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MANAV SCHOOL OF POLYTECHNIC VYALA, AKOLA

WORKSHOP PRACTICE

SHOP:- Plumbing

2nd sem. CE

Workshop instructor

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PLUMBING AND OTHER PRACTICES

INTRODUCTION

Plumbing deals with the laying of pipe lines. Pipeline provides the means of transporting the fluid. It is obvious that laying-out the pipe line, requires a number of joints to be made and a number of valves incorporated, while connecting different lengths of pipes.

Plumbing work does not require many tools except pipe wrenches, hacksaw, pipe cutter, threading equipment and a pipe vice.

2.2 PLUMBING TOOLS

2.2.1 Pipe Wrench

Pipe wrenches are used for holding and turning the pipes, rods and machine parts. Wrenches of size 300 mm and 450 mm are more useful. The adjustable wrench shown in Fig. 2.1, consists of a fixed jaw and a movable jaw. The movable jaw facilitates the adjustment of the opening between the jaws. The jaws are serrated inside, to enable a firm grip over the pipes.

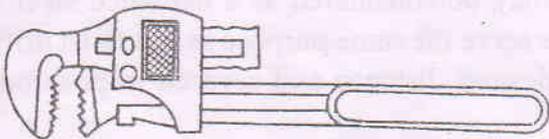


Fig. 2.1 Pipe wrench

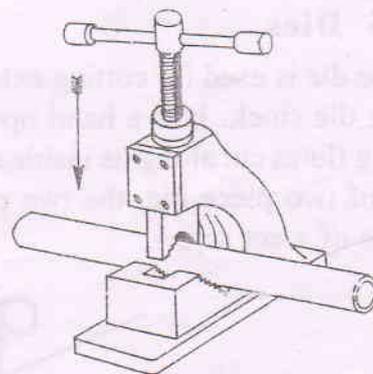


Fig. 2.2 Pipe vice

2.2.2 Pipe Vice

The use of a regular pipe vice is advisable, though ordinary bench vice can serve the purpose in most of the occasions. The pipe vice is fitted on the work bench. It holds the pipes in position during cutting, threading and fitting of bends, couplings, etc. Figure 2.2 shows a pipe vice. It consists of two jaws for holding the work, which are serrated to ensure firm grip.

2.2.3 Pipe Cutter

For an occasional pipe work, a hacksaw is quite satisfactory. Pipe cutters are also used where considerable amount of pipe work is involved. The pipe cutter mainly consists of three wheels, which are hardened and with sharp cutting edges along their periphery. Of these three wheels, one can be adjusted to any desired distance from the other two fixed wheels, to accommodate different sizes of pipes. After adjusting the cutter on a pipe, it is turned around the pipe so that the cutter wheels cut the pipe along a circle. Figure 2.3 shows a pipe cutter.

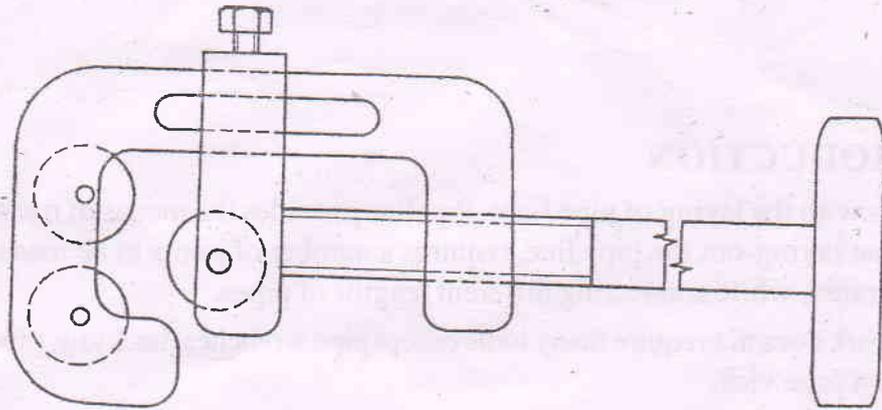


Fig. 2.3 Pipe cutter

2.2.4 Pipe Bending Machine

While laying the pipeline, sometimes a part of a pipe may have to be bent to the required curvature. For this, a pipe bending machine is used. It is mounted on a tripod stand and can swivel about a vertical axis to any desired angle, to cover the required range for the operation. The unit consists of a number of bending blocks and dolly blocks to obtain any desired curvature at the bend.

2.2.5 Dies

A pipe die is used for cutting external threads on pipes (Fig. 2.4). One or two piece dies are used in the die stock. It is a hand operated tool, which may be considered as a hardened steel nut, having flutes cut along its inside surface. These flutes serve the same purpose as in a twist drill. In case of two piece die, the two pieces are set at a desired distance and secured in position by means of a set screw.

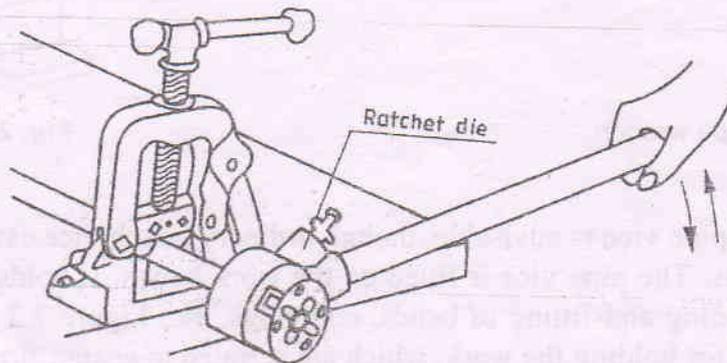


Fig. 2.4 Pipe threading

2.3 PIPES AND PIPE FITTINGS

Pipes are used for carrying fluids such as water, steam, gas, oil, etc., from one place to another. As pipes are made to standard lengths, the desired length of pipe may be obtained by joining them. The type of joint used depends upon the material of the pipe and the purpose for which it is used.

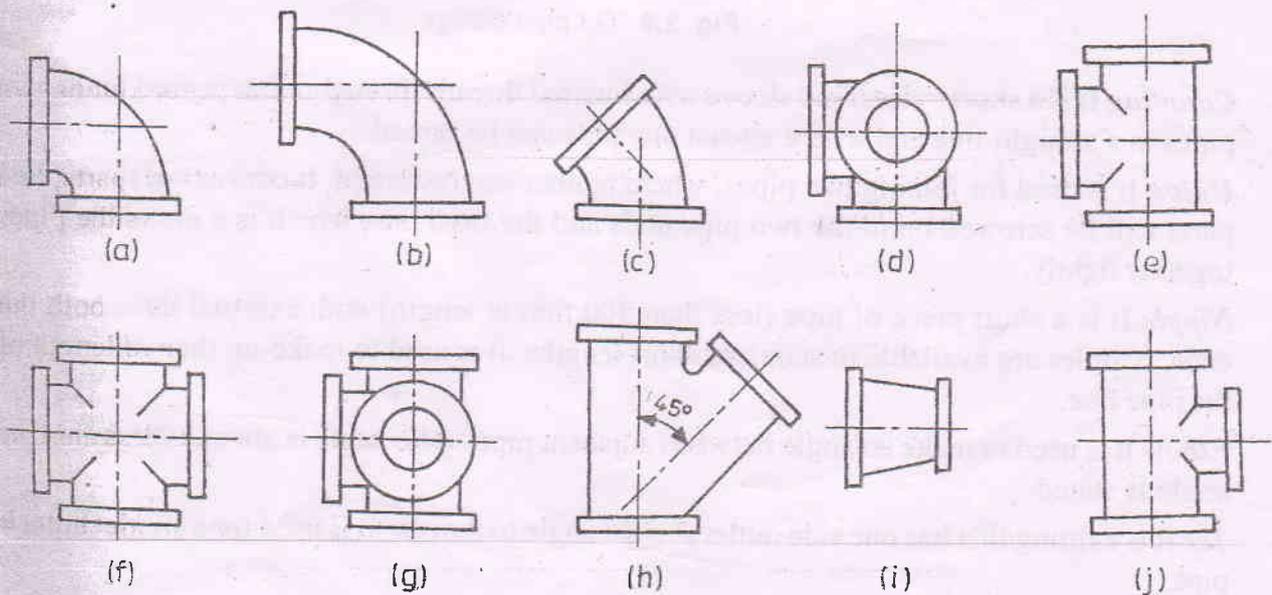
Generally, pipes are made of cast iron, wrought iron, steel, brass or copper. The material selection is based on the nature of the fluid to be conveyed, viz., pressure, temperature, chemical properties, etc. Now-a-days, PVC pipes are extensively used with ease for various applications.

The standard codes of practice followed for specification of pipes is in British system only. However, the sizes may be converted into metric units by taking 1 inch = 25.4 mm as a multiplying factor. There does not exist a separate metric system of specification.

The size of a metallic pipe is designated by its inside diameter. The size of a pipe fitting is designated by the size of the pipe on which it fits. There are different types of pipe fittings available in the market. These should be selected, keeping in mind the desired pipe layout.

2.3.1 Pipe Fittings

2.3.1.1 Cast iron (C.I) pipe fittings Cast iron pipe fittings such as couplings, bends, elbows, tees, crosses, etc., are used with wrought iron and steel pipes of relatively smaller sizes, so that they are either connected or branched-off at required angles as shown in Fig. 2.5.



a - 90° Elbow b - 90° Long radius elbow c - 45° Elbow d - Side outlet 90° elbow
 e - Tee f - Cross g - Side outlet tee h - 45° Lateral i - Reducer
 j - Tee reducer

Fig. 2.5 C.I pipe fittings

2.3.1.2 G. I pipe fittings Wrought iron is coated with zinc by a process known as galvanizing, to make galvanized iron (G.I) pipe fittings, which do not rust readily like C.I fittings. Some of the commonly used G. I pipe fittings are shown in Fig. 2.6.

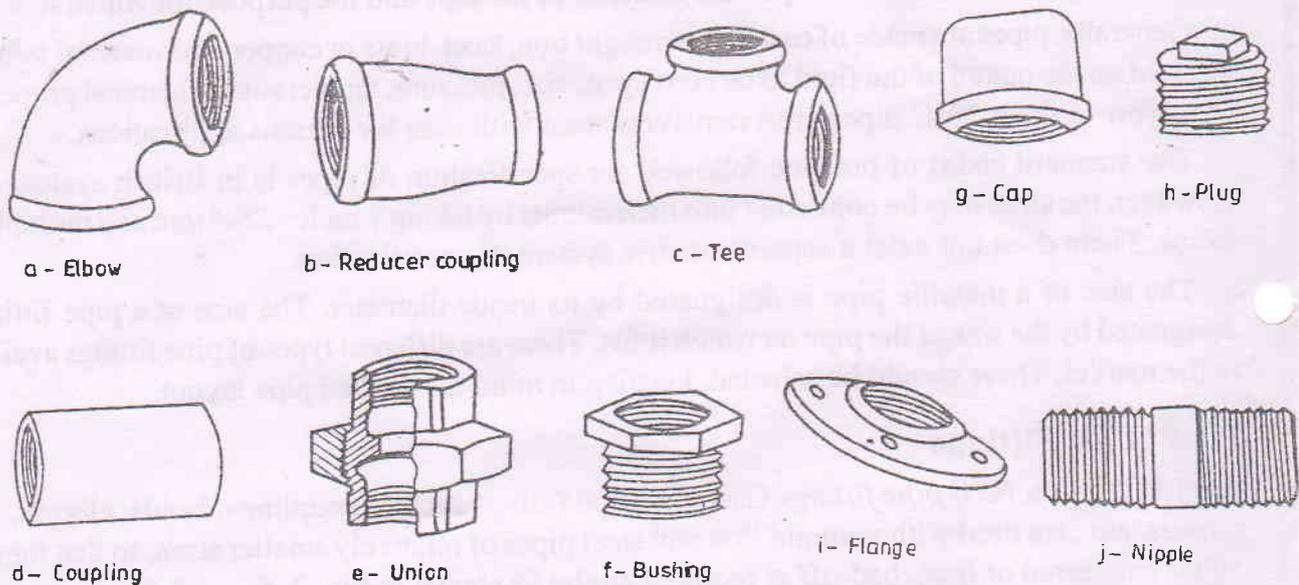


Fig. 2.6 G.I pipe fittings

Coupling It is a short cylindrical sleeve with internal threads throughout. It is used for joining two pipes in a straight line and where atleast one pipe can be turned.

Union It is used for joining two pipes, where neither can be turned. It consists of three parts; two parts will be screwed on to the two pipe ends and the third one, which is a nut, draws the pipes together tightly.

Nipple It is a short piece of pipe (less than 300 mm in length) with external threads at both the ends. Nipples are available in standard short lengths. It is used to make-up the required length of the pipe line.

Elbow It is used to make an angle between adjacent pipes. The angle is always 90° , unless another angle is stated.

Tee It is a fitting that has one side outlet at right angle to the run. It is used for a single outlet branch pipe.

Reducer coupling It is used to connect two different sized pipes.

Bush It is a short sleeve-like piece, used to reduce the size of a threaded opening. It is threaded fully on the inside and at one end on the outside. The other outer end is hexagon shaped.

Plug It is used to screw onto a threaded opening, for closing it temporarily. It is a short piece with external threads at one end and square end on the other, to receive the spanner for operation. A cap may be used for closing external threaded openings temporarily.

2.4 PIPE LAYOUT

For better pipe work, it is advisable to sketch first, the pipe layout (Fig. 2.9), showing dimensions and types of fittings to be used. Careful planning makes it possible to complete the work with fewer joints and fittings. In cutting pipe to length, the portion of the pipe that will be screwed or inserted into the fittings, must also be taken into account.

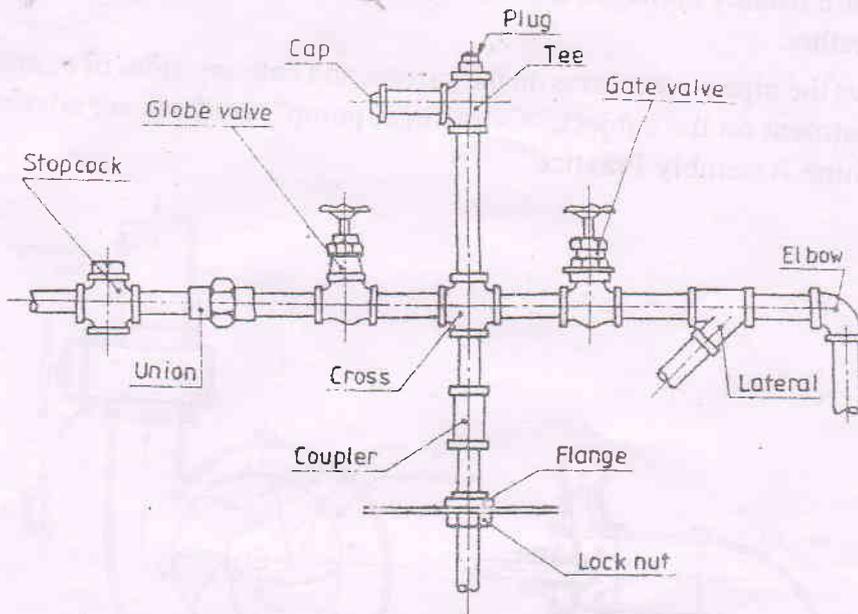


Fig. 2.9 C.I pipe layout

2.4.1 Pipe Threading

After pipes are cut to lengths, to suit the layout, they must be threaded before the assembly. The following are the steps involved while threading a pipe by means of a pipe die:

1. Clamp the pipe securely in a pipe vice.
2. Select proper size of the die and insert into the stock.
3. Place the die on the end of the pipe and apply pressure, while the die is slowly turned.
4. Once the threading is started, apply cutting oil and continue to turn the die into the pipe, till one thread projects through the die.

- NOTE**
- i. Pipe die produces tapered threads. The tapered pipe threads tighten securely into the pipe fittings.
 - ii. While threading, turn the die stock handle back and forth frequently, to loosen the chips.

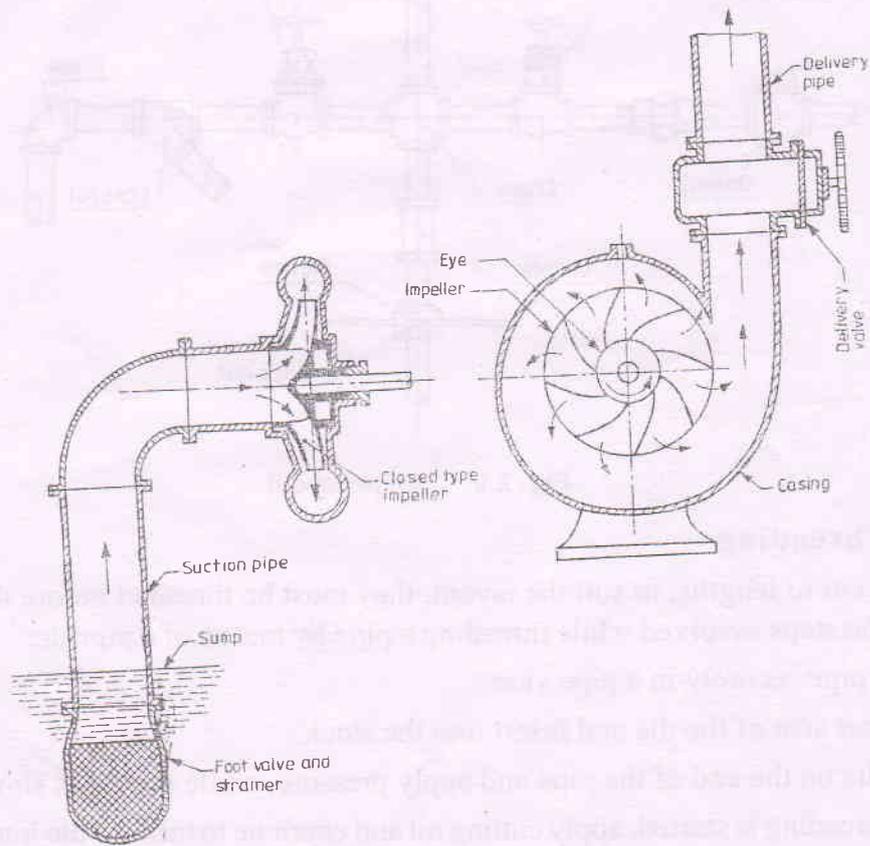
2.4.2 Assembly

Pipe layout should be made so as to avoid strains and bending at the joints. To ensure tight joints in pipe work, the threads are applied with some kind of thread compound, before screwing them

together. While screwing the pipe in its fitting, it is advised to use two pipe wrenches, making one to fit the pipe and the other to fit the pipe fitting. To avoid damaging a valve or a tap with wrench marks, it is advised to use a monkey wrench with smooth jaws.

Some fittings like unions and flanges require gaskets to make tight joints. When fittings are disassembled, gaskets are usually damaged and must be replaced. Gaskets are made from materials such as rubber or leather.

Figure 2.10 shows the pipe connections on the suction and delivery sides of a centrifugal pump. For the detailed treatment on the subject, "Centrifugal pump", students are advised to refer the chapter 7 on "Machine Assembly Practice".



✓ Fig. 2.10 Pipe connections on the suction and delivery sides of a centrifugal pump

2.5 INDUSTRIAL ROOF TRUSSES

A steel roof truss is mainly used for short and medium span, single storey buildings intended for industrial or recreational use. A steel roof truss is a plane frame consisting of a series of rigid triangles, composed of compression rafters or struts and the tension members, called ties. Standard mild steel angles or tubes are used to form the trusses; however, angles are considered to be the most suitable ones for the roof trusses. This is because, the angles can resist both compressive and tensile stresses effectively.