Clean AiR PRODUCTS

SOLUTIONS BUILT TO YOUR SPECIFICATIONS

OPERATION & MAINTENANCE INSTRUCTIONS FOR

Series 412

Vertical Laminar Flow Clean Bench

8605 Wyoming Ave. N. • Minneapolis MN 55445
tel: 763.425.9122 800.423.9728 fax: 763.425.2004
e-mail: sales@cleanairproducts.com
www.cleanairproducts.com

Clean AiR PRODUCTS

Series 412

Vertical Laminar Flow Clean Bench

The Series 412 vertical laminar flow clean benches are specifically designed to create a freestanding ultra-clean mini-environment. These clean benches, or mini-environments, are available in a variety of sizes and styles engineered to provide excellent solutions for many air filtration applications. The systems may vary from vertical flow benches with open interiors to exhausting clean benches with wet process, to recirculating temperature control Class 10 systems.

Clean benches can be used in conjunction with cleanrooms to create clean zones. They can also be used in lieu of or supplemental to a cleanroom. Often times in larger cleanrooms, there are a few "critical clean" areas. It is sometimes more cost-effective to build a lower class cleanroom and supplement it with clean benches, than it is to create a higher class cleanroom. This is especially true when over 60% of a typical cleanroom floor space is area where clean manufacturing or storage does not occur.

Features

- Standard white enamel finish provides excellent corrosion resistance
- HEPA filter is 99.99% efficient
- Open-frame design
- All-metal welded filter module
- Structural shell components are a minimum of 16 gage cold rolled steel
- Support frame is heavy-duty 2 x 4 in. steel tubing
- Horizontal cross bracing is 2 x 2 in. steel tubing
- Cool white fluorescent lamps
- Meets or exceeds requirements of the NEC electrical codes; All standard components are UL rated
- Air flow velocity is factory set in accordance with Federal Standard 209E (90 ±20 FPM)
- Standard sized disposable fiberglass prefilter
- Three-piece access panels are easily removable and allow service to the top cabinet from the front, top or rear of the unit
- Extensive list of options available
- Selected sizes and options UL listed

For more information or to download or fax this product from the web, simply go to:
www.cleanairproducts.com/412

Series 412 Vertical Laminar Flow Clean Bench

Overview

The Series 412 vertical laminar flow clean benches consist of three basic components: The upper cabinet module houses the prefilters, HEPA or ULPA main filters, blower motors and lights. There is a lower support frame which is removable for easy shipment and moving. There are various options for the support frame, depending upon the application of the bench. The third major component is the lower work surface module which may be as simple as a flat table or as complex as a bench containing tanks, heated etch baths, gooseneck faucets, drains and other options. This modular design allows the clean bench to be easily shipped and assembled. Most sizes have been designed to fit thru standard doors and hallways. See the attached drawing and chart for sizes on your specific model. There are a number of mode options that may be ordered depending where the air is to be directed or exhausted.

Construction

The upper cabinet module is constructed of welded 16 gage cold rolled steel that is finish ground to remove all sharp edges and painted with baked white enamel. This module houses the blower, motor, HEPA or ULPA filter, fluorescent lights, on/off switches, circuit breakers and electrical junction box.

Standard height of the upper cabinet is 30 inches. Its length and depth will depend upon the size and style of unit. Standard widths are 2-1/2 inches over nominal 3, 4, 5, 6, 8, 10 foot widths with interior depths of 30, 36, 42 and 54 inches (interior table or working space). The overall cabinet width, depth and height will depend on the style of support frame and mode of operation.

The support frame is fabricated from heavy-duty 2x4 inch steel tubing. Horizontal cross bracing is 2x2 inch steel tubing. The open frame design permits cabinets to be butted end-to-end with no obstructions.

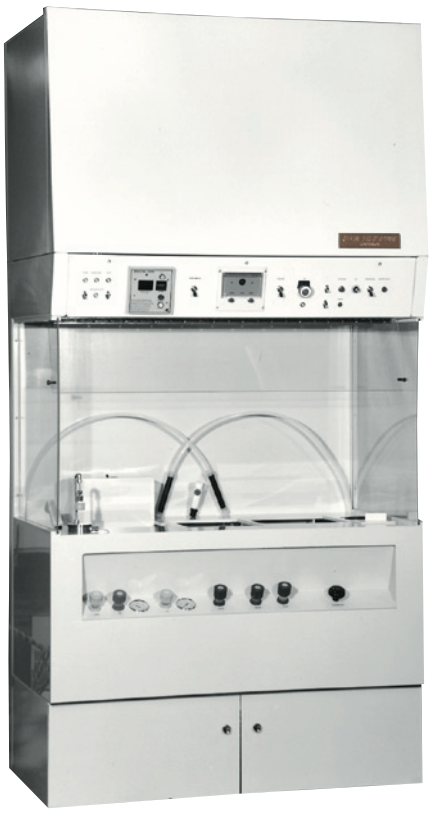
Finish

Standard finish is a white enamel that provides excellent corrosion protection. Custom colors are available.

Filters

The standard HEPA final filter is 99.99% efficient on particles 0.3 micron and larger. Most models have a final HEPA filter with an aluminum frame, white painted metal face guard

CAP412-6T30 Mode "WO" with solid white Formica table top and optional one-piece front access panel.



CAP412-4T30 Mode "E" with polypropylene exhaust plenum, storage cabinet, hinged front window, optional upper instrument beam, and lower plenum instrument panel.

and mini pleated filter media. Filters are removable through the front panel access. Optional ULPA filters, 99.999% on particles 0.12 micron, are available.

Negative Pressure Plenum for Final Filters: HEPA Or ULPA

The Series 412 utilizes flexible ducting connected from the blower to the HEPA filter. This ducting system provides negative pressure in the interior of the upper blower cabinet. The negative internal pressure is created by the blower drawing (sucking) air into the cabinet through the prefilters. The differential pressure drop across the prefilters creates the internal negative pressure. The entire interior of the upper cabinet, including the area that surrounds the HEPA filter, metal supply plenum and flexible ducting, is also under negative pressure; thus preventing any gasket seal leaks from entering the work area. If a gasket leak does occur, the negative pressure area would "draw" the leaked air back to the blower where it is then ducted back to the HEPA filter and preventing the contamination from reaching the work area.

The negative pressure plenum system consists of a metal plenum that is clamped over the HEPA filter and held in place by a threaded rod and leaf spring. A flexible duct attaches between the metal supply plenum and blower for vibration isolation. To replace the HEPA filter, loosen and remove the flexible duct from the blower, loosen the fastener from the threaded rod and remove the leaf spring. Remove the metal supply plenum and lift out the HEPA filter. To replace the HEPA filter, reverse the process. (See attached drawing showing cabinet dimension and chart showing filter size.)

Prefilter

The cabinet has a large prefilter area to keep the filtering efficiency high and minimize the pressure drop across the prefilters. The prefilters are housed on the top of the unit as standard but can be field relocated to the front or rear of the unit, if desired (see Note #1). The prefilters are a commonly available 20x25x1 disposable style that are interchangeable in size with prefilters of higher efficiency. The higher efficiency prefilters can be ordered with the unit or upgraded with the first prefilter change. Higher capacity (2 in. and 4 in. thick) prefilters can be installed on the top of the unit.

CAP412-4T30 Mode "O" with 4 post "KD" (Knock Down) support frame, three-piece front access panels, and optional minihelic pressure gage.

CAP412-8T30 Mode "E" with a stainless steel exhaust plenum, storage cabinet, hinged front window, optional upper instrument beam, and miscellaneous plenum accessories.

Note #1: On the mode E, ER and R clean benches, or when the counterweighted sliding front window is ordered, the prefilters can only be located on the top of the unit. Consult factory for specific details.

Airflow

The air flow velocity is factory set in accordance with Federal Standard 209E (90 ±20 FPM). The blower-motor assembly is sized to provide proper air flow with a minimum 50% increase in HEPA filter pressure drop. This ensures years of bench operation without HEPA filter change.

Light Level

White fluorescent lamps will provide approximately 90 foot candle illumination 6 inches above a 36-inch work surface. An on/off switch is provided for lamp control.

The standard unit has T12 lamps. Selected units are available with T8 lamps and energy saving electronic ballast, however, they are not available in all sizes. T8 lamps must specifically ordered. Consult factory for details. (See attached chart for the number of lamps and lamp type in the selected unit.)

Sound Level

The cabinets are designed for quiet operation. The typical sound level is approximately 65dbA. Larger size units and those with multiple blowers may have a slightly higher sound level. The sound levels are measured with ambient of 55dbA. The sound level of your particular unit may vary depending on the size of the unit surrounding room size and acoustics.

Electrical

Meets or exceeds requirements of the NEC electrical codes. The standard cabinet has a 120V, single-phase, 3-wire electrical system. Selected units are available with optional UL labeling, which must be specifically requested and will be quoted as a line item. Consult the factory for further details on UL listed cabinets. The UL label on the clean bench needs to be specifically ordered.

The electrical junction box is on the rear of the unit. Selected units can be provided with a power cord.

The blower motor has a variable solid state speed controller. Belt drive blowers (optional) use variable pitch pulleys for speed control. UL listed units have a multi speed tap for blower speed adjustment.

The upper cabinet contains the motor, light on/off switches, circuit breaker thermal protection and main cabinet power disconnect switch.

Blower/Motor Assembly

The system utilizes a PSC direct drive motor with a dynamically balanced blower wheel. This assembly is double vibration isolated from the cabinet to provide excellent vibration control. The motor itself is vibration isolated from the blower by multiple shear rubber isolation mounts. The blower/motor assembly is again vibration isolated from the cabinet by a second set of shear rubber vibration isolation mounts. The flexible duct connection between the blower and metal filter supply plenum also serves to further reduce vibration.

Each cabinet has a blower/motor assembly sized for reserve capacity to ensure a long HEPA filter life. A motor speed control mounted on the side of the blower can be adjusted to compensate for extra pressure drop caused by loading or contamination build-up on the HEPA filter surface.

Speed Control

A solid-state speed control is provided to maintain correct air flow velocity. It has RFI suppression and transient high voltage protection.

Certification

Each cabinet is tested to Federal Standard 209E class 100 requirements. Every cabinet meets or exceeds this standard before it is allowed to ship.

Service Access

The three-piece access panels are easily removable and allow service to the top cabinet from the front, top or rear of the unit. The access panels are interchangeable to field convert the location of the prefilters.

A one-piece front panel is used with the counter-weighted sliding front window or when a slightly more decorative front is desired.

Options

- Face shields: hinged, fixed, or counter-weighted sliding
- Lower storage cabinets
- Gold fluorescent lamp sleeves
- ULPA filters 99.999%
- Ionization grids
- Cascades
- Ultrasonic cleaners
- Electrical outlets
- Etch tanks
- Sink for tanks — white or natural polypropylene, teflon or stainless steel
- Gooseneck — Polypropylene, PVC or PVDF for city or DI water
- Hand sprayers — Teflon for DI water or Teflon for N_2
- Gas/vacuum/air fixtures
- Extra height from table top to underside of blower filter cabinet
- Minihelic gauge — 0-2 inch differential pressure
- Special cabinet colors
- Flow-thru style lamp diffuser grill
- Top mounted electrical junction box

- Prefilter location from top to front
- Power cord — 8 ft., 3 wire — available for units under 20 amps
- Suspended ceiling vs. support frame — (4) threaded hanger holes
- Pneumatic and tank drains valves
- Additional electrical receptacle
- DI water loop
- Plenum drain
- Wiring/blower assembly for hazardous materials/areas
- Other types of process tanks available but not listed
- Timers
- Controllers
- Hot plates
- Gas cocks
- Flow meters
- Plenum flushing system
- Alarms
- Selected sizes and options UL listed

The complete list of available options is quite extensive — the most common are listed above. Clean Air Products has an experienced in-house engineering staff. This enables us to modify the Series 412 to meet our customers' bench requirements.

Blower, Motor, Electrical, and Filter Sizes

Model	HEPA Filter	Prefilter	Blower	Motor	Lamp	Electrical*	
3T30	(1) 24x36x3	(1) 20x25x1	(1) DD-10-6	(1) 1/2HP PSC	(2)	120V/1Ø/60HZ	9.7 amp*
4T30	(1) 24x48x3	(2) 20x25x1	(1) DD-10-6	(1) 1/2HP PSC	(2)	120V/1Ø/60HZ	9.7 amp*
5T30	(1) 24x60x3	(2) 20x25x1	(1) DD-10-8	(1) 1/2HP PSC	(2)	120V/1Ø/60HZ	12.5 amp*
6T30	(1) 24x72x3	(3) 20x25x1	(1) DD-10-8	(1) 1/2HP PSC	(2)	120V/1Ø/60HZ	12.5 amp*
8T30	(2) 24x48x3	(4) 20x25x1	(2) DD-10-6	(2) 1/2HP PSC	(2)	120V/1Ø/60HZ	15.2 amp*
10T30	(2) 24x60x3	(5) 20x25x1	(2) DD-10-8	(2) 1/2HP PSC	(2)	120V/1Ø/60HZ	19.95 amp*
3T36	(1) 30x36x3	(1) 20x25x1	(1) DD-10-6	(1) 1/2HP PSC	(2)	120V/1Ø/60HZ	9.7 amp*
4T36	(1) 30x48x3	(2) 20x25x1	(1) DD-10-8	(1) 1/2HP PSC	(2)	120V/1Ø/60HZ	12.5 amp*
5T36	(1) 30x60x3	(2) 20x25x1	(1) DD-10-8	(1) 1/2HP PSC	(2)	120V/1Ø/60HZ	12.5 amp*
6T36	(1) 30x72x3	(3) 20x25x1	(1) DD-10-8	(1) 3/4HP PSC	(2)	120V/1Ø/60HZ	14.7 amp*
8T36	(2) 30x48x3	(4) 20x25x1	(2) DD-10-8	(2) 1/2HP PSC	(2)	120V/1Ø/60HZ	19.95 amp*
10T36	(2) 30x60x3	(5) 20x25x1	(2) DD-10-8	(2) 3/4HP PSC	(2)	120V/1Ø/60HZ	19.95 amp*
3T42	(1) 36X36x3	(1) 20x20x1	(1) DD-10-6	(1) 1/2HP PSC	(4)	120V/1Ø/60HZ	12.5 amp*
4T42	(1) 36x48x3	(2) 20x25x1	(1) DD-10-8	(1) 1/2HP PSC	(4)	120V/1Ø/60HZ	14.4 amp*
5T42	(2) 36x30x3	(2) 20x25x1	(1) DD-10-8	(1) 3/4HP PSC	(4)	120V/1Ø/60HZ	14.4 amp*
6T42	(2) 36x36x3	(3) 20x25x1	(2) DD-10-6	(2) 1/2HP PSC	(4)	120V/1Ø/60HZ	19.8 amp*
8T42	(2) 36x48x3	(4) 20x25x1	(2) DD-10-8	(2) 1/2HP PSC	(4)	120V/1Ø/60HZ	19.8 amp*
10T42	(2) 36x60x3	(5) 20x25x1	(2) DD-10-8	(2) 3/4HP PSC	(4)	120V/1Ø/60HZ	24.4 amp*

* Includes 4 amp receptacle.

Front Laminar Flow Shield and Window Options

- 6-inch flexible laminar flow guide is standard
- Ergonomic hinged front face shield
- Counterweighted vertical sliding front window
- Safety glass upgrade for hinged or sliding front window

The 6-inch front laminar flow guides, face shields, ergonomic hinged face shield or counterweighted sliding windows are designed to isolate and contain the "clean air" within the bench from outside contamination. The type of front shield used can be dependent on the style of bench and the exterior environment.

The 6-inch laminar flow guide helps air develop "laminar flow" in much the same way as a water nozzle on a hose. The shield is short and flexible, so it typically does not interfere with work in the bench. This shield is installed on the shear edge of the HEPA/ULPA filter. It works in conjunction with the end shields which are also located on the shear edge of the filter. As the air comes out of HEPA/ULPA filter, the air has some surface turbulence caused by the configuration of the pleats of the filter. It takes a few inches for the airflow to develop into smooth laminar flow, similar to a water nozzle on a fire hose. Once the air flow leaves the front guide, it still has the side end panels to guide it downward about 12 to 18 inches before there is significant deterioration of the laminar flow. As the air is flowing downward it is also flowing out of the clean bench, because it is confined on the back and sides. This outflow helps prevent contamination from entering the critical work space.

The standard distance between the table top and underside of the top filter cabinet is 28 inches with a 36-inch table top height. When this height changes, either by lowering the table height or making the support "C" frame taller, this face shield becomes even more important and is recommended to increase the length of this guide.

When items are placed within the work area or the operators work inside the bench they can cause turbulence and disrupt the airflow. This turbulence can cause air currents within the bench that would allow outside air to be drawn into the bench because of the energy created by the turbulence.

When turbulence within the bench becomes a concern, a face shield is often installed onto the bench. The ergonomic hinged acrylic face shield is typically installed to create a 12-inch opening on the front of the working area. The face shield guides the laminar flow down closer to the table top and vents the air out of the cabinet through a smaller front opening. The smaller front opening creates a higher exit velocity that reduces the chance of inflow contamination.

In addition to improved airflow and higher pressurization of the work area, the ergonomic hinged front window provides a physical barrier between the operator and the interior clean area. The ergonomic hinged front window is recessed 5 inches at the top and slopes out towards the front edge of the table. This 5-inch recess allows the operator to lean forward and work in a more natural, ergonomic position while their arms are below the window. The window prevents them from leaning too far into the work area causing the blockage of the down flow air, creating turbulence and the introduction of unwanted contamination into the work area.

Cabinet Support Frames

The upper cabinet can be supported in a variety of ways depending on the application. The most common are "C", "CR", "T", "KD", and "SP" frames. Each type of frame is designed for a different type of application. Please consult the factory for additional options.

"C" Frame: The "C" frame is constructed with 2x4 tubular steel that is welded, finished ground and painted with a white baked enamel finish. The front of the "C" frame is open to allow multiple cabinets to be set side by side for a continuous work area. Each frame is furnished with 4 adjustable leg leveling glides.

The frame has a removable clear acrylic panel located on each end of the frame. These panels are installed on the shear edge of the laminar airflow to create a smooth, non-turbulent end boundary for the clean work space. If the units are set side-by-side with the clear end panels removed, work may be easily passed from one station to the next.

The rear of the support frame is enclosed by a solid back panel that is available in a variety of materials. The standard is white vinyl covered steel, however, options include painted steel, stainless steel, white polypropylene or clear acrylic.

Various cabinet options can be installed into this basic support frame. These include built-in solid, perforated or wire table top, exhaust plenum or a 95% air recirculation system.

"CR" Frame (C frame with reinforcing post): The "CR" frame is the same as the "C" frame except for extra vertical reinforcing supports. These vertical supports may be required on some larger systems with heavier top cabinets. The vertical support may be mounted midway back on the frame or on the front edge depending on the "Mode" of the cabinet.

"T" Frame: The "T" frame is designed to allow access to both the

front and rear of the clean bench and to have an open side. A typical application would be bench assembly of small parts where multiple clean benches are placed side-by-side with operators sitting at both the front and rear of the clean bench. With the side plex removed and the open sides of the "T" frame, parts can easily be slid from one bench to another, without having to be taken out of the clean bench area. By working from both sides of the bench you can double the amount of assemblers working per clean bench, reducing the capital cost per employee and conserving floor space.

The table tops on the "T" Series frames can be extended to accommodate a larger (deeper) work surface with a smaller upper filter cabinet. The "T" series of clean benches can achieve Class 100 cleanliness. The extended table options are most often used in applications that do not require critical Class 100 conditions. Depending on the application and the length of the table extension, we recommend having a modified face shield. Consult the factory for details.

The "T" frame system, when used in a row of benches, is designed to have the vertical support "T" frames share the upper filter cabinets — reducing the cost and the bulk of the support frame. It is important to know the assembled configuration to provide the correct combination of supports and table tops.

"KDFP" Frame (Knock down frame): The 4-post support frame is made up of four 2x2 tubular steel legs that bolt onto the outer ends of the top cabinet. The Plexiglas end panels mount on the inside surface of the 2x2 tubular steel legs. The bolt-on legs and back panel ship knocked down, allowing a smaller and more compact shipping package.

Optional removal of the back panel allows easy interior access from both the front and rear of the clean bench. Some applications, when the back panel is removed, will require larger support legs to prevent side sway. This is typically required only for seismic areas.

Multiple units may be put end to end, forming a continuous line. The units can be made with a common set of support posts between two adjoining top cabinets. This option should be specified, as it requires an additional set of support leg mounting holes, however, the units are field convertible to this configuration. This is an ideal system for export because of the small shipping package and ease of assembly. The sharing of support frames is an option and must be specifically quoted to avoid field modifications.

"KDAF" Frame (Knock down frame): The two-end support sections have an "A" shape welded end support section. There is a front and rear vertical support post with an upper and lower cross tube. The Plexiglas end panels mount in shear with the edge of the HEPA filter for improved airflow and mount to the inside surface of the side support frame. The back panel screws to the rear of the side frame supports. The end support sections and back panel knock down for a smaller more compact shipping package.

The unit can be furnished with a built-in table top or free-standing table.

Note: The inside clear width between the side supports is 2 inches less than the even foot. Please take this into account if you are sliding an existing table or piece of equipment into the bench.

"SP" Frame (Straddle post): The straddle post frame can be made with an extended support leg frame that will allow mounting over a machine. Consult the factory for details on your application.

Seismic Floor Supports: Clean Air Products can provide seismic floor mounting angles, support, or threaded hanger supports on its equipment. Consult the factory for specific details on your individual equipment.

Cabinet Operation (Modes)

Note: The options listed below may be the most common for that "Mode" type. There is a more complete listing of options on page 5.

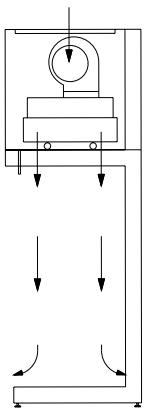
Mode "O" (Open Base)

The Mode "O" or open base upper cabinet is mounted on a support frame with an open area below. This allows a space where a separate vibration isolated table may be located within the work space.

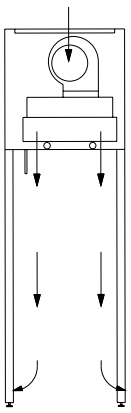
The standard Mode "O" is furnished with a top cabinet that contains: 120 VAC, 60 Hz blower motor assembly, 99.99% efficient HEPA filter, white fluorescent lights, white vinyl covered steel back panel, clear acrylic end panels and "C" style support frame.

Common options available with either the "C", "CR" frame or "KD" frame are hinged or counterweighted sliding window, Series 61 Formica table, Series 62 stainless steel table or Series 64 perforated stainless steel stand alone tables.

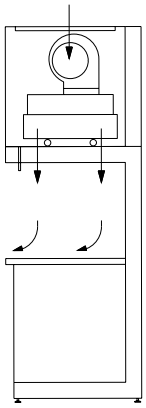
The inside width of the support frame is about 1-1/2 inches under the even foot. (i.e. 6-foot cabinet would be 70-1/2 inches between the floor supports and 70 inches between the end panels.) If tables or other types of workstations are being used inside the bench that are even feet in length (i.e. 72 inches), Clean Air Products can adjust the height of the end panels so that they will stop above the height of the table.



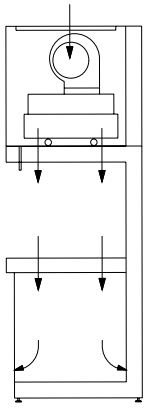
MODE O



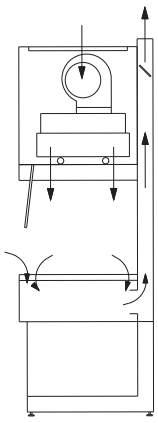
4 POST
KD-MODE O
KD-MODE WO
KD-MODE WT
KD-MODE E



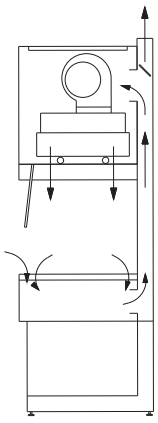
MODE WO



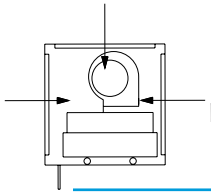
MODE WT



MODE E



MODE ER



PREFILTERS CAN BE LOCATED ON THE TOP, FRONT, OR BACK AND ARE FIELD CONVERTABLE

Mode "WO" (Wash Out)

The Mode "WO" (Wash Out) has a built-in table top. The clean HEPA filtered air flows down from the upper filter cabinet onto the work area providing a Class 100 or Class 10 working environment. The air exits (washes out) from the front of the cabinet preventing outside contamination from entering the hood.

The standard Mode "WO" is furnished with a top cabinet that contains: 120 VAC, 60 Hz blower motor assembly, 99.99% efficient HEPA filter, white fluorescent lights, white vinyl covered steel back panel, clear acrylic end panels, white laminate table top, and "C" style support frame. Optional table tops are available in colored laminate, static dissipative laminate, stainless steel, and liquid-tight recessed center stainless steel. Support frame options are "C", "CR" "T" and "KD"

Other common options are a lower storage cabinet, hinged front window, or counterweighted sliding front window.

Note: The storage cabinet can be recessed to allow knee clearance for operations that require sitting.

Mode "WT" (Wash Thru)

The Mode "WT" has a built in perforated stainless steel perforated table top. The airflow on this model flows down from the HEPA filter and through the perforated table top. This creates a more true vertical laminar airflow within the work area.

Common options include either a hinged or counterweighted sliding front window and the stainless steel back panel.

Mode "E" (Exhausting) and "ER" (Exhaust/Recirculating)

The Mode "E" or exhaust cabinet has a work area table top with a liquid-tight air exhaust plenum below. The table top is constructed of a solid center section with a front and rear exhaust grill. The cabinet is designed to prevent fumes from leaving the cabinet while maintaining a Class 100 or Class 10 working environment within the hood.

The airflow direction within the clean bench is as follows: clean air flows down from the HEPA filter onto the work space creating an ultra clean working environment. The front exhaust grill draws room air into the 8 to 10-inch opening and down into the plenum. This provides an "air curtain" interface between the room air and clean interior environment. The rear exhaust grill draws the clean filtered air from the hood. The "ER" or exhaust/recirculating Mode operates the same as the mode "E" except that a portion of the air is recirculated back to the blower where it is refiltered by the HEPA filter.

The front exhaust connects to the cabinet exhaust duct located on the rear of the cabinet. The cabinet duct connects directly to the exhaust plenum at a point below the table top and flows upward along the rear and terminates approximately 2 inches above the top cabinet. The Mode "E" and Mode "ER" require either hinged or counterweighted sliding window options.

Most applications prefer the exhaust blower to be at the point of discharge to maintain negative exhaust duct pressure, so an exhaust blower is not included with the unit.

Selected models have been air flow tested to fume containment test #ASHRA 11-1985. The test units were equipped with hinged or counterweighted sliding windows with 12-inch work openings.

The interior work area can be made of stainless steel, white polypropylene,

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or fire retardant white polypropylene.

Storage Cabinets, Lower

Storage cabinets can be provided below tabletop on the Mode "WO" or below the exhaust plenum on the Mode "E" and Mode "ER."

Note: Storage cabinets on the Mode "WT" are typically not used because they would block the airflow going thru the table.

The lower storage cabinet can be recessed back 12 inches to allow knee clearance for operations that require sitting.

Drawers

Drawers can be installed below the table. Drawers are nominal 3 inches, 6 inches, and 12 inches deep. They can be configured as singles or in stacks, and depths can be mixed. See drawer specification sheet for additional detail.

All-Polypropylene Lower Support Frame

The all-polypropylene lower support frame option removes the metal support frame and replaces it with an all polypropylene support stand. The unit is available with or without the lower storage cabinet. The lower support frame can be made with the standard width which is 2-1/2 inches over the even foot (74-1/2 inches on a 6-foot bench with 70-inch clear working area) or the wide support frame which is 12-1/2 inches over the even foot or 84-1/2 inches wide outside with a 70-inch inside working area. The extra width is to allow controls and valves to be mounted on the sides rather than on the front of the unit.

Note: With the all-polypropylene lower support frame, the sides are a welded integral part of the lower support assembly. You are not able to remove the side shields as is available with the metal "C" support frame. If the benches are to be lined up side-by-side and have items passed to the side, an access hole must be ordered.

All-Polypropylene Lower Support and Filter Cabinet Shell

This unit has the all-polypropylene lower support frame combined with an all-polypropylene upper filter cabinet shell. With this, the light is mounted exterior and mounted inside a polypropylene light shield. Included are a Teflon-coated blower wheel and plastic blower housing. There is a minimum of exposed metal on the unit.

Common options include: hinged window, counterweighted sliding front window, lower storage cabinet, stainless steel or polypropylene interior, sinks, goosenecks, hand sprayers and N_2 guns.

Specifications

Meets requirements of the National Electrical Codes.

The unit is ready for operation and certified to meet or exceed Class 100 conditions of Federal Standard 209E after the upper cabinet is attached to the lower support frame. The two components are packed separately.

Operation manual and test reports are provided with shipment.

Support Structure

The "C" frame is constructed of welded 2x4 cold rolled tubular steel that has a white baked enamel finish.

The "KD" frame is constructed of four 2x2 cold rolled steel tubular members that receive a white baked enamel finish.

Table Top, Exhaust Plenum, Back Panel and Exhaust Duct

___ Stainless steel Type 304 #4 finish
___ White polypropylene
___ White fire-retardant polypropylene
___ Others

The table top and exhaust grills are removable, exposing the exhaust plenum. The plenum is liquid tight and slopes to the plenum drain. The exhaust duct slopes into the exhaust plenum which includes a volume control damper.

Work Area End Panels

The work area end panels are attached to the interior end support frame and terminate approximately 30.0 inches from the base of the end support frame.

___ Clear acrylic (standard)
___ 304 stainless steel (optional)
___ White polypropylene (optional)
___ Cold rolled steel with white baked enamel (optional)
___ Other _____

Front Viewing Windows

The front viewing windows attached to the front of the air supply module.

___ 6.0 in. flexible clear polished vinyl (standard)
___ 12.0 in. fixed clear acrylic (optional)
___ 12.0 in. hinged clear acrylic (optional)
___ Counterweight sliding front window clear acrylic (optional)

Interior Work Area Dimensions (Standard)

Depth in inches (front to rear)
T30 Series = 30.0
T36 Series = 36.0
T42 Series = 42.0

Width in inches (end to end)
Nominal 3 ft. = 34
Nominal 4 ft. = 46
Nominal 5 ft. = 58
Nominal 6 ft. = 70
Nominal 7 ft. = 82
Nominal 8 ft. = 94
Nominal 9 ft. = 106
Nominal 10 ft. = 118

Height will depend upon the height of the table or bench top from the floor. The height from the floor to the bottom of the upper cabinet module is 64.0 inches with the standard frame. The standard bench top height is 36.0 inches.

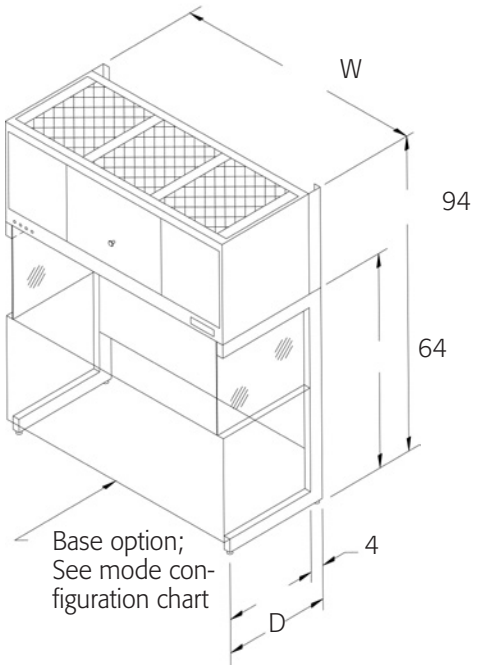
Overall Dimensions (Standard)

Height: 94.0 inches, floor to top of upper cabinet module.

NOTE: Allow a minimum of 1.25 inches over the top of the unit for airflow and servicing of the prefilters.

Depth in inches (front to rear)
T30 Series = 34 front to rear
T36 Series = 40 front to rear
T42 Series = 46 front to rear

Note: A counterweight sliding front window increases the overall depth by 1.5 inches. Mode "ER" increases overall depth by 2 inches.



Sizes (dimension in inches unless noted)

Nominal Width		3 ft.	4 ft.	5 ft.	6 ft.	8 ft.	10 ft.
Overall Width	W=	38½	50½	62½	74½	98½	122½
Overall Depth	D=	34	40	46	58		
Model #		*T30	*T36	*T42	*T54		

* = Width in nominal foot as shown above.

Width in inches: (end to end)
3 ft. = 38.5
4 ft. = 50.5
5 ft. = 62.5
6 ft. = 74.5
7 ft. = 84.5
8 ft. = 98.5
9 ft. = 110.5
10 ft. = 122.5

Part Number Configuration

Model Number CAP412-6T30 WO is for a 6-foot nominal width and "T30" is for a 30-inch deep work depth. The "WO" indicates a wash out style clean bench configuration.

Estimated Weights for Standard Benches

3T30	=	440 lb.	6T36	=	750 lb.
3T36	=	570 lb.	6T42	=	910 lb.
3T42	=	700 lb	8T30	=	765 lb.
4T30	=	490 lb.	8T36	=	920 lb.
4T36	=	630 lb.	8T42	=	1100 lb.
4T42	=	790 lb.	10T30	=	940 lb.
5T30	=	540 lb.	10T36	=	1040 lb.
5T36	=	690 lb.	10T42	=	1240 lb.
5T42	=	840 lb.			
6T30	=	590 lb.			

Standard units shipped F.O.B. factory by padded van.

Upper cabinet module and support frame assemblies are shipped on separate skids. (Assembly is required.)

Specifications subject to change. Please contact factory for details.

Instructions for Use

For the best performance, do not block the vertical airflow. This will create turbulence on the downstream side that can draw in contamination. When using the bench, wear tight fitting arm coverings with slow arm movements to allow the contamination to be blown out of the hood area.

Installation Location, Mounting Requirements, Environmental Conditions

The unit is designed to set onto the floor and be supported by the units 4 leg leveling glides. If the unit is to be used in seismic areas, the units should be attached to the floor. The unit is intended to be used in a dry environment in which condensation will not occur up to 21 degrees C (77 degrees F). Consult the factory for additional information.

Grounding

The units have a rear junction box. The unit is 120 volt 60 Hz single phase. A black wire for line voltage, white for neutral and green for the ground. The serial tag on the front of the unit will provide the unit's amp draw requirements. Optional power cords are provided with a 120 volt 60 Hz power cord, plug and attached ground. The size of the plug will vary depending on the unit's size. The units should only be plugged into a grounded outlet designed for that size plug. Always inspect the cord assembly prior to plugging it into an outlet. This inspection should include damage to the cord, damage to the plug, the blades of the plug including the grounding blade. Never use the unit with damage to the cord, with a plug missing, with damaged blades, with loose or missing ground blades, or on an ungrounded circuit.

The unit is equipped with a main power circuit breaker, with secondary breakers, depending on the size of the unit. These circuit breakers are a button type that have a center button with the current amp rating. Should a circuit breaker trip, determine the cause prior to resetting the circuit breaker.

Use of Unit

- Never use the unit when unit or floor around the unit is wet.
- Never use the unit with a damaged cord assembly.
- Never use the unit if it is not stable on a solid floor. Secure the unit to the floor as required by local code.
- Never use the unit if the airflow is restricted.
- Service the unit only with trained service personnel.
- Never operate the unit without the safety guarding secured and in place.
- Lock out the unit prior to servicing. The motor has an automatic thermal reset and could unexpectedly start.
- Lock out the unit prior to servicing any electrical item.

Read and Save these Instructions!

Please observe the following information related to the product:

1) Read this guide before installing and/or operating the unit.
2) Keep this guide to make references to the safety and operating instructions in the future.
3) Observe warnings associated with handling, installing, using, and maintaining the CAP412.
4) Follow all instructions for set-up, operation, and use.
5) Operate ONLY from the type of power source indicated. If you are unsure of the type of power available to you, contact your dealer or power company.
6) This unit may be equipped with a polarized alternating current (AC) plug with one blade wider than the other. This plug will only fit into the power outlet in one way for safety reasons. If the plug does not fit, call an electrician to replace the outlet. DO NOT REMOVE THE ROUND GROUNDING TERMINAL. THIS UNIT MUST BE GROUNDED FOR SAFETY REASONS AND FOR PROPER OPERATION.
7) Do not place power cords (optional) where they will have things placed on or against them, be walked upon, or be pinched, especially near the outlet, the plug, or where the power cord exits the unit.
8) Overloading outlets and/or extension cords can result in fire and/or electrical shock.
9) ONLY use parts supplied or authorized by the manufacturer. Substitutions may result in fire, electrical shock, or other safety hazards.

Safety Warnings

1) NEVER expose the assembly to moisture or rain.
2) If the unit gets wet, disconnect the power at the source and have an authorized service inspection before using it again.
3) Do not pull on the optional power cord to unplug the unit, and never handle the cord with wet hands.
4) Do not clean the unit with flammable chemicals.
5) Do not expose to explosive or hazardous vapors or materials.
6) Make sure the unit is well supported to prevent falling.
7) Do not block airflow to the unit.
8) Disconnect the power before servicing.
9) Do not operate below 0 degrees Fahrenheit or above 110 degrees Fahrenheit.
10) This unit is designed to operate in a non-hazardous (non-explosive) environment with non-condensing air.
11) NEVER put objects into the blower.
12) Do not operate without metal blower guard.
13) Review application with your safety commissioner for proper use.

Installation of the Series 412

Check that all the equipment has arrived without damage. Notify the truck line ASAP about any damage, exterior or hidden.

POWER SHOULD NOT BE CONNECTED TO THE CABINET UNTIL STEP 7 IS COMPLETED.

1) The top cabinet is shipped separate from the bottom support "C" frame. Take the shipping boards off the bottom of the "C" frame and insert the leg leveling glides. They will be shipped in either a box taped to the lower rear tube of the frame or on the table's top (if your unit has a built-in table top).

2) Take the plastic off the top cabinets. Care must be used to not damage the HEPA filter, which is located on the underside of the cabinet. If a forklift is used, the forks must stick all the way through past the rear of the unit.

3) Inside the top cabinet are the fluorescent lamps and rear cabinet extension channels. These channels extend the top cabinet to the same depth as the lower support "C" frame. They are normally installed before setting the top cabinet on top of the "C" frame.

4) ONLY ON UNITS WITH REAR EXHAUST DUCTS - Mode E, ER and R. Attach the exhaust duct to the rear of the cabinet. The exhaust duct should stick past the top cabinet by approximately 2 inches.

   With the rear duct attached, if any, set the top cabinet onto the lower "C" frame. The unit should line up with the front edge of the frame and the sides of the "C" frame.

5) UNITS WITH FRONT COUNTERWEIGHTED FRONT WINDOW. The stainless steel counterweighted sliding window side brackets extend past the top of the "C" frame. These brackets line up with similar brackets on the top cabinet. There is a white plastic guide inside these stainless steel side brackets. When assembled, the side brackets will butt together and the white inner plastic guide from the lower bracket will insert into the top bracket to form one long continuous track. There is a screw that secures the top bracket to the lower plastic guide.

   A second method is to take out the window by taking off the bottom window stops. Sliding the window out the bottom, unscrew one or both of the stainless brackets attached to the "C" frame. With these removed, set the top cabinet in place and re-attach the side brackets, plex window and bottom window stops.

5a) We recommend taking the front panel off before setting the unit on top of the lower "C" frame. This is done by removing the 2 acorn nuts from the top of the front panel and lifting the panel off the locator pins. After the unit is set back on top, re-attach the nuts to the top of the pins to prevent the panel from accidentally coming off.

6) UNITS WITH FIXED OR HINGED FRONT FACE SHIELDS. These shields are attached after the top cabinet is installed and screwed to the "C" frame.

7) The top cabinet is attached to the "C" frame by 2 screws which are installed in the front right- and left-hand interior bottom corners of the cabinet. Take off the electrical cover panel, which is located on the inside front edge of the cabinet. Clearance holes in the top cabinet are located one inch from the cabinet front and outside edges. You may have to push the sides of the "C" frame slightly in order to get the holes to line up and get the screws started.

8) The 6-inch long front, flexible face shield is designed to direct the laminar flow out of the HEPA filter and give it time to fully develop. This laminar flow can then continue down toward the work surface. Counterweighted

sliding front windows and face shields will assist in directing the laminar flow, but are more often used for containment or operator protection.

9) Connect the cabinet to power, install the fluorescent lamps, and check out the blower and lights. Let the unit run at least 24 hours before using.

Indoor Use

Altitude up to 2000 m or above 2000 m if specified by the manufacturer (see Clause D.9 for further information).

Temperature 0 to 40°C.

Maximum relative humidity 80 percent for temperatures up to 31°C decreasing linearly to 50 percent relative humidity at 40°C.

Mains supply voltage fluctuations not to exceed ±10 percent of the nominal voltage.

Other supply voltage fluctuations as stated by the manufacturer.

Transient overvoltages according to Installation Categories (Overvoltage Categories) I, II and III (see Annex J). For mains supply the minimum and normal category is II.

Pollution Degree 1 or 2.

Daily Operation

The factory recommends that the unit be run continuously. The normal HEPA filter life is a number of years when the hood runs continuously, and it will assure a clean work area.

1) When the cabinet runs continuously, it is ready to use at all times. The work surface will require cleaning which will depend upon its use. The clear plastic hood will only require occasional cleaning on the inside with alcohol. The hood outside is to be cleaned with a plastic cleaner and soft material. Alcohol will make the clear plastic turn a milky color over a long period of time. Use sparingly, and only when needed.

2) The Formica table top may be cleaned with strong household cleaners. Stainless may be cleaned with detergents or alcohol. Abrasive materials will scratch the surface. The vinyl material on the hood may be cleaned with mild household cleaners. Chlorinated or strong cleaners will turn the vinyl yellow. The top of the clear plastic hood may easily be cleaned by removing the front shield panel.

3) When the cabinet is shut off for a short period of time and is turned on, the hood interior is to be wiped clean. The hood should run for 5 to 10 minutes before use when off for intervals of 1 or 2 days.

4) When the cabinet is to be off for 3 to 4 days or more, a plastic drape should be attached to the front of the hood as tightly as possible to prevent dust from entering the hood and getting into the HEPA filter. When the cabinet has not been used for 2 weeks or more, the filter should be purged 1 to 2 hours.

5) A short interval should be allowed each time an object is set into the hood to allow loose material to be washed off the object.

6) Avoid fanning papers, books, arms, coats and fast walking in front of the hood. Air currents will enter the hood and contaminate the interior. Many organizations have a 6-inch line marked on the table top. All work is performed behind this line to minimize contamination due to drafts.

7) The lights may be on or off when the blower is running. The lights have no affect on vertical flow cabinets.

8) Spills should be cleaned up immediately. Sponge the liquid near the HEPA filter first to keep the liquid away from the filter. Should liquid splash onto the HEPA filter, DO NOT attempt to wipe the filter. Wiping the filter will cause filter leaks. The liquid will dry, discolor and plug a small area of the filter in front. The filter is nearly 3 inches deep, and a small plugged area will have little or no affect on the airflow.

9) Do not use the hood for storage of large objects. Large objects will disrupt the smooth laminar airflow, causing turbulent air flow behind them and contaminated room air may be drawn into the hood. Objects should not be placed between the HEPA filter and any point where the clean environment must be maintained. A good practice is to place materials on platforms to allow air movement under, as well as around, the object. All work should be performed with the operator's hands downstream of the critical process points.

Shipments

Clean Air Products takes every reasonable precaution to ensure that your laminar airflow cabinet arrives without damage. However, damage can occur in any shipment, and it is important that you note visible damage immediately with a notation on the consignee's copy of the freight bill. Terms are F.O.B. factory, unless otherwise stated. Your inspection of either visible or concealed damage is the basis of your filing claim (which you must do at once) against carrier. An inspection then must be made to verify the claim against the carrier.

Performance Specifications

All equipment is thoroughly inspected at the Clean Air Products' factory at the time of shipment. Quality control is maintained by constant surveillance over the product, beginning at receipt of purchased material and concluding with a final inspection which certifies performance to Class 100 conditions of Federal Standard 209E, as well as to the unique requirements of each project. In all instances where product quality cannot easily be assessed on the end item, the product is inspected during subassembly fabrication. All electrical components are UL approved; all mechanical components are fabricated or purchased and inspected to performance requirements before assembly into the final product.

All CAP products have been certified to meet or better the following specifications:

HEPA Filter System

The HEPA Filter System consists of two basic members: the absolute HEPA filter and a flexible duct to form a modular component. All HEPA filters purchased by CAP have been D.O.P. tested to meet Mil Standard 282 and are tested for leakage for 99.99% removal of all particulate contaminants greater than 0.3 micron. The CAP FLEX Filter is proof-tested for leaks in the installation to ensure the continued integrity of the HEPA and of the assembly. D.O.P. smoke at 0.3 micron particle size is introduced into the air, and the air flow is scanned with a light scattering photometer for leaks. All laminar flow equipment must meet or exceed Class 100 Federal Spec 209E.

Prefilter

The Prefilter is made of 1-inch thick disposable, non-woven framed fiberglass media, a nominal efficiency of 40% by NBS Test Method using atmospheric dust.

Air System

The blower has been adjusted at the factory to provide 90 FPM across the face of the filter. The motor/blower is a dynamically balanced, direct drive centric unit with the motor mounted in-scroll in a resilient cradle. The motor is a permanent split capacitor type with automatic-reset-thermal overload; it is lubricated for life. The standard motor operates at 120 volt, single phase, 60 Hz power. Motor speed is controlled by a Solid State TRIAC speed control mounted on the blower and available either through the prefilter grill or on the front panel, recessed to prevent tampering. The motor/blower has been chosen to provide a flow of a minimum of 100 FPM (to meet Federal Standard 209E) and sized to provide 1.2 inches of water pressure drop over the HEPA filter at 90 FPM.

For best utilization of the work station, the air velocity should be checked once every 6 months and speed control adjustment made, if necessary, to retain the desired are velocity (usually 90 ± 20 FPM).

Lighting

The intensity of the lighting is a minimum of 80-foot candles at the work surface level on standard equipment. The lights are single or double pin, rapid start, T-12, white lamps, unless stated otherwise. They operate within the work station or cabinet on 120 volt, single phase, 60 Hz power. The cabinet light switch will turn on the lights for bench operation. Cabinets with ultra violet lights are wired UV light or white light on. Both may not be on at the same time.

Sound Level

The sound level is less than 65 dBa against an ambient of 55 dBa. Efficient air diffusion and the use of acoustical blankets provide for quiet operation.

Vibration

The vibration level will be less than 100 micro-inches on the work surface. A special vibration control system provides extraordinary attenuation of blower induced vibration and sound.

Operation Guidelines

Operate the laminar flow work station continuously. The unit will then remain in its initially clean condition. If, for any reason, the unit is turned off, the interior should be cleaned. Turn the unit on and permit it to operate for 5 to 10 minutes before resuming operation.

Allow only essential items in the work station. Objects should not be placed between the HEPA filter and any point where the clean environment must be maintained.

Particular care must be exercised in placing equipment within the work space. Where possible, equipment should be placed on platforms to allow air movement under, as well as around the object.

All work should be performed with the operator's hands downstream of the critical process points.

Movement in the work station should be kept to a minimum.

Maintenance Procedures

Fluorescent Lamp Replacement: (Please refer to exploded parts drawing on your model.)

The lamps are directly exposed for replacement. Replace with the same type as supplied. The lamps are mounted in spring loaded holders and can be pushed toward one holder to remove.

HEPA Flex Replacement: (Please refer to exploded parts drawing on your model.)

The procedure to replace the HEPA filter is to remove the front cabinet panels from the cabinet. Remove the strap that attaches the plastic duct to the blower and free the duct from the blower (tape may be used to hold the duct).

Release the clamps and hold-down bars to remove the filter plenum. The filter can now be slid out of the bench.

USE CAUTION when handling the filter.

DO NOT cut open the cardboard carton.

DO NOT "rack" (twist) from corner to corner), or drop the filter.

DO NOT push on or poke on the pleats. Use care when laying the filter down to do any assembly that is required.

Any of these things can damage the pleats and cause leaks in the filter.

Some applications require an extension frame to make the new 3" or 3-1/2" filter equal to the old 6" filter size. If this is used, it is screwed to the non-grill side of the filter.

DO NOT predrill holes. Use the extension as a template and use the self-driller screws provided.

Add gaskets as required.

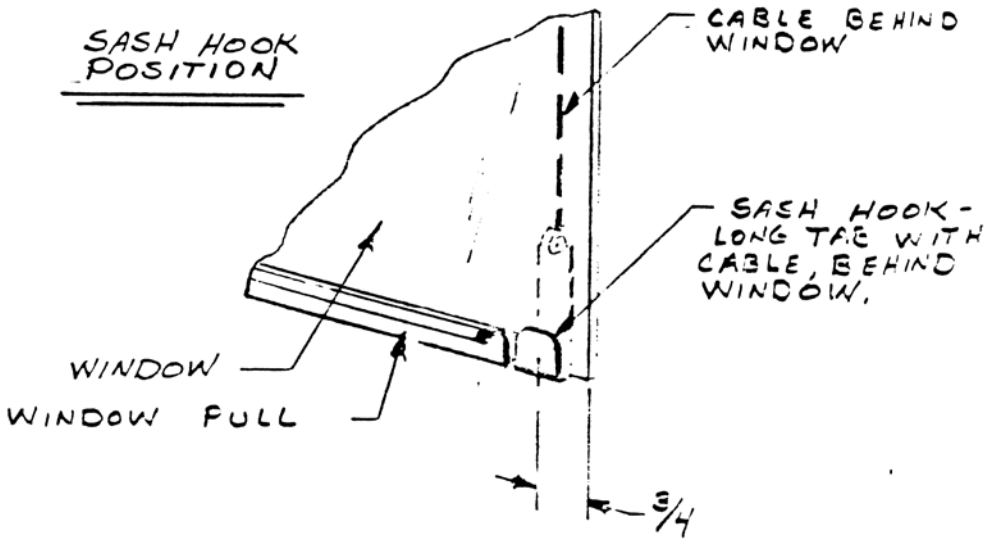
Replacement filters from Clean Air Products come with a new Flex Duct and supports, ready for installation. All filters from Clean Air Products are leak checked for 99.99% with 0.3 micron D.O.P. smoke. The reverse procedure is followed to reassemble the filter into the cabinet.

Single Window Installation

1 Set blower cabinet on top of C-frame and add screws. (CAP412 only).
2. Lower cables with sash hoods down and place hook under window – approximately 3/4 inches from end. (See sketch)
3. Locate weight and weight tube (See Note). Attach both snap clips to the weight and let hang.
4. Install weight tube with weight inside.
5. Slowly raise window and check that all cables are in the pulleys. The pulleys have guide plates on them to help keep the cable in the pulley.

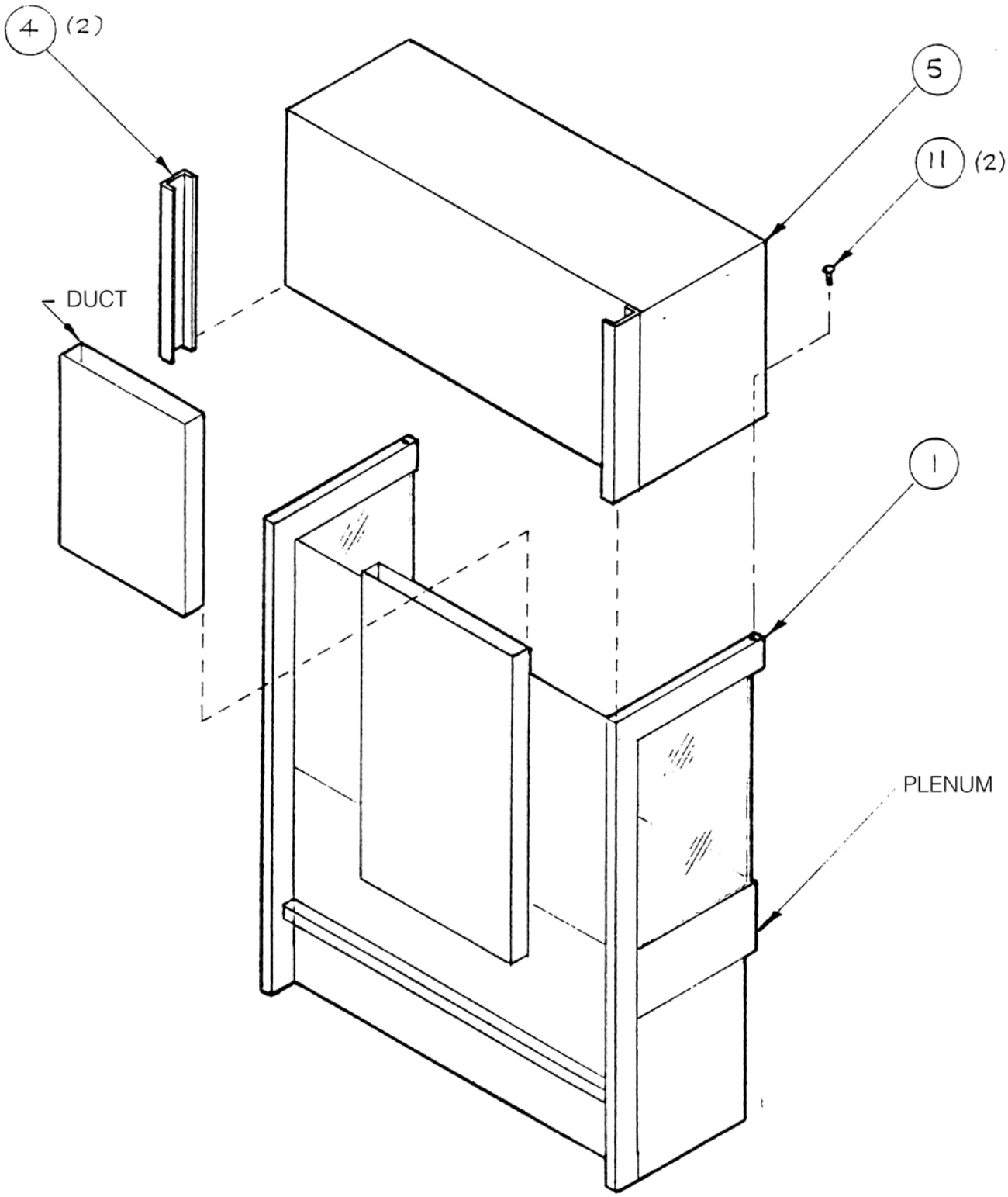
Ref. Dwg. B37667.0011

Note: Weight may be in the bottom of the tube with a wire run to the top to access the weight.
6. The window was pre-set to slide evenly at the factory. If your window does not travel evenly, there is a turnbuckle



located in one cable. This can be tightened or loosened as required to even out the window.

tel: 763.425.9122 800.423.9728
www.cleanairproducts.com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DUCT
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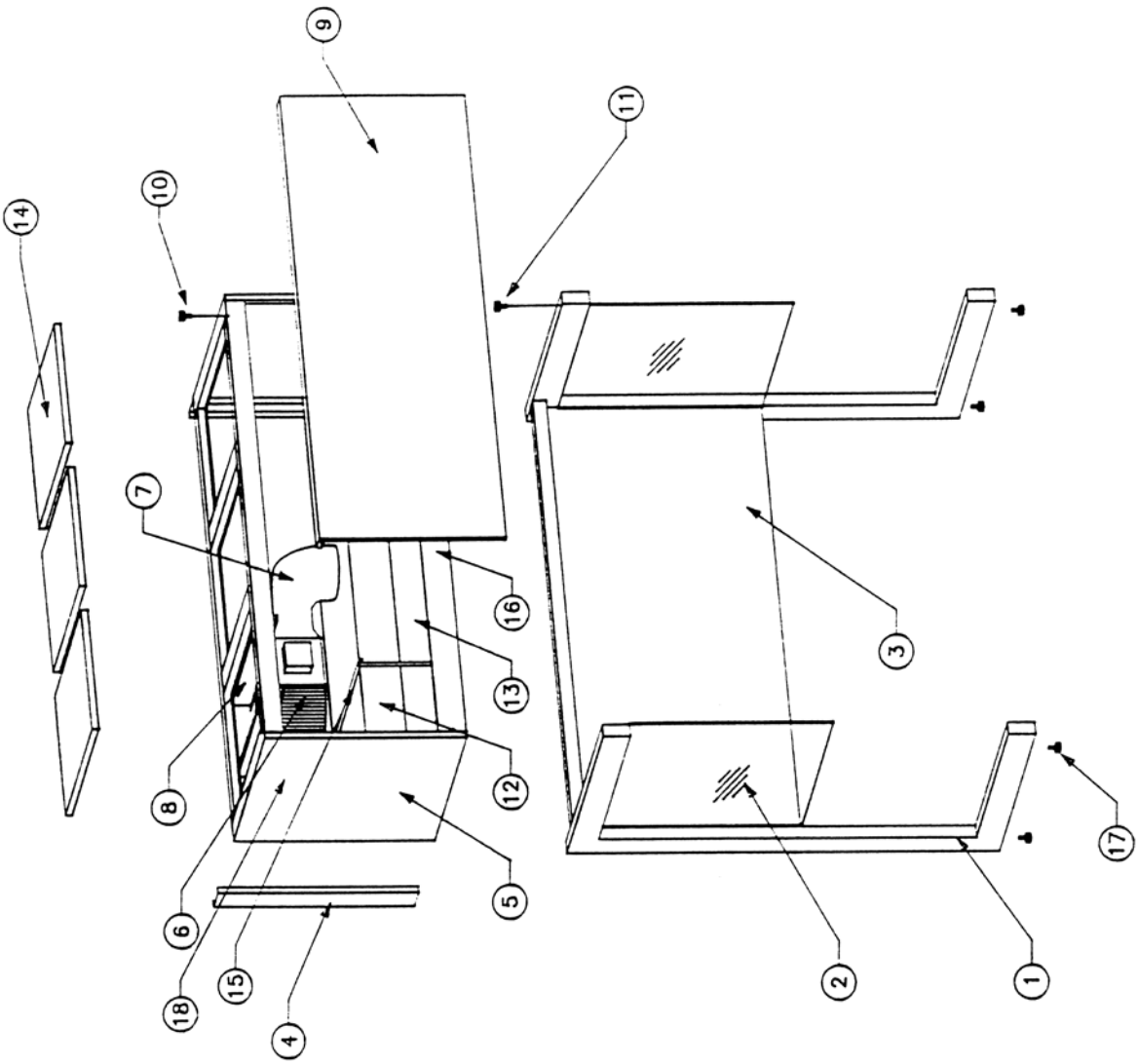
PLENUM

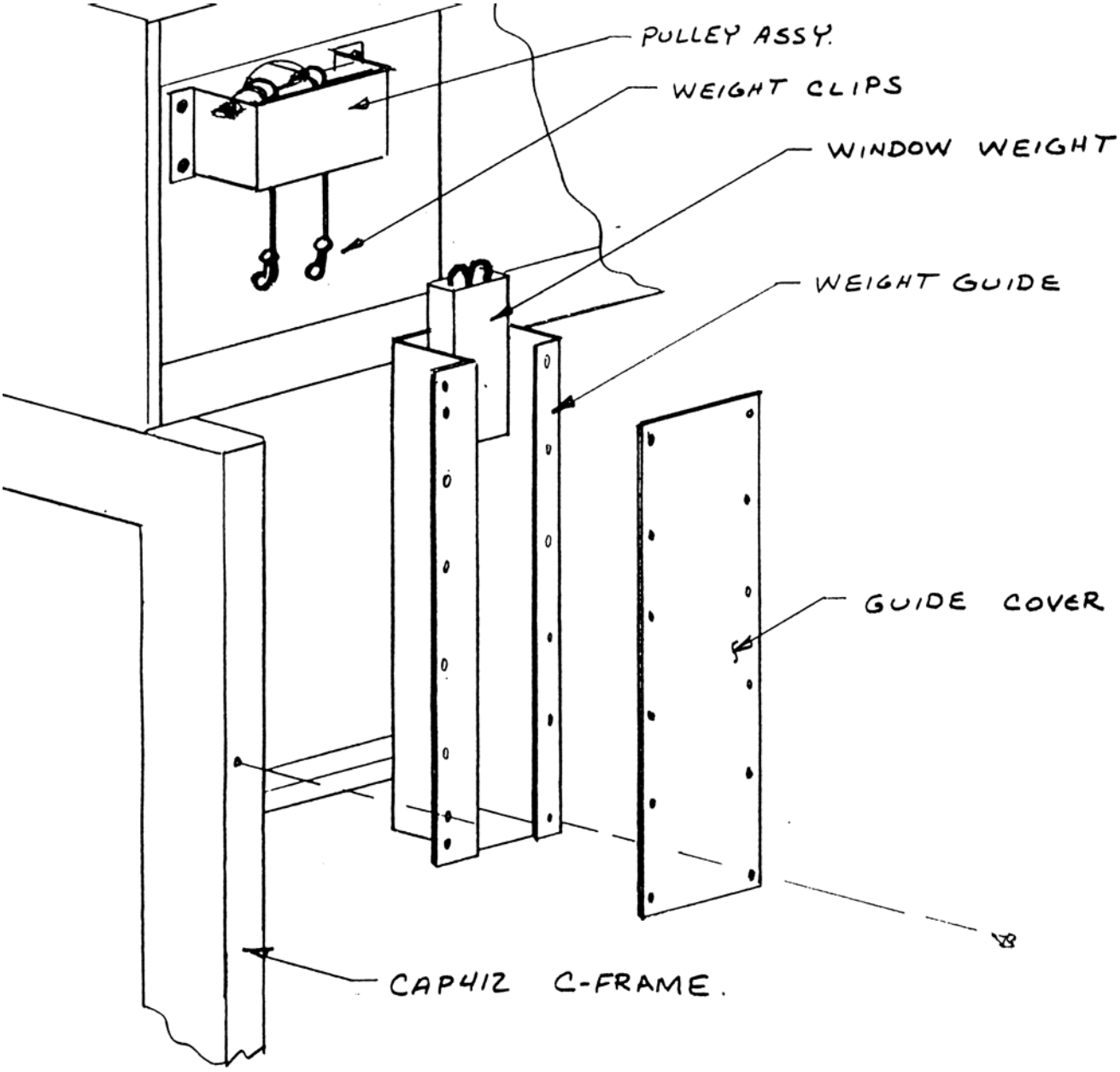
Series 412 Vertical Laminar Flow Clean Bench

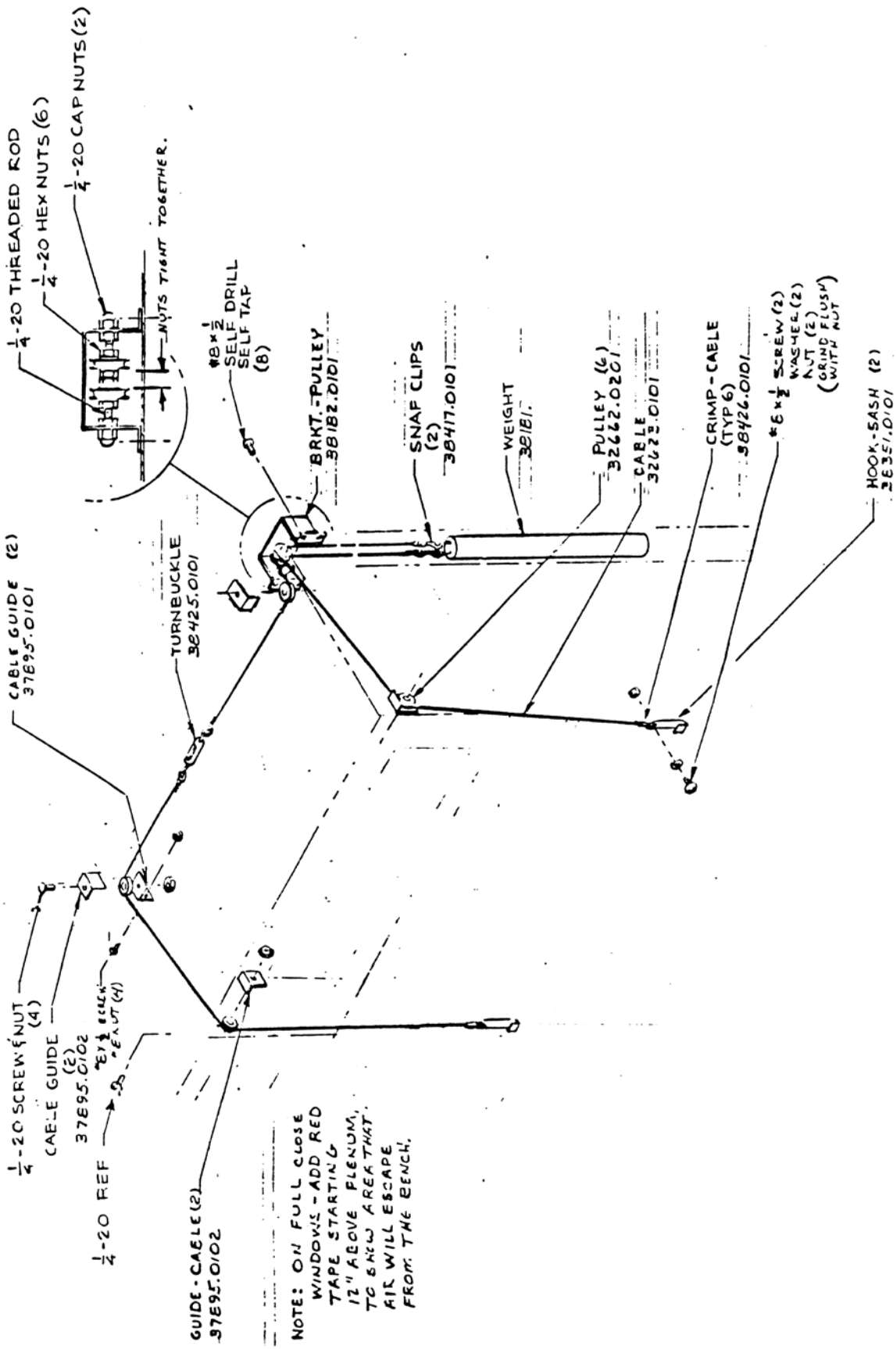


ITEM:	
1.	"C" FRAME
2.	END PANELS
3.	BACK PANEL
4.	CHANNEL – REAR EXTENSION
5.	CABINET SHELL
6.	BLOWER
7.	FLEX DUCT WITH MOUNTING STRAPS
8.	MOUNTING BAR – ANTI–VIBRATION
9.	FRONT PANEL
10.	FRONT PANEL HOLD DOWN SCREWS
11.	TOP CABINET TO "C" FRAME, HOLD DOWN SCREWS
12.	FILTER PLENUM
13.	HEPA FILTER
14.	PREFILTERS
15.	AIR PLENUM AND FILTER HOLD DOWN BAR
16.	ELECTRICAL SERVICE COVER
17.	LEG LEVELER GLIDES
18.	CABINET DISCONNECT

Clean Air Products' Series 412 Assembly

Clean Air Products' Series 412 Counter Weight Assembly





Clean Air Products' Series 412
Window – Counter Weighted

tel: 763.425.9122 800.423.9728
www.cleanairproducts.com

Warranty for Cleanroom & Equipment

Clean Air Products Corporation warrants that it will repair FOB its factory or furnish without charge FOB its factory a similar part to replace any material in its equipment within one year after the date of sale if proved to the satisfaction of the company to have been defective at the time it was sold provided that all parts claimed defective shall be returned, properly identified to the company at its factory, freight charges prepaid. Factory installed equipment of accessories is warranted only to the extent guaranteed by the original equipment manufacturer, and this warranty shall not apply to any portion of the equipment modified by the user. Claims under this warranty should be directed to Clean Air Products, 8605 Wyoming Avenue North, Brooklyn Park, MN 55445, setting forth in detail the nature of the defect, the date of the initial installation, and the serial number and model number of the equipment.

HEPA filters are warranted to have their given efficiency at the time of shipping.

Parts shipped to replace warranty items shall be invoiced out with 60 day terms. Credit shall be issued when defective parts are returned to Clean Air Products' factory. (Contaminated materials shall be credited after receipt of proper disposal is sent to Clean Air Products.)

When special shipping containers are used to ship out new product, defective parts are to be returned in the same container. This shall be so stated on the Bill of Lading sent with the replacement parts.

Contaminated Parts and Equipment

Clean Air Products must be notified if defective parts, or other materials supplied to the purchaser are contaminated with hazardous chemicals or carcinogenic materials that are considered hazardous or carcinogenic by the EPA or other regulatory agencies. These parts are not to be shipped back to Clean Air Products' factory. The purchaser shall be responsible for proper disposal and all costs associated with the disposal and/or storage of the defective contaminated equipment. Prior to their disposal, Clean Air Products may require inspection of said defective materials.

The user and purchaser shall each be responsible and be back charged for cleanup and disposal of all contaminated materials shipped back to Clean Air Products' factory.

Cleanroom Solutions Made Easy!

Laminar Flow Clean Benches

Modular Clean-rooms — Vertical Flow HARDWALL

Dust Containment Cabinets

Fume Hoods

We Build Hassle-Free

Modular Clean-rooms — Vertical Flow SOFTWALL

Wet Process Stations

Coat Racks

Formica Tables

Stainless Steel Tables

Cleanroom Solutions

Filters

Gowning Benches

Desiccator Cabinets

Storage Cabinets

Air Showers

Pass Thru Air Locks

Wall & Ceiling Modules

Clean AIR PRODUCTS

8605 Wyoming Ave. N.
Minneapolis MN 55445
tel: 763.425.9122
800.423.9728
fax: 763.425.2004
e-mail: sales@cleanairproducts.com
www.cleanairproducts.com