

## PIPES AND REQUIREMENTS:

Pipes convey raw water from the source to the treatment plants in the distribution system. Water is under pressure always and hence the pipe material and the fixture should withstand stresses due to the internal pressure, vacuum pressure, when the pipes are empty, water hammer when the valves are closed and temperature stresses.

Requirements of pipe material:

1. It should be capable of withstanding internal and external pressures
2. It should have facility of easy joints
3. It should be available in all sizes, transport and erection should be easy.
4. It should be durable
5. It should not react with water to alter its quality
6. Cost of pipes should be less
7. Frictional head loss should be minimum.
8. The damaged units should be replaced easily.

**Pipeline materials:**

1. Cast iron
2. Wrought iron
3. Steel
4. Galvanized iron
5. Cement concrete
6. Asbestos cement
7. Plastic
8. Copper
9. Lead

### 1. Cast iron pipe

Cast iron pipes are used in great majority of water in distribution mains because of centuries of satisfactory experience with it. Cast-iron pipe is resistant to corrosion and accordingly is long lived –its life may be over 100 years. Cast iron pipes are manufactured by two methods (i) ordinary sand moulding process (ii) centrifugal process.

Advantages of C.I pipes

- C.I pipes are of moderate cost.
- Their jointing is easier.
- They are resistant to corrosion

- They have long life.

Dis -advantages

- They are subject to tuberculation in certain waters, due to which their carrying Capacity is reduced to as much as 70%.
- They are heavier and hence uneconomical when their diameter is more than 120cm.
- They cannot be used for pressures greater than 7 Kg/cm<sup>2</sup>
- They are fragile.

## 2. Wrought iron pipe

Wrought iron pipes are manufactured by rolling flat plates of the such pipes are much lighter than the C.I pipes and can be more easily cut , threaded and worked. They look much neater, but are much costlier.

## 3. Steel pipes

Steel pipes of small diameter can be made from the solid, but the larger sizes are made by riveting together the edges of suitably –curved plates, the sockets being formed later in a press. The joints may be either transverse or longitudinal or transverse and spiral.

## 4. Galvanized Iron pipes

- The pipes are cheap
- Light in weight and easy to handle
- The pipes are easy to join

Disadvantage

- The pipes are affected by acidic or alkaline waters
- The useful life of pipes is short about 7 to 10 years.

## 5. Cement concrete pipes

Cement Concrete pipes may be either plain or reinforced and are best made by spinning process. They may be either pre-cast, or may be prepared at the site. The plain cement concrete pipes are used for heads up to 7 m while reinforced cement concrete pipes are normally used for heads 60 m.

Advantages

- They are more suitable to resist the external loads due to backfilling.
- They maintenance cost is low
- The inside surface of pipes can be made smooth,thus reducing the frictional losses.
- The problem of corrosion is not here.

- Pipes can be cast at site, and hence the transportation problems are reduced.
- Due to their heavy weight, the problem of floatation is not here when they are empty.

#### Disadvantages

- Un-reinforced pipes are liable to tensile cracks, and they cannot withstand high pressure.
- The tendency of leakage is not ruled out as a result of its porosity and shrinkage cracks.
- It is very difficult to repair them.
- Pre-cast pipes are very heavy, and it is difficult to transport them.

### 6. Asbestos cement pipes

Asbestos cement pipes are manufactured from asbestos fiber and Portland cement combined under pressure to form a dense homogenous structure having strong bond between cement and the fiber. Such a pipe is claimed to be completely impervious to passage of water through its walls.

#### Advantages

- They have smooth internal surface, due to which the frictional losses are reduced.
- They are light and can be easily transported.
- They can be easily cut, fitted or jointed.
- Service connections can be easily taken, since they can be easily drilled and tapped
- They are anti-corrosive.

#### Disadvantages

- They are soft and brittle. they are very weak under impact loading due to moving traffic.
- They are cannot be laid in exposed places.
- They are not durable.
- They are costly.

### 7. P.V.C. Pipes

- Pipes are cheap

- The pipes are durable
- The pipes are flexible
- The pipes are free from corrosion
- The pipes are good electric insulators
- The pipes are light in weight and it can easy to mould any shape

#### Disadvantage

- The co-efficient of expansion for plastic is high
- It is difficult to obtain the plastic pipes of uniform composition
- The pipes are less resistance to heat
- Some types of plastic impart taste to the water.

### 8.Copper pipes

- Widely used for service connections

#### Advantgaes

- Cheap, light in weight and easy to handle and transport.
- Easy to join

#### Disadvantages

- Liable for incrustation & easily affected by acidic or alkaline water.
- The useful life of pipe is pipe is short about 7 to 10 years.

### 9. Lead pipes

- Not adopted for conveyance of water due to lead poisoning
- It can be easily bent.
- Apparatus required for alum & chlorine discharge- can not water.
- It can be bent due to hot water.