Sanosil disinfectants

Use in CIP procedures

SANOSIL AG., CH- 8634 Hombrechtikon, Schweiz
Tel.: 055 254 00 54, Fax: 055 254 00 59
E-Mail: info@sanosil.com, Internet: www.sanosil.com

Definition of CIP

CIP stands for **c**lean-**i**n-**p**lace, a procedure for *in situ* cleaning of processing facilities, especially in the food and beverage and pharmaceutical industries.
Put simply, transport and production components such as pipes, pumps, tanks, etc. are connected together to form a circuit and a range of cleaning and rinsing solutions are then pumped through this circuit at different temperatures. The aim is to soak, detach and wash out any residues, dirt or deposits.

Simple CIP system with water/alkali/acid tanks, supply pumps, switchover plate and control system.

CIP system design varies depending on requirements for the plant to be cleaned. The nature, duration and temperature of the rinse cycles can vary widely.

CIP system: design 1 (single use)

This is the most common CIP system design. This consists of a water, an alkali and an acid tank. The chemicals/rinsing solutions *used* are mixed, heated (in some cases steam heated) and pumped through the system to be cleaned. The solutions are left in the system to take effect over a defined period, before the contaminated solutions are collected in a neutralisation tank, neutralised and discharged into the waste water system.

Advantage: Simple, inexpensive system design, easy to manage, can be controlled manually, largely fault-free.
Disadvantage: Higher water and chemical consumption means higher operating costs.

Typical cleaning program, e.g. in an ice cream factory:

1. **A:** Prewash the production unit (**D**) with hot water (40–60 °C) to remove gross contamination. Duration: Approx. 1 min; water is discharged directly.
   Temperature: 40–60 °C **Duration:** 1 min

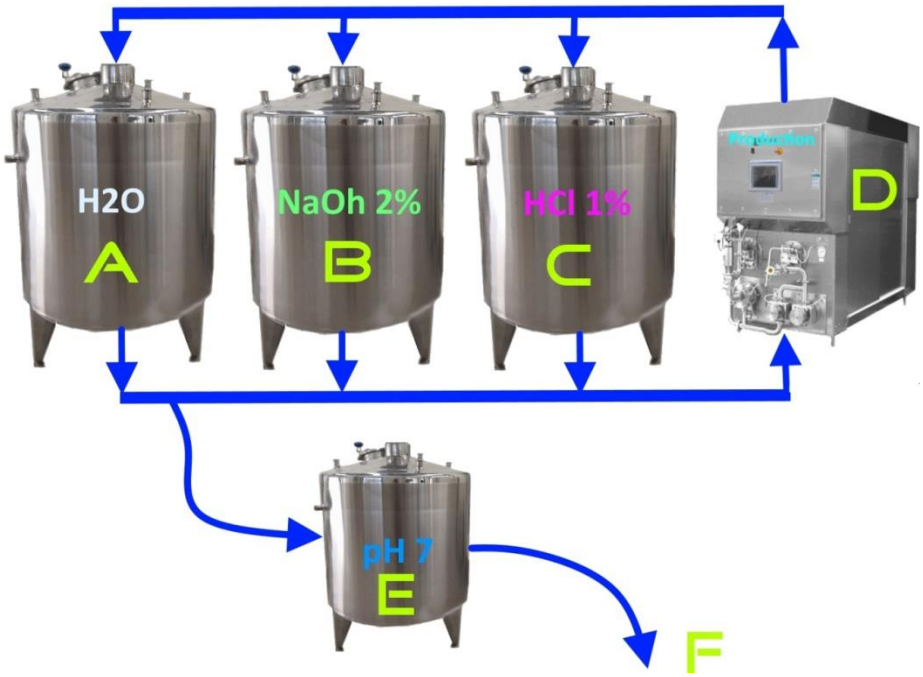
2. **B**: Wash cycle with 2% sodium hydroxide (NaOH) to remove fats and protein residues. Sodium hydroxide also has bactericidal and virucidal properties, but has no effect on yeasts or moulds. The alkali is pumped through the circuit. (In addition to sodium hydroxide, special CIP cleaning agents may also contain sodium hypochlorite, tensides, anti-foaming agents and dispersing agents to keep any dirt particles in suspension.)
   Temperature: 50–70 °C **Duration:** 10–15 min

3. **A**: Interim rinse with water to rinse out the alkali. The alkali is drained off into a neutralisation tank (waste water).
   Temperature: Cold **Duration:** 1 min

4. **C**: Acid wash: To remove limescale and milk stone deposits, acid (e.g. 1% hydrochloric acid) is now pumped through the circuit. C
   Temperature: 50–70 °C **Duration:** 3–10 min

5. **A**: Rinse with clean water A.
   Temperature: 20–70 °C **Duration:** 5–10 min

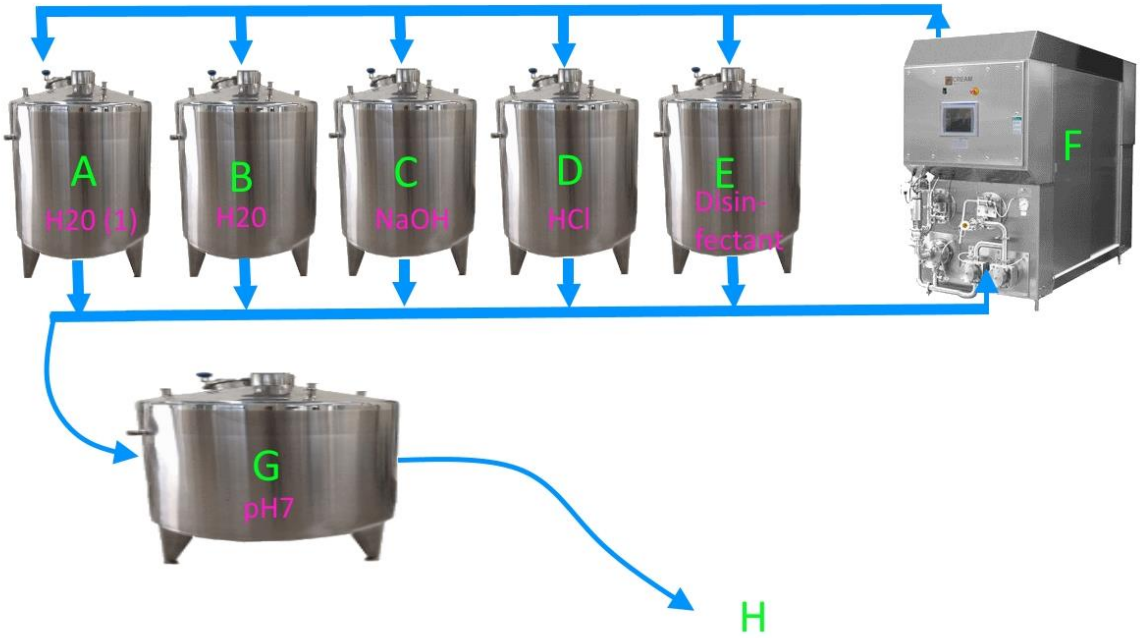
6. **E**: Neutralisation and draining off the waste water. **F**



CIP systems: Design 2 (multi-use) with disinfection step.

More advanced systems use a system of storage and holding tanks, in which most of the used, only lightly contaminated solutions are stored after use and can then be re-used.

Advantage: Saves water, energy (heating) and chemicals.
Disadvantage: More complicated and costly, complex measurement and control systems, so more error-prone.



Typical cleaning program:

1. Prewash the production unit (**F**) with recovered water (40–60 °C) to remove gross contamination. Water is discharged directly. H
   Temperature: 40–60 °C **Duration:** 1 min

2. Wash cycle with 2% sodium hydroxide (NaOH) **C** to remove fats and protein residues. Sodium hydroxide also has bactericidal and virucidal properties, but has no effect on yeasts or moulds. The alkali is pumped through the circuit. (In addition to sodium hydroxide, special CIP cleaning agents may also contain sodium hypochlorite, tensides, anti-foaming agents and dispersing agents to keep any dirt particles in suspension.) Alkali is stored in an alkali holding tank **C** .
   Temperature: 50–70 °C **Duration:** 10–15 min

3. Interim rinse with water to remove the alkali. The alkali is drained off into a neutralisation tank **G** (waste water).
   Temperature: Cold **Duration:** 1 min

4. Acid wash: To remove limescale and milk stone deposits, acid (e.g. 1% hydrochloric acid) is now pumped through the circuit. **D**. Acid is stored in a holding tank **D**.
   Temperature: 50–70 °C **Duration:** 3–10 min

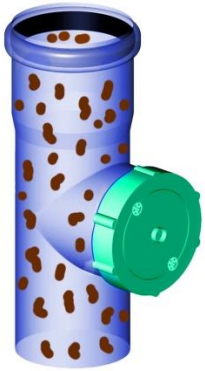
5. Interim rinse with water. This removes the acid, which is drained off into the neutralisation tank **G**.
   Temperature: Cold **Duration:** 1 min

6. Disinfection cycle with disinfectant **E**. Disinfectant is stored in the disinfectant tank.
   Temperature: 20–60 °C **Duration:** 10–20 min

7. Rinse with drinking water. Water is collected in the recovered water tank **A** and used for the next prewash cycle.
   Temperature: 20–70 °C **Duration:** 5–10 min

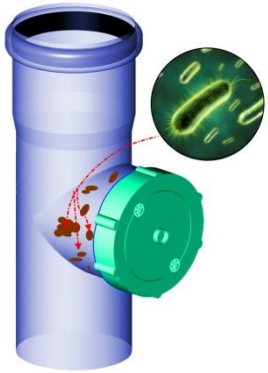
Difficulties: recontamination

If operated correctly, a CIP system can deliver a very high standard of hygiene. Difficulties lurk, however, in the form of blind ends, threaded connectors, T joints and taps. Even where the system is operated correctly, these can harbour dirt residues, allowing colonisation by microorganisms and biofilm formation. A cleaned and disinfected system can be recontaminated from these hot spots, especially when the system is not in use.



T joint with threaded connector Contaminated

T joint with threaded connector following inadequate cleaning



Recolonisation/recontamination of the cleaned system

CIP system - note the many threaded connectors and shut-off valves.

Recontamination can be kept in check with the following measures:

- elimination of all dead zones – blind ends should be integrated into the circuit using elbows
- using sterile hot air to blow the water used for rinsing out of the system – (drying the system)

OR: **Preserving the system with disinfectant solution when not in use.**

Sanosil disinfectants: description

Sanosil S015/Super 25 have been proving their worth for water disinfection for more than 30 years. Their consistent efficacy against bacteria, viruses, yeasts, moulds and a broad spectrum of protozoa has been repeatedly tested and confirmed by internationally recognised institutions. In contrast to many other biocides, Sanosil disinfectant products have outstanding efficacy against biofilms, used as a protective coating by organisms such as Legionella and Pseudomonas.

The main active ingredient is environmentally friendly hydrogen peroxide, which undergoes a sophisticated stabilisation process and has its efficacy against microorganisms further enhanced by the addition of silver. The result is an antimicrobial effect many times greater than that of native hydrogen peroxide. The tiny amounts of silver help to prevent recolonisation. The elemental oxygen produced by the hydrogen peroxide attacks the microbial cell wall as soon as it comes into contact with it **1**. The oxygen reacts with molecules in the cell wall, leading to its denaturation and destruction. This effect is enhanced by silver ions, which bind to sulphur bridges in specific microbial proteins, resulting in their inactivation **2.**

Key characteristics

Sanosil disinfectants S015/Super 25

- are approved for use for disinfection of drinking water systems
- inhibit recontamination and are therefore ideally suited for use in disinfecting water
- can also be used at high temperatures (up to 90 °C)
- when properly dosed, do not alter the odour or taste of the treated water
- do not leave any residues (cf. e.g. quats)
- when properly dosed, do not cause irritation of the skin, eyes or respiratory system
- are environmentally friendly – hydrogen peroxide, the main ingredient, does not contaminate waste water, as it decomposes into water and oxygen only

Product variants (Sanosil Super 25, Sanosil S015)

Sanosil disinfectants are available in two different concentrations, which, at comparable working concentrations, are identical in their efficacy.

Product	User requirements (handling)	- H2O2 content - Transport - Warning symbols
Sanosil Super 25 Highly concentrated Sanosil disinfectant	For use by qualified personnel only.	Contains 50% H_2O_2 Dangerous goods UN 2014, C, O
Sanosil S015 Concentrated disinfectant	Can be used by normal personnel after instruction.	Contains 7.5% H_2O_2 Not classed as dangerous goods

Use of Sanosil disinfectants in the CIP cycle.

Method 1: Shock disinfection

In CIP circuits in which an additional disinfection cycle is run after the cleaning cycle, Sanosil is used for shock disinfection. Depending on requirements and time, a solution of 1000–2000 ml/1000l water (0.1–0.2% Super 25 – multiply by a factor of 6–7 for Sanosil S015) is used.
The disinfectant is added either manually or using a simple metering pump. Ideally, a small amount of water is added first, followed by a metered dose of Sanosil, followed by the rest of the water. This mixes the solution. A high temperature can significantly shorten the required application time, but can also increase the rate of disinfectant decomposition. Potential range is 20–60 °C, and application time is 10–20 min. After the specified application time, the Sanosil solution is pumped back into the holding tank.
If production needs to be resumed immediately, a short rinse cycle with drinking water is all that's required (Sanosil rinses out very easily). If the system is to remain unused for a longer period (evening, weekend, etc.), the rinse cycle should instead be performed immediately, prior to restarting production.

The used Sanosil solution stores well, but will undergo some decomposition depending on factors such as the pH of the water, chemical/organic residues, and not least, water quality.
The concentration therefore needs to be checked regularly. To do so, dilute the Sanosil solution you wish to test 1:9 in fresh water, and use Sanostrip 200 test strips. These can measure Sanosil concentrations within the range 0–200 ml/1000l water. The concentration is indicated by a colour change.
If the rate of decomposition suddenly rises rapidly, the Sanosil solution should be replaced.

Method 2: Preservation

Immediately after cleaning, a well cleaned CIP system has extremely low levels of microorganisms. Even where the water used for rinsing is blown out using hot sterile air, it is, however, very unlikely that all water will be removed. Depending on the amount of water remaining, the system will be re-colonised more or less rapidly by Pseudomonas and other ubiquitous moisture-loving microorganisms.

It has therefore proven practical to flood all pipes with Sanosil solution whenever the plant is on shutdown for 12–24 hours.

Approx. 40 ml/1000l water Sanosil Super 25 or 265 ml/1000l water S015 is added to the water used for the final rinse. Water treated with Sanosil in this way is of drinking water quality and does not need to be rinsed out. If the system is to be shut down for a longer period, the dose should be increased by approx. 10 ml/1000l water Super 25 every 24 hours.

Storage tanks can also be completely flooded, but can also be emptied to save water and sprayed with a 3% Sanosil Super 25 or 20% S015 solution using a cold fogger through the manway. Once again, there is no need to rinse after disinfection.

We recommend Sanosil **EasyFog** or similar for this work.

Use biocides safely. Always read the label and product information before use.

SANOSIL AG., CH- 8634 Hombrechtikon, Schweiz
E-Mail: info@sanosil.com,
Internet: www.sanosil.com