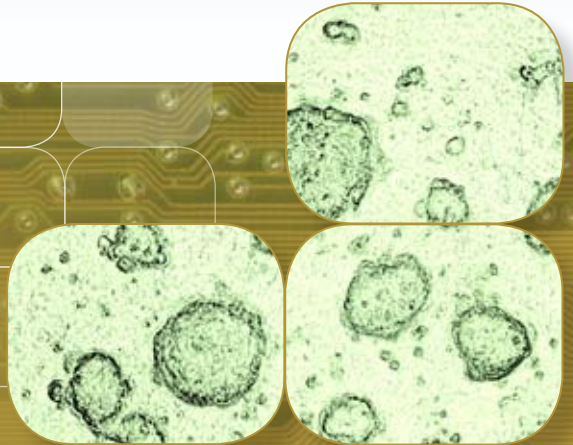


*Esco Cleanroom Air Shower,
Model EAS-2C.*

Cleanroom Air Showers





Esco Cleanroom Air Shower,
Model EAS-2C_.

Standards Compliance	Filtration	Electrical Safety
	EN-1822 (H13), Europe IEST-RP-CC001.3, USA IEST-RP-CC007, USA IEST-RP-CC034.1, USA	UL- 61010-1, USA CAN/CSA-22.2, No.61010-1 EN-61010-1, Europe IEC-61010-1, Worldwide

* Please refer to the specifications table on page 4,6 & 8 for the model listing.

Main Features

- High velocity shower jets 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.
- 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 cleanroom.
- Permanently lubricated direct drive centrifugal blowers are used in conjunction with stainless steel air nozzles.



EAS, Cleanroom Air Shower Series Comparison Chart

Model	Airflow	Door
EAS (A-Series)	Single Sided	Single Leaf
EAS (B-Series)	Double Sided	Single Leaf
EAS (C-Series)	Double Sided	Double Leaf

See the Specification Chart for more details.

3

Introduction

Air Showers are self contained chambers installed at entrances to cleanrooms 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 (4000-4300fpm). Contaminated air is then drawn through the base within the unit, filtered and recirculated.

Esco is a leader in air showers for demanding applications in the micro-electronics, semiconductors, pharmaceutical, spray-

painting, lab animal research and food markets. Esco filed its first Air Shower patent in the 1980's and since then has installed thousands of units in diverse markets worldwide. The present Esco Air Shower is a third-generation product and 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 cleanroom is the operator. Air showers are installed between change areas and the cleanroom. The air shower enhances

cleanroom 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.

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.

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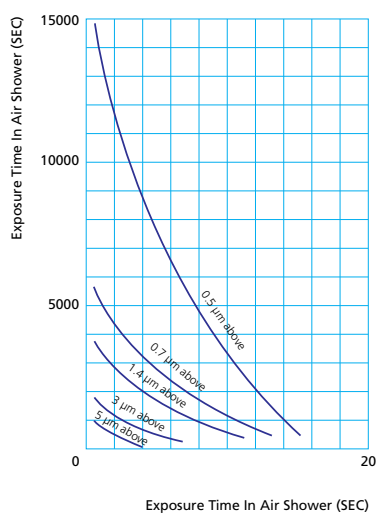
Air Shower Efficacy Testing

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

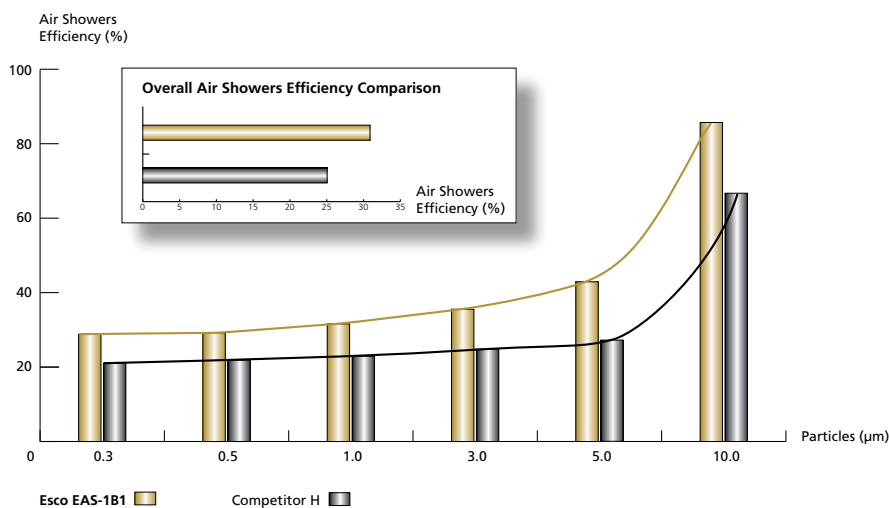
1. New cleanroom garments without laundry processing, which have residual particulate contamination from manufacturing in a non cleanroom environment, are used.
2. The operator gowns up (in a jumpsuit, booties, gloves, mask and hood), and enters a specially sealed enclosure (the body box). This enclosure 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.



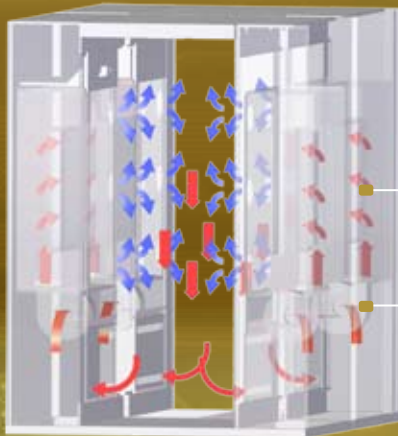
Particles Removal In EAS



Air Showers Efficiency Comparison



Air Shower Filtration System



Blower
HEPA Filter

- Air is forced by the blower(s) through HEPA filter(s) which are 99.99% efficient against particles of 0.3 microns.
- Filtered air is ejected through nozzles at high velocities into the chamber. These turbulent air streams disperse particulate matter on all surfaces.
- Dispersed particulate matter migrate with the air stream towards the lower areas in the air shower chamber. Air enters the blower supply plenum through pre-filter(s) installed at the base of the chamber.

■ ULPA-filtered air

■ Unfiltered / potentially contaminated air

- The air is continuously filtered and recirculated. The air shower is a self-contained device and does not exchange air with the environment it is placed in.

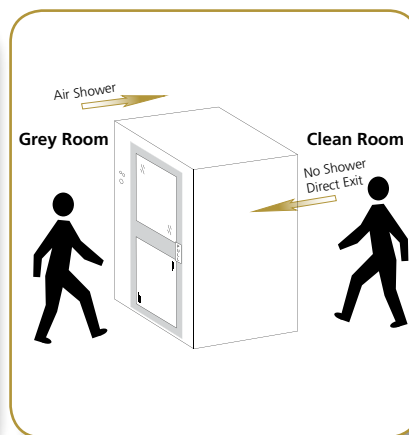
Air Shower Operating Sequences

Unlike conventional air showers which are delivered with a fixed operating sequence, the Esco Air Shower's operating sequence may be selected from three pre-programmed sequences:



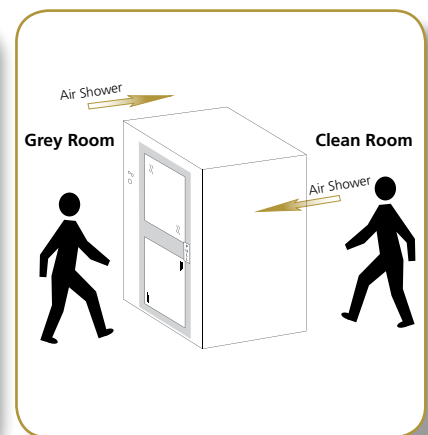
One-Way

Personnel may enter the controlled environment but not exit through the air shower. At the idle state, the clean side door is locked while the grey side is unlocked. This mode of operation is useful for controlling traffic patterns into and out of the controlled environment.



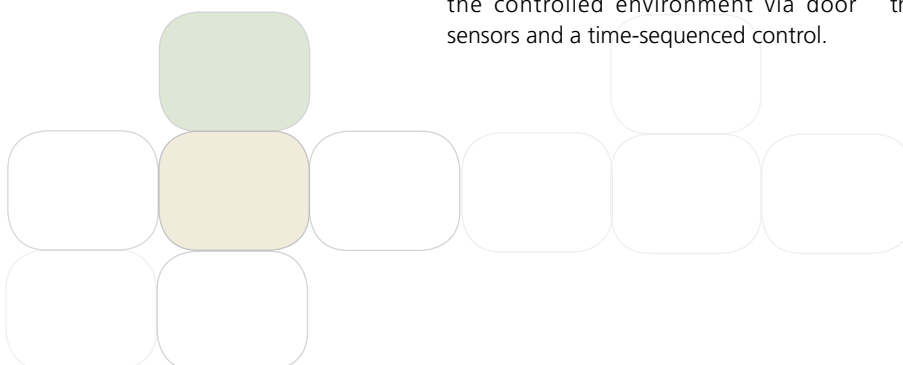
Two-Way One-Way

Personnel may enter or exit the controlled environment through the air shower. When entering the controlled environment the shower is activated. When exiting the shower is disabled to reduce throughput time. The air shower program is able to detect if the person is entering or exiting the controlled environment via door sensors and a time-sequenced control.



Two-Way

Personnel may enter or exit the controlled environment through the air shower. In both directions the air shower is activated. This mode of operation is useful in pharmaceutical and lab animal research applications to prevent the egress of hazardous substances and allergens from the controlled environment.



Cleanroom Air Showers

High Performance Blower System

German made ebm-papst® 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

HEPA filter(s) provide 99.99% typical efficiency for particle sizes of 0.1 to 0.3 microns.



6

ESCO



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.

Door

Heavy-duty, durable aluminium framed door assemblies are constructed with glass windows permitting visibility.



Esco Cleanroom Air Shower,
Model EAS-2C_



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.



Light Diffuser

Diffusers ensure even and uniform lighting throughout the chamber.



Stainless Steel Nozzles

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

Key Features

- Esco Air Shower filters meet the IEST-RP-CC001.3 recommended practice for HEPA performance (USA), and EN 1822 for H13 performance (EU).
- The auto reset feature unlocks doors in case personnel open the air shower door but do not actually enter, thus preventing accidental lock-outs.
- In case of a power failure, all doors are unlocked automatically, and controller settings saved.
- A disposable pre-filter with 85% arrestance extends the life of the main filter.
- The air shower is constructed of electro-galvanised steel sheets with an abrasion-resistant oven-baked powder coated finish.
- Each air shower is individually factory tested for safety and performance in accordance with international standards.
- Robust construction qualify the air shower for the most demanding applications. The air shower is fully assembled and ready to install and operate when shipped.
- Each unit is shipped with a documentation outlining the tests undertaken and the units individual results for each unit.
- All electrical components are UL listed / recognised.
- The Air Shower is warranted for 1 year excluding consumable parts and accessories.

FAST TRACK

FastTrack models are available for shipment within 1 week from order placement, from Esco Singapore, to destinations around the world. The following models are available under this program: EAS-1A1 & EAS-1B1.

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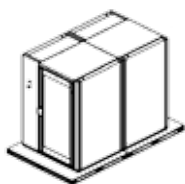
General Specifications, Cleanroom Air Shower, Model EAS (A-Series)

Note to customer: Insert electrical voltage number into last model number digit _ when ordering.

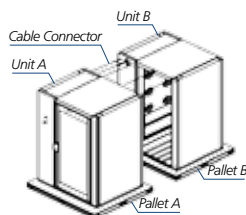
Model		EAS-1A_	EAS-2A_	EAS-3A_
External Dimensions (W x D x H)		1260 x 1000 x 2050 mm 49.7" x 39.4" x 80.7"	1260 x 2000 x 2050 mm 49.7" x 78.7" x 80.7"	1260 x 3000 x 2050 mm 49.7" x 118.1" x 80.7"
Internal Work Area, Dimensions (W x D x H)		790 x 920 x 1930 mm 31.1" x 36.2" x 76.0"	790 x 1920 x 1930 mm 31.1" x 75.6" x 76.0"	790 x 2920 x 1930 mm 31.1" x 115" x 76.0"
Air Change		371/ Hr	356/ Hr	351/ Hr
Initial Airflow Velocity		20-22 m/s (3,937-4,330 fpm)		
Number of Nozzles		6	12	18
Air Shower Duration		Factory set at 12 seconds (adjustable)		
Persons Per Cycle		1	2-3	4-6
Personnel Flow (Persons / Min.)		4	8-12	15-23
		Above figures based on: Total Cycle Time of 16 seconds (12 seconds of Air Shower + 4 seconds for buffer time / personnel entrance and exit)		
Filtration Efficiency		Main Filter: >99.99% at 0.3 µm Pre-Filter: Arrestance 85%, efficiency 20%		
Filtration Elements		Main Filter: HEPA filter Pre-Filter: Disposable and non-washable polyester fibers		
Fluorescent Lamp		17 W x 2	17 W x 4	17 W x 6
Air Shower Construction		1.5 mm/ 0.06"/18 electro-galvanised steel / White oven-baked epoxy powder-coated finish		
Max. Power Consumption, Current, BTU/Hr	During Operation	245 W, 1.2 A, 500 BTU/ Hr	490 W, 2.4 A, 1000 BTU/ Hr	735 W, 3.5 A, 1499 BTU/ Hr
	During Standby	113 W, 0.5 A, 231 BTU/ Hr	226 W, 1 A, 461 BTU/ Hr	339 W, 1.5 A, 692 BTU/ Hr
Electrical	220-240V, AC, 50Hz, 1 Ø	EAS-1A1	EAS-2A1	EAS-3A1
	110-130V, AC, 60Hz, 1 Ø	EAS-1A2	EAS-2A2	EAS-3A2
	220-240V, AC, 60Hz, 1 Ø	EAS-1A3	EAS-2A3	EAS-3A3
Gross Weight		410 kg (904 lbs)	820 kg (1808 lbs)	1230 kg (2712 lbs)
Net Weight		250 kg (551 lbs)	500 kg (1102 lbs)	750 kg (1653 lbs)
Shipping Dimensions, Maximum (W x D x H) *	Assembled (W x D x H)		1450 x 1250 x 2152 mm 57.1" x 49.2" x 84.7"	N/A
	Module Form (W x D x H)	Pallet A	N/A	1450 x 1250 x 2152 mm 57.1" x 49.2" x 84.7"
		Pallet B	N/A	1450 x 1250 x 2152 mm 57.1" x 49.2" x 84.7"
		Pallet C	N/A	1450 x 1250 x 2152 mm 57.1" x 49.2" x 84.7"
	Unassembled (W x D x H)	Pallet A	2100 x 1300 x 778 mm 82.7" x 51.2" x 30.6"	2100 x 1300 x 1296 mm 82.7" x 51.2" x 51.0"
		Pallet B	N/A	2100 x 1300 x 781 mm 82.7" x 51.2" x 30.7"
Shipping Volume, Maximum	Assembled		3.90 m³ (138 cu.ft.)	7.80 m³ (276 cu.ft.)
	Module Form		N/A	7.80 m³ (276 cu.ft.)
	Unassembled		2.12 m³ (75 cu.ft.)	4.24 m³ (150 cu.ft.)

Esco Cleanroom Air Showers, Modes of Shipment, Model EAS-2A_

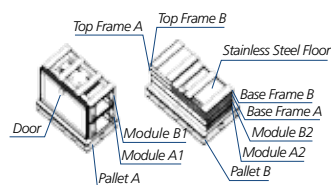
Assembled



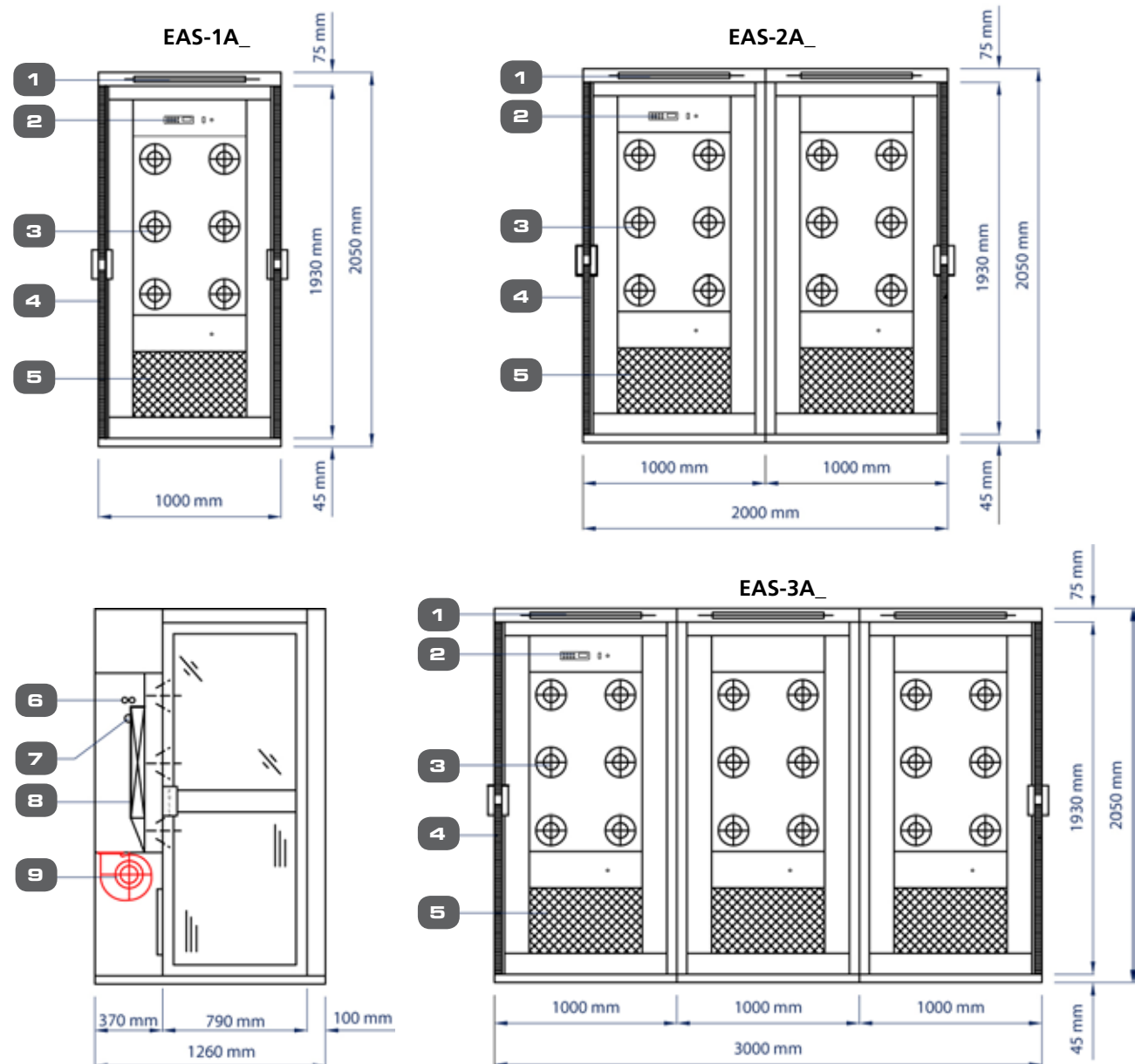
Module Form



Unassembled



Model EAS (A-Series) Cleanroom Air Shower Technical Specifications



1. Fluorescent lamp

2. Esco microprocessor system

3. Nozzles
4. Door

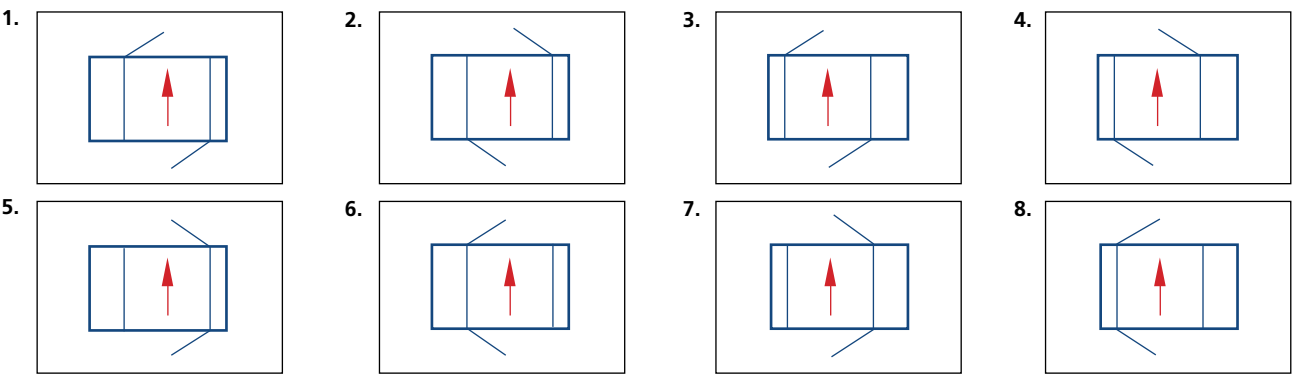
5. Pre-filter

6. Indicator light
7. Emergency switch

8. HEPA filter

9. Blower

Model EAS (A-Series), Door Direction
(Factory Configured. Choose One When Ordering.)



General Specifications, Cleanroom Air Shower, Model EAS (B-Series)*

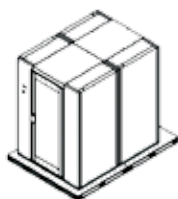
Note to customer: Insert electrical voltage number into last model number digit _ when ordering.

Model			EAS-1B_	EAS-2B_	EAS-3B_
External Dimensions (W x D x H)			1530 x 1000 x 2050 mm 60.2" x 39.4" x 80.7"	1530 x 2000 x 2050 mm 60.2" x 78.7" x 80.7"	1530 x 3000 x 2050 mm 60.2" x 118.1" x 80.7"
Internal Work Area, Dimensions (W x D x H)			790 x 920 x 1930 mm 31.1" x 36.2" x 76.0"	790 x 1920 x 1930 mm 31.1" x 75.6" x 76.0"	790 x 2920 x 1930 mm 31.1" x 115" x 76.0"
Air Change			743/ Hr	712/ Hr	702/ Hr
Initial Airflow Velocity			20-22 m/s (3,937-4,330 fpm)		
Number of Nozzles			12	24	36
Air Shower Duration			Factory set at 12 seconds (adjustable)		
Persons Per Cycle			1	2-3	4-6
Personnel Flow (Persons / Min.)			4	8-12	15-23
Filtration Efficiency			Above figures based on: Total Cycle Time of 16 seconds (12 seconds of Air Shower + 4 seconds for buffer time / personnel entrance and exit)		
Filtration Elements			Main Filter: >99.99% at 0.3 µm Pre-Filter: Arrestance 85%, efficiency 20%		
Fluorescent Lamp			Main Filter: HEPA filter Pre-Filter: Disposable and non-washable polyester fibers		
Air Shower Construction			17 W x 2	17 W x 4	17 W x 6
Air Shower Construction			1.5 mm/ 0.06"/18 electro-galvanised steel / White oven-baked epoxy powder-coated finish		
Max. Power Consumption, Current, BTU/Hr	During Operation		500 W, 2.3 A, 1020 BTU/ Hr	1000 W, 4.6 A, 2040 BTU/ Hr	1500 W, 7 A, 3060 BTU/ Hr
	During Standby		162 W, 0.7 A, 330 BTU/ Hr	200 W, 1 A, 408 BTU/ Hr	250 W, 1.1 A, 510 BTU/ Hr
Electrical	220-240V, AC, 50Hz, 1 Ø		EAS-1B1	EAS-2B1	EAS-3B1
	110-130V, AC, 60Hz, 1 Ø		EAS-1B2	EAS-2B2	EAS-3B2
	220-240V, AC, 60Hz, 1 Ø		EAS-1B3	EAS-2B3	EAS-3B3
Gross Weight			410 kg (904 lbs)	820 kg (1808 lbs)	1230 kg (2712 lbs)
Net Weight			250 kg (551 lbs)	500 kg (1102 lbs)	750 kg (1653 lbs)
Shipping Dimensions, Maximum (W x D x H)**	Assembled (W x D x H)		1750 x 1250 x 2152 mm 68.9" x 49.2" x 84.7"	1750 x 2500 x 2152 mm 68.9" x 98.4" x 84.7"	N/A
	Module Form (W x D x H)	Pallet A	N/A	1750 x 1250 x 2152 mm 68.9" x 49.2" x 84.7"	1750 x 1250 x 2152 mm 68.9" x 49.2" x 84.7"
		Pallet B	N/A	1750 x 1250 x 2152 mm 68.9" x 49.2" x 84.7"	1750 x 1250 x 2152 mm 68.9" x 49.2" x 84.7"
		Pallet C	N/A	N/A	1750 x 1250 x 2152 mm 68.9" x 49.2" x 84.7"
	Unassembled (W x D x H)	Pallet A	2100 x 1300 x 1048 mm 82.7" x 51.2" x 41.3"	2100 x 1300 x 1296 mm 82.7" x 51.2" x 51.0"	2100 x 1300 x 1668 mm 82.7" x 51.2" x 65.7"
		Pallet B	N/A	2100 x 1300 x 800 mm 82.7" x 51.2" x 31.5"	2100 x 1300 x 1219 mm 82.7" x 51.2" x 48.0"
Shipping Volume, Maximum	Assembled		4.70 m³ (166 cu.ft.)	9.40 m³ (333 cu.ft.)	N/A
	Module Form		N/A	9.40 m³ (333 cu.ft.)	14.10 m³ (499 cu.ft.)
	Unassembled		2.83 m³ (100 cu.ft.)	5.71 m³ (202 cu.ft.)	7.87 m³ (279 cu.ft.)

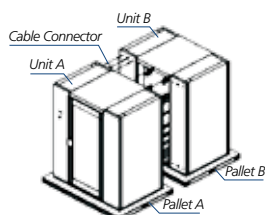
10

Esco Cleanroom Air Showers, Modes of Shipment, Model EAS-2B_

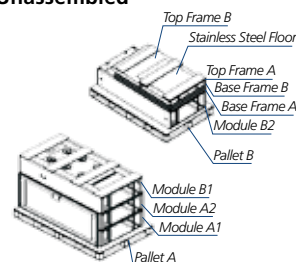
Assembled



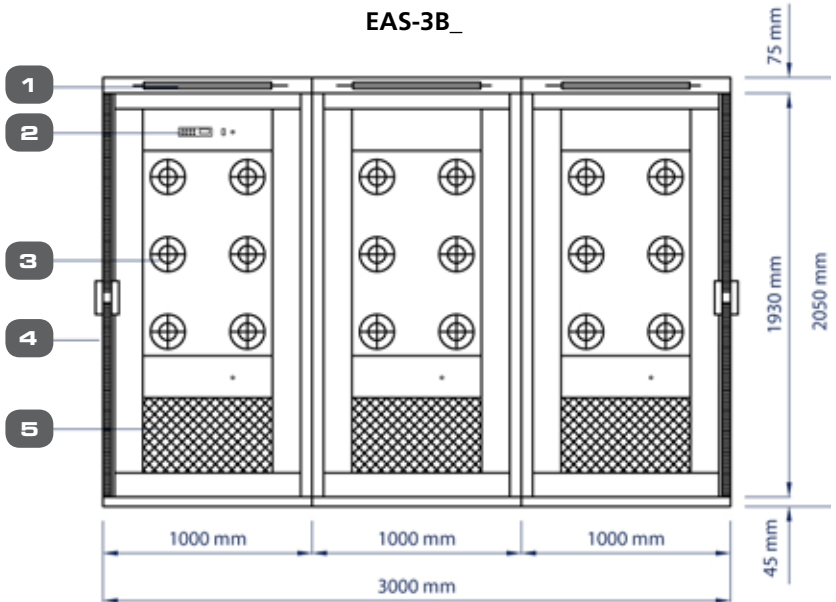
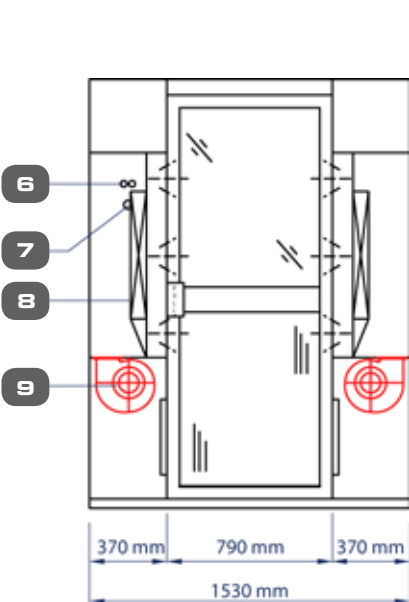
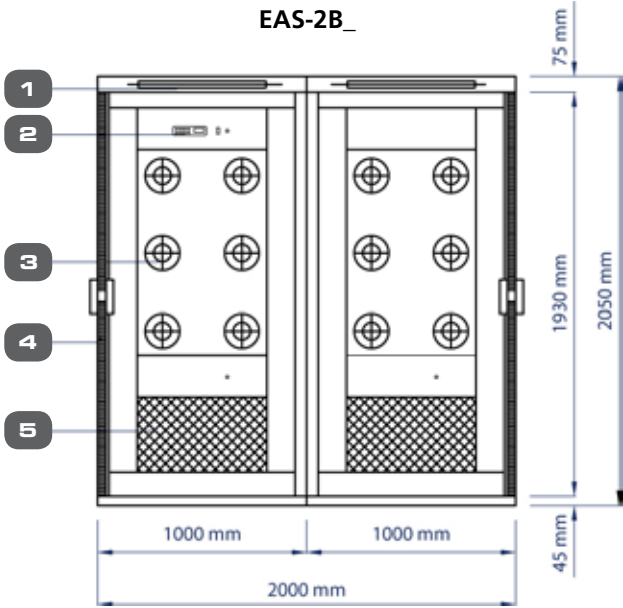
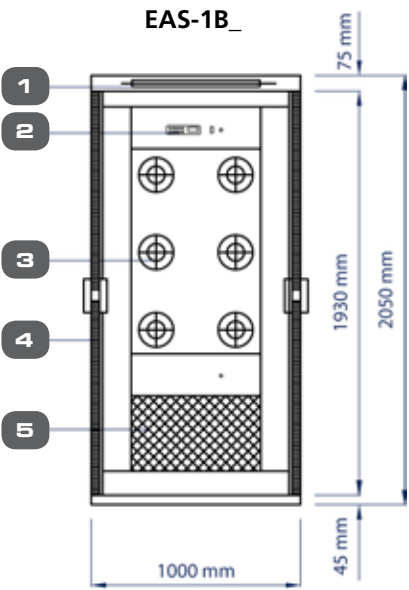
Module Form



Unassembled



Model EAS (B-Series) Cleanroom Air Shower Technical Specifications

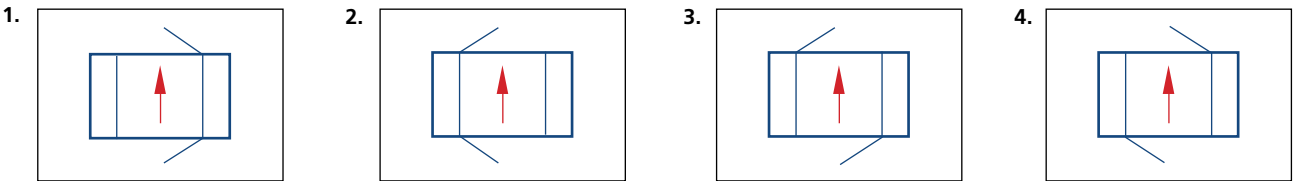


1. Fluorescent lamp
2. Esco microprocessor system
3. Nozzles

4. Door
5. Pre-filter
6. Indicator light

7. Emergency switch
8. HEPA filter
9. Blower

Model EAS (B-Series), Door Direction
(Factory Configured. Choose One When Ordering.)



General Specifications, Cleanroom Air Shower, Model EAS (C-Series)*

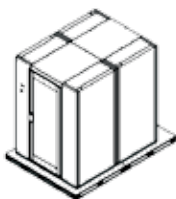
Note to customer: Insert electrical voltage number into last model number digit _ when ordering.

Model		EAS-2C_	EAS-3C_
External Dimensions (W x D x H)		2330 x 2000 x 2050 mm 91.7" x 78.7" x 80.7"	2330 x 3000 x 2050 mm 91.7" x 118.1" x 80.7"
Internal Work Area, Dimensions (W x D x H)		1590 x 1920 x 1930 mm 62.6" x 75.6" x 76.0"	1590 x 2920 x 1930 mm 62.6" x 115" x 76.0"
Air Change		354/ Hr	349/ Hr
Initial Airflow Velocity		20-22 m/s (3,937-4,330 fpm)	
Number of Nozzles		24	36
Air Shower Duration		Factory set at 12 seconds (adjustable)	
Persons Per Cycle		2-3	4-6
Personnel Flow (Persons / Min.)		8-12	15-23
Filtration Efficiency		Main Filter: >99.99% at 0.3 µm Pre-Filter: Arrestance 85%, efficiency 20%	
Filtration Elements		Main Filter: HEPA filter Pre-Filter: Disposable and non-washable polyester fibers	
Fluorescent Lamp		17 W x 8	17 W x 12
Air Shower Construction		1.5 mm/ 0.06"/18 electro-galvanised steel / White oven-baked epoxy powder-coated finish	
Max. Power Consumption, Current, BTU/Hr	During Operation	1000 W, 4.6A, 2040 BTU/ Hr	1500 W, 7 A, 3060 BTU/ Hr
	During Standby	200 W, 1 A, 408 BTU/ Hr	250 W, 1.1 A, 510 BTU/ Hr
Electrical	220-240V, AC, 50Hz, 1 Ø	EAS-2C1	EAS-3C1
	110-130V, AC, 60Hz, 1 Ø	EAS-2C2	EAS-3C2
	220-240V, AC, 60Hz, 1 Ø	EAS-2C3	EAS-3C3
Gross Weight		910 kg (2006 lbs)	1660 kg (3660 lbs)
Net Weight		750 kg (1653 lbs)	1500 kg (3307 lbs)
Shipping Dimensions, Maximum (W x D x H)**	Assembled (W x D x H)		N/A
	Module Form (W x D x H)	Pallet A	2500 x 1250 x 2232 mm 98.4" x 49.2" x 87.9"
		Pallet B	2500 x 1250 x 2232 mm 98.4" x 49.2" x 87.9"
		Pallet C	N/A
	Unassembled (W x D x H)	Pallet A	2100 x 1300 x 1296 mm 82.7" x 51.2" x 51.0"
		Pallet B	2100 x 1300 x 800 mm 82.7" x 51.2" x 31.5"
Shipping Volume, Maximum	Assembled		N/A
	Module Form		13.94 m³ (493 cu.ft.)
	Unassembled		5.71 m³ (202 cu.ft.)

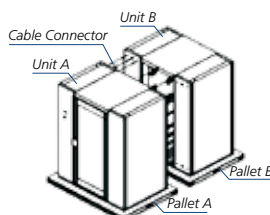
12

Esco Cleanroom Air Showers, Modes of Shipment, Model EAS-2C_

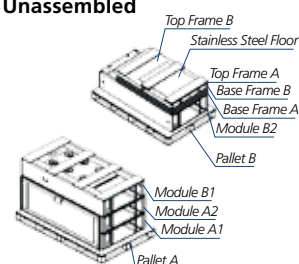
Assembled



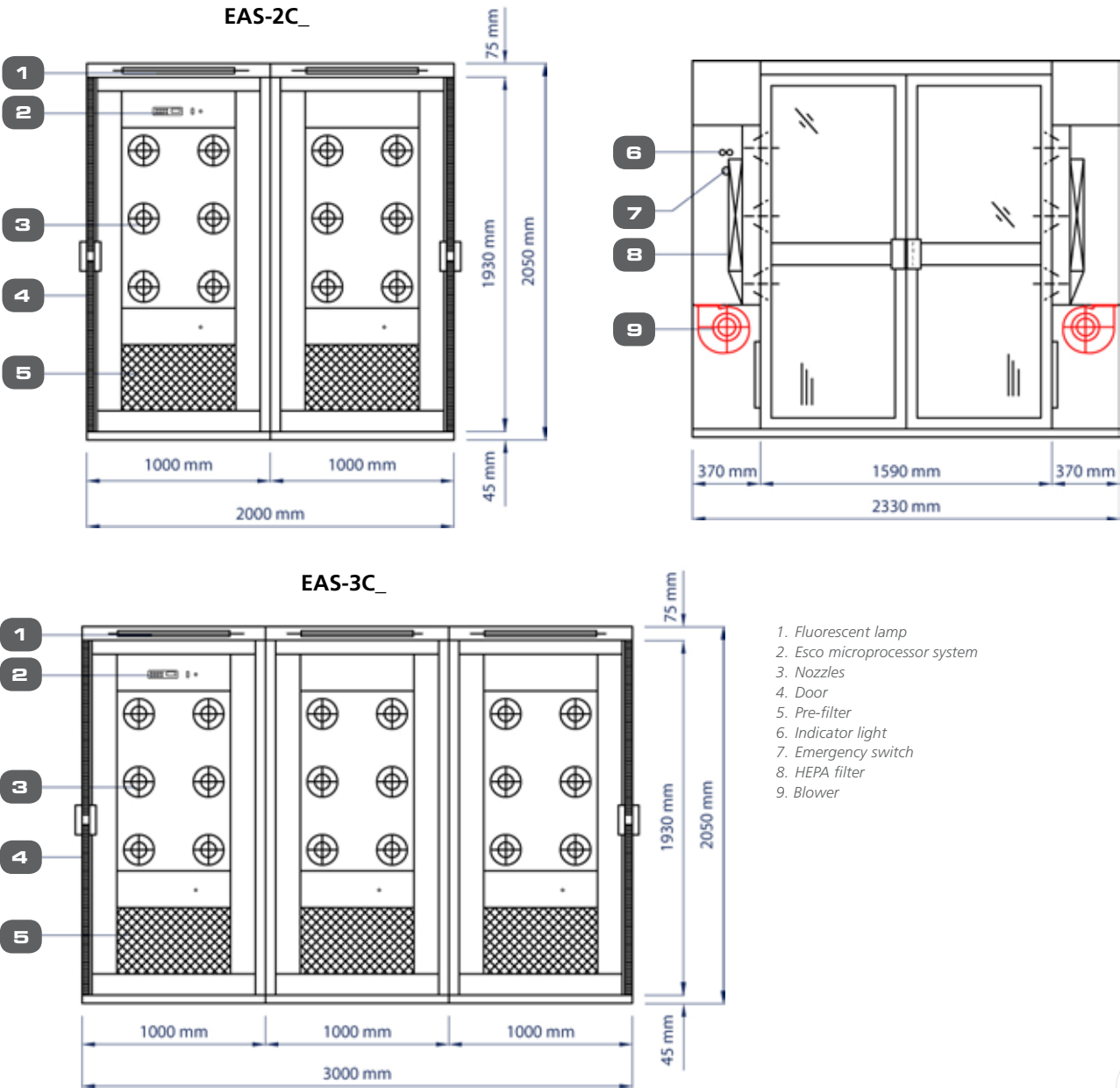
Module Form



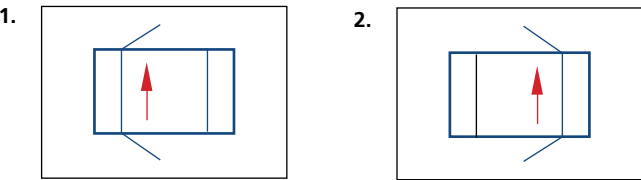
Unassembled



Model EAS (C-Series) Cleanroom Air Shower Technical Specifications



Model EAS (C-Series), Door Direction
(Factory Configured. Choose One When Ordering.)



Custom Cleanroom Air Showers

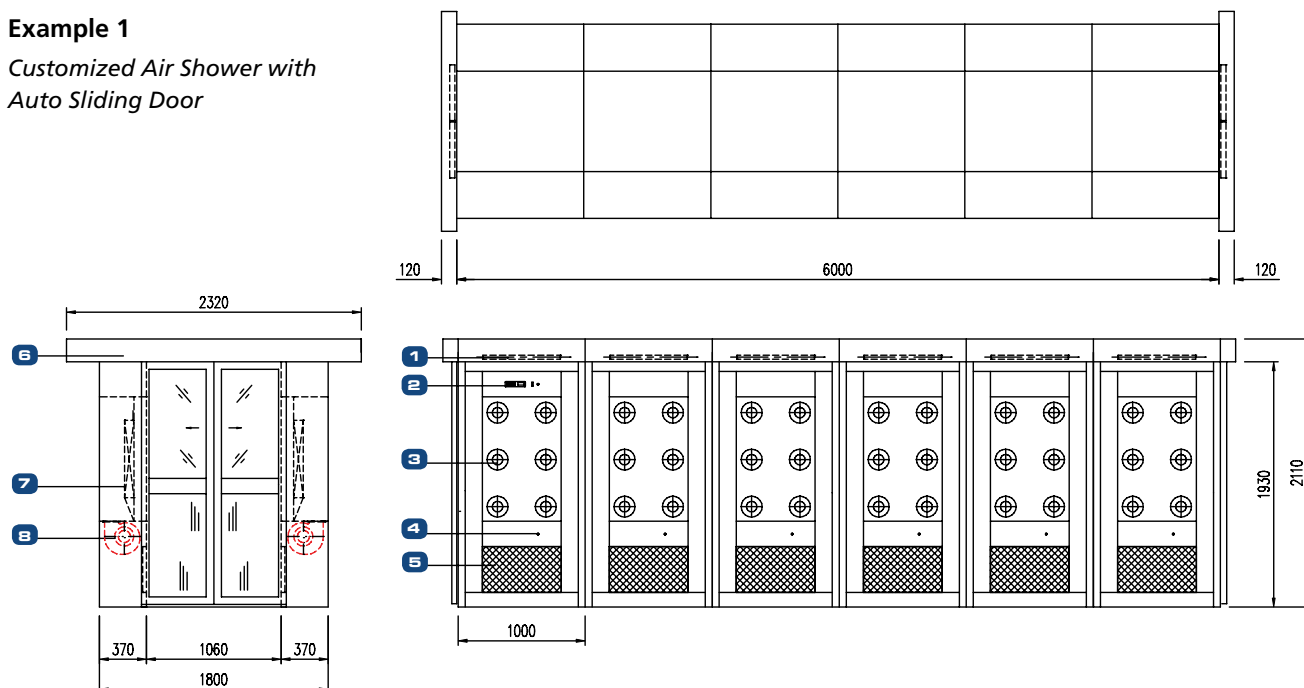
Esco can custom manufacture air showers to suit your application. Typical modifications include:

- Modified dimensions.
- Automatic sliding door with IR sensor for hands-free operation.
- Multiple modules can be ordered to form 1 tunnel system.
- Units may be manufactured without stainless steel flooring.
- L-shape (right or left hand side) entry profiles.
- Full stainless steel construction.



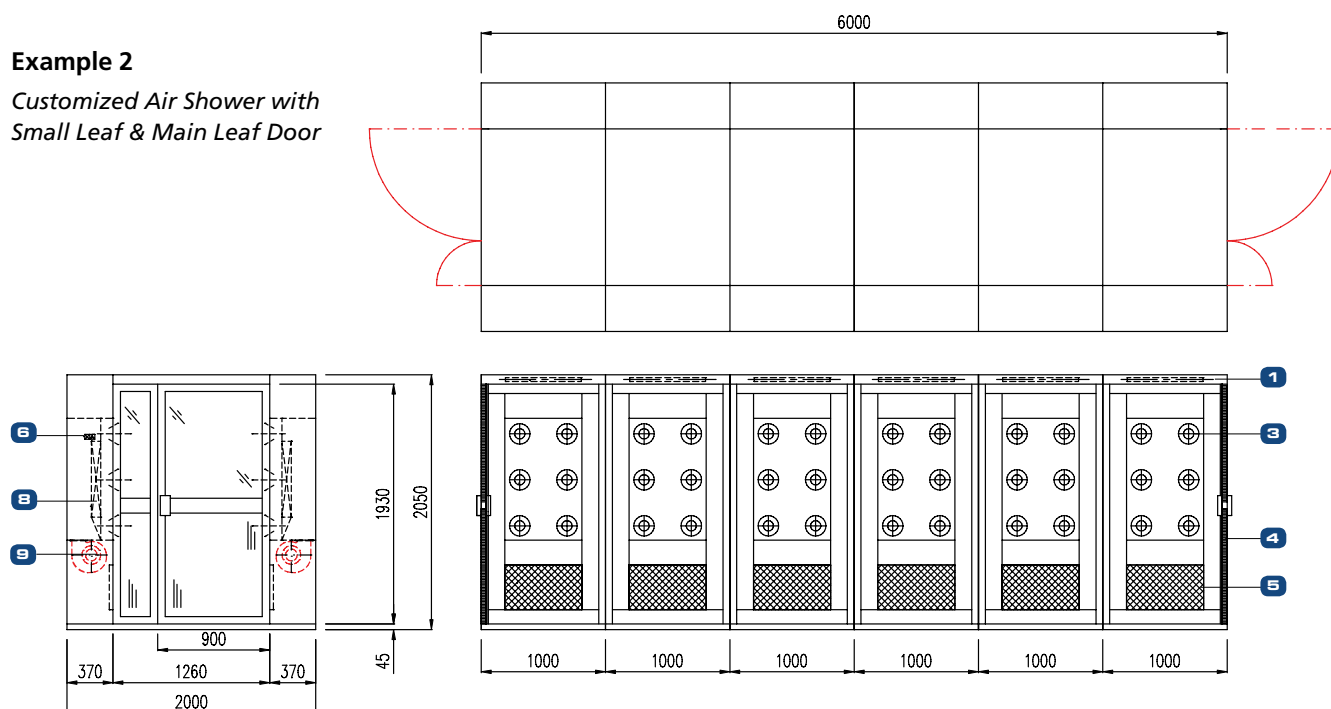
Example 1

Customized Air Shower with Auto Sliding Door



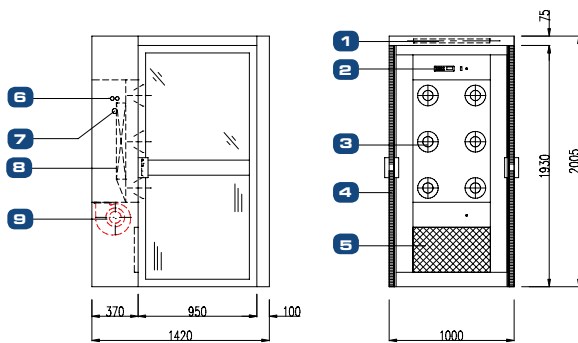
Example 2

Customized Air Shower with Small Leaf & Main Leaf Door



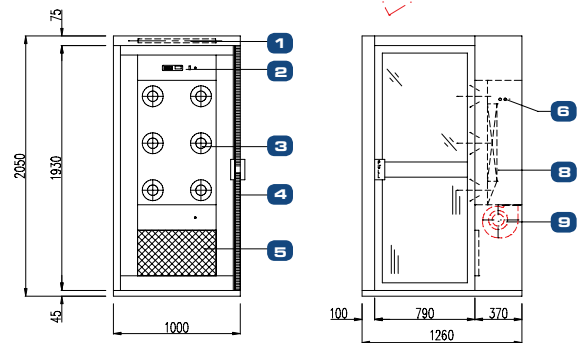
Example 3

Customized Air Shower with Single Side Blower and Single Leaf Door Customized



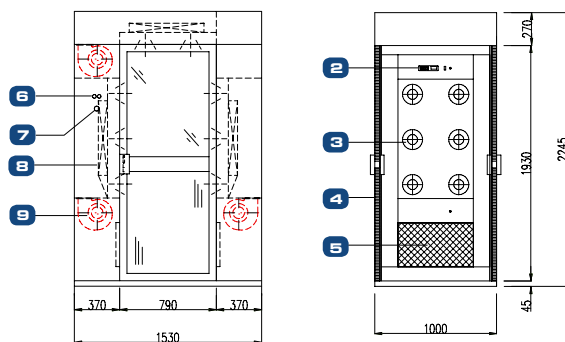
Example 4

Customized Air Shower with L-Shaped Leaf Door



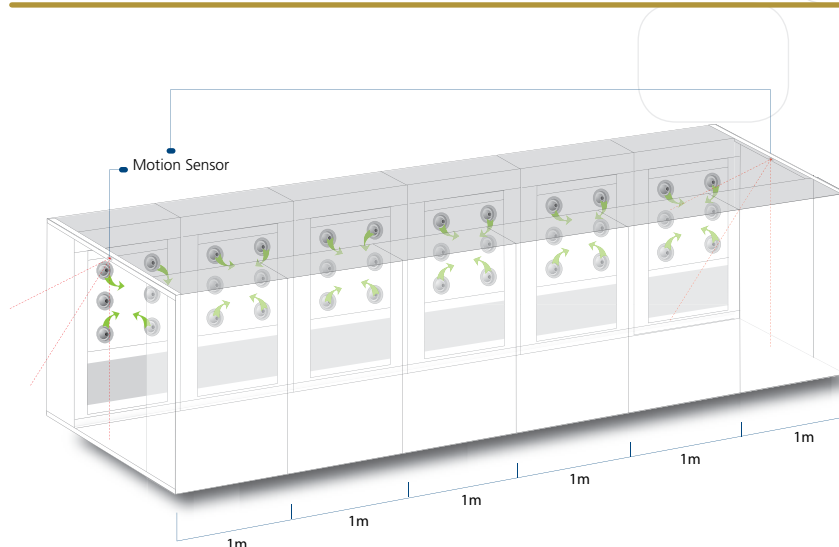
Example 5

Customized Air Shower with Top Blowing



1. Fluorescent lamp
2. Esco microprocessor system
3. Nozzles
4. Door
5. Pre-filter
6. Indicator light
7. Emergency switch
8. HEPA filter
9. Blower

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Esco Cleanroom Air Shower Tunnel System with Motion Sensor

Multiple modules can be ordered to form 1 tunnel system. See illustration for 6 modules of Esco Cleanroom Air Shower (EAS-B) formed into a tunnel system with motion sensor. Tunnel air showers may be supplied with auto sliding doors or without doors. Contact Esco or your Esco Sales Representative for details.

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Esco Technologies, Inc. • 2940 Turnpike Drive, Units 15-16 • Hatboro, PA 19040, USA
 Toll-Free USA and Canada 877-479-ESCO • Tel 215-441-9661 • Fax 215-441-9660
us.escoglobal.com • usa@escoglobal.com

Esco Micro Pte. Ltd. • 21 Changi South Street 1 • Singapore 486 777
 Tel +65 6542 0833 • Fax +65 6542 6920 • mail@escoglobal.com
www.escoglobal.com

Esco Global Offices | Kuala Lumpur, Malaysia | Leiden, The Netherlands | Manama, Bahrain
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