Hygienic Design of Food Manufacturing Premises

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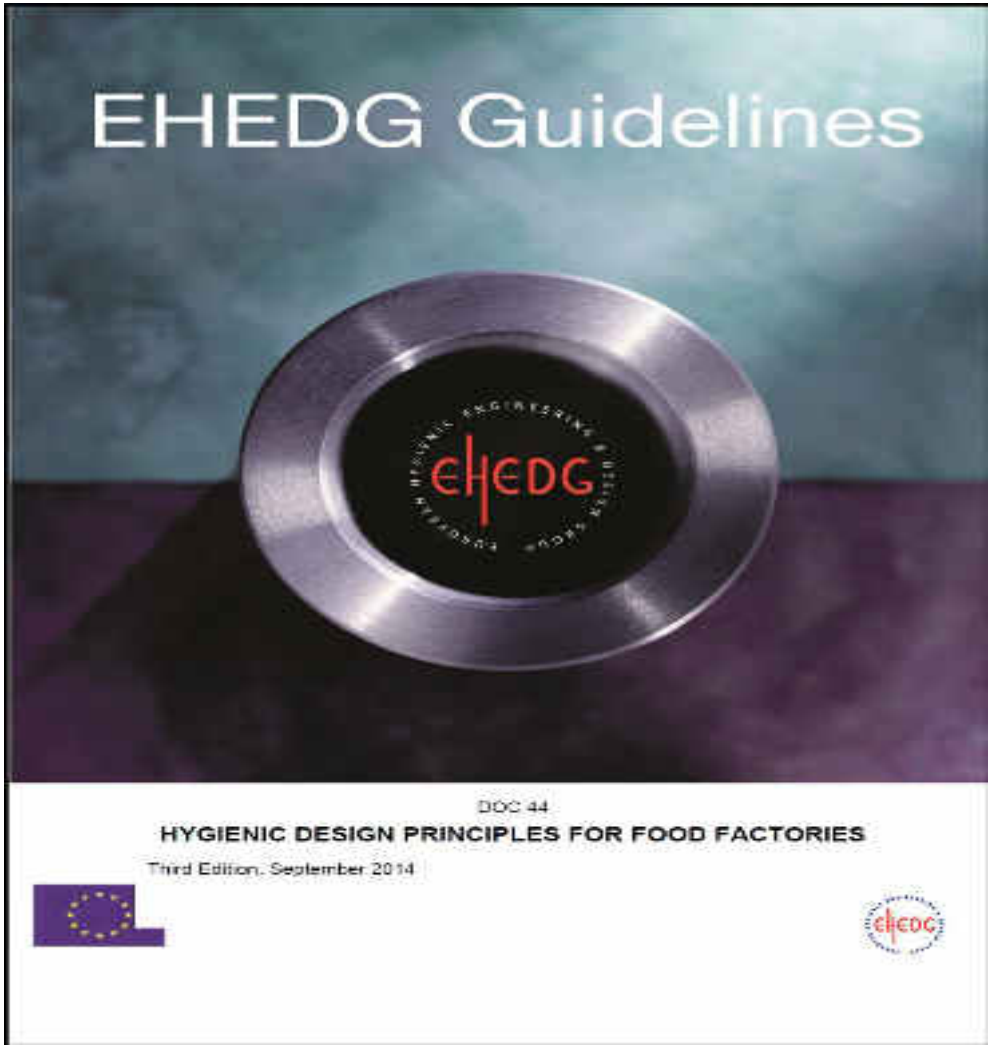
HOLCHEM
TRUE SOLUTIONS

Guideline No.

- Largest Working Group
- Largest Document
- Suggested established best practice
- Novel solutions
- Published late 2014 – currently final review due to EHEDG restructuring



Hygienic food factory design provides:-

- Defence against external factory hazards
- Defence against internal factory hazards - no harbourage sites and ease of cleaning
- Internal flows of people, product, packaging, air and wastes to prevent cross-contamination
- Security against deliberate contamination
- The maintenance of hygienic conditions via structure rigidity - appropriate foundations, steelwork, floor slabs
- The Maintenance of hygienic conditions via material durability
- Compliance with customer/GFSI best practice

New concepts

- Hazard management - segregation, zoning and external/internal barriers
- Personnel entrances and hygiene sequences
- Cleaning and disinfection rooms
- Walls and floor interfaces
- Drains and flooring integration
- Structural rigidity/flexibility
- Services - electrical, compressed air

Hazard management – external hazards

- People (petty crime, journalist, fraud, bioterrorists)
- Pests – rodents, insects, birds, reptiles
- Microorganisms – farm operations, animal activities, refuse/waste disposal, sewage works
- Industrial activities - Chemicals/odours, particulates
- Water – pests, rain, flood,
- Ground movement – effect on foundations and structures

Prevailing wind

River
Rodent
and
insect
risk

Industrial zone

Chemical risk

Particulate risk

Road

Noise and odour risk (from factory)

Security fence

Effluent treatment

Waste

Traffic fume risk

Car park

Finished product

Ingredients

Domestic area

10m
Elevation

12m

14m

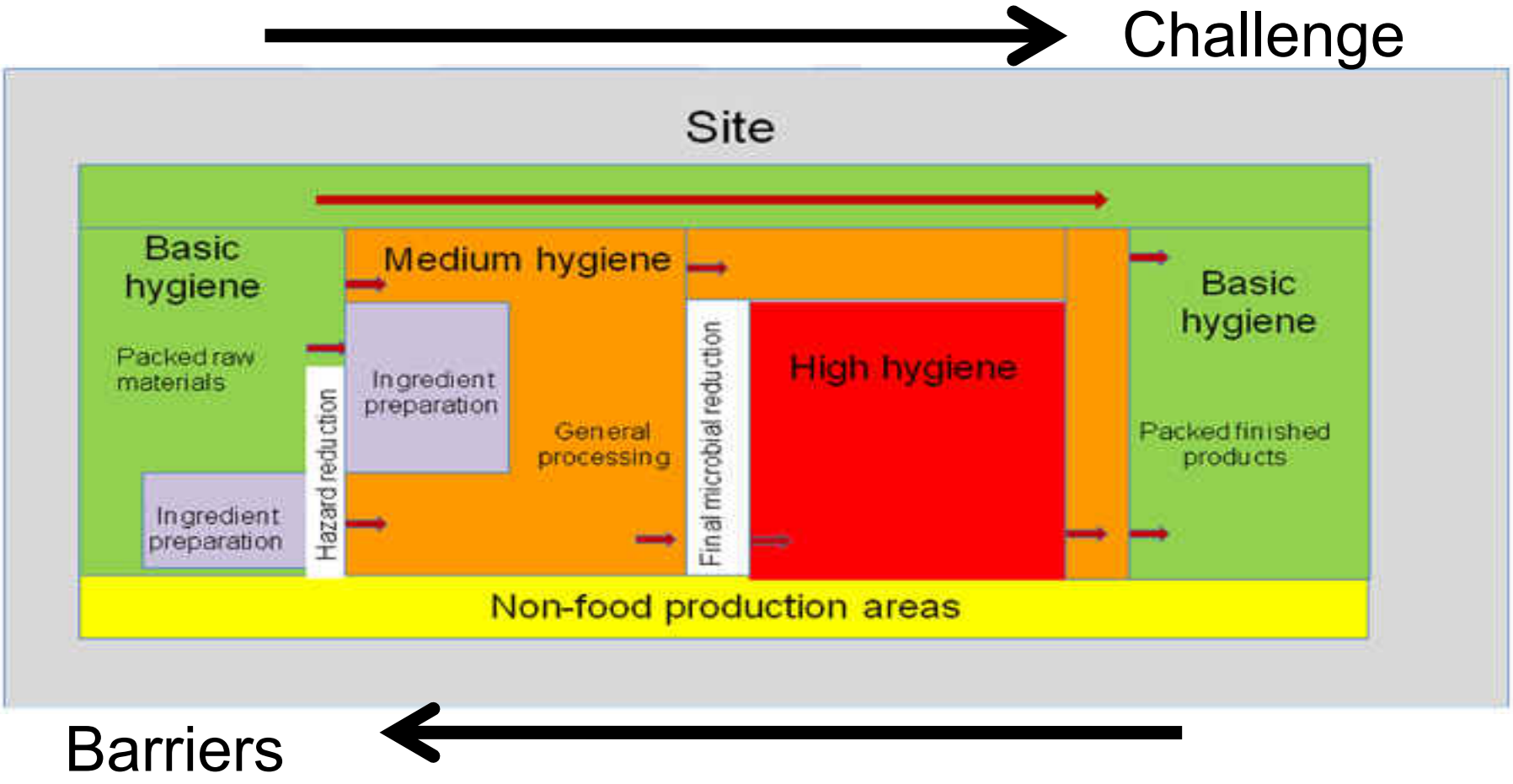
16m

Dust and microbial risk particularly during harvest

Poultry waste spreading
Salmonella risk

Agricultural land

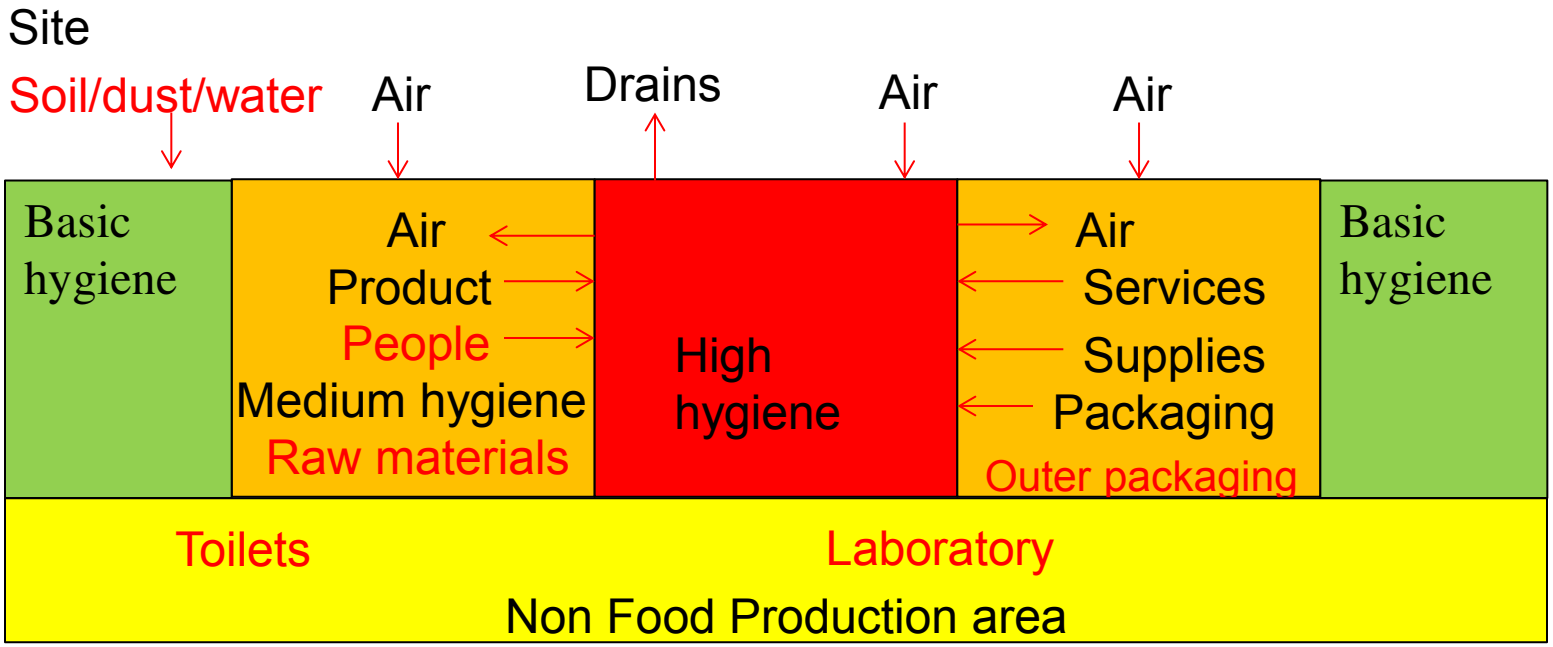
Factory zoning



Zoning and barriers

- Site barrier (1)
- Non-food production areas
- Factory barrier (2)
- Basic hygiene area
  - Soiled raw materials, packed ingredients/finished products
- Medium hygiene area
  - Ingredient preparation
  - General processing
- High hygiene barrier (3)
- High hygiene area
  - Microbiologically decontaminated products, design risk assessed

Prevent entry of pathogens

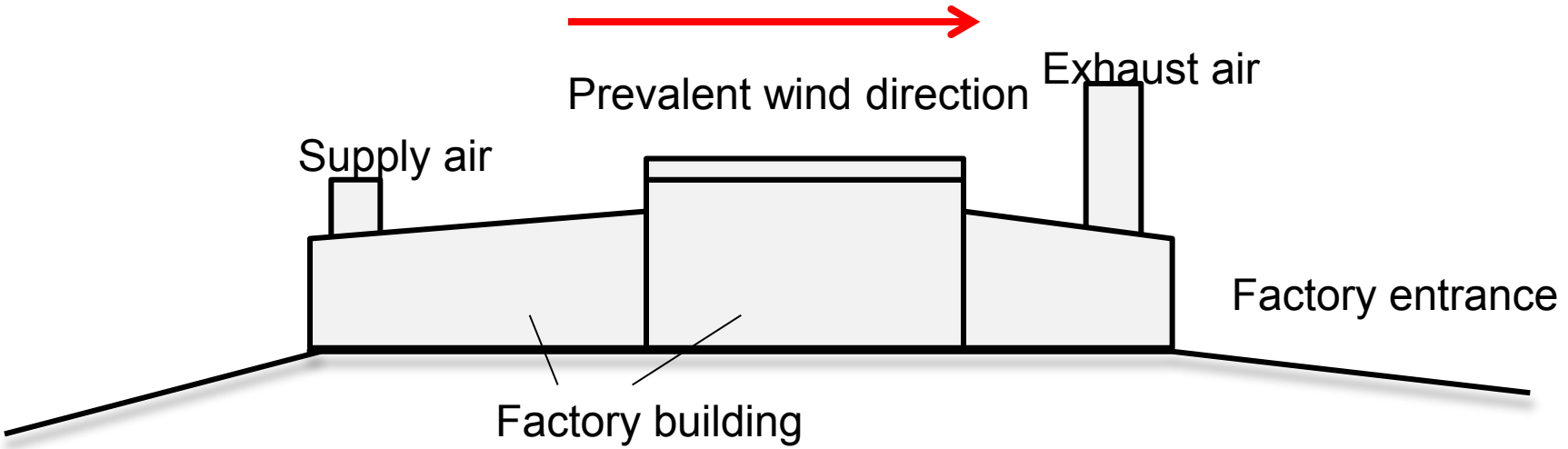


Category of food product:- Degree of protection required

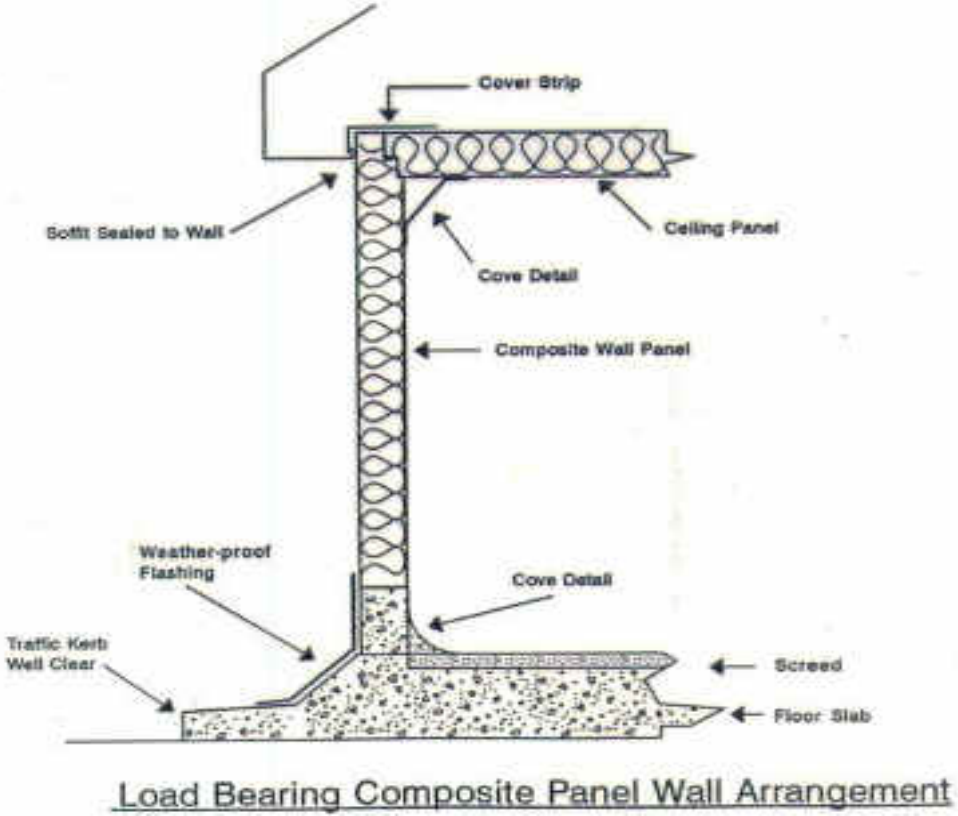
- Degree of preservation/susceptibility to microbial growth
- Shelf-life and storage conditions
- Consumer type
- Size of company/market - strength of brand name
  - (Barrier 1) - Raw produce in the field
  - Barrier 2 - Processed foods/GMP in the factory
  - Barrier 3 – Ready-to-eat products – ready meals, fresh-cut produce, infant formula, chocolate, cereals, peanuts?
    - BRC High care, High risk Ambient high care
  - Aseptic – true aseptic, ultra-clean, some RTE products

Barrier 1: Site Barrier

- Environment
  - wind direction, surface run-off
  - Landscaping



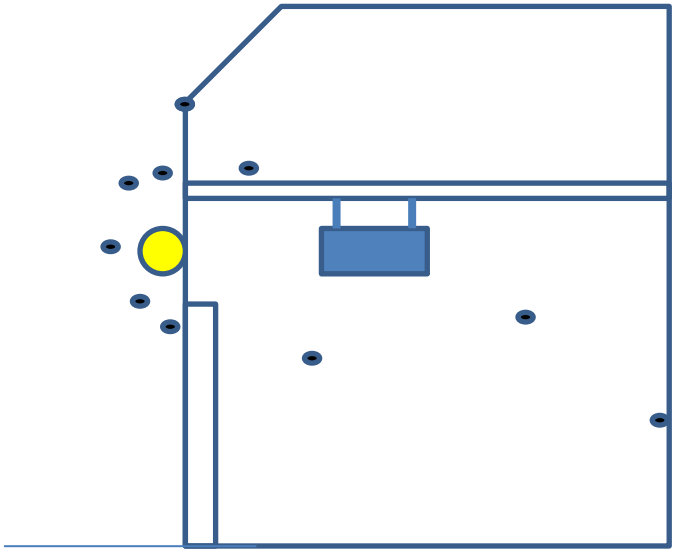
Factory barrier

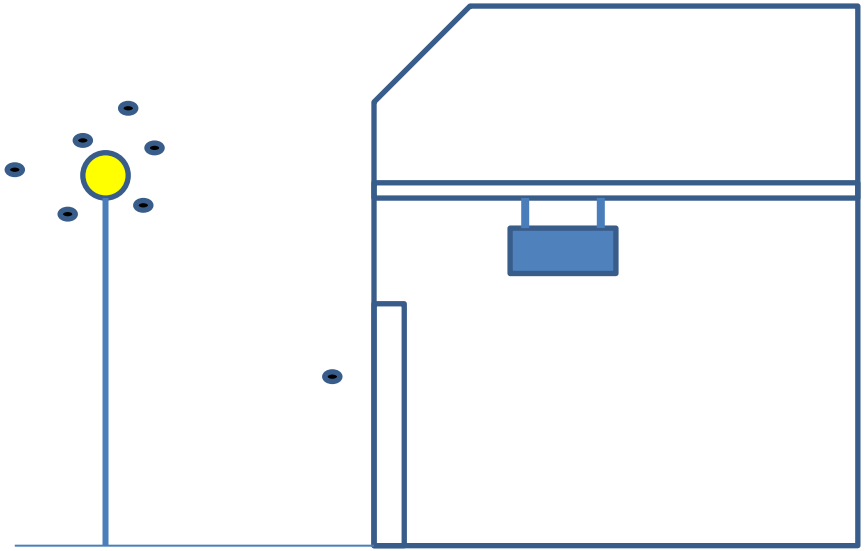


Load Bearing Composite Panel Wall Arrangement

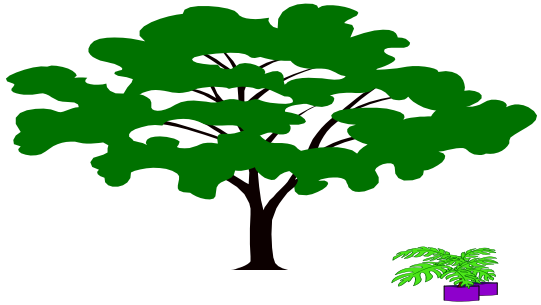
Hygienic receiving

Pests:- Preventing entry principle



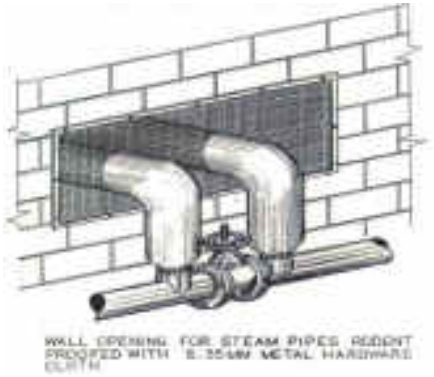


Pests - control them externally!

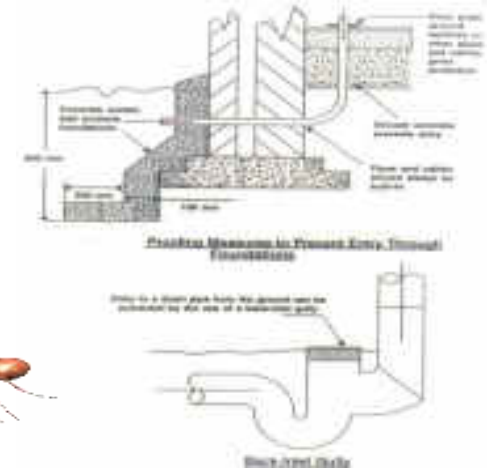


- Sealed surface entry points in the external factory structure
- Covered waste collection units and frequent removal
- 4mm door gaps
- Limit surface water

Hygienic trees and shrubbery!



WALL OPENING FOR STEAM PIPES RODENT PROOFED WITH 6.35MM METAL HARDWARE CLOTH



EXAMPLE OF HOW LEDGES CAN BE ELIMINATED

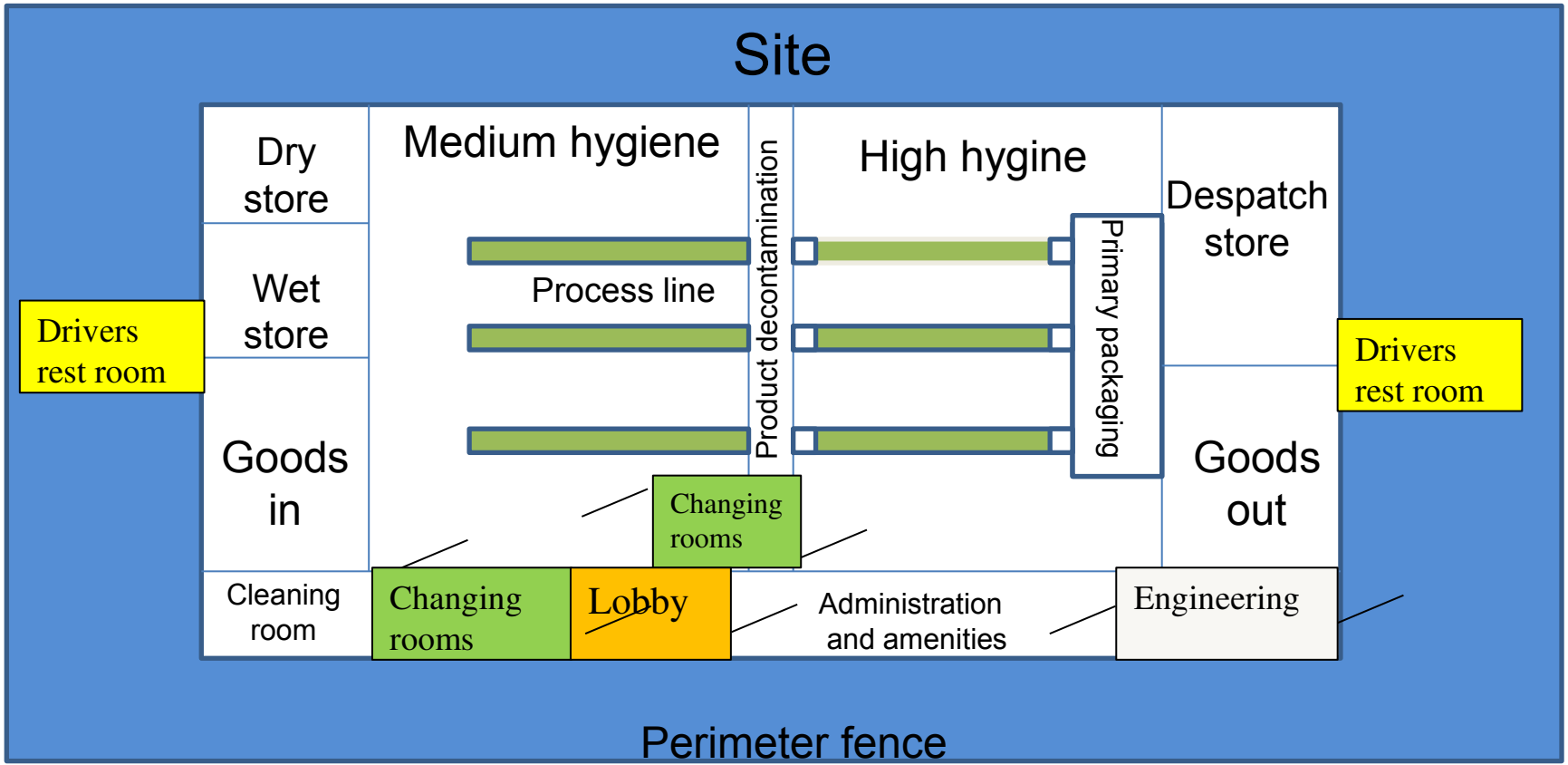
Roofs: water leakage and Salmonella

- Ventilation devices that discharge food particles onto the roof should be avoided (they can attract birds, infestation - Salmonella)
- Roofs shall be pitched to the external walls, self draining and roof drains should be external to the building wherever possible.
- All openings to the roof should be curbed and flashed to a height of 0.3m (12 inches)or more (snow

Site Security

- Perimeter fence/security guards/CCTV/no dogs
- No raw materials/finished products outside barrier 2
- Silos, water tanks locked off (super chlorination?)
- Bulk loading equipment - factory pumps/pipework should be used
- Parking areas not close to factory entrance
- Lighting at night
- National guidance e.g. *Defending food and drink* PAS 96:2008 British Standards

Single operative and goods entrance



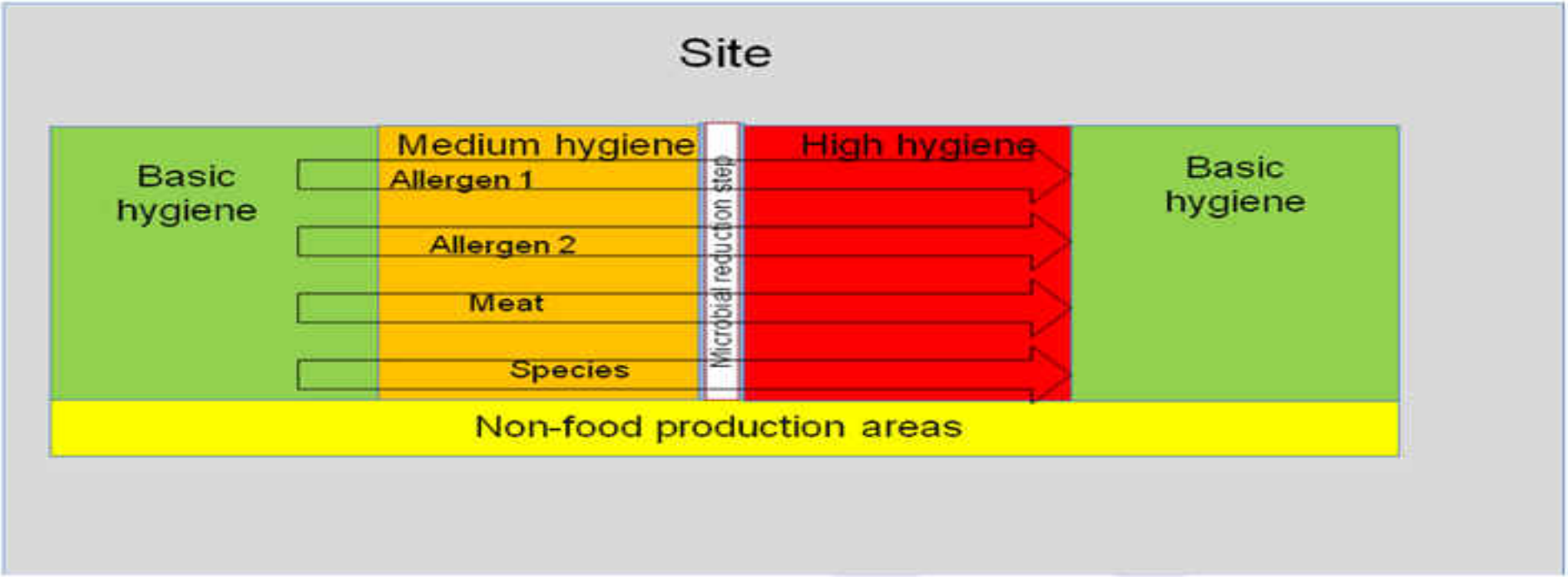
Barrier 2: Internal Hazards

- Microorganisms
- Allergens (milk, gluten, peanuts, strawberries)
- Foreign bodies:- glass, plastic, metal, wood, water
- Religion (Halal, Kosher)
- Personal choice (vegetarian, organic, GMO)
- Legal (meat speciation), DNA
- Bioterrorism
- Fraud

Internal hazards/brand protection

- Allergens (milk, gluten, peanuts, strawberries)
- Religion (Halal, Kosher)
- Personal choice (vegetarian, organic, GMO)
- Legal (meat speciation), DNA
- Separate factories – not likely
- Separate areas (goods in, transport, utensils, cleaning equipment, clothing etc.)
- Separate times (verified cleaning, labelling, rework?)

Horizontal segregation across zones

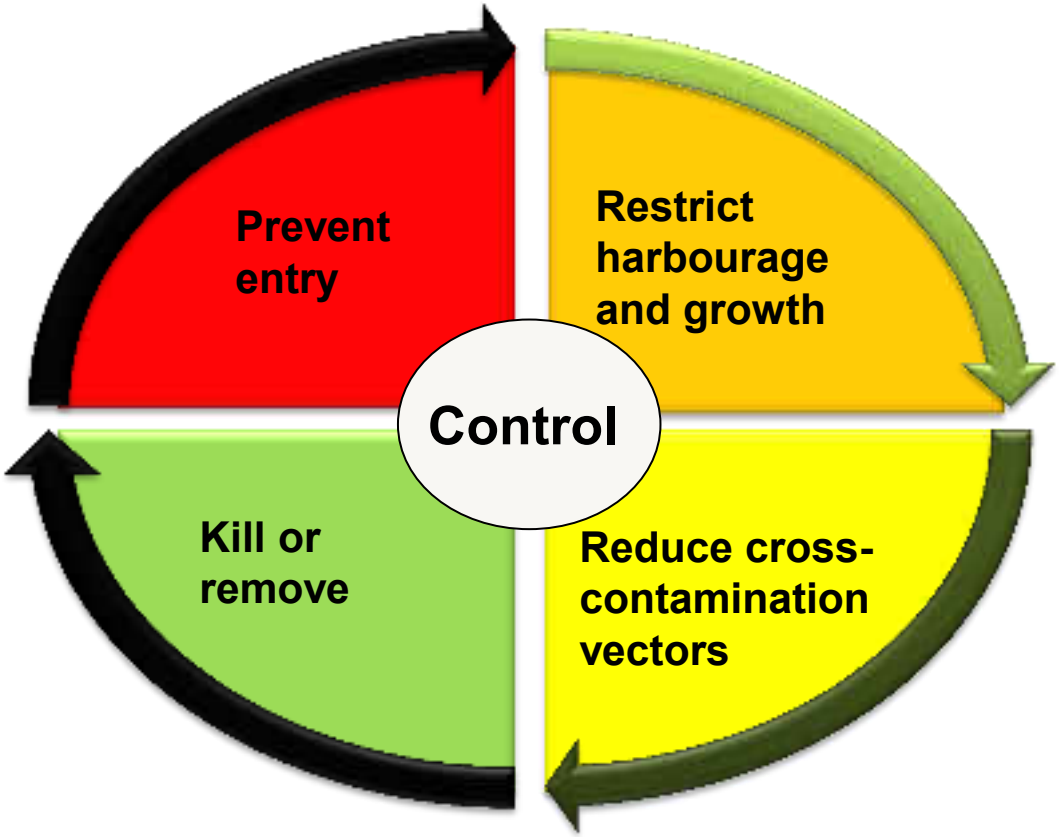


Internal hazards/brand protection

- Foreign bodies
- Pests
- Glass/plastic – covered lighting, breakage policies
- Glass – no windows – what about the cows?
- Wood policy – limit of pallet movement
- Maintenance policy
- Metal/foreign body – metal/x-ray detection
- Pest control

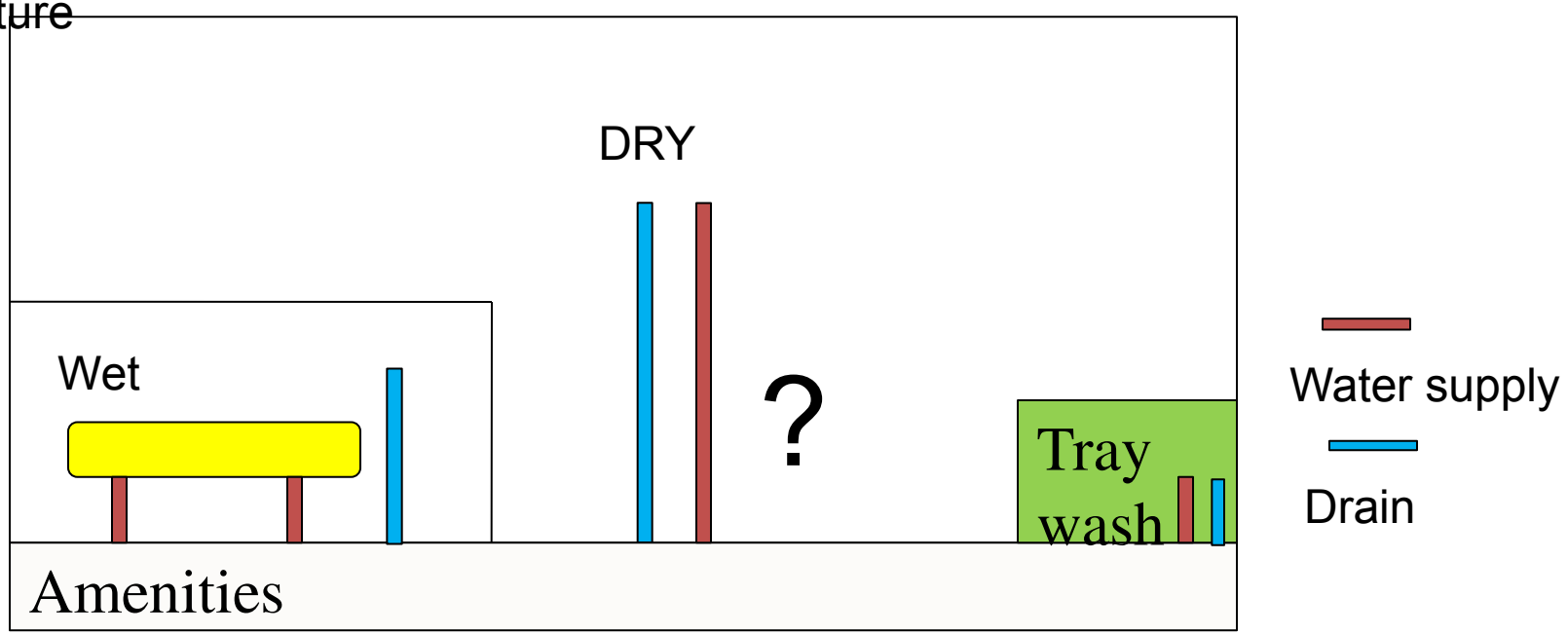
Internal hazards/brand protection

- Microorganisms
- 5 point pathogen control plan



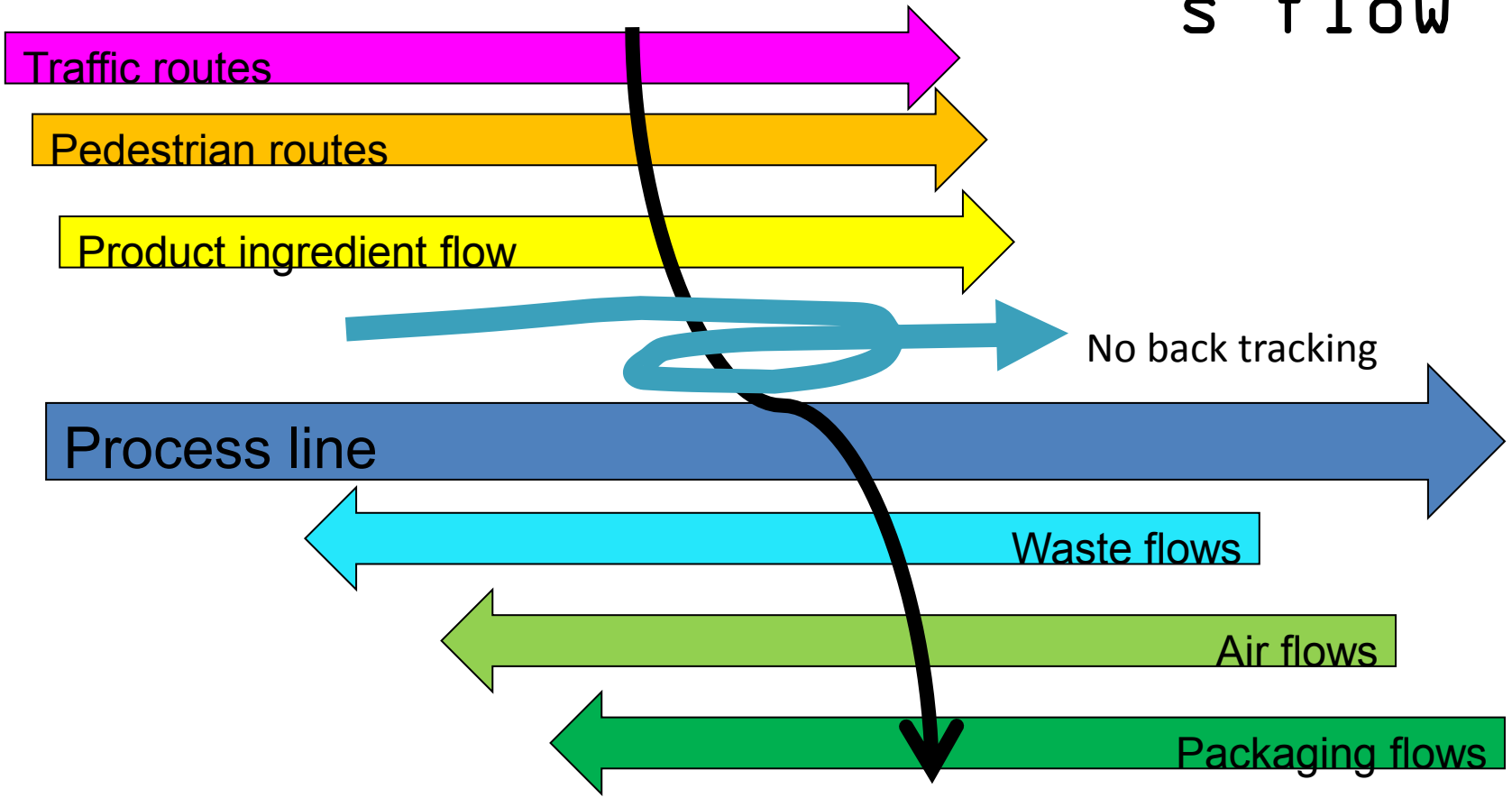
Internal hazards/brand protection

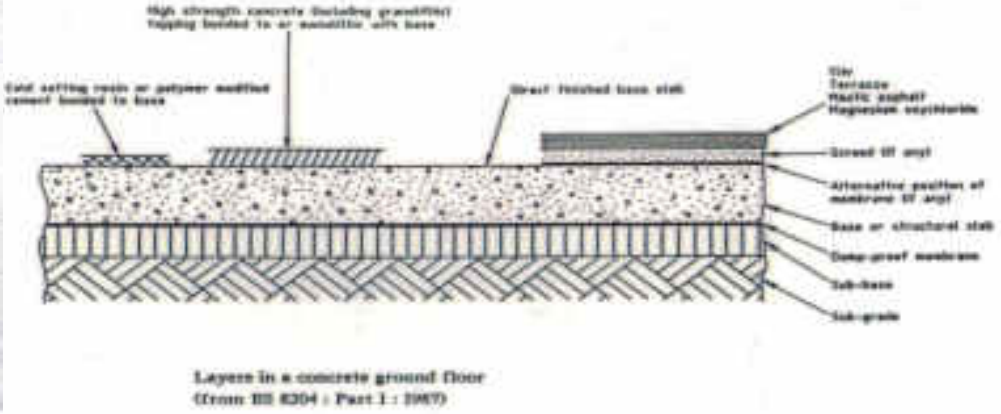
Microbial growth requirements
- Temperature
- Nutrients
- Oxygen
- Water



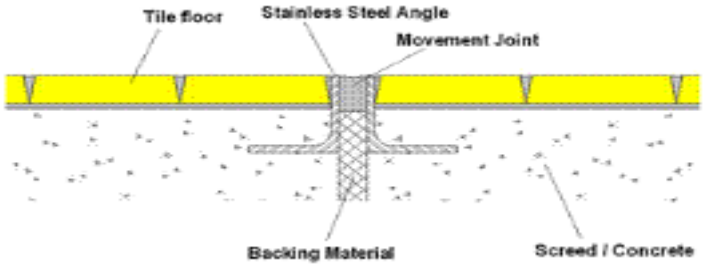
Cross contamination

Proces
s flow



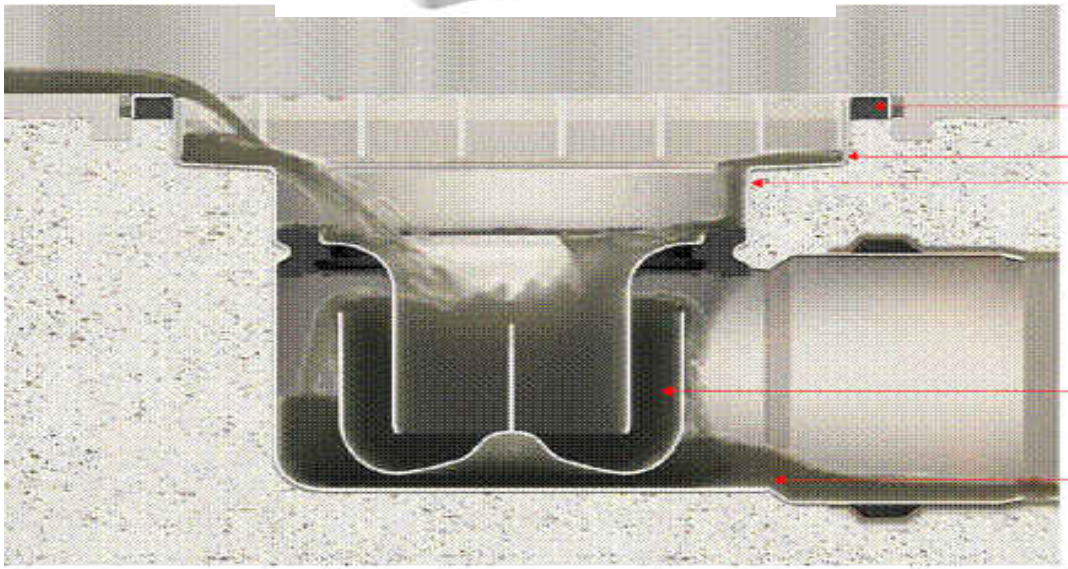


Love your floor.

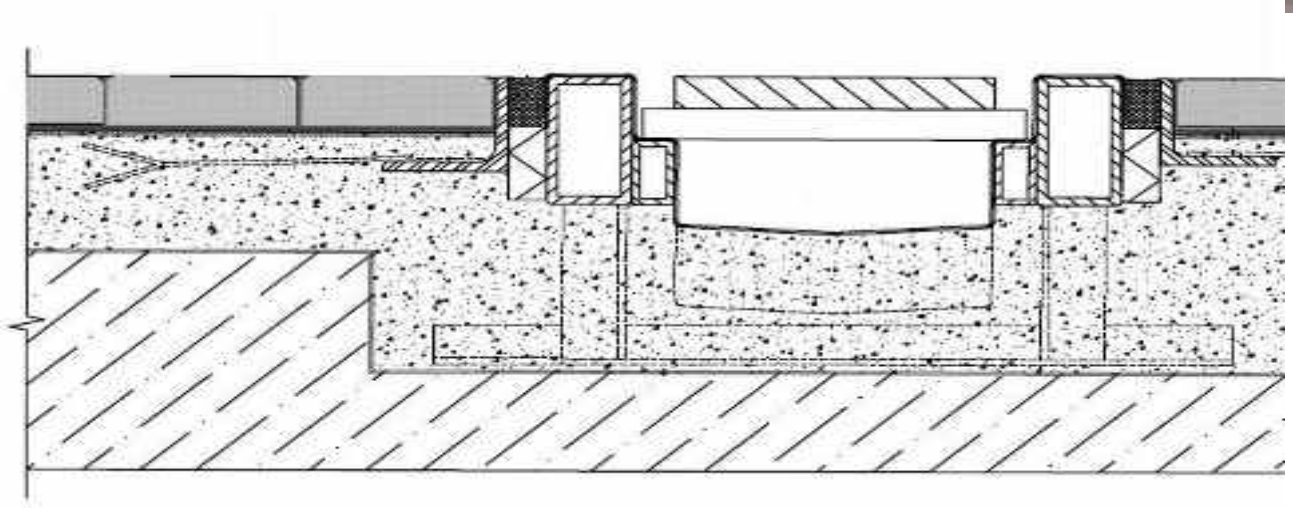


Foundations to prevent structural movement but above all else, consideration of the sub-floor and its movement

Good drain design



Drain/floor interfaces

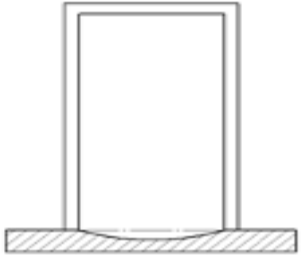


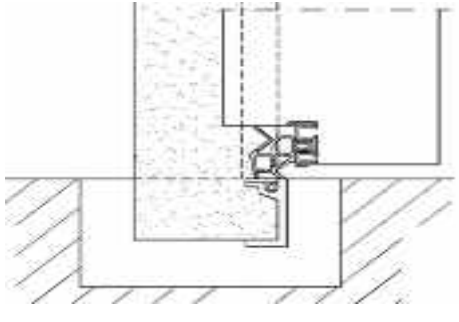
Need to integrate drain and flooring contactors

Doors

To be effective barriers

- Tight fitting (no gaps)
- Threshold
- Solid or closed cell foam
- Self closing (man doors)
- Actuator closing (trucking)
- Horizontal rather than vertical roller shutter doors



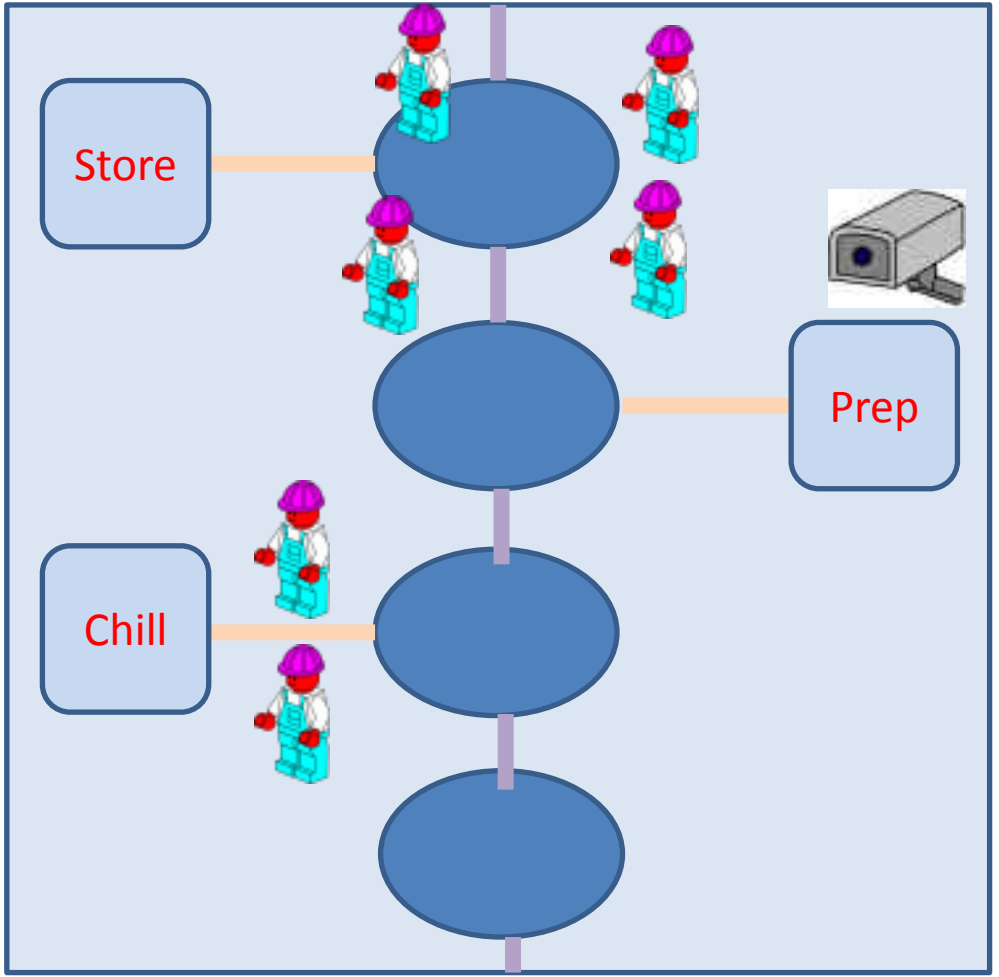


Electrical installations

- Minimum wire ways and cable routing
- No conduits.
- Cables clips should be avoided.
- Control boxes sealed, not over product, sited to facilitate cleaning and bottom cable entry

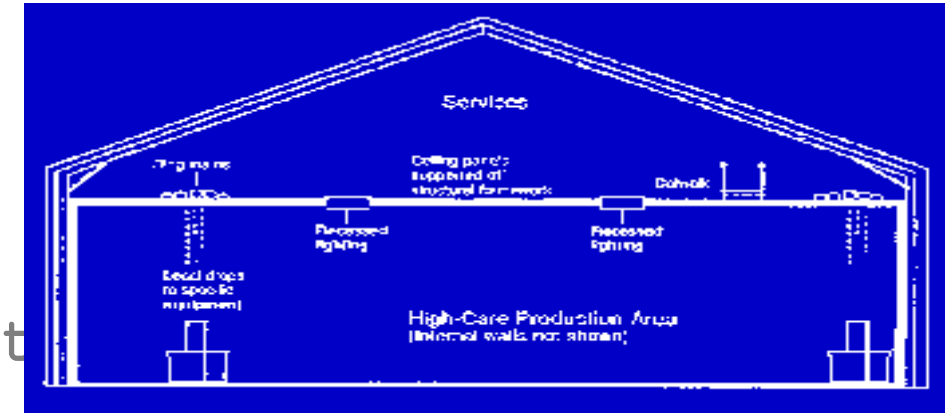
Bioterrorism/fraud

- Key processes: mixing/even distribution
  - Mixers, bulk storage, grinders
- Collective responsibility



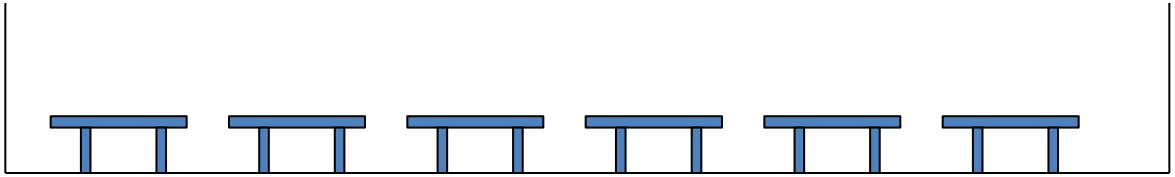
Barrier 3: High hygie

- Product (pasteurisation or decontamination)
- Utensils etc.
- Packaging
- People
- Air
- Solid and liquid wast

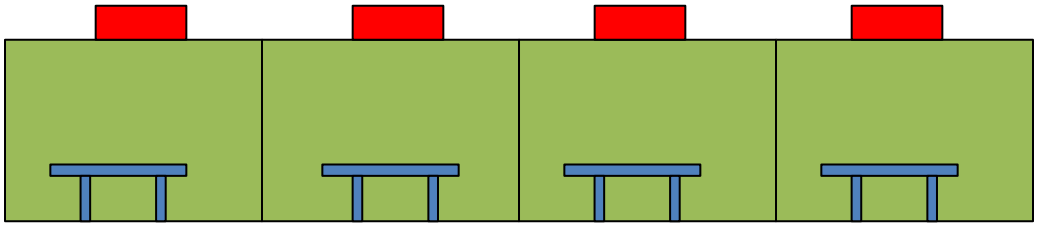


- Risk assess required barriers

Boxes within boxes

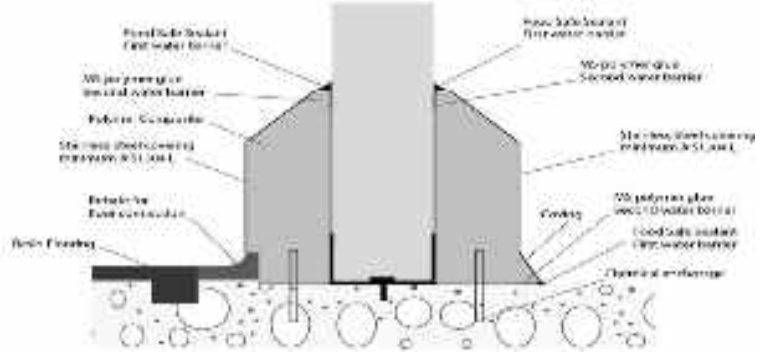


Easy to manage?



- Manufacturing flexibility
- Infection control

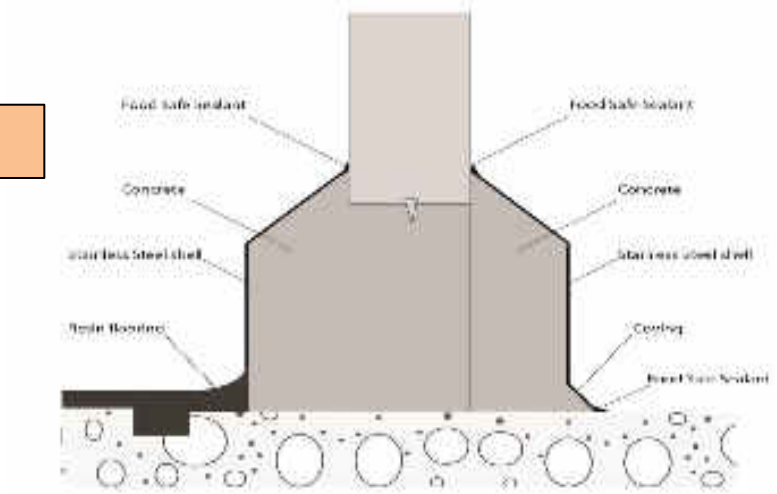
Wall-to-floor Junctions?



High risk

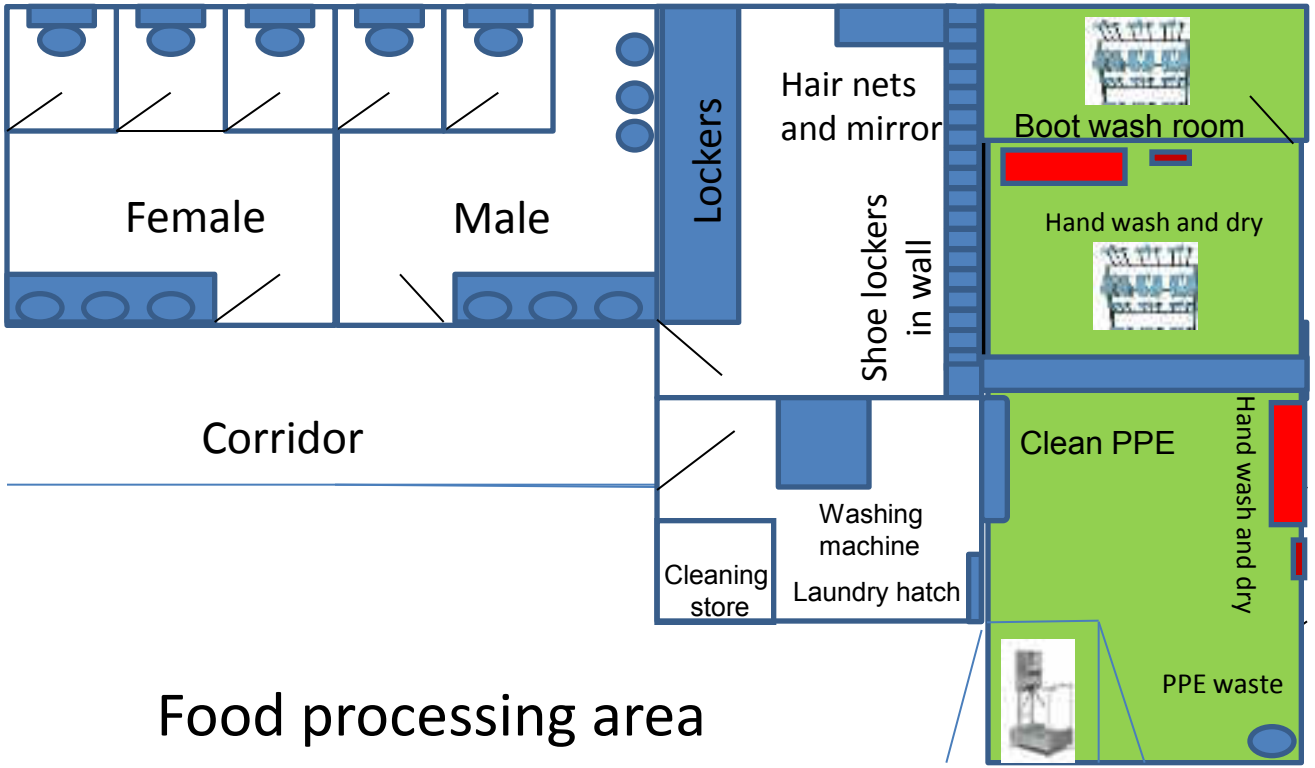
Medium risk

Low risk



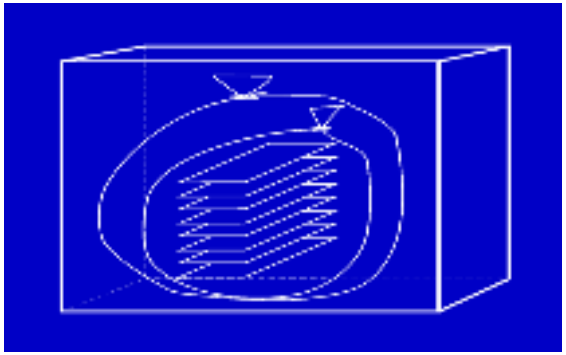
Personnel - High hygiene entry sequence

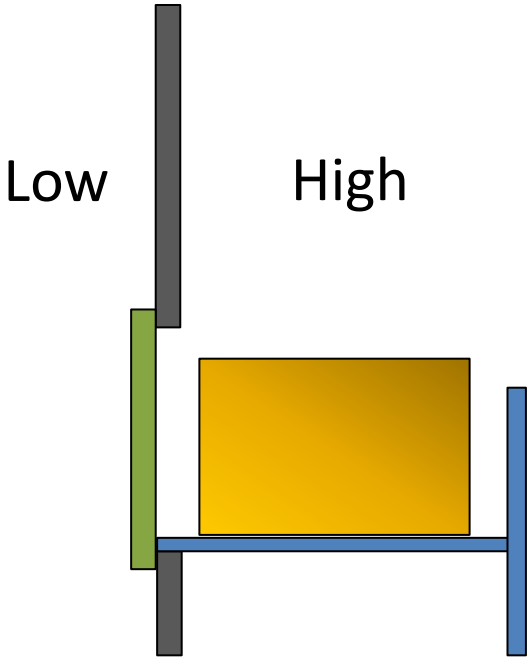
- Remove outer/low risk clothing
- Put on hair net
- Remove footwear
- Step over barrier - Wash hands - **psychology**
- Put on high risk boots
- Step over barrier - Wash hands
- Put on factory clothing
- Alcohol rub on entry



Packaging and airlocks

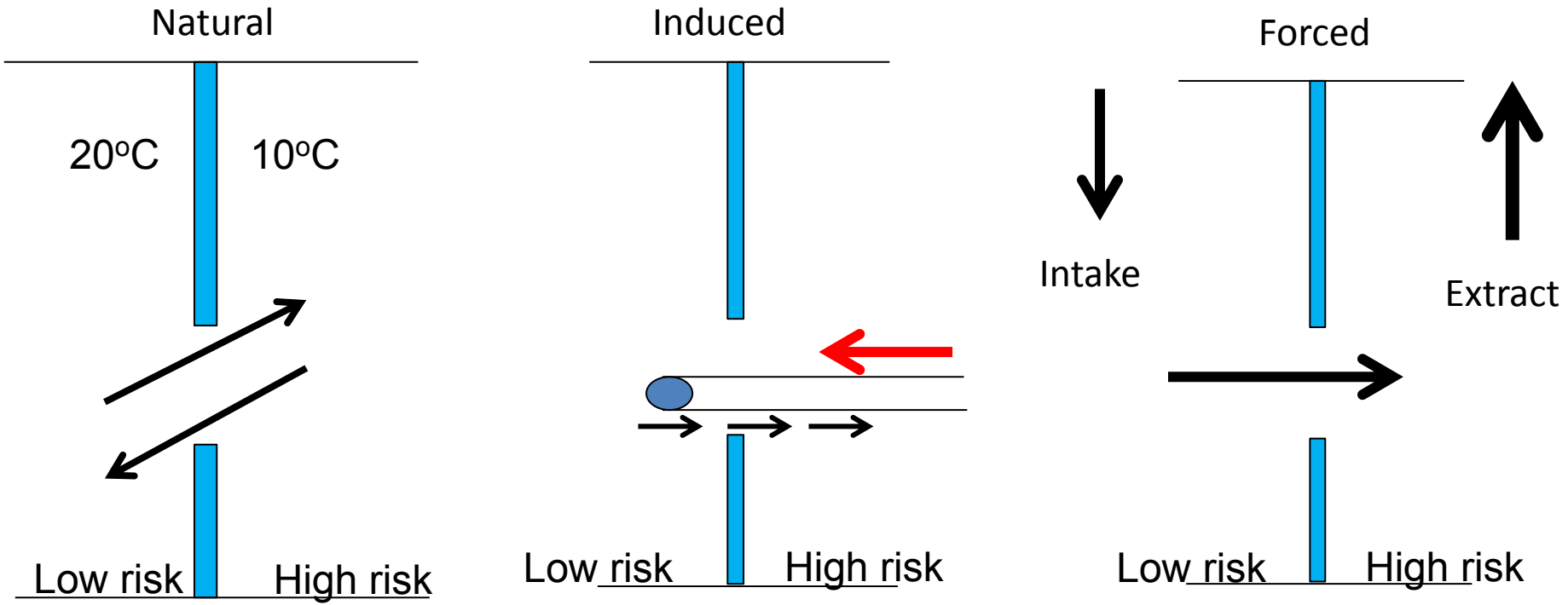
- Double bagged
- Who owns it – high or low
- Who cleans it – high or low
- Can we effectively over pressure it



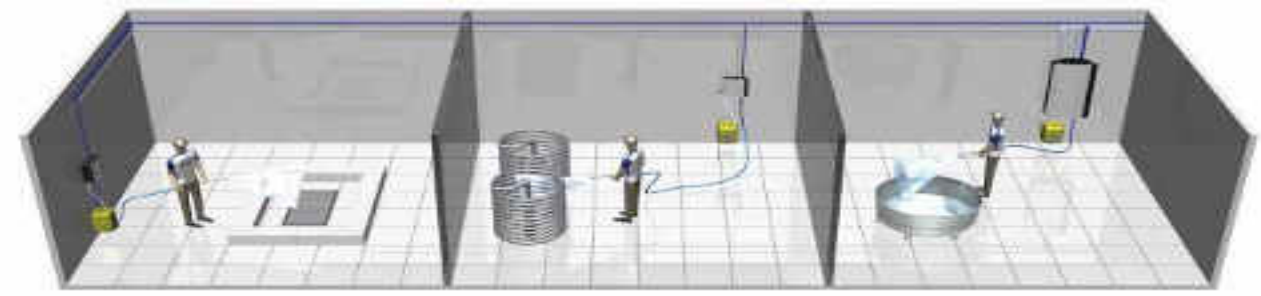


Air movements between high and low hygiene

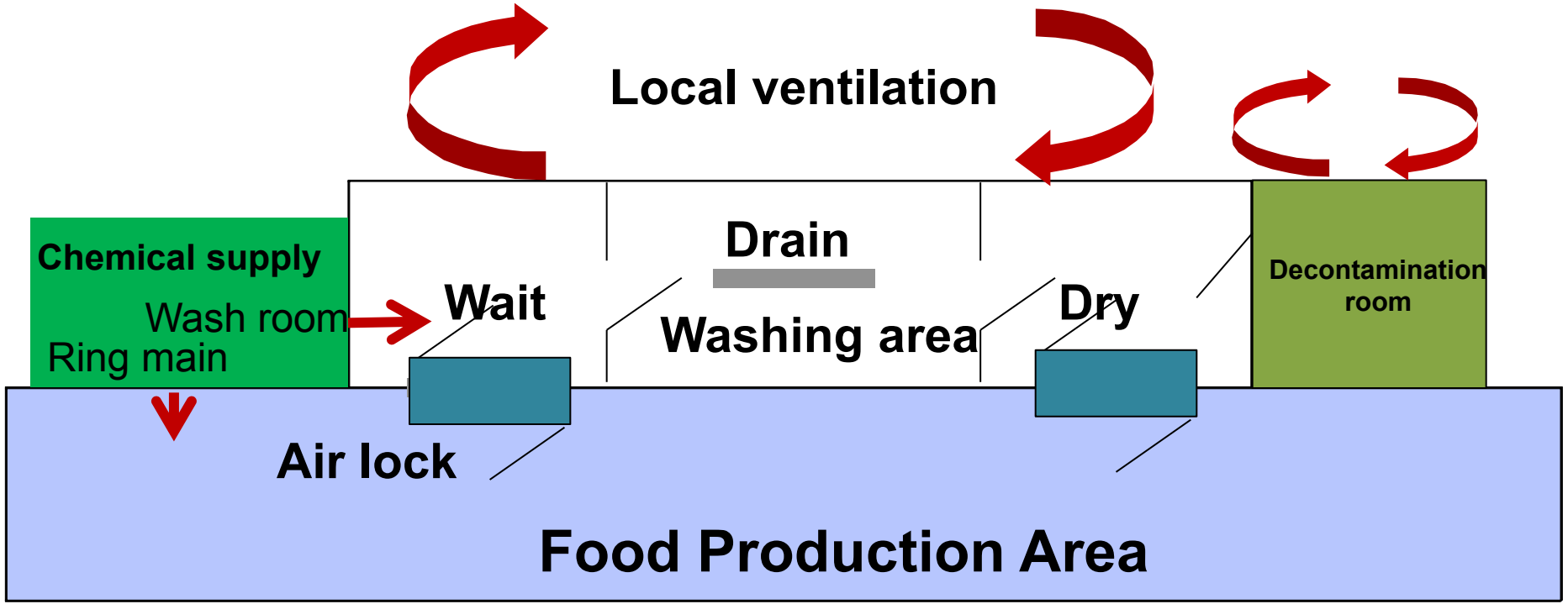
Positive pressure is required, typically 2-5 Pascals /air velocity>3m/s



Design for cleaning and decontamination



Factory exterior



Any Questions?

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