

ESCO Airstream® Class II Biohazard Safety Cabinets

EN12469 European Standard
Type-Tested: Improved New
Design For Better Safety!



The **Esco Airstream® Class II Biohazard Safety Cabinet** is the latest generation of the original Esco Class II Biohazard Safety Cabinet product, offering a sensible balance of quality, performance features and cost-effectiveness. These models are suitable for use with agents assigned to biosafety levels 1, 2 and 3 (in particular 2 and 3) and provide unparalleled protection for the operator and the environment from biological hazards, in addition to an unequalled level of protection for the product from external airborne contamination and cross contamination.

Drawing from a dialogue of over 20 years with our users, Esco engineers have re-designed every component for better performance, longer durability and easier use. Advanced airflow visualization has been employed during type-testing in our laboratories to ensure maximum containment for improved operator protection, and better airflow uniformity within the work zone for better product protection.

The industry-exclusive features designed into this cabinet include for example a world first (patent pending) **backward curve motorized impeller** (replaces conventional blowers) positive plenum design. While the technology employed is state-of-the-art, the results obtained are simple to appreciate: better airflow uniformity for enhanced product protection, improved energy efficiency for lower operating costs, and a more comfortable working environment as a result of reduced noise and vibration levels.

Another key innovation for which Esco is now recognised for - our use of **mini-pleat ULPA (Ultra Low Penetration Air) filter technology** as opposed to conventional HEPA filters - is especially pertinent to the applications for which these cabinets have been designed for. Operating at a **typical efficiency of 99.999% at 0.3 and 0.12 microns** (compared with typical HEPA filters which are 99.99% efficient at 0.3 microns), ULPA filtration technology on these cabinets provides a higher level of operator, product and cross contamination protection.

The Esco Airstream® Class II Biohazard Safety Cabinet has been **independently certified and type-tested by CAMR**, the Centre for Applied Microbiological Research (Porton Down, Salisbury, UK) for compliance with the **Class II requirements of the EN12469:2000** (European standard for microbiological safety cabinets). The type-testing performed included stringent evaluations of cabinet airflows, containment, and operator comfort factors. Note: as of early 2001, this European standard has officially replaced the BS 5726 (British), DIN 12950 (German), NF X44-201 (French) standards for microbiological safety cabinets.



Superior Filtration

Two high-quality **U15 ULPA filters** with a typical efficiency of **99.9999% at MPPS, 0.3 and 0.12 microns** provide the best product and operator protection in the world; typical filter lifespan is more than 3 years depending on ambient operating conditions and total hours in usage per day.

ISO Class 3 air cleanliness within work zone as per ISO 14644.1 (equivalent to Class 1 as per the US Federal Standard 209E, **100 times "cleaner"** than the usual Class 100 classification on cabinets offered by the competition).

Mini-pleat separatorless ULPA filter technology reduces energy consumption and delivers increased laminar flow uniformity for better product / cross contamination protection; less bulky filters are also easier to handle.

Integral filter metal guard on ULPA filter prevents accidental damage to filter media; seamless filter gasket is permanently moulded on the filter frame and will not deteriorate over time.

Removable perforated powder-coated downflow diffuser provides additional protection against filter damage; in addition to increasing downflow uniformity for better product and cross contamination protection.

Cabinet Control System



Sentinel™ Microprocessor Control system allows the user to easily access cabinet functions.

Audible and visual alarms prompt the user in case of any unsafe cabinet condition, such as hardware failure or unsafe sash opening heights.

In order to prevent operator exposure to harmful ultraviolet radiation, an **UV interlock system** is a standard feature on all cabinets with a UV lamp; operator must close the sash in order for UV to activate; if sash is accidentally raised, the UV lamp will automatically deactivate to ensure safety.

Cabinet inflow and downflow velocities are continuously displayed on the LCD screen.

Optimum safety features: Admin PIN can be set to restrict access to cabinet menu functions.

Blower Hour Meter to help the user monitor total cabinet usage time, and thus gauge when to replace the HEPA/ULPA filter(s). **UV Hour Meter** for monitoring total usage time of UV lamp.

Warranty and service information: the Esco Airstream® Class II Biohazard Safety Cabinet is backed by a new **extended 3-year parts warranty (except consumable items)**. Local service in your country is provided by our network of highly trained and competent distributors in more than 60 countries worldwide.



Standard 4ft model on an optional support stand with levelling feet

New Ergonomically Proven Design
According to prEN ISO 14738N

Main Features

Designed for ergonomics: the generously sized 173 mm / 6.8 inch work access opening (203 mm / 8 inch from work surface) allows easy access to the interior; the width of the inflow air grille has been minimized in order to place the work zone closer to the operator.

A removable, **rounded front armrest** extends the length of the cabinet's front edge and eliminates pressure points on the arms while maximizing cabinet containment - by increasing airflow laminarity into the plane of the work access opening.

Smooth, corrosion-resistant, attractive exterior is free of large protrusions and easy to clean.

The large, generously sized interior with more usable working space for the operator. Interior surfaces are designed to eliminate protrusions, channels, and any other difficult to clean areas - all joints, corners and seams are expertly sealed for **maximum cleanability**.

Built-in white 5000k fluorescent lighting offers excellent illumination throughout the work zone in order to reduce operator fatigue; transparent side walls and white power-coated interior back panel are non-reflecting and will not cause glare.

Instant-start, non-flickering, energy efficient **electronic ballasts** are used instead of conventional electromagnetic ballasts. There are no starters to replace.

The sliding window is **completely frameless** for maximum visibility into the work zone. An enclosure houses the sash as it is raised, thus preventing exposure to any biological hazards that may have adhered to the inside.

Sash is counterbalanced to allow operation with minimal physical force and effort; a **fail-safe double balancing system** is employed - in the event that a cable should fail, the sash will tilt and lock in position so as not to endanger the operator.

UV-absorbing tempered glass sides increase operator comfort and provide a high level of protection against harmful UV rays when a UV lamp is installed; glass is also stronger and more durable compared to plastic materials.

Standard work surface is a **multi-piece work tray**. Work surface trays are fabricated from a single piece of stainless steel without any fasteners, thus eliminating difficult to clean joints; each set of trays has lifting provisions to facilitate easy access to the lower drain spillage trough.

Durable grade stainless steel work surface will never rust, chip, or generate particles; multi-piece work tray design features individual trays which are easily removable for autoclaving and / or cleaning.

The drain pan is generously sized to contain any liquid spills and can be easily cleaned.

Optional Retrofit Kits™, including accessories such as electrical outlets, service fixtures can easily be field-installed. No factory-fitting is necessary. All Retrofit Kit™ provisions are pre-installed on standard models (see engineering diagram on page 4 for further information).

Extremely low noise (less than 60dBA - see technical specifications table on page 4) and vibration levels due to proprietary construction and mounting technology.

Main Body Construction

Industrial-grade main body and dress panels constructed from electro-galvanised steel is durable.

All-metal frame is reinforced, welded and expertly gasketed, side windows are double framed and internally sealed, thus ensuring an airtight carcass for better safety to the operator and the environment.

The unique **electrolytic zinc coating** on the steel provides an additional barrier of protection against corrosion and rust as compared to conventional uncoated cold-rolled steels in order to maximize the service life of the cabinet.

All parts are finished in a specially selected, abrasion resistant **thermosetting powder coating** process that is both environmentally friendly (compared to conventional paints) as well as resistant to common disinfecting chemicals.

Permanently lubricated direct drive centrifugal blower(s); **energy efficient external rotor** type design reduces operating costs; industry exclusive **backward-curve motorised impeller design** guarantees better airflow uniformity, lower noise and lower overall energy consumption.

Built-in solid state variable speed controller(s) (infinitely adjustable from zero to the maximum setting) with built-in RFI and noise filters is superior to conventional "step" controllers.

Inherently self-balancing design eliminates the need for internal damper adjustments; system automatically maintains exhaust / recirculation airflow ratios throughout entire filter lifespan.

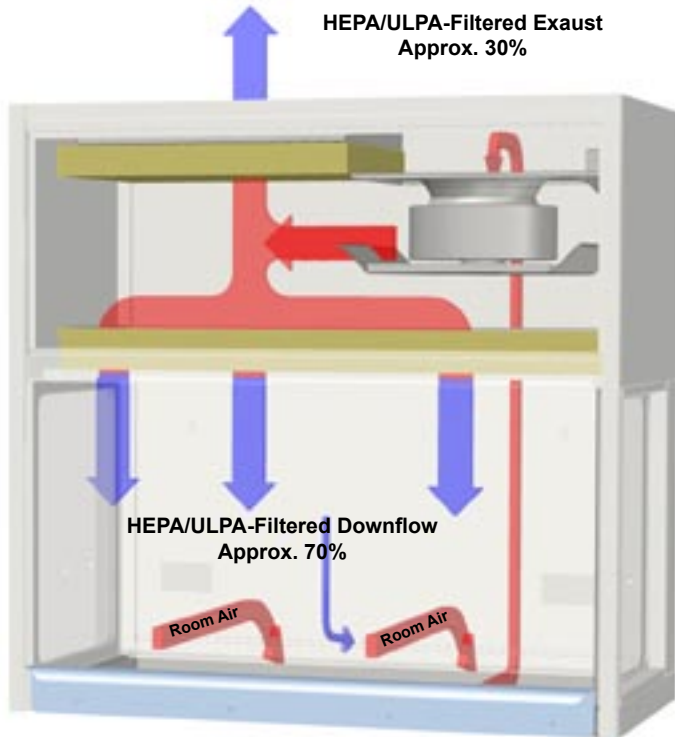
Esco's proprietary **Dynamic Chamber™** design places all contaminated areas under negative pressure or surrounds them with negative pressure; this fail-safe mechanism guarantees protection in case a leak develops in the cabinet's outer shell.

Inherently safe design maintains containment for protection even with some or all work trays removed, thus ensuring safety during cleaning.

Superior electrical safety for the operator; all electrical components are UL listed or UL recognized; all cabinets are factory tested for electrical safety after production.

Cabinet is shipped fully-assembled in wood crate; simply plug the unit into a power source for operation - no local installation is required; 10 international plug types are available.

Designed to meet the general safety requirements of the IEC 61010-1 / EN 61010-1 / UL 3101-1 / CSA-C22.2 No.1010.1-92. All cabinet electrical components are UL listed and / or recognised.



Class II cabinets provide product, operator and environment protection. They are suitable for general microbiological work with agents assigned to biosafety levels 1, 2, or 3. Class II cabinets are recommended for most applications and are the most common and cost-effective systems available on the market today.

When microbiological work is performed in the presence of volatile toxic chemicals (which cannot be removed by the ULPA filter), this cabinet may be refitted on-site by adding the optional exhaust collar, which allows the exhaust of air to the external environment via ductwork. Note: separate ductwork and remote blower required.

In both cabinet operation modes, Esco Airstream® Class II Biohazard Safety Cabinets have been designed to exceed the Class II requirements of the European Standard EN 12469:2000 "Biotechnology - Performance Criteria for Microbiological Safety Cabinets".

Now the first in the world with an exclusive backward-curved motorised impeller system that replaces conventional forward-curved blowers. This unique system distributes air within the positive plenum in all directions (unlike conventional blowers which direct air in only one direction), eliminating direct pressure on the filters. The result - lower noise levels, better airflow uniformity, and extremely low power consumption.



Your safety means the world to us: the following tests are performed individually at our in-house laboratory on every cabinet produced:

- a. Inflow / downflow velocities
- b. Aerosol challenge test for filter integrity
- c. Light / noise / vibration levels
- d. Airflow pattern visualisation test
- e. Electrical safety tests

A detailed report is included with every cabinet detailing the tests performed and results obtained.

Extensive testing, including KI-Discus containment testing according to EN12469:2000 and microbiological testing, is continuously performed at our research and development laboratories to improve cabinet containment and performance.

Ordering information: Esco Airstream® Class II Biohazard Safety Cabinet is available from stock at our headquarters in standard 4 foot and 6 foot models. Specify these standard sizes when ordering for quicker delivery times. For more information, contact us.

Service & Maintenance Features

Colour-coded panels: access panels to electrical / electronics panel and filter/blower internal plenum are colour-coded red to caution users of the potentially dangerous / contaminated areas.



A plugged aerosol sampling port (connected to the common positive plenum) for filter testing by the aerosol challenge method is accessible from below the work surface tray.

A conveniently accessible paper-catch is integrated in the air return area in order to prevent wipes and small items from entering the blower.

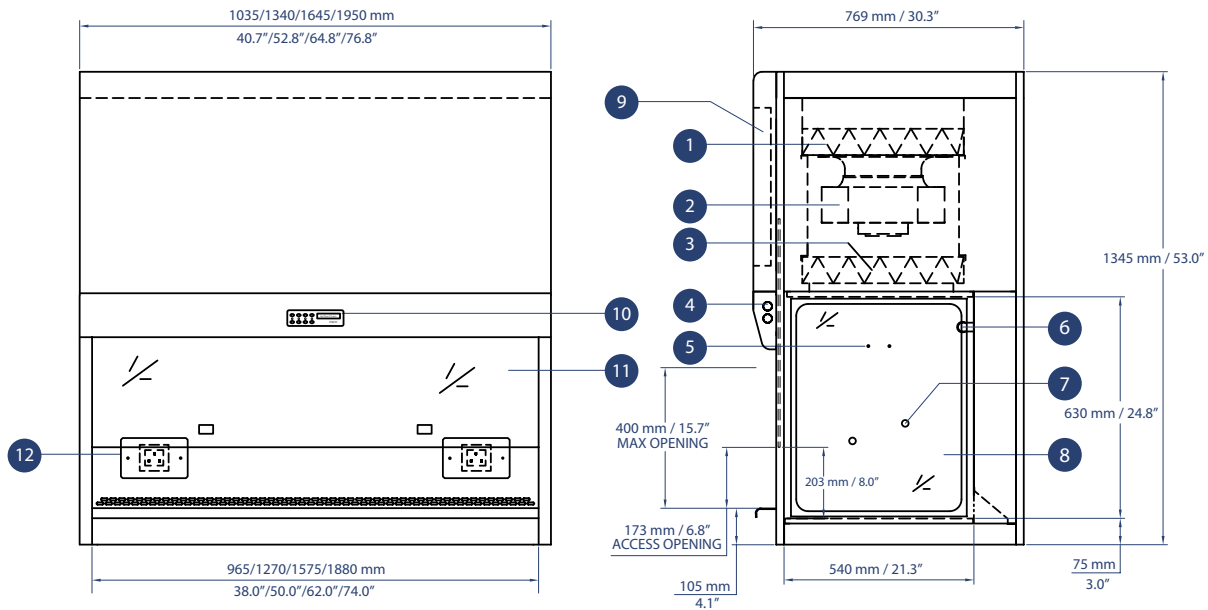
Minimal downtime: all maintenance can be performed from the front of the cabinet thus eliminating the need for the unit to be physically relocated or disconnected from service connections. Complete isolation of all cabinet components (except the ULPA filters and the blower) from contaminated spaces means that maintenance can be performed safely without the need for time-consuming and costly fumigation / chemical decontamination.

Servicing your cabinet is a breeze with Esco's unique hinged maintenance panel. Simply remove the fasteners at both sides of the panel, lift it up, and mount it on self-supporting struts. The fluorescent lamps (mounted out of the air stream for perfect airflow uniformity), electrical components, electronic boards, display and keyswitch are all mounted behind this panel.

For filter and blower maintenance, remove the access cover (secured and gasketed to the cabinet carcass) mounted on the front of the cabinet. Notice the lifting grip provisions that allow this cover to be removed with minimal physical effort. Your service provider can then access the internal plenum for filter replacement and blower maintenance.

The housing of this plenum is fabricated from lightweight material to allow easy access for maintenance. In addition, the unique telescoping design eliminates the need for physical lifting and enables filter replacements to be completed with less manpower, time and effort.

The modular electrical system can be replaced quickly with snap together connectors in case of any electrical fault, thus reducing downtime.



- 1. Exhaust ULPA Filter 2. Blower 3. Downflow ULPA Filter 4. Fluorescent Lamp 5. IV Bar Retrofit Kit™ Provision
- 6. UV Light Retrofit Kit™ Provision 7. Service Fixture Retrofit Kit™ Provisions (2 on each sidewall) 8. Tempered Glass Side Panel
- 9. Electrical/Electronics Module 10. Esco Sentinel™ Microprocessor Control 11. Tempered Glass Sash Window
- 12. Electrical Outlet Retrofit Kit™ Provisions (Optional - 1 for 3ft Models, 2 for 4ft and above)

General Specifications		AC2-3AX	AC2-4AX	AC2-5AX	AC2-6AX
External Dimensions (L x W x H)		1035 x 769 x 1345 mm 40.7" x 30.3" x 53.0"	1340 x 769 x 1345 mm 52.8" x 30.3" x 53.0"	1645 x 769 x 1345 mm 64.8" x 30.3" x 53.0"	1950 x 769 x 1345 mm 76.8" x 30.3" x 53.0"
Internal Work Zone (L x W x H)		965 x 540 x 630 mm 38.0" x 21.3" x 24.8"	1270 x 540 x 630 mm 50.0" x 21.3" x 24.8"	1575 x 540 x 630 mm 62.0" x 21.3" x 24.8"	1880 x 540 x 630 mm 74.0" x 21.3" x 24.8"
Standards Compliance		EN 12469:2000 (exceeds requirements for Class II microbiological safety cabinets) Air cleanliness: ISO 14664.1 Class 3, IEST-G-CC1001, IEST-G-CC1002 and other equivalent requirements Filter performance: IEST-RP-CC034.1, IEST-RP-CC007.1, IEST-RP-CC001.3 and EN1822 Electrical safety: IEC 61010-1 / EN 61010-1 / UL 3101-1 / CSA C22.2 No. 1010.1-92			
Average Airflow Velocities	Inflow	Initial setpoint: 0.45 m/s or 90 fpm (audible / visual alarm will activate at 0.4m/s or 80fpm)			
	Downflow	Initial setpoint: 0.31 m/s or 61 fpm (uniformity is +/-0.05 m/s or +/- 9.8 fpm)			
Airflow Volumes At Initial Airflow Velocity Setpoints	Inflow	270 cmh / 159 cfm	356 cmh / 210 cfm	441 cmh / 260 cfm	527 cmh / 310 cfm
	Downflow (70%)	581 cmh / 342 cfm	765 cmh / 450 cfm	949 cmh / 559 cfm	1133 cmh / 667 cfm
	Exhaust (30%)	270 cmh / 159 cfm	356 cmh / 210 cfm	441 cmh / 260 cfm	527 cmh / 310 cfm
Cleanliness Within Working Area		ISO 14644.1 Class 3, US Federal Standard 209E Class 1 / M1.5, AS 1386 Class 1.5, JIS B9920 Class 3, BS5295 Class C, Class M10,000 as per KS 27030.1 and equivalent classes of VDI 2083 and AFNOR X44101			
Downflow and Exhaust Filter Type		ULPA filter with integral metal guards and filter frame gaskets; fully compliant with EN 1822 and IEST-RP-CC001.3 requirements (each cabinet has individual downflow and exhaust filters)			
Filter Efficiency Ratings		Minimum: 99.9995% at 0.3µm / 99.9994% at 0.12µm / 99.9991% at MPPS Typical: 99.9999% at 0.3µm / 99.9999% at 0.12µm / 99.9999% at MPPS			
Noise Level		Typically <60 dBA at initial blower speed setting, according to EN 12469:2000 (based on 4 feet model, subject to acoustic properties of test environment)			
Light Intensity		>1200 Lux / >111 foot candles, measured at work surface level (zero background) as per NSF49 test grid			
Maximum Power Consumption / Current	(220-240VAC / 50Hz Models) 1Ph	298W / 1.30A	312W / 1.35A	560W / 2.43A	576W / 2.50A
	(110-130VAC / 60Hz Models) 1Ph	398W / 3.32A	412W / 3.43A	760W / 6.33A	776W / 6.47A
Power Supply Options		Choose from the following options and specify option number when ordering (e.g. AC2-4A2 for a 110-130VAC 60HZ) 1. 220-240VAC 50HZ, 1 phase 2. 110-130VAC 60HZ, 1 phase 3. 220-240VAC 60HZ, 1 phase 4. 110-130VAC 50HZ, 1 phase 5. 100-110VAC 50HZ / 60HZ			
Net Weight (Approximate)		190 kgs / 418 lbs	225 kgs / 495 lbs	260 kgs / 572 lbs	310 kgs / 682 lbs
Max Shipping Weight		285 kgs / 627 lbs	320 kgs / 704 lbs	355 kgs / 781 lbs	405 kgs / 891 lbs
Max Shipping Dimensions (L x W x H)		1200 x 950 x 1880 mm 47.2" x 37.4" x 74.0"	1500 x 950 x 1880 mm 59.0" x 37.4" x 74.0"	1800 x 950 x 1880 mm 70.9" x 37.4" x 74.0"	2100 x 950 x 1880 mm 82.7" x 37.4" x 74.0"
Max Shipping Volume		2.14 cbm / 75.6 cbf	2.68 cbm / 94.6 cbf	3.21 cbm / 113.4 cbf	3.75 cbm / 132.4 cbf

NOTE: Airstream Class II Biosafety Cabinet is also available in 2ft width (AC2-2AX) on special order. Contact Esco for further information.

ESCO® Esco Biotechnology Equipment Division

Esco Biotech is a highly focused manufacturer of laminar flow, biohazard safety and other HEPA-filtered cabinets for the laboratory with a history of quality cabinets since 1978. We are highly oriented towards the international marketplace, with sales in more than 60 countries and 90% of turnover exported. Our products have been independently tested to standards such as AS1807.5 and EN12469. Products are manufactured under an ISO 9001 registered quality system.

Your local distributor: