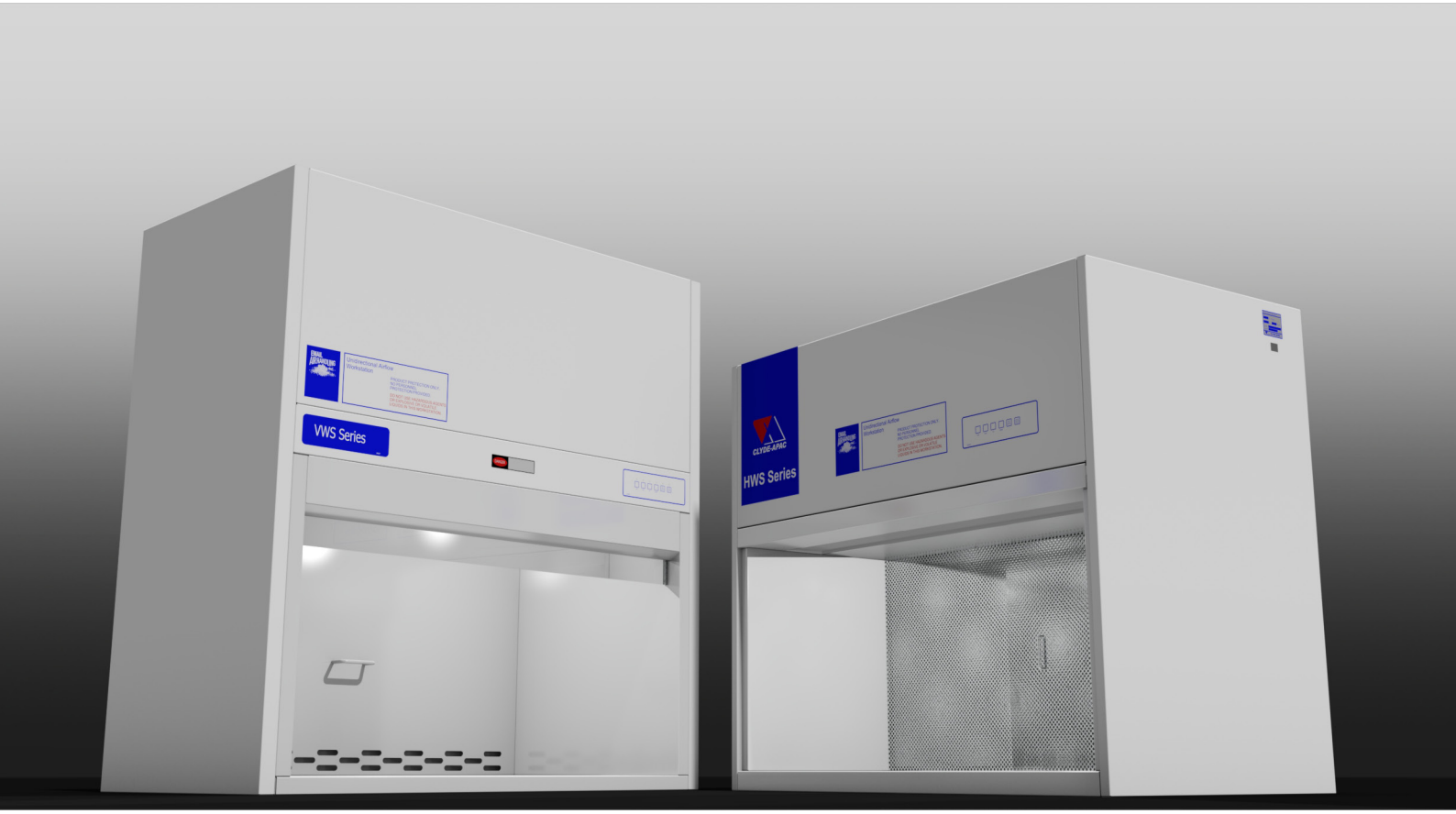
CLYDE-APAC

HWS & VWS SERIES

LAMINAR FLOW CLEAN WORK STATION

OPERATION AND MAINTENANCE MANUAL



AES ENVIRONMENTAL

CLYDE-APAC EMAIL AIRHANDLING VOKES Filtration Technology

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1. INTRODUCTION

Thank you for your decision to purchase a laminar flow cabinet manufactured in Australia by AES Environmental.

AES Environmental has designed and manufactured its HWS & VWS Series to comply with Australian Standard AS2252 Part 6, which specifies requirements for laminar flow cabinets (clean work stations).

AES Environmental maintains an ISO 9001:2008 quality management system to. To ensure that all stages of manufacture are subjected to rigorous checks and that specified quality standards are engrained in each product.

HEPA filters are individually tested and certified for efficiency, integrity and pressure drop before installation in cabinets.

Each cabinet undergoes stringent testing of filter installations, airflows and other performance aspects.

All tests are conducted by a NATA-accredited factory laboratory using calibrated apparatus and test procedures.

Backed by a comprehensive warranty covering the quality and performance of materials and workmanship, HWS & VWS Series cabinets are designed to provide many years of reliable operation.

Your investment in this cabinet and its contribution to your work programme should be protected by regular specialised inspection, testing and certification. AES Environmental maintain fully equipped field service laboratories in major Australian centres.

These laboratories provide comprehensive on-site commissioning, testing and certification services for all safety cabinets, laminar flow systems, cleanrooms and HEPA filter installations.

2. APPLICATIONS AND LIMITATIONS

2.1 APPLICATIONS

HWS & VWS Series cabinets are designed to provide a high degree of product protection in laboratory and production facilities. Many critical applications in the pharmaceutical, medical, scientific and electronics fields demand an ultra-clean work environment which is free from biological and particulate contamination.

HWS and VWS Series cabinets are intended for work involving the handling of non-hazardous (non-toxic and non-infectious) materials in such applications.

2.2 LIMITATIONS

Laminar flow cabinets do not provide personnel or environmental protection, as aerosols from the work zone are directed towards the operator. For applications involving the handling of hazardous materials, appropriate. Email safety cabinets should be specified.

2.2.1 HAZARDOUS MATERIALS

HWS and VWS Series cabinets are not safety cabinets. They are not suitable for use with infectious or toxic materials.

2.2.2 FLAMMABLE MATERIALS

HWS and VWS Series cabinets are not suitable for use with flammable or explosive materials, as the fan motor and other electrical components are in the air stream.

3. HWS CABINET DESCRIPTION AND OPTIONS

3.1 DESCRIPTION

HWS Series cabinets are self contained, bench top laminar flow clean work stations which operate independently of other air-handling systems. Horizontal laminar air flow in the work zone creates a biologically-clean, particle-free work environment.

A direct-drive fan draws in ambient air through a prefilter on the top of the cabinet and supplies it to the work zone through a HEPA filter. The average air velocity in the work zone is maintained between 0.45 and 0.5 m/s, with all velocity readings within ± 20% of their average. Air leaves the work zone through the front opening.

Air cleanliness within the work zone is better than Class 3.5 (100) in accordance with AS1386.1. To enhance work zone air cleanliness, it is recommended that cabinets are installed in cleanrooms which provide a secondary barrier. Such cleanrooms are HEPA-filtered and constructed to provide Class 350 conditions in accordance with AS1386, Part 3.

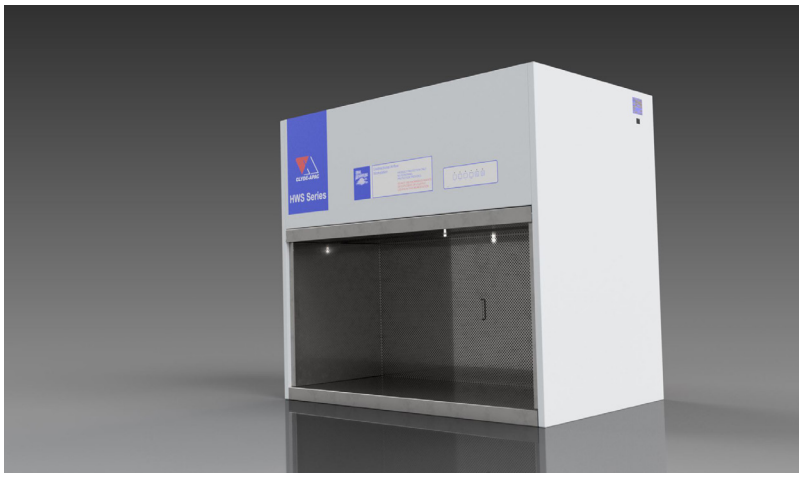
3.2 OPTIONS

Factory options available for HWS Series cabinets are:

- IV hanging rail*
- Hourmeter
- Manometer
- Service taps for air, gas and vacuum*
- Floor stand
- Double sided operation (window on both sides)

**** Fitted in the work zone***

Although these options attract modest additional cost when supplied with a new cabinet, fitting of some items to installed cabinets can be very costly.



4. VWS CABINET DESCRIPTION AND OPTIONS

4.1 DESCRIPTION

VWS Series cabinets are self contained, bench-top laminar flow clean work stations which operate independently of other air- handling systems. Vertical laminar air flow in the work zone creates a biologically-clean, particle-free work environment.

A direct-drive fan draws in ambient air through a prefilter on the top of the cabinet and supplies it to the work zone through a HEPA filter. The average downward laminar air velocity in the work zone is maintained between 0.40 and 0.45 m/s, with all velocity readings within ± 25% of their average. Air leaving the work zone is divided into two main portions. The major part of the airflow leaves through the work opening, and a portion is recirculated to the fan/ HEPA system via perforations in panels which form the lower section of the work zone.

Air cleanliness within the work zone is better than Class 3.5 (100) in accordance with AS2252.6. To enhance work zone air cleanliness, it is recommended that cabinets are installed in cleanrooms which provide a secondary barrier.

Such cleanrooms are HEPA-filtered and constructed to provide Class 350 conditions in accordance with AS1386, Part 3.

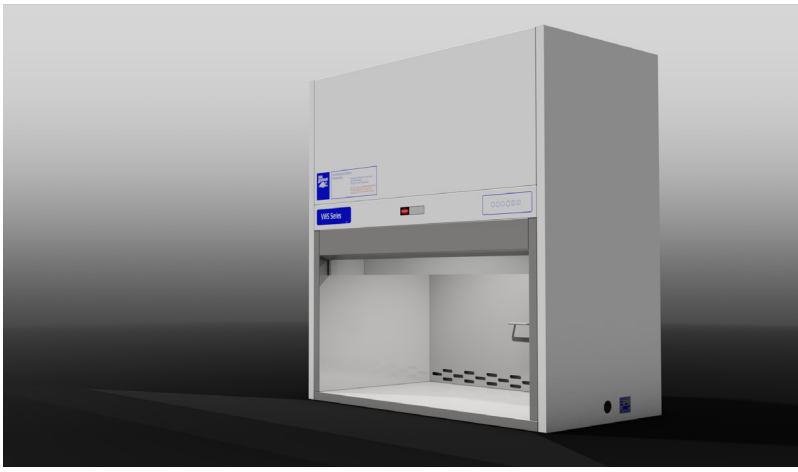
4.2 OPTIONS

Factory options available for VWS Series cabinets are:

- IV hanging rail*
- Hourmeter
- Manometer
- Service taps for air, gas and vacuum*
- Floor stand
- Double sided operation (window on both sides)

**** Fitted in the work zone***

Although these options attract modest additional cost when supplied with a new cabinet, fitting of some items to installed cabinets can be very costly.



5. INSTALLATION, TESTING AND CERTIFICATION

5.1 INSTALLATION

5.1.1 LOCATION

Cabinets should be located in a clean, draught-free area, not subject to air turbulence from air conditioning inlets, room exhausts, personnel traffic and other sources. All windows should be fixed. Work zone cleanliness can be compromised by air turbulence in front of laminar flow cabinets.

Some regulatory authorities may specify that cabinets be installed in a Class 350 cleanroom ***(see 4. above).***

5.1.2 SERVICES

Electrical power and other reticulated services which are required for cabinet operation (such as gas and vacuum) should be provided at the cabinet installation site.

Compliance with local regulations for reticulated services such as gas should be confirmed.

5.2 TESTING AND CERTIFICATION

5.2.1 GENERAL

We recommend that the performance of this cabinet is maintained by regular specialised inspection, testing and certification. All testing procedures should be conducted using calibrated apparatus, in accordance with AS2252.6 and AS1807.

AES Environmental, provides comprehensive on-site maintenance, testing and certification services for cleanrooms, laminar flow work stations, safety cabinets, HEPA filter installations and fume cabinets.

Fully-equipped laboratories staffed by highly skilled service engineers are maintained throughout Australia, and these laboratories are accredited by NATA.

5.2.2 FREQUENCY

Cabinets are tested in the factory and further testing is recommended as follows:

- On site prior to use.
- After any electrical or mechanical maintenance.
- After filter replacement.
- After re-location.
- At least annually.
- If faulty cabinet operation is suspected.

6. CONTROLS

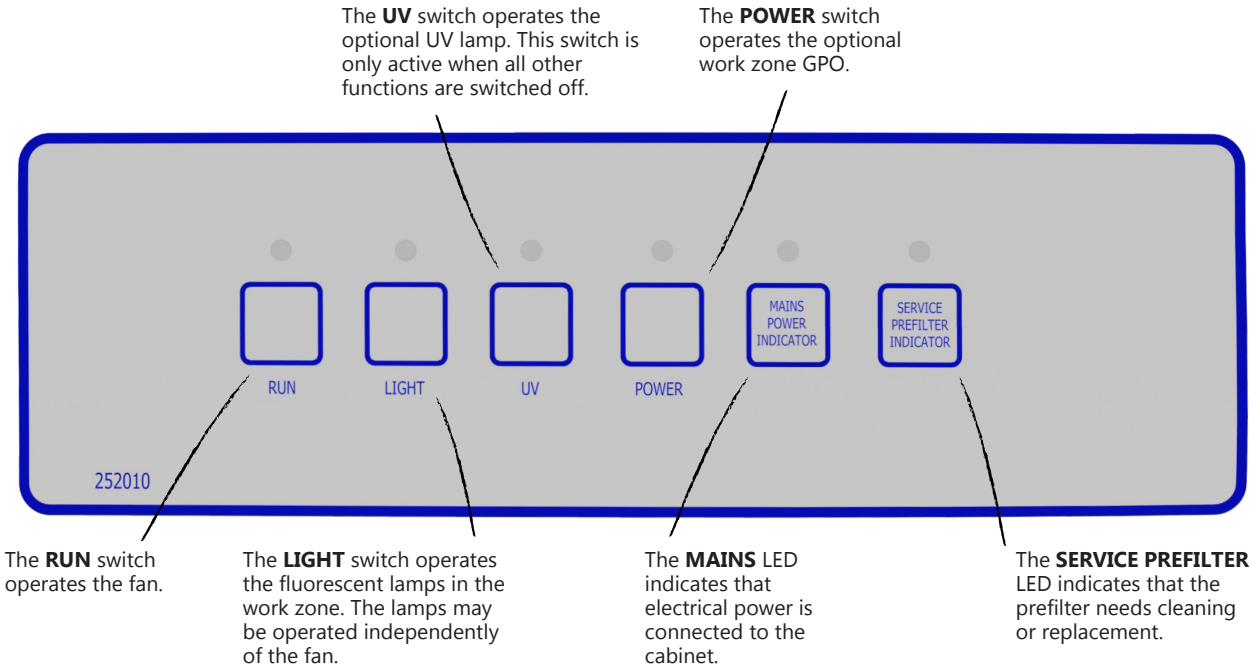
6.1 GENERAL

HWS and VWS Series cabinets are fitted with a low-voltage, touch-control panel to operate standard cabinet functions a general purpose power outlet (GPO) and ultraviolet (UV) lamp.

Light-emitting diodes (LEDs) indicate the status of switchable functions, the prefilter and mains electrical power.

Switches are of the membrane type with a toggle action. A momentary touch on the switch pad will switch the selected function on or off.

6.2 SWITCHES AND INDICATORS



6.3 FUSES

The cabinet electrical system is protected by fuses which are located on the back of the printed circuit board for the control panel.

The fuse specification is as follows:

CABINET CIRCUIT	FUSE RATING (A)
FANS	5
LIGHTS	1
UV OPTION	1
GPO OPTION	5
CIRCUIT BOARD	0.25

7. TECHNIQUES FOR EFFECTIVE CABINET USE

7.1 GENERAL

The function and limitations of cabinets should be clearly understood and be covered in staff training programmes, as should techniques for effective use and cleaning.

Cabinets are open-fronted enclosures and rely on stable, unimpeded airflows and good user technique in order to provide design levels of product protection. Australian Standard AS2252.6 is a recommended guide to the use of laminar flow cabinets.

7.2 PROTECTIVE GARMENTS

Cabinet users should wear suitable clothing. In critical applications, a continuous-fronted garment with adjustable or elasticised wrist closures, or special cleanroom clothing is recommended. Thin, protective gloves are required for some work.

7.3 USE OF THE CABINET

7.3.1 PRE-USE CHECKS

1. Check the test label or certificate to ensure that it is less than 12 months old.

2. Check that the power supply is suitably connected.

3. Switch on the cabinet and check the operation of the following:

- The control panel indicators.
- The fan
- The fluorescent lamps
- Any fitted services, such as gas, power or vacuum.

7.3.2 CABINET SERVICES

1. AS2252.6 states that the use of Bunsen burners is not recommended in laminar flow cabinets as they disrupt the laminar air flow. However, many users wish to use some form of gas burner. If routine use of a gas burner is required, the burner should be of the type which has a pilot light, and only produces full flame on actuation of a touch control.

2. Hose to connect gas supply inside the cabinet should be of the two-ply, reinforced type.

3. Hoses and power leads should not be introduced into cabinets through the work opening.

7.3.3 PRE-OPERATIONAL PROCEDURES

1. Remove unnecessary items from the cabinet.

2. Check that the work zone surfaces are clean. If necessary, wipe down with a suitable cleaning agent/ disinfectant. See 8.2 below. Allow the cabinet to run while being cleaned.

3. Plan work so as to place all materials in, or close to the cabinet and within reach of the operator.

4. Place the working materials in the work surface.

5. Wipe down the external surface of all materials with a suitable cleaning agent/ disinfectant before placing them in the cabinet.

6. Allow the cabinet to run for at least 5 minutes before use so as to stabilise airflows and to clear away any residual aerosols.

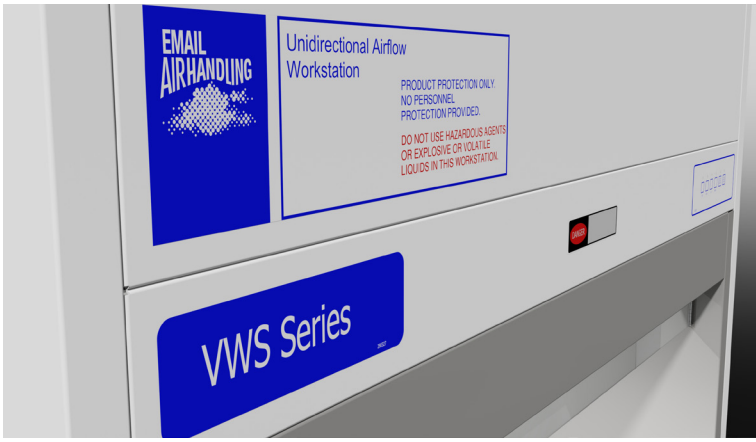
7.3.4 OPERATION

1. Effective contamination control practice should be used to minimise the transmission of contamination into the work zone by the operator's hands and arms, and by uncleaned work materials or equipment.

2. Unnecessary hand and arm movements in, and near the work zone can disrupt airflows and cause cross-contamination

3. Contamination-generating items such as papers, paper products and pencils should not be used in the cabinet.

4. Care should be taken in placing materials in the work zone so as to minimisepotential cross contamination.



5. At the end of work, leave the cabinet running and conduct the following procedures:

a. Clean/disinfect and remove all unnecessary materials to reduce the potential for cross contamination and interruption of airflows; cabinets are not designed for protracted storage of materials.

b. Wipe the work zone surfaces with a cleaning/disinfectant solution.

c. Allow the cabinet to run for at least 5 minutes.

d. Fit the work opening cover/UV shield (if provided).

e. Turn on the UV lamp (if fitted) for 20 minutes. See 10 below.

7.3.5 TROUBLE SHOOTING

7.3.5.1 IF NO AIRFLOW:

1. Check mains power supply.

2. Check 'RUN' switch.

3. Check fuses.

4. Call authorised service technician.

7.3.5.2 IF LOW AIRFLOW VELOCITY:

1. Check mains power supply for low voltage.

2. Check prefilter for obstruction.

3. Check prefilter indicator and service prefilter if necessary.

4. Call authorised service technician.

8. MAINTENANCE, CLEANING AND DISINFECTION

8.1 MAINTENANCE

8.1.1 GENERAL

Under normal conditions of use, regular user maintenance is confined to routine work zone cleaning and occasional prefilter maintenance. Any maintenance requirements outside the scope of those detailed in this section should be entrusted to an authorised service organisation.

8.1.2 PRE-FILTER

An LED on the control panel, which is operated by a pressure sensor, indicates the need for cleaning or replacement of the prefilter. As replacement prefilters are available from all Clyde-Apac branches at low cost, many users may prefer to replace the prefilter when necessary - rather than engage in cleaning them.

For those users who elect to clean the prefilter, the recommended cleaning procedure is as follows:

1. Release the clips and remove the prefilter.

2. Gently tap the filter face-down to remove heavy dust deposits.

3. Gently wash the filter face-down in a warm ***(not hot)*** water and mild detergent solution.

4. Gently rinse the filter face-down with ***low-pressure*** mains water.

5. Allow the filter to ***dry completely*** before refitting.

8.2 CLEANING AND DISINFECTION

Appendix B of AS2243.3 details the properties of common disinfectants and antiseptics. Some disinfectants and cleaning agents, although widely used in cabinets, can present problems unless their limitations are understood and their use is controlled, for example:

(i) Hypochlorite solutions can corrode stainless steel and wet residue should not be left on cabinet surfaces.

(ii) Alcoholic solutions pose a fire hazard and should only be used sparingly and with the cabinet running.

(iii) Abrasive compounds may degrade stainless steel and painted surfaces.

(iv) The grade and quality of stainless steel used in cabinet construction has a high degree of resistance to staining and corrosion, but may be degraded by the use of unsuitable cleaning agents.

9. HEPA FILTERS

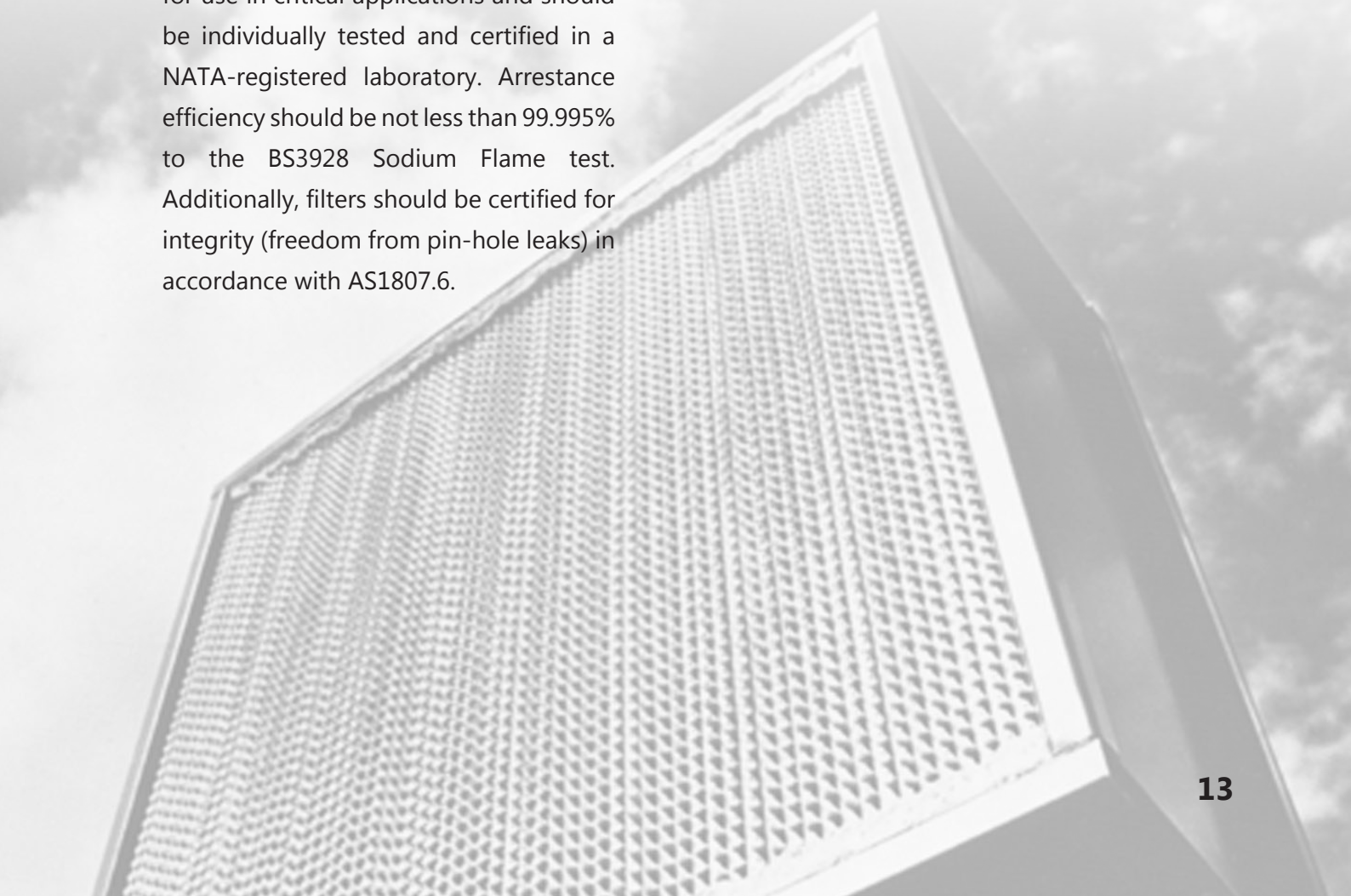
HEPA filters, which arrest sub-micron particles, are the final physical contamination barrier in laminar flow cabinets. They incorporate a very fragile filter medium which is easily damaged by physical contact and which may suffer degradation if splashed with liquid.

HEPA filters can not be cleaned and are normally replaced when their increased resistance to airflow impairs cabinet performance, when excessive leak repair is necessary, or when heavy surface contamination occurs.

Replacement filters should be suitable for use in critical applications and should be individually tested and certified in a NATA-registered laboratory. Arrestance efficiency should be not less than 99.995% to the BS3928 Sodium Flame test. Additionally, filters should be certified for integrity (freedom from pin-hole leaks) in accordance with AS1807.6.

Recommended replacement filters are Clyde-Apac Microseal™ which have been developed for the most-critical applications. Some other filters, although labelled as meeting these requirements, provide no means of traceability of factory test results, and their use can not be recommended.

Determination of the in-situ integrity of HEPA filters and their installation is the most important testing procedure for cabinets. Cabinets with suspected filter damage should not be used until testing of filter integrity has been carried out.



10. UV LAMPS

Many laminar flow cabinets are ordered with an optional germicidal UV lamp fitted in the work zone. The intended use, and occupational health and safety aspects of UV should be understood by laboratory managers and cabinet users, for example:

1. UV can be a useful adjunct to surface cleaning procedures, but should not be seen as a panacea that can replace good cleaning technique.

2. UV lamps should be used for 20 to 30 minutes at the beginning and end of work programmes. They should not be left on for extended periods.

3. Personnel should avoid exposure to UV radiation. Exposure may cause eye damage and erythema. Work opening covers should be in place whenever UV lamps are in use.

4. Radiation intensity reduces over time due to degradation and external staining of lamps. Where the use of UV is a significant element of surface decontamination procedure, regular testing of lamp intensity and lamp replacement should be specified.

5. UV radiation degrades nitrile, plastics and rubber products and organic coatings, such as those used in typical cabinet construction.

11. WARRANTY AND REPLACEMENT PARTS

11.1 WARRANTY

This cabinet is protected by a One (1) year warranty covering all materials, components and workmanship.

We will honour this warranty on advice to a AES Environmental office or authorised distributor with full details of the cabinet, including date of purchase, serial number, and the nature of the fault.

Items which have a limited service life, such as fan motors, fluorescent and ultraviolet lamps and HEPA filters, are not covered in respect of normal degradation over time. Servicing of the cabinet by other than Clyde-Apac technicians or authorised service agents may wholly or partially invalidate the warranty.

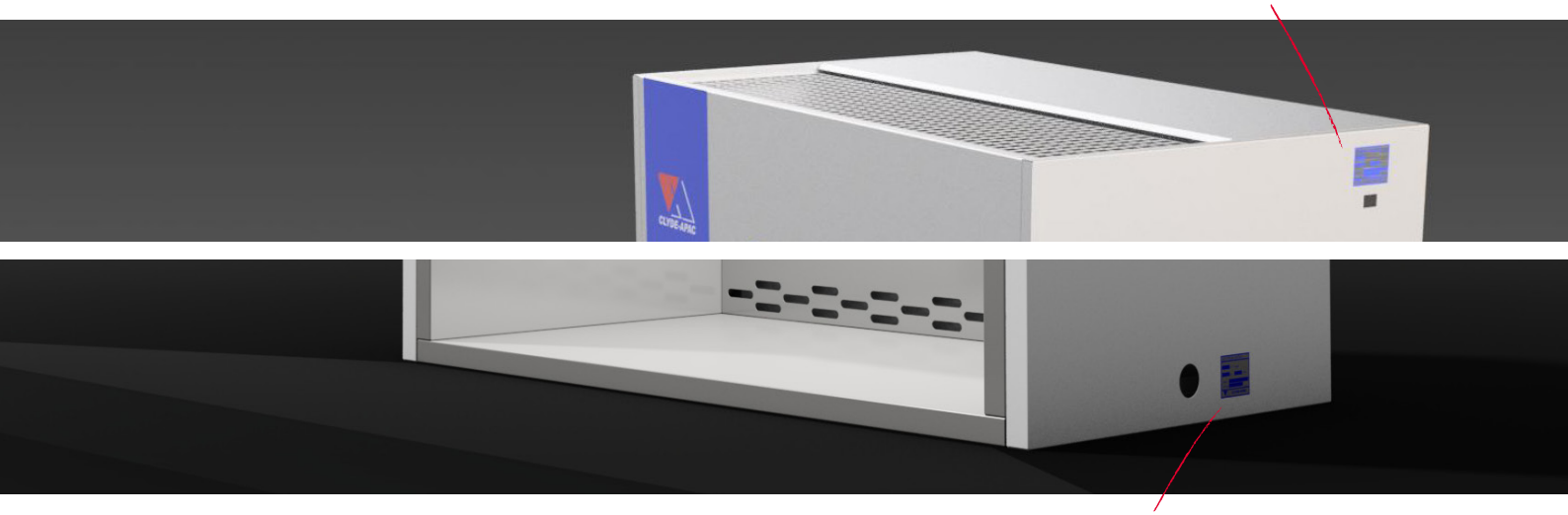
11.2 REPLACEMENT PARTS

Only genuine Clyde-Apac replacement parts should be used in this cabinet. A continuing 100% ex-factory availability of all replacement items is maintained.

The use of non-genuine parts may significantly compromise the protection afforded by the cabinet and may invalidate the warranty. To obtain replacement parts, contact your nearest Clyde-Apac branch or distributor with the following information:

a. Full description of part(s).
b. Cabinet model number and serial number.

HWS - Model and serial number is located on the side, at the top of the cabinet

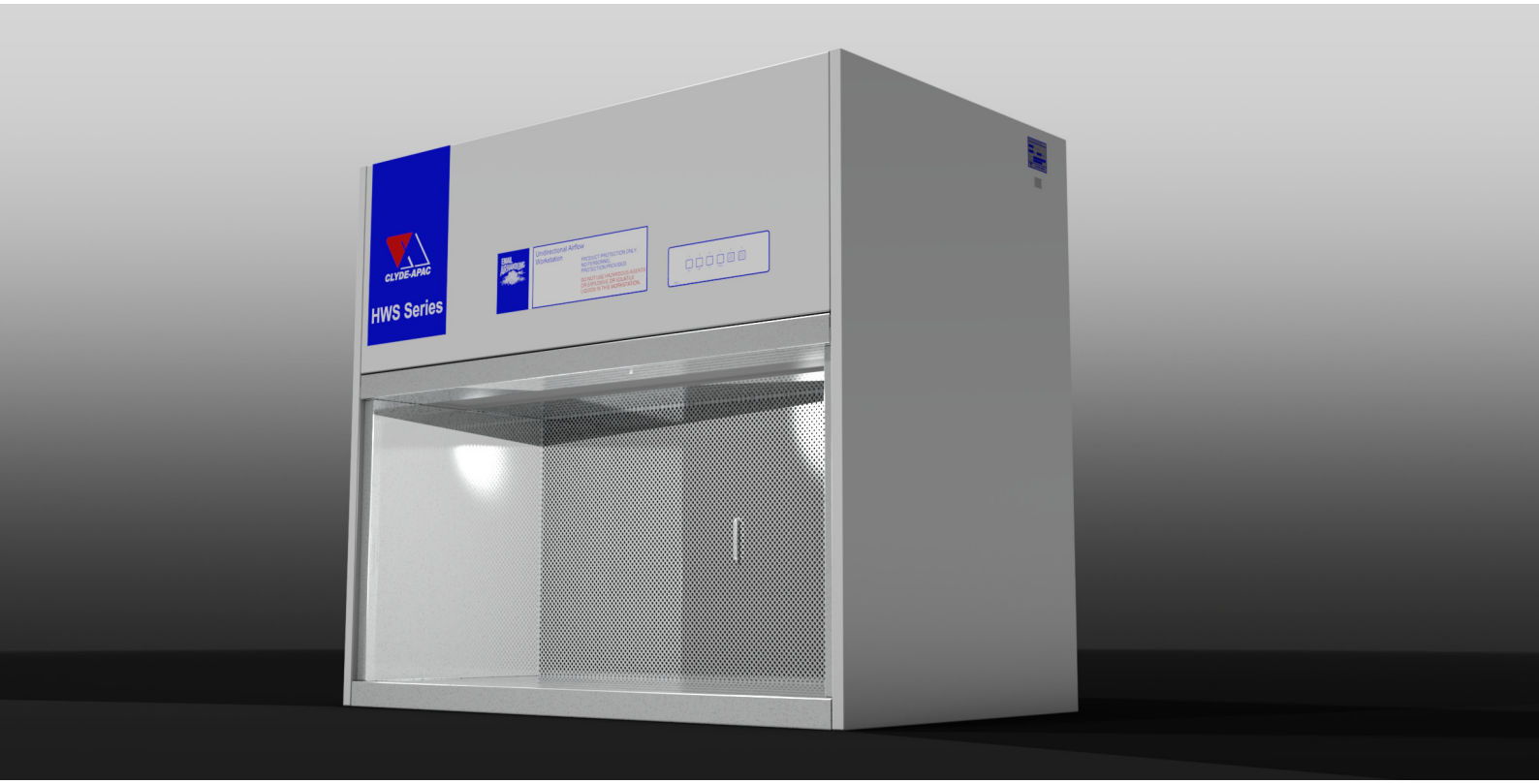


VWS - Model and serial number is located on the side, at the bottom of the cabinet

12. PRODUCT RANGE

In addition to HWS and VWS Series cabinets, AES Environmental manufacture the full range of Clyde Apac standard and custom designed equipment, including:

- Class I biological safety cabinets.
- Class II biological safety cabinets.
- Cytotoxic drug safety cabinets.
- HEPA filter cleanroom modules.
- Laminar flow fume cabinets.
- OTS™ Series laminar flow horizontal and vertical flow operating theatre systems.
- Laminar flow powder containment booths.
- Sterile animal holding units.
- Modular laminar flow cleanroom systems - horizontal and vertical flow
- Custom designs for any application.



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