Basic Building Plumbing

Types of plumbing systems used in building

Types of pipes used for water supply in plumbing works

- Direct Water Supply System
- Indirect Water Supply system

Indirect Water Supply System





India, Pakistan & Asian Countries

Municipal water supply pressure is low



Engineer

Advantages

1) There is no threat of pipe burst

2) Water can be made available from OH tank

Disadvantages

1) Causing problem in working of showers & flush valves

2) Extra cost of pipes and tanks

3) Dead weight of the building increases



Direct Water Supply System

Used in America & European Countries

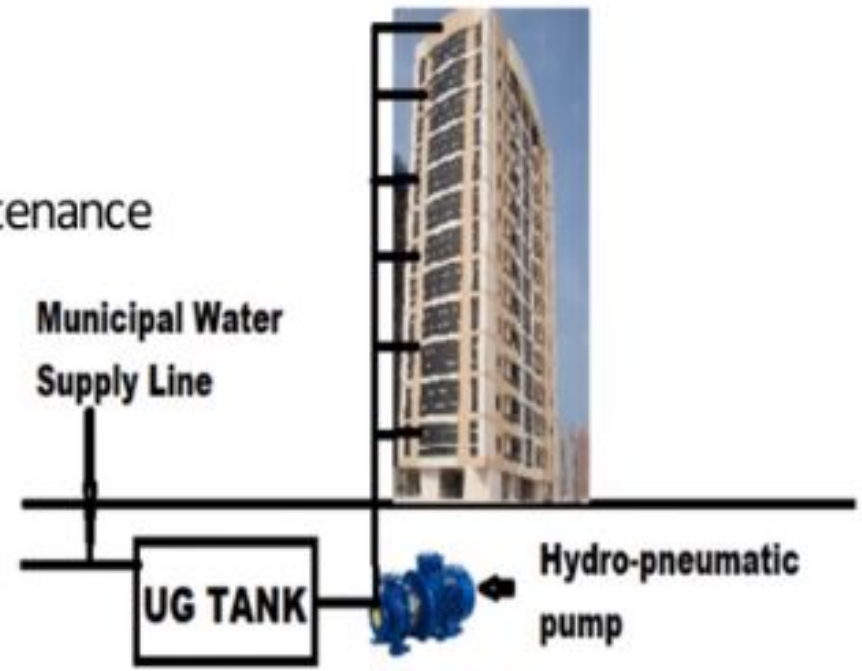
Pressure in Muncipal water supply line is sufficient

Advantages

1) No overhead tank, less piping & less maintenance

2) Water can be supplied at any pressure at any floor

3) Direct Water supply system consumes less energy



Disadvantages





No power no supply of water

Pipes used for plumbing work in buildings

PEX Pipes

Cross Linked Polythelene

Flexible plastic pipe

Initial cost is slightly higher

Installation process is fast & requires minimal maintenance

Better than copper piping



Heat resistant & can be used for hot and cold water supply

It cannot be used in outdoor applications as UV rays can damage its plastic layer

Copper Pipes

Considerable strength, reasonable ductility & high corrosion resistance

Three types available in market - **HEAVY GAUGE**
MEDIUM GAUGE
LIGHT GAUGE



Can be used for both hot & cold water supply

High tensile strength

Can be used in thin walls

When the ground water is highly corrosive to metals then copper pipes are used

Cast Iron Pipes

Used in sewer lines of homes and some commercial properties

Strong & can withstand the weight of dirt & stones without breaking

They can rust & corrode very fast



Galvanized Iron Pipes

Galvanization - a thin coating of Zinc is deposited on Steel to protect it from corrosion

Stronger than copper pipes

They corrode easily in soft & acid waters

Used where chance of corrosion is less

As compared to Copper pipes, GI pipes are very economical

Costlier than PVC pipes

Homes built between 1930 to 1980

Need to be re-piped



Engineering Motive

Stoneware Pipes

Burning soft soil in high temperature

Laid on an even bed of concrete





Used as underground drainage pipes in low cost construction buildings

These pipes are cheap

Asbestos Cement Pipes

Made using asbestos and cement

Very cheap compared to all but they are heavy and they break easily

Used as vent pipes, soil pipes, rain water pipes



Plastic or PVC Pipes

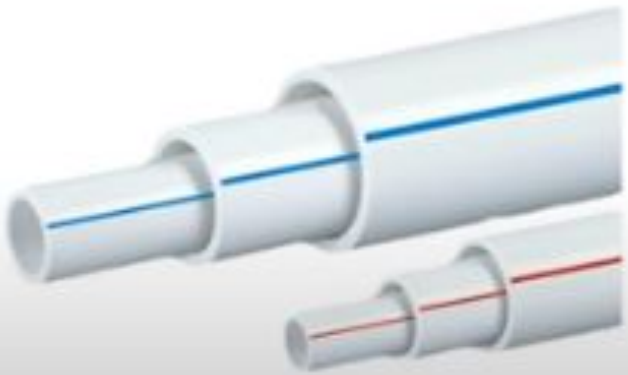
Polyvinyl Chloride

Light weight, easy to install & corrosion resistant

1. Unplasticized PVC (UPVC) or Rigid pipes

Used for cold water supply

Used for distribution of water with temperature below 45 degree C



2. Plasticized PVC pipes



These pipes have lower strength and lower working temperature than UPVC pipes

3. Chlorinated PVC (CPVC) pipes



Can withstand higher temperatures upto 120 degree C

Used for hot & cold water supply

More flexible than PVC pipes

These pipes are costlier than AC pipes but cheaper than GI pipes

Engineering Motive

Concrete Pipes

Reinforced or Unreinforced with varying diameters

Used for drainage of rain water

Large diameter pipes are used for major water supply works



Plumbing Traps



Brings water to the building and take the sewage away

Carries the sewage to the disposal system





Common Gases that Are Produced in a Sewage System -

1) Methane
2) Hydrogen Sulfide
3) Nitrogen
4) Carbon Monoxide









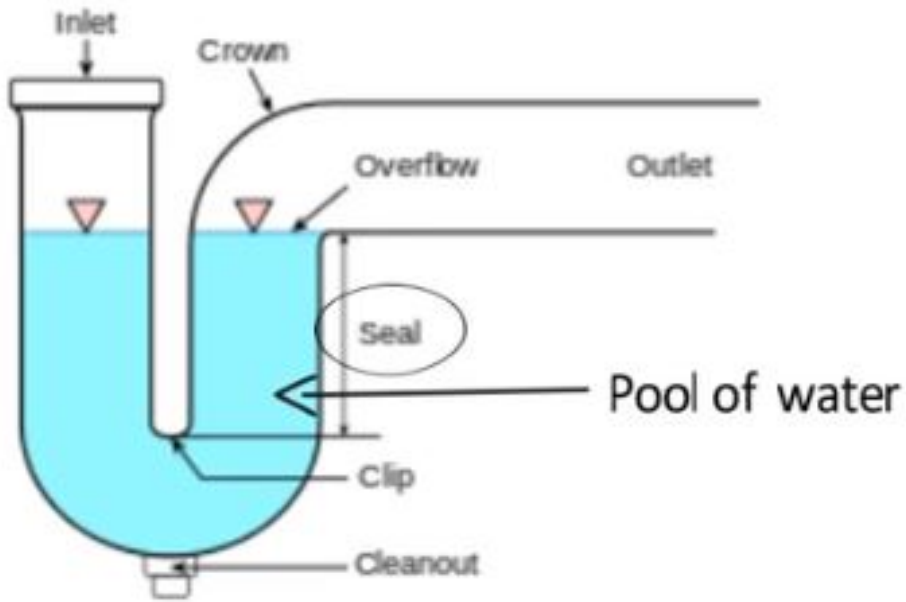




Length of pipe with a curve that bottoms out with a "P" or "S" shape

Engineering Motive

They stop the gases from coming into the building









Engineering
Motive

Good Traps should have following Qualities:

Should provide enough water seal (around 50 mm) under all conditions of flow

Interior surface of trap should be smooth so that the flow is not obstructed which enables self cleansing

An access door should be provided for cleaning the trap

Trap should be made of non- adsorbent material

Diameter of the trap shall in no case be smaller than the diameter of the outlet of the fixture to which it is connected

Floor Trap or Nahani Trap



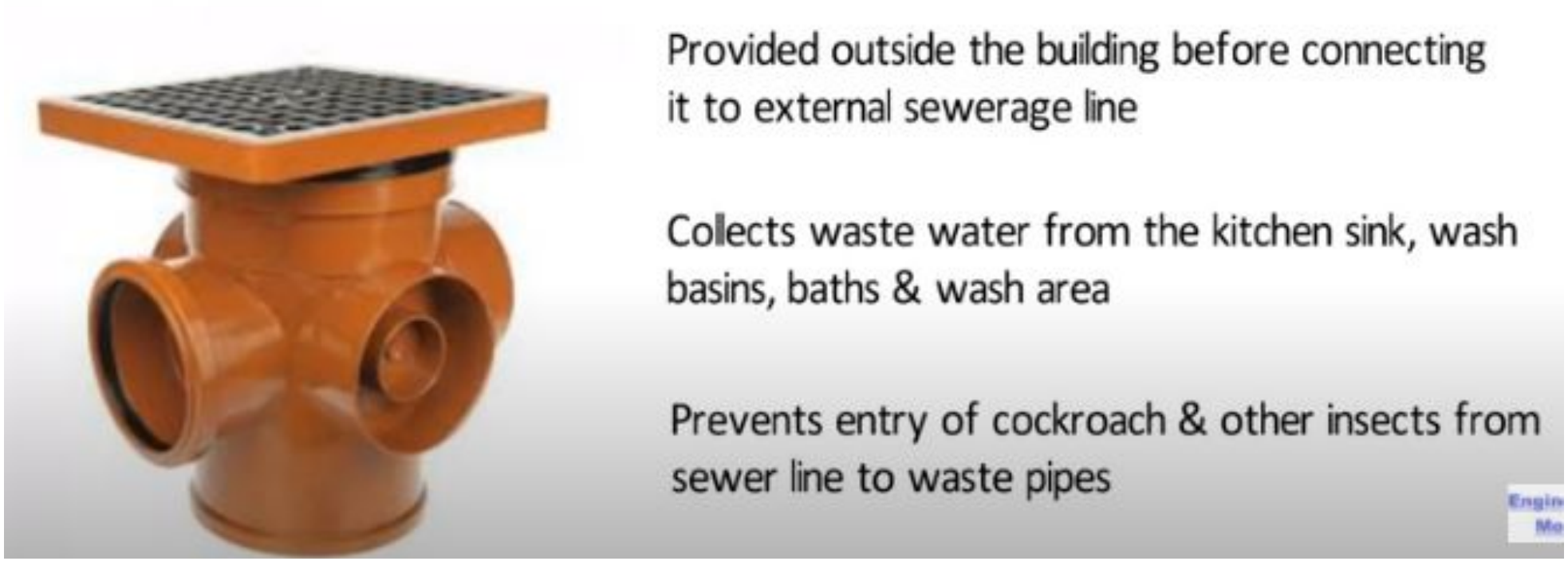
Located below the floor to collect waste water from Bathroom, Wash area, Washbasin & kitchen sink

Available in cast iron or UPVC material

Have removable grating (JALI) on top of the trap

Minimum depth of water seal should be 50 mm

Gully Trap

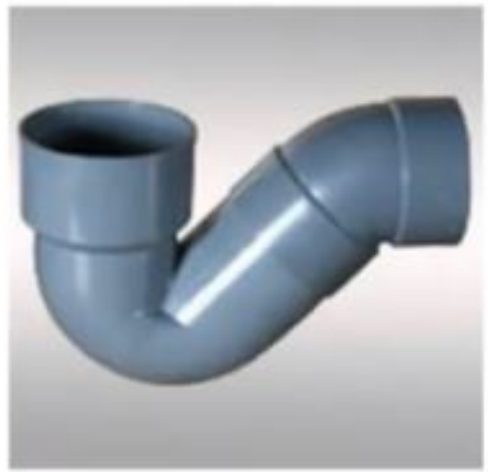


Provided outside the building before connecting it to external sewerage line

Collects waste water from the kitchen sink, wash basins, baths & wash area

Prevents entry of cockroach & other insects from sewer line to waste pipes

P Trap



Forms the shape of an inverted letter "P"
with a horizontal section that runs into the wall



Bathroom



Made from PVC pipe or Steel

Enginee
Moth

S Trap



Used for fixing water closets in toilets

P trap is used for outlet through the wall

S trap is used for outlet through the floor

Q Trap



Used in toilet under water closet

Used in upper storey other than ground floor

Bottle Trap



Used below Washbasin & Sinks to prevent entry of foul gases

Bottom unscrews to allow the clearing of blockages

They can be deeper than the 'P' and 'S' traps







Doesn't have water flowing to it on a regular basis, the water in the trap will dry out

If not used for a long time or if there is a leak in the p-trap, it may go dry & allow sewer gas to rise into a home

To refill a P trap, flush the toilet, pour water in the floor drain or run water down the sink

Always make sure that the trap is not dry

By running water down the drain

Surrounding temperature goes below 0 degree C

Safe for the environment and it won't evaporate or freeze

Periodically pour some water down the drain

Engineering Motive

Definition of Plumbing

The plumbing includes the practice, materials, and fixtures used in the installation., maintenance, extension, and alteration of all piping, fixtures, appliances, and accessories in connection with sanitary drainage or storm drainage facilities, the venting system and the public or private water supply systems/ within or adjacent to any building, structure, or conveyance.

Major elements in plumbing systems

The plumbing system includes

- water supply and distribution pipes: riser, up feed or down feed distribution pipes, underground water reservoir (UGWR), overhead (OH) tank.
- plumbing fixtures and traps,
- soil, waste and vent pipes,
- building drains and building sewers, including-their respective connections, devices, and appurtenances within the property lines of the premises

Some Important Terminologies

Plumbing Fixture:

- The water-supply system of a building distributes water to plumbing fixtures at points of use.
- Fixtures include kitchen sinks, water closets, urinals, bathtubs, showers, lavatories, drinking fountains, laundry trays, and slop (service) sinks.
- The plumbing fixtures are at the terminals of the water-supply system and the start of the wastewater system.
- Each fixture is served by a soil stack, or waste stack, a vent or vent stack, and a trap.

Fixture unit:

- It is the average discharge, during use, of an arbitrarily selected fixture, such as a lavatory or water closet. Once this value is established, the discharge rates of other types of fixtures are stated in terms of the basic fixture.
- A Fixture Unit is not a flow rate unit but a design factor.
- The base fixture unit measurement is based on the discharge from a hand basin. One fixture unit is equal to the discharge from one hand basin. All plumbing fixtures have a fixture unit rating which shows their hydraulic load when compared with a hand basin.

Riser :

- A water supply pipe which extends vertically one full story or more to convey water to branches or fixtures or to OH tank

Water Distribution in a Building

Water distribution in to building can be done in many way:

1. Upfeed distribution

Simple upfeed :

– Water fed to fixtures in a building only by the incoming pressure of the supply water.
– This method is good for buildings up to 5 to 6 stories high.

Pumped upfeed

– Water fed to the fixtures in a building by increasing the pressure of the supply water using additional pumps.

2. Down Feed Distribution

– Uses pumps to deliver water to a rooftop storage tank of the building.
– The water in the storage tank feeds fixtures below due to the force of gravity.
– Commonly one roof top tank is used to distribute water to whole building. For tall building intermediate tank(s) are often used to supply water at different levels.
– If main does not have sufficient pressure to carry water to OH tank, underground water reservoir (UGWR) is provided to store water from main and deliver to the overhead tank

Building Drainage System

Drainage System:

A drainage system (drainage piping) includes all the piping within public or private premises, which conveys sewage, rain water, or other liquid wastes to a legal point of disposal, but does not include the mains of a public sewer system or a private or public sewage treatment or disposal plant.

Major Elements of Building Drainage System:

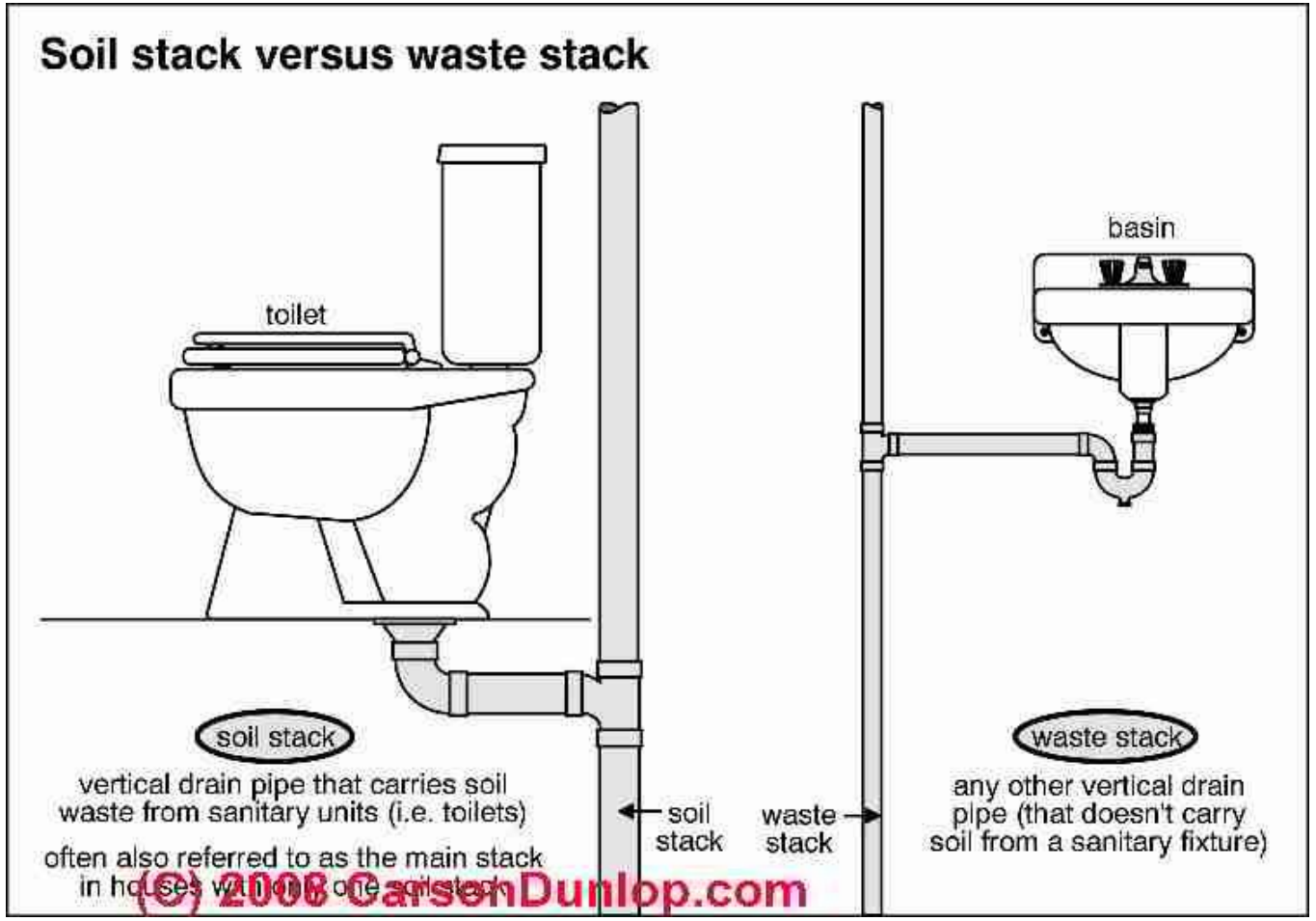
- Wastewater drainage pipe:
  - Soil stack,
  - waste stack and
  - vent pipes,
- Building drains and building sewers, including connections, devices, and appurtenances within the property lines of the premises

- A soil pipe is a pipe that conveys sewage or wastewater reliably, either from the toilet or sink to a soil drain or sewer.
- It transports the waste from your bathroom, toilet and sink on the upper floor of your home to the underground drainage system. However, this can be a smelly job which is why you must make sure that you choose vented soil pipes.

- a soil pipe is for soiled water. This type of pipe will carry water and solids into the sewer. While any pipe could physically perform the task, the soil pipe, also known as a soil vent pipe, as installed in most homes has a specific quality. First, it is of a dimension to allow solid waste to pass. Second, it is vented in a very specific way to maintain a safe environment and reduce odors. Soil pipes are vented high at the top or near to the top of a building, thanks to soil pipe stacks, to allow gases produced by waste to vent safely into the atmosphere. Such gases can be harmful to health so venting them high keeps them out of the way. This is a vital feature of soil pipes and it forms part of building regulations too.

- A waste pipe is often a smaller diameter pipe that carries waste water from your sinks, washing machine, shower, bath and any other appliance you may have that uses water. It can be narrower than a soil pipe as the waste pipe is only designed to carry water. It also doesn’t need the same venting system as a soil pipe. Wastewater does not typically generate harmful gas so does not need to be vented high above ground level.

- The **soil stack** is the large-diameter main vertical **waste pipe** or building drain, or vertical portion of the "main drain" in the building. ...
  The **waste stack pipe** shown in the sketch refers to any other vertical drain piping in the building that does not carry **soil** (sewage) from a sanitary fixture (toilet).



- a vent pipe: **pipe** above a waste **pipe** or soil **pipe** that allows gas to escape from the system.