

OPERATOR'S MANUAL

EdgeGARD® VF

Vertical Down Flow Clean Bench



MODELS:

EGVF401, EGVF501, EGVF601

Welcome to Baker

Thank you for choosing to join the growing number of people who are achieving excellence in science and clinical care through clean air, containment, and incubation solutions from Baker. As a fixture in laboratories and clinical settings around the world, Baker takes special pride in helping people just like you to create optimal environments for their work, while providing a safe and comfortable user experience.

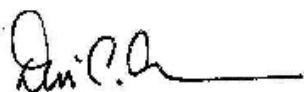
At Baker, nothing is more important to us than the trust you place in our solutions to help you achieve your goals. Whether you are involved with basic scientific research, drug discovery, or patient care, Baker has a proven record of delivering high-performing equipment through an uncompromising commitment to safety, testing, quality, and craftsmanship. Additionally, as a Maine-based family owned business in operation for more than 60 years, you can rest assured that Baker will be there for you throughout the life cycle of your new equipment.

Baker is a pioneer in the field of biological safety, and our reputation is built on taking no shortcuts and making no compromises when it comes to user safety. We are the only manufacturer to routinely subject our own equipment to extensive microbiological aerosol testing in the most challenging conditions – above and beyond what the average user would ever encounter. However, the adequacy of any equipment for user safety in a specific application should always be evaluated. This risk assessment should be performed by an industrial hygienist, safety officer, or other qualified person representing the purchasing organization. Remember that you, the owner and user, are ultimately responsible and that you use this equipment at your own risk.

I recommend that you keep a copy of this manual, along with the factory test report (if applicable), near your new equipment for convenient reference by operators and qualified maintenance personnel. If you have any questions about the use or care of your Baker equipment, please do not hesitate to contact our Technical Service Department for assistance at (800) 992-2537 (+1 207 324-8773 outside the United States) or techsupport@bakerco.com.

Thank you for placing your trust in Baker.

Sincerely,

A handwritten signature in black ink, appearing to read 'David Eagleson', with a horizontal line extending to the right.

David Eagleson
President
The Baker Company, Inc.

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Function of the EdgeGARD® VF

The EdgeGARD® VF is a vertical flow clean bench designed to provide product protection by delivering unidirectional down flow HEPA-filtered supply air to the work area at a velocity of 50-65 feet per minute (fpm) [0.25 to 0.33 meters per second (m/s)]. The EdgeGARD® VF does not provide any personnel or environmental protection against biological, chemical, radiological, or other hazardous substances. Room air is pulled through a prefilter located at the top of the clean bench then into the supply blower. The blower discharges the air into an internal supply plenum where it is forced through a HEPA filter located above the work area. Most of the HEPA-filtered air passes through an air diffuser and flows down into the work area and predominantly out the front access opening. Some of the HEPA-filtered air is diverted down behind the viewscreen creating a downward high velocity momentum air curtain along the rear surface of the viewscreen and also exits the front access opening. Some of the downflow air splits at the work surface level and is pulled towards the front and back work surface perforations. The air is then drawn up the exterior walls under negative pressure and returns to the inlet of the supply blower.

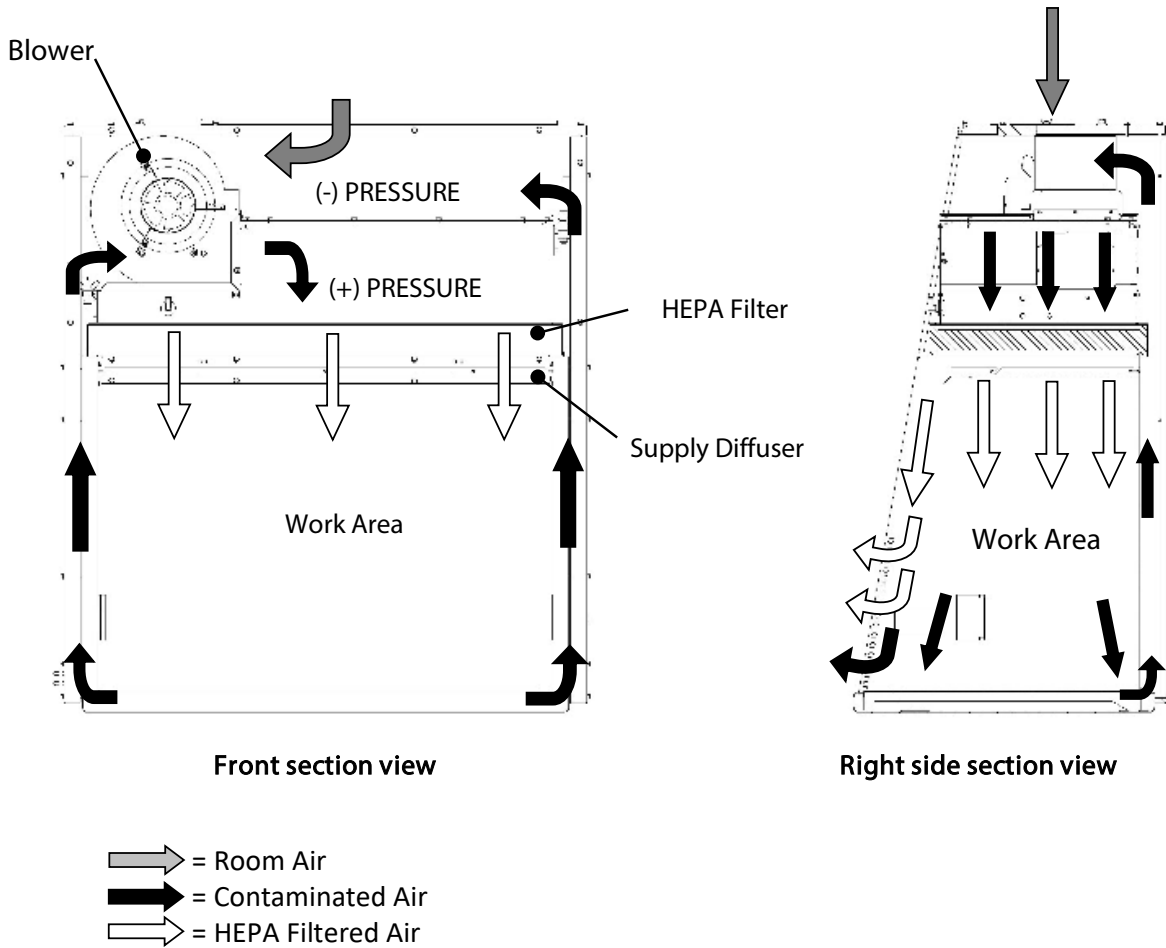


Figure 1. Clean Bench Airflow

Clean Bench Design

Figure 2 below shows the standard construction and components of the clean bench.

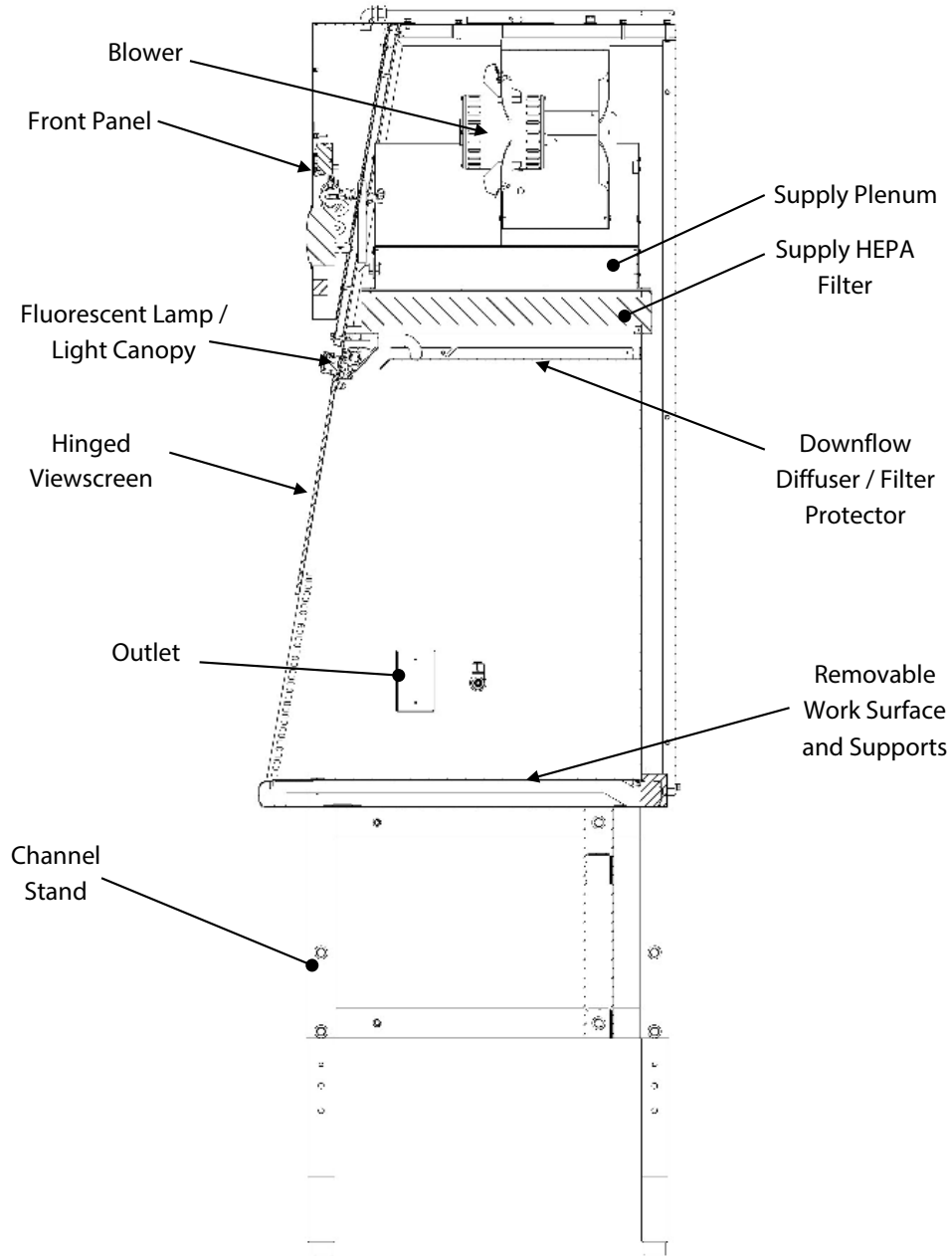


Figure 2. Clean Bench Features

Regulatory Compliance

Standards

This Baker product has been designed, manufactured and tested to comply with the following regulatory standards **where applicable**. Unless stated otherwise, the most recent edition of these standards has been applied.

Electrical, Mechanical, Fire and Personal Safety:

Electrical Equipment for Measurement, Control and Laboratory Use, General Requirements

US: UL61010-1

CANADA: CAN/CSA C22.2 No. 61010-1

INTERNATIONAL: Low Voltage Directive 2006/95/EC; EN61010-1

Safety for Laboratory Hoods and Cabinets

US: UL 1805

ANSI/ASHRAE 110-1995: Method of Testing Performance of Laboratory Fume Hoods

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

1791 Tullie Circle, NE, Atlanta, GA, 30329

www.ashrae.org.

Electromagnetic Compatibility:

Electrical Equipment for Measurement, Control and Laboratory Use, EMC Requirements

INTERNATIONAL: Directive on Electro Magnetic Compatibility, EMC Directive 2014/30/EU; EN61326-1

Hazardous Waste Abatement:

Directive on Restriction of Hazardous Substances, RoHS Directive, 2011/65/EU; EN50581

Directive on Waste Electrical and Electronic Equipment, WEEE Directive, 2012/19/EU

Biological Safety:

US: Biosafety Cabinetry Certification; NSF/ANSI 49

INTERNATIONAL: Biotechnology – Performance criteria for microbiological safety cabinets; EN 12469

Industry Guideline References:

IEST-RP-CC002.3: Unidirectional Flow Clean-Air Devices,

Institute of Environmental Sciences and Technology

Cautionary Notes

Hazards may still exist, especially if the clean bench is not installed, operated and maintained in accordance with the instructions in this manual and the service manual.

This clean bench may be affected by high levels of electromagnetic radiation from other electronic devices that are being used in close proximity or connected to the same facility power system.

This clean bench may cause radio interference or affect the operation of other equipment in close proximity. Mitigation measures such as relocation, re-orientation, or shielding may be required.

Standard Features

Controls

The operator controls and indicators are arranged in a switch assembly on the front of the clean bench. There are switches for blower, fluorescent light, and outlets. See the **Controls** section in this manual for more detail.

Drain Pan

The drain pan is constructed of stainless steel with smooth corners to facilitate cleaning and disinfection.

Filter

CAUTION

**Filter media is very delicate and should never be touched.
Only qualified technicians should replace HEPA filter.**

Supply

The High Efficiency Particulate Air (HEPA) filter consist of a continuous sheet of glass fibers pleated and mounted in a rigid frame. The supply filter inside the clean bench is scan-tested HEPA filter. They are 99.99% effective in removal of the most penetrating particle size (mpps) (0.3 micron). Each filter is leak checked after

installation in the clean bench and prior to shipment. HEPA filter are not intended to filter gasses or vapors. Since this clean bench is partially recirculating, there could be gaseous buildup to the point of equilibrium if gasses or vapors are used. Misuse of chemicals, Bunsen burners, or a heavy dust load will shorten the filter's life.

High Velocity Return Air Slots

High velocity return air slots are located at the front access opening on both sidewalls and horizontally along the top of the access opening behind the viewscreen. The purpose of the slots is to improve the clean bench integrity by capturing any particulates at these critical transitions.

Lighting

The work area is illuminated to provide a typical average light intensity of 100 foot-candles [1076 lux] at the work surface. This clean bench features solid-state electronic ballasts for the visible and optional UV lighting. These ballasts increase reliability, efficiency and service life with lower heat output.

Motor/Blower

The motor and blower are built as a single assembly and balanced to minimize vibration. The motor/blower system automatically compensates for an increase in pressure drop across the filter(s) without reducing the total air flow rate by more than 10%. The air flow capacity of the clean bench is measured by the ability to provide a nearly constant volume of air as the filter resistance to airflow increases.

Motor Speed Control

The StediVOLT™ speed controller compensates for normal fluctuations in line voltage and is designed to maintain relatively consistent air flow when the clean bench filter(s) load. This helps to maintain airflow in the clean bench.

Outlets

This clean bench has an outlet in the right sidewall for powering instruments inside the work area. The outlet is rated at 5 Amps total. On 115V clean benches the outlet is protected by a Ground Fault Circuit Interrupter (GFCI).

Pressure Plenum (UniPressure™ Preflow Plenum)

The plenum design directs air across, then through the supply filter improving downflow air uniformity, extending filter life and reducing noise. The plenum provides an evenly distributed filter clamping force assuring a secure and sealed filter.

Pressure Monitor

The clean bench has an analog pressure gauge which displays the clean bench negative operating pressure.

Stand

Telescoping Stand

The telescoping stand has adjustable legs and leg levelers. The legs provide a maximum height (from the bottom of the drain pan to the bottom of the leg levelers) of 36 ⁵/₈ in [915mm] and a minimum height of 28 ¹/₈ in [711mm].

Viewscreen

The clean bench viewscreen is constructed of acrylic. It has a hinge mechanism at the top to allow access to the work area, which can lock the viewscreen in the open position. The lock is activated by sliding the viewscreen to the right in the fully open position, and released by lifting and sliding the viewscreen to the left.

Work Surface

The work surface is constructed of stainless steel. This surface is finished to reduce light reflection. The work surface and work surface supports are removable allowing access to the drain pan.

Working Access Opening Height

The standard access opening is 14 in [356 mm].

Optional Features

Anchoring Systems

Anchors

Floor and wall restraints are available without California OSHPD pre-approval.

Cable Port

Cable ports can be located in the left or right sidewall. Cable ports provide a safe means of introducing power and/or data cables, siphoning tubes, etc., into the work area of the clean bench without having to use the front opening.

Deep Well

The deep well option provides a lowered work surface for better ergonomics and more vertical space.

Foot Rest

An adjustable ergonomic foot rest is available for added operator comfort.

IV Bar

The clean bench can be equipped with an intravenous (IV) bar to facilitate the hanging of required materials.

Service Connections

Hardware

Stainless steel petcocks, needle valves, and stainless steel needle valves are all available as plumbing hardware.

Quantity and Exiting Direction

Factory installed services are available on either sidewall. Other optional configurations available from the factory are located on the rear or top of the clean bench exterior as well as on the left side of the clean bench.

Material

Optional plumbing is available in black iron piping, copper or stainless steel.

Powered Hydraulic Lift Stand

Cradle Lift

The cradle lift is a stand provided with an electric motor driven hydraulic pump that allows height adjustment to help with worker comfort. This stand is shaped to allow the clean bench to set in between the lifting cylinders giving greater ability to fit through doorways or into rooms with low ceiling heights. The lift stand has 5 in [127 mm] diameter casters for moving the clean bench. Pull bars come standard with the cradle lift, and allow for ease of workstation movement.

Proper Clean Bench Use

CAUTIONS

- A clean bench provides product protection only.
- Hazardous materials should never be used with this clean bench.
- Explosive or flammable substances should never be used in this clean bench.
- Biological, chemical, radiological, or other hazardous substances should never be used in this clean bench.
- A clean bench is a valuable supplement to, but not a replacement for, good laboratory technique and safe practice.
- If the operator does not operate the clean bench correctly, it may not provide adequate protection. To ensure product protection the workstation must be operated per the manufacturer's instructions.

Baker clean benches are designed for continuous operation. It is recommended that the blower be left on at all times to provide isolation and keep the interior work area clean and free of particulates.

Reference sources are *National Sanitation Foundation (NSF) Standard 49 Annex E*, and *The Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th edition* published by the U.S. Department of Health & Human Services as HHS Publication No. (CDC) 21-1112'.

The facility industrial hygienist, pharmacist or biosafety officer shall ensure that:

The clean bench is appropriate for all operations and procedures to be performed.

All operators are thoroughly trained and competent regarding clean bench operation and all procedures they are required to perform.

That the clean bench operation, procedures, and operators are monitored at regular intervals to ensure that safety is maintained.

Controls

The operator controls with indicators are arranged on the front control panel of the clean bench.

[Reference Figure 3]

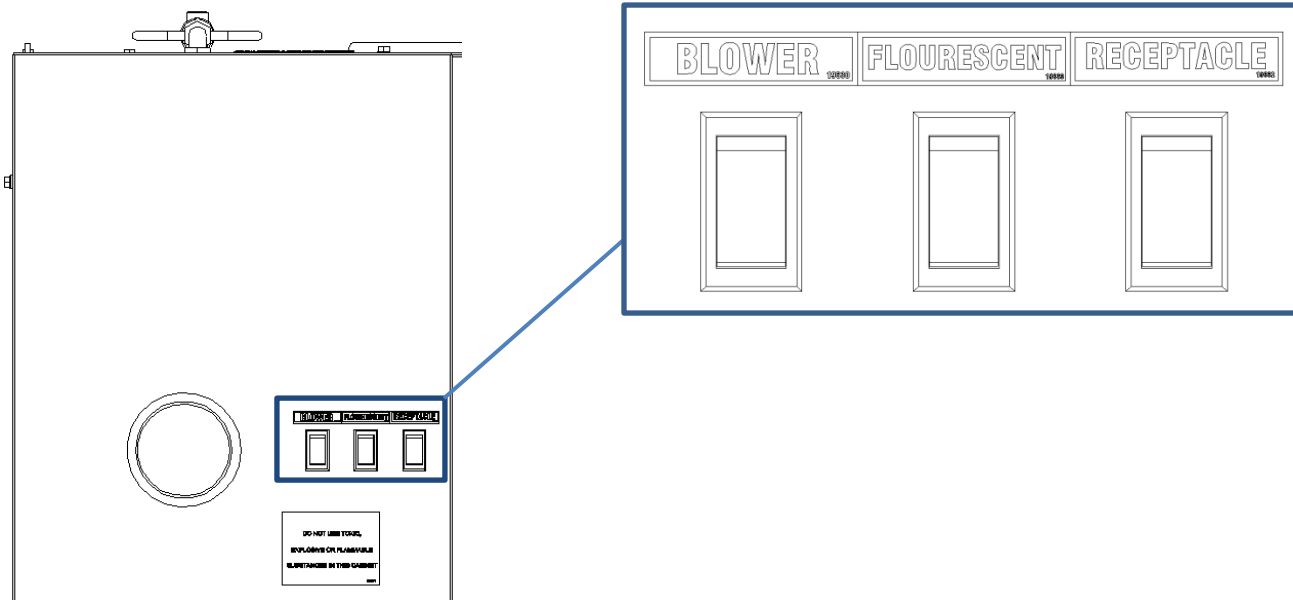
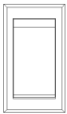


Figure 3

BLOWER



Blower On/Off – This switch controls the power to the clean bench blower. A red indicator light located in the switch will illuminate when it is on.

FLOURESCENT



Fluorescent Light On/Off – This switch controls operation of the fluorescent light. A red indicator light located in the switch will illuminate when it is on.

NOTE: The blower switch must be turned on for the fluorescent light to operate.

RECEPTACLE



Receptacle On/Off – This switch controls the outlets in the work area. A red indicator light located in the switch will illuminate when it is on.

Operation

Pressure Monitor

The clean bench pressure monitor measures and displays the clean bench negative pressure. This pressure is measured at the inlet to the clean bench blower.

Blower

The motor and blower are built as a single assembly and balanced to minimize vibration.

The blower motor system is designed to automatically compensate for an increase in pressure drop across the filter without reducing total air flow rate by more than 10%. The airflow capacity of the clean bench is measured by the ability to provide a nearly constant volume of air as the filter resistance to airflow increases. The motor control also compensates for normal variations in power to the clean bench.

Fluorescent Light

The fluorescent lighting is designed to provide an average intensity of greater than 100 foot candles at the clean bench work surface.

The blower must be on for the fluorescent light to operate.

Receptacle

The circuit powering the outlet circuit is protected by a self-resetting circuit breaker(s) which allows a total of 5 Amps on all outlets. This helps protect the primary clean bench controls from inadvertent overloads of the clean bench outlets. The clean bench is typically equipped with an outlet in the left sidewall of the work area.

For 115V AC/60Hz clean benches, the outlet circuit is also protected by a Ground Fault Circuit Interrupter (GFCI). The GFCI outlet is typically installed in the left sidewall. When optional outlet(s) are installed they are wired such that they are also protected by the GFCI. If the GFCI is tripped by the presence of an unsafe condition a red indicator on the GFCI will be on and the reset button on the front of the GFCI will be extended. Once the fault condition is corrected press the [RESET] button on the GFCI to reconnect power to the outlets. There is also a [TEST] button on the front of the device. The manufacturer recommends that the GFCI device be tested monthly to assure safe operation.

Start-up Procedure

The operator should have read and understood the controls and operation section of this manual prior to performing this procedure.

1. If the clean bench has not been left running continuously, turn on the blower. An indicator light located in the rocker switch will illuminate when it is on. Listen for the sound of the clean bench blower running.
2. With the viewscreen placed at the safe design opening, check the reading on the analog pressure gauge; the displayed value should remain consistent with the recorded value in the most recent certification report. A significant change in pressure should be cause for investigation. This device is not intended to be used for air flow set-point verification.
3. Turn on the fluorescent light. The indicator light within the switch will illuminate along with the interior work area. The fluorescent light will not operate unless the blower is on.
4. Check to determine that the drain valve is in the closed position.
5. Wipe down all interior surfaces of the clean bench work area with an appropriate surface disinfectant.

IMPORTANT

Some disinfectants, such as bleach or iodine, may corrode or stain the steel surfaces. Good practice is to thoroughly rinse the surface afterward with sterile water and wipe completely dry to prevent corrosion.

6. Place all materials to be used for the procedure on the solid section of the work surface inside the clean bench. This may require raising the viewscreen. Blocking the perforated grilles must be avoided. **Disinfect the exterior of these materials prior to placing them on the work surface.** Everything required, and only what is required, should be placed in the clean bench before beginning work so that nothing passes in or out through the air barrier until the procedure is completed. Implements should be arranged in the clean bench's work area in logical order so that clean and dirty materials are segregated, preferably on opposite sides of the work area. If wipes or absorbent towels are used on the work surface, be sure to keep them away from the grilles.
7. After equipment is in place inside the clean bench, adjust the sliding viewscreen to the safe design opening. This position is important to maintain proper clean bench airflow.
8. Before using, allow a minimum of three minutes with the clean bench operating in its normal safe configuration to purge any contaminants or suspended particulates.

Working in the Clean Bench

This section contains some suggested basic work practices that should be observed when using a clean bench. It is not intended to be a comprehensive list for all applications. A good reference source is *The Biosafety in Microbiological and Biomedical Laboratories* (BMBL) 5th edition published by the U.S. Department of Health and Human Services as HHS Publication No. (CDC) 21-1112 advisory document for safe work practices.

The operator's hands and arms should be washed thoroughly with germicidal soap both before and after working in the clean bench. It is recommended that long-sleeved gowns or lab coats with tight-fitting cuffs and sterile gloves are worn, to minimize the shedding of skin, or related contaminants, into the work area and to protect hands, arms, and clothing from contamination.

Avoid using floor-type pipette discard canisters. It is important that used pipettes be discarded into a tray or other suitable container inside the clean bench. This reduces unnecessary movement in and out of the work area. Because of the restricted access, pipetting within the clean bench will require the use of pipetting aids.

Work should be performed using slow movements, and the number of movements should be limited as much as possible. All materials required should be placed in the clean bench prior to starting a procedure to reduce the need for the operator to move arms in and out of the clean bench through the air barrier.

Room airflow can significantly affect clean bench operation. Opening and closing doors in the laboratory can cause air disturbances which might interfere with clean bench airflow. This kind of activity should be kept to a minimum while the clean bench is in use. Personnel should avoid walking by the front of the clean bench while it is in use. The location of facility air diffusers and personal fans can have an adverse effect on clean bench safety.

When a procedure has been completed, all equipment that has been in contact with the research agent should be enclosed and the entire work surface decontaminated. Trays of discarded pipettes, glassware, etc., should be covered. Once this has been done, remove all equipment from the clean bench.

WARNING

Never use the clean bench to store supplies or laboratory equipment.

After removing all materials, culture apparatus, etc. from the clean bench, decontamination of the interior surfaces should be repeated. Check the work area carefully for spilled or splashed nutrient that might support bacterial growth.

It is recommended that the clean bench be left running continuously to ensure cleanliness.

Using Ancillary Equipment

The more equipment and material that is placed in the clean bench, the greater the possibility of disrupted airflow. The resulting turbulence can alter the designed airflow and reduce the effectiveness of the clean

bench. When equipment which rotates, vibrates or heats is used, be sure to place it at the rear of the work area if possible. This will help minimize the turbulence at the access opening.

Reacting to Spills

Even when good work practices are used, occasional spills may occur. All spills should be dealt with immediately to prevent contamination and to avoid any damage to the stainless steel surfaces. It is recommended that the operator, in coordination with the facility safety professional, have a written plan available in case of an accidental exposure or spill. The safety plan should include all of the emergency procedures to be followed in the event of an accident. All employees who use the clean bench should be familiar with the safety plan.

Cleaning and Disinfecting Stainless Steel

IMPORTANT

After cleaning and disinfection, all surfaces should be rinsed with sterile water and wiped completely dry.

Simple Cleaning

IMPORTANT

Do not use steel wool or steel pads when cleaning stainless steel.

Dirt deposits on stainless steel (dust, dirt and finger marks) can usually be removed using warm water, with or without detergent. If this does not remove the deposits, a mild, non-abrasive household cleaner can be used with warm water and bristle brushes, sponges or clean cloths.

Iron rust discoloration can be treated by rubbing the surface with a solution of 15% to 20% by volume of nitric acid and water and letting it stand for one to two minutes to loosen the rust. The proper safety equipment should always be used when handling acids.

Disinfection

The purpose of disinfection is to destroy any organisms that could pose a potential health hazard or compromise the integrity of the experiment. To ensure an organism is killed it is important to use a disinfectant in the proper concentration that is known to be effective for the specific organism. Standard disinfectants include: Iodophor-detergent, ethanol, phenol, and other alcohols. Hypochlorite (chlorine bleach) can also be used in dilute concentrations. Caution should be used, as hypochlorite can cause pitting and/or cracking of stainless steel if it is either too concentrated or not completely removed from the surface

in a timely manner. Allow an appropriate time to lapse for deactivation purposes (ref. *BMBL* 5th Edition) depending on the type of disinfection agent used. Follow up with a sterile water rinse and wipe completely dry to protect the stainless steel surface.

Disinfect the work area and work surface before and after every procedure.

Disinfect surfaces of all equipment used.

Remove all items from the inside of the clean bench.

Place all items that may have come in contact with the agent(s), such as used pipettes, in a plastic bag or other suitable container.

Disinfect the entire inside surface of the clean bench.

For additional information on cleaning and disinfecting stainless steel, please refer to: "Decontamination, Sterilization, Disinfection, and Antisepsis," Vesley, Donald and Lauer, James L., *Laboratory Safety Principles and Practices*, 2nd edition, 1995, Fleming, D.O., Richardson, J.H., Tulis, J.J. and Vesley, D., editors, ASM Press, Washington, D.C., pp. 219-237; and *Biosafety Reference Manual*, 2nd edition, 1995, Heinsohn, P.A., Jacobs, R.R. and Concoby, B.A., editors, AIHA Publications, pp.101-110.

Cleaning Spills

CAUTION

It must be assumed that the drain pan is contaminated.

Spills on the work surface should be first cleaned and disinfected. Spills that fall through the perforated grilles in the work surface should be cleaned up and all waste put in an appropriate disposal container inside the work area. The remainder can be removed through the drain valve in the drain pan after proper decontamination of the work area. To clean the drain pan under the work surface, lift the work surface, completely surface decontaminate the work surface including the underside and work surface supports, then remove all decontaminated items from the work area. Removing these parts provides unobstructed access to the drain pan for easy cleaning. The drain valve must be closed when cleaning of the drain pan is completed. Before reinstalling the work surface and supports, disinfect all surfaces.



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This manual includes information for proper clean bench operation.

We recommend that the manual be kept near the clean bench for ready reference.