

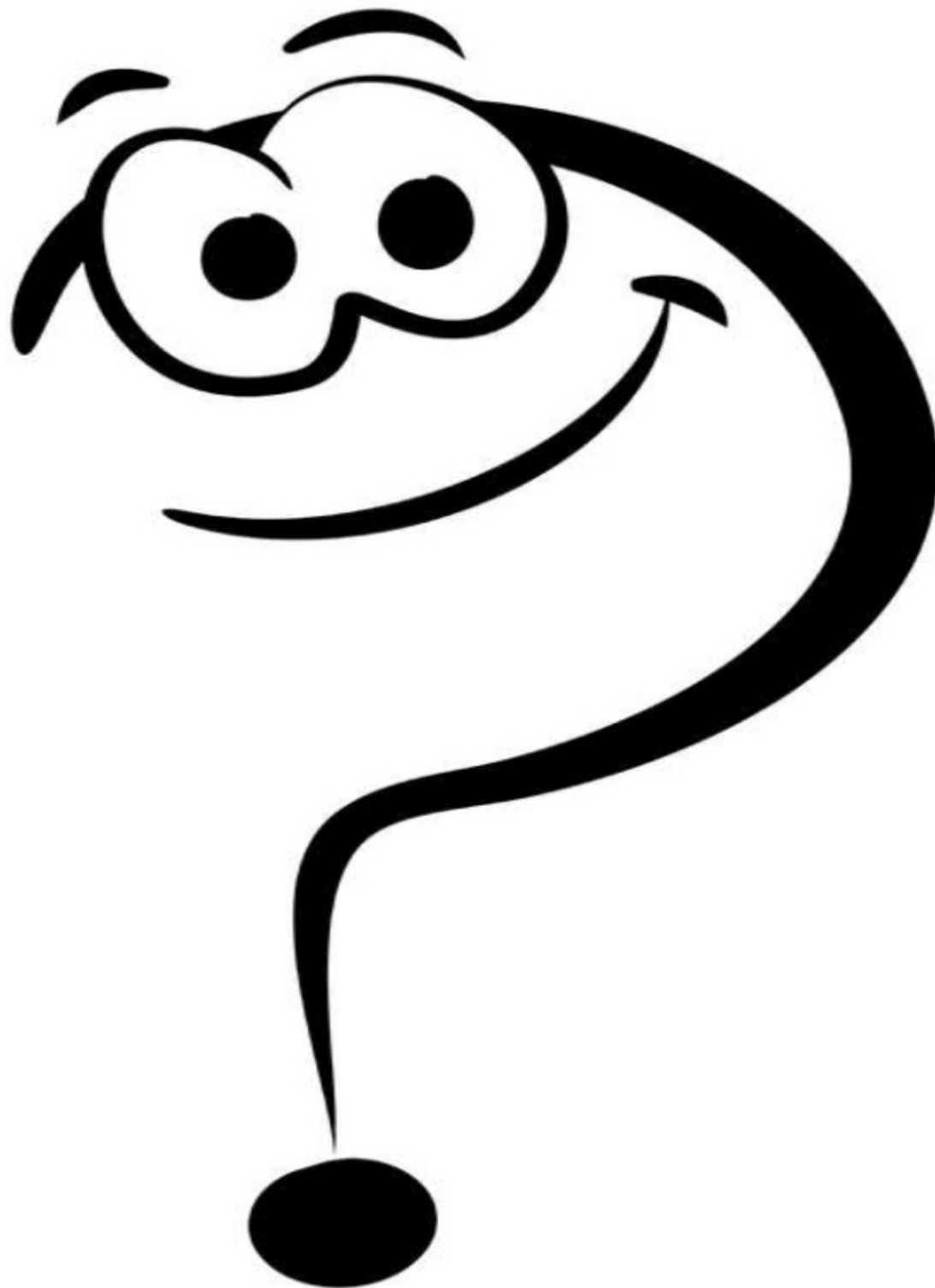
A worker in a white cleanroom suit and cap stands to the left of a large, white, rectangular cleanroom unit. The unit has a glass door and is situated in an industrial setting with various pipes and machinery visible in the background.

CLEAN ROOMS & CLASSIFICATION OF CLEAN ROOMS

by: Amna Saeed

Pharm.D(2009-2014) (L.C.W.U)





WHY WE
NEED
CLEAN
ROOM???



TO AVOID
"CONTAMINATION"

THE ANSWER

ANDY BACON



CONTAMINATION

Contamination is a process or act that causes materials or surfaces to be soiled with contaminating substances.

Sources of Contamination:

- 1:Facilities
- 2:People
- 3:Tool generated
- 4: Fluids
- 5: Product generated



1. Facilities

Walls, floors and ceilings

Paint and coatings

Construction material (sheet rock, saw dust etc.)

Air conditioning debris

Room air and vapors

Spills and leaks

2. People

Skin flakes and oil

Cosmetics and perfume

Clothing debris (lint, fibers etc.)

Hair



3. Tool Generated

Friction and wear particles

Lubricants and emissions

Vibrations

mops and dusters

4. Fluids

Particulates floating in air

Bacteria, organics and moisture

Floor finishes or coatings

Cleaning chemicals

Deionized water



5. Product generated

Silicon chips

Quartz flakes

Cleanroom debris

Aluminum particles

HOW TO CONTROL
CONTAMINATION???



WHAT ARE THE CONTAMINATED SOURCES?

CONTAMINATION
AWARENESS



Sources
of contaminants



WHAT DO I NEED CONTROL FOR?



Specifics
needs definitions



CONTAMINATION
CONTROL MANAGEMENT

WHICH PRODUCT WILL GIVE FULL PROTECTION?



Adequate
product selection



WHAT ARE THE DIFFERENT CATEGORIES?



Contaminants
categorisation



Key Elements of Contamination Control

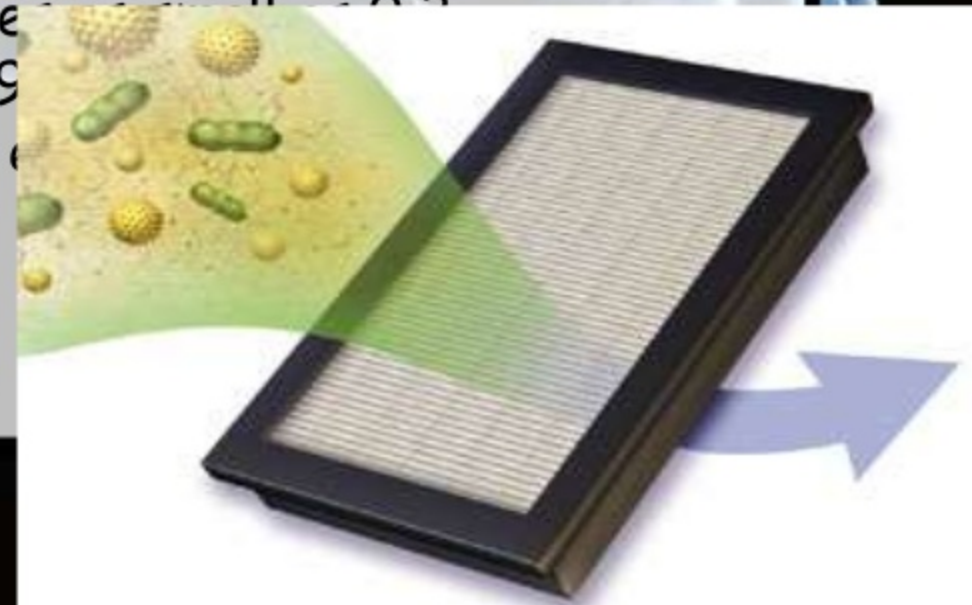
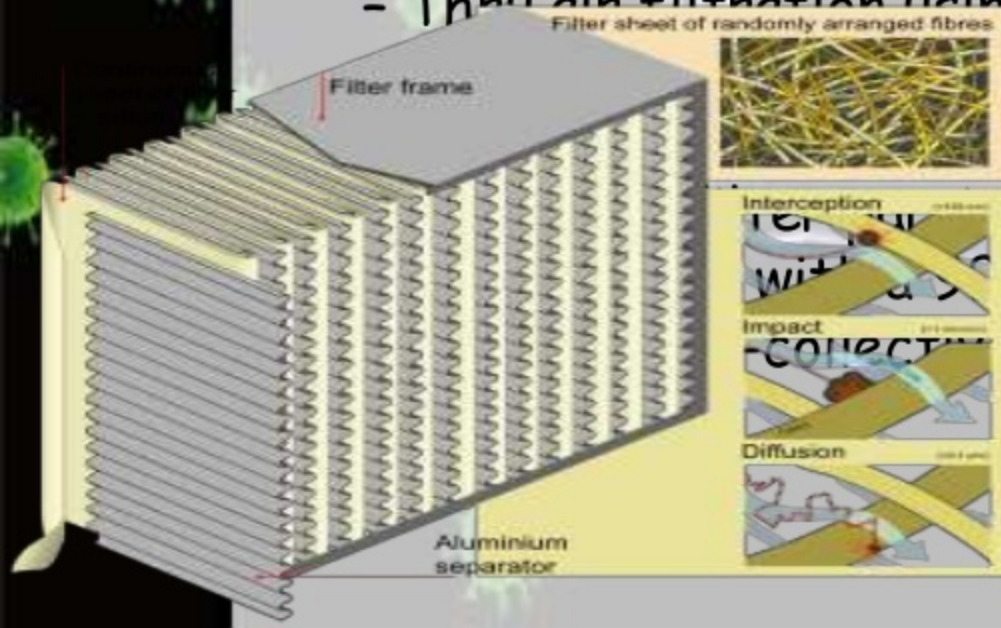
- HVAC system
- HEPA
- CLEANROOM ARCHITECTURE
- LAMINAR FLOW CABINET
- FILTRATION
- CLEANING
- CLEANROOM GARMENTS
- HUMANS IN CLEANROOM
- COMODITIES
- COSMETICS
- MEASUREMENTS & INSTRUMENTATION
- ELECTROSTATIC DISCHARGE(ESD)

HVAC SYSTEM (heating, ventilation & air-conditioning)

What can HVAC do?

HVAC system performs **four** basic functions:

1. Control airborne particles, dust and micro-organisms
 - Through air filtration using high efficiency particulate



2. Maintain room pressure (delta P) -

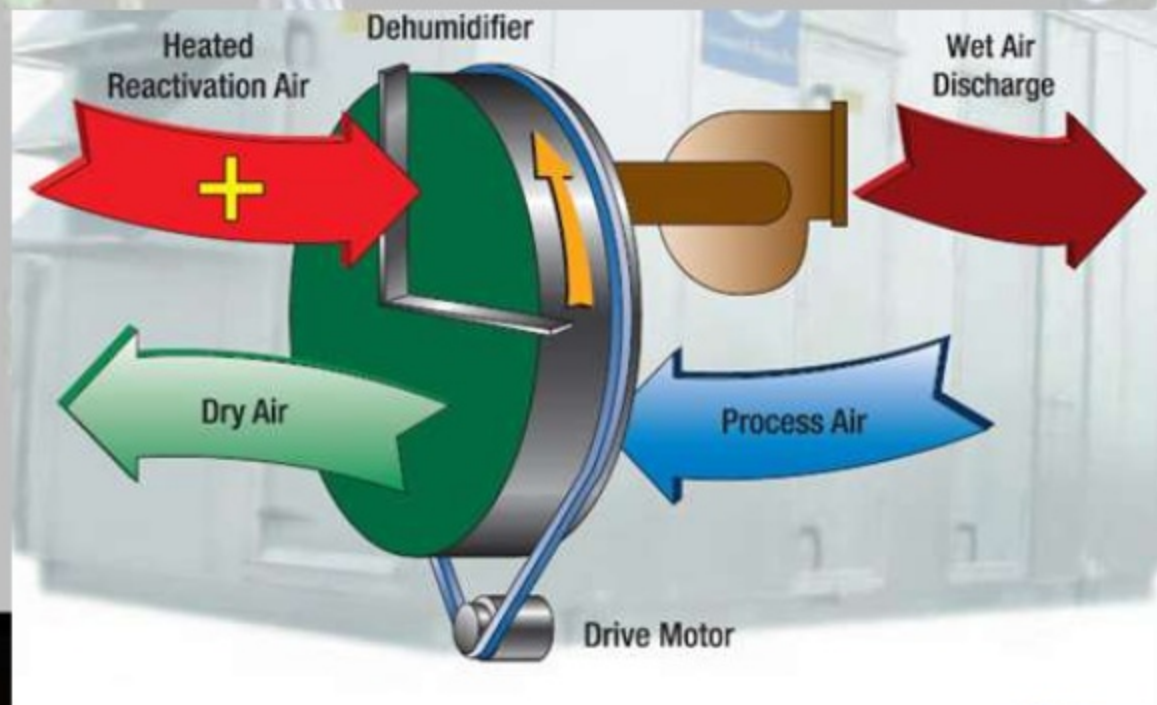
Areas that must remain "cleaner" than surrounding areas must be kept under a "positive" pressurization,

This is achieved by the HVAC system providing more air into the "cleaner" space than is mechanically removed from that same space.



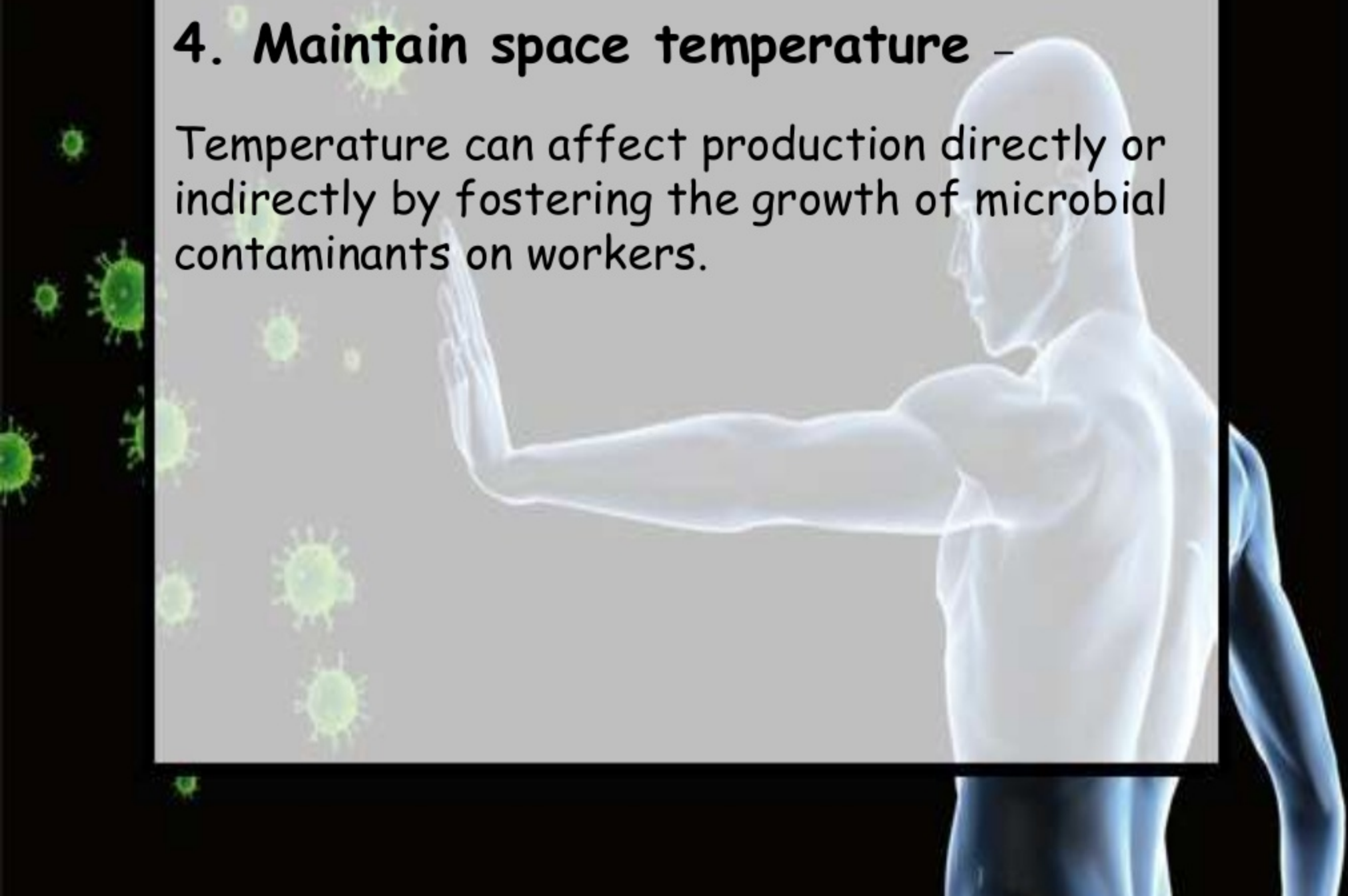
3: Maintain space moisture (Relative Humidity)

- Humidity is controlled by cooling air to dew point temperatures or by using desiccant dehumidifiers.



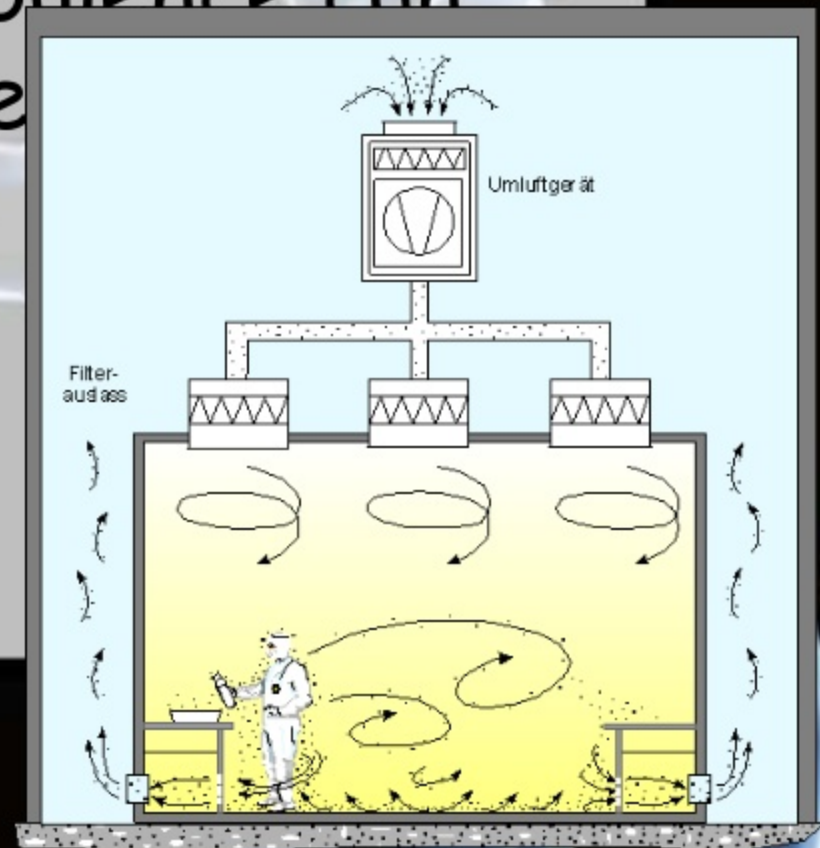
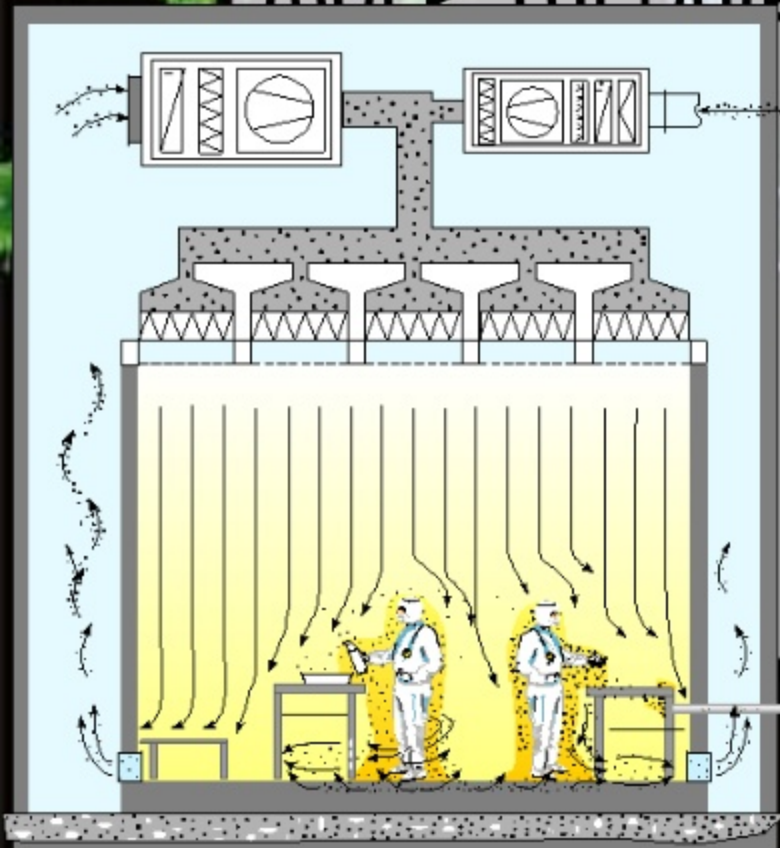
4. Maintain space temperature –

Temperature can affect production directly or indirectly by fostering the growth of microbial contaminants on workers.



CLEANROOM ARCHITECTURE

This air flow is called laminar flow.
The more restriction of air flow the
more turbulence. Turbulence can
affect the movement of particles.



Laminar flow cabinet

- Laminar flow cabinets have HEPA filters (down to 0.3 microns) and pre filters (Biological safety cabinets).
- A constant flow of air is drawn either through the front or back of the cabinet.



through pre and HEPA filters on to the work surface.

COMPONENTS OF LAMINAR FLOW CABINETS

Prefilters : Made of synthetic material.

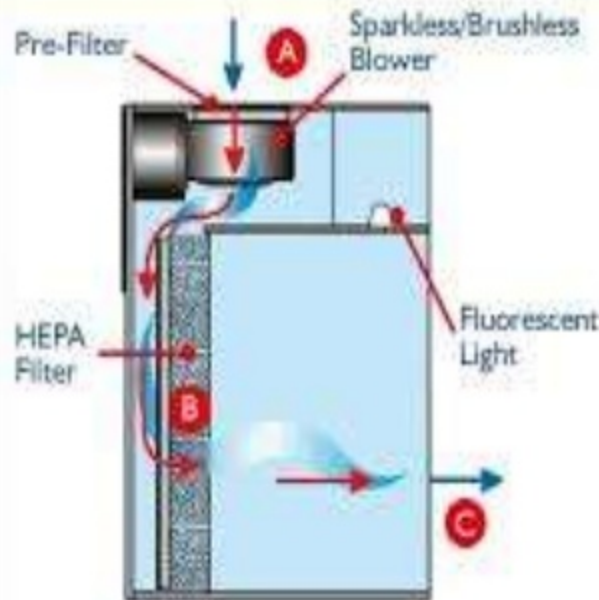
Hepa Filters : Made of glass fibre with pleated corrugated aluminium support.

Blower Units : Electrically balanced blowers with minimum vibration.

Lighting : Fluorescent tube.

manometer : Pressure measuring device

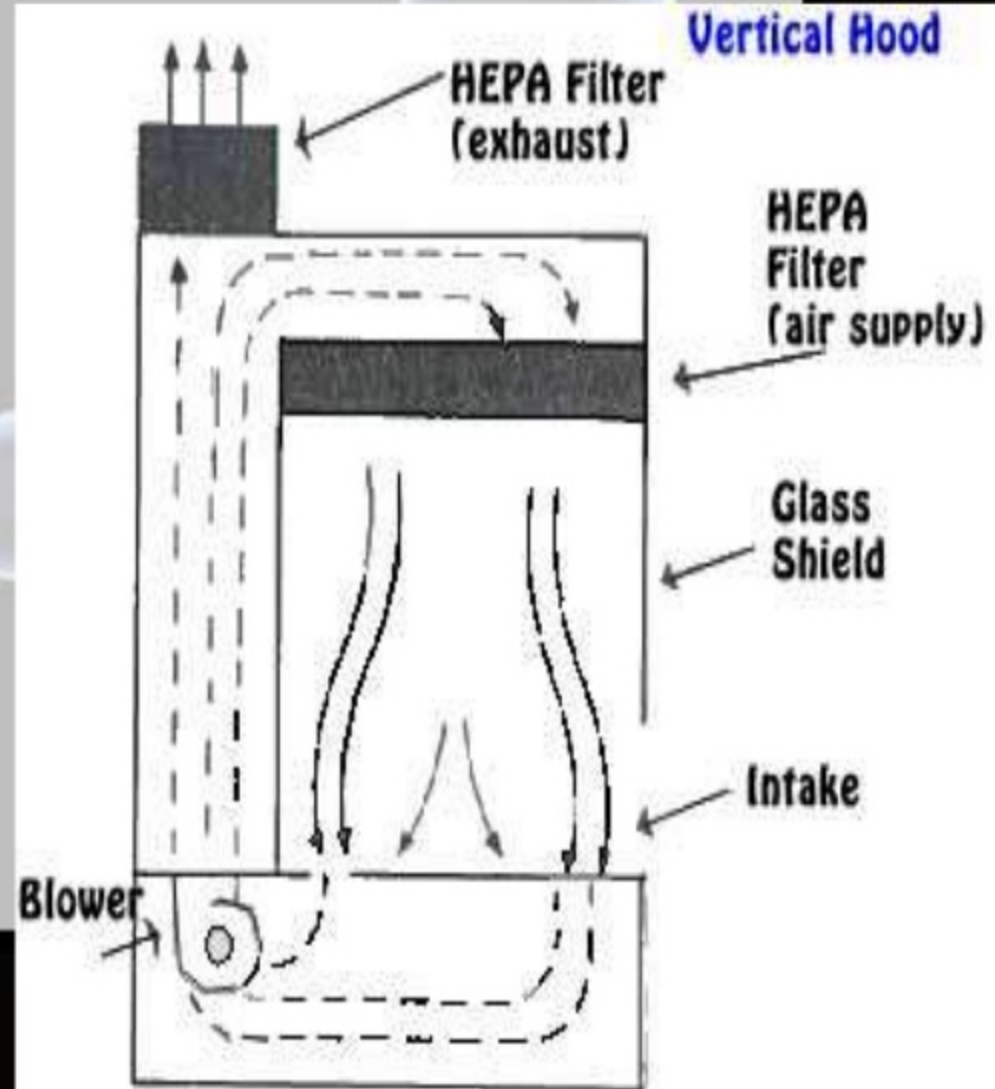
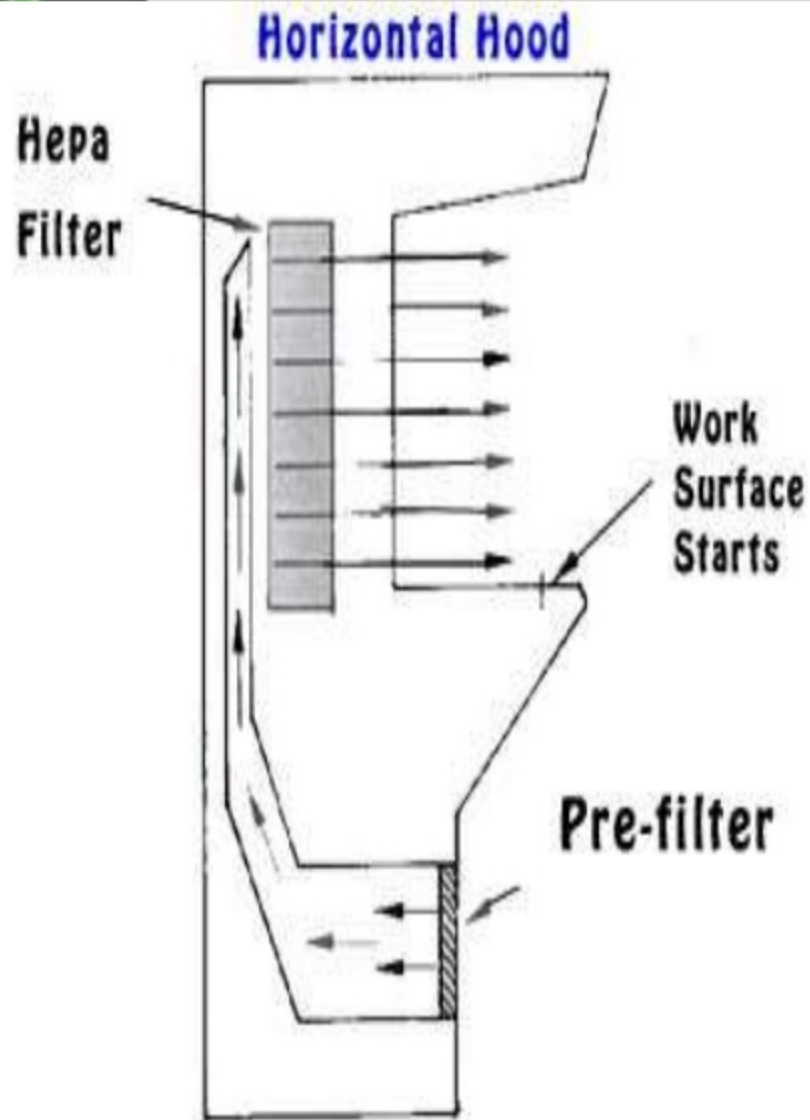
How the Horizontal Clean Bench Works:



1. Room air enters at "A" where it is cleaned via electrostatic pre-filtration.
2. Air then moves to the rear of the bench and exits at "B" through the HEPA filter.
3. Ultra-clean, Class 100 air exits the workstation at "C".

synthetic
ss fibre with
ors.
amically
least vibrant
.
iolet (UV)
device

TYPES OF LAMINAR FLOW CABINETS



CLEANROOM GARMENTS

The requirements for cleanroom garments will vary from location to location.

Gloves, face masks and head covers are standard in nearly every cleanroom environment

