

Introduction

Drainage is a critical component affecting the hygienic performance of commercial food preparation business. Effective drainage helps to mitigate hazards from the external environment and is central to the safe and hygienic operation internally. Within the food production facility, surface liquids represent potential hazard of microbiological contamination.

Liquids may be part of the cleaning process, or may originate from specific equipment discharge points, or be simply the result of an accidental spillage. Quite often the liquids contains other components – organic matter being predominant. Floor drainage components cater for these situations through three core functions - interception, conveyance of fluids, and ability to act as a barrier.

Effective cleaning of drainage in commercial food preparation business reduces risk of contamination and spoiling of food during preparation, processing, and storage. The main objective of cleaning is to remove soil to obtain clean surface and thereby reduce number of microorganisms. A further reduction of microorganism can be obtained by disinfection step.

Principles of cleaning

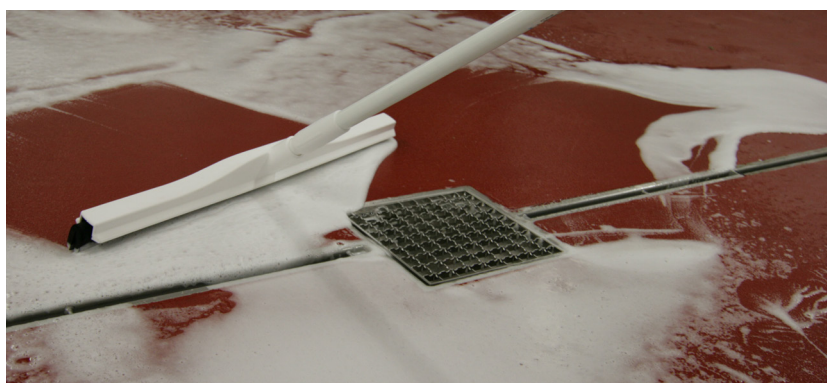
The principles of cleaning involve combination of thermal, kinetic and chemical energy. The cleaning processes are always combination of these factors and time of these to work. The key point to highlight is that all equipment – including

drainage – in food processing plant should have hygienic design, which is easy to clean and disinfect. Otherwise the cleaning process is time and energy consuming and not cost effective.

All surfaces of ACO stainless steel drainage are hygienically designed – no sharp corners, edges, dead spaces and crevices. ACO drainage is easily accessible for cleaning and visual inspection.

The effectiveness of drainage cleaning depends on number of factors:

- Soil type and properties
- Material, design and surfaces
- Water quality
- Cleaning chemicals
- Cleaning procedure
- Cleaning parameters; like temperature, time, flow velocity and concentration of chemicals



There are two different types of surface to be cleaned:

■ Product contact surface

All equipment that intentionally or unintentionally (e.g. due to splashing) comes to contact with final product or from which product or condensate may drain, drop or be drawn into the main product or product container.

■ Non product contact surface

All other exposed surfaces, including surfaces associated with equipment, such as support structures, control panels and external surfaces. It also includes surfaces related to the manufacturing environment, such as floors, walls and drain channels.

We also differentiate cleaning process as whether it is applied dry or wet.

■ Dry cleaning

Dry cleaning is essentially a mechanical removal of soils using sweeping, brushing, wiping and vacuuming. Environments typically to be cleaned by dry methods include plants which are producing flour, cocoa, dry milk products, dry soups and dry infant formulas.

■ Wet cleaning

Wet cleaning involves application of fluids (usually water based) to achieve the desired cleaning result. This can be applied to Open Plant Cleaning (OPC): surfaces to be cleaned have to be accessible to fluids. In addition, some components may be physically removed from production area and cleaned separately – Cleaning out of place (COP). Drainage systems require wet cleaning.

The last is a distinction between whether the cleaning process is done manually or automatically.

■ Manual cleaning

Manual cleaning is generally considered as labour intensive and, therefore often expensive. The manual tools should be hygienic – resistant to applied chemicals and suitable for a specific operation. On top of it; operators should be properly trained to be able to perform cleaning as expected to achieve clean surfaces. ACO drainage has all elements of hygienic design that makes cleaning of ACO drainage much easier and faster when compared to competitive products.

■ Automatic cleaning

Utensils and dismantled parts of equipment are cleaned and disinfected automatically in industrial washing machines, tray or tunnel washers (automatic COP). CIP is also defined as automatic cleaning system.

Cleaning chemicals

There are three main classes of cleaning compounds:

- detergents
- alkalis
- acids
- disinfectants/sanitizers

Detergents

This broad group of chemicals is widely used in households and in food industries brings different type of soil from surfaces into cleaning foams and emulsions that could be easily rinsed off.

Alkalies

Alkaline compounds are effective for dissolution of proteins and removal of fats. Example of alkalies are sodium hydroxide (caustic soda) and potassium hydroxide. These compounds are hazardous to personnel and mostly used in CIP – automatic dosing system is recommended.

Acids

Acids, both organic and inorganic, are commonly used for removal of mineral deposits, such as: hard water scale or milkstone. Acids are potentially corrosive to construction materials and must be used with care.

When chemical cleaning is performed, it is necessary to use low-pressure sprays, foam or gel. Foam and gel are more viscous than sprayed agents and preferred as they are not prone to aerosol formation. Selection of the correct detergent for given application should be always done in co-operation with the detergent supplier.

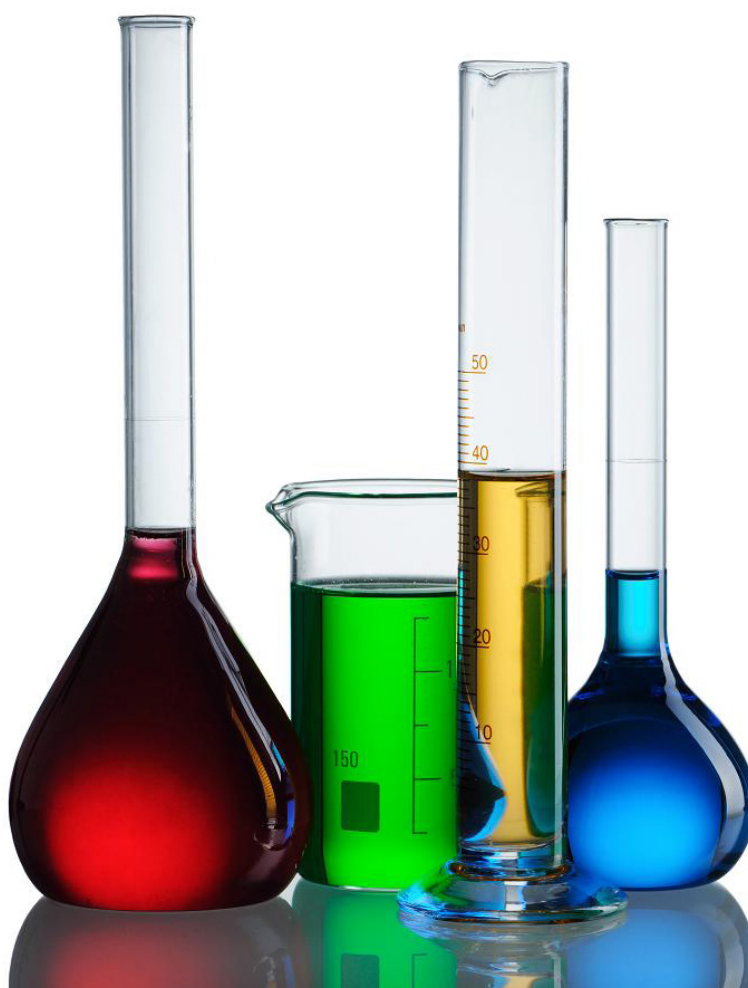
Disinfectants/sanitizers

In case of high risk areas or production areas with microbiological sensitive products, the floors and drain systems should be sprayed with disinfectants/sanitizers, which will reduce the contamination risk even more. The disinfectants/sanitizers will kill remaining micro-organisms, according to the required specifications.

The plant downtime and labour associated with cleaning is major cost of any food processing operation.

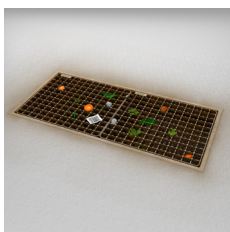
Sources of soil

Primary source of soil is from processed food product itself. Microbiological biofilms mainly contribute to the soil build ups on drainage surfaces. These films vary in their solubility depending upon such factors as heat effect, age, dryness, time, etc. It is essential that personnel involved in the cleaning process design have understanding of the nature of the soil to be removed before selecting a detergent and cleaning method. The rule of thumb is that acid cleaners dissolve alkaline soils (minerals), and detergents dissolve acid soils and food wastes (proteins).




Manual cleaning of drainage

- 1




Remove all present grocery, raw materials, wrapping materials and tools.


Cover all equipment that could be contaminated.
- 2




Remove excess dirt from floor and gratings, and place into designated container.
- 3




Remove gratings.
- 4



Remove and empty silt basket and foul air trap.
- 5

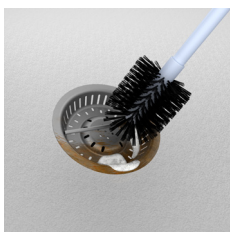


Place collected waste and dirt into designated container.
- 6

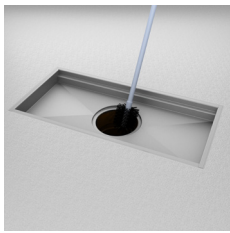


Rinse grating, silt basket and foul air trap with clean water.

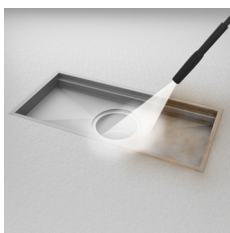
Then place foul air trap into its original position.
- 7



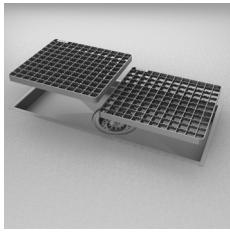
Wash all surfaces with designated detergent and designated hand brush.
- 8



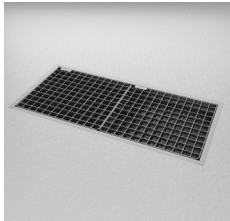
Rinse all surfaces with clean water.
- 9



Visually check surface cleanliness - repeat cleaning process if necessary.
- 10

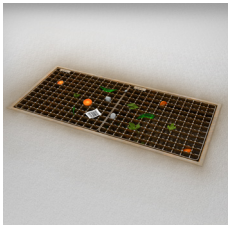


Place silt basket and grating to its original position.
- 11

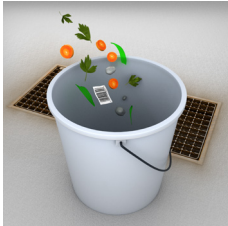



Rinse the entire equipment with clean water.


Chemical cleaning of drainage


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1 Remove all present grocery, raw materials, wrapping materials and tools.

Cover all equipment that could be contaminated.
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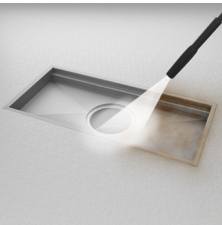
2 Remove excess dirt from floor and gratings, and place into designated container.
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3 Remove gratings.
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4 Remove and empty silt basket and foul air trap.
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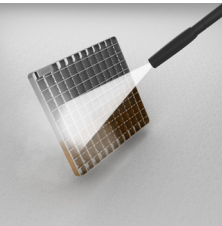
5 Place collected waste and dirt into designated container.
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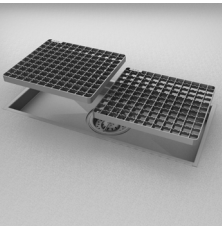
6 Rinse grating, silt basket and foul air trap with clean water.

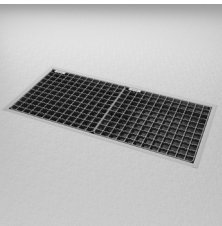
Then place foul air trap into its original position.
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7 Apply foam to all surfaces

Leave for 15 minutes

Rinse off foam with clean water.
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8 Visually check surface cleanliness - repeat cleaning process if necessary.
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9 Place silt basket and grating to its original position.
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10 Rinse the entire equipment with clean water.

Overview with recommended cleaning procedures for drainage

These instructions are for guidance only. **Always follow manufacturer's instructions.**
All procedures have to be verified and adjusted to the application specifics.

Frequency	Daily	Weekly
Procedure	Removal of organic deposits (fats, proteins, saccharides and polysaccharides)	Removal of inorganic deposits that could promote very resistant biofilms
Note: Removal of rinse water residues		
Physical agents	<ul style="list-style-type: none"> ■ Steam ■ Medium pressure water to max 25 bar ■ Mechanical / kinetic energy (brushes, CIP medium velocity) 	Mechanical abrasive methods – polishing
Note: Removal of excess water with a squeegee		
Chemical agents	<ul style="list-style-type: none"> ■ Caustics (sodium hydroxide, potassium hydroxide) ■ Detergents / surfactants 	<ul style="list-style-type: none"> ■ Nitric acid for stainless steel passivation where chlorine attack could be expected ■ Inorganic acids (phosphoric acid) ■ Weak organic acids
Note: Alcohols (isopropylalcohol, ethanol)		
Examples of chemical cleaning agents suitable for ACO stainless steel drainage	Standard chemical agents used for floor cleaning should be sufficient (should be validated) Oxofoam, Endorochlor (Diversey)	<ul style="list-style-type: none"> ■ Acifoam (Diversey) ■ Acigel (Diversey) ■ Super Dilac (Diversey)
Note: Chlorine tablets (Suma Tab D4 by Diversey) are often added to the water in foul trap in microbial sensitive production area's		

Any cleaning procedures, including those recommended by equipment suppliers, must be properly validated at the equipment, where it will be applied and on the soil that could be expected even after certain time of usage.

Always follow manufacturer's instructions to avoid damage to the equipment.