

Appendix 6: Cleaning and sanitising surfaces and utensils

This appendix includes information on cleaning and sanitising eating and drinking utensils and food contact surfaces. It is for information only and businesses are not legally obliged (under the food safety standards) to clean and sanitise at the temperatures or times specified below.

Cleaning and sanitising are separate procedures, and sanitising is distinct from sterilising.

Cleaning is a process that removes visible contamination such as food waste, dirt and grease from a surface, usually using water and detergent. During the cleaning process, microorganisms will be removed but the cleaning process is not designed to destroy microorganisms.

Sanitising is a process that destroys microorganisms, reducing the numbers present on a surface to a safe level. This is usually achieved by the use of both heat and water, or by specific sanitising chemicals (detergents are generally not sanitisers).

Sterilising is a process designed to destroy all microorganisms including microorganisms that have formed a protective coat (spores). The standards do not require eating and drinking utensils and food contact surfaces to be sterilised.

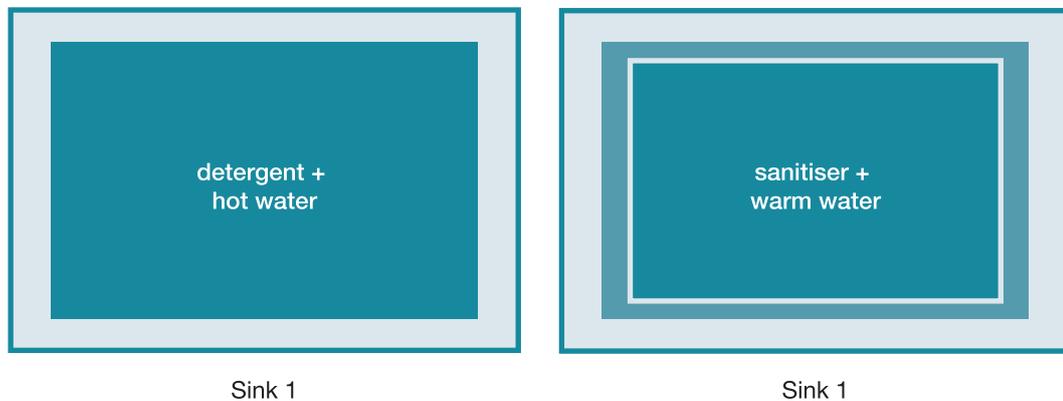
Cleaning and sanitising should usually be done as separate processes. A surface needs to be thoroughly cleaned before it is sanitised, as sanitisers generally do not work well in the presence of food residues and detergents.

The six recommended steps for effective cleaning and sanitising are:

1. Pre-clean: scrape or wipe food scraps and other matter off surfaces and rinse with water.
2. Wash: use hot water and detergent to remove grease and food residue. (Soak if needed.)
3. Rinse: rinse off detergent and any loosened residue.
4. Sanitise: use a sanitiser to destroy remaining microorganisms (refer to manufacturer's instructions).
5. Final rinse: wash off the sanitiser if necessary (refer to manufacturer's instructions).
6. Dry: allow to drip dry or use single use towels.

Cleaning and sanitising can be done manually (e.g. using spray bottles or sinks), or using dishwashers or other specialised equipment, depending on the size and number of items to be cleaned and sanitised. An example of a simple double sink arrangement that may be suitable for small amounts of utensils or small equipment is illustrated below.

Figure: Example of cleaning and sanitising using a double sink. (The 2nd sink could alternatively have water at 77°C or hotter if no sanitiser chemical is used.)



Cleaning

The thorough cleaning of eating and drinking utensils and food contact surfaces is a critical step before sanitising. Food businesses must use a cleaning process that ensures the utensil or food contact surface looks clean, feels clean and smells clean.

Effective cleaning

For effective cleaning, the following factors should be considered:

- Warm to hot water is generally needed — Heated water will help remove grease or fat but the temperature should not be so hot that it bakes food residue onto the surface. For example, 54°C to 60°C has been recommended (Mallman et al 1947) for washing utensils as higher temperatures tend to bake on food residues.
- Detergents should be appropriate for the task — For example, household detergents may suffice for small-scale manual washing, but specialised detergents may be needed depending on the residue to be removed and the equipment being used.
- Detergents containing sanitisers are not required — If such a detergent is used, advice on whether it can clean and sanitise to the required standard should be sought from the manufacturer or supplier.
- The use of a mechanical washer for large volumes of washing up is preferred — Studies have found that mechanical washing is consistently more effective than washing up by hand (e.g. Sigua et al 2011).
- Cleaning without water may be necessary in some situations. Whatever method is used it must achieve the intended outcome: that is, that the utensil or surface looks clean, feels clean and smells clean.

Sanitising

Sanitation of eating and drinking utensils and food contact surfaces should only be done after they have been thoroughly cleaned; otherwise it may not be effective. Sanitising can be achieved through the use of hot water, chemicals or other processes. Some examples are:

- soaking items in very hot water (see below)
- soaking items in diluted bleach (see below)
- saturating items with 70% alcohol
- applying a commercial food-grade sanitiser according to the manufacturer's instructions, with particular attention to the required concentration and contact time.

Effective sanitation

For effective sanitation, the following factors are important:

- All surfaces to be sanitised must be clean, since sanitisers generally do not work well in the presence of food residues or other soil.
- Sanitisers should be used at the correct concentration (too low or too high is not effective) and temperature and for the correct contact time. Ideally, details will be specified by the sanitiser's manufacturer. Using products with informative labels or product specification sheets will enable details of use to be easily checked.
- Some sanitisers require extended contact time to ensure pathogens are reduced to a safe level.
- Diluted sanitisers often have a shorter shelf life than the concentrated form, so this should be checked before use, and a fresh batch made if needed.
- All surfaces to be sanitised should be completely covered with the sanitising solution, using a dip or spray. Special attention should be given to equipment with surfaces that are difficult to get at, such as stab mixers, blenders, meat slicers and can openers. Equipment may need to be dismantled to gain proper access to the surfaces that need to be sanitised.
- After sanitising, utensils and surfaces should be thoroughly dried. If used while still wet, there is a greater chance that they could pick up dirt or other contaminants. Air drying is preferable. If towels are used they should be clean, dry and ideally single use, because if they become contaminated they may then transfer pathogenic microorganisms between items. Tea towels should not be repeatedly used without washing and drying between uses.
- Care should be taken not to re-contaminate sanitised utensils and equipment; for example by ensuring they are packed away with clean hands and stored in a clean and sanitary place.

Hot water

Sanitation using hot water can be achieved manually (e.g. in a sink) or mechanically (e.g. with a dishwasher). The decision to use hot water should consider whether the items to be sanitised can withstand the sanitation temperature and whether the equipment used can produce the intended outcome. Whatever the method used it should be able to sanitise the utensil or surface so that it does not permit the transmission of infectious disease.

Manual sanitation

The method used for manual sanitation needs to ensure that utensils or food contact surfaces are exposed to a time–temperature combination that ensures they are sanitised. For example, the US Food Code 2013 requires utensils and food contact surfaces to be immersed in water at a minimum temperature of 77°C for at least 30 seconds. To achieve this, the sink may need to have a heating element or hot water delivered at a higher temperature. Australian Standard AS 4674-2004 *Design, Construction and Fit-Out of Food Premises* recommends that sinks used for sanitising deliver hot water of at least 80°C.

The water temperature may need to be monitored with a thermometer to confirm it remains hot enough for the whole sanitation period. Care should be taken to avoid scalding hands.

Commercial dishwashers

Businesses may choose to sanitise using a commercial dishwasher or glasswasher. There is no prescribed method for sanitation by dishwasher; however the information below is provided for consideration.

AS 4674-2004 generally recommends that dishwashers and glasswashers:

- are capable of washing and rinsing in one continuous operation
- when used for sanitising:
 - » do not contain brushes
 - » where hot water is used to sanitise, only operate on the sanitising cycle when the water is at sanitising temperature
 - » the water temperature used in the sanitising rinse cycle, combined with the time that the utensils are rinsed in water at that temperature (or a combination of time and temperature in wash, rinse and sanitising rinse and/or drying cycles) is sufficient to ensure that the utensils are sanitised.

International standards that specify temperatures include:

- the US Food Code 2013 and associated standard NSF 3: Commercial Warewashing Equipment (NSF International 2012), which require:
 - » a minimum wash and rinse temperature of 74°C for stationary rack, single temperature dishwashers
 - » minimum 66°–71°C wash temperature and 82°C rinse temperature for other dishwasher types

(a list of certified dishwashers is available at www.nsf.org — search Certified Products and Systems)

- the European standard for commercial dishwashing with one-tank dishwashers (DIN Standard 10512), which requires 60–65°C wash (in the wash water tank) and 80–85°C rinse (in the rinse tank or boiler) where there is no sanitiser chemical used.

Generally, commercial dishwashers should be able to use high temperatures (greater than 80°C) in their sanitation rinse cycles. The program results in the cumulative buildup of heat in the item that affects sanitation. Businesses should use the program that the manufacturer has specified for sanitising. See also Best practice use of dishwashers, below.

It may be useful to monitor the surface temperature of utensils and equipment. The US Food Code requires that the food utensils and equipment being sanitised reach a final **surface** temperature of 71°C if hot water mechanical operations are used for sanitising.

The surface temperature of items in the dishwasher could be checked, for example, using the following methods:

- indicator temperature-sensitive tape applied to items in the dishwasher — these tapes change colour irreversibly once exposed to certain temperatures and can be easily applied to plates or utensils
- a maximum-registering thermometer attached to items with tape or an elastic band
- a laser thermometer directed at items as soon as the dishwasher is finished and opened.

Domestic dishwashers

Domestic dishwashers may be used by small food businesses (e.g. some home-based businesses) where only small volumes of dirty eating and drinking utensils are generated. Domestic dishwashers consistently perform better than washing dishes by hand.

Generally, while domestic dishwashers use lower rinse temperatures than commercial dishwashers, the cycles are longer to compensate for these lower temperatures.

While there is no prescribed method for sanitation with domestic dishwashers specified in the standards, the hottest and longest dishwasher program is recommended (e.g. 'hygienic wash' or equivalent heavy-duty, high-intensity settings). Lighter settings may not reach a hot enough temperature for long enough to sufficiently reduce microorganism levels.

Factors affecting dishwasher effectiveness

A recent Canadian study (Sahai et al 2015) showed that the rinse temperature and amount of food residue on utensils placed in the machine significantly affect the efficacy of domestic dishwasher sanitation:

- hotter rinse temperatures (especially 55°C or above) resulted in fewer bacteria remaining on utensils
- if utensils were 'somewhat' or 'very' soiled before washing, they were less likely to be effectively sanitised due to the presence of food residue protecting bacteria.

For best sanitising outcomes with domestic dishwashers the study recommended that:

- cutlery should be loaded with handles down and utensils and equipment should not nest closely together
- the manufacturer's recommended cycle should be used – e.g. the sanitation setting or heavy duty/ pots and pans cycle (rather than lighter/eco cycles)
- incoming water should be at the temperature specified by the manufacturer for the machine used.

Best-practice use of dishwashers

As with any food handling task, people responsible for using a dishwasher should have and apply the appropriate skills and knowledge. Operators should know how the machine works, what onsite variables affect operation, and what action (e.g. monitoring and maintenance) is needed to ensure its effective operation. Manufacturers' instructions on dishwasher use should be followed, regardless of the type of dishwasher.

Some general best-practice tips include:

- using the correct detergent/ chemical (if applicable) in the washer
- scraping/rinsing off excess food from utensils and crockery before loading
- loading the utensils and crockery to allow space around each item for water to reach their surfaces
- using effective temperatures for both washing and rinsing —the longest, hottest cycle available is recommended (particularly if heat is being used to sanitise: use the program designed by the manufacturer for sanitation), rather than lighter cycles or economy settings
- visually checking that equipment and utensils are clean and dry once the dishwasher is finished
- using clean hands to unpack the items
- cleaning the dishwasher regularly (including filters) and avoiding repeatedly re-using the wash water, to ensure there is no build-up of food residues
- maintaining and servicing the dishwasher regularly and correctly to ensure it is working properly.

Chemical sanitisers

Chemicals may be used to sanitise food utensils and equipment manually or in dishwashers that have been designed for use with chemical sanitisers. The chemicals used should be suitable for use with food contact surfaces and eating utensils (food grade).

Traditionally used chemical sanitisers include chlorine-based compounds (e.g. hypochlorite or bleach), quaternary ammonium compounds, alcohol, iodophors (iodine), organic acids (e.g. peracetic acid) and hydrogen peroxide.

Other chemicals may be just as effective as traditional chemicals if correctly prepared and used. However, alternatives such as vinegar, lemon juice and methylated spirits are not generally recommended unless specific methodology (including concentration, pH, temperature, contact time, etc.) has been validated and verified to be effective. Non-commercial products often do not come with specific instructions for use as sanitisers, and variations in solution strength and application procedures may make these alternatives less effective than commercial sanitisers. Some chemicals may leave residues that taint food.

Disinfectants and cleaning agents designed for use on floors and toilets are generally not suitable for use with food contact surfaces.

Bleach

Bleach (sodium hypochlorite, NaOCl) is one of the most commonly used chemical sanitisers in the food industry. Plain bleach that is free from fragrances and other additives is generally recommended to minimise possible contamination or tainting from added chemicals. The table below lists various bleach dilutions and illustrates how the concentration of bleach required for effective sanitising depends on the temperature of the water. For example, 100 ppm chlorine is generally recommended in cold water (using the 13°C option below) and 50 ppm is effective in warm water. The contact time required may vary depending on the product used (see manufacturer's instructions) but, as a general indication, is about 10–30 seconds. Diluted bleach solutions should be discarded after 24 hours because the active ingredient breaks down and becomes ineffective.

Dilutions of bleach using commercial (10% chlorine) or household bleach (4% chlorine)

Final chlorine concentration required	25 ppm	50 ppm	100 ppm
Minimum water temperature	49°C	38°C	13°C
Volume to add to 10 litres of water	2.5 ml commercial bleach or 6.25 ml household bleach	5 ml commercial bleach or 12.5 ml household bleach	10 ml commercial bleach or 25 ml household bleach

Best-practice use of chemical sanitisers

General points on effective sanitation are provided at the start of this section. To ensure the sanitiser is suitable for use and is used correctly, manufacturer's instructions should always be followed. The user should be sure about:

- what the sanitiser can be used for (whether it is safe to use for the utensils and food contact surfaces the business needs to sanitise)
- what the sanitiser can achieve in destroying microorganisms
- how to correctly use the sanitiser, including dilution rate, exposure/contact time, rinsing and shelf life (of concentrated and diluted solutions).

If instructions are not clearly provided with the product, further advice should be sought from the supplier or manufacturer. Note that the temperature, pH and hardness of the water can all affect a sanitiser's effectiveness (US Food Code 2013). In addition, different brands of sanitisers may vary in the details of how they should be used; for example, what dilution to use or whether rinsing is needed. Some manufacturers may provide kits that can be used to check the concentration of diluted sanitisers.

To avoid microorganisms building up resistance to any one active agent, it is a good idea to regularly change the type of sanitiser used.

Other sanitising methods

Other methods may be used to sanitise eating and drinking utensils and food contact surfaces (e.g. dry steam cleaning, ultraviolet irradiation and microwaving), as long as the business can demonstrate the method is effective.

Cleaning and sanitising procedures and records

A food business should consider every piece of equipment on their premises that needs to be cleaned and sanitised, and develop a plan that includes details on:

- what the equipment is
- how often it should be cleaned and sanitised (dependent on the utensil or equipment; for example 4-hourly may be appropriate for meat and salad slicers or stick blenders, weekly or monthly may be appropriate for ceiling fans)
- how it should be cleaned (e.g. equipment dismantling instructions, detergents to be used, whether soaking is required, dishwasher or hand scrubbing instructions, etc.)
- how it should be sanitised (e.g. chemical sanitiser instructions including dilutions, contact times, rinsing, shelf life of diluted product, etc.)
- personnel responsible for each cleaning and sanitising duty.

This information could be included in a table such as this:

Item/ equipment	How often	Method	Products used	Who	Notes
1. Baine marie	Every day after use	1. Drain water, discard food left in trays. 2. Remove trays and grids. 3. Pre-rinse in warm water. 4. Wash in warm water in sink with detergent and scrubber. Soak if needed. 5. Rinse with clean hot water. 6. Mix 5ml concentrated bleach into 10L warm water in sink. Use gloves and goggles. 7. Soak trays and grids in bleach solution for 10 mins. 8. Wet clean cloth in bleach solution and wipe inside of bain marie. 9. Allow to air dry.	Scourer, detergent, bleach	Kitchen hand (name)	Bleach, detergent, gloves and goggles in cupboard above sink. Double check instructions for using bleach on bottle.

Items that are often forgotten include extraction filters, flues, cool room ceilings, plastic door strips, touch points (switches, handles), refrigerators (inside and outside), toilet doors and ceiling fans.

A monthly roster or checklist listing all the tasks, which days each task needs to be performed, and who is responsible, could be useful for businesses to keep track of cleaning and sanitising. Example templates for cleaning procedures and record keeping are provided in Appendix 8.

Further information

See the Australian Standard AS 4079-2001 *Guide to Cleaning and Sanitizing of Plant and Equipment in the Food Industry* for general principles and how to establish, verify and monitor a cleaning and sanitising program.

See also Jurisdictional websites in Resources and References.