

# PRINCIPLES OF DESIGN OF WATER SUPPLY

- Plumbing fixtures and appurtances should be supplied with water in sufficient volume and at pressures adequate to function satisfactorily and without undue noise under all circumstances.
- The design of pipe should be made so that there is no contact between the lines feeding to the cistern or any such other appliance with those feeding water for human consumption.
- Pipe network should be completely water tight and also remain undamaged either by traffic loads, vibrations or temperature and any strains of buildings.
- Pipe network in the premises should be optimum discharge of water is obtained consistent with economy. The system should be free from water hammer, corrosion and should also look aesthetic.
- The pipe network should be laid and fixed that it doe not pass by the side of any sewage line or refuse drain nor does it pass through any field of foul ground where dirt or city have been deposited and manure dumps.
- The pipe network should be laid and fixed so that it shell be accessible at any time for attending to damages, leakages etc.
- The pipe network should be of adequate size to give the desired rate of flow.

- The pipe network should be divided into sections to facilitate repairs. These sections should be separated by valves in order that a section can be isolated for repairs keeping the rest of the distribution.
- The methods of joining pipe should be such as to avoid water losses.
- Whenever the pipes are bent it should be so made that these are not likely to materially diminish or alter cross section.
- The piping should be so laid that air locks do not occur and it should be possible to flush out the network from time to time.
- The pipes to carry satisfactory and unsatisfactory water should be laid separately. Whenever a supply of less satisfactory water and satisfactory water has to be mixed, which shall be done only by discharging both the flows into a cistern and by a pipe discharging into the air gap above the top level of the cistern at the height equal to twice its nominal bore and in no case less than 15cm. It is necessary to maintain a definite air gap in all plumbing used in the water closet.
- In the building if a provision is required to be made for storage of water on account of
  1. In the interruption of supply
  2. to maintain a reserve supply
  3. to regulate discharge in the mains
  4. to maintain a reserve for firefighting arrangements, a tank for storage of water

should be provided which should be watertight and also should be of sufficient thickness and capacity. The storage reserve should be dust prove and mosquito-proof. Each storage tank should be easily accessible and placed in such a position as to facilitate thorough inspection and cleaning. Stagnation of water within the tank is to be avoided. The tank should be so arranged as to have periodical cleaning done without seriously interfering with the supply of water. It is to be understood that water when it is stagnant is likely to become a good breeding ground for various organisms which are very dangerous for human beings. Therefore water tanks are require to be periodically cleaned and after cleaning properly disinfected.

In the case of underground tanks the contamination of stored water on account of above ground flow and due to seepage of underground water should be avoided. Whenever underground tanks are required for fire fighting purposes, the same should be approachable easily by fire tenders. The water which is required for fire fighting is so provided that everyday it gets renewal through an inflow of fresh water supply.

Lead piping should not be utilized anywhere in the domestic water supply system. Polythene and PVC pipes should not be installed near hot water pipes or near any source of heat.

The dead ends in the pipe lines should be avoided to the extent possible.

The mains should be arranged in a grid formation or network fashion. Where dead ends are unavoidable, a hydrant should be provided as a washout as the deposition of solids is at a higher rate in the case of dead ends where water stagnates requiring cleaning of pipe lines at frequent intervals.

The wash hydrant should connect to an effectively trapped chamber to avoid contamination. It should not discharge directly into a sewer line or a manhole or chamber on sewer line.

Air valves should be provided at all summit and washout at low points. The pipeline may follow the general contours of the land. It should be so laid that it generally rises to air walls to a water washout. Care should be maintained positive pressure at every point in the pipe line under normal working conditions.

The mains should be laid at least 90cms below surface under load and atleast 75cms below under a foot path to protect it from various traffic loads coming on it. Otherwise, there are chances of pipe settling under load and breaking.

Safety demands that water pipe should be separated from electric, telephone and other such cable no piping should be so laid as to pass into or through any sew line or manhole pit, as pit or any material of such nature that it is likely to cause undue deterioration of pipe.

Where laying of any pipe through corrosive soil or environment is inevitable, the piping should be properly protected from contact with such conditions by being carried through

Cast iron tubes or some other suitable means.

Changes in diameter of pipe or changes in direction pipe should be gradual and not abrupt. Abrupt changes involve avoidable lose of head of water.

No boiler for generating steam or closed boiler of any description or any such machinery should be directly connected with supply pipe. Every such boiler or machinery should be supplied from a feed tank.

The design of pipe work should be such that there is no possibility back flow from any cistern or appliance whether by siphonage or otherwise. Non return valve should not be relied upon to prevent such back flow.

Where pipe network has to be laid in a recent fill, proper precautions have to be taken to provide continuous and even support.

Source: <http://mediatoget.blogspot.in/2012/04/principles-of-design-of-water-supply.html>