# BEVERAGE SANITATION PROGRAMS

**1. Sanitizer:** Any substance that reduce the microbial contamination to a safe level as determined by public health requirement.

**2. Sanitization:** Application of any effective method to clean the surface for the destruction of pathogens and other organisms. Such treatment shall not adversely effect the equipment, product or health of consumer and shall be acceptable to the health authority

**3. Sterilizer:** Any agent that will destroy or eliminate all forms of life including all forms of vegetative bacteria, bacterial spores, fungi, viruses.

**4. Disinfectant:** Any agent that will kill 100% of infectious bacteria although not capable of killing bacterial spores.

**5. Cleaner_ sanitizer:** Any chemical that possess the properties of both a cleaner or sanitizer is called cleaner sanitizer

**6. CIP:** Effective internal sanitization is performed by utilizing multiple step procedure in closed loop system .these circulation and balanced flow through CIP circuit is required at optimum flow velocities and flow rates in each circuit section .The following equipment can be cleaned or sanitized by automatic CIP system.

1. Syrup or ingredient tanks and their associated piping and valving system
2. Syrup or ingredient receiving, processing and distribution system including pumps, walls, pipes and houses.
3. Fillers and beverage processing system including proportional, chillers, deaeration, carbonators, pumps, and piping.
4. Bottled water fillers.

**FIVE STEP SANITATION FLOW CHARTS**

Step 1: Pre rinse with treated water for (5-10 minutes)

Step 2: Clean with detergent for 20 minutes.

Step 3: Rinse with treated water for (10-15 minutes)

Step 4: Sanitize with sanitizer for 20 minutes

Step 5: Wash with treated water for (5-10 minutes)

**3 STEP SANITATION FLOW CHART**

a. pre rinse with treated water for (10_12 mins)

b. clean with hot water at 85c for 20 mins

c. Rinse with treated water for (10_15 mins)

**Detergents**

i. TSP (trisodium phosphate) 8 - 24 g/L

ii. NaOH (sodium hydroxide) 1 - 2.5%

iii. Chlorine100ppm

iv. Hot water (85°C)

v. Ozone (0.2 - 1%)

**BOTTLE WASHING PLANT**

In industries 5 cell compartments are present.

Cell 1: receiving of empty bottles.

Cell 2: washing of bottles

Cell 3: inspection of washed bottles.

Cell 4: filling.

Cell 5: shipping.

**Cell 1.**

Glass bottles comes in first cell then there is visual inspection .50% of bottles are ejected here due to.

1. broken glass
2. dirty bottles
3. brand name
4. label

After visual inspection bottles comes in decaser. It has capacity of 90 bottles then pass on conveyer belt.

**Cell 2**

Inspection of glass bottles in light; 30% of bottles are rejected here.

**Purpose**

The purpose of bottle washer is to clean and sanitize returnable bottles that have been brought back from trade.

**Principles of operation**

1. Returnable bottles are rinsed to remove beverage residue, straw and any liquid or debris.

2. High strength solution of caustic soda, caustic base detergent or caustic with additives at elevated temp are used.

3. Rinsing jets of clean water are used to remove all traces of caustic and detergent.

4. The use of proper temp and conc. of caustic solution will determine the sanitary quality of bottles.

**Basic cleaning requirement for glass washing**

1. Caustic solution 3.5%

2. Temperature 66°C

3. Time 7.5mins

**Process**

1. Rinsing water and caustic solution.

2. Soaking in hot caustic solution.

3. Flushing of water inside or outside.

| Bottle washer | temperature | Conc. of caustic solution. |
|---|---|---|
| 1st compartment | 43°C | 2% |
| 2nd compartment | 60°C | 3-3.5% |
| 3rd compartment | 71°C | 2% |
| 4th compartment | 54°C | 1% |
| 5th compartment | 38°C | _ |

**BOTTLE WASHING**

**Bottle washer**

It consists of.

1. Bottle in feed.
2. Pre rinse jet.
3. Pre heat rinse.
4. Hot caustic soak tank.
5. Hot caustic soak with high pressure jetting.
6. Warm caustic soak tank.
7. Warm caustic soak tank with high pressure jetting.
8. Warm water jetting.
9. Caustic carry over water jetting.
10. Warm water soaks.
11. Cold water jetting.
12. Fresh water jetting.

**1. Bottle in feed**

Bottles are conveyed to the bottle washer where the bottles are automatically picked and inserted into bottle cells. These bottles cells are attached to the cell carrier that is attach to a continuous chain which carries the bottle through bottle washer.

**2. Pre-rinse section**

Entering the machine bottles are held upside down in the bottle cell and are spray with jets of warm water to remove heavy soil and loose objects, pre rinse water is recycled from rinse section.

**3. Pre-heat rinse**

As the bottle enter the fist tank they are immersed in hot cleaning solution which acts on the soil residues to dissolve and dispersed the soil and bacterial contamination .in this tank water solution is gently agitated by paddles o give a gentle flow of detergent into the bottle cells.

**4. Washing tank and caustic conveyer tank**

In these tanks the bottles are subjected to a series of soaking and detergent jetting .the jets force the cleaning solution inside the bottles thus providing additional mechanical action to help dislodge and dispose more persistent soil .rotating sprays operate with two nozzles at one level.

**5. Heating system**

To increase the efficiency of cleaning solution the bottle washer operates at high temperature. Heat exchangers are installed below the cleaning solution and are control to ensue a gradual rise in bottle temperature, thus ensuring a complete cleaning and disinfection without thermal shocks.

**6. Warm rinse tank**

On leaving the wash tank the bottles are drained then enter the warm rinse circulating spray section. a series of spray from dilute caustic to fresh water remove the last traces of soil and residual detergent on the outside and inside of bottle .rinsing with warm water is done at 50 to 60°C.

**7. Final rinse tank.**

The final rinsing is done with clean water of good microbiological quality water must meet drinking water standard and test negative to total coliform. Rinse water may contain chlorine but not more than 1ppm free available chlorine.

**Cell no 3.**

**Light inspection**

Washed bottles convey from washer to cell 3 for empty light inspection. Here 15% bottles are rejected.

**Bottle light inspection**

**Purpose**

The bottle inspector inspects the container for cleanliness and signs of damage before filling and packaging. The inspection is done manually or automatically by electronic or camera technology.

**Principle of operation**

The critical areas of inspection are

1. Locking ring area, screw thread of roll on glass.
2. Side walls.
3. Bottom (for evidence of dirt, foreign matter or liquid)

**Methods of inspection**

1. Manual 2. Automatic

**Process description**

**Glass bottle inspection**

It is essential that all packages be clean and free from foreign matter prior to filling .in line inspection should be perform on all empty returnable bottles from washer and degree of inspection and the method use depend on plant access to supply service, spare parts and availability of experience personnel.

**Manual technique**

All unclean bottles detected and set aside .the rejected bottles are either unclean able or contain material which can be removed when they have pass through the washer second time .with manual inspection the recommended speed per inspector is 150 bottles per minute .rotation of inspector is important because the process required concentration or activeness. Inspector should be rotated after every 15 minutes.

**Equipment detail**

The manual inspection station required a soft light to enhance the outline of any material not remove from the bottle by the washer reflecting mirrors are installed at the top to give a clear view of locking ring area.

Most manual lights are two sided and can accommodate two conveyers at a time .inspecting clean bottles are an important quality assurance function of line staff. Bottles are inspected with the following goals.

1. Dirty bottles should be return to the in feed of the washer for recleaning. Test should confirm that caustic temp and conc. are correct and that all rinse jets are working properly.

2. Unclean able bottles (paint, concrete, welding drops) should be destroyed they should never be reintroduce in to the washer.

3. Bottles rejected at the inspection line for damage or any physical abnormality should be destroyed even minor damage at locking ring area or at the screw thread of roll on glass can cause both a safety hazard and potential quality problem from $CO_2$ loss.

**Record keeping**

Record should be maintained on all the bottles rejected at the inspection line and the reason for the inspection this data will help the maintenance staff and plant management in identifying problems and correcting them.

Record should indicate the following.

1- Total no. of bottles washed during production run.

2- No. of rejected bottles identified to be clean able or uncleanable.

3- No. of damage bottles rejected.

4- Bottles type and size.

**Cell no 4**

Bottles come to the filler for filling purpose .bottle filling consists of 5 steps.

1- Starting position

2- Flushing with $CO_2$

3- pressurization

4- Filling phase

5- Snifting

After filling and crowning bottles pass through coding machine on conveyer belt that prints code on each bottle .these are inspected by manual light here rejection is 5 %.

**Cell no 5**

Storage and shipping of filled bottle is done 96 bottles are shifted in the form of finished bottles from conveyer to the shell for marketing.

**BEVERAGE PLANT SANITATION**

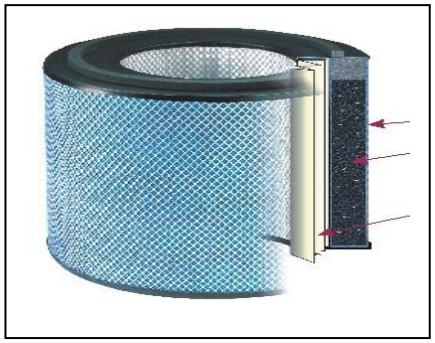
**Introduction**

- Most soils found in beverage plants are high in sugar content & water soluble.
- Ineffective sanitation in a beverage plant can reduce product acceptability

***Film Deposits***

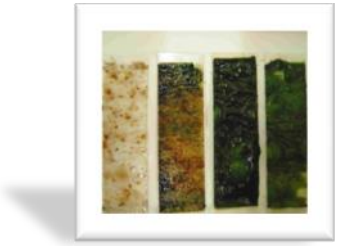
Film deposits most frequently occur inside

- Storage tanks
- Transfer lines
- Filters.



Especially films from aspartame and certain gums are difficult to eliminate. Chlorinated cleaning compound (or one specially formulated with surfactants for food soils) should be applied.

**Cleaning Practices**



- Pre Rinse
- Apply a cleaning compound
- Post Rinse
- Sanitize with quaternary ammonium compounds
- Rinse quaternary ammonium sanitizers

**Special care**

**1- Inspection of Ingredients and Raw Materials**

- Because foreign objects and microbial contamination does occur in both raw materials and the finished product.
- They should be inspected, including rodent and insect inspection, for foreign matter.

**2- Bottle Cleaning**

- Centralized high-pressure, low-volume cleaning equipment has improved the efficacy of bottle cleaning.
- Tenacious soil can be removed from very difficult-to-reach areas such as conveyors, bottle fillers, cappers, and casers.

**3- Bottle Filler**

- Bottling equipment may break glass bottles, creating a physical hazard.
- Plant personnel should keep a constant watch for broken glass that may fall into product containers

**4- Equipment Cleaning**

- Large vessels should be cleaned through filling with hot water and detergent while steam is spread through a CIP sprayer in the center of the tank.
- This process should continue for 30minutes, at which time the tank is emptied, rinsed with water, and steamed for 2 to 3hours for sterilization purposes.

**5- Cleaning Compounds**

- Spray cleaning is most effective.
- The cleaning compound should be low-foaming
- prevent reaction with surface
- Easily be rinsed to avoid the uptake of flavors by the drink.

**6- Sanitizers**

- Sanitizers should be incorporated with the final rinse.
- TACT (time, action, concentration, and temperature) approach
- 1% cleaning compound concentration at 43.5ºC can be equivalent to a 0.5% concentration at 60ºC

**7- Cleaning Practices**

**Automated Cleaning**

- The four basic parameters to be controlled are time, temperature, chemical concentration, and impingement.
- Rinse water may be recycled one time for reuse and cleaning compounds several times.
- The initial premise may use recycled water from the previous final rinse.

**8- Sanitation principles & employee practices**

- All employees visiting a lavatory must wash their hands.
- Products must not be returned to the production area.
- Waste materials must be placed in covered containers
- Each keep the immediate work area clean and tidy.
- Tobacco use is forbidden, except in designated areas.
- Spitting is prohibited anywhere in the plant.
- A periodic inspection of clothing, lunchrooms, and lockers.

- Headgear should be worn at all times.

**Summary**

- Cleaning involves the incorporation of a properly blended, low-foaming cleaning compound with specific cleaning properties for the soil that exists.
- Sanitizers such as chlorine, iodine, or an acid anionic surfactant are recommended for the final rinse in large mixing tanks, cold water lines, and coolers.
- A combination of wet and dry cleaning is usually most appropriate.
- Wash with water and a phosphate or carbonate cleaner for nonmetallic surfaces and caustic soda or equivalent for cleaning metal equipment, then sanitized with hypochlorite or other suitable cleaner.
- Installation of a circular spray head inside a tank will help remove soils more effectively, combined with soaking with soda ash and caustic soda.
- Fillers, bottling lines, and other packaging equipment can be cleaned with a CIP system.