



A Guide to Animal Containment Workstations



HAZARDS IN HANDLING LABORATORY ANIMALS

– ALLERGENS ISSUE

We can find many articles/paper written on the care of research animals, yet little was written on protecting the health and safety of the people who care for or use these animals. Allergic reactions to animals are among the most common conditions that adversely affect the health of workers involved in the care and use of animals in research. “An estimated 10% of laboratory workers eventually develop occupation-related asthma. Information from 159 American institutions and 93 facilities from 20 other nations indicated that an effective program to control the problem of occupational allergy to laboratory animals remains to be developed. It has been demonstrated that three-quarters of all institutions with laboratory animals had animal-care workers with allergic symptoms”¹.

2

Considerable attention, time and money should be constantly invested to provide for and improve occupational health in many ways such as facility design, work practices, personal protective equipment, caging equipment and complementary materials and accessories. About 33% of animal handlers have allergic symptoms, and approximately 10% have symptoms of animal-induced asthma. Animals or animal products such as dander, hair, scales, fur, saliva, and body wastes contain powerful allergens that can cause both respiratory and skin disorders. Workers at risk include laboratory animal and veterinary technicians, researchers, veterinarians, and others who have prolonged, close association with animals or their secretions or excretions. Also at risk are workers who handle animal products or associated materials such as bedding and feed.

Inhalation is one of the most common ways for allergens to enter the body. After a period of time (often several months, but occasionally many years), workers may inhale sufficient quantities of allergens to become sensitized that is, they develop symptoms when exposed again, even to tiny amounts of the allergen. Airborne exposures to dusts derived from animals are not currently regulated to protect workers from developing allergic problems. The diagnosis of animal allergy or sensitization is made using skin-prick tests, blood antibody tests, and other methods. Symptoms vary among workers who have become sensitized to animals. Mild reactions include sneezing and runny nose.

More serious reactions to an inhaled allergen may result in asthma symptoms such as cough, chest tightness, wheezing, or shortness of breath. In sensitized workers, reactions often occur soon after exposure to the animal or animal product, but they may be delayed for 2 to 8 hours or more. Some animals in research facilities may be inoculated with bio-

¹“A worldwide survey of management practices in laboratory animal allergy” by Irving Lutsky, VMD, Department of Comparative Medicine, Hebrew University - Hadassah Medical School, Jerusalem, Israel (1987).



hazardous agents such as infectious agents and toxic or radioactive chemicals. When such agents are used, the room and cages should be clearly marked and employees should be given instruction on the appropriate and safe methods of handling animals, bedding, and cages. Once an individual becomes sensitized to animals, allergy symptoms can occur after only a few minutes of exposure, or they may be delayed up to 8 hours or more. In severe cases, anaphylactic reactions (including shock) may develop, although rarely.



REFERENCES

ILAR Journal V42(1) 2001 Laboratory Animal Allergy

- **Introduction** *Thomas L. Woffle and Robert K. Bush*
- **Mechanism and Epidemiology of Laboratory Animal Allergy** *Robert K. Bush*
- **Laboratory Animal Allergens** *Robert A. Wood*
- **Controlling Exposure to Laboratory Animal Allergens** *D.J. Harrison*
- **Laboratory Animal Allergy: A British Perspective on a Global Problem** *Susan Gordon*
- **Medical Surveillance of Allergy in Laboratory Animal Handlers** *James P. Seward*
- **Assessment and Treatment of Laboratory Animal Allergy** *Robert K. Bush*

ANIMAL CAGE CHANGING

- STANDARD OPERATING PROCEDURES

Performance Standard: All animals are to be provided a clean living environment so as to maintain optimum health and safety in accordance to regulatory guidelines.

A. General Instruction

- All bedding changes must be done within the individual animal quarters under the “Animal Containment Workstation” with the door closed.
- Once a technician is properly gowned for bedding changes and/or is in the process of a bedding change, he/she must not go into the dirty section of the facility unless they are completely finished with the bedding changes and after-changing maintenance. If a technician has no other choice but to go into the dirty section of the facility, he/she can’t return to the clean section of the facility unless they have degowned the contaminated clothes and go through with gowning process again.
- Cages must be removed from the ventilated rack stall one at a time and changed one at a time. Mass collecting and changing shouldn’t be allowed.
- Spray your gloved hands with disinfectant between each cage change.
- Perform a total animal count during each bedding change

4

B. Pre-Changing Preparation

- Gown up according to the Policies and Guidelines.
- Disinfect all carts used for changing.
- From the clean room take the number of cages, wire lids, top covers, and water bottles necessary to change a particular animal quarter and place them in the cart.
- If using non-sterilized water, fill the water bottles from the “Animal Drinking Water” jug and cap securely.
- After making sure all needed items are in possession, proceed with the items and “dirty” carts to the individual animal quarters scheduled for changing.
- Disinfect the changing surface of the “Animal Containment Workstation” before placing any items on it. Set the disinfectant aside but within the workstation for later use.
- Wheel the bedding bin near the “Animal Containment Workstation”.
- Fill the small plastic food container with the specific diet to be used from the appropriate food bin and bring it into the animal handling workstation.



- Take a few stacks of empty rodent cages, wire lids, and cover tops and place it in the “Animal Containment Workstation”.
- Get a rodent cage and, while leaving it in the “Animal Containment Workstation”, scoop 1 cup (250ml, 8oz.) of bedding from the bin. Pour the bedding into the empty rodent cage in the workstation. Do not take the cage out or pour the bedding outside of the workstation. Repeat the process until all the cages within the changing station are filled.
- After making sure all needed items are in the “Animal Containment Workstation” or around the station within reach, proceed to the ventilated rack system.

C. Cage-Changing Process

- At the ventilated rack system, remove one rodent cage from its slot and bring into the “Animal Containment Workstation”.
- With the cage in the workstation, remove the metal cage ID tag from the cover top and set aside. Then remove the cover top, used water bottle and used wire lid and place the items on the “dirty” cart.
- Spray your gloved hands with the disinfectant. It is not necessary to wipe dry.
- Proceed to remove the rodent, holding it via mid-base of the tail, from the soiled cage and transfer it to a clean cage. If there is more than one rodent in the cage, pick up the rodents one at a time while transferring them to the clean cage. Count the number of animals in the cage.
- Leaving the clean cage with newly transferred animals in the changing station, remove the soiled cage and place it in the “dirty” cart.
- Place a clean wire lid on top of the clean cage correctly; the feeder being on your left, the water bottle slot on your right and the edges of the wire lid sitting evenly on the cage lip edge.
- After checking to make sure the water cap is properly tightened, place a pre-filled water bottle in the designated spot on the wire lid.
- Leaving the clean cage in the changing station, scoop 1 cup (250ml) of the proper diet or as per approved protocols, pour it into the feeder section of the wire lid.
- Place the cover top on the cage with the ventilation holes away from your body, on the rear side of the cage. Make sure the top is fitted properly on the cage and is locked in.
- Attach the metal cage ID tag onto the cover top.
- Remove the clean rodent cage from the changing station and replace it into its proper slot, locking it in.
- Repeat the steps to continue changing the rest of the system.

D. Post-Changing Procedure

- After all the cages have been changed, walk around the ventilated system to make sure all the rodent cages are slotted in properly and locked into place.
- Input the number of animals on the census sheet.
- If there are any soiled items left in the “Animal Containment Workstation”, remove them and place them in the “dirty” cart.
- Spray the working surface of the “Animal Containment Workstation” with disinfectant and wipe clean.
- If the ventilated rack itself is dusty or dirty, get several sheets of paper towels and moisten it with the spray disinfectant. Proceed to wipe the rack with the moisten paper towel. Discard paper towel in the garbage can when finished.
- Spray disinfectant on all the “clean” carts surfaces and wipe.
- Record all activities completed in the animal room on the room check sheet, and on the “individual activity report card”. Report any infractions, discrepancies or/ and any problems to your supervisor.

6

Product Name	Primary Application	Allergen Control	Biohazard Protection
VIVA Dual Access Workstation (VDA)	Cage changing	Yes	No
VIVA Universal Workstation (VA2)	Research procedures	Yes	Yes
VIVA Bedding Disposal Workstation (VBD)	Bedding disposal from soiled cages after charging	Yes	No
VIVA Air Shower (EAS)	Allergen control for personnel entering/exiting the facility	Yes	Not applicable



ESCO'S ANIMAL CONTAINMENT WORKSTATIONS

A. Viva® Dual Access Workstations

The Escó Viva Dual Access Workstation provides operator, product and laboratory environment protection against allergens during animal handling. According to US National Institute for Occupational Safety and Health (NIOSH), animal handlers should ensure measures are taken to protecting themselves from exposure to animals and animal products which can cause occupational hazards such as asthma and allergies. The Viva Dual Access Workstation is our new product which offers the best combination of performance, quality and cost-effective in the market today to meet the safety needs of your organization.



7

Fig 1. Viva® Dual Access Animal Containment Workstation, Model VDA-4A_.

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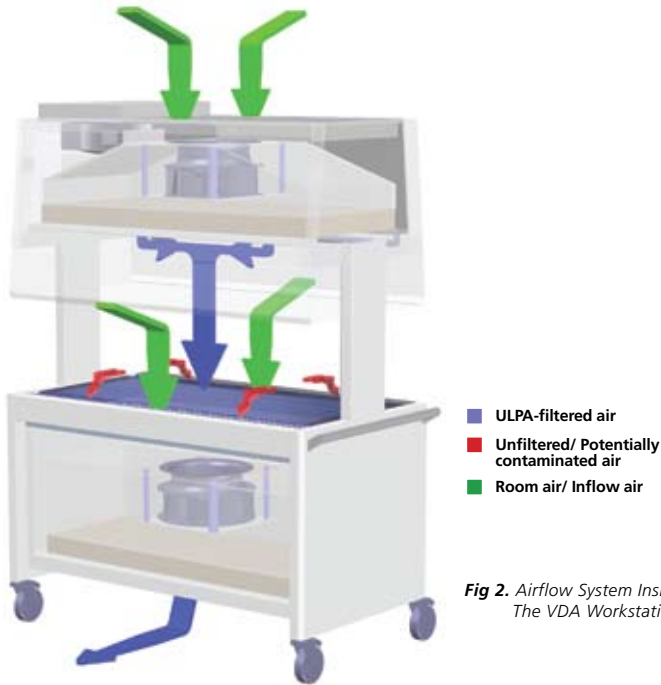


Fig 2. Airflow System Inside The VDA Workstation

1. The Model VDA, Dual Access Workstation employs a total exhaust, non-recirculating airflow configuration.
2. The blower system pulls ambient intake air through the pre-filter, trapping larger dust particles and extending the useful life of the ULPA filter.
3. Air flows through the main ULPA supply filter and bathes the work zone in clean air with a non-turbulent airflow.
4. Recessed air grilles on the peripheral work surface collect ambient air. Combined with vertical laminar downflow, the VDA creates an air curtain to protect the operator from contaminants released from the work surface.
5. An activated carbon filter removes odors.
6. The exhaust ULPA filter removes contaminants before air is returned to the environment.



B. Viva[®] Universal Workstations

The Esco Viva Animal Containment Universal Workstation provides operator, sample and laboratory environment protection against allergens during animal handling. According to National Institute for Occupational Safety and Health (NIOSH), animal handlers should ensure measures are taken to protecting themselves from exposure to animals and animal products which can cause occupational hazards such as asthma and allergies. The Viva Animal Containment Universal Workstation is our new product which offers the best combination of performance, quality and cost-effective in the market today to meet the safety needs of your organisation.

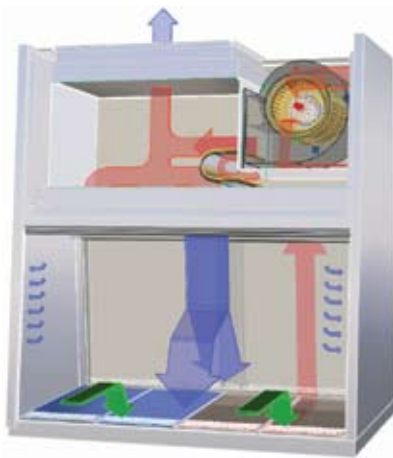


9

Fig 3. Viva[®] Universal Animal Containment Workstation, Model VA2-4A_.

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

Fig 4. Airflow System Inside The VA2 Workstation

10

1. Ambient air pulled through the perforations towards the work zone front prevents 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.
2. Approximately 40% of the air in the common plenum is exhausted through the ULPA filter to the room. The remaining 60% 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.
3. The uniform, non-turbulent air stream protects against cross-contamination within and throughout the work area.
4. Near the work surface, the ULPA-filtered 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 downflow enters the side capture zones at a higher velocity (small blue arrows).
5. A combination of inflow and downflow air streams form an air barrier that prevents contaminated room air from entering the work zone, and prevents work surface emissions from escaping the work zone.

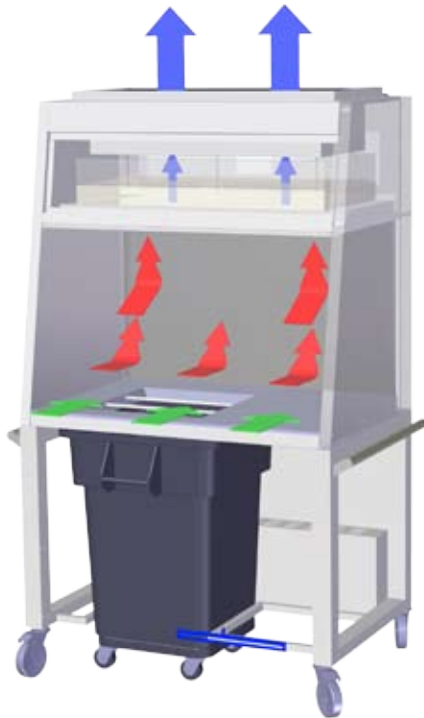


C. Viva[®] Bedding Disposal Workstations

Cage cleaning and bedding disposal procedures are now simpler, safer and more productive with the Viva Bedding Disposal Workstation. Specifically designed for the animal research laboratory, the mobile workstation protects personnel and the lab environment from exposure to allergens and unpleasant odors. The industry-exclusive hydraulic height-adjustable stand allows the work surface height to be adjusted to user preference therefore minimizing strain during repetitive operations. An integrated waste container enables direct disposal of waste items within the work zone.



Fig 5. Viva[®] Bedding Disposal Workstation, Model VBD-4A_



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

Fig 6. Airflow System Inside The VBD Workstation

1. Room air is drawn in across the front of the cabinet with an average velocity of 0.35 m/s (70 fpm).
2. Air is drawn up through the cabinet’s work zone and forced through the ULPA filter (>99.99% typical efficiency for 0.3 micron sized particles).
3. The state-of-the-art baffle system ensures airflow uniformity throughout the cabinet’s main chamber.
4. The ULPA filtered air then returns to the laboratory stripped of all airborne contaminants or is vented through the optional exhaust collar to exhaust ducting for enhanced safety.



SALIENT FEATURES OF ESCO'S ANIMAL CONTAINMENT WORKSTATIONS

A. Safety

At Esco, your safety is of paramount importance to us. Thus our unit has been packed with features that would take your safety to an altogether new level. A highlight of these features is as follows:

- Highly efficient ULPA and activated carbon filters for maximum operator, product and environment protection.
- Audible and visual alarms alert the operator of unsafe sash positions and if airflow is low.
- Red colour-coded access panels to electrical system caution users of potentially dangerous/contaminated parts.
- Automatic pre-purge and post purge cycles ensure correct unit operation and operator safety.
- Electro-galvanized steel sheets used in the outer shell of the units lend enhanced rust resistant properties.

13

B. Performance

The unit is precisely engineered to deliver the required performance anytime you need it.

- Sentinel microprocessor control system monitors all critical unit airflow parameters and alerts the operator through audible/visual alarms in case of any malfunction. Airflow sensors employed are temperature-compensated.
- Temperature compensation leads to improved accuracy of airflow sensor.
- Two 32-watt energy efficient fluorescent lamps with electronic ballast.

The logo for ESCO, featuring the word "ESCO" in a bold, blue, sans-serif font with a registered trademark symbol.

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C. Cleanability

The issue of cleanability is important to ensure easy procedures.

- Work surface can be lifted up and propped up for access to exhaust prefilter and for cleaning. (*VDA & VA2 only*)
- Large drain pan to contain any spillage which can be easily cleaned and drain plug for easy drainage. (*VDA & VA2 only*)

D. Operator Comfort

The features incorporated in this unit allow for greater operator comfort and better working conditions.

- Large working area allows the use of standard rodent cages.
- High, recessed and angled sash openings allow easy access for operators.
- Large wheels improve maneuverability and mobility of unit. Total lock brakes on all wheels ensure station can be held in position.
- Electric hydraulic lift adjusts work surface height to accommodate operators of different heights. (Optional for VA2)
- Electronic ballast for fluorescent lighting results in lower heat output, higher energy efficiency, increased reliability / service life and most importantly zero-flicker.

14

E. Easy Servicing

We design the units in such a way that the number of people required for servicing them is minimal, besides ensuring that the downtime is as short as possible.

- Each unit is supplied with a convenient hand tool kit and extra fasteners.
- Blower hour meter to track blower operating usage for servicing.



F. Cost Savings

Esco uses the permanently lubricated direct drive centrifugal blowers which employ an energy-efficient external rotor type design. This helps Esco units deliver excellent performance while keeping the operating cost low at the same time.

G. Testing

Before being shipped, each individual unit is extensively tested for performance and safety and delivered with a detailed test report and certificate of performance. Testing performed at our factory laboratory includes:

- Operator comfort tests: noise, light, vibration
- Filter efficiency
- Electrical safety to IEC 61010-1

Additional units are also randomly selected on a statistical sampling basis and re-tested using research-grade instrumentation and additional test protocols at our dedicated Product Development Laboratory.



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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