

Protector[®] Glove Boxes

*Protecting your
laboratory environment*

For more information, please contact us:

[ExpotechUSA](#)
[10700 Rockley Road](#)
[Houston, Texas 77099](#)
[USA](#)

[281-496-0900 \[voice\]](#)

[281-496-0400 \[fax\]](#)

E-mail: sales@expotechusa.com

Website: www.ExpotechUSA.com

Glove Boxes, An Overview



The purpose of a glove box is to provide a physical barrier.

Depending on the type of glove box, the physical barrier may be:

- ✚ Isolating a sensitive material from outside environmental contamination.
- ✚ Protecting the operator from hazardous materials.

What is a Glove Box?



- ✚ A sealed enclosure where all handling is through gloveports.
- ✚ Used for personnel and/or product protection.

Selecting the right Glove Box



- ✚ Choose the Controlled Atmosphere Glove Box when an inert atmosphere is needed.
- ✚ Choose the Multi-Hazard Glove Box when a ventilated, particulate-free atmosphere and filtered exhaust is needed.

Protector[®] Controlled Atmosphere Glove Box



- ✚ Maintains an inert atmosphere, i.e. nitrogen or argon.
- ✚ Protects air-sensitive materials, i.e. inorganics, organics, organometallics and biochemicals.
- ✚ Protects materials from oxygen and moisture contamination.

LABCONCO[®]

Controlled Atmosphere Glove Box

Transfer Chamber

- ✚ Allows quick and easy material transfer to and from main chamber.
- ✚ Achieves deep vacuum level of $-29''$ Hg.

30" of mercury is considered absolute vacuum

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Controlled Atmosphere Glove Box

Main Chamber



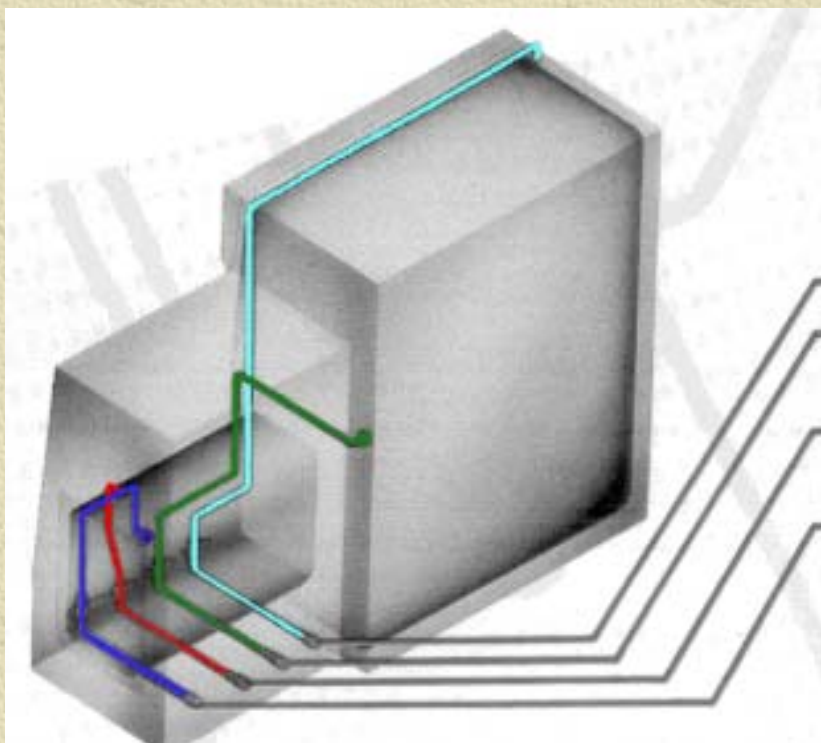
- ✚ Allows easy manipulation of materials in a sealed chamber using gloves.
- ✚ Operates within a positive or negative pressure range of -6 to +6 inches of water.

Inches of water is a much smaller pressure measurement than inches of mercury. 1" H₂O = 0.073" Hg

Controlled Atmosphere Glove Box

Operation Basics

- ✚ The Main Chamber and Transfer Chamber are connected to compressed gas and vacuum pump with dedicated tubing.
- ✚ Plumbing lines allow chambers to be evacuated, then filled with pure gas.
- ✚ By manipulating the gas pressures, oxygen and/or moisture contaminants are replaced with a pure gas atmosphere.



Glove Box Inlet Connection

Glove Box Outlet Connection

Transfer Chamber Inlet Connection

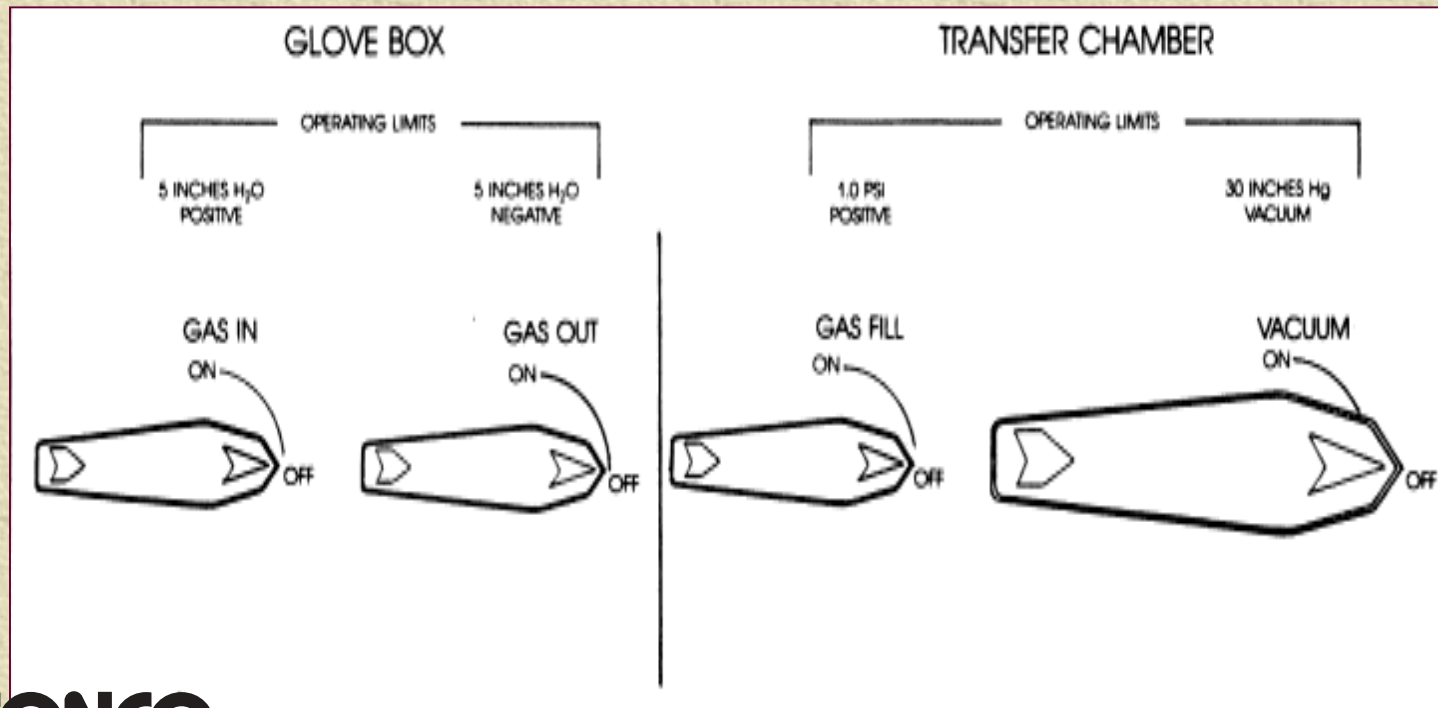
Transfer Chamber Outlet Connection

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Controlled Atmosphere Glove Box

Manual Valves

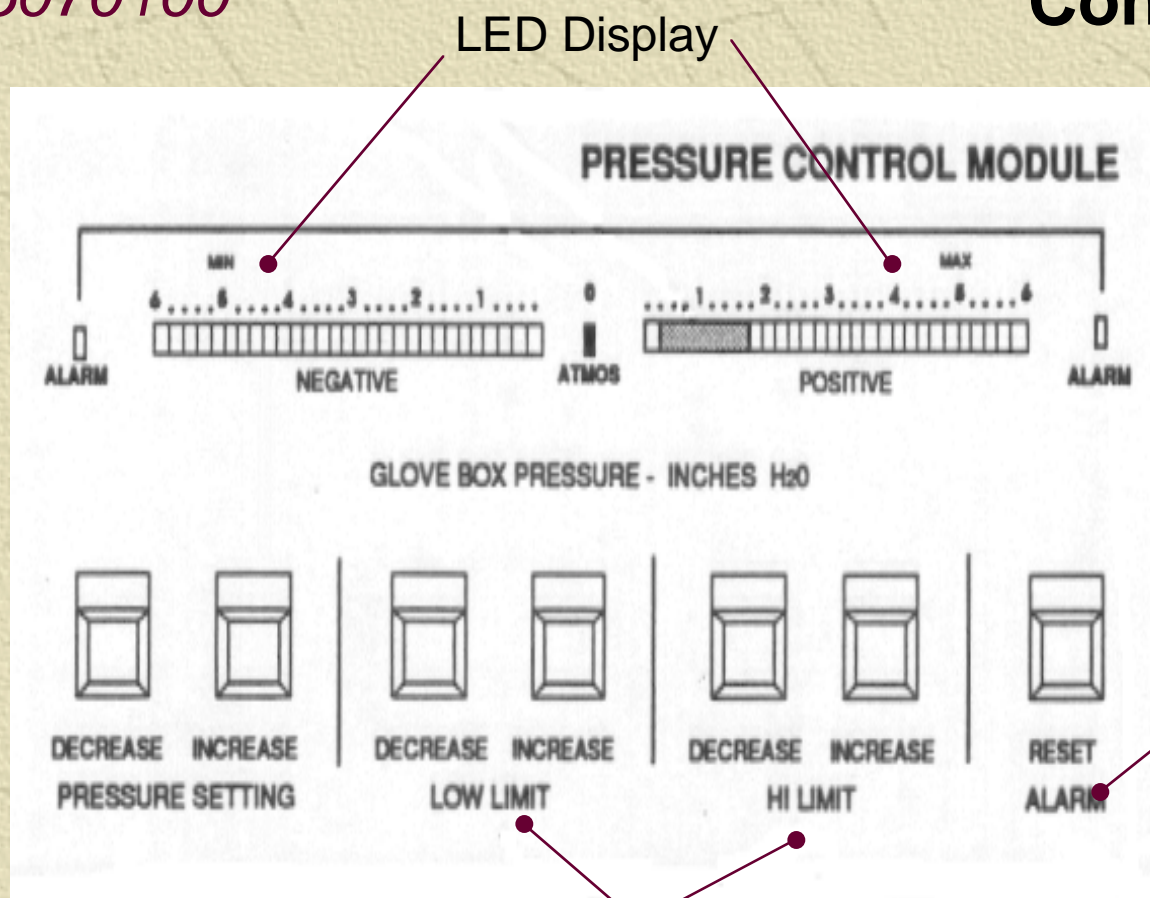
For Models 5060000 and 5061000. Four manual valves control chamber pressures. These valves control evacuation and gas filling operations.



Controlled Atmosphere Glove Box

*For models 5070000
and 5070100*

Main Chamber Electronic Controls



Switches keep main chamber pressure between set points.

Alarm indicates when main chamber pressure exceeds safe limits.

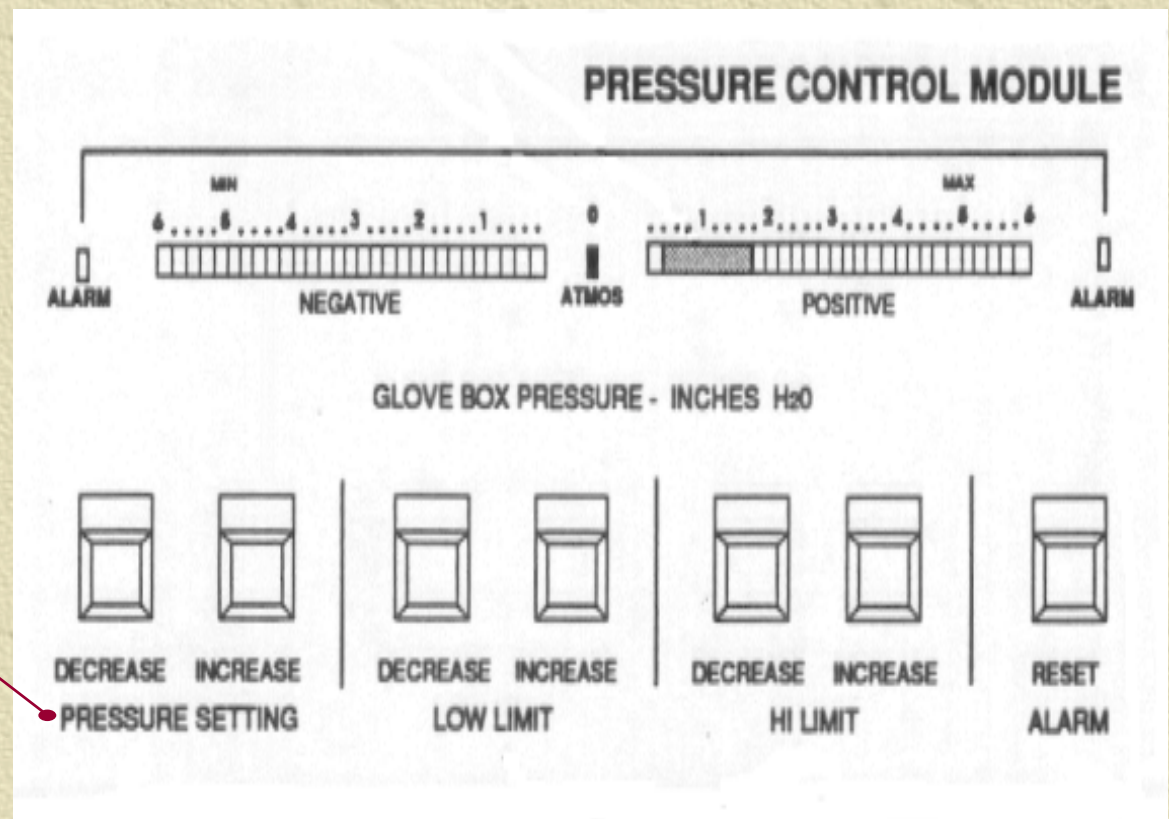
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Controlled Atmosphere Glove Box

Main Chamber Electronic Controls

For models 5070000 and 5070100

Pressure controlled Foot pedal and pressure override switches allow user to increase or decrease operating pressure.



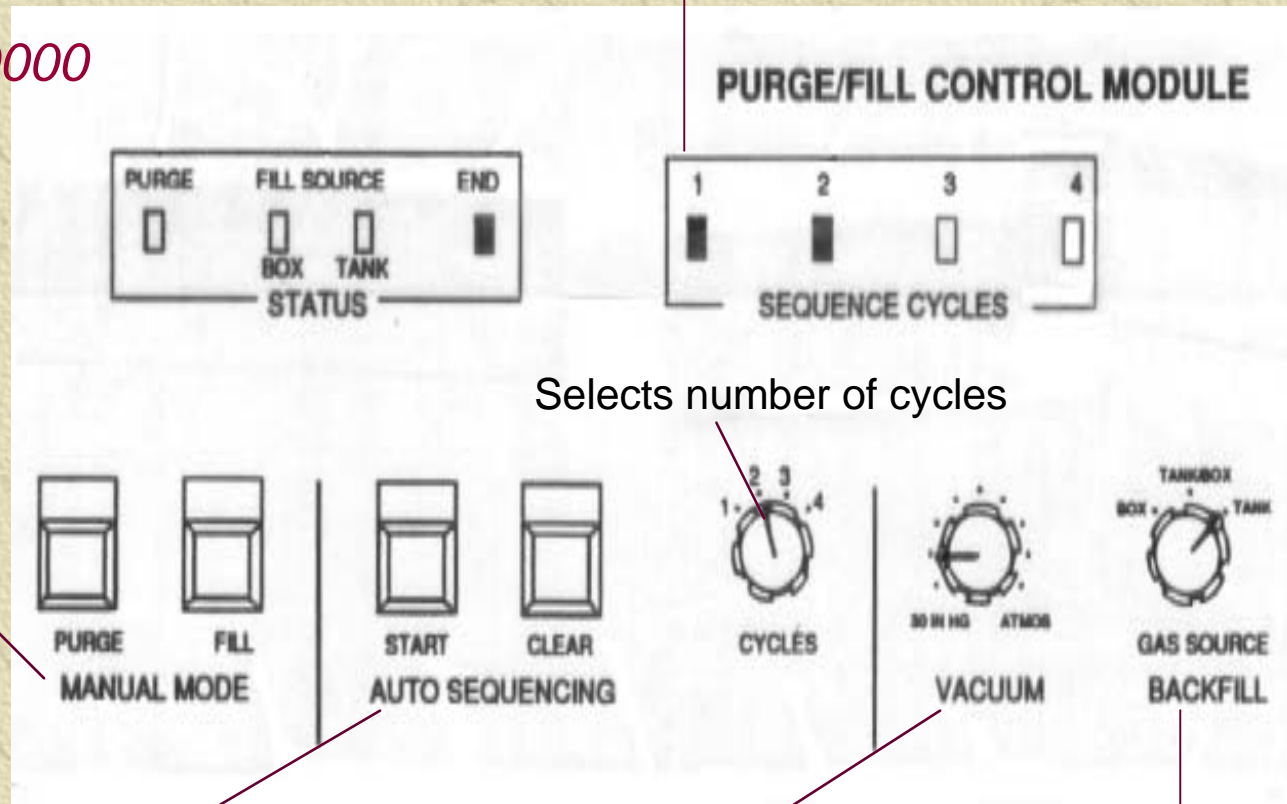
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Controlled Atmosphere Glove Box

Transfer Chamber Electronic Controls

*For models 5080000
and 5080100*

Indicates the number of evacuation and fill cycles selected and completed



Manual evacuation
and fill switches

Selects number of cycles

Cycle start and
cancel switches

Vacuum level switch
selects level of vacuum
for each cycle

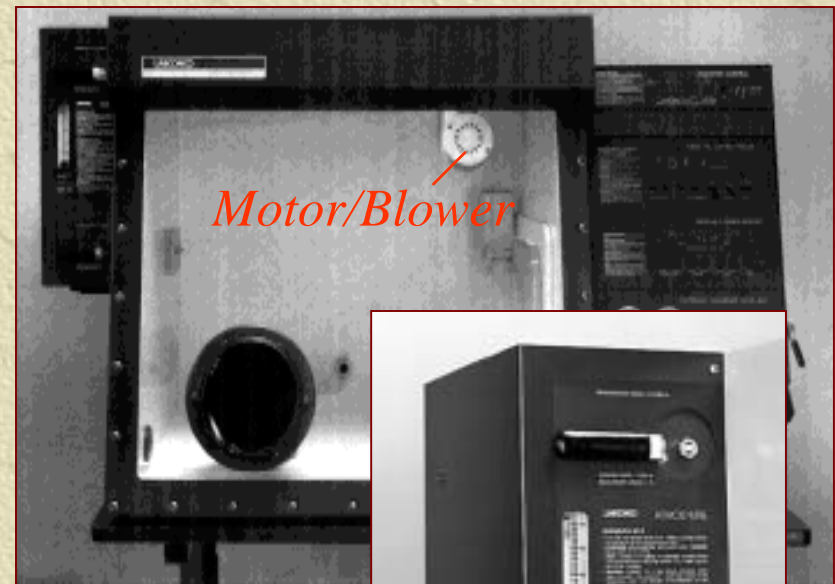
Gas Source switch
(selects source of fill gas)

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Controlled Atmosphere Glove Box

AtmosPure[®] Regenerative Drying Train Option

- ✚ Factory installed.
- ✚ Includes gas purifier column, blower and electronic regeneration panel.
- ✚ Reduces water contamination to 5 ppm, and oxygen to 1 ppm.
- ✚ Continuous operation removes oxygen and moisture from the glove box atmosphere by recirculating it through the train.



*Close-up of
AtmosPure Drying Train*

Controlled Atmosphere Glove Box

Features & Benefits

One piece molded fiberglass or stainless steel liner

Laminated safety glass angled 10°

One-piece, molded neoprene window gasket

8" diameter glove ports

Two interior electrical receptacles

Easy access circuit breakers

30" Neoprene Gloves included

30-watt fluorescent lamp

One exterior 3-wire electrical receptacle

Large transfer chamber

Control switches and pressure gauges

Inner and outer transfer chamber doors

Four manual valves for gas inlet and outlet control



LABCONCO[®]

Controlled Atmosphere Glove Box

Features & Benefits

All Protector® Glove Boxes are factory tested with a helium mass spectrometer while pressurized with helium at 5" water gauge. No leaks $> 1 \times 10^{-6}$ cc/scc or 31cc/year.



Large viewing window is removable for loading bulky apparatus.



Pressure relief "bubbler" manometer prevents glove box damage from extreme high or low pressures.

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Controlled Atmosphere Glove Box

Bubbler/Manometer Basics



- ✚ Bubbler included with Controlled Atmosphere Glove Box.
- ✚ Bubbler prevents over or under pressure extremes inside the main chamber.
- ✚ *maximum pressurization is + or -6" H_2O*
- ✚ U-tube is filled with vacuum pump oil which moves within the column releasing excess pressure to prevent Glove Box damage.

Controlled Atmosphere Glove Box

Accessories



Exterior Port Cover



Interior Port Cover



Fixed and Mobile Base Stands



Drying Train

Controlled Atmosphere Glove Box



Interior Shelves



Rotary Vane
Vacuum Pumps

Accessories



Seamless Neoprene, Butyl,
and Hypalon Gloves
available in two sizes

LABCONCO®

Controlled Atmosphere Glove Box

Accessories



Optional Mini Transfer Chamber for left side

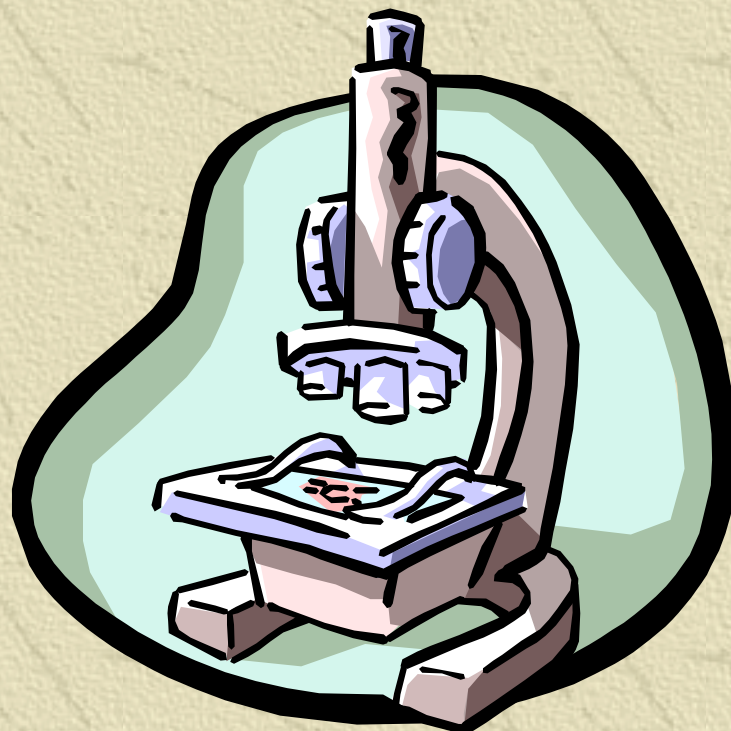
Optional Sliding Transfer Tray for loading materials into the glove box



Controlled Atmosphere Glove Box

Market Applications

- ✚ Hydrophilic chemicals
- ✚ Organometallics
 - ✓ Alternate energy cells, i.e. lithium batteries
 - ✓ Metabolic research
 - ✓ Oxygen- or moisture- sensitive compounds, i.e. sodium
- ✚ Electronic components



Glove Boxes can be Super Sized!

Double Controlled Atmosphere Glove Boxes

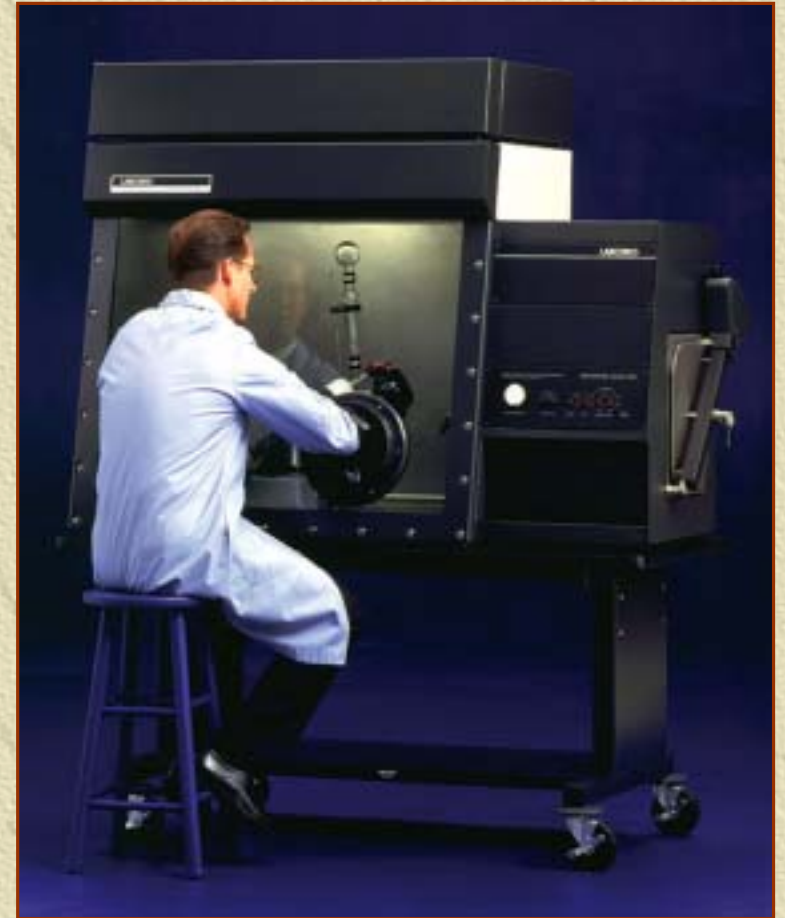
- + Greater working area.
- + Control system costs do not double.
- + Available in stainless steel.



Protector[®] Multi-Hazard Glove Box

- ✚ Provides a physical barrier to protect operator from exposure to potentially dangerous particulates.
- ✚ Inlet air is HEPA* filtered providing a Class 100 environment.
- ✚ Air exiting the box is HEPA filtered to remove particulates.
- ✚ Adjustable air flow volumes from 0 – 60 cfm.

**High efficiency particulate air*



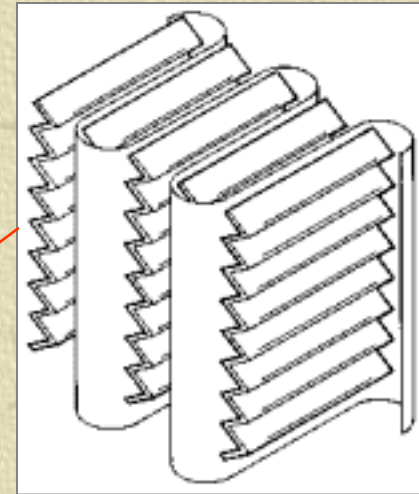
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Multi-Hazard Glove Box

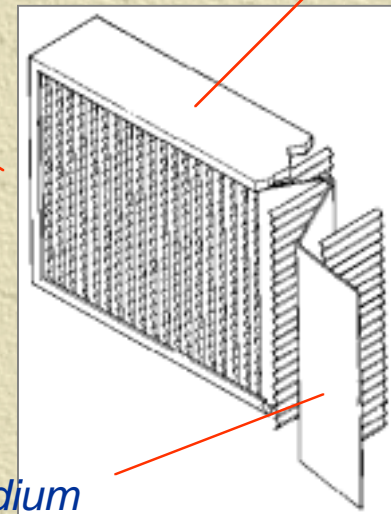
HEPA Filters

(High Efficiency Particulate Air)

- ✚ Disposable filter of boron silicate microfibers cast into a thin sheet.
- ✚ Media is folded to maximize its surface area. Sometimes aluminum separators are used between the folds.
- ✚ Retains airborne particles and microorganisms, but gases pass freely through filter.



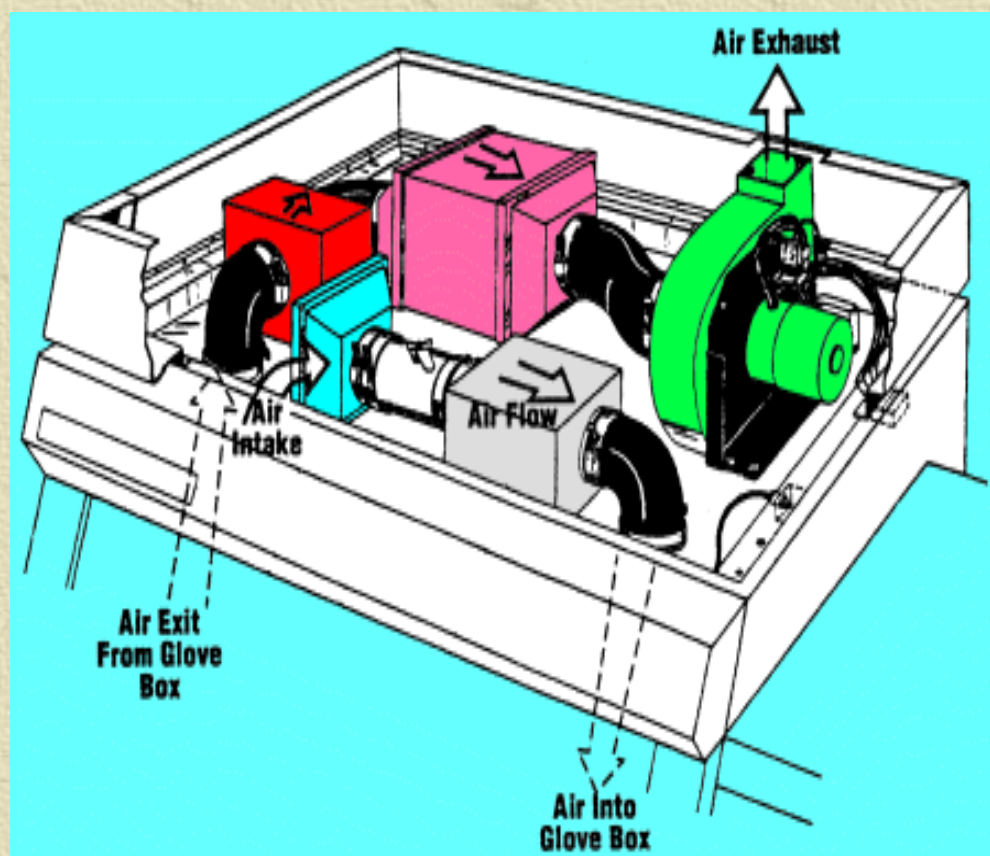
Filter frame



Continuous sheet of Filter Medium

Multi-Hazard Glove Box

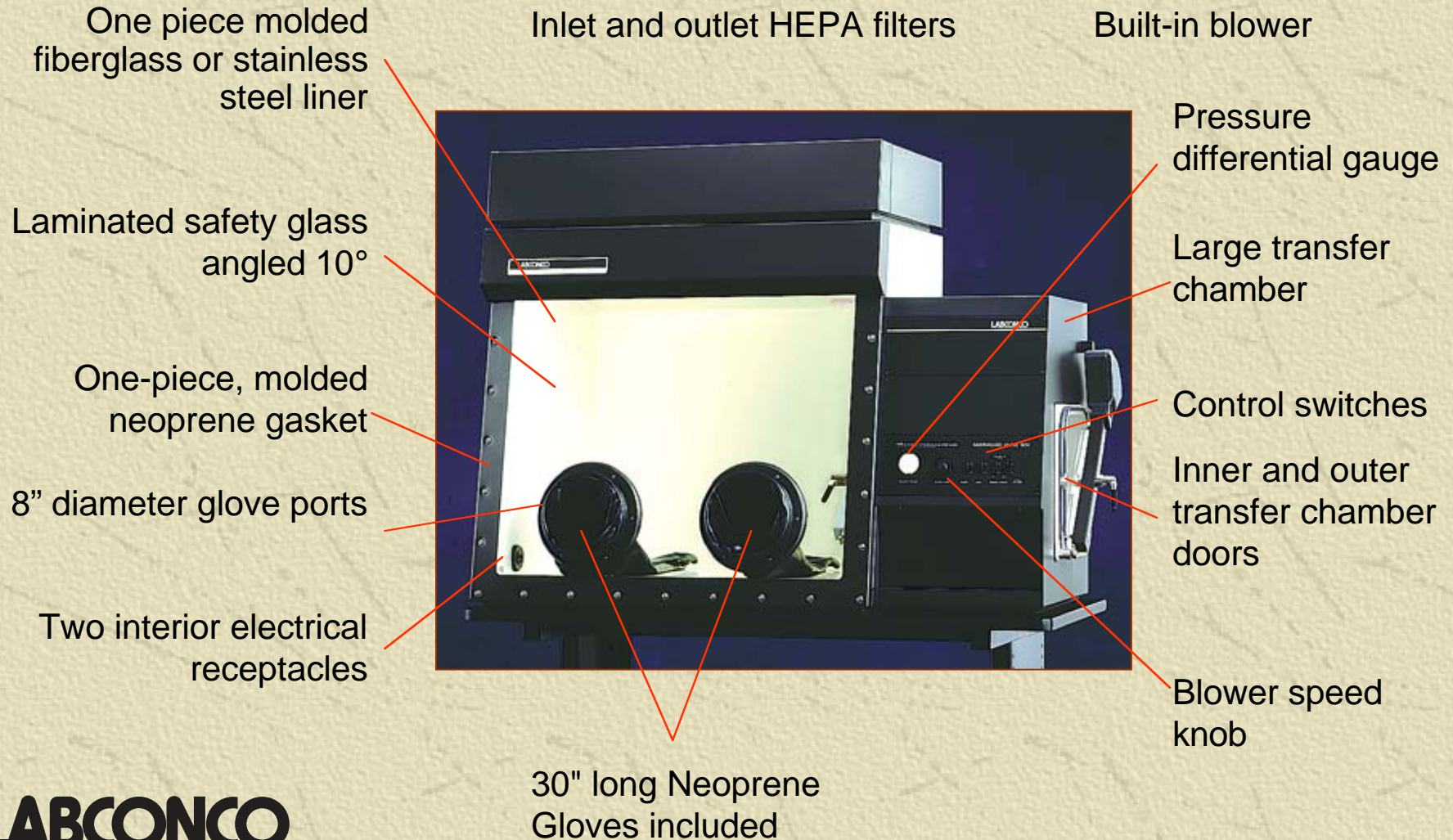
Air Filtration System



- ✚ Prefilter
- ✚ HEPA intake filter
- ✚ Primary exhaust HEPA filter
- ✚ Optional secondary exhaust filter (HEPA or Carbon)
- ✚ Blower

Multi-Hazard Glove Box

Features and Benefits



Multi-Hazard Glove Box

Accessories



Carbon Exhaust Filter



HEPA Inlet or Exhaust
Filter



Interior Shelves

Multi-Hazard Glove Box

Accessories



Interior Glove Port Cover



Base Stand



Mobile Base Stand



Exterior Glove Port Cover

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Multi-Hazard Glove Box

Applications

Chemical and biochemical research involving:

- ✚ Non-biohazardous microorganisms
- ✚ Chemical powders, drugs, proteins and enzymes
- ✚ Asbestos; Carcinogenic materials
- ✚ Crime scene evidence
- ✚ Low level radioactive materials



Multi-Hazard Glove Box or Class II Safety Cabinet?



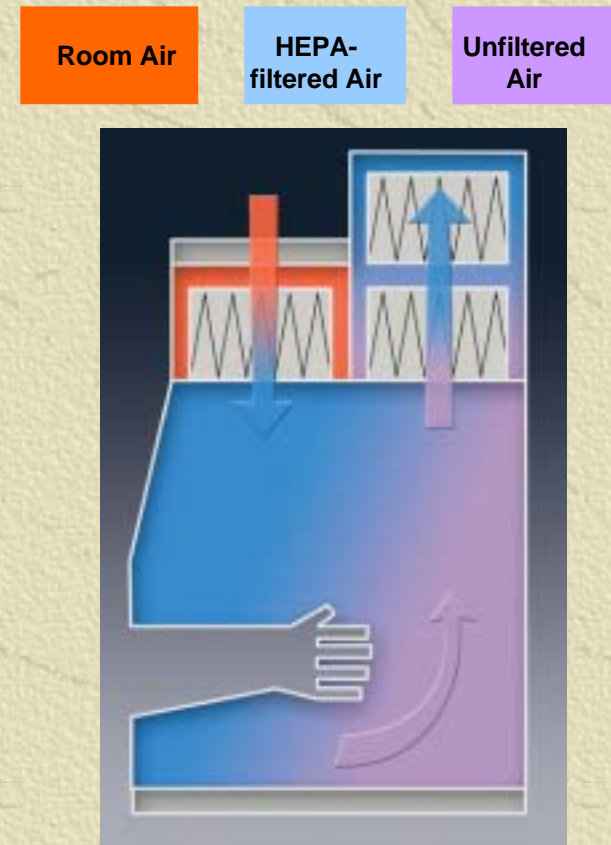
Multi-Hazard Glove Boxes are designed to contain toxic particulates, **but not biohazardous microorganisms.**

Biological Safety Cabinets are designed to contain biohazards, such as bacteria and viruses.



Multi-Hazard Glove Box versus Class III Biosafety Cabinet

- ✚ The Multi-Hazard Glove Box is designed to contain toxic, **but not biohazardous**, particulate contaminants.
- ✚ Transfer chamber does not sterilize material coming out of the glove box.
- ✚ Class III Biosafety Cabinet has a double door autoclave transfer chamber to sterilize all material being removed.
- ✚ Only sterilization insures the destruction of all biohazard sources.



Class III Cabinet Airflow

Protector[®] Combination Glove Box



- ✚ Handles both atmosphere-sensitive materials or hazardous materials.
- ✚ Converts quickly from controlled atmosphere function to vented hazardous material operation.

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Protector[®] Combination Glove Box



- ✚ Closing two internal valves converts the box to a leak-tight glove box ready for controlled atmosphere procedures.
- ✚ Opening the internal valves allows the integral blower to pull room air through inlet and exhaust HEPA filters.

User Group

The **American Glove Box Society** is a not-for-profit organization whose members are Glove Box users.

AGS has developed guidelines for glove box construction. These guidelines recommend specific design and construction features for glove boxes.



ags@gloveboxsociety.org

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[USA](#)

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