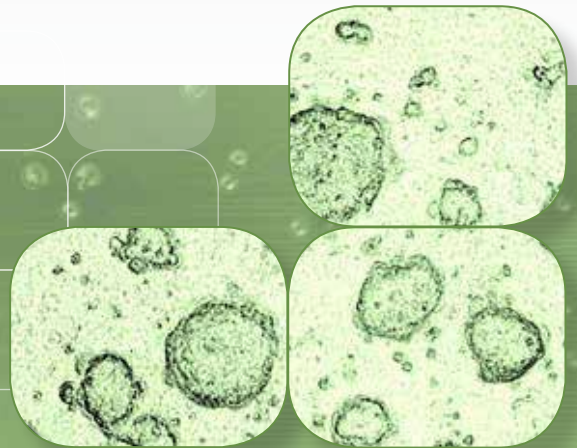


*Esco Cleanroom Air Shower,
Model EAS-2C.*

Cleanroom Air Showers



ESCO
PHARMA®

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 the pioneering company for the construction of air showers with different applications on areas in the micro-electronics, semiconductors, pharmaceutical, spray painting, laboratory animal research and food markets.

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 augments the cleanroom operating protocol by reminding the operators that they are entering a controlled environment.

Pharmaceutical and Lab Animal Research Applications: Air showers maintain the cleanliness of the pharmaceutical production and laboratory animal breeding areas. It can also minimize egress of hazardous substances and allergens entering the controlled environment.

Main Features

- High velocity shower jets in excess of 20 m/s to 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 > 99.999% 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 exterior of the air shower to regulate traffic flow, in and out of the cleanroom.
- Permanently lubricated direct drive centrifugal blowers 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) | Single Sided | Single leaf |
| EAS (C-Series) | Single Sided | Single leaf |

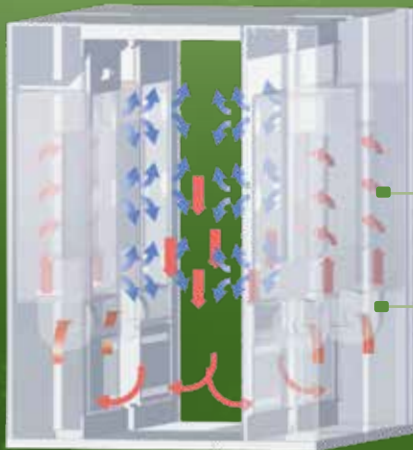
See the Specification Chart for more details.

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.

Air Shower Filtration System



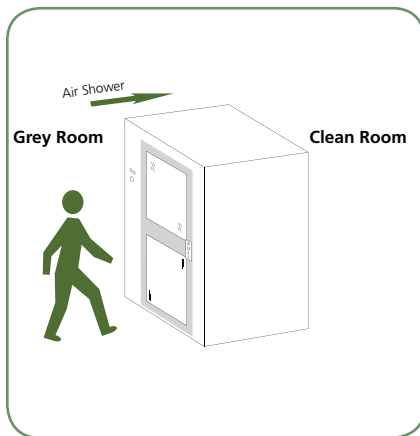
Blower
HEPA Filter

■ ULPA-filtered air
■ Unfiltered/potentially contaminated air

- 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.
- 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.

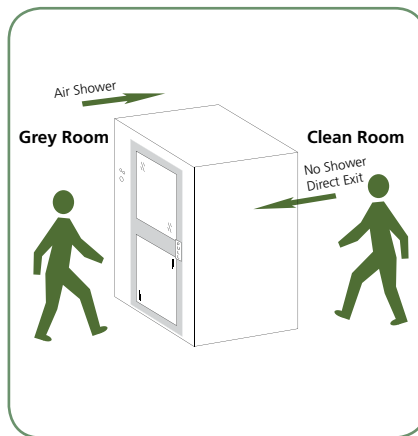
Air Shower Operating Sequences

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:



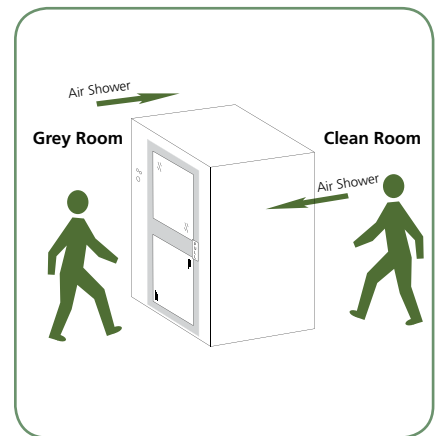
One-Way

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 in and out of the controlled environment.



Two-Way One-Way

Personnel may enter or exit the controlled environment through the air shower. 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.



4



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 unlock all doors instantly.

Door

Heavy-duty, durable aluminum 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 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 automatic reset feature unlocks the doors preventing accidental lock-outs in cases when an operator opens the air shower without actually entering.
- In case of a power failure, all doors are unlocked automatically, and the settings are retained.
- 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 qualifies the air shower for the most demanding applications. The air shower is carefully assembled and readily installed and operated when shipped.
- Each unit is shipped with a documentation outlining the tests undertaken and its individual results.
- All electrical components are UL listed / recognised.
- The Air Shower is warranted for one 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.

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

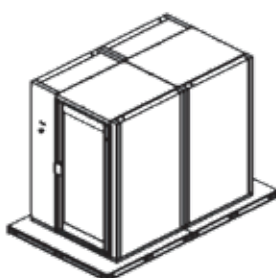
Note to customer: Insert electrical voltage number into last model number digit _ when ordering.

| Model | | EAS-1A_ | EAS-2A_ | EAS-2A_ |
|--|-------------------------|--|--|---|
| 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 |
| 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: 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, BTY/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, 1Ø | EAS-1A1 | EAS-2A1 | EAS-3A1 |
| | 110-130V, AC, 60Hz, 1Ø | EAS-1A2 | EAS-2A2 | EAS-3A2 |
| | 220-240V, AC, 60Hz, 1Ø | EAS-1A3 | EAS-2A3 | EAS-3A3 |
| Note: Customer must provide isolator switch on site. | | | | |
| Gross Weight | | 390 kg (858 lbs) | 660 kg (1,452 lbs) | 980 kg (2,156 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 | 11.70 m3 (414 cu.ft.) |
| | Unassembled | | 2.12 m3 (75 cu.ft.) | 4.24 m3 (150 cu.ft.) |

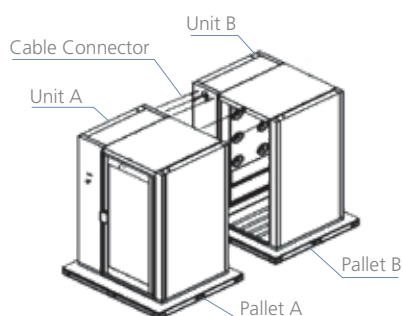
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Esco Cleanroom Air Showers, Modes of Shipment, Model EAS-2A_

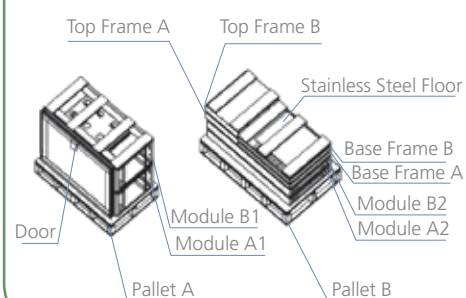
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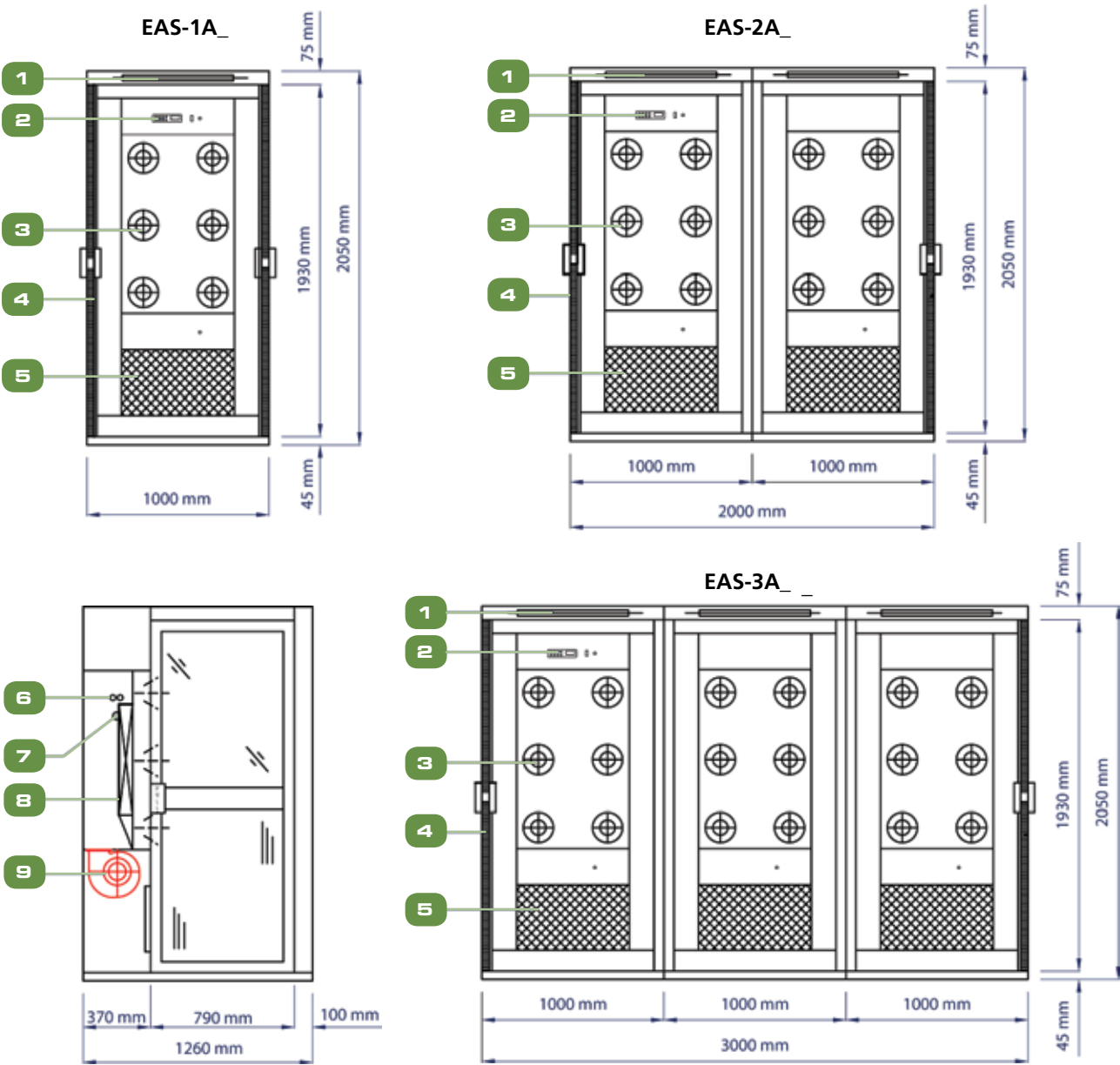
Module Form



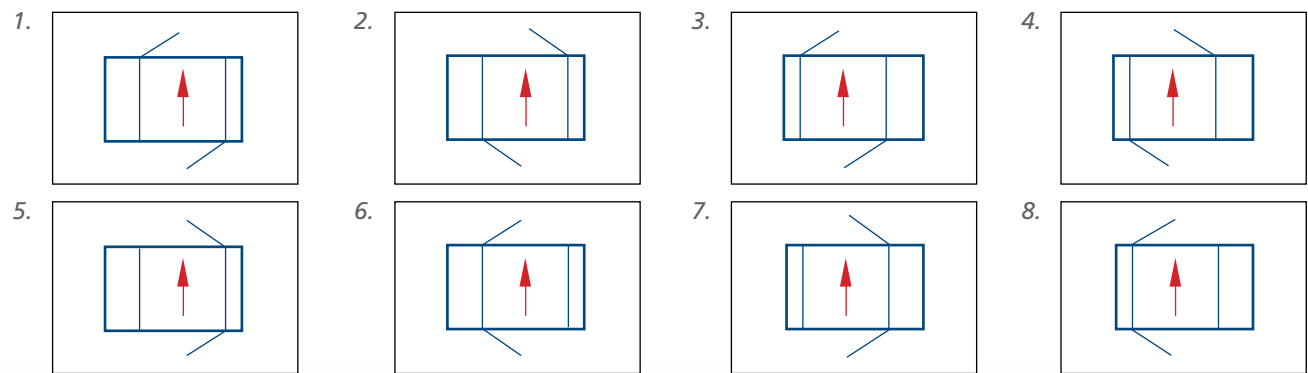
Unassembled



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



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



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

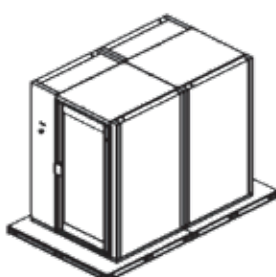
Note to customer: Insert electrical voltage number into last model number digit _ when ordering.

| 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 | | 1.5 mm/ 0.06"/18 electro-galvanised steel / White oven-baked epoxy powder-coated finish | | |
| Max. Power Consumption Current, BTY/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, 1Ø | EAS-1B1 | EAS-2B1 | EAS-3B1 |
| | 110-130V, AC, 60Hz, 1Ø | EAS-1B2 | EAS-2B2 | EAS-3B2 |
| | 220-240V, AC, 60Hz, 1Ø | EAS-1B3 | EAS-2B3 | EAS-3B3 |
| | Note: Customer must provide isolator switch on site. | | | |
| Gross Weight | | 450 kg (990 lbs) | 820 kg (1808 lbs) | 1250 kg (2750 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" | 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" |
| | | Pallet B | N/A | 1750 x 1250 x 2152 mm 68.9" x 49.2" x 84.7" |
| | | Pallet C | 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 1668 mm 82.7" x 51.2" x 65.7" |
| | | Pallet B | N/A | 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.) |
| | Module Form | | N/A | 14.10 m³ (499 cu.ft.) |
| | Unassembled | | 2.83 m³ (100 cu.ft.) | 5.71 m³ (202 cu.ft.) |

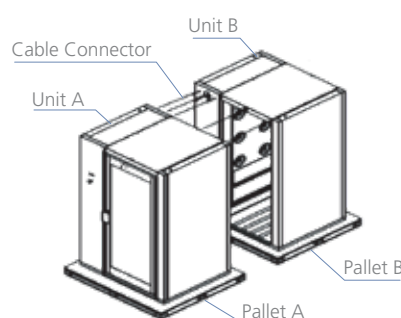
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Esco Cleanroom Air Showers, Modes of Shipment, Model EAS-2B_

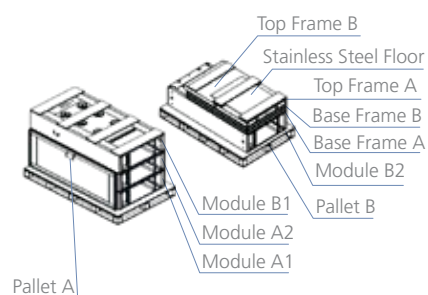
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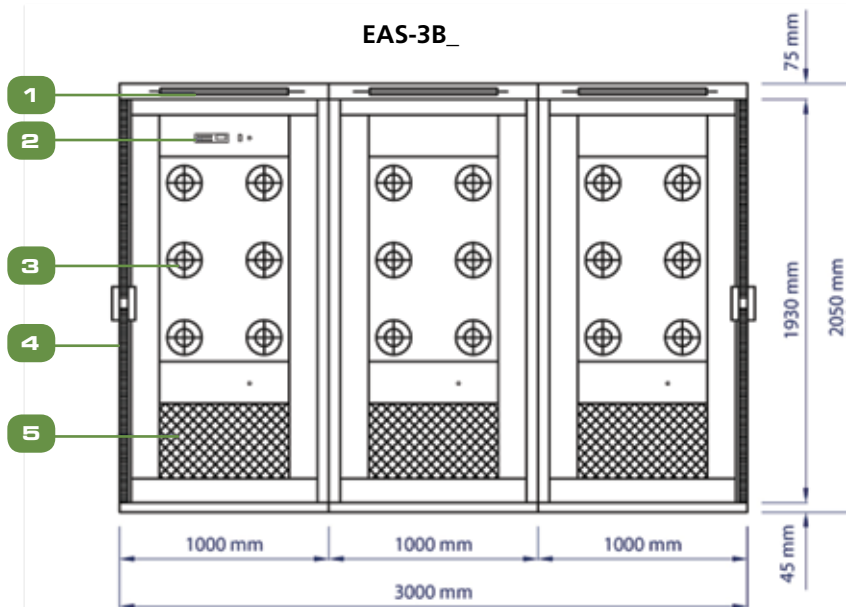
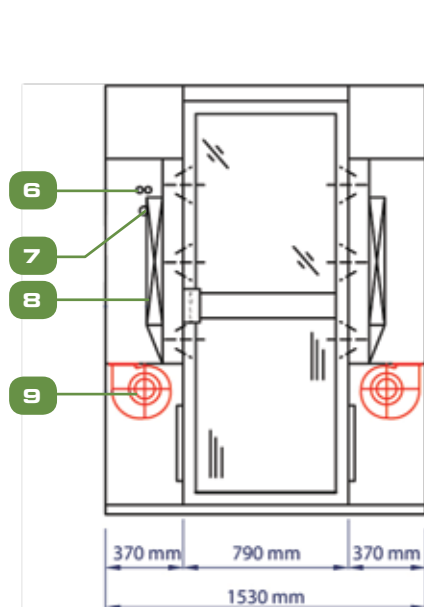
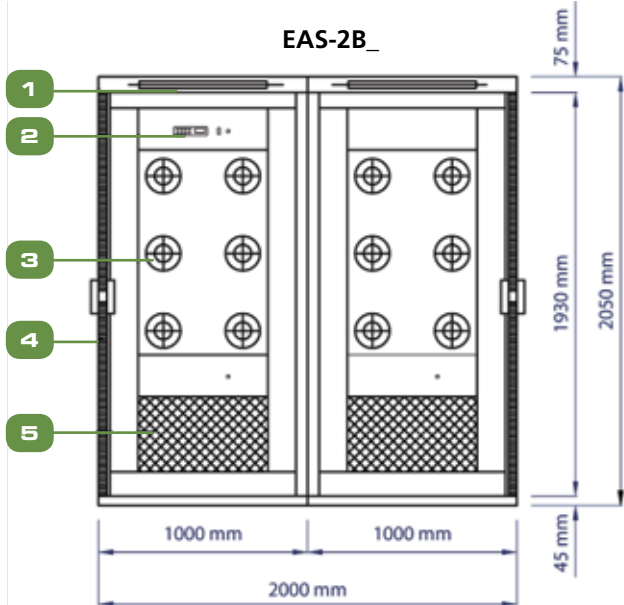
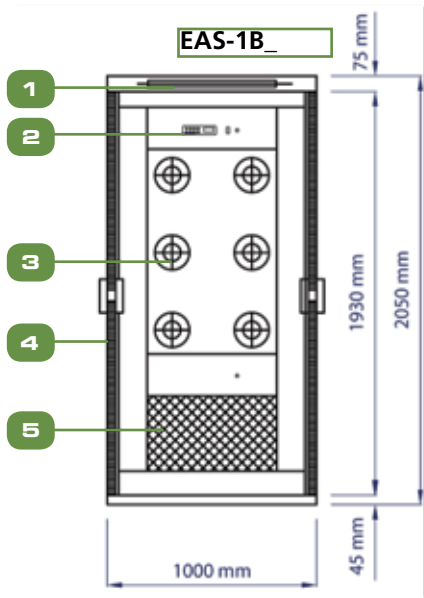
Module Form



Unassembled



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



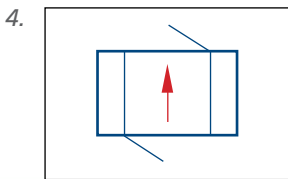
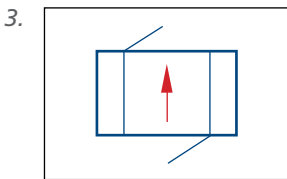
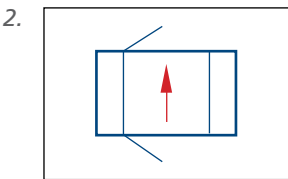
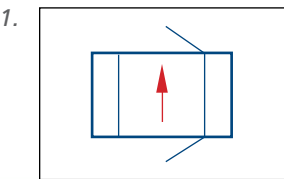
- 1. Fluorescent lamp
- 2. Esco microprocessor system
- 3. Nozzles

- 4. Door
- 5. Pre-filters
- 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 (C-Series)*

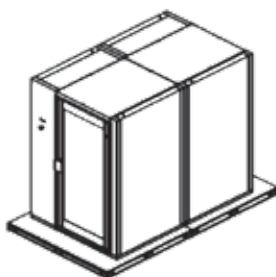
Note to customer: Insert electrical voltage number into last model number digit _ when ordering.

| 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 | | 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: 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, BTY/Hr | During Operation | 1000 W, 2.3 A, 1020 BTU/ Hr | 1500 W, 7 A, 3060 BTU/ Hr |
| | During Standby | 162 W, 0.7 A, 330 BTU/ Hr | 250 W, 1.1 A, 510 BTU/ Hr |
| Electrical | 220-240V, AC, 50Hz, 1Ø | EAS-2C1 | EAS-3C1 |
| | 110-130V, AC, 60Hz, 1Ø | EAS-2C2 | EAS-3C2 |
| | 220-240V, AC, 60Hz, 1Ø | EAS-2C3 | EAS-3C3 |
| | Note: Customer must provide isolator switch on site. | | |
| Gross Weight | | 910 kg (2006 lbs) | 1660 kg (3660 lbs) |
| Shipping Dimensions, Maximum (W x D x H)* | Assembled (W x D x H) | 2500 x 2500 x 2232 mm 98.4" x 98.4" x 87.9" | 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 | 13.94 m³ (493 cu.ft.) | N/A |
| | Module Form | 13.94 m³ (493 cu.ft.) | 20.91 m³ (740 cu.ft.) |
| | Unassembled | 5.71 m³ (202 cu.ft.) | 7.87 m³ (279 cu.ft.) |

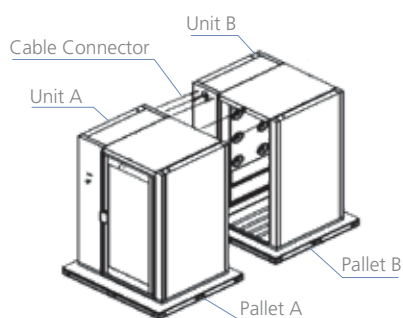
10

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

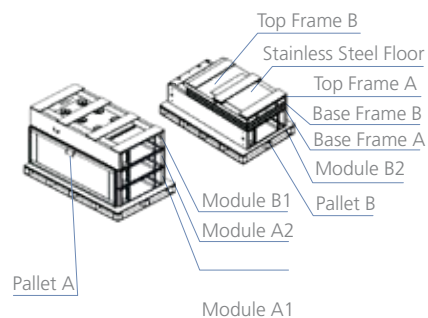
Assembled



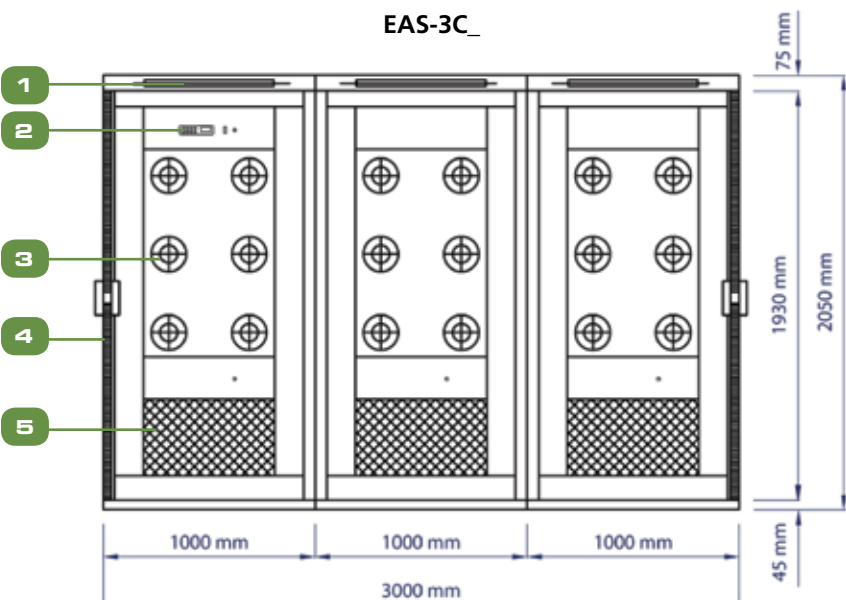
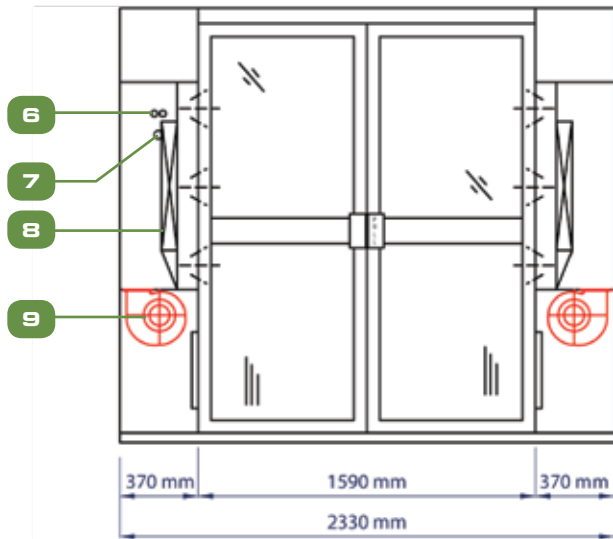
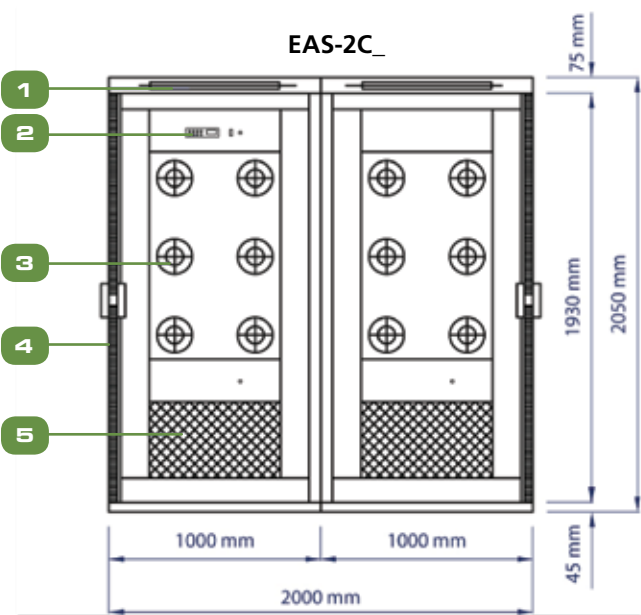
Module Form



Unassembled

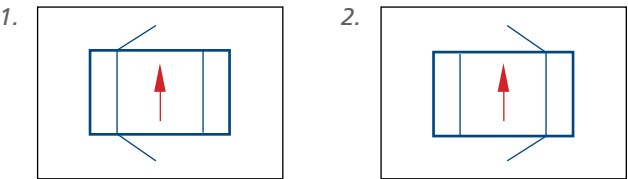


Model EAS (C-Series) Cleanroom Air Shower Technical Specifications

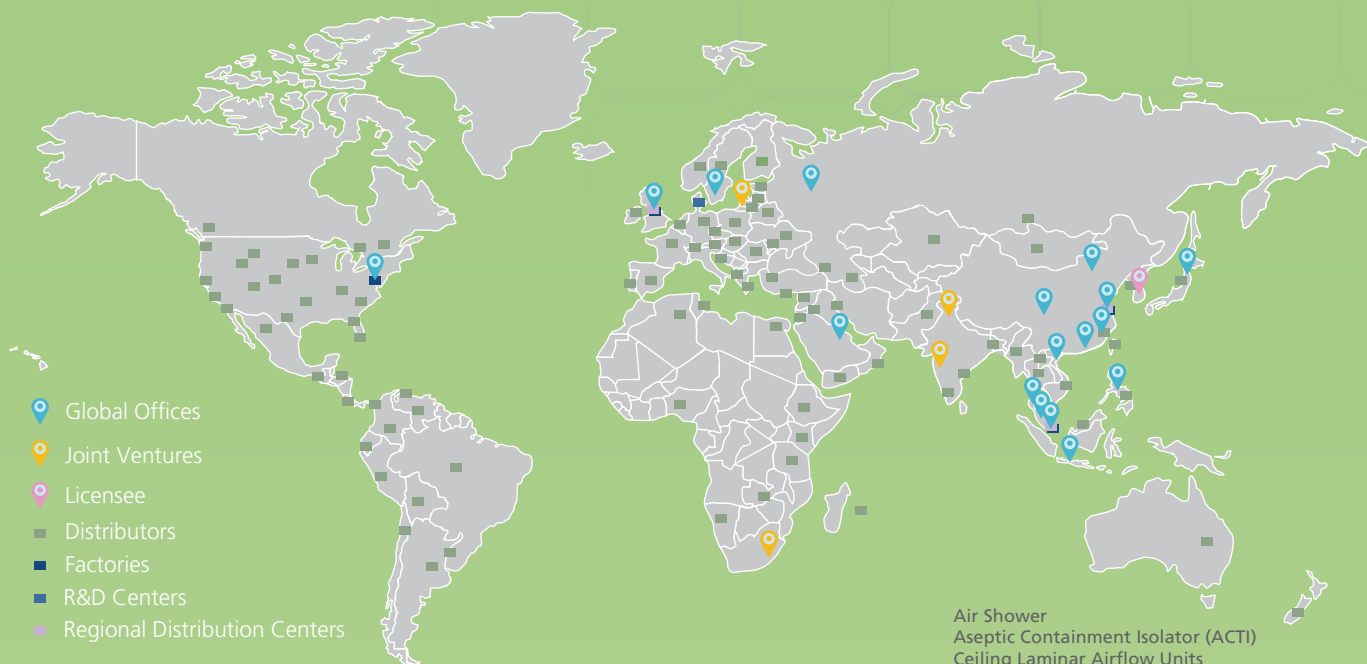


- 1. Fluorescent lamp
- 2. Esco microprocessor system
- 3. Nozzles
- 4. Door
- 5. Pre-filters
- 6. Indicator light
- 7. Emergency switch
- 8. HEPA filter
- 9. Blower

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



ESCO GLOBAL NETWORK



Air Shower
Aseptic Containment Isolator (ACTI)
Ceiling Laminar Airflow Units
Cleanroom Transfer Hatch
Containment Barrier Isolator (CBI)
Compounding Aseptic Isolator
Compounding Aseptic Containment Isolator
Downflow Booth (DFB)
Dynamic Floor Label Hatch
Dynamic Pass Box
Evidence Drying Cabinet
Laminar Flow Storage Cabinet
General Processing Platform Isolator (GPPI)
Healthcare Platform isolator
Laminar Flow Horizontal Trolley
Laminar Flow Straddle Units, Single and Double Laminar
Flow Vertical Trolley
Pass Box
Soft Wall Cleanroom
Sputum Booth
Ventilated Balance Enclosure (VBE)
Weighing and Dispensing Containment Isolator (WDCI)

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