Dairy Food Safety
VICTORIA

Hygienic design:
guidelines for dairy food manufacturing premises

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Introduction

The construction and layout of your manufacturing premises is critical in ensuring the safety of dairy foods.

Failure to adequately plan and construct a premises that meets hygienic requirements may result in persistent microbial contamination that is challenging to remove or manage. Poorly designed premises that are difficult to clean are more likely to harbour foodborne pathogens such as *Listeria monocytogenes* and *Salmonella* which can subsequently contaminate product.

This document outlines practical hygienic design considerations for both premises and equipment to assist potential and existing dairy manufacturers plan and develop premises both fit for purpose and compliant with regulatory licensing requirements.

This guideline will help businesses achieve compliance with Standard 3.2.3 – Food Premises and Equipment of the Australia New Zealand Food Standards Code and support the production of safe and suitable food.

As part of the licensing process, Dairy Food Safety Victoria will undertake a review of your site to ensure your premises and equipment:

- are fit for purpose
- are in a good state of repair
- are able to be cleaned and sanitised effectively
- comply with legislation.

Australia New Zealand Food Standards Code – Standard 3.2.3

The objective of this standard is to ensure that the construction and layout of premises, fixtures, fittings, and equipment minimises opportunities for food contamination, and all can be easily cleaned and sanitised.

This guideline follows the format of Standard 3.2.3, focusing specifically on the sections relevant to dairy manufacturing businesses. It provides guidance on how each clause can be implemented in a dairy premises.

Requirements for export

If you intend to export dairy food, your business must also be registered with the Commonwealth Department of Agriculture, Water and Environment and comply with the requirements of in the Export Control (Milk and Milk Products) Orders 2005. There may also be additional importing country requirements.

About this guide

All dairy premises must meet the requirements of Standard 3.2.3 of the Australia New Zealand Food Standards Code.

This guide explains the requirements of Standard 3.2.3, particularly how it relates to dairy manufacturers.

DFSV will inspect your premises prior to issuing a licence to ensure that the premises complies with the Code.

The DFSV **Licensing Site Assessment Checklist - Manufacturing Premises** used for this purpose is included in Appendix 1.

Ensuring that your premises meets the prescribed criteria on this checklist will help you to ensure that the requirements have been met and expedite the licence approval process.

Design and construction

Poorly designed equipment or premises can cause ongoing contamination issues which can be disruptive and expensive to rectify. Therefore, decisions made at the design stage of development can be critical to optimise food safety and reduce the need for future modifications.

Site location is also important. Prospective licensees should consider the potential food safety impacts on their dairy food business from external factors and neighbouring facilities such as dust, pests or offensive odours. Consideration should also be given to the impacts the dairy business may have on neighbouring properties such as odour, truck traffic and noise.

Other requirements that a prospective dairy food business may have to comply with include local council laws, building and planning permits. The onus is on the business to identify relevant regulations and comply with them. A helpful starting point is Business Victoria, a website developed to help small business grow and develop, managed by the Department of Jobs, Precincts and Regions at: www.business.vic.gov.au

The construction should ensure that food safety and hygiene standards can be maintained. Construction materials should be durable under the conditions they will encounter during use and should not pose a risk of contaminating food with microorganisms, chemicals or foreign matter. Importantly, they must be able to be effectively cleaned and sanitised.

It is important to involve key stakeholders in the early stages of planning and design to consider and discuss different perspectives and requirements for hygiene outcomes. This may involve industry experts, consultants, customers, certification bodies, as well as staff from within the business. Plans may be submitted to Dairy Food Safety Victoria to support the granting of a dairy manufacturer licence.

General requirements

Std 3.2.3 Div 2 Clause 3

The design and construction of food premises must be appropriate for the activities for which the premises are used.

Dairy processing activities generally occur in discrete manufacturing areas. Ensuring a one-way flow from unprocessed (e.g. raw) product receipt through the various processing operations to final storage and dispatch is a good means of minimising the potential for cross contamination (Figure 1).

The design should also address the level of risk of potential contamination posed by the different processing areas. Classifying the various production stages into low/medium/high categories can help achieve the level of control required to effectively manage the hazards identified at each stage. This will influence where controls such as air locks, footbaths, protective clothing change requirements, personnel access and security should be included in the plan (see Figure 1).

Selection of the appropriate construction standards, materials, building finish and services will generally be determined by:

- the degree to which *product or packaging* will be exposed
- the degree to which *the production environment* will be exposed to chemicals, moisture, temperature or product e.g. spillage or processing by-products.

For example, in a wet manufacturing area such as in cheesemaking, where product is exposed, a high standard is warranted for the building finishes and services, including good drainage and ventilation. By contrast, a lower-level standard for flooring and finishes may be adequate in a dry packaged goods storage area.

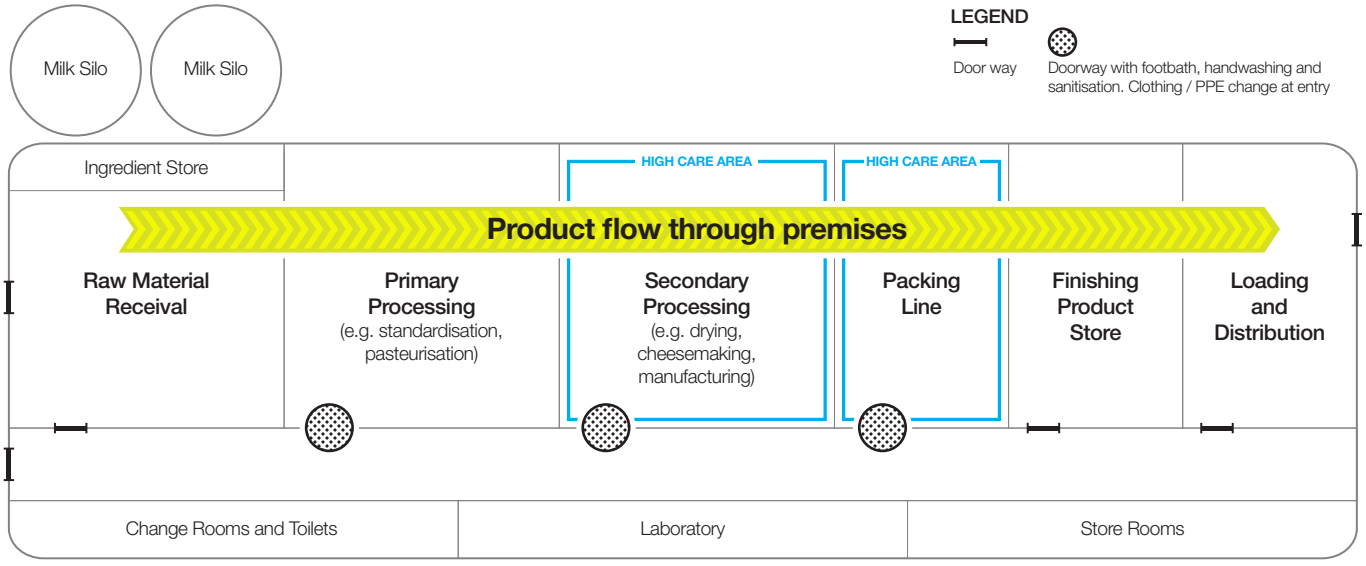
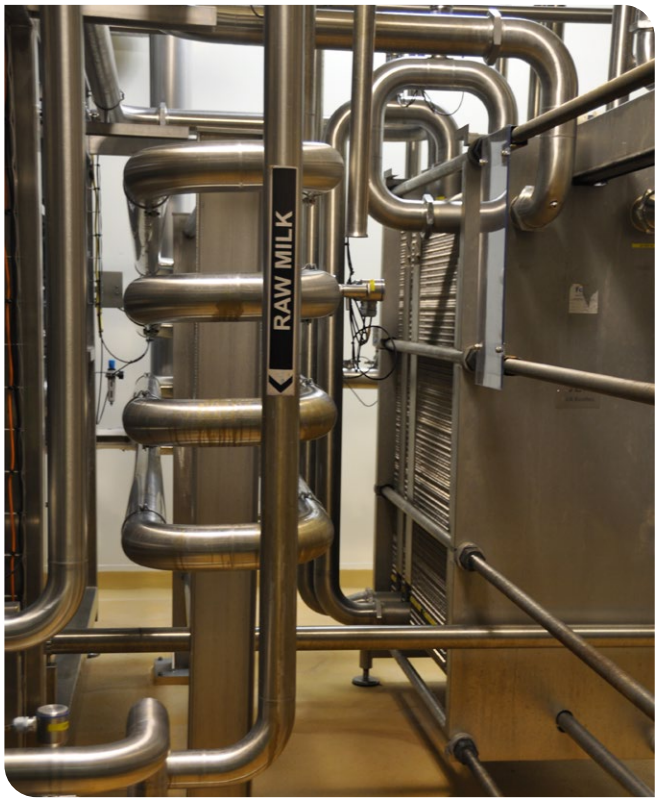


Figure 1: Example of plant design concept with one-way product flow



Adequate space

Std 3.2.3
Div 2
Clause 3

The design and construction must provide adequate space for the activities to be conducted on the food premises, and for the fixtures, fittings and equipment used for those activities.

To meet the requirements of this clause, consideration should be given in the planning stage to factors such as:

- delivery of incoming goods and services
- segregated/secure storage e.g. for allergens and chemicals
- staff changing facilities and toilets
- a safe and ergonomic working environment for operators
- transfer of equipment, ingredients and finished goods between areas
- sufficient and safe access to dismantle, clean and sanitise equipment
- sufficient and safe access for equipment maintenance
- space for potential operation expansion and access for future upgrades
- storage and dispatch of outgoing products
- site security.

Cleanability

Std 3.2.3
Div 2
Clause 3

The design and construction must permit the food premises to be effectively cleaned and, if necessary, sanitised.

The design, layout and type of food contact materials in your premises can directly impact the success of cleaning and sanitation operations. Within the dairy industry, a wide range of products are made using distinctly different processing operations. These may generate a variety of soils that need to be removed from the manufacturing environment. Cleaning regimes can vary widely. Automated cleaning-in-place (CIP) systems are commonly used in dairy processing, however many will still require some degree of dismantling and manual cleaning and sanitising to prevent biofilm development and potential microbial contamination. It is also important to be aware of the corrosive effect that cleaning chemicals (often used at hot temperatures), can have on both food contact surfaces and the processing environment.

The Cleaning and Sanitising Program should be documented as part of the company's food safety program. It should include details of what requires cleaning and sanitising, how it is cleaned and the frequency of the task.

Australian Standard AS 4709-2001 *Guide to Cleaning and Sanitising of Plant and Equipment in the Food Industry* provides additional information and guidance on this subject. Refer also to the DFSV Technical information note *Cleaning and sanitising in the dairy industry*.

Contaminants

Std 3.2.3 Div 2 Clause 3

The design and construction must, to the extent that is practicable, exclude dirt, dust, fumes, smoke and other contaminants.

The exclusion of contaminants such as microorganisms, chemicals and foreign matter from the food processing environment can be addressed by control measures such as:

- careful management of staff and equipment movement through the premises
- segregation of chemicals from food and ingredients
- effective sealing of production areas and buildings
- protection of exposed product from potential overhead contamination (e.g. covers and lids)
- use of air locks to control and manage potential contamination of production areas from external environments
- internal positive pressure filtered air
- clothing change areas
- footwear exchange areas e.g. 'step-over benches' or doorway entry footwear sanitising systems
- handwashing/sanitising stations
- 'high-care' personnel washing/changing areas
- high velocity air shower devices for personnel clothing.

Pests

Std 3.2.3 Div 2 Clause 3

Design and construction, to the extent that is practicable, must not permit the entry and harbourage of pests.

Food processing buildings need to be effectively sealed to prevent pest entry. The type of pests found on a site may vary according to location. For example, sites in rural locations may need to control additional or different pests to those in urban areas. Pest control requirements may need to be adapted to seasonal conditions, or other environmental conditions such as nearby construction zones.

In addition to the control measures listed above, the following strategies can be used to limit access and breeding opportunities for pests:

- rapid roller doors or self-closing doors
- rubber seals or bristle strips on doors
- plastic strip curtains
- fly screens
- bird deterrents.

Professional pest control companies can provide tailored advice and pest control programs. Refer also to the DFSV Technical information note *Introduction to pest control programs.*

Water supply

Std 3.2.3 Div 2 Clause 4

Food premises must have an adequate supply of potable water

Water used in a food production facility must be potable (fit for human consumption), and the volume, pressure and temperatures sufficient to cover the demands of the operations during peak loads.

Where water is not sourced from a treated (reticulated) supply, and is instead sourced from rivers, dams, bores or rainwater tanks, it needs to be effectively treated, stored and tested to ensure it is potable. Treatment systems utilising chlorination, UV light, and ozonation are available options for generating potable water and need to be monitored and maintained regularly to be effective. Suitable materials for water storage vessels include galvanized steel, fibreglass, food-grade plastic and concrete.

Hot water is required for cleaning, handwashing, processing heat treatments and some sanitizing procedures. Culinary standard boiler water additives suitable for food applications should be used where steam comes in direct contact with product. Plant design incorporating steam traps, strainers and condensate traps helps prevent possible product contamination with physical and chemical contaminants originating from the steam system.

Std 3.2.3 Div 2 Clause 4

If a food business demonstrates that the use of non-potable water for a purpose will not adversely affect the safety of the food handled by the business, then non-potable water may be used for that purpose.

Under some circumstances non-potable water may be used outside of manufacturing rooms, such as in boilers, condensers, non-product passes in heat exchangers, outside cleaning and firefighting. Piping and outlets used in these situations will need to be clearly distinguishable from the potable water system. If non-potable water is intended to be used, DFSV should be provided with a plan outlining the use and management of any non-potable water on site.

Refer also to Safe Food Australia - *A guide to the Food Safety Standards* (Standard 3.2.3 *Food premises and equipment – Water supply*)

Sewage and waste water disposal

Std 3.2.3 Div 2 Clause 5

Food premises must have a sewage and waste water disposal system that will effectively dispose of all sewage and waste water and is constructed and located so that there is no likelihood of the sewage and waste water polluting the water supply or contaminating food.

Dairy processing may generate large volumes of effluent such as whey and wash water, which may require further treatment before being discharged to the sewage system. Liquid waste disposal systems should be constructed and located so there is no likelihood of contaminating food or the production environment or polluting the water supply. It should be capable of handling anticipated peak load volumes and possible expansion.

Seeking advice from the local water authority or the Environment Protection Authority Victoria (EPA) on food and oil interceptor requirements is advisable. Note that food and oil interceptors should be installed outside of production areas. Minimising objectionable odours generated from effluent may also need to be considered where relevant.

Storage of garbage and recyclable matter

Std 3.2.3 Div 2 Clause 6

Food premises must have facilities capable of containing the volume and type of wastes, keep them enclosed to prevent pest and animal access, and be easily and effectively cleaned.

All dairy manufacturing businesses should ensure adequate procedures are in place for the handling and storage of solid waste, so it does not pose a risk to product, attract pests, or create a nuisance.

- *Internal* waste bins should be of sufficient capacity and be appropriately sited to prevent cross-contamination
- *External* holding of waste and recyclable material must be of sufficient capacity and be regularly collected
- Internal and external bins should be clearly differentiated, and not used interchangeably
- External waste bins should have close-fitting lids which are kept closed and be regularly cleaned
- Management of external waste storage areas should be actively managed to ensure pests are discouraged (e.g. kept clean and tidy, with regular pickups to avoid overfilling)
- Obsolete equipment should be stored in a manner that does not provide harbourage for pests.

Ventilation

Std 3.2.3 Div 2 Clause 7

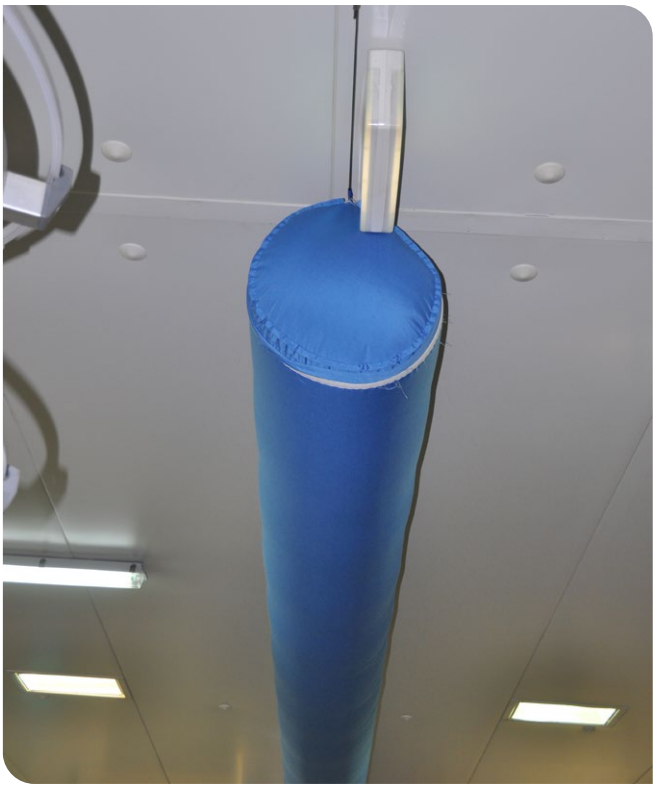
Premises must have sufficient natural or mechanical ventilation to effectively remove fumes, smoke, steam and vapours.

For most dairy manufacturing premises, ventilation systems will serve to minimise condensation on walls and ceilings and maintain a hygienic and comfortable working environment. However, they need to operate in a way that does not contaminate product with extraneous matter or allergens. For example, incorrectly designed ventilation systems may result in air flow that can carry allergen dust or other contaminants into high risk areas.

Building regulations may have specific requirements in regard to ventilation, and technical advice on the suitability and effectiveness of ventilation systems may be necessary. Heating, ventilation and air conditioning (HVAC) design require input from a competent HVAC engineer to meet the needs of the facility and the process. Consideration should be given to steam generation and the resulting potential for condensation resulting in mould issues due to poor ventilation.

Specific features of ventilation systems to be considered for dairy manufacturing premises include:

- weather and pest-proofing of air inlets and outlets
- direction of prevailing winds
- effective sealing of all openings, and the use of air locks
- whether incoming air requires filtration
- selection of a purified, recycled air flow, or a once-through system



- minimum distance of separation between air inlets and outlets
- the types, effectiveness and maintenance of air filters
- the appropriate number of air changes per hour
- design, fabrication and routing of the ducting used in air transfer
- air flow over exposed product
- location of exhaust fans in ‘high-load’ areas of production
- minimisation of wet floors, open drains and, where practicable, isolation of open processes that emit large amounts of heat or moisture into the air.

Unfiltered air or negative air pressure drawing air into processing areas where product is exposed can cause microbiological product contamination. Exhaust fans used to remove air, such as in areas of high humidity, may create a negative air pressure within the facility. In this situation, whenever an outside door or window is opened, the incoming air may contain moisture, dust, chemicals, bacteria, mould, insects, off odours and other debris that may contaminate food and food contact surfaces.

Positive air pressure is often used to prevent the ingress of airborne contaminants into processing areas, particularly critical high-care or product packing areas. Important consideration for these environments include:

- volume (proportion) of supply air exceeding the exhaust air capacity under operational conditions e.g. >20%
- internal pressure to be maintained e.g. >50 pascals.

Humidity, temperature control and air flow are critical issues in cheese maturation rooms. Specialist systems and expertise may be required to achieve the optimal balance of these factors.

Lighting

Std 3.2.3
Div 2
Clause 8

Natural or artificial light provided must be sufficient for the activities conducted by the business.

The amount of light needed for food processing operations depends on the functions being performed. In general, the more critical an operation the greater the required light intensity to support efficient and safe operations.

The amount of light that should be available in a workplace environment is outlined in Australian Standard AS 1680.1-2006 *Interior and workplace lighting: Part 1 General principles and recommendations*. Manufacturers may also need to obtain technical expertise in calculating lighting requirements and to comply with building regulation energy efficiency provisions.

The type of lights, their location and installation are also important. To minimise the possibility of food becoming contaminated with broken glass from light globes, light fittings should be enclosed, or shatterproof lamps used. All internal lights should be recessed flush with the ceiling or wall wherever possible to ensure smooth, easily cleanable surfaces with minimal gaps or joins.

Outdoor lighting may attract pests, especially when located near building entrances. Consideration should be given to the type of lighting selected for these areas.

Floors, walls and ceilings

Floors

Std 3.2.3
Div 3
Clause 10

Floors must be designed and constructed in a way that is appropriate for the activities conducted on the food premises.

The selection of flooring materials is a critical factor in the design of dairy manufacturing premises. Floors need to withstand the rigours and stresses of manufacturing operations to minimise the likelihood of environmental contamination of product. If not, a business will likely need to commit significant time, energy and (financial) resources into the upkeep and frequent maintenance of flooring on an ongoing basis.

Floors should be:

- suited to the operating environment e.g. robust material and with long term durability and non-slip properties
- able to be effectively cleaned
- unable to absorb grease, food particles or water
- laid so that they drain effectively to prevent ponding of water
- unable to provide harbourage for pests and microorganisms, to the extent practicable.

Further information on flooring is provided in Appendix 1. Australian Standard AS 4674-2004: *Design, construction and fit-out of food premises* also provides information on the suitability of floor finishes.

Internal drainage

Depending on the premises and the intended activities, an appropriate and effective internal drainage system is vitally important. Once in place it cannot be easily altered. Drains are a potential source of contamination as almost anything present in the manufacturing environment will end up in the system.

Ineffective drainage can result in pooled water and excessive moisture in production areas. Environmental pathogens such as *Listeria monocytogenes* can proliferate in such moist environments, particularly in areas such as floor cracks, joints and drains, where product residues can provide a nutrient source. If *Listeria monocytogenes* becomes established, it is very difficult to remove and these areas can become ongoing sources of contamination in the production area. Pooled water in these areas can act a means of spreading the organism throughout the plant, for example via trolley wheels or human traffic.

Drains should:

- flow from a higher hygiene area to a lower hygiene area, i.e. from packaged product to raw milk receival
- be of a smooth and impermeable construction, have sufficient capacity and fall, and be easily cleaned and maintained
- be made of suitable materials, considering the corrosive nature of dairy effluent e.g. hot whey or cleaning chemicals
- have channels and outlets positioned to minimise the flow of wastewater across the floor, preferably parallel and near (but no closer than 12 cm) to the wall
- with underground grid-type drainage systems, have a drain located in the centre of each ‘square’ (usually by dividing the floor into a series of six metre squares)
- have collection points away from packaging areas, and not be inaccessible due to equipment located over them
- have a fitted straining device that can be easily removed for cleaning, in conjunction with a water seal
- Where minimal waste liquid volumes are generated, an above-floor drainage system may be a suitable option.

Walls and ceilings

Std 3.2.3
Div 3
Clause 11

Walls and ceilings must be designed and constructed in a way appropriate for the activities conducted on the premises.

Materials used in construction and finish of walls and ceilings may vary depending on the risks of food or environment contamination within the different areas of the factory e.g. wet versus dry processing or exposed versus packaged product.

Factors to consider with respect to the finish of walls and floors in food processing areas include:

- use of solid materials (including sandwich panelling) to prevent vermin access
- use of approved non-toxic materials
- the likelihood of surfaces being subjected to heat, condensation, product splashing
- cleaning methods e.g. wet or dry, hot or cold water, water pressure, and chemicals used
- ability to withstand possible impact from equipment such as trolleys
- any regulatory building code requirements, such as minimum floor to ceiling height
- ease of maintenance and replacement
- a ceiling slope e.g. 1:20 to assist air movement in mechanical ventilation
- the fire rating of sandwich panels.

Solid dwarf walls should be used to support sheet walls, such as pre-formed panels e.g. sandwich panels. Coved dwarf walls provide an excellent defence against environmental contamination and should be at least 15 cm high. The junction between the dwarf wall and the wall panelling should be sealed so that moisture and product cannot penetrate the joint or panel.

Coving

Junctions between floors and walls, nibs or plinths are common sources of contamination. The 90-degree angle makes cleaning extremely difficult and any build-up of soil in this area can provide nutrients for growth of bacteria such as *Listeria monocytogenes* in wet areas.

Coving, usually in conjunction with dwarf walls (a low sub-wall, used to support sheet walls such as sandwich panel), presents a protective and easily cleanable surface of this floor/wall intersection. However, use of materials such as aluminium strip coving attached and sealed with silicone can lead to environmental contamination problems once moisture gains access into the hollow cavity.

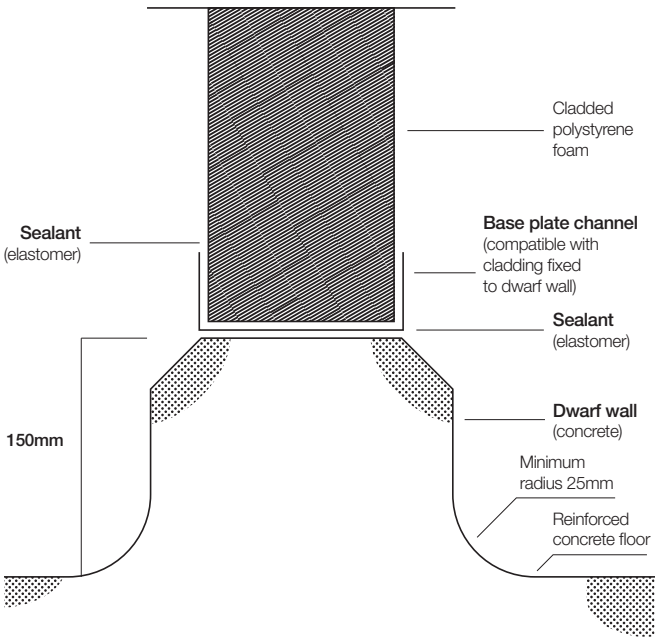


Figure 2: Typical dwarf wall design to support sheet walls in dairy processing areas

Seals

Std 3.2.3
Div 3
Clause 11

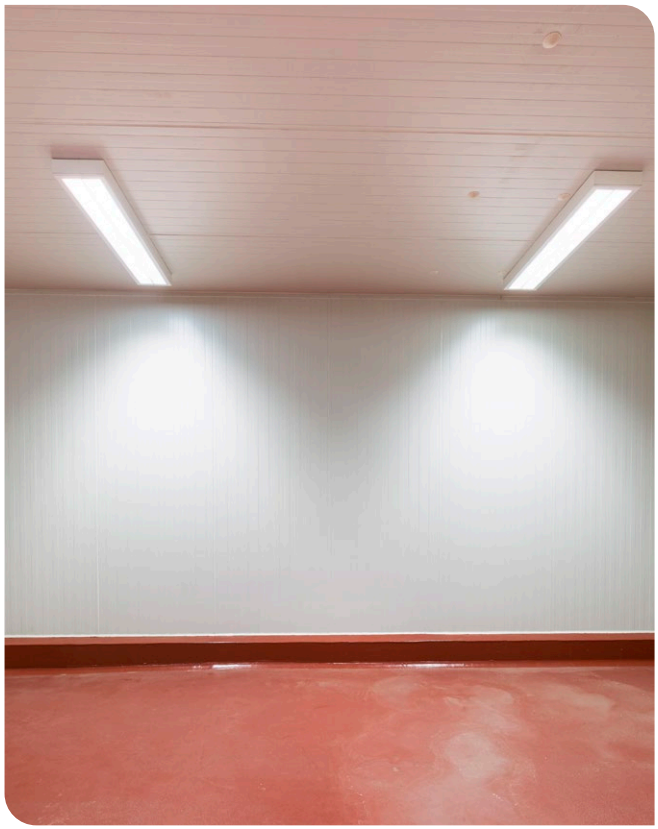
Walls and ceilings must be sealed to prevent entry of dirt, dust and pests.

Air lock access, with self-closing doors, is recommended into any food production area. Doors should be of rigid construction, impervious to moisture, and effective in minimising external contaminants. When a door is made of wood, a full width kick-plate will help resist damage and an impervious coating will make it easy to clean. Where practicable, door jambs should have vertical corners protected e.g. from trolleys, crates etc, and frames finished flush with the wall. Internal doors should be used to separate manufacturing and non-manufacturing sections, and may be constructed of heavy plastic, rubber or other suitable materials. All doors leading to production areas including emergency exit one-way doors **must** be effectively sealed to facilitate pest control.

Windows should be non-opening in any room where product is manufactured, packed or stored in an exposed condition, and located where the chance of any impact with the glass is unlikely. Glass used in windows may need to comply with a minimum thickness under building code requirements.

Openable windows used in other areas should be close-fitting with insect screens fitted.

Any wall openings, such as for pipelines or services, should be effectively flashed flush with the wall.



Cleanability

Std 3.2.3
Div 3
Clause 11

Walls and ceilings must be unable to absorb grease, food particles or water, be easily and effectively cleaned and not provide harbourage for pests.

The surface and finish of walls and ceilings should be smooth and impervious, effectively sealed and be able to withstand the rigours of cleaning over time. This includes resistance to corrosion and flaking which may result in product contamination. The finish should be light coloured to help visually assess cleanliness.

Minimising the need to attach pipes, cables and shelves to walls will facilitate ease of cleaning and discourage pest harbourage.

Sloping of ledges or sills, particularly in powder processing operations, at a 45-degree angle will help to minimise dust accumulation.

Ensuring above-ceiling areas are accessible, preferably from outside the production area, will enable pest control and services access.

Fixtures, fittings and equipment

General requirements

Std 3.2.3
Div 4
Clause 12

Fixtures, fittings and equipment must be designed, constructed, located and installed so that there is no likelihood they will cause food contamination, be fit for their intended use, and be easily and effectively cleaned.

Examples of where a business can ensure that all sources of potential contamination are identified and being controlled include:

- dead ends in pipework that prevent adequate cleaning
- hollow box sections e.g. equipment frames that can trap residues and contaminants
- hollow rollers used in conveyors
- falling components e.g. loose bolts/nuts over a filling machine
- dripping/spraying liquid product or lubricants
- uncovered food product
- soil or product build-ups
- inaccessible inspection hatches
- cross-contamination of processed product from raw product or allergens.

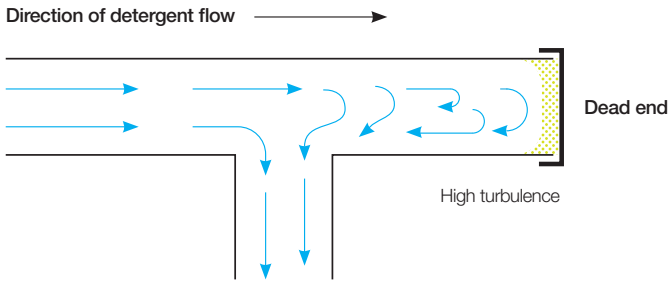


Figure 3a: Superior direction of flow resulting in effective cleaning

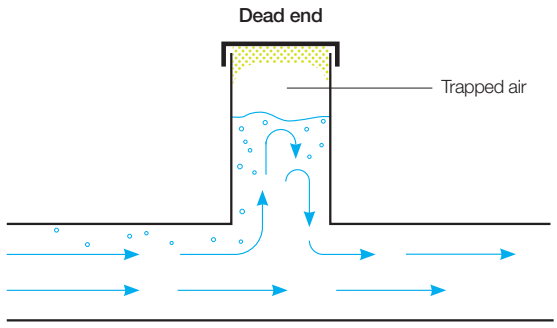


Figure 3b: Inferior direction of flow resulting in poor cleaning

'Clean' is defined as a state that can be assessed physically by sight, touch and smell. Examples of common methods used to verify cleanliness are protein, ATP or microbial swabs. There should be suitable cleaning and sanitising procedures in place for all items of equipment. Documentation of the cleaning and sanitising program, including what is covered and how it is done, will form part of every company's food safety program.

Cleanability

Std 3.2.3
Div 4
Clause 12

Fixtures, fittings and equipment must allow for adjacent floors, walls, ceilings and other surfaces to be easily and effectively cleaned.

Allowing sufficient space between equipment and walls and between items of processing equipment will allow for safe and easy cleaning and inspection. Likewise, adequate clearance between the base of equipment items and the floor, should be allowed for cleaning. Placing equipment on wheels will improve accessibility to both equipment and the surrounding floors and walls. Note that wheels on mobile equipment can harbour and spread microbial contamination, so should be included in the equipment cleaning program.

Contaminants

Std 3.2.3 Div 4 Clause 12

Where there is a likelihood they would cause food contamination, ensure food contact surfaces are made of material that will not contaminate food, are unable to absorb grease, food particles and water, and be effectively cleaned and sanitised.

To meet this requirement, all food contact surfaces should be:

- non-absorbent
- smooth (free of pits, cracks, and crevices)
- non-toxic and unaffected by food products or ingredients
- capable of withstanding repeated cleaning
- constructed of materials classified as 'food grade'.

Stainless steel is commonly used as a food contact surface in the dairy industry. Stainless steel is a class of corrosion resistant alloy steels containing at least 10.5% chromium. Resistance to attack is due to the naturally occurring chromium-rich oxide film formed on the surface of the steel.

There are various grades and surface finishes of stainless steel to suit the conditions the steel must withstand. Stainless steel used in food containers, pipework, and food contact equipment is predominantly 304 or 316 type austenitic stainless steels. The key difference between these two metals is that 316 contains molybdenum – an alloy which enhances corrosion resistance, especially in more saline or chlorine-exposed environments.

Selection of the appropriate grade of stainless steel will depend on the application, such as exposure to low pH products and the types of cleaning and sanitising agents used. The stainless steel surface should be finished to an Ra value (surface roughness measure) of <1.0 µm. All welds should also have a smooth finish. Smooth surfaces promote efficient and effective cleaning and reduce the rate of corrosion. Cracks and crevices provide niches for harbourage of bacteria.

Plastics and rubber compounds can be used for a wide range of purposes e.g. seals and gaskets. They should be made of suitable food grade materials and be cleanable and durable under the conditions of use.

Wood is generally not acceptable as a food contact surface as it can be difficult to clean and disinfect and may shed splinters. One exception, however, is for the storage and maturation of cheese, provided the timber is not chemically treated, and the surface is smooth and well maintained.

Effective cleaning can be performed by either dry, manual, or cleaning-in-place (CIP) methods, or a combination of these. CIP installations can vary widely from basic to complex automated systems.

Hand washing facilities

Std 3.2.3 Div 4 Clause 14

Designated and appropriate hand washing facilities must be available and accessible for food handlers.

Food premises must have hand washing facilities that are:

- easily accessed by food handlers
- immediately adjacent to toilets
- permanent fixtures
- provided with a supply of warm running potable water
- of a size that allows easy and effective hand washing, and
- clearly designated for the sole purposes of washing hands.

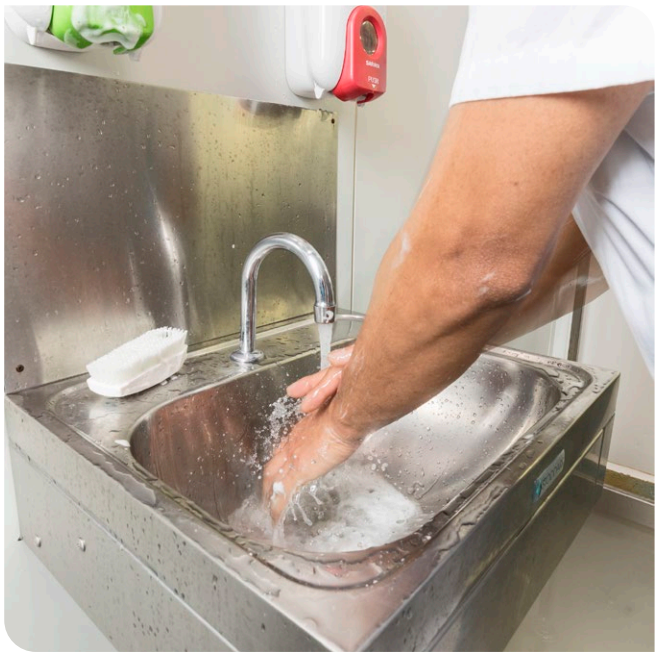
Stations for hand washing, drying and sanitising should ideally be provided at all entry points into manufacturing areas, as well as adjacent to toilets. The use of hands-free taps, for example electronic or elbow or knee operated, will reduce microbial cross-contamination. Solid soap should be avoided as it can be a source of contamination.

It may be necessary to install a number of handwashing facilities throughout the premises depending on:

- the size of the business
- the number and location of food handlers and activities
- premises layout.

Waste from sinks should be plumbed to a drain.

The transmission of bacteria is more likely to occur from wet skin, so effective hand drying after washing is essential. Options available include single use paper towels, warm air dryers or high-speed jet air driers. The method selected should effectively dry hands and minimise the dispersal of organisms through aerosol production.



Storage facilities

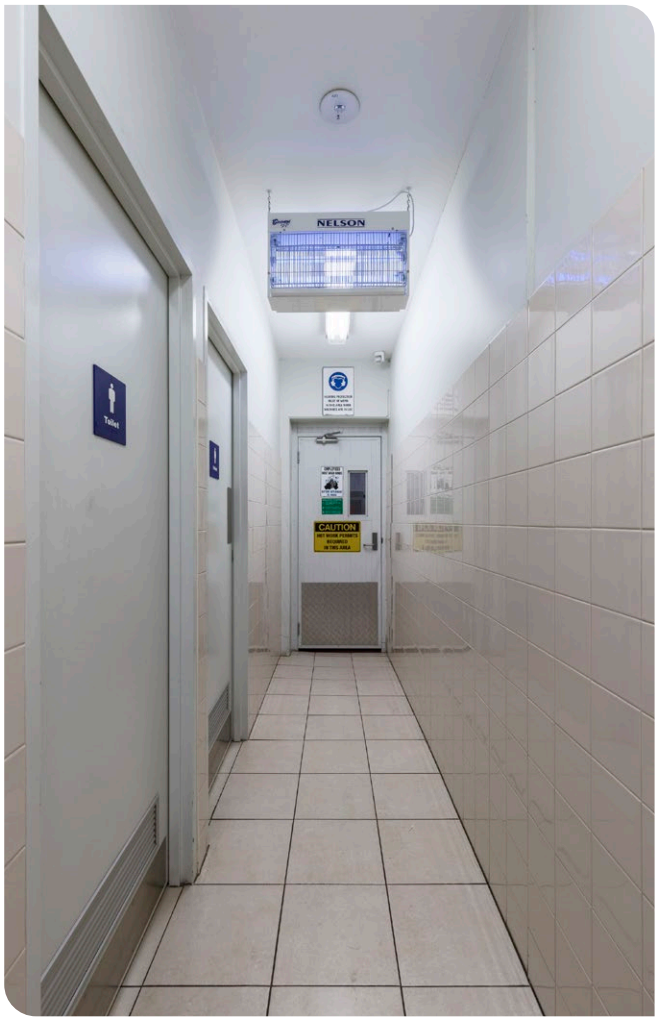
Std 3.2.3
Div 5
Clause 15

Premises must have adequate storage facilities or items that are likely to be the source of contamination, including chemicals, clothing and personal belongings, and be located where there is no likelihood of contaminating food or food contact surfaces.

Provision should be made for safe and separate storage areas for chemicals such as detergents, sanitisers, water treatment chemicals, ingredients containing allergens and pest control agents. Any cleaning equipment should be stored in a location and manner that will prevent cross-contamination of clean surfaces, such as dedicated storage rooms or cabinets.

Other regulations may need to be complied with, for example WorkSafe Victoria for chemical storage and EPA Victoria for chemical containment (bunding) or effluent disposal.

Consider where and how staff entering production areas can change into protective clothing prior to entry and store clothing and personal belongings. Storage space for clean and soiled protective clothing may also be required. Lockers or lidded tubs are ideal for these purposes.



Toilet facilities

Std 3.2.3
Div 5
Clause 16

Adequate toilets must be available for the use of food handlers.

Toilets should be designed, located and maintained so that they are easily accessible for employees to use when required. Further aspects to consider in meeting the term ‘adequate toilets’ include:

- location to ensure separation from, and not opening directly into, any areas where food is manufactured, handled or stored e.g. a ventilated intervening space or vestibule with close fitting and self-closing solid doors
- adequate ventilation, with the exhaust into a suitable environment
- suitable for the anticipated number of employees
- provision of hand washing facilities as described above
- accessibility e.g. during working hours and within a reasonable distance from work/staff facilities areas
- Refer to current building regulations to determine exact requirements.

Food transport vehicles

Std 3.2.3 Div 5 Clause 17

Food transport vehicles must be designed and constructed to protect food from contamination during transport and to ensure they can be effectively cleaned and (if necessary) sanitised.

Food transport vehicles used by the business must be designed and constructed in such a way that protects the food from contamination. Vehicle compartments must be able to be effectively cleaned and withstand the temperatures and chemicals used in the process. Any surfaces which may contact food directly, such as liquid milk products, must also be able to be sanitised.

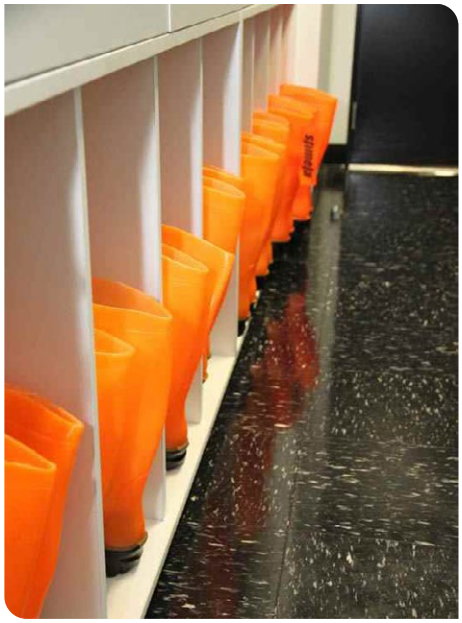
Dairy products ready for sale will be protected by packaging, however consideration should be given to whether the design or state of the vehicle may contribute to possible cross-contamination through damage to the packaging. Examples include dripping water from poorly maintained refrigeration units, or spillage of chemicals, dust or fumes. The presence of odours in the vehicle may result in taints. Vehicles designed with separate compartments to segregate different products can reduce the risk of this occurring.

Vehicles transporting unpackaged food, such as liquid milk, should have compartments designed and constructed that enable them to be cleaned and sanitised to the highest standard.

Next steps

Planning and building a dairy manufacturing facility can be complex and requires a considerable input of time, effort and resources to produce a premises that will be fit for purpose.

As part of the licensing process DFSV will undertake a site assessment against the provisions of Standard 3.2.3 using the checklist provided in Appendix 1. Applicants are invited to use this to conduct their own self-assessment, which may assist to expedite the licence approval process.



Appendix 1:

DFSV Licensing Site Assessment Checklist – Manufacturing Premises

Clause Requirement under Standard 3.2.3

Division 2 – Design and construction of food premises		
3	**General requirements**	✓
	The design and construction of food premises must – a. be appropriate for the activities for which the premises are used.	○
	b. provide adequate space for the activities to be conducted on the food premises and for the fixtures, fittings and equipment used for those activities.	○
	c. permit the food premises to be effectively cleaned and, if necessary, sanitised.	○
	d. to the extent that is practicable – (i) exclude dirt, dust, fumes, smoke and other contaminants; (ii) not permit the entry of pests; and (ii) not provide harbourage for pests.	○
4	**Water supply**	✓
4 (1)	Food premises must have an adequate supply of water if water is to be used at the food premises for any of the activities conducted on the food premises.	○
4 (2)	Subject to subclause (3), a food business must use potable water for all activities that is water that are conducted on the food premises.	○
4 (3)	If a food business demonstrates that the use of non-potable water for a purpose will not adversely affect the safety of the food handled by the food business, the food business may use non-potable water for that purpose.	○
5	**Sewerage and waste water disposal**	✓
	Food premises must have a sewage and waste water disposal system that – a. will effectively dispose of all sewage and waste water.	○
	b. is constructed and located so that there is no likelihood of the sewage and waste water polluting the water supply or contaminating food.	○
6	**Storage of garbage and recyclable matter**	✓
	Food premises must have facilities for the storage of garbage and recyclable matter that – a. adequately contain the volume and type of garbage and recyclable matter on the food premises.	○

	b. enclose the garbage or recyclable matter, if this is necessary to keep pests and animals away from it; and	◯
	c. are designed and constructed so that they may be easily and effectively cleaned.	◯
7	**Ventilation**	✓
	Food premises must have sufficient natural or mechanical ventilation to effectively remove fumes, smoke, steam and vapours from the food premises.	◯
8	**Lighting**	✓
	Food premises must have a lighting system that provides sufficient natural or artificial light for the activities conducted on the food premises.	◯
Division 3 – Floors, walls and ceilings		
10	**Floors**	✓
10 (1)	Floors must be designed and constructed in a way that is appropriate for the activities conducted on the food premises.	◯
10 (2)	Subject to subclause (3), floors must – a. be able to be effectively cleaned;	◯
	b. be unable to absorb grease, food particles or water;	◯
	c. be laid so that there is no ponding of water; and	◯
	d. to the extent that is practicable, be unable to provide harbourage for pests.	◯
11	**Walls and ceilings**	✓
11 (1)	Walls and ceilings must be designed and constructed in a way that is appropriate for the activities conducted on the food premises.	◯
11 (2)	Walls and ceilings must be provided where they are necessary to protect food from contamination.	◯
11 (3)	Walls and ceilings provided in accordance with subclause (2) must be – a. sealed to prevent the entry of dirt, dust and pests;	◯
	b. unable to absorb grease, food particles or water; and	◯
	c. able to be easily and effectively cleaned.	◯

11 (4)	Walls and ceilings must – a. be able to be effectively cleaned; and	○
	b. to the extent that is practicable, be unable to provide harbourage for pests.	○

Division 4 – Fixtures, fittings and equipment		
12	**General requirements**	✓
12 (1)	Fixtures, fittings and equipment must be – a. adequate for the production of safe and suitable food; and	○
	b. fit for their intended use.	○
12 (2)	Fixtures and fittings must be designed, constructed, located and installed, and equipment must be designed, constructed, located and, if necessary, installed, so that – a. there is no likelihood that they will cause food contamination;	○
	b. they are able to be easily and effectively cleaned;	○
	c. adjacent floors, walls, ceilings and other surfaces are able to be easily and effectively cleaned; and	○
	d. to the extent that is practicable, they do not provide harbourage for pests.	○
12 (3)	The food contact surfaces of fixtures, fittings and equipment must be – a. able to be easily and effectively cleaned and, if necessary, sanitised if there is a likelihood that they will cause food contamination;	○
	b. unable to absorb grease, food particles and water if there is a likelihood that they will cause food contamination; and	○
	c. made of material that will not contaminate food.	○
13	**Connections for specific fixtures, fittings and equipment**	✓
13 (1)	Fixtures, fittings and equipment that use water for food handling or other activities and are designed to be connected to a water supply must be connected to an **adequate supply of water**.	○
13 (2)	Fixtures, fittings and equipment that are designed to be connected to a sewage and waste water disposal system and discharge sewage or waste water must be connected to a sewage and waste water disposal system.	○
13 (3)	Automatic equipment that uses water to sanitise utensils or other equipment must only operate for the purpose of sanitation when the water is at a temperature that will sanitise the utensils or equipment.	○

14	**Hand washing facilities**	✓
14 (1)	Subject to subclause (4), food premises must have hand washing facilities that are located where they can be easily accessed by food handlers – a. within areas where food handlers work if their hands are likely to be a source of contamination of food; and	○
	b. if there are toilets on the food premises – immediately adjacent to the toilets or toilet cubicles.	○
14 (2)	Subject to the following subclauses, hand washing facilities must be – a. permanent fixtures;	○
	b. connected to, or otherwise provided with, a supply of warm running potable water;	○
	c. of a size that allows easy and effective hand washing; and	○
	d. clearly designated for the sole purpose of washing hands, arms and face.	○
Division 5 – Miscellaneous		
15	**Storage facilities**	✓
15 (1)	Food premises must have adequate storage facilities for the storage of items that are likely to be the source of contamination of food, including chemicals, clothing and personal belongings.	○
15 (2)	Storage facilities must be located where there is no likelihood of stored items contaminating food or food contact surfaces.	○
16	**Toilet facilities**	✓
	A food business must ensure that adequate toilets are available for the use of food handlers working for the food business.	○
17	**Food transport vehicles**	✓
17 (1)	Vehicles used to transport food must be designed and constructed to protect food if there is a likelihood of food being contaminated during transport.	○
17 (2)	Parts of vehicles used to transport food must be designed and constructed so that they are able to be effectively cleaned.	○
17 (3)	Food contact surfaces in parts of vehicles used to transport food must be designed and constructed to be effectively cleaned and, if necessary, sanitised.	○

Appendix 2

Floors for dairy manufacturing facilities

Floor surfaces need to be conducive to maintaining a hygienic environment, be durable and provide good traction and personal safety. The selection of an appropriate floor surface is influenced by location within the dairy processing premises. For example, in warehouses and light industrial areas, steel trowelled case-hardened concrete floors are usually acceptable. However, in high traffic areas and wet processing zones, floor surfaces should be impervious, non-absorbent, washable, and allow adequate surface drainage.

The floor finish employed within a dairy processing plant will depend on the operations being carried out in each area, the type of soiling expected, and how the floor will be cleaned.

Things to consider include whether the floor is:

- exposed to high mechanical stress e.g. from trolleys, forklifts or vibrating machinery
- subject to scraping, chipping and abrasion e.g. by pallets, boxes or dismantled equipment
- exposed to milk, whey, hot liquids or heat shock
- exposed to strong chemical solutions
- expected to have foot traffic (will need to be slip resistant)
- required to slope to a drain (a slope of between 1:80 to 1:100 is usually considered satisfactory).

The addition of antimicrobials including nanoparticles such as silver ions to floor surface coatings and grouting are an option that may warrant consideration for controlling microbial growth.

A further consideration is the supporting foundation, as it is critical to ensuring the longevity of the floor, regardless of whether solid tiles, overlays, or coatings are used. It is not only the thickness of concrete that is important. The nature of the surface e.g. porous or otherwise, may necessitate further treatment to optimise adhesion of the overlying floor surface material.

For all floors it is vital to have a maintenance program to ensure immediate repair or patching of any surface damage. Prompt action can prevent water getting under the floor surface, as it may compromise the flooring and make effective repairs difficult.

Floor finish	Features	Considerations	DP	WA	CF	DS
Ceramic tiles*	• Highly durable and excellent for high traffic loads • Relatively expensive and require long duration for installation • Grout that is permeable makes cleaning and sanitising difficult	Epoxy grout finished flush with tiles Grout lines need to be maintained so they don't harbour microbes, dirt, and grease Impact resistance	✓	✓	✓	✓
Quarry tiles	• Machine-made clay or earthenware paving is usually unglazed, highly durable and excellent for high traffic loads • Relatively expensive and require long duration for installation • Grout that is permeable makes cleaning and sanitising difficult	Epoxy grout finished flush with tiles Grout lines need to be maintained – can harbour microbes, dirt, and grease Sealed with a water-based penetrating sealer Impact resistance	✓	✓	✓	✓
Steel trowelled case hardened concrete	• Smooth finishing treatment results in reduced surface absorbency • Not suitable for wet applications unless properly sealed e.g. heavy duty polymer screed	Unsuitable for use in wet areas – porous nature results in absorption of spillages Pressure washing can damage the surface				✓
Stainless steel – slip resistant	• Often used on stairs, raised platforms and decks, and for the construction of drains/drain covers • Durable and good for high traffic loads	Requires welded joints Slip resistance is a challenge for metal surfaces, especially in wet areas	✓	✓	✓	✓
Epoxy resin	• High solids epoxies provide good protection against acids and alkalis – but not against lactic acid • Good adhesion • Fast drying • Withstands abrasive cleaning • Compatible with textured, anti-slip additives • Don't handle cold or thermal shock conditions • Bonds well to prepared concrete	Must be durable and thick enough to create a protective barrier and prevent contaminants permeating to the concrete substrate Epoxy floors are harder, more durable and have a much higher compression strength than polyurethanes	✓	✓	✓	✓

Abbreviations

DP Dairy processing
WA Wet Areas
CF Chillers Freezers
DS Dry Stores

Floor finish	Features	Considerations	DP	WA	CF	DS
Polyurethanes	• Long service life • Good resistance to thermal cycling • Excellent chemical resistance especially to lactic acid • Low odour, seamless, and easy to clean • Fast drying but not recommended for sloped floors • UV stable • Doesn't bond as well to concrete	Be durable and thick enough to create a protective barrier and prevent contaminants permeating to the concrete substrate Polyurethane is softer and more elastic than epoxy resin, making it more resistant to scratching The elasticity makes it suitable for freezers where storage temperatures may reach -30°C	✓	✓	✓	✓
Poly vinyl sheet	• Long lasting, durable, hygienic, easy to clean and often recyclable • Lightweight • Economical	Requires heat welded joints Easily damaged by impact Not suited to heavy traffic Can be slippery when wet	✓		✓	✓
Laminated thermosetting plastic sheeting	• Cures when heated into durable and heat resistant materials • Long lasting, hygienic, easy to clean • Lightweight • Economical	Requires heat welded joints Easily damaged by impact Not suited to heavy traffic Can be slippery when wet	✓		✓	✓

* Australian Standard (AS 4674-2004 *Construction and fit out of food premises*) requires that ceramic floor tiles be epoxy grouted. Further guidance is provided in AS 3958.1—2007 *Ceramic tiles, Part 1: Guide to the installation of ceramic tiles*. Grout width of 2-12mm is considered acceptable for tiles. When selecting a grout, consideration must be made to resistance to continuous or sporadic exposure to chemicals in the plant, plus curing time at the installation temperature, and the ability of the grout to function at the envisaged operating temperatures.

Abbreviations

DP	Dairy processing
WA	Wet Areas
CF	Chillers Freezers
DS	Dry Stores

Glossary

Above-ground drain: a system suitable for some manufacturing sites where low levels of waste water are generated, thereby eliminating the need for floor disruption. The process utilises an internal above-floor collection sump, with waste pumped to an external treatment system before disposal to trade waste.

Aerosol: airborne suspension of extremely fine liquid droplets, which may carry microorganisms and can be widely dispersed.

Air lock: a small room, usually at the entry into processing areas, consisting of two airtight doors in series which do not open simultaneously.

ATP: Adenosine triphosphate (ATP) is a chemical found in all living cells. It is present in all organic matter so testing for ATP is a common method to measure the cleanliness of surfaces.

Bunding: a constructed retaining wall around an area where potentially polluting substances are handled, processed or stored, to contain unintended leakage of material until remedial action can be taken.

Cleaning-in-place: mechanical cleaning, partly or fully automated, requiring little or no disassembly of the processing equipment.

Coving: an uninterrupted concave surface between the floor and wall, or other vertical surfaces.

Culinary standard steam: steam passed through a fine stainless steel filter element, removing 95% of all particles larger than two microns.

Dwarf wall: a low sub-wall, usually not less than 15cm in height, used to support sheet walls such as cladded polystyrene foam (i.e. sandwich panel).

Fixtures and fittings: all non-structural items, distinct from the plant and machinery, that are permanently installed in a building, and normally form part of a food manufacturing business.

Flashing: thin pieces of impervious material installed as a barrier over or around a joint or opening to prevent the passage of water, contaminants or pests into a building.

High-care areas: sensitive areas of a manufacturing facility designed to a standard where higher levels of precaution, such as practices relating to personnel, ingredients, equipment, packaging and environment, are taken to prevent contamination.

High-load areas: for ventilation applications, production areas where high levels of steam, vapour, smoke or fumes are generated.

Kick plate: a metal plate fastened to the bottom of a door to resist damage.

Nib wall: a short section of a wall that juts out from a building's framework.

Plinth: a slab-like block beneath the base of a column or similar supporting structure.

Potable water: water that is fit for human consumption.

Sanitisation: the application of heat, chemicals, or a combination of these or other processes, to a surface to reduce the number of microorganisms.

Soil: Material that contaminates food processing equipment and contact surfaces including fat, protein, scale, burned on food residues.

Step-over bench: a physical barrier defining where entry into a manufacturing area requires a change into protective clothing.

Recommended reading

- Australia New Zealand Food Standards Code: *Standard 3.2.3. Food Premises and Equipment. Division 2 – Design and construction of food premises.* https://www.legislation.gov.au/Details/F2012C00774
- Australian Stainless Steel Development Association. https://www.assda.asn.au
- Australian Standard AS 4709-2001, *Guide to cleaning and sanitizing of plant and equipment in the food industry.*
- Australian Standard AS 4674-2004, *Design, construction and fit-out of food premises.*
- Australian Standard AS 1680.1-2006, *Interior and workplace lighting: Part 1 General principles and recommendations.*
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- Department of Agriculture and Water Resources, *Export Control (Milk and Milk Products) Orders 2005. Schedule 3. Structural requirements.* https://www.legislation.gov.au/Details/F2005L02871
- Environment Protection Authority Victoria. *Licences and approvals.* http://www.epa.vic.gov.au/our-work/licences-and-approvals
- Food Standards Australia New Zealand 2016, Safe Food Australia. *A Guide to the Food Safety Standards.* Third Edition, FSANZ, Canberra. https://www.foodstandards.gov.au/publications/Pages/safefoodaustralia3rd16.aspx
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