Office Buildings

Office buildings may combine residential apartments, hotels, retail stores, and office space in the same structure. Each may have its own special needs for water. Typically, large buildings require water for HVAC, restrooms, food service, and maintenance.

Plumbing

Appropriate technologies include high-efficiency toilets requiring not more than 1.3 gallons per flush and urinals which flush with 1 gallon or less (no automatically timed flushing systems), as well as self-closing faucets with flows of 0.5 gallons per minute (gpm) for hand washing. If available, and where codes and health departments permit, non-potable water may be used for flushing, and waterless urinals should be evaluated for suitability. ***REST***

Cooling Systems

Modern office buildings need to remove heat generated by computers, lights, people, and other operations. 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 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.
- operating towers at a minimum of five cycles of concentration using potable water, depending upon the chemistry of the make-up water used, including considerations for reclaimed water or on-site sources.
- avoiding once-through cooling with potable water. ***FOOD***
- 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.

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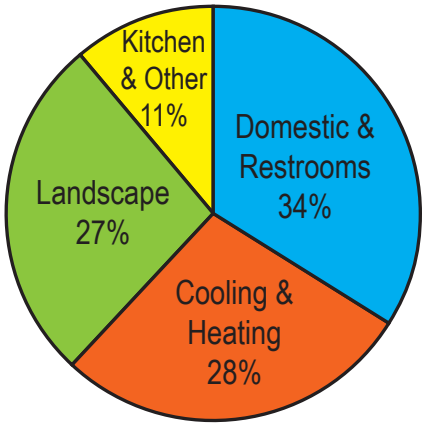

Typical water use in office buildings

- 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. ***THERM***

Heating Systems

Steam boilers and hot-water boilers provide heat and hot water in some buildings. 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:

- recirculating hot-water systems for large buildings. ***REST***
- 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 make-up water).
- 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.

Ensuring that facilities system operators are trained appropriately can help reduce water and energy waste and save money.

- 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). ***REST, THERM***

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. ***TREAT***

Ice Machines

Ice machines use water for ice and sometimes for cooling the compressor. Select:

- ice-making machines that are air-cooled, using remote heads to expel warm air outside the work space and customer areas. Air-cooled machines are preferred over cooling-tower loops.
- energy-efficient flake or nugget machines rather than cube-ice machines. If cube-ice machines are used, those that meet CEE Tier 2 efficiency standards are preferred. Tier 3 machines are even more efficient (CEE Commercial Kitchens). ***FOOD***

Floor Cleaning

Floor-cleaning efficiency measures include:

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

Submetering

Separate metering of individual units (tenants), water-using systems, or building areas — is recommended where possible in order to ensure that the costs of water use and, where feasible, wastewater disposal are equitably dispersed and accounted for accurately. Reflecting actual use and costs often offers a reliable incentive for water-use efficiency. ***METER***

Other

Other recommendations include:

- installing automatic shutoff and solenoid valves on all hoses and water-using equipment. ***PROC***
- installing faucets on set tubs and janitorial sinks with flows not to exceed 2.2 gpm. ***REST***

Reflecting actual use and costs can offer a reliable incentive for water-use efficiency, especially since many modern buildings house residences, hotels, retail stores, and business offices, each with its own special needs for water.

Refer to the following summaries for additional water-efficiency measures:

- **Restaurants and Fast-Food Outlets**
- **Hotels and Motels**
- **Water Features, Pools, and Landscapes**

TIP: Conspicuously mark fire-protection plumbing so no connections will be made other than those for fire protection. Install flow-detection meters on fire services to reveal unauthorized water flows. ***REST***