliness level must be determined after sufficient review about airflow pattern, ventilation rate, room pressure and others.

3. Layout

The layout must consider workability and satisfy cleanliness. Dust works must be isolated. In addition, it is necessary to comprehensively review doorway, passage, usefulness and maintenance of persons and materials.

4. Structure & Materials

Interior surface must be smooth, as possible, and has the structure to prevent airflow from being dispersed and dust from being accumulated. Select materials that raise less dust, prevent particles from being attached and can be easily cleaned. Sometimes chemical-resistant, moisture-resistant and fire-resistant materials may be used depending on work types.

5. Equipment

Peripherals composing the clean room include(but not limit to) air shower(for human's entrance), pass box(for carrying things in/out), relief clamber(for room pressure regulation) and clean stocker and clean locker to store dust-free garments. You must understand each function sufficiently.

6. Control of Working Persons and Materials

Mobile products carried by workers from exterior become the biggest cause of dust occurrence. Workers must have basic knowledge of clean room including dust-free garments and makeup problems.

7. Utility

Energy supply devices for water supply and drainage, gas, electricity and something else must be selected by considering the fluidity of airflow pattern and layout. In addition, it must be considered not to cause the deterioration of cleanliness in maintenance.

8. Safety & Emergency Plan

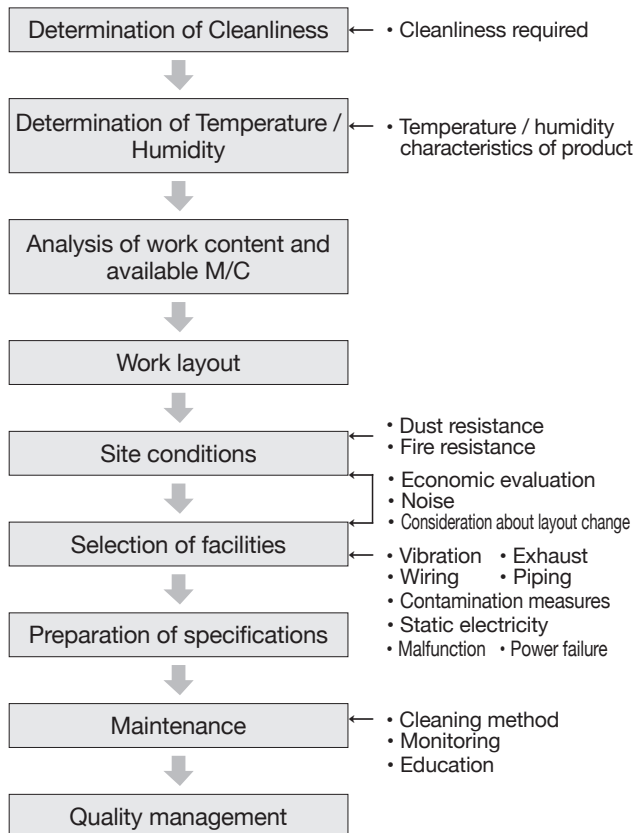
Since the clean room has air-tight structure, it is important that care be taken to establish plans against fire and gas leak, etc. In addition, it is necessary to consider the installation of emergency power system that is affected by power failure.

Patterns and characteristics of airflow

Item \ Pattern	Vertical Laminar Airflow Clean Room	Horizontal Laminar Airflow Clean Room	Turbulent Airflow Clean Room	Mixed Airflow Clean Room	Tunnel Clean Room
Cleanliness	ISO Class 3~5 (Class 1~100)	ISO Class 5~6 (Class 100~1,000)	ISO Class 6~8 (Class 1,000~100,000)	ISO Class 6~8 (Class 1,000~100,000)	ISO Class 3~5 (Class 1~100)
Cleanliness in Moving	Low affected by workers	Affected by upstream dust	Affected by workers	A little affected by workers due to layout	The lowest affection from workers
Operation Cost	High	Middle	Low	Middle	Middle
Layout Change	Simple	Difficult	Simple	Simple	Difficult
Maintenance of Manufacturing Device	In a room or a return space	In a room or a return space	In a room	In a room or a return space	In a return space
Expansion	Difficult	Difficult	A little difficult	Difficult	Line can be expanded
Precise Control for Air Handling	A little unbalance in interior for the whole room control	Affected by upstream heat	Unbalanced	Unbalanced	Allowed highly precise control at each working area
Pattern					

Design of Clean Room

Overall Order Planning



Cautions for Clean Room Design

Items	Cautions
Entrance	<ul style="list-style-type: none"> Minimize the entrance / exit. (In particular, when installing air shower) Do not expose to the air. Separate from shoes shelves. Locate at the bottom (Especially, cross flow)
Accessible Room	<ul style="list-style-type: none"> Maximize the airflow in the accessible room. Furnish washstand, and prepare beverages if the number of persons is great. Install at least double doors between clean rooms. (Install air shower separately) Make it enable to communicate with the inner side. Provide a lounge if necessary.
Carrying In / Out	<ul style="list-style-type: none"> Use pass boxes if possible. Install a carrying-in entrance (for large-sized devices).
Interior Layout	<ul style="list-style-type: none"> Minimize and simplify the interior arrangement. Provide the management office to the outside and consider the communication method. Consider expansion plans. Minimize flow line lengths. Consider the direction of refresh airflow and working places. Arrange partitions, local exhausts and return ducts in dusty workplaces.
Interior Facilities	<ul style="list-style-type: none"> Minimize the exposure of wiring and ducts. Install light fittings on the ceiling as long as possible. Arrange emergency exit, fire alarm, fire extinguisher, safety devices against power failure, toxic gas. Interphone, telephone Clean thoroughly. Particle concentration, temperature/humidity recorder

ICR Standard Specification

1. General

- 1.1 Company Name _____
- 1.2 Address _____
- 1.3 Intended Use _____
- 1.4 Phone _____ FAX _____
- 1.5 Dept. _____ Personnel _____
- 1.6 Spec. Creation Date _____
- 1.7 Estimate Date _____
- 1.8 Expected completion Date _____

2. Performance Specification

- 2.1 Temperature _____ °C ± _____ °C
- 2.2 Humidity _____ % ± _____ %
- 2.3 Cleanliness Class _____ (_____ μm basis)
- 2.4 Vibration _____
- 2.5 Noise _____
- 2.6 Luminance _____

3. Room Conditions

- 3.1 No. of Workers _____ Persons
- 3.2 Ambient Temp Lowest _____ °C Highest _____ °C
- 3.3 Humidity Lowest _____ % Highest _____ %
- 3.4 Internal Heat Lowest _____ kW Highest _____ kW
- 3.5 Indoor Power Consumption _____ kW
- 3.6 Indoor Service Hours _____ HR
- 3.7 Exhaust _____ CMM

4. Room Structure

- 4.1 Room Size _____ m (D) x _____ m (L) x _____ m (H)
- 4.2 Partitions, windows, Doors _____ PCS
- 4.3 Wall Materials _____
- 4.4 Ceiling Materials _____
- 4.5 Floor Materials _____
- 4.6 Fire Measures _____
- 4.7 Air Shower _____ Set
- 4.8 Pass Box _____ Set
- 4.9 Others _____

5. Current Status

- 5.1 Floor Status _____
- 5.2 Available Ceiling Height _____
- 5.3 Current Ceiling Material & Thickness _____
- 5.4 Installation Place of Air Handling Unit _____
- 5.5 Heat Source of Air Handling Unit _____
- 5.6 Supply Power Source Capacity _____
- 5.7 Water/Steam Source Capacity _____
- 5.8 Exhaust Place & Treatment _____
- 5.9 Drainage Place & Treatment _____ Qty. _____
- 5.10 Compressor Location & Capacity _____
- 5.11 Vacuum Gauge Location & Capacity _____
- 5.12 Supply Gas Type, Capacity and Place _____

6. Other Special Requirements

Sandwich Panel Type Clean Room

The sandwich panel that insulator partition for clean room are integrated into is widely used small to large sized clean rooms as wall and/or ceiling panels.

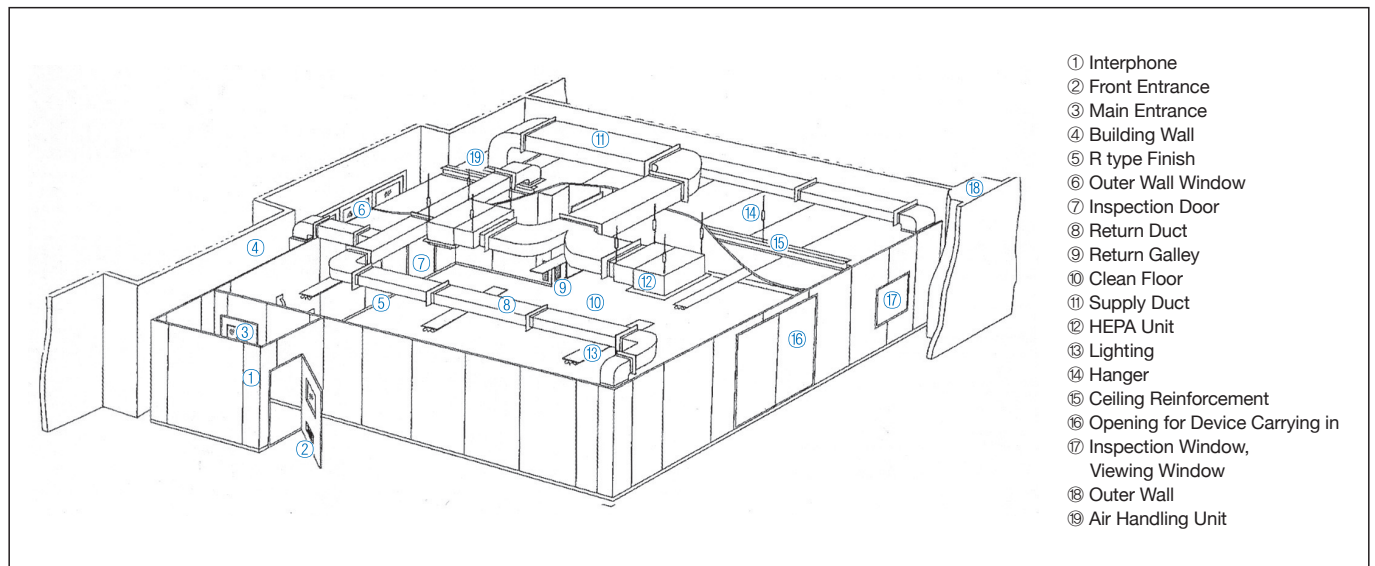
WooLee modularizes these sandwich panels and facilities.

◆ Features

1. The modularized sandwich panel can be easily installed and make it enable to construct in a short time.
2. The layout can be freely changed by assembling the panels so it is easy to install in moving and expand.
3. Free-pillar structure with no □/凸
4. Its flat surface prevents dust from being attached and guarantees tidy finish.
5. Airtight seal providing superb insulating effect.
6. The construction by fire resistant panels or chemical resistant panels is possible if necessary.



◆ Installation Example of a Clean Room



THERMAL CLEAN CHAMBER(STANDARD)

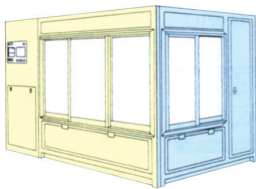
The thermal clean chamber is a product to maintain high cleanliness standard and manage temperature/humidity in its specific space. WooLee can manufacture units satisfying up to Cleanliness ISO3 (Class 1) $\pm 0.005^{\circ}\text{C}$.

◆ Feature

1. Cleanliness complying with ISO3(Class 1)
2. Temperature control between $0.1^{\circ}\text{C} \sim 0.005^{\circ}\text{C}$
3. The design tailored to internal devices is available
4. Multiple protection circuits guaranteeing its excellent stability.
5. It provides high cleanliness environment and highly precise temperature/humidity conditions in order to prevent particles and gases, which become the cause of product defect, from being attached and prevent expansion/contraction due to the change of temperature/humidity.
6. Humidity control providing Low humidity specification between 5~40%RH as well as standard specification between 40~60%RH
7. Airflow system matching with PID control, ultra precision parts and temperature precision allows temperature precision between $0.1^{\circ}\text{C} \sim 0.005^{\circ}\text{C}$.

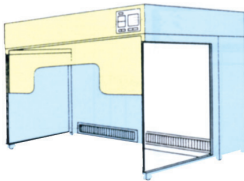


◆ Thermal Clean Chamber



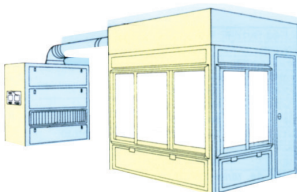
C Type(Enclosure Type)

- Optimized for instruments and steppers
- Composed of thermostat, blower, HEPA filter embedded Air handling unit, workspace(chamber)
- Chamber that can attach auto shutter(electric powered, pneumatic), inspection window to check operation, maintenance door
- Vertical laminar airflow type(HEPA filter attached on the ceiling) and horizontal laminar airflow type(HEPA filter attached to the side)



B Type(Opening Type)

- For projection aligner
- Open type unit that embeds an Air handling unit with temperature controller on the back of the vertical laminar airflow type clean bench
- Compact size easy-to-move, excellent handling performance by attaching castor



S Type(Separation Type)

- Appropriate for E-beam lithography system and small sized unit with a small quantity of air throughput
- Duct method separating an air handling unit from workplace(chamber) to block noise, vibration and/or electric noise. Internal devices that can be operated in 4 directions(front, both sides, rear)
- The circulation type unit interlocking inlet and chamber part with duct is, also, provided.

◆ Main Application

Semi-conduction	Stepper(Zoom-out photograph exposure system), Aligner, Electron beam exposure equipment
Display Panel	Liquid crystal panel, Plasma display, FED
Precision Processing	Specular grinder, Laser processing M/C, Magnetic head cutting M/C, Precise lens grinder, Spin coater for CD-R DVD-R
Precision Instrument	Precision measuring M/C, 2D/3D measuring M/C
Biologically	Sample treatment that constant temperature and humidity is required

Thermal Clean Chamber(For exposure unit)

◆ Feature

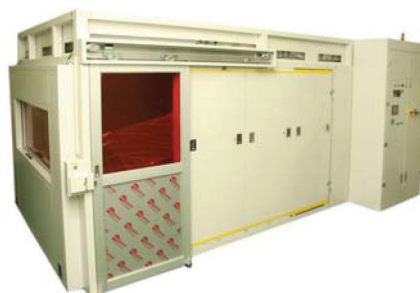
1. Cleanliness complying with ISO4(Class 10)
2. Temperature control between 0.1℃~0.01℃
3. The design tailored to internal devices is available.
4. Multiple protection circuits guaranteeing its excellent stability.
5. It provides high cleanliness environment and highly precise temperature/humidity conditions in order to prevent particles and gases, which become the cause of product defect, from being attached and prevent expansion/contraction due to the change of temperature/humidity.
6. Airflow system matching with PID control, ultra precision parts and temperature precision allows temperature precision between 0.1℃~0.01℃
7. S-Mark, Semi Certification(option)



Thermal Clean Chamber(For instrument)

◆ Feature

1. Cleanliness complying with ISO5(Class 100)
2. Temperature control of 0.01℃
3. The design tailored to internal devices is available.
4. Multiple protection circuits guaranteeing its excellent stability.
5. High cleanliness environment and highly precise temperature / conditions
6. Temperature precision up to $\pm 0.01^{\circ}\text{C}$, applying PID control
7. S-Mark, Semi Certification(option)



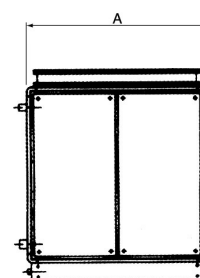
Air Handling Unit

Air Handling Unit

Unit that keeps interior air in comfort status and is composed of air filter, heating coil, cooling coil and humidifier

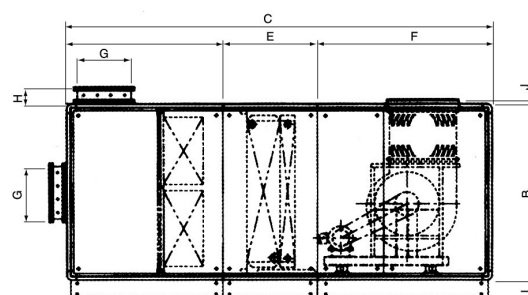
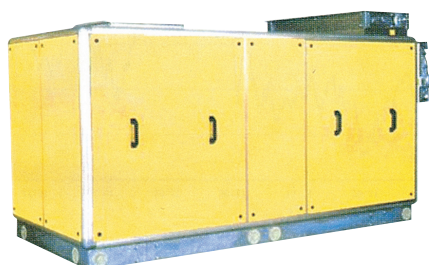
Feature

1. Compact structure design
 - Compact design to reduce installation space and floor area
2. AL Profile Frame(Optional)
 - High strength semi-permanent structure with elegant appearance, using aluminum molded frame. Externally/internally fastened and assembled through internal folding casing. It provides excellent durability and more beautiful appearance.
3. Excellent electrostatic powder coating
 - Use of cold rolled steel sheet or galvanized steel sheet. For cold rolled steel sheet, anti-corrosion coating after surface cleaning and phosphate coating treatment is performed and then finish treatment is provided through excellent electrostatic powder coating with corrosion-resistant effect and superb adhesive property.



Dimensions and Standard Specifications

The Basic Drawing & Dimension



Standard Specification

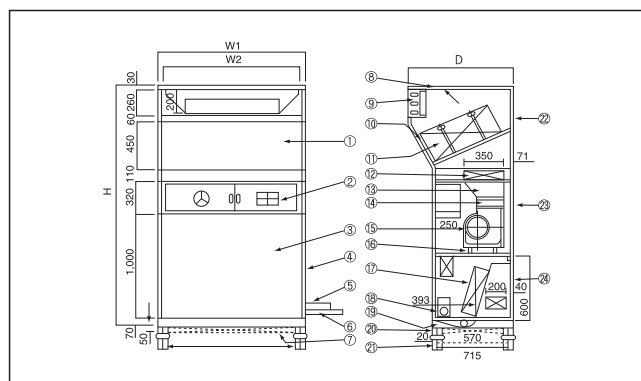
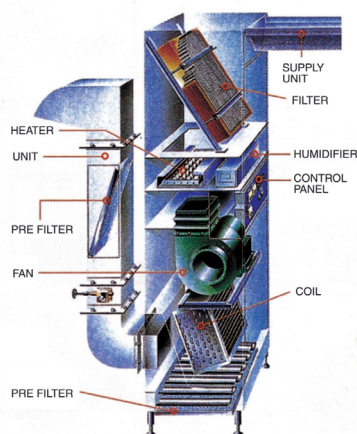
WL-AHU	080	120	170	230	280	340	420	510	590	680	840	930	1100	1200	1400
Air Volume(CMM)	80	120	168	224	280	336	420	504	588	672	840	924	1,008	1,176	1,344
Static Pressure(mmAq)	90	90	90	90	90	90	90	90	90	100	100	100	100	100	100
Cooling Capa(kcal/Hr)	33,000	50,000	75,000	95,000	120,000	160,000	190,000	220,000	250,000	290,000	360,000	400,000	440,000	500,000	570,000
Heating Capa(kcal/Hr)	45,000	68,000	100,000	140,000	170,000	200,000	240,000	290,000	340,000	380,000	470,000	510,000	560,000	650,000	750,000
Coil Size	22SX700L	26SX900L	36SX1,000L	46SX1,200L	46SX1,200L	46SX1,350L	46SX1,650L	56SX1,650L	56SX2,000L	56SX2,200L	56SX2,600L	56SX2,900L	56SX3,350L	56SX3,800L	56SX4,200L
Supply fan(DS)	#2	#2.5	#3	#3.5	#4	#4	#4.5	#5	#5.5	#5.5	#4.5X2	#4.5X2	#5X2	#5X2	#5.5X2
Supply Motor(kW)	2.2	3.7	5.5	5.5	7.5	11	11	15	19	22	11X2	15X2	15X2	19X2	19X2
Filter(Q'ty)	1.5	2	3	4	5	6	7.5	9	10.5	12	15	16.5	18	21	24
Damper	310X981	310X981	410X1,106	410X1,438	410X1,438	410X1,438	610X1,743	610X1,743	610X2,332	610X2,332	710X2,996	710X1,632X2	810X1,733X2	810X1,733X2	810X2,000X2

Dimension

WL-AHU	808	120	170	230	280	340	420	510	590	680	840	930	1100	1200	1300
A	1,203	1,203	1,328	1,650	1,660	1,660	1,965	1,965	2,554	2,554	3,218	3,523	3,828	4,429	5,054
B	1,103	1,203	1,328	1,328	1,660	1,660	1,660	1,965	1,965	1,965	1,965	1,965	1,965	1,965	1,965
C	2,505	2,805	3,105	3,105	3,356	3,356	3,656	3,656	3,656	3,906	4,207	4,207	4,207	4,420	4,207
D	852	852	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,708	1,703	1,703	1,703	1,703
E	801	801	801	801	801	801	801	801	801	801	801	801	801	801	801
F	852	1,152	1,152	1,152	1,403	1,403	1,703	1,703	1,703	1,953	1,703	1,703	1,703	1,703	1,953
G	310	310	410	410	410	410	610	610	610	610	710	710	810	810	810
H	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
I	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
J	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50

The air control package unit is an integral clean unit embedding HEPA filter and fan and can maintain a constant temperature/humidity and refresh air.

1. Can guarantee Class 1,000 that has been only implemented by the existing down flow or cross flow type.
2. Integral unit that HEPA filter, fan, coils and humidifier are built in. It is easy to maintain and manage.
3. Since any separate M/C room or duct is not required, you can take full advantage of your space.
4. Can be installed at a place that requires temperature/humidity management and air purification, such as laboratory, operating room, inspecting room, etc.



No.	PARTICULARS	MAT'S	QTY	DESCRIPTION	No.	PARTICULARS	MAT'S	QTY	DESCRIPTION
1	FRONT(UPPER)PANEL	SBC	1	1.6t	13	HOPPER	SBC	1	1.2t
2	CONTROL BOX		1	1.2t	14	NEOPRENE PACKING			40x300W
3	FRONT(BOTTO)PANEL		1	1.2t	15	FAN & MOTOR		1	
4	SIDE PANEL		2	1.2t	16	RUBBER ISOLATOR		4	YA-2035
5	FRESH AIR DUCT		1	1.2t	17	COOLING COIL	AL CU	1	
6	PIPE CONNECTION			1.2t	18	HUMIDIFIER	SBC	1	1.2t
7	PRE-FILTER		1		19	DRAIN-PAN		1	1.2t
8	TOP PANEL	SBC	1	1.6t	20	PRE-FILTER CASE	SBC	1	3.2t
9	GRILLE	AL	1		21	LEG		4	φ 25
10	FILTER BRACKET	SBC	2	3.2t	22	BACK(TOP) PANEL		1	1.2t
11	HEPA FILTER	SUS	1	292X915X762	23	BACK(UPPER) PANEL		1	1.2t
12	HEATER	SBC	1		24	BACK(BOTTOM) PANEL		1	1.2t

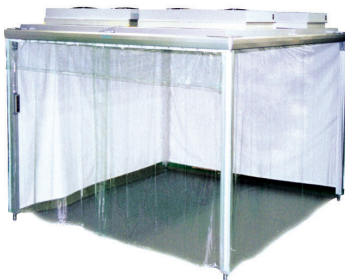
TYPE	WAC-03	WAC-05	WAC-08	WAC-10
W1	1050	1250	1400	1600
W2	850	1050	1200	1400
D	715	715	715	715
H	2300	2300	2300	2300

MODEL NO.	WAC-03	WAC-05	WAC-08	WAC-10
AIR VOL(CMM)	30	50	75	100
FAN MODEL	133D	090~040	013~060	013~060
FAN MOTOR(kW)	0.75	1.5	1.5	2.2
COOLING CAPA.(kcal/h)	8,400	14,300	21,500	28,800
HEATING CAPA.(kcal/h)	6,400	10,750	15,480	20,800
ELEC.HEATING(kWXSTEP)	1.85X4	3.2X4	4.5X4	6X4
HUMIDITER CAPA.(kg/H)	2.4	3.6	4.8	7.2
PAN TYPE(kW)	2	3	4	6
HEPA FILTER	99.97%(0.3μm BY D.O.P TEST)			
PRE FILTER	AF1.85%(Thickness : 50mm)			
CONTROL	HUMIDISTAT, HEATING, COOLING, SOLENOID VALVE, EXPANSION VALVE			
POWER CONSUMPTION(kW)	10.65	18.15	10.65	35.2
SOUND LEVEL(dB)	55~60			
POWER SOURCE	3ø / 220V, 380V / 50, 60Hz			
NOTE : Cold water in air conditioning and hot water in heating are available. Duct type is allowed.				

Clean Booth

This clean booth is a facility to highly purify the part of workspace or operate units at the part of the whole process. In other saying, it is an inexpensive and convenient facility that can be locally installed at a place that requires a clean space and acquire a desired cleanliness with clean air coming through fans and filters.

■ Standard Clean Booth



■ SS-Clean Booth

Self Setting
Clean booth



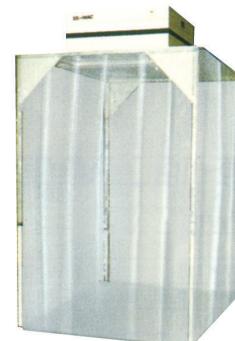
■ ISO5(Class 100) Clean Booth



■ FDA Clean Booth



■ Economical Clean Booth



SS-MAC Series

SS-MAC Series



Specification

Type	MAC-103 [ULPA Spec.]	MAC-55 [ULPA Spec.]	MAC-35 [ULPA Spec.]	MAC-15 [ULPA Spec.]
Dust collection Efficiency	99.97% or higher at 0.3 μ m particles (dust in the air) [99.999% or higher at 0.1~0.2 μ m (dust in the air)]			
Main Filter	HEPA filter [ULPA filter]			
Air volume(m ³ /min) - H/L	10.0/- [8.0/-]	4.5/1.1 [3.3/0.7]	3.0/1.0 [2.2/0.7]	1.0/0.5 [0.8/0.4]
Extract Speed(m/sec) - H/L	0.51/- [0.41/-]	0.39/0.1 [0.29/0.06]	0.46/0.15 [0.34/0.11]	0.48/0.24 [0.39/0.19]
Noise(dBA) - H/L	57/- [57/-]	52/33 [52/34]	55/38 [55/40]	52/43 [53/44]
Consumption Power(W)	119/102 [121/100]	35/8 [31/8]	32/10 [30/11]	13/6 [11/6]
Power	110V Spec. : AC110V 1 ϕ 50Hz/60Hz, 220V Spec. : AC220V 1 ϕ 50Hz/60Hz			
Dimension	W664XD664XH200	W514XD519.5XH150	W410XD415.5XH150	W250XD255.5XH130
Weight(kg)	15	10	6.5	2.5
Motor Type	DC motor			
Structure	Charge prevention ABS resin			
Std. Equipment	Fiber Pre filter attached			
	Power code with ground plug : 2m, Option Spec. : Connection in Terminal			
	Accessory : Packing for attaching outlet, Installation Screw			

- Noise is measured at 1m distance away from the extraction side in an anechoic room.
- The specifications like air volume are same in 50Hz and 60Hz.
- The contents within [] indicates the filter specifications.

EC-MAC Series - 1

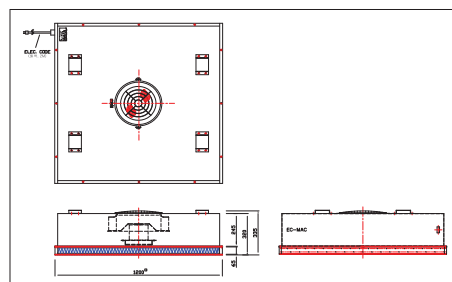
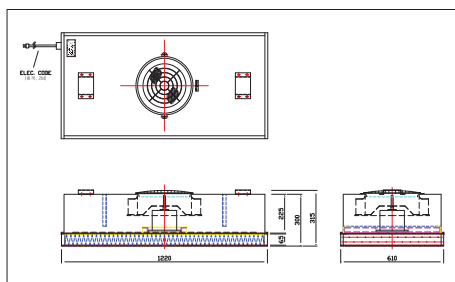


Specification

Type	EC-MAC-31 [HEPA Spec.]	EC-MAC-101 [HEPA Spec.]	EC-MAC-151 [HEPA Spec.]	EC-MAC-251 [HEPA Spec.]	EC-MAC-351 [HEPA Spec.]
Dust collection Efficiency	99.97% or higher at 0.3 μ m particles				
Main Filter	Low pressure loss HEPA FILTER				
Air volume(m ³ /min)	3.0(3.0)	10.0(10.0)	15.0(15.0)	25(20)	35.0(35.0)
Extraction Speed(m/sec)	0.38(0.38)	0.51(0.51)	0.37(0.37)	0.61(0.49)	0.43(0.43)
Noise(dBA)	53(52)	55(53)	57(56)	58(57)	59(58)
Consumption Power(W)	28(27)	110V Spec. : 114(98), 220V spec. : 118(100)	110V Spec. : 157(141), 220V Spec. : 158(141)	110V Spec. : 180(180), 220V Spec. : 180(180)	110V Spec. : 240(240), 220V Spec. : 240(240)
Power	110V Spec. : AC110V 1 ϕ 50Hz/60Hz, 220V Spec. : AC220V 1 ϕ 50Hz/60Hz				
Dimension	W400xD400XH185, H size is 215 for 185	W610xD610XH185, H size is 215 for 200	W610xD1220XH200, H size is 215 for 200	W1220xD610XH200, H size is 215 for 200	W1200xD1200XH200, H size is 215 for 200
Weight(kg)	6.5	12	22	22	41
Std. Equipment	Fiber PRE FILTER attached				
	Power code with ground plug : 2m, Option Spec. : Connection in Terminal				
	Accessory : Packing for attaching outlet, Installation Screw				

- The contents within () indicates the 50Hz specifications. Noise is measured at 1m distance away from the extraction side in an anechoic room.
- The contents within [] indicates the ULPA filter specifications

EC-MAC Series - 2



Specification

Type	EC-MAC-252 [HEPA Spec.]	EC-MAC-352 [HEPA Spec.]	EC-MAC-353 [HEPA Spec.]	EC-MAC-354 [HEPA Spec.]
Dust collection Efficiency	99.97% or higher at 0.3 μ m particles			
Main Filter	Low pressure loss HEPA FILTER			
Air volume(m ³ /min)	25(25.0)	35.0(35.0)	35.0(35.0)	35.0(35.0)
Extraction Speed(m/sec)	0.61(0.61)	0.42(0.42)	0.8(0.8)	0.8(0.8)
Noise(dBA)	60(60)	60(60)	60(60)	60(60)
Consumption Power(W)	110V Spec : 370(370), 220V Spec : 370(370)	110V Spec : 370(370), 220V Spec : 370(370)	110V Spec : 370(370), 220V Spec : 370(370)	110V Spec : 230(230), 220V Spec : 230(230)
Power	110V Spec : AC110V 1 ϕ 50Hz/60Hz, 220V Spec : AC220V 1 ϕ 50Hz/60Hz			
Dimension	W1220×D610×H315, H size is 330 for 315	W1200×D1200×H335, H size is 350 for 335	W1220×D610×H335, H size is 330 for 315	W1220×D610×H200, H size is 215 for 200
Weight(kg)	30	41	30	28
Std. Equipment	Fiber PRE FILTER attached			
	Power code with ground plug : 2m, Option Spec. : Connection in Terminal			
	Accessory : Packing for attaching outlet, Installation Screw			

- The contents within () indicates the 50Hz specifications. Noise is measured at 1m distance away from the extraction side in an anechoic room.
- The contents within [] indicates the ULPA filter specifications

BLDC-MAC Series



Specification

Type	BLDC-MAC-101 [HEPA Spec.]	BLDC-MAC-151 [HEPA Spec.]
Dust collection Efficiency	99.97% or higher at 0.3 μ m particles	
Main Filter	Low pressure loss HEPA FILTER 50t	
Air volume(m ³ /min)	0~12(0~1,300RPM Linear)	0~18(0~1,300RPM Linear)
Extraction Speed(m/sec)	0.55	0.44
Noise(dBA)	Less than 50	Less than 50
Consumption Power(W)	0.32	0.32
Power	110V Spec : AC110V 1 ϕ 50Hz/60Hz, 220V Spec : AC220V 1 ϕ 50Hz/60Hz	
Dimension	W610×D610×H185	W1220×D610×H200
Weight(kg)	12	
Std. Equipment	LIU controller(0~1, 300 PRM, Adjustment in unit of 10 PRM)	
	Safety Net	
	Power code with ground plug : 2m, Option Spec. : Connection in Terminal	
	Accessory : Packing for attaching outlet, Screw	

Clean Bench (Vertical Airflow)

This clean bench is a facility that blocks the inflow of external pollutant and keeps cleanliness at a place that requires precise assembly, experiment and/or test.

◆ Feature

The vertical airflow type clean bench is appropriate for all works because it has a structure that keeps the inside of a work room in positive pressure and obtains cleanliness. The clean bench with gas lamp or bactericidal lamp is used for bio-related sterilization.

Safety design interlocking with fans is applied to allow gas to be ignited by a foot switch only when the room is ventilated.

The clean bench can be selected from the specification table below, and different sized clean bench can be, also, manufactured.

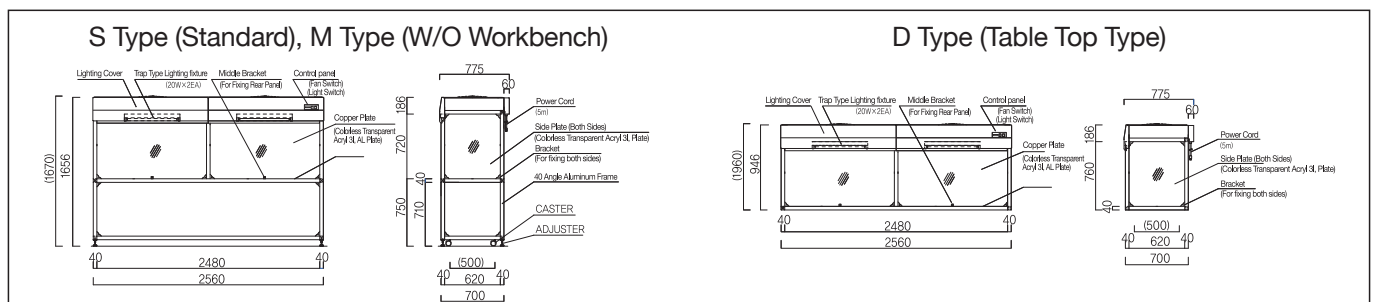


◆ Specification

Spec.		Type	VS-844			VS-844			VS-844			VS-844		
		K	L	M	K	L	M	K	L	M	K	L	M	
Interior Cleanliness			U.S.Fed.Std.209E Class M3.5(Class100)											
Dust collection Efficiency			99.99% or higher at 0.3μm or bigger particles											
Dust Collection	Main Filter	Ultra-thin HEPA filter												
Element	Pre-Filter	Non-woven Filter												
Air Throughput			About 12m³/min			About 19m³/min			About 23m³/min			About 28m³/min		
Wind Speed			0.45m/sec (Air volume adjustment damper function)											
Main Body	Structure	Steel plate coating												
	Workbench	STS304 hair line grind												
	Rear Plate	Steel plate coating												
Power			3 ϕ / 220V, 380V / 50Hz, 60Hz											
Power Consumption			About 250 V			About 500 V						About 700 V		
Weight(kg)			142	148	155	180	185	200	215	225	235	270	280	290
Symbols	W1 : Exterior width of device	840			1300			1600			1910			
	W2 : Internal width of mounting device	680			1140			1440			1750			
	W3 : Effective size of working room	820			1280			1580			1890			
	H1 : Max. height when opening shutter	1750	2050	2360	1750	2050	2360	1750	2050	2360	1750	2050	2360	
	H2 : External height of device	1550	1700	1855	1550	1700	1855	1550	1700	1855	1550	1700	1855	
	H3 : Height of workroom	570	720	875	570	720	875	570	720	875	570	720	875	
	H4 : Max. shutter	420	570	725	420	570	725	420	570	725	420	570	725	
	N1 : No. of Pre-filters	2									3			
	N2 : No. of fluorescent lights	2									4			
	N3 : No. of Sterilization lamps	1				2								
	P : W of fluorescent light	20				40								

Fan Filter Unit Clean Bench

◆ Outside Drawing



Air Shower

The air shower is a unit that removes particles, such as dust, attached to the surface of object or the skin of human by spraying in cleaned high-speed jet air(25m/sec or faster) before entering a cleaning room in order to prevent the clean room from being contaminated.

In addition, it can be used to restrict public access and obtains front room effect by isolating clean room and general room. WooLee prepares various variations appropriate for the entrance/exit of various facilities, persons, bogies and conveyors.

Standard Air Shower

Feature

1. Maximization of air volume and energy saving by the use of high efficient turbo fan
2. Auto stop of air circulation and auto off of lighting can be set. It is useful for energy saving.
3. Advanced air shower sprays jet airflow to the whole body from head to tiptoe through maximum 32 air jet nozzle. Its performance is drastically improved in comparison to the existing products.



HAS-8014AS



AAS-8014AS



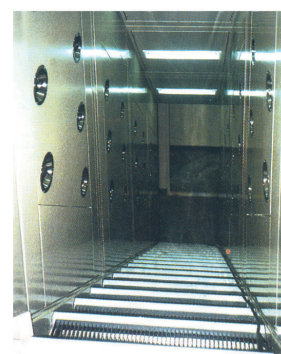
ESA-8014AS

Type	HAS-8014AS	AAS-8014AS	ESA-8014AS
Dust collection efficiency	99.99% or higher at 0.3μm (dust in the air)		
Dust collection element : Main filter	HEPA filter(3A-616165TLAU) x 2	HEPA filter(3A-616165TLAU) x 2	HEPA filter(3A-616165TLAU) x 1
Pre-filter	Pre-filter(600 x 200) x 2	Pre-filter(400 x 350) x 2	Pre-filter(400 x 350) x 1
Air throughput : In air jet (m³/min)	Apx. 33(In circulation : Apx. 12)	Apx. 23(In circulation : Apx.12)	Apx. 16(In circulation : Apx. 6)
Spray air speed : In air jet (m/s)	Apx. 25(23m/sec for ceiling side)	Apx. 25(Apx. 32m/sec)	Apx. 25m/sec
Circulation times : In air jet (times/hour)	Apx. 1259(in circulation : Apx. 458)	Apx. 877(in circulation : Apx. 458)	Apx. 610(in circulation : Apx. 458)
Noise (dBA) * 1 m from device	69	69	68
Power	3ø / 220V, 380V / 50Hz, 60Hz		
Power consumption : In air jet (W)	Apx. 1240(in circulation : Apx. 160)	Apx. 640(in circulation : Apx. 160)	Apx. 600(in circulation : Apx. 80)
Facility power	Apx. 2400 VA	Apx. 2500 VA	Apx. 1250 VA
Operation switch	Air jet auto/manual conversion switch, timer, fan switch, light switch		
Weight(kg)	Apx. 325	Apx. 325	Apx. 300
Structure	Main body : Steel plate baking coating		

Automatic Type Air Shower (Automatic Swing Door)



Stage Type Air Shower

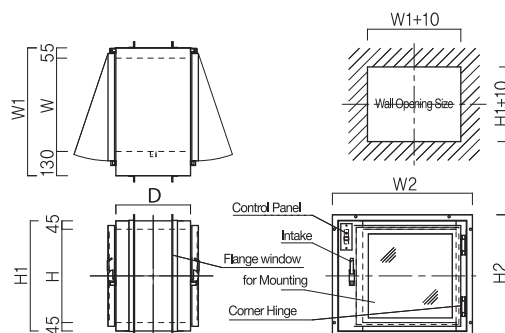


Pass Box

The pass box is installed at the boundary between zones with different cleanliness and is used to prevent dust and bacteria, which become the cause of contamination, from being coming in by enabling articles to be carried in/out without the pass of any person. WooLee manufactures a wide range of pass boxes from standard product to special product for large item and customizes the pass boxes according to their needs, such as air jet, clean air curtain, automatic door, automatic conveyor and others.

Standard Pass Box

Feature



Feature

1. Use of large sized tempered glass - Easy to check the contents
2. Magnet packing - Improved door's airtightness

Dimension by size

Type	Weight (kg)	Type	Weight (kg)	Type	Weight (kg)	Type	W	W1	W2	H	H1	H2	D
HPB03-554	Apx. 60	APB03-554	Apx. 55	EPB03-554	Apx. 54	□ PB03-554	500	685	750	500	590	655	400
HPB03-558	Apx. 80	APB03-558	Apx. 75	EPB03-558	Apx. 74	□ PB03-558	500	685	750	500	590	655	800
HPB03-574	Apx. 65	APB03-574	Apx. 60	EPB03-574	Apx. 59	□ PB03-574	500	685	750	750	840	905	400
HPB03-578	Apx. 90	APB03-578	Apx. 85	EPB03-578	Apx. 84	□ PB03-578	500	685	750	750	840	905	800
HPB03-754	Apx. 65	APB03-754	Apx. 60	EPB03-754	Apx. 59	□ PB03-754	750	935	1000	500	590	655	400
HPB03-758	Apx. 90	APB03-758	Apx. 85	EPB03-758	Apx. 84	□ PB03-758	750	935	1000	500	590	655	800

Specification

Type	HPB03-XXX	APB03-XXX	EPB3-XXX
Dust collection Efficiency	99.99% or higher at 0.3μm particles	-	-
Dust collection Element	HEPA	-	-
Air throughput	1 m³/min	-	-
Power	1ø / 220V / 50Hz, 60Hz		
Facility Power	Apx. 60 VA	-	-
Interlock Method	Electronic lock. Indicator, Buzzer	Indicator, Buzzer	Indicator, buzzer
Structure	Steel plate baking coating, High resistance : (Hairline mapping) Window : Colorness transparent tampered glass		
Interphone	○	△	△
Sterilization Lamp	△	△	△
Super-clean Hinge	△	△	△

○ : Standard Device △ : Option

Standards and Cleanliness of Clean Air System

Cleanliness Class by NASA Standards

NASA standards are the standard values indicating the relationship between the class mark by particle and no. of bacteria. FDA takes the value of airborne bacteria from this standard.

Cleanliness Class	Airborne Bacteria (CFU/ft ³)	Falling Bacteria (CFU/ft ² ·week)
100	0.1	1,200
10,000	0.5	6,000
100,000	2.5	30,000

Comparison of Bacteria Density

FDA and NASA specify the same value for airborne bacteria. WHO GMP adopts non-strict values for Grade B, C and D in comparison to FDA but uses more strict value for Grade A.

Cleanliness Class		FDA CFUm3 (CFU/ft ³)	NASA CFUm3 (CFU/ft ³)	WHO GMP CFUm ³
A	100	-	-	1>
B	100	3.5(0.1)	3.5(0.1)	5
C	10,000	-	18(0.5)	100
D	100,000	88(2.5)	88(2.5)	500

Cleanliness and Work Area by FDA

FDA divides the work area that control is required into important area and management area.

Area	Particle Density	Floating Bacteria Density (CFU/ft ³)	Description
Important Area	Class 100	0.1	Area that control liquid, container and cover of sterilant is exposed directly Filling, closure and the treatment of ex-sterilant or intermediate sterilization product are included.
Management Area	Class 100,000	2.5	Area that prepares intermediate manufacturing before sterilization and process material and container cover. When combining raw materials Device surface contacting with raw material, process material, intermediate product. It includes the case that container and cover are exposed to plant environment after final etching the surface

Cleanly Class by WHO GMP

WHO GMP was revised in 1992 and adopts metric unit. The difference between Grade A and B is that Grade A is based on laminar airflow.
(Grade B uses non-laminar airflow)

Grade	Particle Density(pcs/m ³)		Floating Bacteria Density (CFU/m ³)
	0.5~5Micron	5Micron	
A	3,500	0	1>
B	3,500	0	5
C	350,000	2,000	100
D	3,500,000	20,000	500

Facility Conditions

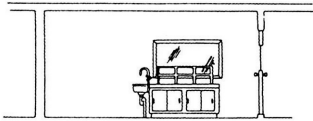
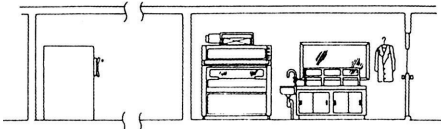
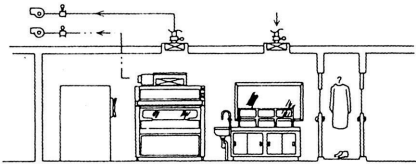
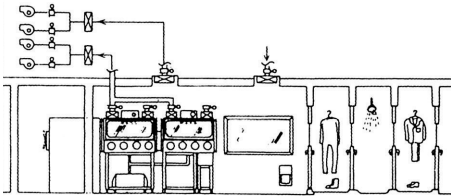
FDA displays the airflow and air handling conditions in WHO GMP. FDA specifies the airflow speed of laminar as 0.45 m/sec \pm 20 %.

Grade		FDA		WHO GMP	
A	100	-		Laminar airflow	Vertical airflow 0.3m/sec; Horizontal airflow 0.45m/sec
B	100	Laminar airflow	0.45m/sec±20%	Turbulent airflow	Circulation : 20 times /hour or more
C	10,000	-			
D	100,000	Turbulent airflow	Circulation : 20 times /hour or more Pressure difference : 1.25mm AQ or more		

Facility of Biohazard Controlled Room

The biohazard controlled room has an airflow system of the opposite direction to that of industrial clean room or biologically clean room. The facility that protects workers from dangerous articles or high density bacteria or prevents dangerous articles or high density bacteria from being spread out of the area is called biohazard room. This field is standardized by USA NIH, CDC, NSF No. 49. The clarification by environmental measures(physical containment) is shown in the table below and divided into from P1 for microbes with the lowest risk to P4 with the highest risk.

◆ Biohazard Facility Standards

Level	Pathogen	Facility Description	Reference Drawing
P1	1~2	<ul style="list-style-type: none"> General microbial Lab. 	
P2	2~3	<ul style="list-style-type: none"> Use of Class 1 or II cabinet only for the experiment that a lot of aerosols occurs in Install auto clamp. Use after setting a limit to a general microbial lab. area. 	
P3	3	<ul style="list-style-type: none"> Only experiment within Class I or Class II cabinet (Indoor exhaust allowed). Isolated from outside by using double door or air lock (They must not be opened at the same time) Provide the airflow from outside to inside by pressurizing the whole lab. The surface of the lab. must have a structure or material quality that can be cleaned or disinfected When carrying out an article, sterilize it in an auto clamp or its surface with disinfectants 	
P4	4	<ul style="list-style-type: none"> Only experiment within class II cabinet. Set a limit to independent building or a area isolated from other areas by an intermediate area. The whole lab. has a water-tolerance structure. With barometric pressure, set negative pressure in the order of outside → Support area → laboratory, cabinet. In the Lab. : Air supply - Primary HEPA filter, Exhaust = Secondary HEPA filter. two fan Double-sided auto clamp Drain after airtight sterilization at 120℃ 	

◆ Fields that require biohazard measures

Pathogen Related Area	Genetic Engineering Area
<ul style="list-style-type: none"> International infectious disease research including Lassa Fever, Marburg, etc. Cell culture room Hospital facilities isolating infectious disease patients or inspecting pathogens 	<ul style="list-style-type: none"> DNA manipulation experiment Mass product of medicines using new microbe Research on genetic structure

Standard of Safety Cabinet

◆ Classification of Safety Cabinet

The safety cabinet is standardized by USA, NSF No. 49. It is divided into Class I, IIA, IIB₁, IIB₂, III according to its risk degree. The classification of the safety cabinet is listed in the table below.

Japan Air Cleaning Association (JACA Std. No.16C) standardizes as the same classification and enforces type certification system for Class II type.

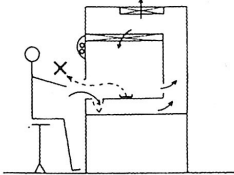
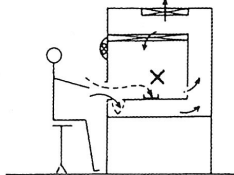
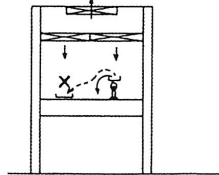
◆ Classification of Safety Cabinet (NSF Std. No. 49, Revised Jun 1987)

Class		I	IIB ₃		IIB ₂	III
Category			IIA	IIB ₁		
Sealing		Spread prevention at working part by airflow				Fully sealed
Front Panel		Open fixed		Open side		Globe
Risk Degree	Virus	Low ~ middle				High
	General Germ	Class 1 ~ 3 (Bacillus subtilis, tetanus bacillus, hepatitis, salmonella typhi, yersinia pestis, German measles, etc.)				Class4 Lassa fever, Marburg disease
	DNA Recombination	P ₁ ~P ₃				P ₄
Intended Use		<ul style="list-style-type: none">• Safety measures for workers and environment• Appropriate for things that does not require aseptic manipulation	<ul style="list-style-type: none">• Prevent the infection of workers with an incoming air barricade at front aperture• Aseptic laminar flow from HEPA filter enable the aseptic manipulation of experiment targets and can prevent from cross contamination of experiment targets• HEPA filter purifies exhaust air and protects environment			<ul style="list-style-type: none">• To Fully isolate and protect workers and environment from hazards• To enable the experiment & manipulation with the highest risk
Contamination Chamber		-	Contaminated positive pressure part may exist (only for pressure-resistant structure)	The contaminated part must be negative pressure state or the contaminated positive pressure part must be built up in the negative pressure part		<ul style="list-style-type: none">• Negative pressure of 12.7mmAq at minimum in gas light cabinet
Airflow	Front End Air	Front end air only (All fresh type)	Aseptic laminar flow passed through HEPA filter (All fresh type)		All contaminated air is exhausted through HEPA filter	None
	Air Supply	Do not cause environmental contamination	For the air passing through HEPA filter, some of the air is circulated for air supply and the other air is exhausted.			Aseptic air passed through HEPA filter (All fresh type)
	Exhaust	Indoor exhaust available		Outdoor exhaust (Negative duct method)		

◆ Performance Test

WooLee performs all inspection for safety cabinets under JACA standards as well as NS standards. Since the wind speed, air volume and airflow direction of cabinets are determined depending on airflow balance(bacteria test), the protection test for workers with hey fever, sample protection test and cross contamination test between products must be performed in secret. IIA/B3 type cabinet cabinets pass these tests. For the test methods about various inspection and performance test results of safety cabinets, refer to technical data.

◆ Big 3 Performances of Class II Safety Cabinet

<ul style="list-style-type: none"> • Personal Protection Workroom must not be exposed by contaminated air spray. 	<ul style="list-style-type: none"> • Product Protection Contaminated air spray must not be entered the workroom and affect aseptic tissues. 	<ul style="list-style-type: none"> • Cross-contamination protection When treating various types of products in workroom, the products must not be cross-contaminated. 
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◆ Test Items (JACA Std. No. 16C & No. 17b)

- Performance test : 1. Sealing degree(soap method, halogen gas method, pressure reduction method), 2. HEPA filter transmission factor 3. Airflow balance~Bacteria test(worker stability, product protection and cross contamination prevention), 4. wind speed(Extracted wind speed, incoming speed, etc.), 5. Airflow direction, 6. temperature rise, 7. Noise level, 8. Luminance, 9. Vibration, 10. Stability and strength(Conduction & tilt, twist, workbench's twist), 11. Sink leakage & capacity, 12. Short-circuit & ground resistance, 13. Other general performance
- Field test(after carried in and installed) : 1. Airtight, 2. HEPA filter transmission factor, 3. Wind speed & air volume, 4. Airflow direction, 5. Sink leakage & capacity, 6. Luminance, 7. Ground resistance

* For the test methods for each test item and test results about WooLee's products, refer to technical data(Published by WooLee).

Biology Clean Room

The biology clean room is the combination of sandwich panel and diverse subsidiary materials and is installed and constructed by considering chemical resistance and the preservation ability of cleanliness, sterilization and pasteurization. It can be applied to aseptic drugs, food manufacturing plants or research labs and aseptic operating rooms & wards.

◆ Features

1. Panel type: Easy to assemble and short construction period
2. Flat panel structure preventing dust from being accumulated
3. Excellent insulation effect
4. Round processed interior corners prevent dust from being accumulated and make cleaning and disinfection convenient.
5. Panel with excellent chemical-resistance
6. It is possible to acquire FDA validation.

◆ Use of Standard Panel

Surface Materials	Thickness	Insulator	Weight	Thermal Conductivity	Thermal Transmittance	Anti-thermal Temperature
color steel plate (Ivory color)	50mm	Rigid poly urethane foam	12kg / m ³	0.018kcal / mh℃	0.44kcal / mh℃	60℃
Color aluminum (Ivory color)			7kg / m ³			



Clean Room



Aseptic Infirmary



Aseptic Operating Room



Research Lab Clean Room

Biohazard Facility

Design Example of P3 (BSL-3) Facility

The treatment of pathogen and genetic manipulation organisms must be performed in a biohazard room. In addition, proper operation and management as well as installation is required. WooLee provides the design and the construction of P2 ~ P4 (BSL-2 ~ 4) biohazard facility.

Features

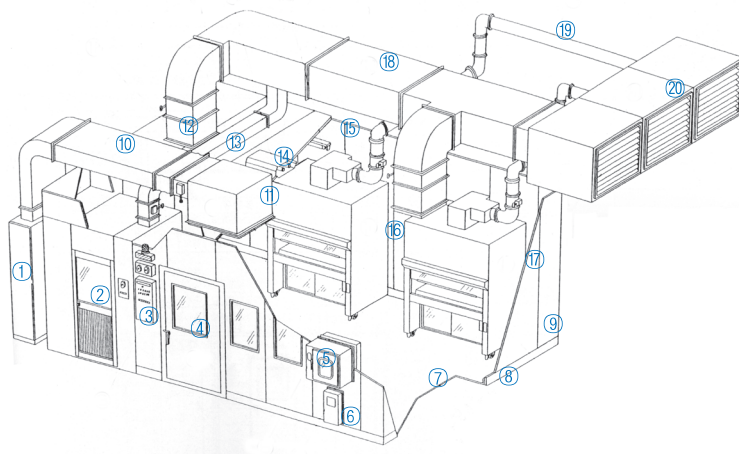
1. Its interior has negative pressure and airtight structure in order to prevent pollutants from being leaked.
2. Airflow by full outside method, HEPA filter at inlet/outlet, airtight sealing duct
3. Interior airflow is designed toward a constant direction (from higher risk area to lower risk area)
4. The HEPA filter attached to the pressure regulator displays the interior negative pressure grade.
5. Ceiling, wall and floor are made of chemical-resistant materials and can be infected and sterilized.



Specification

Category	Contents
Performance	Air supply : 99.99% or higher at 0.3 μ m or bigger particles(dust in the air) Exhaust : 99.99% or higher at 0.3 μ m or bigger particles(dust in the air)
Ventilation Count	Apx. 10~20 times/hour
Internal Pressure	- 30 Pa or lower
Dust Collection	HEPA filter(scan test product)
- Air Supply Filter	HEPA filter(scan test product)
- Exhaust Valve	HEPA filter(scan test product)
- Pre-Filter	Non-woven filter
Air Handling Method	Fully outside air, general air handling
- Wall & Ceiling	
Structural material	Aluminum sandwich panel
- wood	
- Floor	Coating by silicon cylinder
- Door	Aluminum chassis, Colorless transparent glass
Unit	Suspended from the ceiling
- Air Supply Unit	
- Exhaust Unit	Exhaust duct connection available(airtight duct type)
- Safety Negative Pressure Damper	Filter embedded(Alarm lamp)

System Schematic Diagram



- ① Package for exhaust
- ② Air lock(negative pressure)
- ③ Control panel
- ④ Airtight door for carry-in
- ⑤ Pass box attaching sterilization lamp(for P3)
- ⑥ Safety negative pressure damper(AND-1)
- ⑦ Flooring material
- ⑧ Base
- ⑨ Aluminum sandwich panel
- ⑩ Air supply duct
- ⑪ Air supply HEPA unit
- ⑫ Exhaust HEPA unit
- ⑬ Exhaust duct for air lock
- ⑭ Flush mounted light fixture
- ⑮ Sterilization lamp
- ⑯ Safety cabinet(BHC-1302II A/B3)
- ⑰ Safety cabinet(BHC-1302II A/B3)
- ⑱ Exhaust duct
- ⑲ Exhaust duct for safety cabinet
- ⑳ Exhaust blower unit

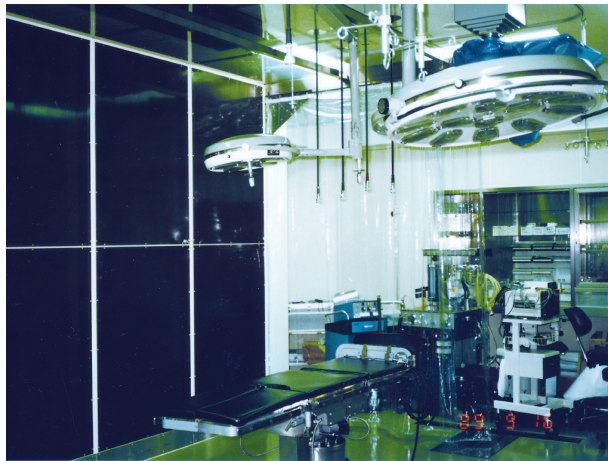
Hospital Facilities

Aseptic Operating Room

To prevent infection in operation such as organ transplantation, plasty and coxal articulation, aseptic operating rooms are required. Since it is modular type, it is inexpensive and requires small installation space so it can be constructed in a short period(3~4days).

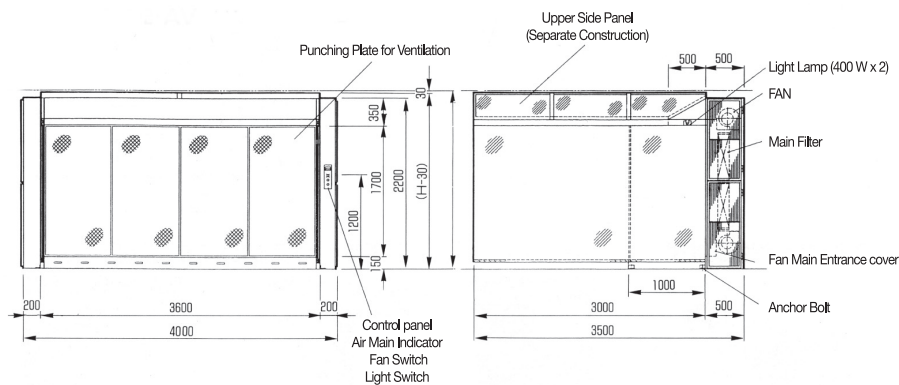
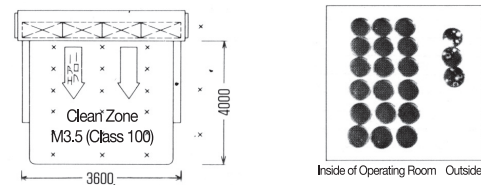
Features

1. Enables the existing operating room to be refitted into an aseptic operating with ISO5 Cleanliness(Class 100).
2. Requires small installation space. Inexpensive construction cost
3. Slide panel made of transparent vinyl can conveniently operated(Glass sliding wall is, also, available)
4. Filters can be attached/detached from the front side so maintenance work is easy.



Performance

- Cleanliness : ISO5(Class 100) zone is shown in the figure below. The entire operating room becomes ultra-clean space.
- Aseptic degree : The figure below shows the inside of an operating room and the test results for floating bacteria in the outside air. No bacteria were detected in the operating room.



Specification

Type	BCO-4-2-A	Output Power	Apx. 4200 VA
Aseptic Degree	0.1 pcs/ft or lower	Weight	Apx. 800kg
Cleanliness	ISO5(Class 100)	Structure	Main body : Steel plate baking coating
Dust Collection Efficiency	99.99% or higher at 0.3μm or bigger particles (dust in the air)		Side panel : Charge prevention vinyl panel and transparent panel
Dust collection Element	Main filter : HEPA filter		Punching : Aluminum, Almite finish (brown)
	Pre-filter : Non-woven filter		Partition : Stainless Steel
Air Volume (m³/min)	Apx. 200m³/min		Illumination : 40 W fluorescent
Air Speed (m/sec)	Apx. 0.5m/sec	Option	Glass sliding wall
Noise	Apx. 62dBA (Measured 1 m away from the unit)		(Transparent vinyl)
Power	AC380V 3ø 50/60Hz		

Simplified Isolation Room Unit for Bed

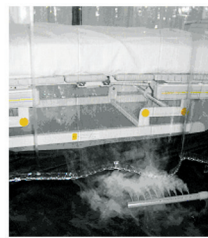
This is a booth limited to bed in order to isolate an infected patient temporarily. It provides excellent effects to prevent bacterial virus from being spread.

Features

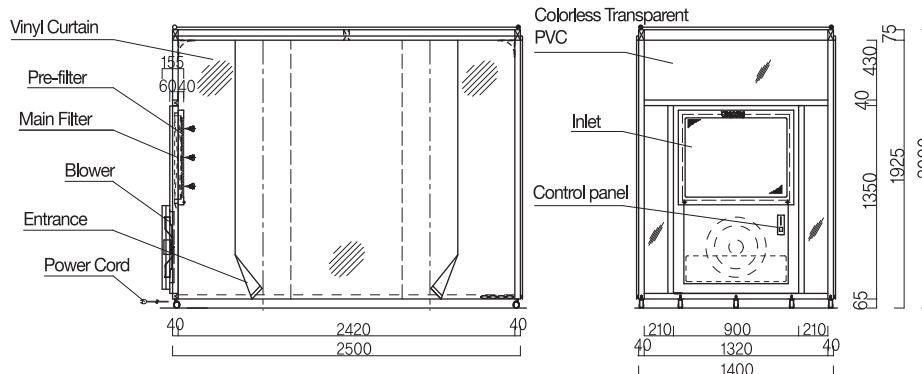
1. The air in bed maintained in negative pressure is sterilized through a high performance HEPA filter and exhausted.
2. The modular type booth composed of clean partition and vinyl cover can be easily assembled and moved.
3. Inexpensive price
4. Collapsible bed unit that is easy-to-carry in/out is, also, available.



Incoming airflow
under the bed



Incoming airflow
at the bottom



Specification

Model Type		EIB-31S	EIB-31KS
Type		Aluminum Type	Steel Plate Square Pipe Type
Dust Collection Efficiency		99.99% or higher at 0.3 μ m particles(dust in the air)	
Dust Collection Element		Main filter, Pre-filter	
Air Volume(m ³ /min)		High speed : Apx. 7.2m ³ /min, Low speed : Apx. 3.3m ³ /min	
Circulation Count(Hour/Count)		Apx. 60(Hour/Count)	
Power		AC220V 1 ϕ 50/60Hz	
Power Consumption(VA)		High speed : 60 W(75 VA), Low speed : 50 W (50 VA)	
Weight		Apx. 110kg	
Structure	Filter Unit	Steel plate baking coating(White gray)	Steel plate baking coating(White gray)
	Ceiling	Colorless transparent vinyl curtain	Colorless transparent vinyl curtain
	Pillar	Aluminum	Steel plate baking coating
	Surrounding	Colorless transparent vinyl curtain, Partly transparent PVC plate	Colorless transparent vinyl curtain, Partly transparent PVC plate

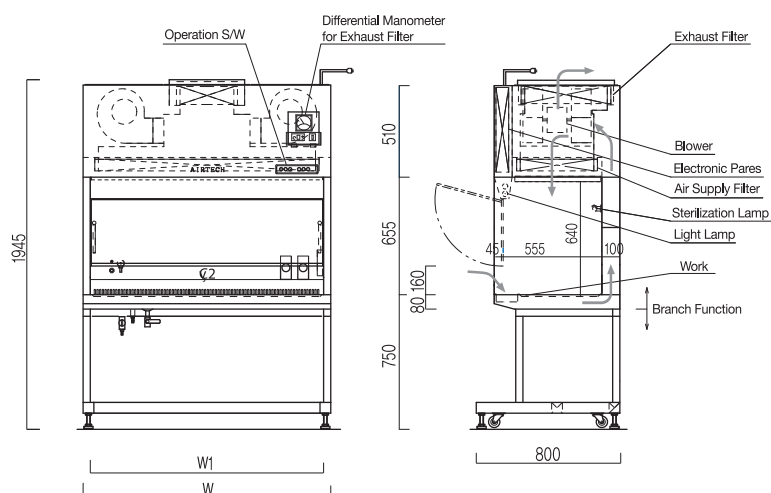
Bio Safety Clean Bench

■ Class II Av

Simple and inexpensive safety cabinet. This high performance cabinet is used to study and inspect genetic manipulation and/pathogen and, also, have Class IIA (dedicated to internal exhaust) function.

◆ Features

1. Lift up type front shutter : Easy to operate
2. Can easily confirm the operation status and provides the safety monitoring function and display system.
3. Displays abnormal exhaust status and clogged exhaust filter.



Type	W	W1	W2
BHC-1000 II A	1080mm	1000mm	1000mm
BHC-1300 II A	1380mm	1300mm	1300mm

◆ Specification

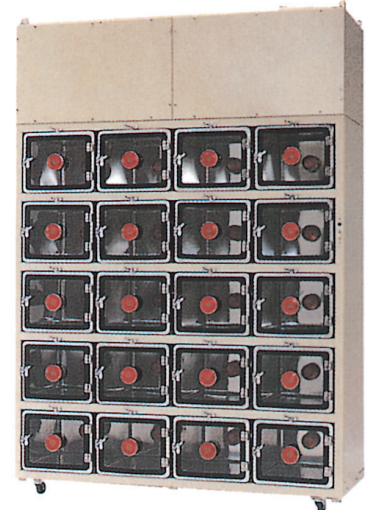
Type	BHC-1000 II A	BHC-1300 II A
Dust collection Efficiency	99.99% or higher at 0.3 μ m particles	
Air Supply Capacity (m ³ /min)	Apx. 10.5	Apx. 14.0
Exhaust Capacity (m ³ /min)	Apx. 5.5	Apx. 7.0
Incoming Wind Speed (m/sec)	Apx. 0.57	Apx. 0.56
Spraying Wind Speed (m/sec)	Apx. 0.37/ Center : 0.28/ Inside : 0.31	Apx. 0.38/ Center : 0.28/ Inside : 0.32
Power	3 ϕ / 380V / 50, 60Hz	
Power Consumption (V/A)	Apx. 290	Apx. 400
Weight (kg)	Apx. 170	Apx. 210
Front Panel	Open Top On/Off Method	
Structure	Main body : Steel plate baking coating, Working room Workbench shutter: Colorless transparent tempered glass	
Lighting	30W X 2	40W X 2
	15W X 2	15W X 2
Exhaust Alarm Function	Exist	Exist
Option	Gas burner(with Foot S/W) Vacuum management (Valve attached), Front On/Off panel, clogged exhaust filter(HEPA filter) alarm	

Infected Animal Preparing Unit

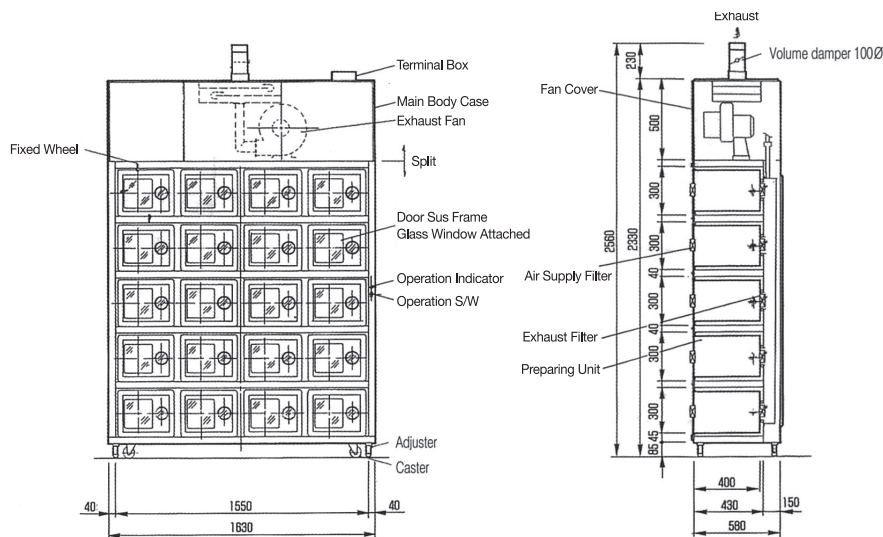
AIB TYPE Infected Animal Preparing Unit

Features

1. A HEPA filter for air supply is attached to each preparing unit so it safely blocks the movement of incoming or outgoing pollutant.
2. The preparing unit can be sterilized with auto clamp.
3. The door in the preparing unit has a glass unit to conveniently observe animals in it.
4. The preparing unit can be also used as a carry box.
5. Its exhaust chamber and duct has structures to prevent from being contaminated.
6. The preparing unit is equipped with wheels to make movement convenient.
7. Low noise



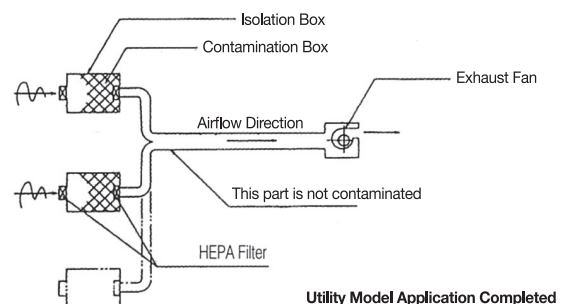
AIB-200M



Specification

Type	AIB-20M
Dust collection Efficiency	99.99% or higher at 0.3 μ m particles
Dust Collection Element	HEPA filter (Air supply unit)
Air Volume	0.8m ³ /min
Structure	Preparing unit : STS304
Dimension	Row 4, Stage 5 320 (W) x 400 (D) x 250 (H) (Valid)
Front Door	Frame~STS304, Window~3t Tempered glass
Power	AC220V 1 ϕ 50/60Hz
Power consumption	Apx. 1000VA
Weight	Apx. 530kg

System Drawing

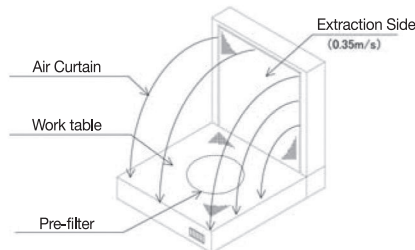


L Type Clean Partition

◆ Features

1. It is available in all fields from electronic industry to bio-tech industry.
2. Convenient and simple design structure
3. Use of vinyl hood and aluminum frame to make the mobility of process facility improve.
4. Dust is quickly absorbed on the table side so it is not spread around.

◆ Airflow Drawing



* This partition can be used in multipurpose according to customer's needs.

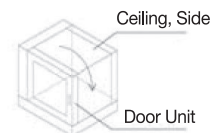
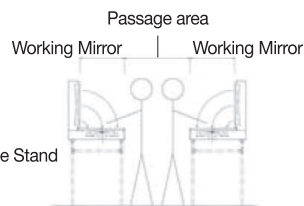
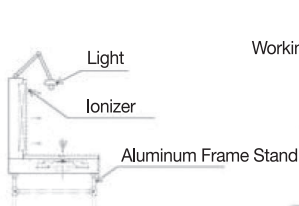
Optional installation

Tunnel Type

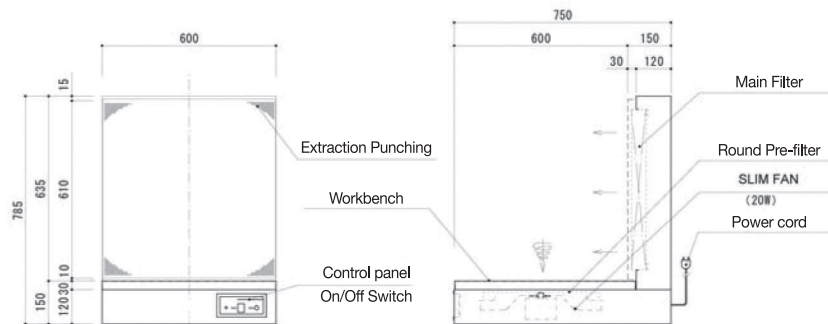
Conveyor Combination(Conection)

Clean Pass Box

Vigil Hood Attachment



◆ Dimension Drawing



◆ Specification

Dust collection efficiency	99.97% or higher at 0.3 μ m particles
Cleanliness	ISO Class5(Calss100), Vertical airflow, Target particle diameter : 0.3 μ m (when constructed)
Dust Collection Element	Pre-filter : Round type honey comb filter Main filter : HEPA filter
Extraction Wind Speed	Apx. 0.3 m/sec
Air Throughput	Apx. 6.5 m ³ /min
Structure	Main Body : Sheet metal print coating Workbench (Steel/STS304)
Coating color	ATC-7 (White Gray)
Power	AC200V or 220V, 1 ϕ , 50/60Hz
Power Consumption	70VA
Weight	Apx. 41kg
Option	Conduction sheet, Charge prevention hood, Aluminum frame cradle

* The information in the catalog may be changed for improvement.

Clean Partition

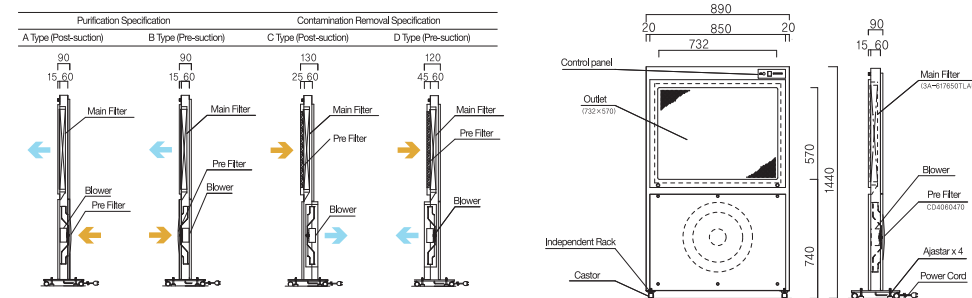
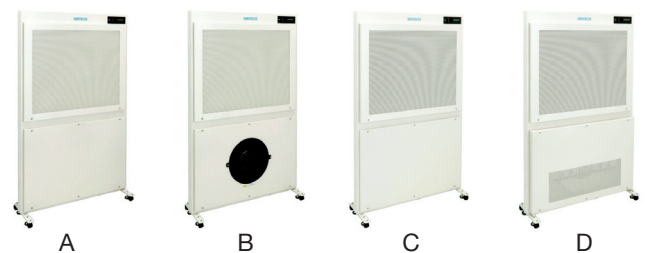
The clean partition is an ultra-thin type air purifier independently developed by WooLee. This light and compact unit is used in a space that requires cleanliness. This is divided into cleanliness type and contamination removal type according to its intended use. There are 4 types according to airflow methods and each type can be selected depending on its needs.

Features

1. Generates dust-free and aseptic air with HEPA filter,
2. Cleanliness and contamination removal specifications
3. Slim type that does not occupy a large space(Front : 890mm, Width : 90~120mm, Height : 1,395mm)
4. Various installations according to customer's usage and installation space.
5. It can be used diverse places, such as examination room, operating room, waiting room, office, contamination prevention room and clean room.
6. Low noise (Apx. 37dBA (Note : Night-time noise standard in resident area : 40dBA))

Installation Places

1. Various types of examination rooms(For prevention of doctor's infection)
2. Waiting rooms, examination waiting rooms, Wards (prevention of secondary infection)
3. Pharmacy, dispensary, clinical inspection room, antibiotic manufacturing(Hormone)
4. Experiment of pathogenic bacteria and infection animals
5. Aseptic treatment room, various operating room, Lasik operating room for ophthalmology, Nursery
6. Hospital, animal hospital, college Lab.



Specification

Type	ACP-896AH	ACP-896BH	ACP-896CH	ACP-896CH
Dust collection Efficiency	99.99% or higher at 0.3 μ m particles(dust in the air)			
Dust collection Element : Main Filter	HEPA filter			
Pre-filter	Round type pre-filter			
Air Throughput : High/Low Speed (m3/sec)	Apx. 6.5/2.8	Apx. 6.5/2.8	Apx. 6.5/2.8	Apx. 6.5/2.8
Spraying Wind Speed : High/Low Speed (m/sec)	Apx. 0.26/0.11	Apx. 0.26/0.11	Apx. 0.26/0.11	Apx. 0.26/0.11
Power	AC220V, 1 ϕ , 50/60Hz			
Power Consumption: High/Low Speed (m/sec)	Apx. 60/50	Apx. 60/50	Apx. 60/50	Apx. 60/50
Weight	Apx. 32	Apx. 32	Apx. 38	Apx. 38
Structure	Steel plate baking coating			

Slim Type Mothproof Air Curtain

Space saving unit that reduces installation area in comparison to the existing type. This unit improves mothproof efficiency by upbalance airflow and saves energy by adopting serial brushless motor.



◆ Features

1. Unbalance airflow : Korean first original technology
2. Power saving design and space saving unit that reduces installation area in comparison to other company's products
3. Interlocking with speed shutter door
4. Standard size : 2,000 (W) x 2,500 (H)
(Option Spec. : Width: within 3,000mm, Height : Negotiable)
5. Air discharge at a constant weak wind speed in order to dispel insects on the surface of speed shutter door

◆ Intended Use

To prevent insects and vermin from being entered manufacturing and/or laboratory facilities

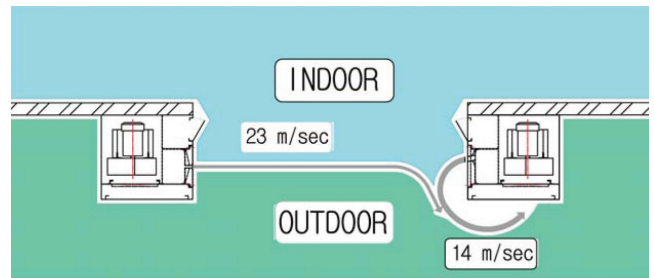
◆ Application

Manufacturing and/or laboratory facilities of BIO related companies including food and medicine

◆ Unbalance airflow with excellent mothproof efficiency

The unbalance airflow is formed in high speed and low speed layers, and the mothproof efficiency of this air curtain is about 90% or higher.

This air curtain keeps a constant wind speed in the whole space from the floor to the ceiling area.



◆ Specification

Type	AAC-20254C
Dust Collection Element	Lath net, Polyester non-woven filter
Air Throughput (m³/min)	Apx. 262m³/min (High speed : 102m³/min, Low speed : 160m³/min) * It takes about 3 seconds from start up to highest speed.
Spraying Wind Speed	High speed: 0 ~ 25 m/sec (Volume adjustment function / Option) Low speed: 0 ~ 15 m/sec (Volume adjustment function / Option)
Power	3ø / 220V, 380V / 50, 60Hz
Power consumption (W)	Apx. 3,300W(Voltage, 14A)
Weight (kg)	Apx. 370kg
Structure	Steel plate baking coating
Installation conditions	High/low speed location can be selected(Install this unit according to the wind direction of the installation place). Use an anchor bolt to the main body. Fix it to the floor.

* This specification is for Indoor installation. Do not expose rain or water.

Water Air Shower

This water air shower is a unit that cleans and dries harmful substances attached to rain coat in animal breeding facility or medicine and medical supplies manufacturing process.

◆ Characteristics

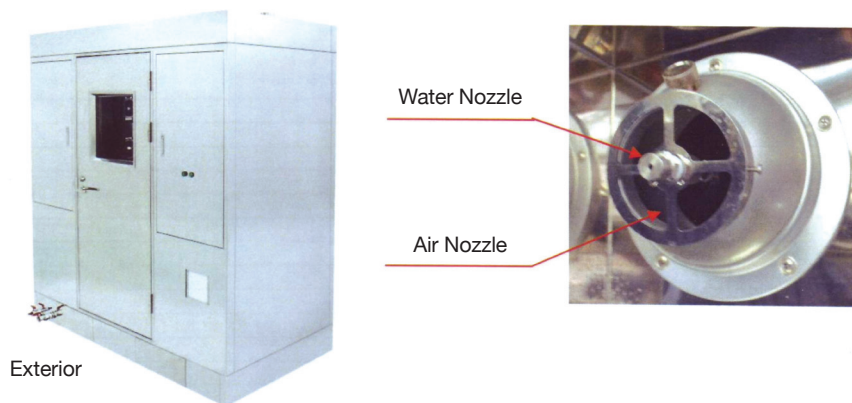
If you take the air shower after wearing your rain coat when entering manufacturing or laboratory room, this unit cleans and removes harmful substances on the surface of the rain coat with a water nozzle and then dries the rain coat with a powerful air jet nozzle.

◆ Intended Use

To remove harmful substances when entering animal lab., animal breeding room, hospital, medicine lab and manufacturing process

◆ Application

BIO related companies such as animal lab. animal breeding room, hospital, research lab., medicine and medical supplies.



◆ Specification

Dust collection Efficiency	99.99% or higher at 0.3 μ m particles
Circulation Recovery (count/hour)	Air Jet : Apx. 972 count/hour
Air Jet Nozzle	8 nozzles (Ceiling x 2, side x 6)
Spraying Wind speed (m/sec)	Air Jet: Apx. 30 m/sec
Air Supply Capacity	Air Jet: Apx. 35 m ³ /min
Exhaust Capacity	Apx. 1 m ³ /min
Power	3 ϕ / 380V / 50, 60Hz
Pre-Filter	Non-woven filter
Main Filter	HEPA filter
Operation S/W	Fan, water switch : Simultaneous operation of Water shower and air shower (cleaning) → Drying with Air Jet
	Water S/W : Water shower (Manual On/Off)
	Fan S/W : Air Jet (Manual On/Off)
	Light S/W On (Manual On/Off)
Blower	1kW
Floor	Grating (main bar : STS304, Surface, Synthetic rubber)
Exterior	Stainless steel (STS304, 400# grinding)
Noise (dBA)	Apx. 65 dBA (1m away from device) Indoor Apx. 85 dBA
Power consumption (VA)	Apx. 3,600 VA (11.2 A)
Weight (kg)	Apx. 820kg



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