

Industrial Bakeries

Water quality is of primary concern in industrial bakery processes since bakery products are made for human consumption. Water is used to heat and cool products, to transport raw product, and to clean and sanitize: floors, processing equipment, containers, vessels, and raw food products.

Standards and Practices

With modern technologies, it is possible to design and build a facility that has a reduced requirement for water.

- ◆ Provide adequate metering, submetering at all major water using areas, and for process control.
- ◆ Use product and by-product recovery systems.
- ◆ Consider all possible opportunities for water recovery and reuse, or alternative water supplies, such as filtration and membrane processes, capturing condensate drain water from air conditioning and refrigeration systems.
- ◆ Design for minimal or no water use.
- ◆ Design the facility for ease of cleaning.
- ◆ Take advantage of dry methods for cleanup and transport.

If applicable, minimize the use of water on water-lubricated conveyor belts by ensuring that spray nozzles are properly sized, well-aligned, and equipped with automatic shutoffs.

Larger equipment that cannot be disassembled easily must be cleaned in place and sanitized in place. Use pigging in the clean-in-place system for process pipes.

Cooling Systems

Cooling towers remove heat generated in a manufacturing process or by air-conditioning or refrigeration equipment. Energy-efficient equipment may reduce such waste heat, which is usually removed by a central refrigeration system and compressor. The compressor may be air-cooled or connected with a circulating loop to a cooling tower or evaporative condenser. As warm water from the compressor trickles through the cooling tower, some water evaporates, cooling the remaining water, which returns to cool

To ensure a supply of high-quality water, consider all reasonable opportunities for water recovery and reuse, such as capturing condensate and using filtration and membrane processes.



Cleaning process pipes in-place requires use of a “pig” — a device that fits snugly inside a pipe and is sent through it to clean the inside.

the equipment. Measures to reduce water waste in cooling towers include:

- ◆ performing a life-cycle analysis, including all operating, capital, and personnel costs, to determine whether use of a cooling tower is more cost-effective than air cooling.
- ◆ equipping cooling towers with conductivity controllers, make-up and blowdown meters, and overflow alarms.
- ◆ operate towers at a minimum of five cycles of concentration in regions with high water quality (low TDS) for towers using potable water, depending upon the chemistry of the make-up water, including considerations for reclaimed water or on-site sources.
- ◆ avoiding once-through cooling with potable water.
- ◆ using high-efficiency drift eliminators that reduce drift loss to less than 0.002 percent of circulating water volume for cross-flow towers and 0.001 percent for counter-flow towers.
- ◆ evaluating the processes in the plant for maximum energy efficiency and waste-heat recovery, since a more efficient building will reject less heat to the cooling tower.
- ◆ providing adequate training to cooling-tower operators.

Heating Systems

Steam boilers and hot-water boilers provide heat and hot water for many purposes. Closed-loop systems return water and steam condensate to the boiler for reuse, saving energy and water. Open-loop systems expend the water or steam without return to the boiler.

Several water-efficiency choices are available:

- ◆ steam boilers of 200 boiler horsepower (hp) or greater, equipped with conductivity controllers to regulate top blowdown.
- ◆ for closed-loop systems, condensate-return meters on steam boilers of 200 boiler hp or greater.
- ◆ closed-loop steam systems operating at twenty cycles of concentration or greater (5 percent or less of makeup water) where chemistry of the water allows.
- ◆ steam-distribution lines and equipment with steam traps meeting all codes.
- ◆ make-up meters on feed-water lines:
 - » to steam boilers and water boilers of more than 100,000 Btus per hour.
 - » to closed-loop hot-water systems for heating.

- ◆ boiler-temperature and make-up meters that are clearly visible to operators.
- ◆ discharge pipes that are easy to inspect for flow and visible indicators that will indicate whether the valve has activated, thereby reducing plumbing leaks due to repeated openings of water-temperature- and pressure-relief valves (TPRVs).



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Plumbing

Use high-efficiency toilets requiring no more than 1.3 gallons per flush and urinals which flush with 1 gallon or less. Avoid automatically timed flushing systems. Use self-closing faucets with flows of 0.5 gpm for hand washing. If available, and if codes and health departments permit, flush with non-potable water.

Floor Cleaning Equipment

Employ these floor-cleaning efficiency practices:

- ◆ use low-flow, high-pressure nozzles on hoses or water brooms for floor and mat washing where a flow of water is needed.
- ◆ minimize the need to use a hose as a broom by installing drains close to areas where liquid discharges are expected.

Industrial bakeries should use product and byproduct recovery systems.

Reuse and Recycling

Water is used for a variety of applications as a heat-transfer agent. This water remains relatively clean and is an excellent source of water for reuse.

Water Treatment

Measures to improve the efficiency of water treatment include:

- ◆ for all filtration processes, installing pressure gauges to determine when to backwash or change cartridges, followed by backwash based upon pressure differential.
- ◆ for all ion-exchange and softening processes, setting recharge cycles by volume of water treated or using conductivity controllers.
- ◆ avoiding the use of timers for softener-recharge systems.
- ◆ using water treatment only when necessary.
- ◆ use a reverse osmosis and nanofiltration systems with the lowest reject rate for its size.
- ◆ choose distillation equipment that recovers at least 85 percent of the feed water.

Other

Install automatic-shutoff and solenoid valves on all hoses and water-using equipment.

Install faucets on set tubs and janitorial sinks with flows not to exceed 2.2 gpm.

TIP: Conspicuously mark fire-protection plumbing so no connections will be made except for fire protection. Additionally, install flow-detection meters on fire services to indicate unauthorized water flows.