AIR SHOWER

BROCHURE

KAIZEN AIRTECH SOLUTIONS

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Introduction

Air Showers are self-contained chambers installed at entrances to clean rooms and other controlled environments. They minimize particulate matter entering or exiting the clean space. Personnel and materials entering or exiting the controlled environment are “scrubbed” by high velocity HEPA-filtered air jets with velocities of 20-22m/s (4000 – 4300 fpm).Contaminated air is then drawn through the base within the unit, filtered and recirculated. Kaizen is a leader in air showers for demanding applications in the micro-electronics, semiconductors, pharmaceutical, spray painting, lab animal research and food markets. The present Kaizen Air Shower features a field-programmable microprocessor control that offers the maximum application flexibility of any unit on the market.

Cleanroom Applications

The greatest source of particulate contamination in a clean room is the operator. Air showers are installed between change areas and the clean room. The air shower enhances clean room operating protocol by serving as a reminder to all operators that they are entering a controlled environment. Personnel therefore develop the habit of gowning up properly before entering the air shower.

1. Pharma Production
2. Micro-Electronic Fabrications and Production Units
3. Semi-Conductor Production Lines
4. Basic and Applied Science Research Laboratories

Pharmaceutical and Lab Animal Research Applications:

Air showers keep pharmaceutical production and lab animal breeding areas clean and also minimize egress of hazardous substances and allergens from the controlled environment.

Air Shower Efficeincy Testing

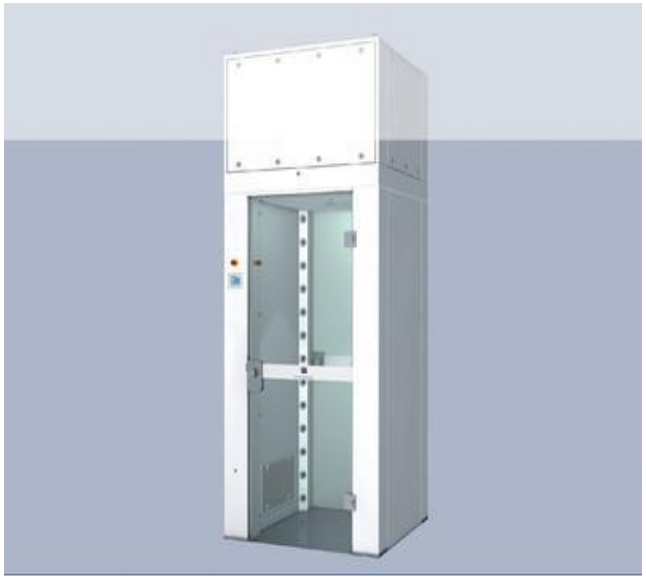
Kaizen is the company in the industry to validate the efficiency of our air showers using the body box test, a method pioneered by Kaizen.

1. New clean room garments without laundry processing, which have residual particulate contamination from manufacturing in a non-clean room environment, are used.
2. The operator gowns up (in a jumpsuit, booties, gloves, mask and hood), and enters a specially sealed enclosure (the body box). This enclosure is equipped with vertical laminar flow.
3. The operator performs a series of standardized physical movements in order to induce the generation of particles in the body box, for a specific duration.
4. A particle counter connected to the base of the body box measures particle count levels. This count is the baseline level.
5. The operator gowns up using another garment from the same batch.
6. The operator proceeds into the air shower (device under test), for a shower cycle.
7. The operator exits the air shower and proceeds into the body box. In the body box the operator performs the same series of standardized physical movements in order to induce the generation of particles in the body box, for a specific duration.
8. Particle count levels are measured, and compared against the baseline. The overall efficacy of the air shower under test and shower cycle is calculated. Shower cleaning efficiency at various particle sizes is also characterized.
9. The test is repeated multiple times, to gather sufficient data and eliminate any bias. Exposure Time In Air Shower (SEC)

Exposure Time In Air Shower (SEC)

Types of Air Shower

1. Top Mounted



2. Side Mounted

Parameters to be considered:

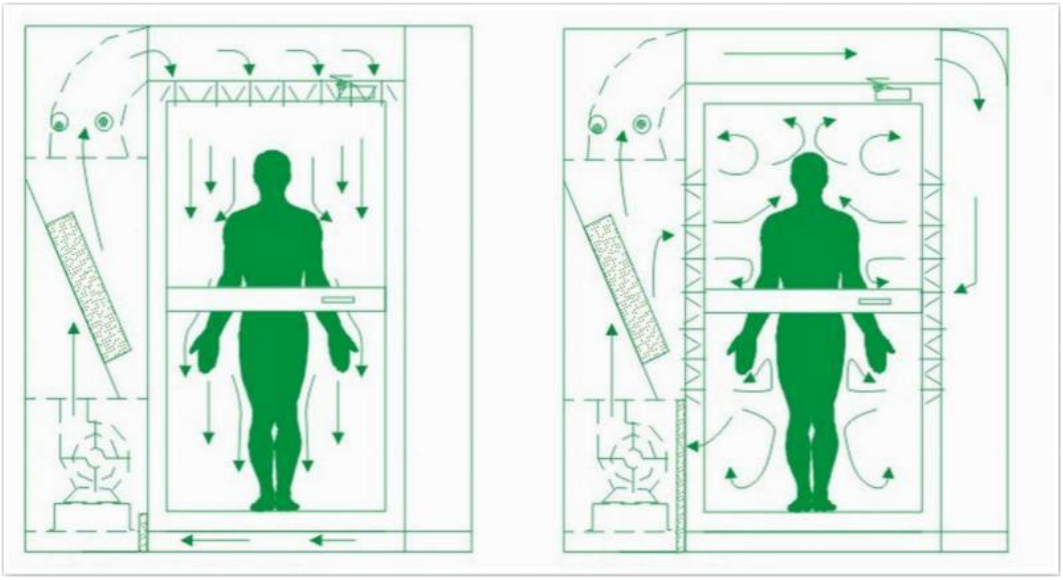
1. **Material of construction-**

- All materials used to be compatible with a clean room environment.
- Walls will be of a hard, durable, non-particulating surface.

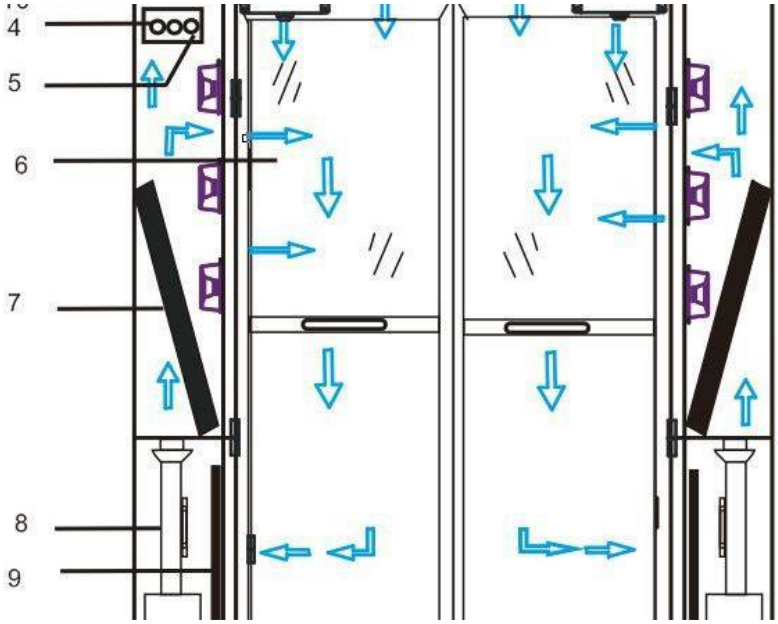
1. SS 304
2. Powder coated

B. Air Flow type:

1. Single-side flow,
2. Two-side flow,
3. Tower-side flow.
4. Multi-side flow



Single side, two side and multisided air flow shown in pictures



Main Features:

- High velocity shower jet in excess of 20 m/s ensure efficient scrubbing action to remove particulate matter.
- Operating modes can be programmed in the field.
- Microprocessor controller supervises all functions.
- Mini-pleated HEPA filtration achieves > 99.99% typical efficiency at 0.3 micron particles maintain class ISO7.
- A disposable pre-filter with 85% arrestance extends the life of the main filter.
- An emergency stop button is mounted on both sides of the shower.
- Indicator lights mounted on both sides of the air shower exterior regulate traffic flow in and out of the clean room.
- Permanently lubricated direct drive centrifugal blowers are used in conjunction with stainless steel air nozzles

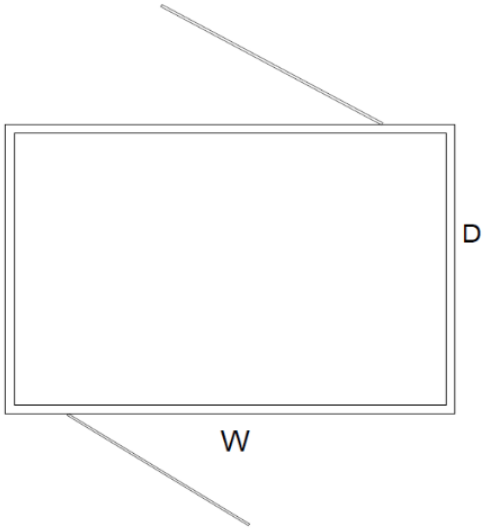
Models:

SR.NO	MODEL NO	INTERNAL SIZE	EXTERNAL SIZE	DOOR SIZE	ORIANTATION
		(W x D X H in mm)	(W x D X H in mm)		
1	KAS-T2B-S	950 x 900 x 1950	1550 x 1000 x 2600	W 890 x H 1950 mm	Straight
2	KAS-T2B-L	950 x 900 x 1950	1550 x 1000 x 2600	W 890 x H 1950 mm	L shaped
3	KAS-T4W-S	950 x 1900 x 1950	1550 x 2000 x 2600	W 890 x H 1950 mm	Straight
4	KAS-T4W-L	950 x 1900 x 1950	1550 x 2000 x 2600	W 890 x H 1950 mm	L shaped
5	KAS-T4D-S	1900 x 900 x 1950	2500 x 1000 x 2600	W 1780 x H 1950 mm	Straight
6	KAS-T8B-S	1900 x 1900 x 1950	2500 x 2000 x 2600	W 1780 x H 1950 mm	Straight
7	KAS-T8B-L	1900 x 1900 x 1950	2500 x 2000 x 2600	W 1780 x H 1950 mm	L shaped
8	KAS-S2B-S	950 x 900 x 1950	1850 x 1000 x 2200	W 890 x H 1950 mm	Straight
9	KAS-S2B-L	950 x 900 x 1950	1850 x 1000 x 2200	W 890 x H 1950 mm	L shaped
10	KAS-S4W-S	950 x 1900 x 1950	1850 x 2000 x 2200	W 890 x H 1950 mm	Straight
11	KAS-S4W-L	950 x 1900 x 1950	1850 x 2000 x 2200	W 890 x H 1950 mm	L shaped
12	KAS-S4D-S	1900 x 900 x 1950	2800 x 1000 x 2200	W 1780 x H 1950 mm	Straight
13	KAS-S8B-S	1900 x 1900 x 1950	2800 x 2000 x 2200	W 1780 x H 1950 mm	Straight
14	KAS-S8B-L	1900 x 1900 x 1950	2800 x 2000 x 2200	W 1780 x H 1950 mm	L shaped

***Note:** Sizes can vary by +/- 5%

Velocity ranges: 20-32 m/s or (3937-6299 fpm)

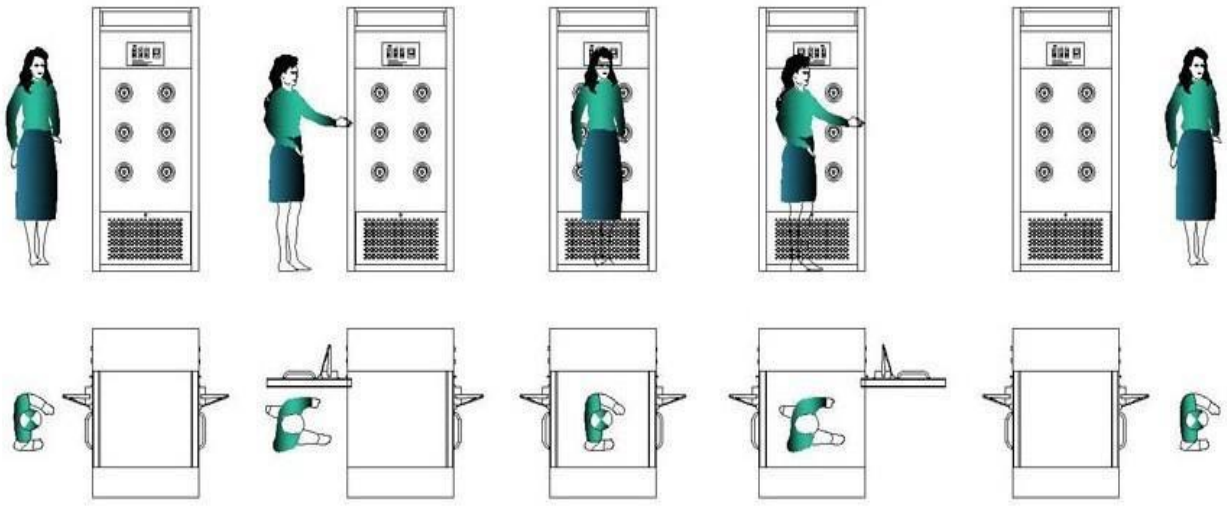
Air Shower Layout



Operation principle:

The air circulating within the air shower tunnel passes through the filter assembly, comprising of pre-filters and HEPA filters, for efficient removal of dust and contaminating particles within the equipment. The clean air is then passed through the nozzles at a high velocity to create pressurized air streams, capable of providing enough scrubbing action for the removal of particulate contaminants adhering to the clothes and skin surfaces of the personnel. The contaminated air is then directed downwards through the grilles and hollow walls of the air shower tunnel and is redirected towards the filter assembly for filtration and recirculation.

Following figure shows operation of air shower-



High Performance Blower System

German made ebm-papstR permanently lubricated, centrifugal motor/blowers with external rotor designs. Motors selected for energy efficiency, compact design, and flat profile. Completely integrated assembly optimizes motor cooling. All rotating parts balanced for smooth, quiet, vibration-free operation.

HEPA Filtration System

International standard mini plate type HEPA filter, should be made of ultra clean glass fiber paper media of imported origin, assembled in anodized frame. Particle retention 0.3-micron, Efficiency 99.997 % initial pressure drop 16 mm WC

Made of synthetic non- woven, polyester fiber with fine HDPE reinforcement.

Return Air Filter: Made of Synthetic non-woven polyester fibers with fine HDPE mesh reinforcement. Particle retention 10-micron, efficiency 90%, initial pressure drop 6mm WC

CONFIGURATIONS

- Blower/motor inspections performed from access provided
- All service connections and access (except LED strip light) are from side access panels or end access panels.
- A 2" diameter sleeve through the roof section for a fire sprinkler. ASPT does not supply the fire sprinkler components.
- Dimensions shall match those indicated on our literature (or customer specified on custom units) with a minimum tolerance of .0625

CYCLE CONTROL

- The exit doors of the air shower will be locked when the entry door is open.
- The air shower cycle will begin upon entry to the air shower after entry door closes
- All doors will be locked during the air shower cycle.
- High velocity blower will run 15 seconds (user adjustable)
- The personnel shall proceed out the exit door (the entry door remains locked)
- Once the exit door shuts all doors unlock and the system resets.
- When the exit door opens first the air shower acts as an air lock and the blower does not run

DOORS

- Doors are clear anodized aluminum or SS304 frame doors with .025" clear tempered glass.
- Doors are interlocked with 24VDC magnetic door of locks with 600 pounds holding force.
- Doors includes automatic door closure, electromagnetic interlocking, SS handle, sealed on the top and two sides of the jamb with door seal and a drag sweep are supplied for the bottom of the door (which is field installed)

NOISE AND VIBRATIONS

- Unit's maximum noise level is 74dba, with a back ground noise level of 10dba.
- Interior noise levels shall not exceed 87 dBa
- Fan/Blower assembly to be isolated by means of rubber isolator pads.

Illumination system

- Air showers use top mounted fluorescent LED lights for adequate illumination of the air shower tunnel.
- The fluorescent lights are concealed within a light panel and are designed to ensure uniform and even lighting throughout.
- The illumination system of our air shower conforms to US federal standards and provides an illumination level of more than 800lux throughout the air shower tunnel.

Programmable operation

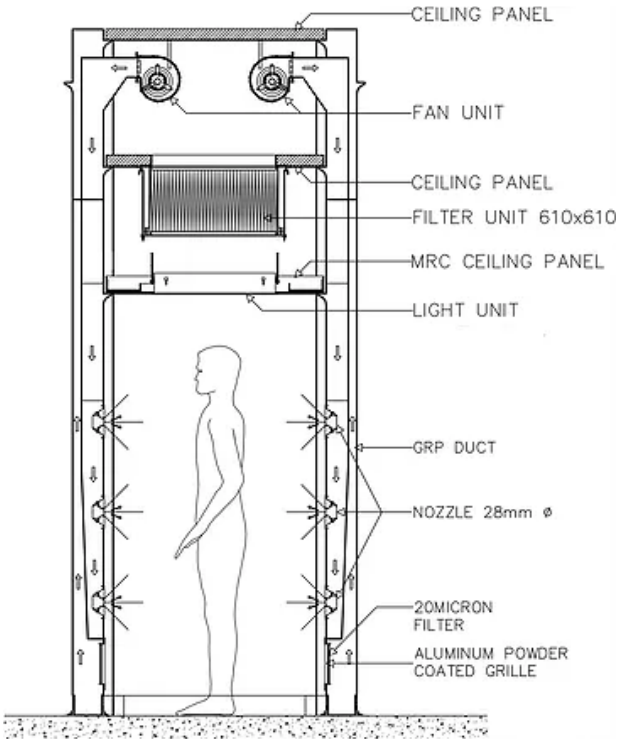
- The air shower tunnel uses microprocessor based controllers for precise control of various operating parameters. The programmable solid state circuit control system is located at the junction box of the air shower and helps in maintaining optimum conditions of temperature, humidity and illumination within the working area.
- It also facilitates the adjustment and opening and closing of air nozzles and in setting the operation timer from 0-9,990 seconds.
- The junction box also houses an emergency setting button that allow switching off of the equipment with audio and visual alarms.

Electromagnetic Interlock Door-

- Electromagnetic interlocking doors prevent personnel from accidentally opening both air shower doors at the same time, thereby preventing cross-contamination of the clean room and the external environment.

Construction:

Following figure shows construction of air shower:



Accessories:

Light Indicator and Emergency Switch

Indicator lamps indicate if doors are locked or unlocked, thereby regulating the flow of personnel in and out of the air shower.

Emergency buttons mounted on both external faces of the shower unlocks all doors instantly.

Sentinel Microprocessor Control System, Programmable

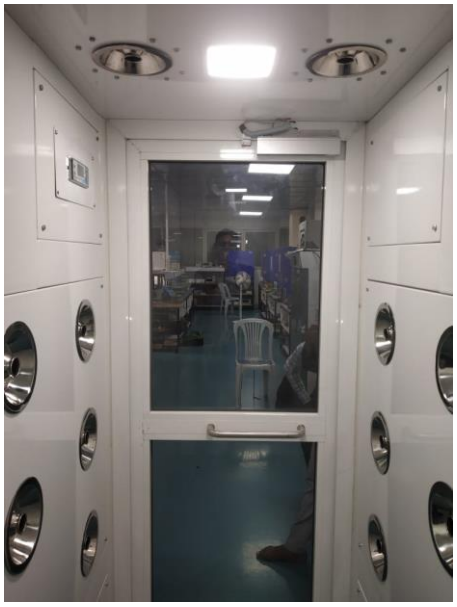
The microprocessor control detects improper operation and displays corresponding error messages should the integrity of the cleanroom be violated.

The LCD displays shower duration and countdown, and reports cycle progress and operational status.

A 24 hour clock displays local time.

Stainless Steel Nozzles

An array of stainless steel nozzles direct high-velocity jets within the chamber.



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