

Airstream®



*Airstream Class II, Biological Safety Cabinet (E-series),
Model AC2-4E_*

Class II, Biological Safety Cabinets *The Industry's Most Energy Efficient Class II Cabinet*





Main Features

Unique Esc Dynamic Chamber™ plenum design delivers quiet, uniform airflow.

Negative pressure plenum surrounds contaminated positive pressure plenum; no fabric bags are used.

- Dual, long-life ULPA filters for supply and exhaust airflow.
- Low cabinet power consumption, reduced heat output, delivers lower total cost of ownership. (refer to graph on page 3)

Esc Sentinel™ microprocessor supervises all cabinet functions.

- Ergonomically angled front improves reach and comfort.
- Actual work opening is 25.4 mm (1") larger than tested sash opening to provide additional work space.
- Frameless, shatterproof sash is easier to clean, offers larger, unobstructed viewing area.
- Removable one-piece work surface simplifies cleaning (applicable to AC2-S series and AC2-D series).

E-Series cabinets include multi-piece tray components which lift and remove to provide easy access encourage surface decontamination and can be sterilized inside autoclave.

Airstream E-Series Class II Biological Safety Cabinet features glass sides to enhance visibility inside the work area. Model AC2-4E_.



Airstream S-Series Class II Biological Safety Cabinet with stainless steel side, Model AC2-4S_.

Note: The last digit of the Model Number _ indicates desired electrical service (60Hz, 50Hz). See the Specification Chart for details. Specify voltage/Hz when ordering.

Airstream AC2 Series Model Number, Side Wall Configuration			
Cabinet Size	Glass, E-Series	Stainless Steel S-Series	Stainless Steel, DUO, D-Series
0.6 meters (2')	AC2-2E_	-	-
0.9 meters (3')	AC2-3E_	AC2-3S_	-
1.2 meters (4')	AC2-4E_	AC2-4S_	AC2-4D_
1.5 meters (5')	AC2-5E_	AC2-5S_	-
1.8 meters (6')	AC2-6E_	AC2-6S_	AC2-6D_

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Biological Safety Cabinets • Class II Biological Safety Cabinets (S-Series, E-Series and Airstream Duo)

- Improved lighting is brighter, more uniform, reduces glare.
- Optional UV lamp is located behind control panel away from line of sight; lamp operates on programmable timer.



Airstream Duo, Class II Biological Safety Cabinet with stainless steel side, dual blower motors and dual exhaust filter, Model AC2-4D_.

- Esco **ISOCIDE™** antimicrobial surface on all painted surfaces minimizes contamination.
- Integrated RFI and electrical noise filters eliminate interference with and from adjacent equipment.



E-Series with Tempered Glass Side Walls

- Multi-piece work surface removal simplifies cleaning.
- Glass sides increase visibility and prevent the operator from being "boxed-in."

S-Series with Stainless Steel Side Models

- Enhanced side-capture zones and negative pressure side walls optimize containment.
- Interior work area formed from a single piece of stainless steel with large radius corners to simplify cleaning.

D-Series Duo, with Stainless Steel Sides, Dual Blower Motors, Dual Exhaust Filters

- Dual fan design for redundant operation.
- Dual exhaust filters for added safety.
- If one fan fails, the second fan provides minimum containment.

Touchpad data entry buttons permit control settings and access to diagnostics, default settings and hierarchical menus.

Color coded indicator lamps display green for primary function (fan operation); blue for secondary function (fluorescent lights and electrical outlet); and orange for caution (UV lamp ON).

Programmable automatic UV light timer simplifies operation, enhances contamination control, extends UV lamp life and saves energy.

A graphical interface indicates cabinet performance.

Digital read-out with alpha-numeric display indicates all input, status and alarm functions.

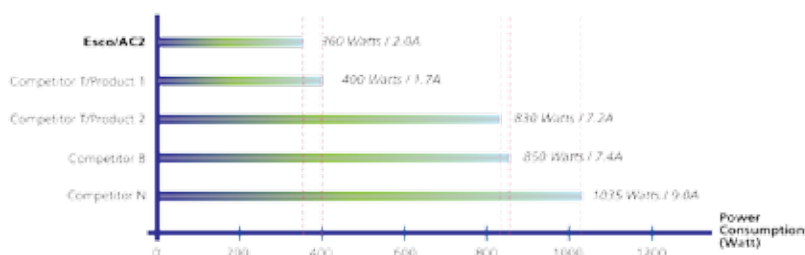
All functions can be user activated through touch-pad programming access; see Operations Manual.



Sentinel Microprocessor Control System, Programmable

■ When programmed ON

- the start-up sequence confirms status with Air Safe and local time display.
- the Personal Identification Number (PIN) access restricts unauthorized adjustments.
- an airflow alarm warns of deviations from normal velocities.



Power Consumption Comparison Chart

The Esco AC2 cabinet utilises an extremely efficient backward curve fan, allowing for exceedingly low levels of cabinet power consumption that is unparalleled in the industry.

The result is greater cost-savings for the user with no compromise in cabinet performance.

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Operator, Product and Environmental Protection

Esco Airstream Class II Biological Safety Cabinets offer a premium level of operator, product and environmental protection with advanced technology at an economical price. Intelligent, ergonomic design enhances productivity, operator comfort, maintenance and utility value. With an extensive track record of safety, reliability and performance, Airstream cabinets make ideal investments for a wide range of general laboratory applications. Airstream biological safety cabinets provide protection against Biosafety Levels 1, 2 and 3, and can be used for handling Biosafety Level 4, provided that the operator wears a positive pressure suit.

Containment and Protection

- A combination of a supply ULPA filter and an exhaust ULPA filter create a fully integrated performance envelope for product, operator and environmental protection.
- Inflow of room air enters the front air grille to establish operator protection; room air does not enter the work zone, preventing product contamination.
- Raised armrest prevents the likelihood of inflow grille blocking by operator's arms.
- Auto-purge holes located at the front side walls (on AC2-S Series) eliminate eddy currents and dead air pockets in the critical area behind the sash window.
- The inflow velocity, downflow velocity, air flow path and intake geometry are precision tuned and tested to

create an optimum air curtain on the front aperture; this curtain maintains personal and product protection even in the unlikely event of a severe inflow or downflow imbalance that would compromise protection in a conventional cabinet.

Integrated Filtration System

Independent supply and exhaust filters provide 99.999% typical efficiency for particle sizes of 0.1 to 0.3 microns. Airstream filters meet the IEST-RP-CC001.3 recommended practice for ULPA performance (USA), and EN 1822 for H14 performance (EU).

- ULPA filters (per IEST-RP-CC001.3), are tested to a typical efficiency of >99.999% for 0.1 to 0.3 micron particles; these provide better filtration capability than conventional H13 HEPA filters that have a typical efficiency of > 99.99% for 0.3 micron particles.
- Modern separatorless mini-pleat filter construction maximizes the filter surface area to extend filter life and eliminate possible filter media damage by thin and sharp aluminum separators used in conventional HEPA filter construction.

Mini-pleat Separatorless Filter (left) vs. Conventional Aluminum Separator Filter (right)



Esco cabinets use Swedish Camfil Farr® mini-pleat filters without aluminum separators to increase filter efficiency, minimize the chance of leakage, and to prolong filter life. Filters include a lightweight aluminum frame for structural stability and elimination of swelling common to conventional wood frames.

- The filter assembly is constructed in accordance with EN1822 requirements.

- The supply filter provides ISO Class 3 (per ISO14644.1) clean air to the work surface in a gentle vertical laminar flow for product protection.
- The exhaust filter traps biohazard particles acquired from the work surface before air is exhausted to the room, offering personal and environmental protection.
- The Airstream Duo includes two exhaust filters to double exhaust protection.
- The exhaust filter media is protected from mechanical damage by an integrated metal screen guard, which is absent from conventional HEPA filters.

Single Blower System, Airstream S-Series and E-Series Models

The AC2 blower system is designed for high performance operation, maximum energy efficiency and minimal maintenance.

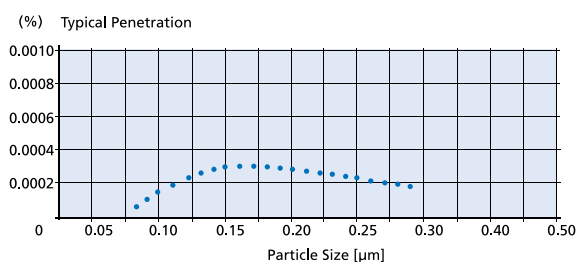
- Industry exclusive backward curved, motorized impeller design replaces conventional blowers.
- Improved energy efficiency lowers operating costs.
- Reduced noise and vibration levels over conventional blowers provide a comfortable working environment.
- An integral blower hour meter tracks operating life and aids in predictive maintenance planning.
- Built-in RFI and electrical noise filters eliminate interference with adjacent instrumentation.
- The external rotor motor design allows for optimum cooling of the motor during extended operations and extends the motor bearing life.
- Speed can be adjusted electronically without the need for mechanical adjustment.
- To prevent fan damage, a paper-catch grille traps papers or towels that may drop down on the drain pan, preventing them from being pulled into the column by fan suction.

Dual Blower System, Airstream D-Series Duo Models

The Airstream Duo includes a dual blower system designed for redundancy.

- Dual permanently lubricated direct-drive external rotor motor/blowers assure cabinet safety in the event of a motor failure.

Esco ULPA Filter Efficiency



● Typical Penetration

Independent supply and exhaust filters provide 99.999% typical efficiency for particle sizes of 0.1 to 0.3 microns. Airstream Series filters meet the IEST-RP-CC001.3 recommended practice for ULPA performance (USA), and EN 1822 for HEPA performance (EU).

Standards Compliance	For Microbiological Safety Cabinets*	For Air Quality	For Filtration	For Electrical Safety
	Type-tested to EN 12469, Europe	ISO 14644.1 Class 3, Worldwide IEST-G-CC1001, USA IEST-G-CC1002, USA	IEST-RP-CC034.1, Worldwide IEST-RP-CC007.1, Worldwide IEST-RP-CC001.3, Worldwide EN 1822, Europe	IEC 61010-1, Worldwide EN 61010-1, Europe UL 61010-1, USA CAN/CSA C22.2 No. 61010-1

* For details on most recent certifications contact Esco or your Esco Sales Representative.

- The external rotor motor design allows for optimum cooling of the motor during extended operations.
- The double blower system assures inherently safe operation if one blower fails.

Front Sash Assembly

The front sash is counterbalanced for convenient one-hand operation.

- The frameless sash eliminates operator's line of sight blockage.
- A generous sash opening allows for easier access into the work zone, provides ample room for transferring of small equipment; see Specifications.
- The sliding window can be fully opened to insert and remove larger instrumentation and equipment.

Sentinel™ Microprocessor Control, Alarm, Monitoring System

The Esco Sentinel™ microprocessor-based control system supervises operation of all cabinet functions.

- The control panel is located on the center of the cabinet, and angled down for easy access by the operator
- Continuous monitoring of cabinet airflow is displayed on a bright, easy-to-read LCD panel. The large display monitors operational parameters.
- A true airflow velocity sensor provide independent measurement of inflow and downflow velocities despite room temperature fluctuation.

- All electronic parts are contained inside a plug-and-play module that permits easy exchange if required.
- Microprocessor software updates are available from Esco for download via the Internet.

Consult your Esco Operating Manual or contact Esco or your Sales Representative for information on user-preference programming capabilities built into the Sentinel microprocessor platform.

Cabinet Construction

Robust construction and enhanced safety features qualify the cabinet for the most demanding laboratory applications. The cabinet is fully assembled and ready to install and operate when shipped.

- The cabinet work zone has no welded joints to collect contaminants or rust.
- All stainless steel work surfaces are accessible for cleaning.
- S Series cabinets (stainless steel sides) include interior sides and back wall formed from a single piece of stainless-steel with large radius corners to simplify interior cleaning.
- E Series cabinets (tempered glass sides) include multi-piece tray components which lift and remove to provide easy access and to encourage surface decontamination.
- A recessed central area and drain pan channels spills and prevent liquids from entering the lower filtration and blower systems.

- The drain pan is flush with the side walls to eliminate concealed or hard-to-clean spaces.
- There are no screws on the front or sides to trap contaminants or complicate cleaning.
- External surfaces are coated with Esco Isocide™ antimicrobial coating to protect against surface contamination and inhibit bacterial growth. Isocide eliminates 99.9% of surface bacteria within 24 hours of exposure.

Service Fitting Access

The cabinet is prepared for easy installation of optional gas and vacuum fittings; see Accessories.

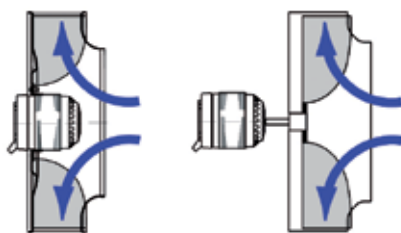
- Optional service fittings openings are offset for easier access.

Comfortable Ergonomic Design

The cabinet is engineered for comfort, utility value and safety.

- The angled viewing window and narrow profile front grille improves reach into the work area.
- The instant-start 5000k fluorescent lamp operates on an electronic ballast to reduce heat, improve comfort and conserve energy.
- The lamp delivers uniform lighting to the work surface for greater comfort, reduced glare and improved productivity; see Specifications.
- The front armrest is raised above the work zone to improve comfort and to minimize blockage of forward airflow perforations.
- The optional adjustable support stand provides work surface height control.
- The frameless sash eliminates operator's line of sight blockage.
- A generous sash opening allows for easier access into the work zone, provides ample room for transferring of small equipment; see Specifications.
- The sliding window can be fully opened to insert and remove larger instrumentation and equipment.

Esco Centrifugal Fan with External Rotor Motor (left) vs. Conventional Fan with Standard Motor (right)

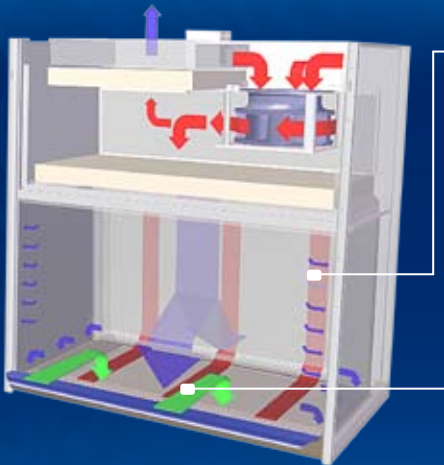


- Esco Airstream cabinets use a combination of high performance scroll blowers (supply) and German made **ebm-papst®** permanently lubricated, centrifugal motor/blowers with external rotor designs (exhaust).
- Selected for energy efficiency, compact design, and flat profile, the completely integrated exhaust blower assembly optimizes motor cooling, with unified rotating parts and overall component balance for smooth, quiet, vibration-free operation.
- Weight is equally distributed to all bearings to extend bearing life, transfer heat and maximize speed control.

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Cabinet Filtration System Stainless Steel Side Walls/ Tempered Glass



- ULPA-filtered air
- Unfiltered / potentially contaminated air
- Room air / Inflow air

Side capture zones (applicable for AC2-S Series only)

Dynamic air barrier, inflow and forward-directed downflow air converge

- Ambient air is pulled through the perforations located towards the work zone front to prevent contamination of the work surface and work product. The inflow does not mix with the clean air within the cabinet work zone. Inflow air travels through a return path toward the common air plenum (blower plenum) at the top of the cabinet.
- The uniform, non-turbulent air stream protects against cross contamination within and throughout the work area.
- Near the work surface, the downflow air stream splits with a portion moving toward the front air grille, and the remainder moving to the rear air grille. A small portion of the ULPA filtered downflow enters the intake perforations at the side capture zones at a higher velocity (small blue arrows).
- A combination of inflow and downflow air streams forms an air barrier that prevents contaminated room air from entering the work zone, and prevents work surface emissions from escaping the work zone.
- Air returns to the common air plenum where the 32% exhaust and 68% recirculation process is continued.

Electrical Safety and Certification

All components meet or exceed applicable safety requirements.

- Each cabinet is individually factory tested for electrical safety.
- Documentation specific to each cabinet serial number is maintained on file.
- Certified to major world standards for microbiological safety cabinets, including the EN12469 (refer to technical specifications for the full list).
- Contact Esco or your Sales Representative for site preparation information; see Electrical Specifications.

Warranty

Airstream AC2 Series cabinets are warranted for 3 years excluding consumable parts and accessories.

- Each cabinet is shipped with a comprehensive User's Manual complete with a report documenting all test procedures.
- Additional IQ/OQ/PQ documentation is available upon request.
- Contact your local Sales Representative for specific warranty details or documentation requests.

Accessories and Options

Esco offers a variety of options and accessories to meet local applications. Contact Esco or your local Sales Representative for ordering information.

Support Stands

- Fixed height, available 737 mm (29") or 838 mm (33"), ± 38.1 mm (1.5")
 - With leveling feet
 - With casters
- Adjustable height, hydraulic range 737 mm (29") to 838 mm (33")
 - With casters
- Telescoping height stand, nominal range 737 mm (29") or 838 mm (33")
 - Adjustable in 25.4 mm (1") increments
- Infinitely adjustable cradle stand, with casters
 - Elevates to seating or standing work surface height
 - When lowered permits movement through standard doorway

Note: Increases exterior dimensions

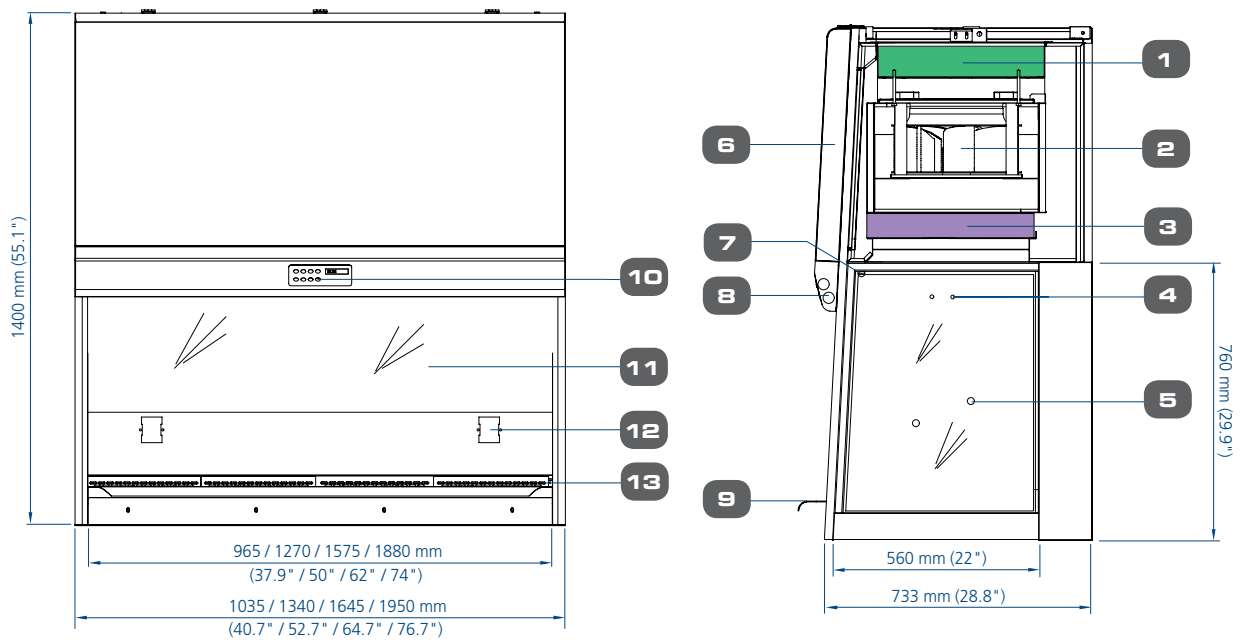
Electrical Outlets and Utility Fixtures

- Electrical outlet, ground fault, North America
- Electrical outlet, Europe / Worldwide
- Petcock (air, gas, vacuum)
 - North America (American) style
 - Europe / Worldwide style DIN 12898, DIN 12919, DIN 3537

Cabinet Accessories

- Germicidal UV lamp
 - Controlled by automatic UV lamp timer through Sentinel™ micro-processor control panel
 - Emission of 253.7 nanometers for most efficient decontamination
 - Lamp is positioned away from operator line of sight for safety and proper exposure to interior surfaces.
- PVC armrest
 - Chemically treated, improves operator comfort, easy to clean. 712 mm (28") standard size.
- Ergonomic lab chair
 - Laboratory grade construction, meets Class 100 cleanliness; alcohol resistant PVC materials
 - Adjustable 395-490 mm (15.6"-19.3")
- Ergonomic foot rest
 - Angled, helps maintain proper posture
 - Adjustable height
 - Anti-skid coating, chemical resistant finish
- IV bar, with hooks
 - Stainless steel construction
 - Available for all standard Esco cabinets
- Microscope viewing device
 - Mounting and viewing pouch integrated into sash. Factory installed; specify when ordering.

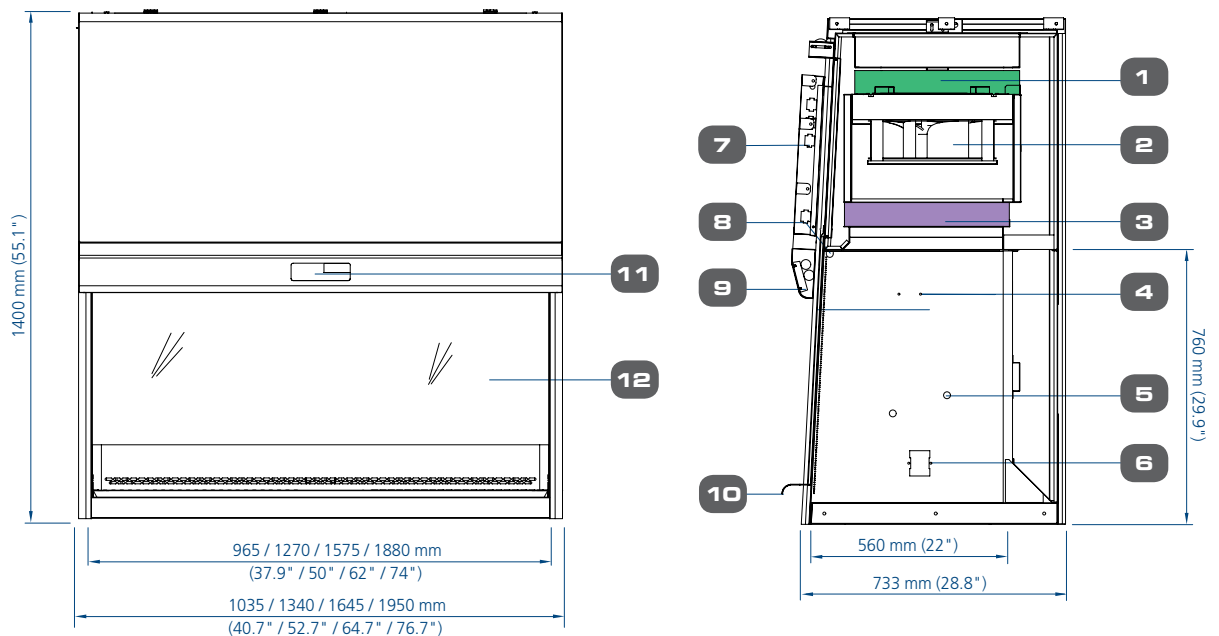
Airstream Model AC2 (E-Series) Biological Safety Cabinet Technical Specifications, Tempered Glass Side Walls



- | | | | |
|---|---|--|---|
| 1. Exhaust ULPA filter | 5. Plugged service fixture provisions
(2 on each side) | 8. Fluorescent lamp | 11. Tempered glass sliding sash window |
| 2. Blower | 6. Electrical and electronics panel | 9. Stainless steel armrest | 12. Standard electrical outlet Retrofit
Kit™ provision |
| 3. Downflow ULPA filter | 7. Standard UV light Retrofit
Kit™ provision | 10. Esco Sentinel microprocessor
control system | 13. Stainless steel multi-piece work tray |
| 4. Standard IV bar Retrofit Kit™
provision | | | |

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Airstream Model AC2 (S-Series) Biological Safety Cabinet Technical Specifications, Stainless Steel Side Walls

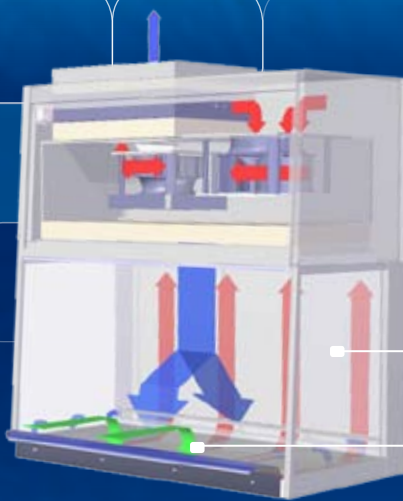


- | | | | |
|---|---|---|--|
| 1. Exhaust ULPA filter | 5. Plugged service fixture provisions
(2 on each side) | 7. Electrical and electronics panel | 10. Stainless steel armrest |
| 2. Blower | 6. Standard electrical outlet Retrofit
Kit™ provision | 8. Standard UV light Retrofit Kit™
provision | 11. Esco Sentinel microprocessor
control system |
| 3. Downflow ULPA filter | | 9. Fluorescent lamp | 12. Tempered glass sliding sash window |
| 4. Standard IV light Retrofit Kit™
provision | | | |

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Cabinet Filtration System (Duo, Stainless Steel Side Walls)



- ULPA-filtered air
- Unfiltered / potentially contaminated air
- Room air / Inflow air

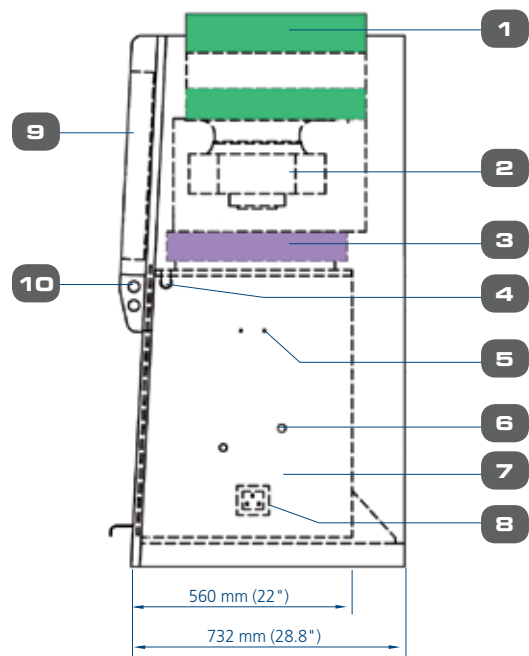
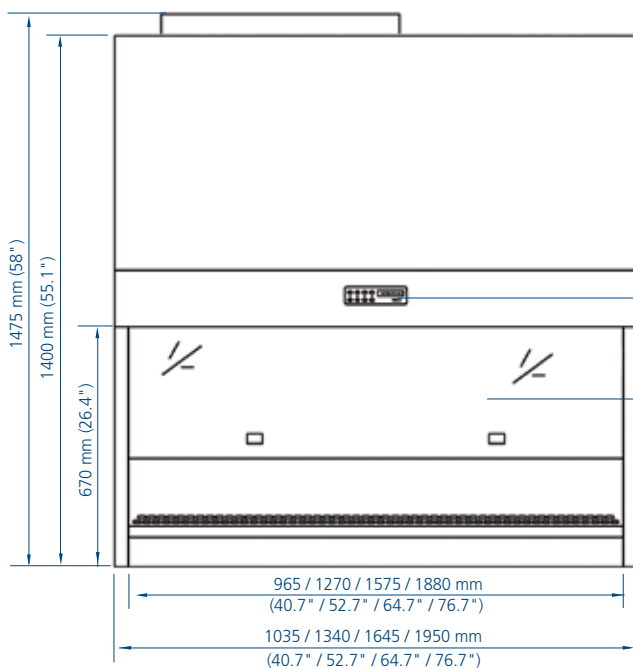
Side capture zones

Dynamic air barrier, inflow and forward-directed downflow air converge

- Ambient air is pulled through the perforations located towards the work zone front to prevent contamination of the work surface and work product. The inflow does not mix with the clean air within the cabinet work zone. Inflow air travels through a return path toward the common air plenum (blower plenum) at the top of the cabinet.
- Dual blowers and dual exhaust filters provide an added measure of protection. If the primary blower fails, the secondary blower still pushes the air across the exhaust filters to maintain inflow and containment.
- Approximately 32% of the air in the common plenum is exhausted through the ULPA filter to the room. The remaining 68% of the air is passed through the downflow ULPA filter and into the work area as a vertical laminar flow air stream bathing the work surface in clean air.
- The uniform, non-turbulent air stream protects against cross contamination within and throughout the work area.
- Near the work surface, the downflow air stream splits with a portion moving toward the front air grille, and the remainder moving to the rear air grille. A small portion of the ULPA filtered downflow enters the intake perforations at the side capture zones at a higher velocity (small blue arrows).
- A combination of inflow and downflow air streams forms an air barrier that prevents contaminated room air from entering the work zone, and prevents work surface emissions from escaping the work zone.
- Air returns to the common air plenum where the 32% exhaust and 68% recirculation process is continued.

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Airstream Duo Model AC2 (D-Series) Biological Safety Cabinet Technical Specifications, Stainless Steel Side Walls, Dual Blowers



1. Exhaust ULPA filter
2. Blower
3. Downflow ULPA filter
4. Standard UV light Retrofit Kit Provision

5. IV bar Retrofit Kit provision
6. Plugged service fixture provisions (2 on each side)
7. Stainless steel work zone

8. Electrical outlet Retrofit Kit provision (2 & 3 ft model - only 1 single outlet in work zone left side wall)
9. Electrical panel

10. Fluorescent lamp
11. Esco Sentinel microprocessor control system
12. Tempered glass sash window

Airstream

Biological Safety Cabinets • Class II Biological Safety Cabinets (E-Series, S-Series and D-Series)

General Specifications, Airstream Class II, Biological Safety Cabinets (E-Series)

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

Model	AC2-2E_	AC2-3E_	AC2-4E_	AC2-5E_	AC2-6E_
Nominal Size	0.6 meters (2')	0.9 meters (3')	1.2 meters (4')	1.5 meters (5')	1.8 meters (6')
External Dimensions (W x D x H)	730 x 733 x 1400 mm 28.7" x 28.8" x 55.1"	1035 x 733 x 1400 mm 40.7" x 28.8" x 55.1"	1340 x 733 x 1400 mm 52.7" x 28.8" x 55.1"	1645 x 733 x 1400 mm 64.7" x 28.8" x 55.1"	1950 x 733 x 1400 mm 76.7" x 28.8" x 55.1"
Internal Work Area, Dimensions (W x D x H)	660 x 560 x 670 mm 26.0" x 22.0" x 26.4"	965 x 560 x 670 mm 38.0" x 22.0" x 26.4"	1270 x 560 x 670 mm 50.0" x 22.0" x 26.4"	1575 x 560 x 670 mm 62.0" x 22.0" x 26.4"	1880 x 560 x 670 mm 74.0" x 22.0" x 26.4"
Internal Work Area, Space	0.29 m ² (3.1 sq.ft)	0.43 m ² (4.6 sq.ft)	0.58 m ² (6.2 sq.ft)	0.73 m ² (7.7 sq.ft)	0.87 m ² (9.3 sq.ft)
Average Airflow Velocity	Inflow	0.45 m/s (90 fpm) at initial setpoint, audible/visual alarm will activate at 0.40 m/s (80 fpm)			
	Downflow	0.30 m/s (60 fpm) at initial setpoint with uniformity of better than +/- 20%			
Airflow Volume	Inflow	185 m ³ /h (109 cfm)	270 m ³ /h (159 cfm)	356 m ³ /h (209 cfm)	441 m ³ /h (260 cfm)
	Downflow	423 m ³ /h (249 cfm)	563 m ³ /h (331 cfm)	741 m ³ /h (436 cfm)	919 m ³ /h (591 cfm)
	Exhaust	185 m ³ /h (109 cfm)	270 m ³ /h (159 cfm)	356 m ³ /h (209 cfm)	441 m ³ /h (260 cfm)
ULPA Filter Typical Efficiency	Downflow	>99.999% at 0.1 to 0.3 microns as per IEST-RP-CC001.3 USA >99.995% at MPPS as per EN 1822 (H-14) EU			
	Exhaust				
Sound Emission (Typical)	NSF 49	<65 dBA	<64 dBA	<65 dBA	<65 dBA
	EN 12469	<62 dBA	<61 dBA	<62 dBA	<63 dBA
Fluorescent Light Intensity At Zero Ambient	>900 Lux (> 84 foot candles)	>1130 Lux (>105 foot candles)	>1280 Lux (>119 foot candles)	>1050 Lux (>97 foot candles)	>1220 Lux (>113 foot candles)
Cabinet Construction	Main Body	1.2 mm (0.06") 16 gauge electrogalvanized steel with white oven-baked epoxy Isocide antimicrobial powder coated finish			
	Work Zone	1.5 mm (0.06") 16 gauge stainless steel, type 304, with 4B finish			
	Side Walls	UV absorbing tempered glass, 5 mm (0.2"), colorless and transparent			
Electrical*	220-240V, AC, 50Hz, 1ø	AC2-2E1	AC2-3E1	AC2-4E1	AC2-5E1
	110-130V, AC, 60Hz, 1ø	AC2-2E2	AC2-3E2	AC2-4E2	AC2-5E2
	220-240V, AC, 60Hz, 1ø	AC2-2E3	AC2-3E3	AC2-4E3	AC2-5E3
Net Weight**	160 kg (353 lbs)	177 kg (390 lbs)	277 kg (611 lbs)	270 kg (595 lbs)	305 kg (672 lbs)
Shipping Weight**	187 kg (412 lbs)	230 kg (507 lbs)	322 kg (710 lbs)	326 kg (718 lbs)	361 kg (795 lbs)
Shipping Dimensions, Maximum (W x D x H)**	850 x 860 x 1750 mm 33.5" x 33.9" x 68.9"	1140 x 860 x 1715 mm 44.9" x 33.9" x 67.5"	1440 x 860 x 1650 mm 56.7" x 33.9" x 65"	1750 x 860 x 1650 mm 68.9" x 33.9" x 65"	2060 x 860 x 1680 mm 81.1" x 33.9" x 66.1"
Shipping Volume, Maximum**	1.28 m ³ (45.6 cu.ft.)	1.6 m ³ (57 cu.ft.)	2.04 m ³ (72 cu.ft.)	2.48 m ³ (88 cu.ft.)	2.98 m ³ (105 cu.ft.)

* Additional voltages may be available; contact Esco for ordering information.

** Cabinet only; excludes optional stand

Microbiological Testing

Esco performs testing in accordance with more than 10 of the world's most recognized standards for local, regional and international criteria.

Testing in our microbiology laboratory is conducted according to NSF/ANSI 49, EN12469, and JIS K3800. An NSF-accredited biohazard cabinet field certifier is available in-house full-time to supervise all testing work, using harmless *Bacillus atrophaeus* (formerly *Bacillus Subtilis*) bacteria that is used to challenge the cabinet, then incubated for 48 hours and the Colony Forming Units (CFU) are counted to determine the testing results. Increased microbiological challenge tests with objects inside the cabinet work

zone, Bunsen burner, external airflow disturbance, and Human-As-Mannequin test adapted from Fume Hood development were performed to simulate real-world conditions.

Personnel Protection Test

The test objective is to evaluate the safety of the cabinet for the personnel operating on potentially hazardous samples in the cabinet work zone.

- A nebulizer containing 55 mL of 5 to 8 x 10⁸ spores/mL *B.atrophaeus* spores is placed inside the work zone, 10 cm (4") behind the front opening sash.
- Target slit air samplers and impingers are placed outside the work zone to capture possibly escaping *B.atrophaeus* spores, then the sample is incubated.

- Acceptance: The number of *Bacillus atrophaeus* CFU recovered from the agar plates shall not exceed 10 CFU per test.

Product Protection Test

The test objective is to determine cabinet protection to the product/samples inside the cabinet work zone from environmental contaminants.

- A nebulizer containing 55 mL of 5 to 8 x 10⁶ spores/mL *B.atrophaeus* is placed at 10 cm (4") in front of sash window.
- Target agar plates are placed throughout the entire work surface.
- Acceptance: The number of *Bacillus atrophaeus* CFU recovered from the agar plates shall not exceed 5 CFU per test.

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General Specifications, Airstream Class II, Biological Safety Cabinets (S-Series)

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

Model		AC2-3S_	AC2-4S_	AC2-5S_	AC2-6S_
Nominal Size		0.9 meters (3')	1.2 meters (4')	1.5 meters (5')	1.8 meters (6')
External Dimensions (W x D x H)		1035 x 733 x 1400 mm 40.7" x 28.8" x 55.1"	1340 x 733 x 1400 mm 52.7" x 28.8" x 55.1"	1645 x 733 x 1400 mm 64.7" x 28.8" x 55.1"	1950 x 733 x 1400 mm 76.7" x 28.8" x 55.1"
Internal Work Area, Dimensions (W x D x H)		965 x 560 x 670 mm 38.0" x 22.0" x 26.4"	1270 x 560 x 670 mm 50.0" x 22.0" x 26.4"	1575 x 560 x 670 mm 62.0" x 22.0" x 26.4"	1880 x 560 x 670 mm 74.0" x 22.0" x 26.4"
Internal Work Area, Space		0.43 m ² (4.7 sq.ft)	0.58 m ² (6.2 sq.ft)	0.73 m ² (7.7 sq.ft)	0.87 m ² (9.3 sq.ft)
Average Airflow Velocity	Inflow	0.45 m/s (90 fpm) at initial setpoint, audible/visual alarm will activate at 0.40 m/s (80 fpm)			
	Downflow	0.30 m/s (60 fpm) at initial setpoint with uniformity of better than +/- 20%			
Airflow Volume	Inflow	270 m ³ /h (159 cfm)	356 m ³ /h (209 cfm)	441 m ³ /h (260 cfm)	527 m ³ /h (310 cfm)
	Downflow	563 m ³ /h (331 cfm)	741 m ³ /h (436 cfm)	919 m ³ /h (591 cfm)	1096 m ³ /h (645 cfm)
	Exhaust	270 m ³ /h (159 cfm)	356 m ³ /h (209 cfm)	441 m ³ /h (260 cfm)	527 m ³ /h (310 cfm)
ULPA Filter Typical Efficiency	Downflow	>99.999% at 0.1 to 0.3 microns as per IEST-RP-CC001.3 USA >99.995% at MPPS as per EN 1822 (H-14) EU			
	Exhaust				
Sound Emission (Typical)	NSF / ANSI 49	<64 dBA	<65 dBA	<65 dBA	<66 dBA
	EN 12469	<61 dBA	<62 dBA	<62 dBA	<63 dBA
Fluorescent Light Intensity At Zero Ambient		>1040 Lux (>97 foot candles)	>1190 Lux (>111 foot candles)	>920 Lux (>85 foot candles)	>1020 Lux (>95 foot candles)
Cabinet Construction	Main Body	1.2 mm (0.06") 16 gauge electrogalvanized steel with white oven-baked epoxy Isocide antimicrobial powder coated finish			
	Work Zone	1.5 mm (0.06") 16 gauge stainless steel, type 304, with 4B finish			
	Side Walls	1.2 mm (0.05") 18 gauge stainless steel, type 304			
Electrical*	220-240V, AC, 50Hz, 1ø	AC2-3S1	AC2-4S1	AC2-5S1	AC2-6S1
	110-130V, AC, 60Hz, 1ø	AC2-3S2	AC2-4S2	AC2-5S2	AC2-6S2
	220-240V, AC, 60Hz, 1ø	AC2-3S3	AC2-4S3	AC2-5S3	AC2-6S3
Net Weight**		180 kg (397 lbs)	218 kg (481 lbs)	273 kg (602 lbs)	305 kg (672 lbs)
Shipping Weight**		230 kg (507 lbs)	292 kg (644 lbs)	426 kg (939 lbs)	361 kg (795 lbs)
Shipping Dimensions, Maximum (W x D x H)**		1130 x 860 x 1650 mm 44.5" x 33.9" x 65.0"	1440 x 860 x 1650 mm 56.7" x 33.9" x 65"	1750 x 860 x 1650 mm 68.9" x 33.9" x 65"	2100 x 950 x 1880 mm 82.7" x 37.4" x 74.0"
Shipping Volume, Maximum**		1.6 m ³ (57 cu.ft.)	2.04 m ³ (72 cu.ft.)	2.48 m ³ (88 cu.ft.)	3.75 m ³ (132 cu.ft.)

* Additional voltages may be available; contact Esco for ordering information.

** Cabinet only; excludes optional stand.

(cont.)

Cross Contamination Test

The test objective is to evaluate cabinet protection from cross contamination of samples placed simultaneously inside the work zone.

- A nebulizer containing 55 mL of spores (5 to 8 x 10⁴/mL) is placed against one of the work zone sidewalls.
- Target agar plates are placed 360 mm (14") away from the same side wall
- Acceptance: The number of *Bacillus atrophaeus* CFU recovered on agar plates shall not exceed 2 CFU per test.

KI Discus Containment Test According to EN 12469 (Potassium Iodide)

Esco is currently one of the few companies in the world equipped to perform the KI Discus test for our customers. The KI Discus test is defined in the European Standard for microbiological safety cabinets, EN12469, as a test method for validating the operator/personnel protection capabilities of the cabinet.

- The KI Discus test shows excellent correlation with the microbiological test method for operator protection,

and is useful for validating the actual containment performance of the cabinet on-site.

- The KI-Discus takes only 45 minutes as opposed to 2 days for microbiological testing.
- Thus, each Esco Airstream AC2 model is type tested using the KI Discus method for operator safety.

General Specifications, Airstream Class II, Biological Safety Cabinets (D-Series)

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

Model		AC2-4D_	AC2-6D_
Nominal Size		1.2 meters (4')	1.8 meters (6')
External Dimensions (W x D x H)		1340 x 740 x 1475 mm 52.8" x 29.1" x 58"	1950 x 740 x 1360 mm 76.7" x 29.1" x 52.9"
Internal Work Area, Dimensions (W x D x H)		1270 x 560 x 670 mm 50" x 22.0" x 26.4"	1880 x 560 x 670 mm 74.0" x 22.0" x 26.4"
Internal Work Area, Space		0.58 m ² (sq.ft)	0.87 m ² (9.3 sq.ft)
Average Airflow Velocity	Inflow	0.45 m/s (90 fpm) at initial setpoint, audible/visual alarm will activate at 0.40 m/s (80 fpm)	
	Downflow	0.30 m/s (60 fpm) at initial setpoint with uniformity of better than +/- 20%	
Airflow Volume	Inflow	270 m ³ /h (159 cfm)	527 m ³ /h (310 cfm)
	Downflow	563 m ³ /h (331 cfm)	1096 m ³ /h (645 cfm)
	Exhaust	270 m ³ /h (159 cfm)	527 m ³ /h (310 cfm)
ULPA Filter Typical Efficiency	Downflow	>99.999% at 0.1 to 0.3 microns as per IEST-RP-CC001.3 USA	
	Exhaust	>99.995% at MPPS as per EN 1822 (H-14) EU	
Sound Emission (Typical)	NSF / ANSI 49	<65.5 dBA	<66 dBA
	EN 12469	<62.5 dBA	<63 dBA
Fluorescent Light Intensity At Zero Ambient		>1200 Lux (>111.5 foot candles)	>1020 Lux (>95 foot candles)
Cabinet Construction	Main Body	1.5 mm (0.06") 16 gauge electrogalvanized steel with white oven-baked epoxy Isocide antimicrobial powder coated finish	
	Work Zone	1.2 mm (0.06") 16 gauge stainless steel, type 304, with 4B finish	
	Side Walls	1.2 mm (0.05") 18 gauge stainless steel, type 304	
Electrical*	220-240V, AC, 50Hz, 1ø	AC2-4D1	AC2-6D1
	110-130V, AC, 60Hz, 1ø	AC2-3D2	AC2-6D2
	220-240V, AC, 60Hz, 1ø	AC2-3D3	AC2-6D3
Net Weight**		223.5 kg (492.7 lbs)	315 kg (694 lbs)
Shipping Weight**		245.5 kg (541.2 lbs)	370 kg (815 lbs)
Shipping Dimensions, Maximum (W x D x H)**		1500 x 950 x 1880 mm 59" x 37.4" x 74"	2100 x 950 x 1880 mm 82.7" x 37.4" x 74"
Shipping Volume, Maximum**		2.68 m ³ (96.4 cu.ft.)	3.75 m ³ (132 cu.ft.)

* Additional voltages may be available; contact Esco for ordering information.

** Cabinet only; excludes optional stand

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Comprehensive Performance Testing At Esco



Every Airstream model manufactured by Esco is individually tested, documented by serial number and validated with the following test methods.

- Inflow / downflow velocity
- PAO aerosol challenge for filter integrity
- Light, noise and vibration
- Airflow pattern visualization
- Electrical safety to IEC61010-1
- Additional microbiological testing is performed on statistical sampling basis.

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Esco Containment, Clean Air and Laboratory Equipment Products

Biological Safety Cabinets, Class II, III
 Fume Hoods, Conventional, High Performance, Ductless Carbon Filtered
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 Animal Containment Workstations
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 Specialty Workstations: *In-Vitro* Fertilization, Powder Weighing
 PCR Thermal Cyclers, Conventional, Real-Time
 Cleanroom Fan Filter Units, Modular Rooms, Air Showers, Pass Thrus

Since 1978, Esco has emerged as a leader in the development of controlled environment, laboratory and cleanroom equipment solutions. Products sold in more than 100 countries include biological safety cabinets, fume hoods, ductless fume hoods, laminar flow clean benches, animal containment workstations, cytotoxic cabinets, hospital pharmacy isolators, and PCR cabinets and instrumentation. With the most extensive product line in the industry, Esco has passed more tests, in more languages, for more certifications, throughout more countries than any biosafety cabinet manufacturer in the world. Esco remains dedicated to delivering innovative solutions for the clinical, life science, research and industrial laboratory community. www.escoglobal.com.

NSF / ANSI 49 Biological Safety Cabinets • Animal Containment Workstations • Fume Hoods • Clean Benches

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