



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Research Paper

Study On Installation Qualification on Laminar Air Flow System

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ARTICLE INFO

Published: 16 Jan. 2025

Keywords:

Installation Qualification, Laminar Air Flow System, aims of study, qualification procedures.

DOI:

10.5281/zenodo.14673860

ABSTRACT

This document provides guidance for qualification of a LAF (dispensing/sampling booth) installed in a laboratory. Qualification study was performed at Sardar Patel University, Balaghat. It outlines objectives, responsibilities & requirements for qualifying the LAF to ensure it performs reproducibly within specifications. Key areas covered include equipment description, technical specification, training, pre-qualification instruments needed, performance qualification procedures, acceptance criteria, documentation requirements, do's & don'ts with respect to LAF. Based on the objective, the aims of study were decided as "Study on the LAF system". Due to its efficacy removal of 99.97% of airborne particles as small as 0.3-micron,⁸ this equipment is widely used in life science research, mushroom cultivation, microbiology, IVF, IUI and histopathology / pathology lab, plant tissue and cell culture and pharmaceutical and electronics industry and many more. Considering its susceptibility of operation here we also focused its cleaning procedure with safety precaution.

INTRODUCTION

LAF is a type of airflow where the entire body of air within a space has a uniform velocity and direction. LAF cabinets create a particulate-free working area by emitting air through a filtration system and exhausting it across the work surface. A laminar air flow workstation is a closed cabinet fitted with HEPA filtered air flow system. Here, laminar means unidirectional constant flow of air with almost no or minimal turbulence. The air flow velocity remains between 0.3 m/s to 0.5

m/s. The purpose of using such workstations in laboratory is to create particle and bacteria free working environment to carry out specialized work. As these units discharge air towards user, they provide no personal protection but product protection from room contaminants.

Vertical vs Horizontal Laminar Flow

It is the most used type of laminar air flow. In vertical flow cabinet, room air is entered in working area through HEPA filter fitted on top of the cabinet. Thus, air flows downward (vertically)

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



towards work surface and leaves the cabinet sweeping out particles and bacteria. In horizontal air flow cabinet, room air is entered in working area through HEPA filter fitted on the back side of the cabinet. Filtered air flows horizontally towards the user creating sterile working environment.

LAF cabinets are made up of several parts, including:

Cabinet: Made of stainless steel, the cabinet provides insulation to the inner environment and protects it from the outside environment.

Working station: A flat working station made of stainless steel is present inside the cabinet.

Filter pad: A filter pad is present on the top of the cabinet to trap dust particles and some microbes.

Fan: A fan is present below the filter pad that sucks in the air and moves it around in the cabinet.

LAF cabinets provide a clean and sterile atmosphere for work, and protect the user from dangerous contaminants. They are also eco-friendly, easy to maintain, and portable. In laboratories, a laminar air flow cabinet is used to

create a sterile atmosphere for activities like plant tissue culture. This is because the presence of pollutants in the environment may readily impact these processes. The Laminar Air Flow Cabinet Market size was valued at USD 2.50 Billion in 2022 and is projected to reach USD 3.70 Billion by 2030

Method of Installation & Qualification-

These article covered Unpacking, Installation and Debugging, User Instructions, Trouble Shooting and Solution of LAF.

Stage-1 Unpacking, Installation and Debugging

Please firstly check if the packing box is in good condition. If the packing box is damaged, please take photos.

Unpacking: Choose proper tools and unpacking method as shown in the below picture.

For wooden box: Method1 Necessary tools for unpacking: Electric drill with hexagon dead M8(Picture1)

Method 2 Use M8 Wrench to unpack(Picture2)

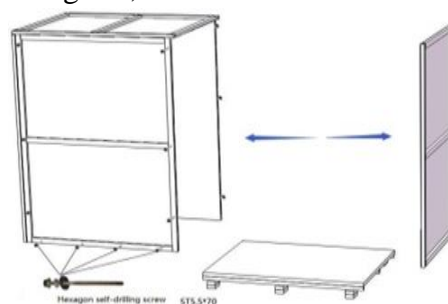


Picture-1

Picture-2

58The following diagram demonstrates quick unpacking procedures (Picture 3). Remove the screws as shown in the below diagram, then

remove the wooden sheet to right and left of the wooden box.



Picture-3

Accessories Checking: Manufacturer provided the list of accessory. Refer to the packing list and check the accessories availability.

Items	Quantity	Position
Main body	1unit	Wood packaging
Base stand	1unit	Paper(Behind the cabinet)
Power Cord	1pc	Bags(Behind the cabinet)
Fuse(10A)	1pc	Bags(Behind the cabinet)
UV Lamp(T630W)	1pc	Paper(Behind the cabinet)
GasTapSAN-3102	1pc	Paper(Behind the cabinet)
Water Tap SAN-2102	1pc	Paper(Behind the cabinet)
BLHZ-203UserManual	1pc	Envelope(Behind the cabinet)
Test report	1pc	Envelope(Behind the cabinet)
Quality certification card	1pc	Envelope(Behind the cabinet)
Warranty Card	1pc	Envelope(Behind the cabinet)
Product acceptance certificate and installation report	1pc	Envelope(Behind the cabinet)
Training certificate	1pc	Envelope(Behind the cabinet)
Hexagon cylinder head bolt M10*55	3sets	Bag (Behind the cabinet)
flatwasher10+Springwasher 109	3sets	Bags (Behind the cabinet)
Allen wrench	1pc	Bags (Behind the cabinet)

Installation Conditions and Operating Environment

Laminar Flow Cabinet shall be placed in the protective area of an air stream, and the working area of the Laminar Flow Cabinet cannot be near to the door or window, and should be away from the air outlet to prevent the air flow from the ventilation system, air conditioning, door, window and personnel. At least 300 mm gap must be kept in the side and back side of the Laminar Air Flow for clean operating and for inspection.

Working environment:

- Only applicable for indoor operation;

- Ambient temperature: 15°C ~ 35°C
- Relative Humidity: ≤ 75%;
- Atmospheric pressure range: 70KPa ~ 106KPa;
- Electrical parameters: Adequate power supply to the laminar flow cabinet (See 2.1.4 Technical Parameters);

Power supply need to be grounded; (Judging method: test the live wire and the neutral wire of the socket with multi meter. The voltage between live and ground should equal to the voltage of local electrical grid, and the voltage between neutral and



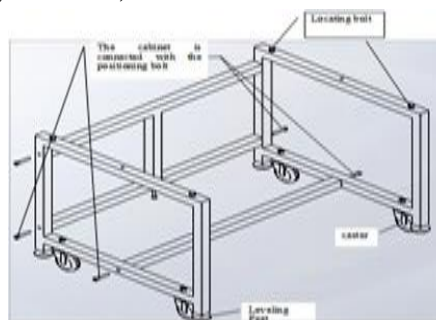
ground should equal to 0. Otherwise the power supply is not grounded correctly);

Installation-

Remove all the packing materials; Check the surface of main body to make sure there is no scratch, deformation or foreign bodies; Confirm the complement of accessories according to the list. Before removing the packing material, move

the entire equipment to the place where it is going to be installed. The base stand will be packed at back of main body, please take it out before installation. Do not invert, disassemble or tilt the cabinet during transportation.

a. Assemble the base stand with main body as shown in the picture. Please connect the base stand with the main body referring to Picture 4



Picture-4

Removing Hexagon cylinder head bolt on both side lateral brace and T frame, the bottom of T frame, assemble referring to the picture, fasten the screw and Cap nut on the both side of base stand. Foot height can be adjusted. Clock wise rotation of feet, when feet height is less than casters, the cabinet can be(or base stand) moved; anti clock wise rotation of feet, when feet height is greater

than casters, then play a fixed role in preventing the cabinet (or base stand) from moving. If you have any questions please contact engineers for commissioning.

b. Connecting main body and base stand. Please connect main body and base stand refer to Picture5.



Picture-5



Picture-6

First, keep the main body above the base stand.(picture 5),then align the bolt of base stand.

Mounting holes of the Main body at both sides, using Hexagon head bolt M10*55,flat washer

10, Spring washer 10 insert through base stand and the side panel and make them stable. Pick up the gas (water) tap from accessory kit, first, unscrew the tap and nut, find the Mounting holes at the both side of cabinet glass. The Tap needs to be fixed as shown in the picture. The water mouth of the Tap should be inside the cabinet's operating zone, refer

Picture 6, The other end of the Tap which is having threading on the pipe should be inserted through the glass hole, the threaded pipe should be fastened with washer and nut outside the glass and need to be tightened with a wrench. Please refer the below picture to carry out the tap fixing to the cabinet. See picture 6 and 7.



c. After the above steps, move cabinet to the right cabinet position slightly, remove the power cord, check the power cord is intact.

First, make sure the voltage and frequency to be same as nameplate showing, and then check the follows items with power on :

Checking after installation

Checking Items	Normal working status
Fan motor	Running normally
Fluorescent lamp	Lamp lights up after pressing button
UV Lamp	Lamp lights up after pressing button
Display screen buttons	All buttons can be used
Socket	Use multi meter to test voltage output after pressing the socket button

All the manufacturer were provided their service manual in which Debugging methods mentioned.

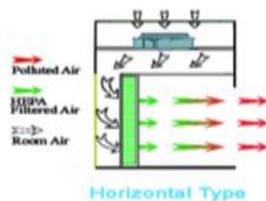
User Instructions:

it covers Functions & Product Concept. Laminar Flow Cabinet–is used only for sample protection. Laminar Flow Cabinet is a work bench or similar enclosure, which creates a particle- free working

environment by taking air through a filtration system and exhausting it across a work surface in a laminar or unidirectional air stream.

It is widely divided into vertical and horizontal laminar airflow type. This series is for horizontal type.

Operating Principle/ Air flow Pattern



Picture-8

Protected Objects

Laminar flow cabinet is to protect the experimental material, to create a local high cleanliness air environment, the main role is to ensure the accuracy of the operating area of the experiment, but for the environment and operators can't afford protection.

Technical Parameters

Model Parameters	BLHZ-203
External Size (W*D*H)	1300*820*2040mm
Internal Size(W*D*H)	1200*500*570mm
Power Supply	AC220V±10% AC110V±10%
Frequency	50Hz 60Hz
Consumption	400W
Air flow velocity	0.3~0.5m/s

UV Lamp Consumption	30W*1
Fluorescent lamp Consumption	12W(LED)*1
HEPA Filter	99.999% efficiency at 0.3um
Noise	≤65dB

- 1) Vibration amplitude: The net vibration amplitude, at arrange of frequency from 10Hz to 10KHz,would not exceed 5 μm .
- 2) Illumination: The average illumination is more than 350lux
- 3) Electrical properties: The cabinet would not break down in 5s when the voltage increases by1390V(AC) with in 5s. Grounding resistance ≤0.1Ω

Product Structure

Structural Composition of LAF



Picture-9

- | | |
|--------------------|------------------------|
| 1. Glass door | 9. Side window |
| 2. Power socket | 10. Worktable |
| 3. Ground terminal | 11. Base Stand |
| 4. Control panel | 12. Support foot |
| 5. Power switch | 13. Foot master caster |
| 6. UV lamp | |
| 7. LED light | |
| 8. Water, gas tap | |

Structure Introduction

- 1) **Driving system of front window:** Driving system consists of tubular motor, front window, hauling mechanism and limits witch.

- 2) **Air filtration system:** Air Filtration System is the most important system. It consists of blower and HEPA filter. The function of Air Filtration System is transferring filtered air to work area, ensure air flow velocity, and keep Class 100 cleanness of work area.
- 3) **UV lamp:** The entire work zone could be sterilized effectively by the UV lamp located at the top of work zone. Emission of 253.7

nanometers could ensure the most efficient decontamination.

- 4) **LED light:** The laminar flow cabinet is equipped with LED light, which ensures the standard requirement of average illumination is met.

5) **Control Panel:**



Picture-10




1. blower
2. Fluorescent Lamp
3. UV lamp
4. Power
5. Socket
6. Front window Up Status
7. Front window Down Status
8. Air volume decreases
9. Air volume increases


a. Gear Display


You can know working wind speed by gear display.


b. Soft touch buttons.


The main operation of the device can be carried out by touching button


- (1) : The power button
- (2) : To control blower working status. Blower has memory function, next boot blower gear shows the last shut down, to avoid each boot need to adjust the fan, (It will not work when front window is fully closed.)
- (3) : To control fluorescent lamp


- (4) : To control UV lamp (UV lamp, blower, fluorescent lamp and front window inter lock, it won't work when fluorescent lamp, blower, front window open)

- (5) : To control socket power status.

- (6) : Press Down button, front window will fall down. Each time you press, the buzzer will sound once; hold this key, the front window will continue to decline; release the button, the front window will stop declining.

- (7) : Press UP button, front window will raise. Each time you press, the buzzer will sound once; hold this key, the front window will continue to rise; release the button, the front window will stop rising.

- (8) : To control blower speed down. When blower is working, if number is More than 1, Each time you press, wind speed can down a gear, and the buzzer rings once.

- (9) : To control blower speed increase. When blower is working, if number is less than 9,

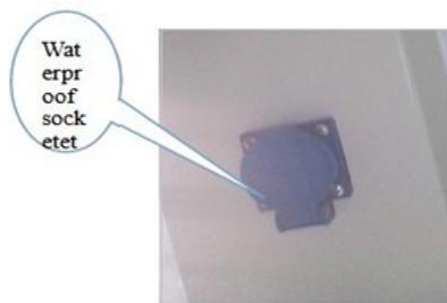
Each time you press, wind speed can increase a gear, and the buzzer rings once

(10) LCD display: When powered on, from top to bottom is FAN, It indicate the strength of blower wind speed, Shown below is the current state of the Winds; The right of the display is time; UV TIME, UV lamp working time; WORK TIME: HEPA filter working time.

(11) Clock Adjustment: In standby mode, press light button continuously to enter clock setting mode after a buzzer alarm. Firstly, minute position is flashing, press UP and DOWN to adjust to present time. Then press the blower button switching to hour position and adjust to present time. After that, long press the light button again, data will be saved after a buzzer alarm.

6) **Water proof Socket:** Water proof socket is arranged in the operating area, to within the operating area of the power supply equipment and in the lighting lamp installing the front side plate (Picture 11) and need to use a socket, open the power supply equipment, press the display of the socket button (Picture 10), the water proof socket open cover, access to electricity source plug.

- (1) Please make sure the total load of sockets should be $\leq 500W$;
- (2) Water proof socket only when the front cover down to the water proof, the front cover is opened, the socket cannot be considered water proof socket.



Picture-11

7) **Fuse:** The equipment is equipped with main power fuse, They are located near the power cord's outlet. Fuse label is corresponding to the relevant specifications.

8) **Control of Front Window Front window is motorized**

9) **Structure:** Cabinet body is built up of 1.2mm cold-rolled steel with anti-powder coating. Strong and steady. Work table is fully made up of 304 stainless steel which looks beautiful and with corrosion resistance performance. Base and is made up of cold-rolled steel with anti-powder coating. Soft touch type control panel, easy to handle and beautiful appearance.

Instructions of Operation:

- Make sure input voltage is correct and stable. The rated load of main power socket should be

higher than cabinet consumption. Plug must be well grounded.

- Moving principles of different samples inside cabinet: When two or more samples need to be moved, be sure that low-polluting samples move to high-polluting samples. Movement of items should also follow the principles moving slowly and stably.
- The weight of items placed in the cabinet should not be more than $23Kg/25 \times 25cm^2$;
- Avoid vibration: avoid using vibration equipment (eg centrifuges, vortex oscillator, etc.) inside the cabinet. Vibration would cause lower cleanliness of operating area and affect operator protection.

No flame: No flame is allowed inside the cabinet. Using of fire will lead to airflow disorder, and

filter damage. If sterilization is required during the experiment, infrared sterilizer is highly recommended.

HEPA filter life: With the usage time increasing, dust and bacteria accumulate inside HEPA filter. Filter Resistance is getting bigger, when it reaches the maximum point, the speed requirement can't be met. Then need contact service department of vendor to get a new one. The used filter should be processed as medical waste.

The steel plate is under fan, which is sealed strictly in the factory. The operator is not allowed to remove or loose screws of those parts. If necessary, please contact service personal.

The maximum storage period is one year .If the period is more than one year, performance test should be done

Operation Process:

- a. Connect to a suitable power supply
- b. Press the relevant key functions (related keys, function and operation of the 2.2.2 in the description); check the function key and the operation results are consistent, and according to the above clean table technical parameters of the test whether the normal start and wind speed is up to the standard requirements, lighting and ultraviolet lamp is normal work.
- c. The cabinet should be sterilized by UV lamp for at least 30 minutes with the window fully closed before any experiment.

(1) For safety of eyes and skin, people should leave the room during the UV sterilization.

(2) UV lamp should be checked regularly. It should be replaced when either the total working time reaches 600 hours or the intensity is lower than the requirement.

- d. Please move up the front window at the suitable height above the work table and turn on the fan. Make sure the experiment should be started after fan working for at least 30 minutes..

For operating safety, please place the experiment materials inside the cabinet before experiment start.

After finishing the experiment, please fully close the front window and make sure to sterilize the cabinet by UV lamp for 30 minutes before turning off the cabinet.

Daily Maintenance

Preparations before maintenance: removal of item in the equipment. Preparation of goods: cotton or towel, concentrated soap, hot water, water ,medical alcohol or other disinfectants, etc.

Clean the Cabinet Surface Clean the surface of working zone

Wipe the entire surface with a soft cotton cloth which has been soaked with concentrated liquid soap. Afterwards, wipe off the foam with another cotton cloth or towel which has been soaked with clean hot/warm water. At the end, wipe the entire surface with a dry cotton cloth or towel rapidly. For the contaminated or dirty work surface and sump, use 70% rubbing alcohol or other disinfectant to wipe. Disinfectants used for wiping should not damage the 304 stainless steel. Clean the external surface and front window. Use a piece of soft cotton cloth or towel to wipe the surface with non-abrasive household cleanser.

Overall maintenance period

There commended interval period for comprehensive maintenance is either one year or 1000 working hours.

Maintenance methods

1) Weekly or daily maintenance

- a. Disinfect and clean the operating area;
- b. Clean the external surface and front window around the operating area(Reference2.4.1 instruction);
- c. Check the various functions of the cabinet(Reference2.4.2instruction);
- d. Record down the maintenance result

2) Monthly maintenance



- Clean the external surface and front window (Reference 2.4.2 instruction).
- Use towel with 70% rubbing alcohol or 1:100 dilution of household bleach to wipe the working table, the inner face of front window and the inner wall surface of the working area (exclude the top wind grid). Use another towel with sterile water to wipe those area to erase the remain of chlorine.
- Check the various functions of the cabinet;
- Record down the maintenance result;

3)Annual maintenance

- Check the two lifting belt of the front window tubular motor, make sure both of them are well connected to the motor with same tightness.
- Check the UV lamp and LED light.
- Apply for overall performance test of the cabinet annually to ensure that the safety meets requirements. User is responsible for testing costs.
- Record down the maintenance result.

When doing maintenance, please pay attention to cut off the power, so as to avoid electric shock!

Storage conditions

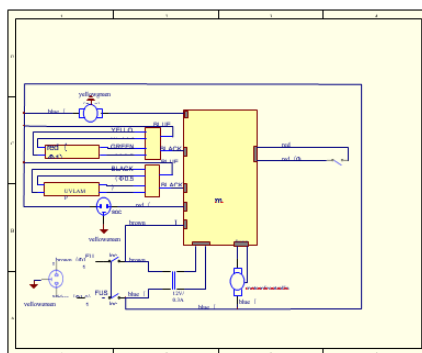
Laminar flow cabinet should be stored in a warehouse with relative humidity not more than

75% and temperature lower than 40°C. The warehouse should have good ventilation performance without acid, alkali or other corrosive gases. Storage period shall not exceed one year. Laminar flow cabinet stored for more than one year needs to be unpacked and checked before selling and using. Only the tested and qualified laminar flow cabinet could be sold.

Replacement Parts List: it should be provided b69y vendor.

Number	Name	Specification
BR-01	Fuse	10A
BR-02	LampholderT8	LG13-01A
BR-03	UV Lamp	T630W
BR-04	LEDT5stand	T512W
BR-05	UV lamp ballast	1*TL8-30W
BR-06	HEPA filter	1223*570*69
BR-07	Fan	FH320A
BR-08	Control panel	LCD Control panel
BR-09	Front window	1223*640*5
BR-10	Left Side window	539*405*5
BR-11	Right Side window	539*405*5 (hashole)
BR-12	Single wall gas tap	SAN-3102
BR-13	Tubular motor	TMN45-10/17

Wiring Diagram (Picture12);



Picture-12

Trouble Shooting and Solution: Common Failures and Solutions

Please confirm that the power is well connected, the cord is in good condition (without any damage)

and the power lock is unlocked before trouble shooting the following problems.

Failure	Checking Part	Suggestion
Fluorescent lamp fails to work	Lamp holder	Connect the tube and lamp holder tightly
	Lamp	Replace the lamp
	Circuit	Check the circuit
	LED stand plug	Connect the plug and stand tightly
	LED stand	Replace stand
	Ballast	Replace the ballast
	Control panel	Replace the control panel
UV lamp fail to work	Interlock	Make sure the front window is fully closed; the fluorescent lamp and the blower are not in work.
	Lamp holder	Connect the tube and lamp holder tightly
	Circuit	Check the circuit
	Ballast	Replace the UV lamp tube
	UV lamp	Check if the micro switch is broken
	Micro Switch	Replace the control panel
	Control panel	Connect the tube and lamp holder tightly
Button fail to work	Control panel	Make sure the power is well connected and the fuse is in good condition
		Check if the button is broken
		Make sure the connecting wire is well connected
		Replace the control panel
Blower fail to work	Micro switch	Check if the micro switch is broken

work	Blower	Replace the blower if it is defective
	Circuit	Check the circuit
	Control panel	Replace the control panel

No electricity in equipment	Power supply	Check whether the power supply is well connected
	Power wire	Check whether power cord is in good condition
	Fuse	Check whether the fuse is damaged
	Power key	Check whether the power key is locked or damaged
	Control panel	Replace the control panel
	Potential transformer	Check whether the transformer works normally
Display fail to work	Connection winding displacement	Connection winding displacement
	Display screen	Check whether the screen is in good condition
	Control panel	Replace the control panel

Front window fails to work	Circuit	Check the circuit
	Motor of front window	Check the front window motor
	Transmission part	Check the transmission connection and lead rail
	Control panel	Replace the control panel

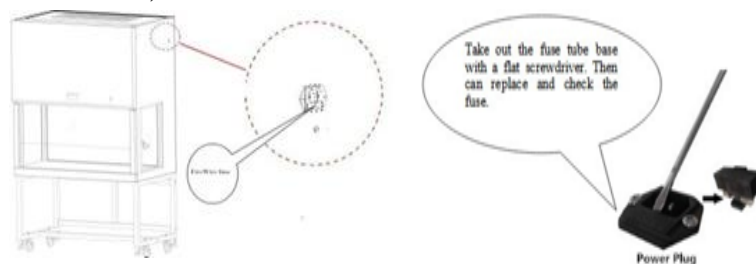
Notes

- (1) The above trouble shooting methods should be done by qualified electricians under safe conditions (cut off power supply). Other components should not be removed. Risk caused by failing to follow those instructions would be responsible by user.
- (2) Please contact Bio lab technical department or agent if a failure could not be traced or solved. Do NOT repair the equipment without a qualified electrician.
- (3) The trouble shooting and repair of this equipment only could be undertaken by trained and recognized technicians;

- (4) Please contact Bio lab technical department or agent to order required component or part. The model number and the serial number of purchased cabinet need to be indicated.

Replace the fuse

For replacing the fuse, turn off the power and disconnect the plug. Use a Phillips screw driver and rotate it anti clock wise to un screw the fuse holder. Replace the fuse inside the fuse holder and then, use a Phillips screw driver and rotate it clockwise to screw back the fuse holder.



Picture-13

Replace fluorescent light

When the fluorescent light needs to be changed, turn off the power. Then remove the LED stand,



LED stand

unplug the right side, After replacing a new LED stand, inserted into the inclined slot.

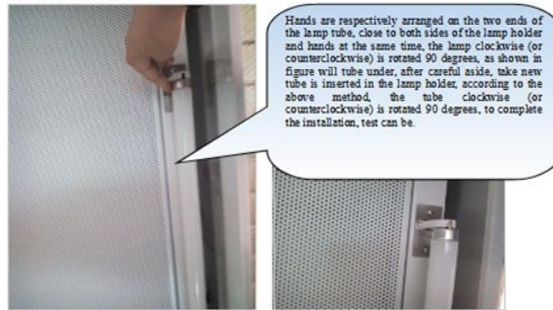
Replace the UV lamp



LED stand plug

UV lamp should be replaced regularly according to the frequency of use, when using UV lamps reach to the time of 600 hours, we recommend to replace the lamp. When replacing, press UP button to raise front window to the highest level, and turn

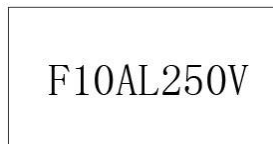
off the power, and then screw the bulb 90° and take it off, then take the correspondence type of lamp, and put it to The lamp holder and screw 90° in reverse direction. (picture14)



Picture-14

Label Description

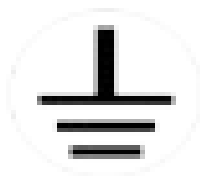
Fuse label



Picture-15

Note:10 A power fuse label

Ground label



Picture-16

vendor provided Warranty is 12 months from EX-factory date (excluding consumable accessories: UV lamp, fluorescent lamp and fuse). vendor

would not be liable for any repair of damage caused by improper operation .If the warranty has been expired, Bio lab would still responsible for repair with relative charges. Lifetime of laminar flow cabinet is 8 years from production date on the label.

Sop Horizontal Laminar Air Flow Unit

Make/Model:.....

SOP Number:.....

Prepared date:.....

Review date:.....

Purpose:

Laminar air flow unit is used to provide aseptic conditions when working with microorganisms and during sterility testing.

Procedure:

- Switch ON the mains.

- Ensure that the manometer is showing Zero reading before starting.
- Turn the switch of the Air Flow to ON position. Ensure that the differential pressure is within the limit of 8 to 15 mm of water. Turn the switch of the UV light to ON position.
- After 30 minutes, switch OFF the UV light and switch ON the visible light.
- Perform aseptic transfer.
- Allow drying the pre-filter at room temperature.
- Assemble the pre-filter at their original place and tighten the screw properly.
- Switch ON the LAF unit and check the differential pressure is in between 8 to 15 mm of water gauge.
- Pre-filter of the LAF unit shall be cleaned once in three months.

Cleaning Of Pre-Filters:

- Ensure that the LAF is switch off.
- Pre-filter is situated on the back side of the LAF, unscrew and then remove the pre- filter from LAF.
- Transfer the pre-filter to washing area and blow the compressed air from reverse side to blow out all the dust particles.
- Wash the pre-filter with DM water and then with liquid detergent solution. Finally wash again with DM water to remove the detergent solution.
- Remove the trapped water from the pre-filter by jerking and finally rinse with 70% IPA solution.

Precautions:

- Take care to prevent any damage to the integrity of filter during cleaning. In case of observation of any damage to filters, immediately inform to the technician.
- Instrument should be cleaned when the electrical connection of the equipment is in OFF position.
- Clean the laminar air flow chamber after every operation.
- Do not work when UV light is ON a sit may cause eye damage.
- Maintain the level of the plat form by adjusting the equipment from the base with the help of glass beads in such a manner that the platform level should remain horizontally flat.



Horizontal Laminar Air Flow Unit

Prepared by:	Checked by:	Approved by:

RESULT & DISCUSSION:

By using the vendor provided specification, leaflet, and tools, successfully installed the horizontal laminar airflow system at the laboratory. During deboxing and installation

qualification various challenges were faced finally all the problem were overcome by equipment manual system. SOP for handling of LAF were made for its better uses. Safety & precaution was measure concern identified while installation of LAF.

CONCLUSION:

Since LAF having UV light, safety & precaution (Does *Donts) is measure concern while using

equipment. Vendor provides instruction & guidance was very important for qualification of LAF equipment. Due to its efficacy removal of 99.97% of airborne particles as small as 0.3 micron,⁸ this equipment is widely used in life science research, microbiology and histopathology / pathology lab, plant tissue and cell culture and pharmaceutical and electronics industry and many more. Considering its susceptibility of operation cleaning procedure with safety precaution play crucial role for its performance. Test like HEPA integrity, Air velocity, Air visualization pattern, Recovery test and Air born particulate count test are the major performance test for LAF. We will cover the guidance on such qualification test of LAF In next upcoming article.

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HOW TO CITE: Dr. Pratima Bisen, Arti Bhagat, Anand Vishwakarm, Dr. Surendra Pardhi*, Study On Installation Qualification on Laminar Air Flow System, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 1, 1339-1353. <https://doi.org/10.5281/zenodo.14673860>

