



# Customising Laboratory Equipment: Biological Safety Cabinets

## Esco Group of Companies

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## Introduction

Esco's Laboratory Department has been designing and manufacturing Biological Safety Cabinets since the company was established in 1978.

Over the subsequent 40 years, every opportunity has been taken to learn about product efficiency, design ergonomics and changing client requirements.

This product evolution has produced a range of market leading equipment that can be tailored to different processes and environments.

A Biological Safety Cabinet is a primary engineering control which provides user protection against biohazards. The inflow air creates an airflow barrier preventing accidental release of biohazards from the cabinet's working area and, at the same time, provides product protection with the airflow barrier inside the work zone, which is created by the downflow air.

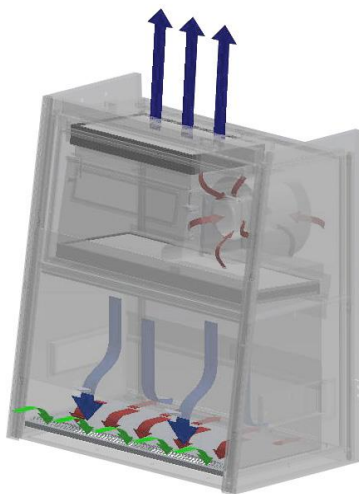
Biosafety Cabinets are divided to three classes depending on the application, inflow velocities and exhaust requirements. *Refer to Table 1.*

**Table 1: Classification of Biological Safety Cabinets (per EN 12469)**

Class	Protection offered	Recirculating Air (%)	Exhaust Air (%)	Biosafety Level
I	Operator Protection only	0	100	1,2 & 3
II	Operator and Sample Protection	70	30	1,2 & 3*
III	Operator and Sample Protection, Sealed enclosure	0	100	1,2,3 & 4

\* Open front cabinets (e.g. Class II BSC) can still be used in BSL 4 facilities but will require positive-pressured personnel suit for laboratory users.

The class II cabinet is the most common safety cabinet of all the different types available. It has a plenum from which 30% of air is exhausted, and 70% re-circulated to the work area as the downflow.



**Figure 1: BSC Class II Airflow Diagram**

### **Airstream® Biosafety Cabinets**

In the European market, the Airstream® range is our biggest selling unit due to its design adaptability, effectiveness and affordability. Airstream® offers a wide variety of models all designed to suit multiple processes and requirements.

The Airstream® E-Series (AC2-E) is available in 2ft to 6ft units and has an antimicrobial coating on all painted surfaces as standard.

With the presence of its DC ECM blower, it is considered an energy-efficient Class II Biosafety Cabinet with 70% energy savings compared to an AC motor.

It also features stable and self-compensating airflow, despite building voltage fluctuations & filter loading. Certified to EN 12469, Esco's Airstream® Class II Biological Safety Cabinet also has an antimicrobial coating on its external painted surfaces for improved safety.

#### **Key Advantages:**

- Sentinel™ Gold Microprocessor Controller displays all safety information on one screen.
- Curved Corner and Glass Side with large corner radius facilitates easily cleaning and enables easy reach of service fixture and outlets.
- Ergonomically-designed raised arm rest helps prevent grill blocking and create a comfortable working posture.
- Low Noise and Ergonomic Design.



**Figure 2: AC2-4E8**

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Another recognized product of the Airstream® Series is the Airstream® Plus Class II Biological Safety Cabinet (E-Series), TUV NORD. These units still have the features of the Airstream® Gen 3 but now upgraded with LED light, dual DC-ECM motor and added with optional hydrogen peroxide injection port for even better decontamination process.

#### Key Advantages:

- Sentinel™ Gold Microprocessor Controller displays all safety information on one screen.
- Motorized window offering an aerosol tight seal with the convenience of moving the window by a fingertip.
- Easy-to-reach service fixtures and outlets, large corner radius for easy cleaning.
- Removable Paper Catch which is easy to clean with optional pre-filter.
- RS 232 data output port enables remote monitoring of cabinet operating parameters.
- Angled Drain Pan that is easy to clean and does not harbor contaminants.



Figure 3: AC2-4E8-TU

#### Labculture® Biosafety Cabinets

The Labculture® combines a multitude of design features to provide optimum operator, product and environmental protection. It utilizes 2 minipleat ULPA (Ultra Low Air Penetration) filters which operate at a typical efficiency of 99.999%.

Ergonomic features include: a 10-degree sloped front sash to minimize glares and reflections and a single-piece steel work zone with the absence of screws or connectors for hassle-free cleaning.

#### Key Advantages:

- Negative pressure plenum surrounds the contaminated positive pressure plenum; no fabric bags are used.
- Night setback mode / standby mode reduces power consumption while maintaining containment.
- A frameless sash that is easier to clean.
- Coved single-piece work surface contains spillage. The absence of screws or connectors in the work zone facilitates ease of cleaning and decontamination.



Figure 4: LA2-4A1-E

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## The Project

Esco was selected as the successful provider of biological safety cabinets (BSCs) by a globally recognised pharmaceutical company.

Generally, our BSCs are a standardised unit with different options available to suit the client's intended processes.

The selectable options include unit sizes from 2ft to 6ft, an Ultraviolet Lamp (UV), electrical outlets and service fixtures for gas, nitrogen, air, water, a vacuum or a universal fixture.

For this specific project, the client needed customisations for both aesthetic and process driven reasons.

The Airstream® TU model and Labculture® model were selected as basis models.

### Airstream® Customisations

The Standard AC2-TU model was customized to have a SS304 external construction and the internal work zone was upgraded from SS304 to SS316.



The client's process required the removal of UV lamp provision on all 12 cabinets.

Two of the Biosafety Cabinets were customized to have 2 IP66 electrical sockets on the left of the chamber.

As for the remaining 10 units, 4 IP66 electrical outlets, data cable glands, and 40 mm thread service fixtures for vacuum and air were added.

### Labculture® Customisations

The remaining 3 Biosafety Cabinet were customised versions of Esco's Labculture® 4 ft. and 6 ft. models.

The unit's external construction was modified to SS 304 while the internal was improved to SS 316. The provision for UV lamp and service fixtures were also removed.

Each unit was modified to have an IP66 electrical outlet, a data cable gland and a stainless-steel name plate. A motorised stainless steel support stand was also added to provide adaptability of the height so that the operator can adjust it to the most ergonomic position.

The final customization was the inclusion of a photohelic gauge with an alarm. This device measures and controls pressures of air or compatible gases.

The addition of an alarm offers safety as it ensures that in any instance where the pressure deviates from the optimal level, it is brought to the client's attention immediately.

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## Project Summary

The customization of Airstream® and Labculture® Biosafety cabinets did not pose a challenge for Esco GB Ltd UK to deliver. The project involved upgrading the materials of the unit and adding several features in order to meet the client's requirements.

As a result of the ability to improve existing standard biosafety cabinets, Esco was able to supply the client with cabinets that matched their process and that fit into their company's aesthetic.

The clients have expressed their satisfaction regarding the overall handling of the project. Throughout the process, weekly reports, updates and photos of progress were submitted to provide the clients with confidence that Esco will be able to complete the project and deliver on time.

With this, Esco has continuously proven to provide customer satisfaction through world-class product and services.

For more information, please visit:  
[www.escoglobal.com](http://www.escoglobal.com)

## We understand your BSC requirements.

Esco offers a wide range of Biosafety Cabinet models to suit your samples, application, and requirements.

### Class I Biosafety Cabinets

#### Airstream® Class I BSC



Model: AC1-4E8



Model AC2-4E8



Model AC2-4D8



Model AC2-4G8



Model AC2-4S8



Model AC2-4E8-TU



Model AC2-4S8-TU

### Class II Biosafety Cabinets

#### Airstream® Class II BSC

### Class II Biosafety Cabinets

#### Labculture® Class II BSC



Model: LA2-4L1

### Class III Biosafety Cabinets

#### Airstream® Class III BSC



Model: AC3-4B1

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