

CHAPTER 3 - PREMISES AND EQUIPMENT



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OUTLINE

1. Principle

2. Premises

- General
- Production Areas
- Storage Areas
- Quality Control Areas
- Ancillary Areas



OUTLINE

3. Equipment

- Design and Construction
- Location and Installation
- Pipes and pipelines
- Maintenance and Calibration
- Cleaning
- Designated for intended use
- Verification (see Appendix 2)



PRINCIPLE

- Premises and equipment must be located, designed, constructed, adapted and maintained to suit the operations to be carried out.
- Their layout and design must aim to minimize the risk of errors and permit effective cleaning and maintenance in order to avoid cross-contamination, build up of dust or dirt and, in general, any adverse effect on the quality of products.



GENERAL

- To facilitate proper operation, cleaning and maintenance, premises for manufacturing shall be of:
 - Suitable size
 - Design
 - Construction
 - Location



GENERAL

- Premises shall be carefully **maintained**, ensuring that repair and maintenance operations **do not present any hazard to the quality of products**.
- They shall be **cleaned** and, where applicable, **disinfected** according to **detailed written procedures**.
- Steps shall be taken in order to **prevent the entry of unauthorized** people.
- Production, storage and quality control areas shall **not be used as a right of way** by personnel who do not work in them.



GENERAL

Example of
lighting
and ventilation
used in
production
area





GENERAL

LIGHTING FACILITIES

- LED lighting: ideal for warehouses, processing areas
- Fluorescent lighting: cost-effective, best for employee areas and packaging

Protection against contamination
in case of glass breakage

i.e. Plastic coated shatterproof bulbs





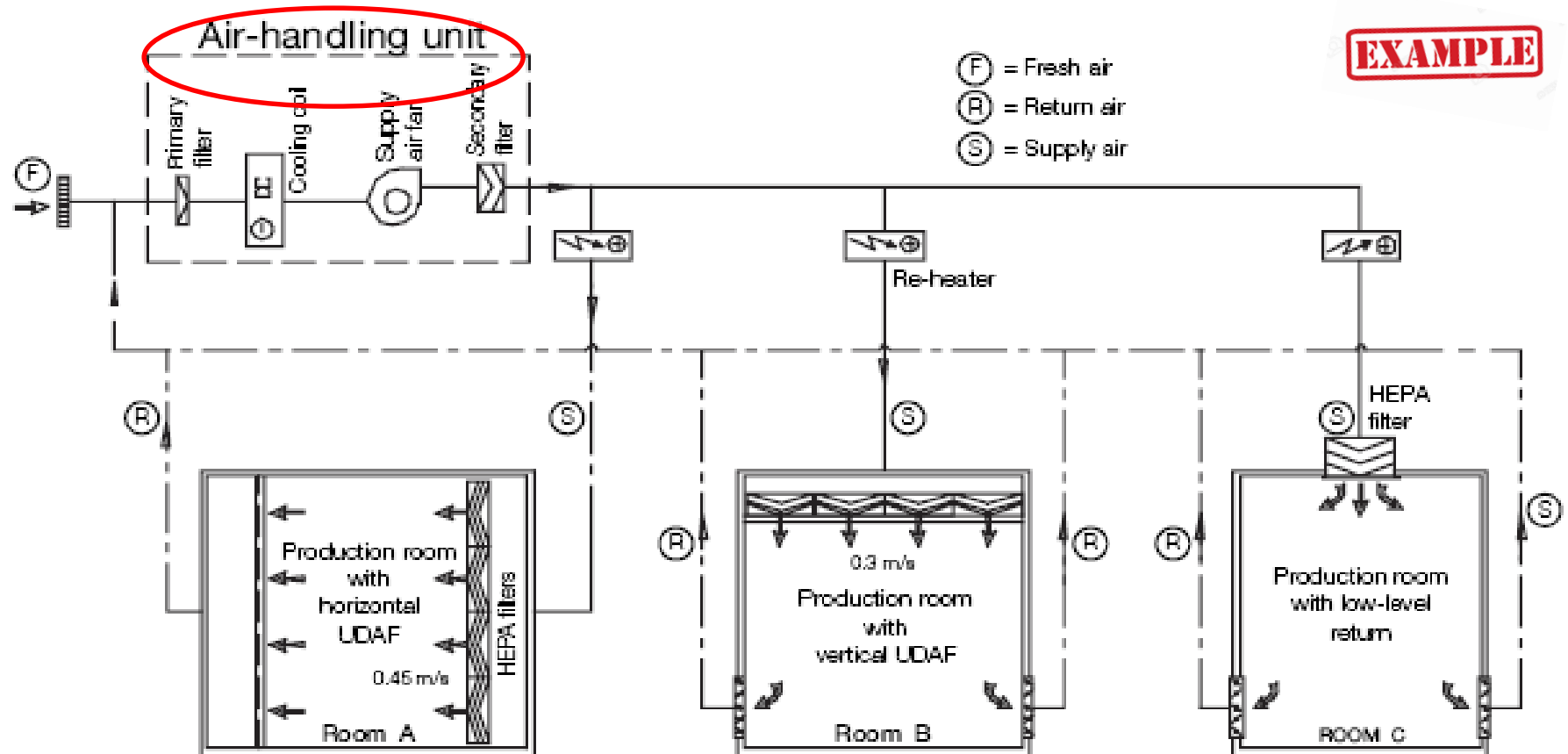
GENERAL

VENTILATION

- **Good air quality** can be achieved by **controlling** the direction of airflow, level of particulates, dust, vapour, microbial load, temperature and humidity.
- **Air Handling Unit (AHU)**: An equipment used to circulate air
- **Heating, Ventilation and Air Conditioning (HVAC)**: a term for the collective mechanical equipment used to control air quality in a manufacturing facility;
 - central unit to which AHU is connected

GENERAL

Horizontal unidirectional flow, vertical unidirectional flow and turbulent flow



UDAF, unidirectional airflow; HEPA, high-efficiency particulate air.



GENERAL

Examples of ventilation system:



HVAC system



Centralized air
condition



Wall type air
condition



GENERAL

Examples of supporting equipment for ventilation system



Dehumidifier



Exhaust fans



GENERAL

- Direction of air flow within the production area shall never be from a dirty area to a clean area.
- Dry or powdered product should have a dust collection system installed.
- For the rest of the areas where there is product exposure, suitable ventilation is required.



GENERAL

- WINDOW

- Windows & other openings shall be so constructed as to avoid accumulation of dirt

- DOOR

- Where appropriate, be self-closing & self fitting

Both windows and doors should be smooth, non-absorbent surfaces



GENERAL

Ensure that bottom and top of doors and windows are sealed







GENERAL

Premises shall be located at a **suitable site approved** by the relevant authorities.

- **Appropriately located** (i.e. away from dusty roads, garbage dump, pollution sources and other potential sources of contamination such as foundries and chemical processing plant)
- With **convenient access to roads** for the easy transport of starting materials and finished products.



GENERAL

- Premises shall be situated in an environment which, when considered together with measures to protect the manufacture, presents minimal risk of causing contamination of materials or products.



GENERAL

- TM and HS may share the same manufacturing facilities provided cross-contamination is adequately addressed (examples include but not limited to: by performing cleaning verification or the use of separate equipment, etc.).
- Dedicated and self-contained facilities must be available for the production of particular products, such as highly sensitising materials (e.g. penicillins) or biological preparations medicinal products (e.g. from live micro-organisms i.e. these products shall not be produced in the same facilities used to produce TM and HS.



GENERAL

- Premises shall be designed, constructed and maintained to protect against access and harboring of vermin, rodents, birds, insects or other animals.
- Protection can be done by implementing a pest control program



GENERAL

Ensure that all main openings are **effectively protected against entry of flies, mosquitoes and rodents** (e.g. air curtains provided/ mosquito electrolucutor provided)

mosquito electrolucutor



air curtains





GENERAL

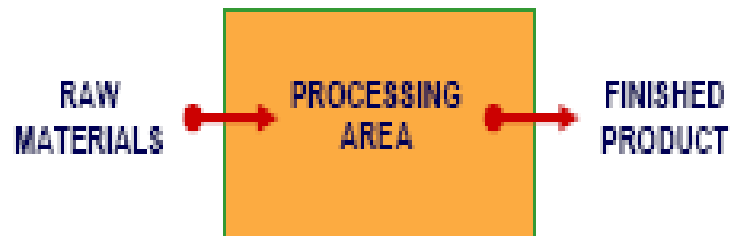
- Premises should be designed with **logical flow of materials** in mind (from receiving of materials → production (including packing) → storage of finished products), so as **to prevent mix up and cross-contamination**.
- **Personal flow** should be **different from material flow**



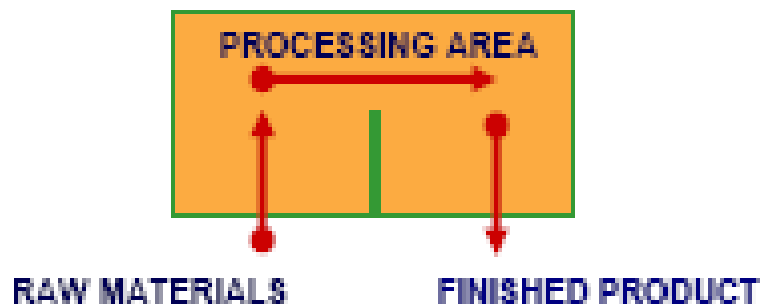
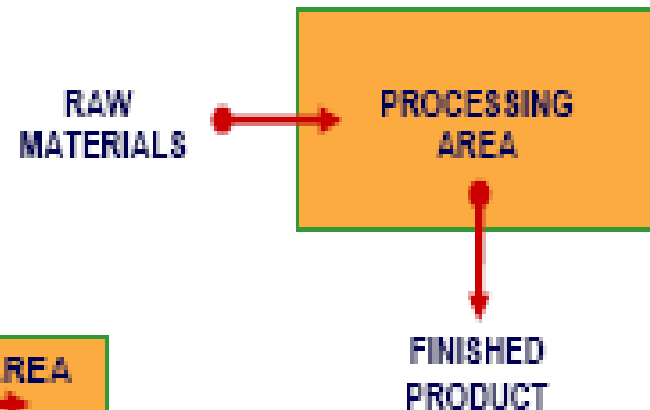
GENERAL

EXAMPLE

A.) STRAIGHT LINE FLOW



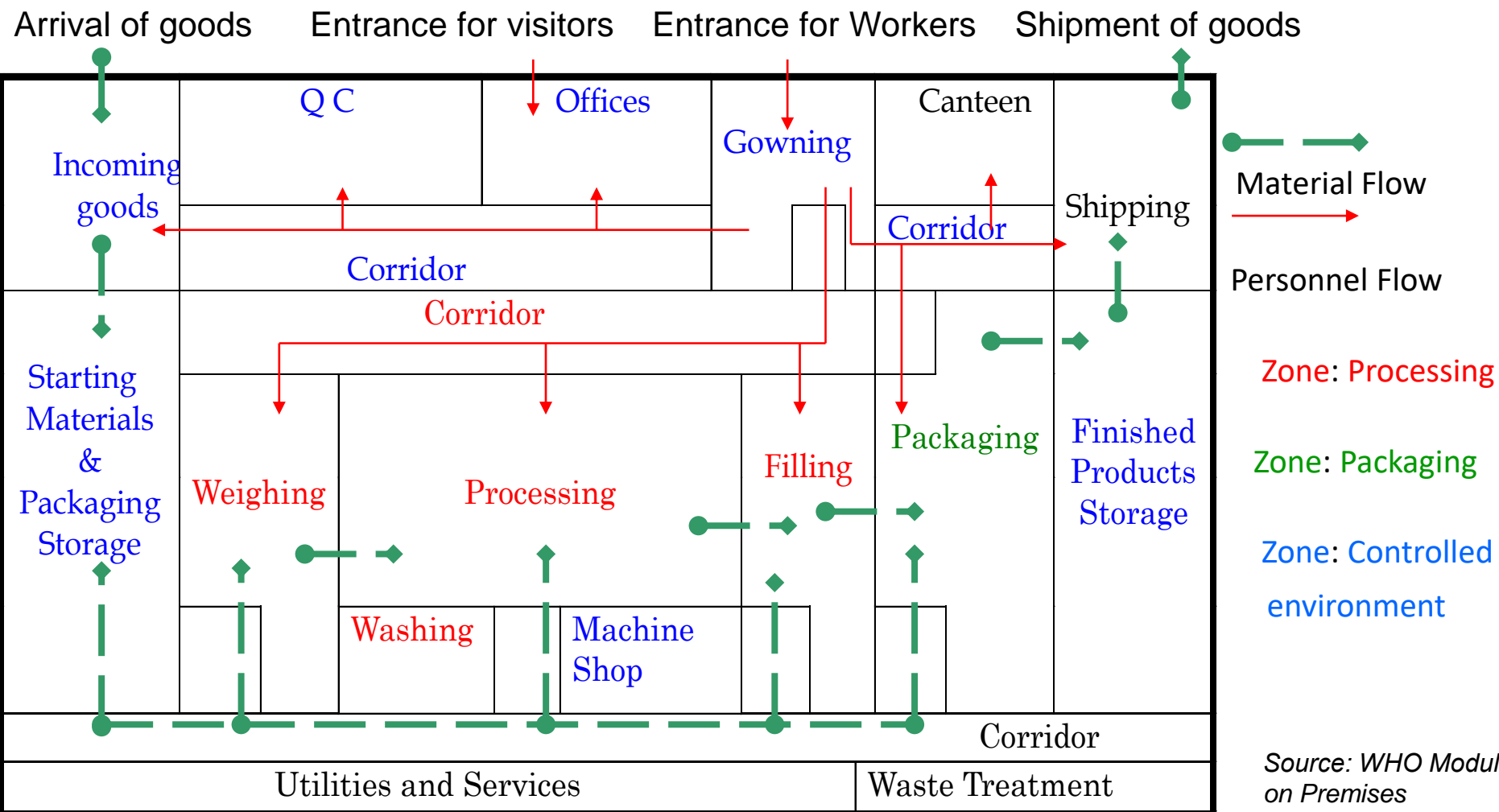
B.) L – SHAPED FLOW



C.) U – SHAPED FLOW



Example of Materials and Personnel Flow





GENERAL

- Defined areas for the following operations are required:
 - Receiving and quarantine of incoming materials
 - Sampling
 - Storage of starting and packaging materials
 - Weighing /Dispensing
 - Processing
 - Storage of bulk/intermediate products
 - Packaging
 - Equipment washing
 - Storage of quarantine finished products
 - Storage of approved finished products
 - Designated area for quality control



GENERAL

Equipment washing areas



Hoses shall be stored to allow them to dry so as to prevent retention of liquid.



GENERAL



Storage of Quarantine Materials

- Where quarantine status is ensured by **storage in separate areas**, these areas must be **clearly marked** and their **access restricted to authorized personnel**.
- Any system replacing the physical quarantine shall give equivalent security.





GENERAL

Weighing / Dispensing

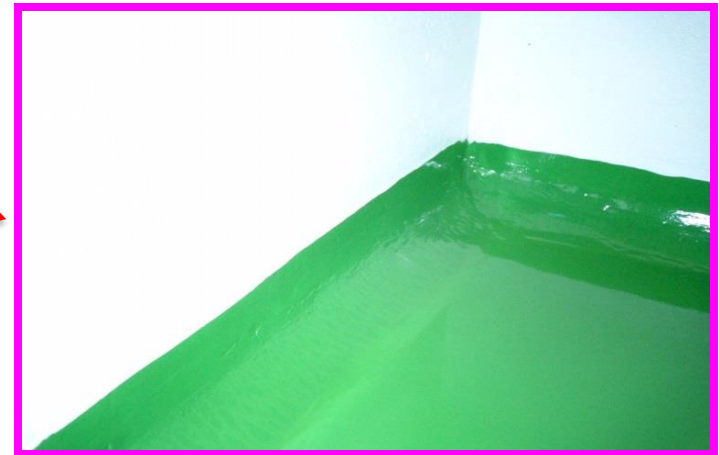
The weighing of starting materials should be carried out in a separate weighing area designed for that use, complete with provisions for dust control.





PRODUCTION AREAS

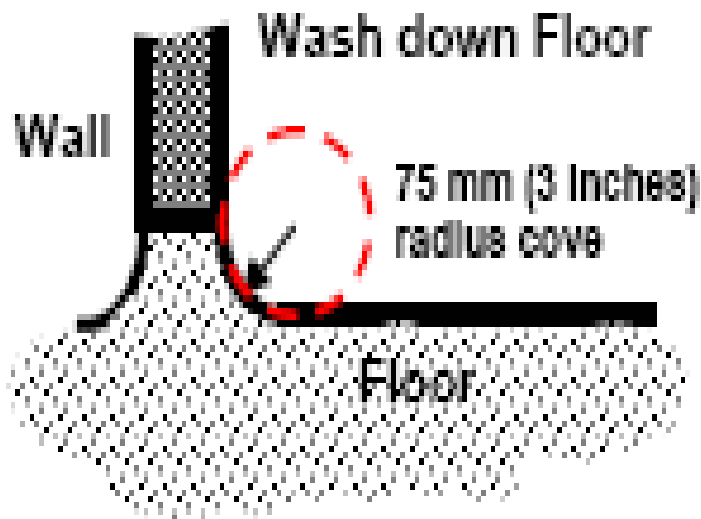
- Interior surfaces (walls, floors, and ceilings) shall be smooth, free from cracks and open joints, and shall not shed particulate matter and shall permit easy and effective cleaning and, if necessary, disinfection.
- Coving of junctions between walls and floors in the production areas is encouraged to facilitate cleaning.



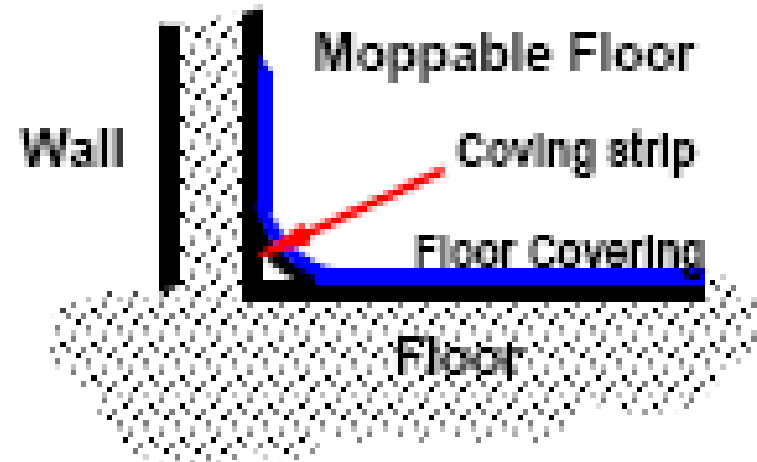


PRODUCTION AREAS

EXAMPLE



Rounded corner coves facilitate easy cleaning & sanitizing



Coving strip support floor covering for mop-able cleaning & sanitizing



PRODUCTION AREAS

Covings at walls, ceiling and floor Joints are encouraged





PRODUCTION AREAS

FLOORS

Where appropriate:

- Water-proof
- Non-absorbent
- Washable
- Non-slip material
- Without crevices
- Easy to clean & disinfect





PRODUCTION AREAS

Ensure that the floorings are smooth, impervious and continuous and does not allow collection of dust (preferably epoxy coated)





PRODUCTION AREAS



- Solid concrete with epoxy or polyurethane resin finish is suitable for processing areas as it has a non-porous topping with non skid surface & retards bacterial growth.
- Solid concrete for warehouse



PRODUCTION AREAS

WALLS AND CEILINGS

Where appropriate:

- Smooth
- Water-proof
- Non-absorbent
- Washable
- Easy to clean & disinfect



PRODUCTION AREAS

- Ensure that walls are smooth and not prone to catch dust
- Ensure that the walls and floors are washable





PRODUCTION AREAS

Any open channels shall be avoided, but if required they shall be shallow enough to facilitate cleaning and disinfecting.



All drainages shall have trapped gullies.

The water trap prevents foul air passing through the drain from stagnant or dirty water within the connection pipe work.





PRODUCTION AREAS

Ensure that the premise is neat and clean and is free of pooled water. Floorings are sloped to self drain the spilled water or washings.





PRODUCTION AREAS

- Production areas shall be **well lit**, particularly where **visual on-line controls** are carried out.
- Pipework, light fittings, ventilation points and other services shall be designed and sited to **avoid the creation of recesses** which are **difficult to clean**. As far as possible, for maintenance purposes, they shall be **accessible from outside** the manufacturing areas.
- **Separate areas** shall be used for the production of finished products intended for **external use** or application and finished products intended for **internal consumption** solely.



PRODUCTION AREAS

In cases where **dust is generated** (e.g. during sampling, weighing, mixing and processing operations, packaging of dry products), **specific provisions** shall be taken to **avoid cross-contamination and facilitate cleaning**.



Dust extractor



PRODUCTION AREAS

Premises for the packaging of products shall be specifically designed and laid out so as to **avoid mix-ups or cross-contamination**.



filling



labeling



Secondary packaging
process



PRODUCTION AREA

- Premises shall preferably be laid out in such a way as to allow the production to take place in areas connected in a logical order corresponding to the sequence of the operations and to the requisite cleanliness levels.
- Adequacy of working space, which shall allow orderly and logical placement of equipment and materials and to suit the operation, efficient flow of work, effective communication and supervision as well as to avoid crowding and disorders.



PRODUCTION AREA

CHANGING ROOM

- Changing rooms shall be directly connected to but separated from processing areas
- Changing rooms into the production areas shall have adequate hand washing and/or sanitizing facilities



- Paper towels or hand drier should be provided whichever is suitable
- Fabric Towels are not recommended



PRODUCTION AREA

CHANGING ROOM

- Store working shoes separately
- Separate areas shall be available for the storage of clean protective garments away from the dirty and soiled ones.





STORAGE AREAS

Storage areas shall be of **sufficient capacity** to allow **orderly storage** of various categories of materials and products with **proper segregation**.





STORAGE AREAS

Storage areas should be maintained in a **clean, dry & orderly condition**. Goods should be **stored off the floor** and **away from walls** that will permit easy cleaning and the **use of pest control agents without risk of contamination**





STORAGE AREAS



- Segregated and secured areas (e.g. under lock and key) shall be provided for the storage of rejected, recalled or returned materials or products.



- Highly active materials or products (e.g. flammable, explosive or toxic substances) shall be stored in separate, safe and secure areas.



STORAGE AREAS



- Receiving and dispatch bays shall protect materials and products from the weather.
- Reception areas shall be designed and equipped to allow containers of incoming materials to be cleaned, where necessary, before storage.



STORAGE AREAS

- There shall normally be a separate sampling area for starting materials.
- If sampling is performed in the storage area, it shall be conducted in such a way as to prevent contamination or cross-contamination (e.g. by using sampling booth).



STORAGE AREAS

Printed packaging materials are considered critical to the conformity of the products, and special attention shall be paid to the safe and secure storage of these materials.





STORAGE AREAS

- Crude (i.e. unprocessed) natural materials shall be stored in separate areas.
- The store area shall be well ventilated and equipped in such a way as to give protection against insects, or other animals, especially rodents.



STORAGE AREAS

- Effective measures shall be taken to prevent the spread of any such animals and microorganisms brought in with the crude natural materials to prevent fermentation, mould growth and cross-contamination.
- Containers shall be located in such a way as to allow free air circulation.



STORAGE AREAS

- Special attention shall be paid to the **cleanliness and good maintenance** of the storage areas particularly when dust is generated.
- **Storage of plant materials, animal materials including parts, microorganisms, extracts, tinctures and other preparations** that require special conditions of temperature, humidity or light protection; these conditions shall be provided and monitored.



QUALITY CONTROL AREAS

If testing is done within the premises, **quality control laboratories should be separated from production areas.** This is particularly important for laboratories for the handling of microorganisms.



QUALITY CONTROL AREAS



Control laboratories shall be designed to suit the operations to be carried out in them. Sufficient space shall be given to avoid mix-ups and cross-contamination.



QUALITY CONTROL AREAS



There shall be adequate suitable storage space for samples (including retained and reference samples) and records.



QUALITY CONTROL AREAS

- Separate rooms may be necessary to **protect sensitive instruments** from vibrations, electrical interference, humidity, etc.
- Special requirements are needed in laboratories **handling particular substances such as microorganisms**



ANCILLARY AREAS

- Rest and refreshment rooms and toilets shall be separated from other areas and shall not have direct access to controlled areas (e.g. production and storage areas).
- Facilities for changing clothes, and for washing and toilet purposes shall be easily accessible and appropriate for the number of users.



ANCILLARY AREAS

- Maintenance workshops shall be separated from production areas. Whenever parts and tools are stored in the production area, they shall be kept in rooms or lockers reserved for that use.
- Animal houses shall be well isolated from other areas, with separate entrance (animal access) and air handling facilities.



ANCILLARY AREAS



A separate room may be needed for storing clean, idle equipment which should be kept dry at all times.



EQUIPMENT

Equipment shall be

- designed
- placed
- maintained

to suit their intended use





LOCATION & INSTALLATION

- Prevent contamination
- Minimize the risk of error
- Tested to ensure that equipment operate appropriately
- Avoid congestion and cross contamination





DESIGN & CONSTRUCTION

Pipelines should be constructed using suitable materials (e.g. Stainless Steel) which is stable when in contact with the process materials, during hot sanitation & disinfection.





PIPES & PIPELINES

- Clearly labeled to show:
 - ✓ Content (where applicable)
 - ✓ Direction of flow





BALANCING & MEASURING EQUIPMENT

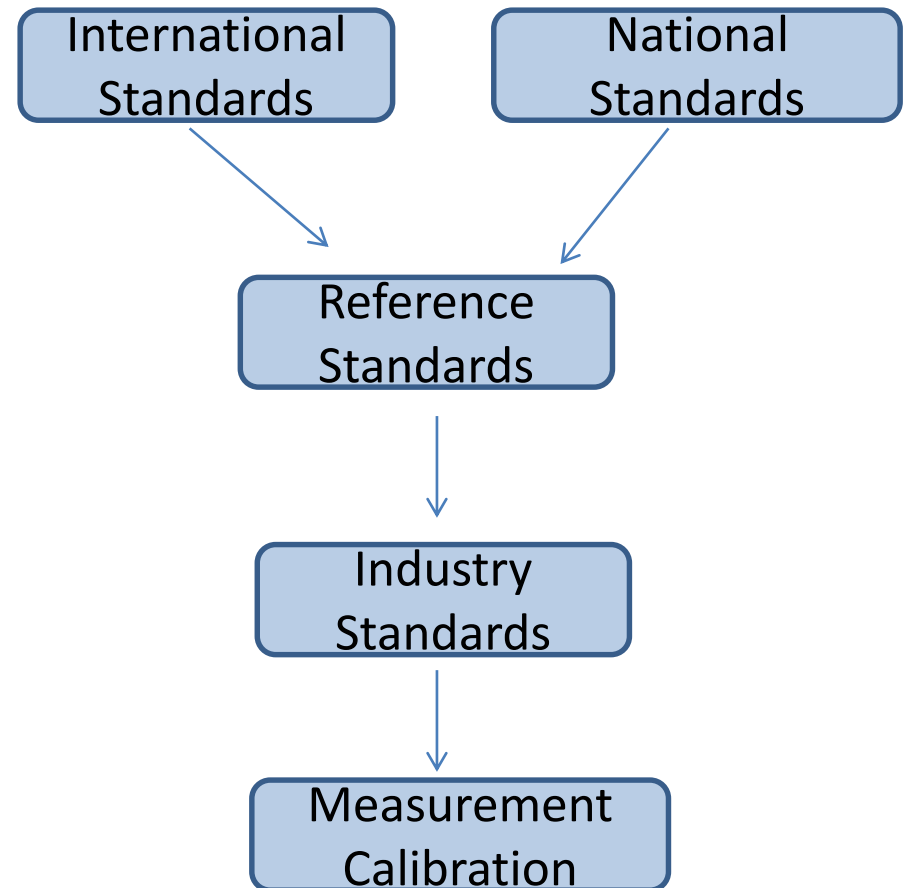
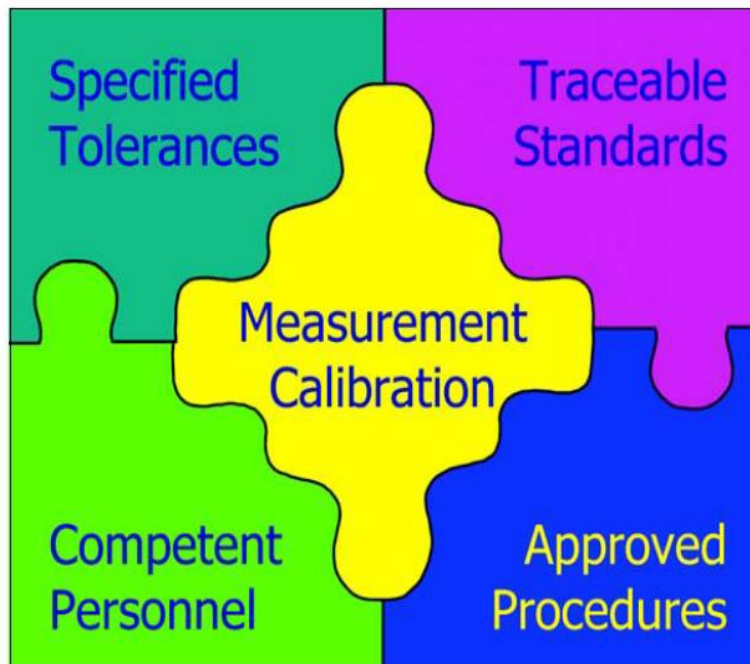
- Available in appropriate range & precision for production and control operation
- Weighing, measuring, testing and recording equipment should be serviced and calibrated regularly.





CALIBRATION

Calibration of equipment / measuring device should have the following:





CALIBRATION

- Determine the accuracy of measuring instruments.
 - Calibrated and checked according to:
 - * Frequency
 - * Method
- And the records are maintained





CALIBRATION

➤ Calibration Tag

CALIBRATION	
I.D. No. _____	
BY _____	DATE _____
DUE _____	

- Shall have **SOP or program for calibration** of measuring, weighing, recording and control equipment (clause 5.43.2)



CALIBRATION

This information is provided as an **example** and the frequency will be based on the need, previous performance and critically of the equipment

Type of equipment	Requirement	Suggested frequency
Reference thermometers (liquid-in-glass)	Full traceable recalibration Single point (e.g. ice-point check)	Every 3 years Annually
Reference thermocouples	Full traceable recalibration Check against reference thermometer	Every 3 years Annually
Working thermometers and working thermocouples	Check against reference thermometer at ice-point and/or working temperature range	Annually
Balances	Full traceable calibration	Annually



CALIBRATION

Third party/external calibration body

- Supplier selection and evaluation should be done prior to the execution following the SOP of selection and purchasing of services and supplies that has an effect to quality testing
- Contract / working agreement should be prepared which clearly defined scope and responsibilities of each party
- Final responsibility belongs to the equipment owner
- Owner should verify the readiness of the equipment when received from the third party / external calibration body



EQUIPMENT: CLEANING

- Designed for easy and thorough cleaning
- Detailed and written procedures
- Stored in clean and dry condition





DEDICATED EQUIPMENT

Dedicated equipment used to manufacture products intended for internal consumption solely shall be separated from equipment used for the manufacturing of products intended for external use or application.



EQUIPMENT

- Defective equipment shall be remove and/or clearly labelled
- Repair and maintenance shall not present hazard to the quality of products

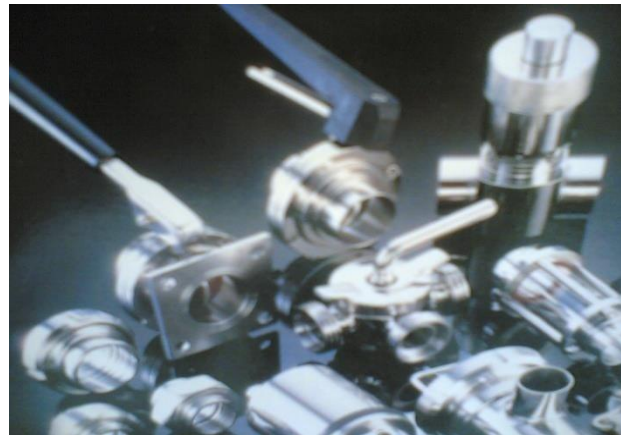




EQUIPMENT

Surface of equipment must not be:

- Reactive
- Additive
- Absorptive





EQUIPMENT

Pipes, hoses, pumps and valves used for treated water, starting materials and products shall be cleaned and sanitised according to written procedures that details the alert and action limits and measures for microbiological contamination



EQUIPMENT

Must also have SOPs for :

- Equipment assembly (Clause 5.43.1)
- Maintenance, cleaning and sanitation of equipment (Clause 5.43.3)



EQUIPMENT: VERIFICATION

- Equipment shall be **periodically verified** to determine if they are still operating in a valid state
- Verification of equipment should be **done prior to the testing method verification**
- Verification of Equipment should be done as described in ASEAN Guidelines on Good Manufacturing Practice for Traditional Medicines and Health Supplements, **Appendix 2 - Verification**



REFERENCE

- ASEAN Guidelines on Good Manufacturing Practices for Traditional Medicines
- ASEAN Guidelines on Good Manufacturing Practices for Health Supplements

THANK YOU!



ONE VISION, ONE IDENTITY, ONE COMMUNITY