DESIGNING OF ASEPTIC AREA

- **CONTENT**:-Introduction,flow diagram of aseptic area, clean-up section, compounding section, aseptic area, quarantine section, packaging and labeling section, floors-walls and ceilings, doors- windows and services, personal and protective clothing, cleaning and disinfection, air supply, laminar flow equipment, clean area classification, sources of contamination in aseptic areas and method of prevention .

- **INTRODUCTION:-**Production of sterile products should be carried out in a clean environment with a limit for the environmental quality of microbial and dust particle contamination.

  • The production area is normally divided into

  i)The clean-up area

  ii) The compounding area

  iii) The aseptic area

  iv) The quarantine area

  v)The packaging/labelling area.

- **FLOW DIAGRAM OF ASEPTIC AREA:-**

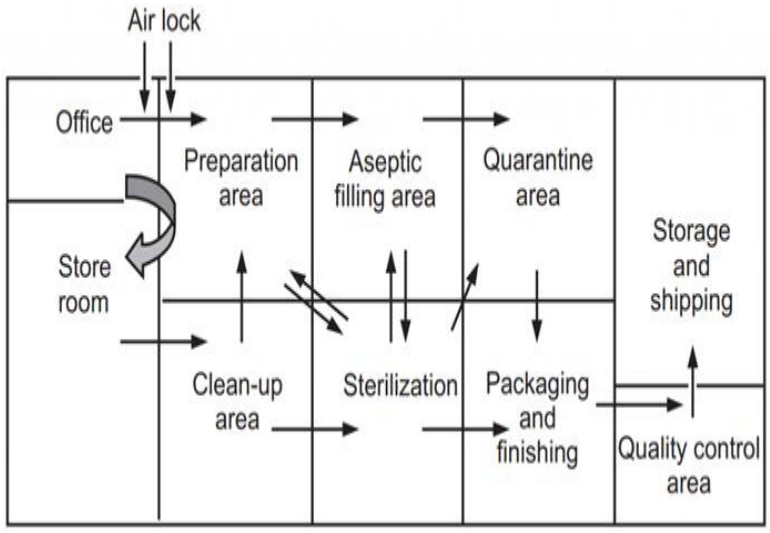

Fig.1:- Flow diagram of aseptic area

- **CLEAN-UP SECTION:-**The cleaning area has walls and ceilings made up of film coating materials.

  • Air inside the clean area should be free from dust and microorganisms.

  • This is ensured through high efficiency (95%) filters.

  • Air existing in the clean area should be frequently replace (10-15 air changes per hour).

- **COMPOUNDING SECTION:-**This area contains stainless steel cabinets and counters and is involved in the actual compounding.

  • Unlike aseptic area, maintenance of sterile conditions is not essential.

- **ASEPTIC AREA:-**In this area, strict control measures should be adopted to avoid contamination of the preparations.

  • The stainless steel counters and cabinets should be such that they should not allow dirt particles to accumulate.

  • Mixing and storage of the compounded preparations should be done outside the aseptic area.

  • The compounded preparations are then transferred to the aseptic area through pipelines where the filling operation is carried out.

Fig.2:- Aseptic area

- **QUARANTINE SECTION:-**This area consists of a store where the in process batches as well as approved batches are stored separately.

  • This area has limited access and is under the control of a responsible person.

  • Without the consent of the in charge, other personnel cannot enter into this particular area.

- **PACKING AND LEBALLING SECTION:-**In this area, the batches are packed and labelled.

  • Packing is carried out by packaging machines, while labels are obtained by over printing devices.

  • At a time, only one product labels are printed.

  • Parenteral packing plays a vital role in the production of sterile preparations.

  • Packing should be carried out in such a manner that the sterility of the product is maintained.

- **FLOORS, WALLS AND CEILINGS :-**

  •All clean surfaces including the floor, walls and ceilings must be smooth, easy to clean, disinfected and be constructed to minimize microbial and particulate contamination.

  •Flexing and non-flexing types of materials are used for construction of floor.

  • Flexing floor materials are made up of synthetic elastomers of which mostcommonly used are polyvinylchloride (PVC). PVC flooring is easily repaired, cleaned, relatively cheap and simple.

  • Non-flexing floors are made of hard inorganic filler substances in a matrix material.

  • Walls must be made up of non-inflammable or fire resistant material e.g.: Stainless steel, glass, enamelled steel, etc.

  • Generally plaster walls are easily damaged by the impact.

  • For reduction of fungal growth, 1% of 8-hydroxyquinolone, pentachlorophenol, etc may be added to the paint.

- **DOORS, WINDOWS AND SERVICES:-**Doors and windows should fit flush with the walls. Windows if required, are solely to provide illumination and are not for ventilation.

• Windows should be non-openable.

• Doors should be well fitted by maintaining the positive pressure air flow and self-closing. Doors must be limited in number.

• Gas cylinders should be excluded and all gases should be piped from outside the area.

• Sinks and drains must be excluded from the areas where aseptic procedures are performed in clean room areas.

• Light sources in clean rooms are fitted with the ceilings to reduce the collection of the dust and to avoid the disturbance of the air flow pattern with in the room.

- **PERSONAL AND PROTECTIVE CLOTHING :-**The main source of contamination of clean areas arises from skin scales which are released by the operators

• Personnel selected to work on the preparation of the parenteral products must be neat and reliable.

• The operator should wear sterile protective clothing including head wear, powder free rubber or plastic gloves, a non-fiber shedding facemask and footwear.

• All protective clothing is designed to prevent the contamination from the body.

Fig.3:-Personal and protective clothing

➢ CLEANING AND DISINFECTION :-

Cleaning and disinfection procedures are used for the removal of microbial and particulate contamination.

• Cleaning agents are the alkaline detergents, non-ionic and ionic surfactants.

• Different types of disinfectants should be employed in rotation to prevent the development of resistant strains of microorganisms.

• Different concentration of quaternary ammonium compounds, sodium hypochloride, ethanol and formaldehyde solutions are used as disinfectants in cleaning area.

• Cetrimide or chlorohexidine in 70% alcohol are suitable for use as skin disinfectants.

Fig.4:-Cleaning and disinfection area

➢ AIR SUPPLY :-

The air supplied to a clean room must be filtered through high efficiency particulate air (HEPA) filters.

• The HEPA filter must be positioned at the inlet of the clean room and the pre- filter may be fitted upstream of the HEPA filters to prolong the life of final filter.

• HEPA filters are used in the construction of vertical and horizontal laminar air flow bench.

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➢ LAMINAR FLOW EQUIPMENT :-

1. Vertical laminar air flow bench
2. Horizontal laminar air flow bench

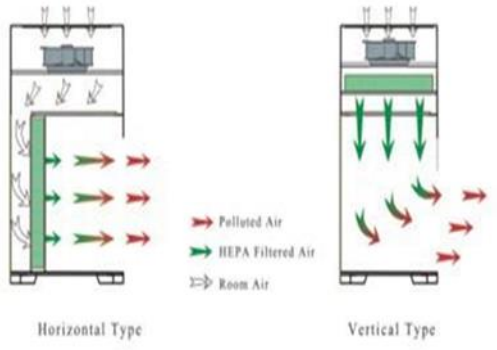

Fig.5:-Laminar flow equipment

➢ **AIR FLOW PATTERN:-** The air flow pattern within the clean room must be carefully regulated

• The general airflow patterns in in clean rooms are,

1. Unidirectional airflow
2. Non-unidirectional airflow
3. Combined airflow

1. Unidirectional airflow :-

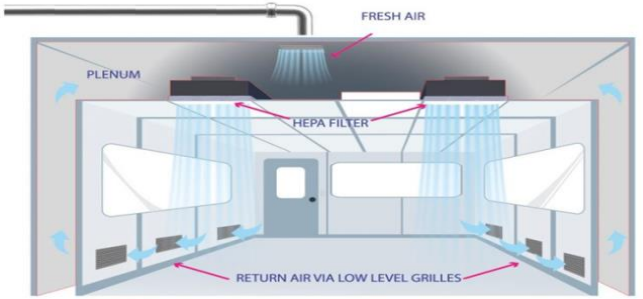

Fig. 6 :- Unidirectional airflow

2. Non-unidirectional airflow :-

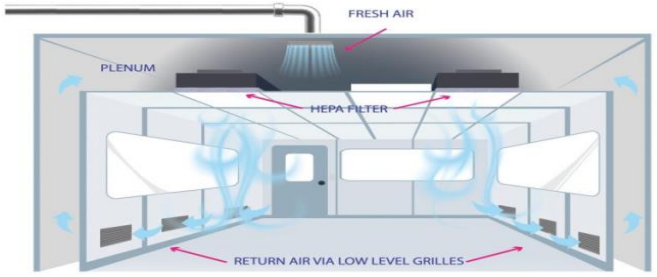

Fig. 7:- Non-unidirectional airflow

➢ CLEAN AREA CLASSIFICATION:-

	Maximum permitted number of particles per m^3 equal to or greater than the tabulated size			
	At rest		In operation	
Grade	0.5 µm	5.0 µm	0.5 µm	5.0 µm
A	3,520	20	3,520	20
B	3,520	29	352,000	2,900
C	352,000	2,900	3,520,000	29,000
D	3,520,000	29,000	Not defined	Not defined

Table no.1-Clean area classification

➢ SOURCES OF CONTAMINATION IN ASEPTIC AREA AND METHOD OF PREVENTION:-

• The most common sources of contamination fall into the following three main categories:

• Atmospheric contamination

• Fluid contamination

• Transfer contaminants

1.ATMOSPHERIC CONTAMINATION:-

• Atmospheric conditions during manufacturing as well as during storage affects the quality of final preparation.

• Atmosphere in and around the industrial area contains potential contaminants like dust, silica, etc and gases like CO2 , water vapour, etc.

•PREVENTION:-Prior to its entry into the working area, the air should be initially passed through a suitable pre- filter then treated with an electrostatic precipitator and finally through HEPA filters.

2.FLUID CONTAMINATION:-Besides serving as the most common solvent in pharmaceutical industry, water also serves as the greatest solvent in pharmaceutical industry.

•PREVENTION:-Almost all of the pharmaceutical operations should be carried out using purified water obtained upon deionization, distillation, ionexchange, reverse osmosis, filtration or other similar processes.

3.TRANSFER CONTAMINATION:-

Transfer contaminants refer to the contaminants sourced from personnel and wheels of trolleys used for transport of goods.

• For example, atmospheric dust particles may get entangled with the fibres of the clothes which can get dislodged due to body movements and lead to contamination.

•PREVENTION:-Personnel should be well trained and periodically evaluated in theprinciples of aseptic processing and techniques to be employed before participating in the preparation of sterile products

➢ REFRENCES:-

1.Stephen P. Denyer, Rosamund M. Baird, Guide to microbiological control in pharmaceutical and medical devices, secondEdition ,page no.-68-89

2. Dr. ChandrakantKokare,Pharmaceutical microbiology principle and application, Niraliprakashan, Edition- 2016,page no -22.1-22.12

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