

Sanitary Drainage Systems

* **Drainage load**: This refers to the volume of drainage the pipe will be responsible for carrying.

* When necessary you can determine a fixture's drainage unit value by the size of the fixture's trap

Trap Size	Fixture Unit	UPC
1.25 inch	1	1 unit
1.5 inch	2	3 units
2 inch	3	4 units
3 inch	5	6 units
4 inch	6	8 units

* Fixture unit value of a pump
 $1 \text{ gpm} = 2 \text{ units}$

* Drainage piping shall be cast iron, galvanized steel, galvanized wrought iron, lead, copper, brass, SS 304 or 316, Sch 40 ABS DWV, Sch 40 PVC DWV, extra-strength vitrified clay pipe or other approved materials having a smooth and uniform bore.

* No galvanized wrought-iron or galvanized steel pipe shall be used underground and shall be kept at least (6) inches (152 mm) above ground.

* No vitrified clay pipe or fittings shall be used above ground or where pressurized by a pump or ejector. They shall be kept at least 12 inches (305 mm) below ground.

* The threads of drainage fittings shall be tapered so as to allow $\frac{1}{4}$ inch per foot (20.9 mm/m) grade.

* GPM

upto 7½ gpm	equals	1 units
8 to 15	equals	2 units
16 to 30	equals	4 units
31 to 50	equals	6 units

* A floor drain shall be provided adjacent to the fixture, and the fixture shall be connected on the sewer side of the floor drain trap. The fixture and floor drain shall be trapped and vented as required by this code.

* Horizontal drainage lines, connecting with a vertical stack, shall enter through forty-five (45) degree wye branches.

* Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal, and each run of piping, that is more than one hundred (100) feet (30.48 m) in total developed length, shall be provided with a cleanout for each one 100 feet (30.48 m).

* Cleanout can be omitted on horizontal down line less than 5 feet (1.524 m) in length.

* An additional cleanout shall be provided in a drainage line for each aggregate horizontal change of direction.

* Cleanouts in piping larger than 2 inches shall have a clearance of not less than 18 inch (0.457 m) in front of the cleanout.

* Size of Pipe	Size of cleanout	Threads (per 25.4 m)
40	38	11-1/2
50	38	11-1/2
65	64	8
80	64	8
100 & larger	89	8

* Grade of horizontal drainage piping - $2/8$

* A sewage pump receiving the discharge of water closets or urinals shall have a minimum discharge capacity of 20 gallons per minute (75 lps)

* Building sewers receiving discharge from any pump ejector shall be adequately sized to prevent overloading. 1 gpm = 2 fixture units.

* Clearance between exposed pipes and the finished surface of wall, partition or ceiling, shall be not less than 50 mm.

* HDPE — High Density Polyethylene complying to DIN 19535 and 19537.

* The rod size of supporting pipe
(a) for pipes of 2 inch or less — 10 mm
(b) for pipe of 2.5 inch or larger — 12 mm.

* Hanger spacing for all sizes of HDPE and UPVC pipes on straight vertical runs shall not be more than 2 m.

On straight horizontal runs shall not be more than 1.5 m.

* **Testing of drain, waste and vent piping:**

- Piping shall be tested for line, gradient and water tightness.

- Piping shall be filled with clean fresh water, leaving all the high points open to allow purging of air.

- Fill entire system with water to a minimum head of 3 m (10 feet) at higher part of the system. The system shall hold the water level to within 100 mm drop in 8 hours.

- Vertical piping shall be tested in sections.

Facts to Remember About Drainage Piping:

- o A drainage pipe installed underground must have a minimum diameter of 2 inches.
- o All drainage piping must be protected from the effects of flooding.
- o Horizontal branches that connect to the bases of stacks must connect at a point not less than ten (10) pipe diameters downstream from the stack.
- * Multiple buildings situated on the same building lot may not share a common building sewer that connects to a public sewer:
 - o You may not reduce the size of a drainage pipe as it heads for the waste-disposal site. The pipe size may be enlarged, but may not be reduced.
 - o Mechanical joints are not allowed for use on drainage pipe that is installed underground.
 - o Mechanical joints must be made with approved elastomeric seal.

o When a pump is used for a drainage system, a check valve and a full open valve are required. When possible, the valves are to be installed above the sump cover.

Cleaning and disinfection of WWS system

- 1) Flush the piping system with clean, potable water until dirty water does not appear at the point of outlet.
- 2) Fill the system or part thereof with a water/chlorine solution containing at least 50 parts per million (ppm) of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.
- 3) Drain the system or part thereof of the previous solution and refill with a water/chlorine solution at least 200 ppm and isolate and allow to stand for 3 hours.
4. Following the allowed standing time, flush the system with clean, potable water until chlorine does not remain in the water coming from the system.
5. Submit water samples to the independent testing laboratory.

Special Fixtures for Healthcare

- o Any concealed piping that serves special fixture and that may require maintenance or inspection must be accessible.
- o All piping for sterilizers must be accessible.
- o Clinical sinks are sometimes called bedpan washers.
- o Local vents may not tie in to vents from the sanitary plumbing or sterilizer vents.
- o Hospitals are required to have at least two water services.

Fixtures

o Single family residence

- one toilet
- one lavatory
- one bathing unit
- one kitchen sink
- one washing machine hookup

o Multi family buildings

Same as single family building, but each dwelling in the building must be equipped with minimum fixtures.

o Nightclubs and restaurants

- One toilet for every 40 people
- Lavatories - one lavatory for every 75 people
- One service sink
- One drinking fountain for every 500 people
- Zero bath units.

Drinking fountains are not required in establishments, such as restaurants, where water is served.

o Day-care facilities:

- One toilet for every 15 people
- One lavatory for every 15 people
- One bathing unit for every 15 people
- One service sink
- One drinking fountain for every 100 people.

o Employee and customer facilities

The distance an employee is required to walk to the facilities may not exceed 500 feet.

A minimum of one toilet is required for each facility when the occupancy load is up to 35 people. One lavatory is required in each facility for up to 15 people.

A drinking fountain is required for occupancy loads up to 100 people.

When toilet facilities for employees are located in covered meals, the travel distance must not exceed 300 feet.

o Handicap fixtures

Handicap fixtures are not cheap; you cannot afford to overlook them when bidding a job. Single-family homes and most residential multi-family dwellings are exempt from handicap requirements.

Hotels, motels, inns and the like are required to provide a toilet, lavatory, bathing unit, and kitchen sink for handicap use.

If plumbing a gang shower arrangement, such as in a school gym, at least one of the shower units must be handicap-accessible.

The door to a privacy stall for handicapped toilet must provide a minimum of 32 inch of clear space for wheelchair access.

Two types of showers are normally used for handicapped purpose. The first type allows the user to leave a wheelchair and shower while sitting on a seat. The other style of shower stall is meant for the user to roll a wheelchair into the stall and shower while seated in the wheelchair.

— The distribution of water from a water cooler or drinking fountain must occur at a maximum height of 36 inches above the finished floor. The outlet of drinking water must be located at the front of the unit, and the water must flow upwards for a minimum distance of 4 inches.

o Toilets and bidets require a minimum distance of 15 inches from the center of the fixture to the nearest sidewall.

- o Floor drains must have a minimum diameter of 2 inches. Floor drains must be trapped, usually must be vented, and must be equipped with removable strainer.
- o Sinks are required to have drain with a minimum diameter of 1.5 inches.
- o Modern toilet use 1.6 gallons of water or less to flush.
- o Hot water is piped to the left side of the faucet or valve. Cold water should be piped to the right side of the faucet or valve.
- o Main fact to remember about water coolers and fountains is that \geq they are not allowed in the toilets.
- o Water supplies to urinals must be protected from backflow. Only one urinal may be flushed by a single flush valve.
- o The amount of water used by a urinal, in a single flush, should be limited to a maximum of 1.5 gallons.
- o Flush valve must be equipped with accessible vacuum breaker.

Water Heaters

- o The maximum outlet water temperature for the water heater is 140° F.
- o Every water heater is required to be equipped with a drain valve near the bottom of the water heater. All drain valves must conform to ASSE 1005.
- o Location of water heaters and hot water storage tanks are important. Code requires both water heaters and hot water storage tanks to be accessible for observation, maintenance, servicing and replacement. Every water heater is required to bear a label of an approved agency.
- o Every hot water supply system is required to be fitted with an automatic temperature control.
- o All water heaters must be third-party certified. Water heaters must be installed in accordance with manufacturer's instruction.
- o Electric water heaters must conform to the requirements of the plumbing code and the provision of NFPA 70, as listed in the plumbing code.

Connections:

o A cold water branch line from a main water supply to a hot water storage tank or water heater must be provided with a cut-off valve that is accessible on the same floor, located near the equipment and serving only the hot water storage tank or water heater.

o Every electric water heater must be provided with its own electrical disconnect switch in close proximity to the water heater. In case of the gas-fired or oil-fired water heaters, cut off valve must be installed close to the water heater to stop the fuel flow when needed.

Relief Valves

Temp - and - pressure relief valves are required on all water heaters and storage tanks that are operating above atmospheric pressure.

Relief valves must be of a self closing (levered) type.

o Relief valves must be installed in the shell of a water heater tank.

o Energy cutoff valves are required on all water heaters that are automatically controlled.

o Temp setting if not more than 210°F

o Pressure setting that does not exceed manufacturer rated pressure, or 150 psi, whichever is less.

o Never omit the installation of required relief valves. The result of doing so can be catastrophic.

o Venting water heaters: Venting systems might consist of approved chimneys, Type B vents, Type L vents, or plastic pipe.

o No water heater is allowed to be vented into a fireplace or into a chimney that serves a fireplace.

o Vents must terminate above the roof surface of the building being served.