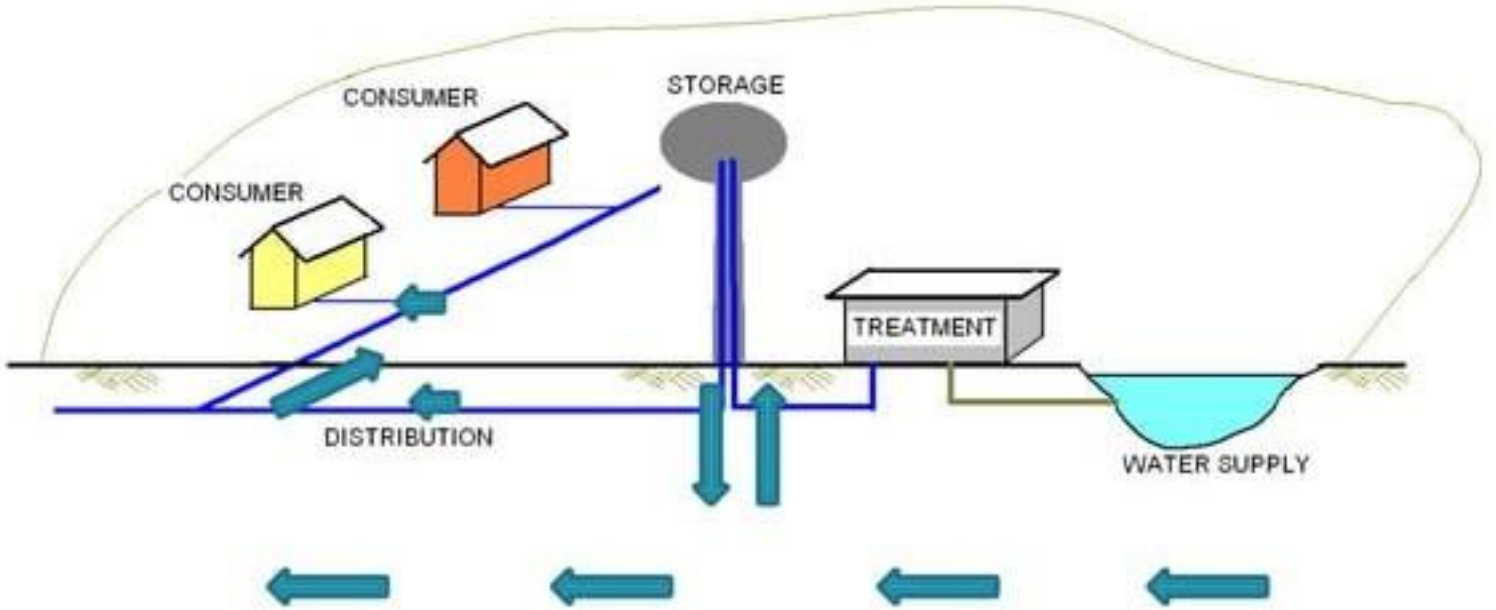
Water Supply System



PIPES

A **pipe** is a tubular section or hollow cylinder, used mainly to convey substances which can flow — liquids and gases (fluids), slurries, powders and masses of small solids.

Pipes are used for various purposes such as :

- In plumbing
- Pipelines – transporting gas or liquid over long distances
- Also sometimes as a structural member
- Casing for concrete pilings used in construction project
- The petroleum industry for Oil well casing and Oil refinery equipment

TYPES OF PIPES

Materials often forms the basis for choosing any pipe . The following are the types :

Cast iron pipe is a pipe which has had historic use as a pressure pipe for transmission of water, gas and sewage, and as a water drainage pipe

Ductile iron pipe is a pipe made of ductile iron commonly used for potable water transmission and distribution.

PVC pipes: This type of pipe has a wide variety of plumbing uses from drainage pipe to water mains. It is most commonly used for irrigation piping, home, and building supply piping.

Asbestos cement pipes: these pipes are not so much in use today

- **Copper Pipes:** This type of pipe is mostly used for hot and cold water distribution as well as being regularly used in HVAC systems for refrigerant lines.

- **Galvanized pipe**: is a zinc coated steel or iron pipe. This galvanized coating keeps the water from eating up the pipe. Galvanized pipe is considered a safe transport for drinking water and is seen in larger commercial applications for water distribution.

CORROSION CONTROL

- The metal pipes may get corroded by acidic water. Therefore, protective lining on the pipes needs to be provided against corrosion.
- Soil should be tested before laying pipes in ground .
- Pipes can be wrapped in plastic during installation to protect metal from soil .
- Organic chemicals , especially solvents and gasoline , weakens PVC pipes , cause pipe to expand and rupture.
- The operator in charge should be alert for any unusual odour as it maybe a sign of chemical spill that may damage the pipes .

In any plant various fluids flow through pipes from one end to other.

We have to transfer the content of Tank no. 1 to the other two tanks.

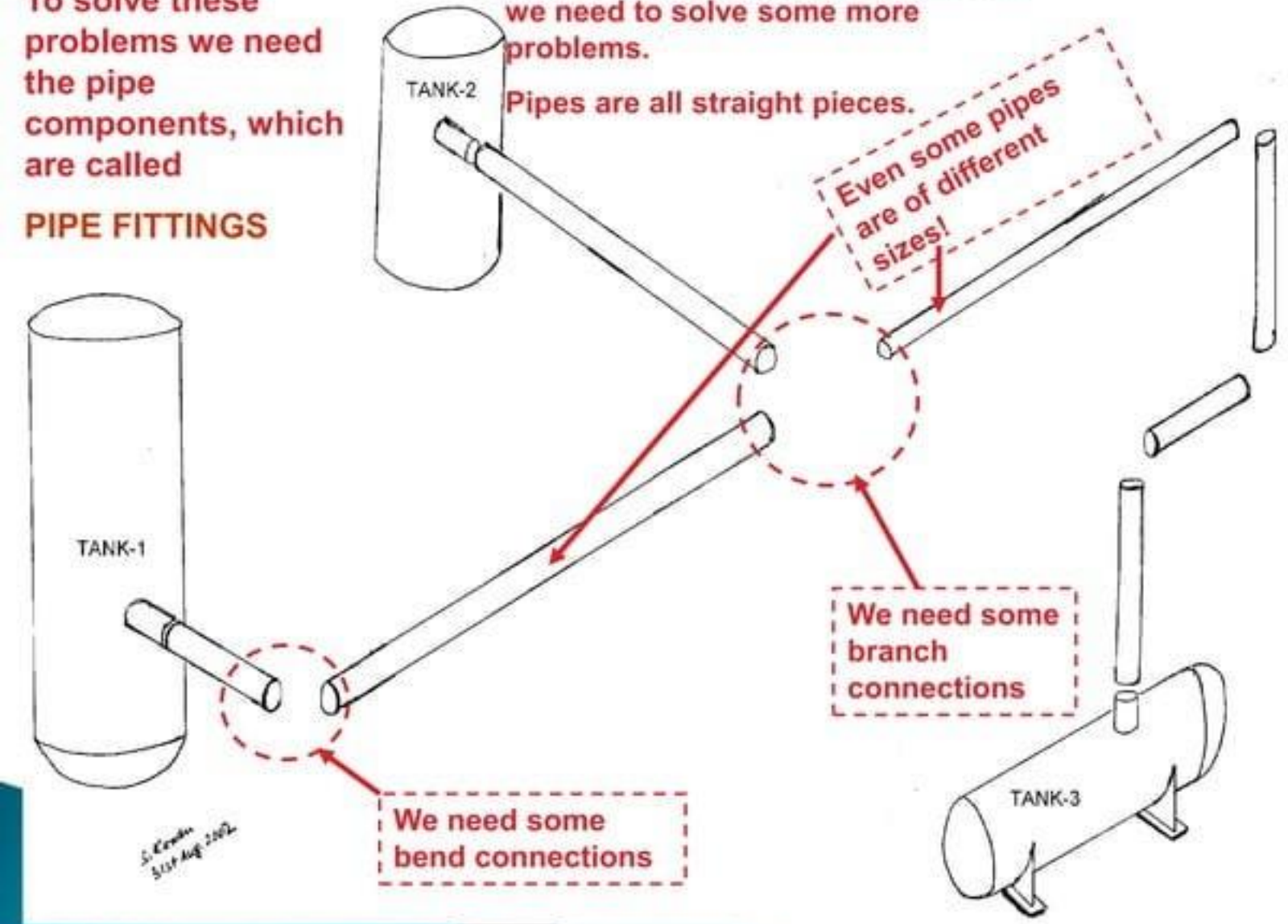
We will need to connect pipes to transfer the fluids from Tank-1 to Tank-2 and Tank-3

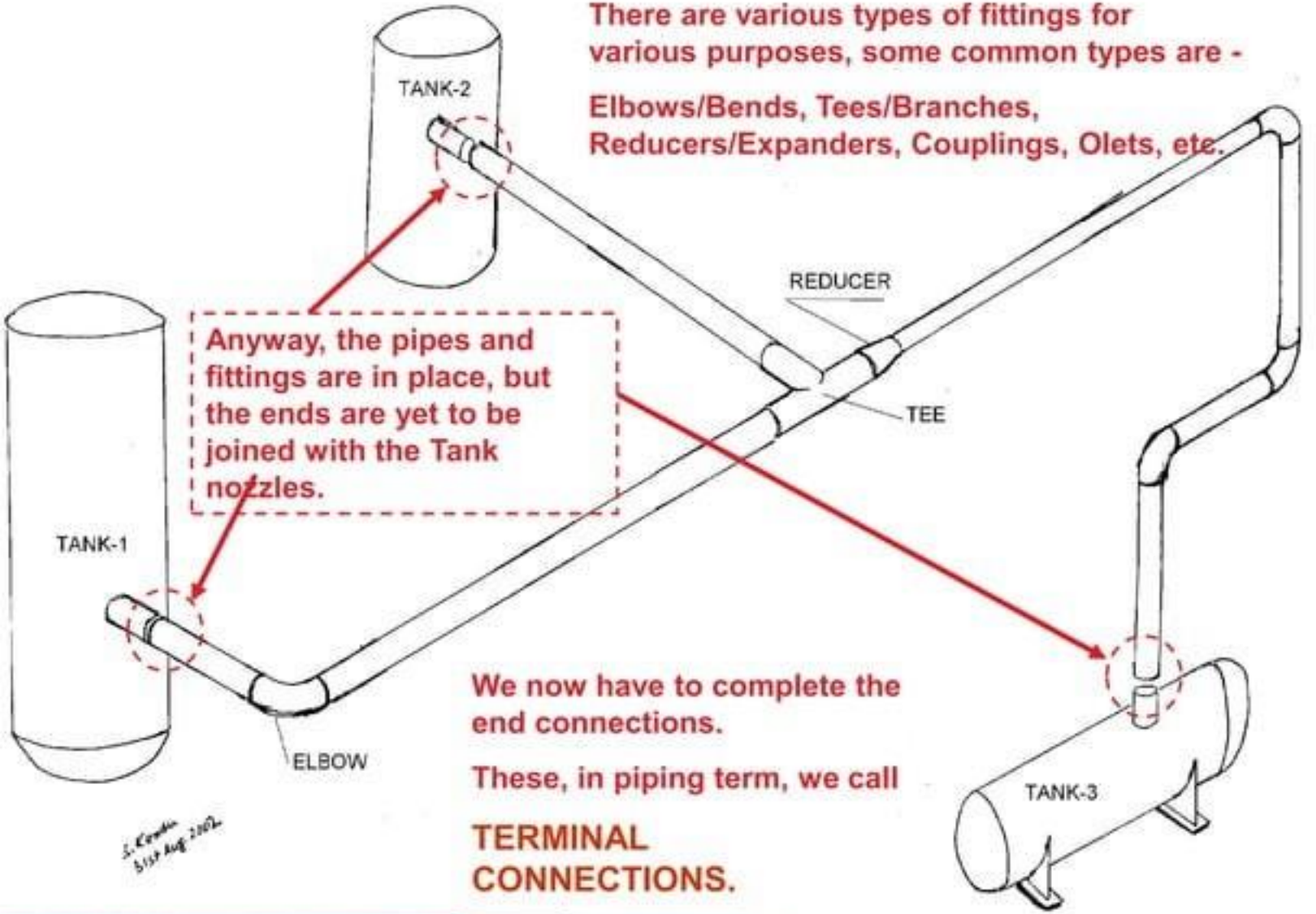
To solve these problems we need the pipe components, which are called

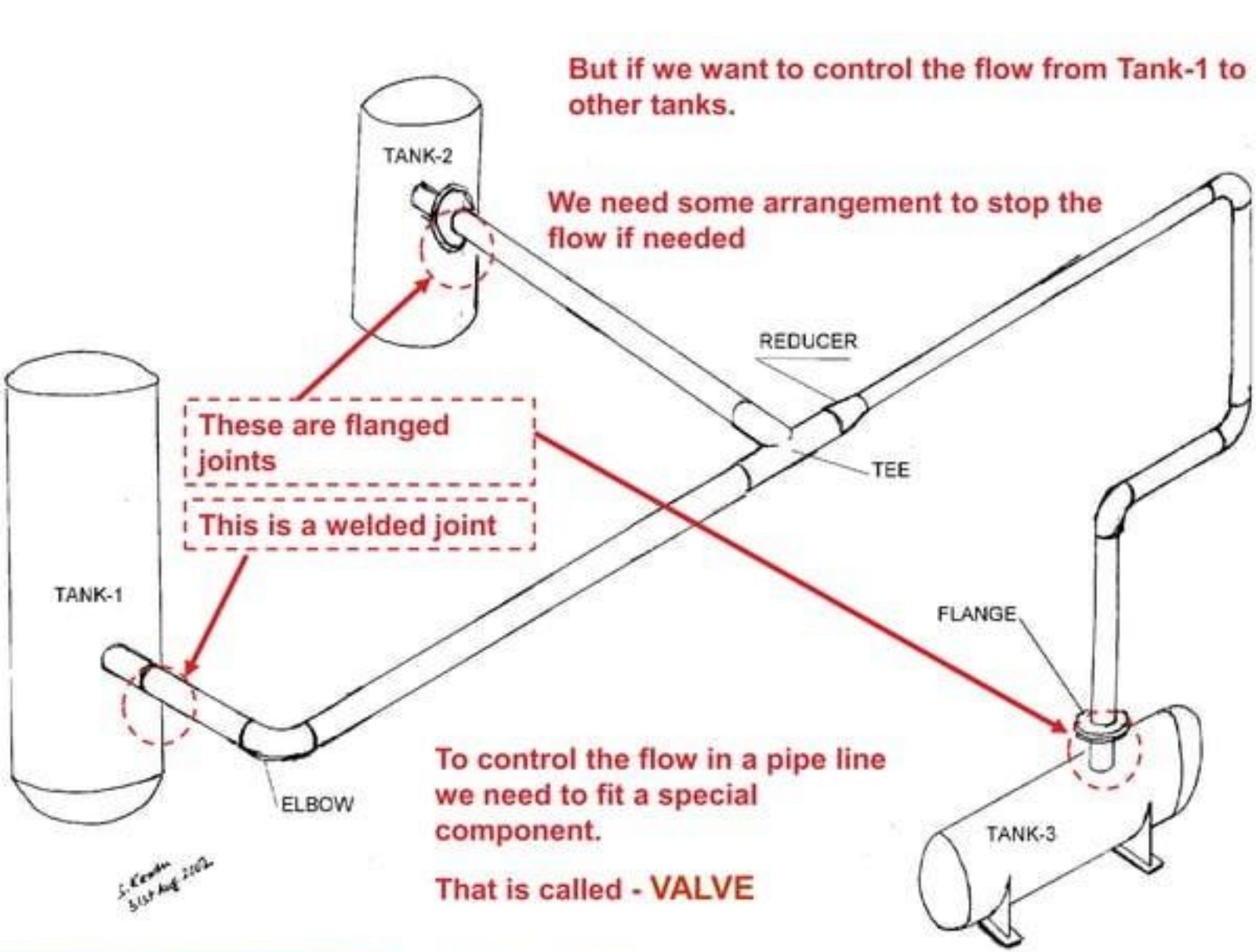
PIPE FITTINGS

We have just brought the pipes, now we need to solve some more problems.

Pipes are all straight pieces.




There are various types of fittings for various purposes, some common types are -
Elbows/Bends, Tees/Branches, Reducers/Expanders, Couplings, Olets, etc.
TANK-2
REDUCER
TEE
Anyway, the pipes and fittings are in place, but the ends are yet to be joined with the Tank nozzles.
TANK-1
ELBOW
TANK-3
We now have to complete the end connections.
These, in piping term, we call
TERMINAL CONNECTIONS.

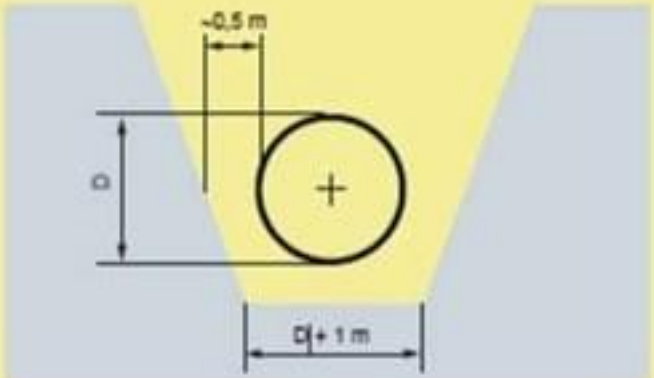

But if we want to control the flow from Tank-1 to other tanks.
TANK-2
We need some arrangement to stop the flow if needed
REDUCER
These are flanged joints
TEE
This is a welded joint
TANK-1
FLANGE
ELBOW
To control the flow in a pipe line we need to fit a special component.
That is called - VALVE
TANK-3

Installation of pipes

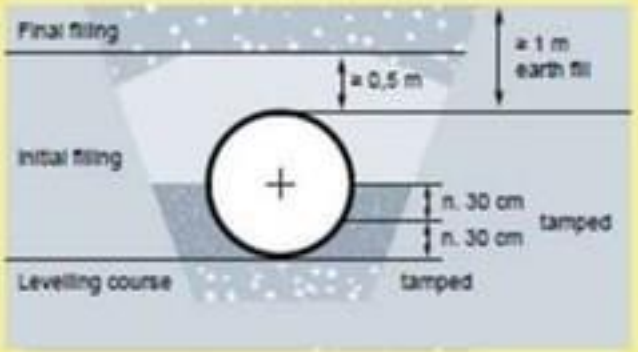
1. Trench, Foundation and Filling:

- a trench is dug wide enough to accommodate enough working space on both side of the pipe.
- Levelling- at the bottom for which max grain size of aggregates should be 60mm.
- if subsoil is soft, pipeline is founded on grid or piles.
- Filling: initial fill must meet the same requirements as the levelling course.
- main principle while filling: pipes, especially joints must have sufficient lateral support against overhead loads.
- mechanical compaction has to be done only after 50 cm of fill.

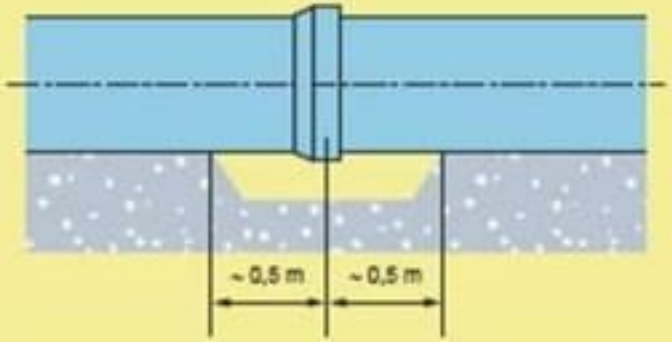
Trench *Figure 1*



Filling of trench *Figure 2*



Trench bottom at sleeve *Figure 3*



2. Joining Methods

A **fitting** is used in pipe plumbing systems to connect straight pipe or tubing sections , to adapt to different sizes or shapes and for other purposes, such as regulating the flow of fluids.

COMMON TYPES OF FITTINGS

1.Elbow

An elbow is a pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, usually a 90° or 45° angle.

2. Coupling

- Pipe coupling: A coupling connects two pipes to each other. There is no change in the direction of the two pipes. If the size of the pipe is not the same, the fitting may be called a reducing coupling or reducer, or an adapter.

3. Union

- A combination pipe union and reducer fitting .
- A union is similar to a coupling, except it is designed to allow quick and convenient disconnection of pipes for maintenance or fixture replacement.

Thread Pipe

Cap

Compression Connections

4. Threaded pipe

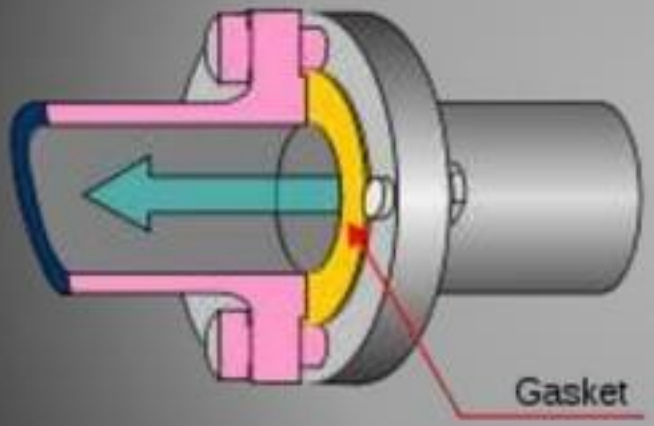
- A threaded pipe is a pipe with a screw thread at one or both ends for assembly. Steel pipe is often joined using threaded connections

5. Cap

- A type of pipe fitting, usually liquid or gas tight, which covers the end of a pipe. A cap is used like plug.

6. Compression Connections

- Compression fittings consist of a tapered concave conical seat, a hollow barrel-shaped compression ring, and a compression nut which is threaded onto the body of the fitting and tightened to make a leak-proof connection.



7. Flange fittings

- Flanges are generally used when there is a connection to valves
- Flange fittings generally involve pressing two surfaces to be joined tightly together, by means of threaded bolts, wedges, clamps, or other means of applying high compressive forces.

8. Soldering

- A chemical flux is applied to the inner sleeve, and the pipe is inserted.
- The joint is then heated using a propane torch.
- The solder is applied to the heated joint

9. Welding

The material of the pipe or tubing is itself partially melted in a carefully controlled manner, and the fitting and piping are directly fused together.

Generally butt joins are used for welding in pipes.

2) Inspection of pipe ends

The plastic protections at pipe ends are removed just before installation. In connection with their removal, pipe ends and sleeves are inspected visually.

4) Cutting of pipes at the Installation Site

- determine the cutting point of the pipe
- mark it all the way round
- make a perpendicular cut through to the steel with a carpet knife.
- the pipe is cut with a cutting wheel.
- PVC pipe cutting by a PVC cutting disc.

FIXTURES

Water supply fixtures

- A **plumbing fixture** is an exchangeable device which can be connected to a plumbing system to deliver and drain water.
- The most common plumbing fixtures are:
  - Bathtubs
  - Bidets
  - Channel drains (also called trench drains)
  - Drinking fountains
  - Hose bib (connections for water hoses)
  - Kitchen sinks
  - Lavatories (also called bathroom sinks)
  - Showers
  - Tapware
  - Terminal valves for dishwashers, ice makers, humidifiers, etc.
  - Urinals
  - Utility sinks
  - Water closets

1. Bathtubs

- A **bathtub** is a large container for holding water in which a person may bathe.
- Most modern bathtubs are made of acrylic or fiberglass, but alternatives are available in enamel on steel or cast iron.
- Modern bathtubs have overflow and waste drains and may have taps mounted on them.
- Two main styles of bathtub:
- Western style: shallow and long.
- Eastern style: short and deep.

Bathtubs

2. Drinking fountain

- A **drinking fountain** is a fountain designed to provide drinking water.
- It consists of a basin with either continuously running water or a tap.
- Modern indoor drinking fountains may incorporate filters to remove impurities from the water and chillers to reduce its temperature.
- Water fountains are usually found in public places, like schools, rest areas, libraries, and grocery stores.

3. Kitchen sink

- A **sink** is a bowl-shaped plumbing fixture used for washing hands, for dishwashing or other purposes.
- Sinks generally have taps (faucets) that supply hot and cold water and may include a spray feature to be used for faster rinsing.
- They also include a drain to remove used water.

Sinks are made of many different materials. These include:

- Ceramic
- Concrete
- Copper
- Enamel over steel or cast iron
- Glass
- Granite
- Marble
- Nickel
- Plastic
- Stainless steel
- Stone
- Terrazzo
- Wood

4. Tap

- A **tap** is a valve controlling the release of a liquid/ water.

Tap mechanism

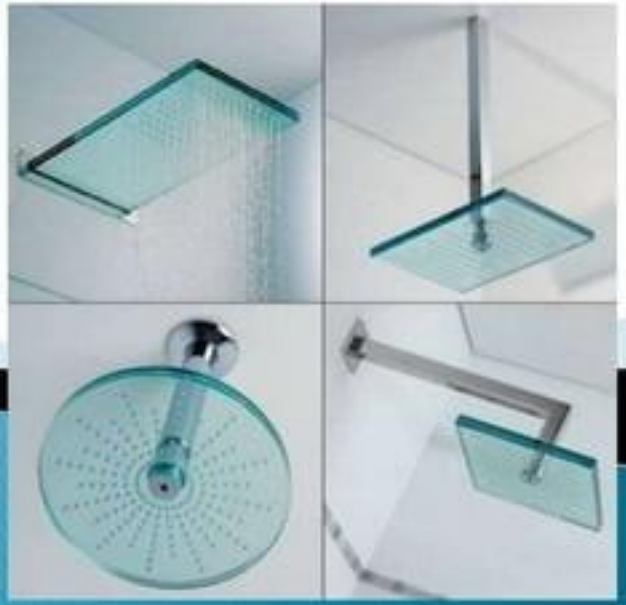
5. Showers

minimum requirements for stall shower: 34-in square

standard height of shower head:
- 66-in for men
- 60-in for women

install at 74-inches & adjust for height

handheld shower offers
additional flexibility

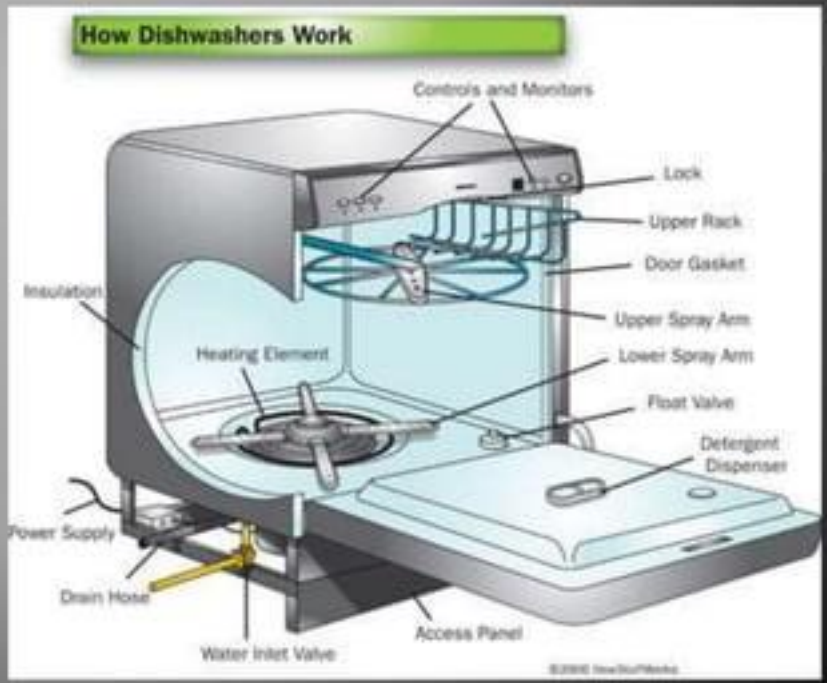


6. Faucets

•deck mounted—used only for tubs
wall mounted—used for showers; tub/shower combo

•both available in single or dual control—single control regulate temperature more easily

7. Dishwasher



8. Utility Sink

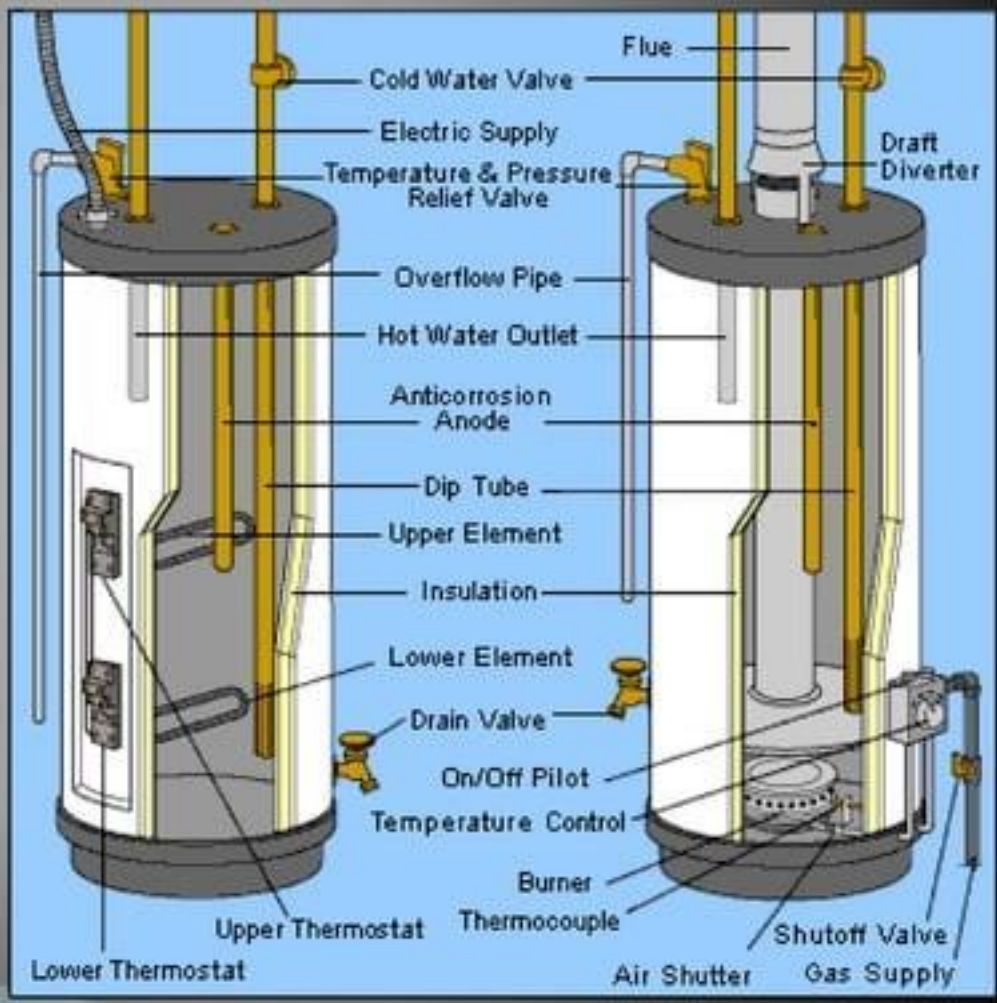
APPLIANCES

Water Heaters

- An appliance used to get hot water by the mean of electricity or by gas and used directly.
- A family of four, each showering for 5 minutes a day, uses 700 gallons of water a week; this is enough for a 3-year supply of drinking water for one person.

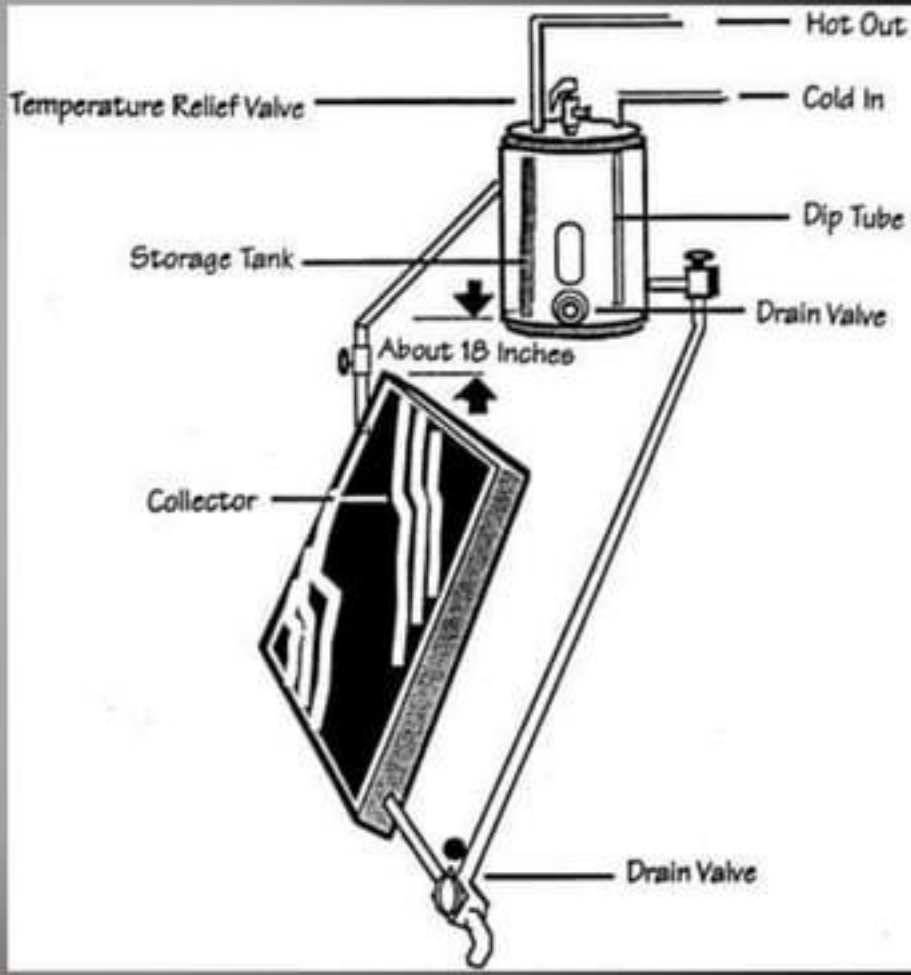
Storage Tank Water Heaters

- When you turn on a hot water faucet or use hot water in a dishwasher or clothes washer, water pipes draw hot water from the tank.



Solar Water Heater

- A solar water heater has an insulated water storage tank mounted above flat plate solar collectors
- The collectors transfer heat from the sun to an antifreeze collector fluid.
- Whenever hot water is used, solar heated water is drawn from the storage tank into the electric water heater




THANKYOU