Unit 2

Tools for Plumbing

Introduction

So far, we have studied the importance of plumbing system, its stages and the role and responsibilities of a plumber. We will now look at the various tools that help a plumber perform the plumbing activities effectively. Like any other sector, a thorough knowledge and working of tools and equipment used in plumbing are essential for a plumber to carry out the tasks.

A plumber requires several tools for the fitting work for plumbing, fixing a tap or to carryout repairs. These tools help the plumber in performing his/her work properly, and therefore it is important that the tools are used systematically and handled carefully to avoid any damage. They should be kept at a designated place after use. The tools can be categorised as per the nature of work like holding tools, fitting tools, cutting tools, pipe threading and bending tools, etc.

The major tools used in plumbing are categorised as:

1. *Holding tools*
   (a) Bench vice
   (b) Pipe vice

2. *Fitting tools*
   (a) Wrenches
   (b) Water-pump pliers
   (c) Spanners
3. *Cutting tools*
   (a) Pipe cutter
   (b) Hacksaw
4. *Pipe bending tools*
   (a) Pipe bending machine
   (b) Threading dies
5. *Other tools*
   (a) Chisel
   (b) Hammer
   (c) Chain wrench
   (d) Rover jumper
   (e) Trowel
   (f) Screw driver
   (g) File
   (h) Plier
   (i) Caulking tools
   (j) Drill machine
   (k) Drill bit
   (l) Hanger
   (m) Measuring tape
   (n) Plumb rule and bob
   (o) Spirit level
   (p) Spade
   (q) Shovel
   (r) Pickaxe
   (s) Mortar pan
   (t) Masons' square
   (u) Water level tube

HOLDING TOOLS

Tools which are used for holding the pipes, pipe fittings and fixtures for plumbing operations are called holding tools. Some of the commonly used holding tools are mentioned below.

Bench vice

A **vice** is a tool used for holding an object for various tasks like filing, chipping, sawing, threading, tapping,

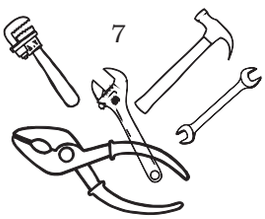


Fig. 2.1: Bench vice

bending, etc. The bench vice has two jaws, one of which is fixed and the other is movable. These jaws are fitted with plates for a better grip on the object during the task. The vice size depends on the width of the jaw. A bench vice is fixed to a table or a bench through a bolt. A vice is opened and closed with the help of a handle attached to a spindle. In this way, the object is held tightly. Bench vices hold the objects and allow use of other tools to complete the tasks (Fig. 2.1).

Fig. 2.2: Pipe vice

Pipe vice

It is a tool used for holding a pipe for carrying out assembly, disassembly, threading, cutting, etc. Pipe vices are of two types:

(i) Open side pipe vice

(ii) Fixed side pipe vice

Standard sizes of vices are 80 mm, 105 mm, 130 mm, 170 mm, etc., as per the opened size of the jaws.

Fitting Tools

While holding tools are used to keep the objects in place, fitting tools are used for carrying out various plumbing operations like cutting, tightening, fixing and other small tasks.

Wrenches

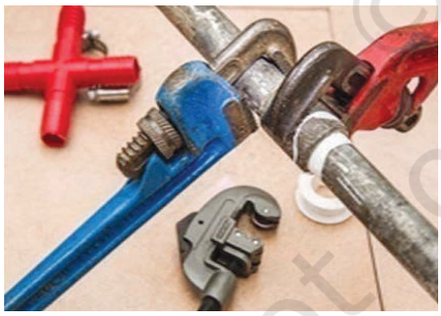


Fig. 2.3: Pipe wrenches

These are hand tools used for tightening and loosening the nuts and bolts. Wrenches hold slippery or small nuts and bolts for loosening or tightening them. Mostly, two types of wrenches are used—adjustable and non-adjustable. These are useful particularly in case of odd-sized nuts and bolts. These tools hold a pipe and pipe fittings for screwing or unscrewing. This is a very common tool, especially for small diameter pipes up to 50 mm.

Adjustable wrench

This type of wrench is used to loosen or tighten the nuts and bolts of any odd and regular sizes. It is used for tightening and loosening valves, cocks, geysers, flexible pipes, etc. It is a good maintenance tool for repair of plumbing items like valves, cocks, pumps, etc.

Fig. 2.4: Different type of wrenches (adjustable)

It has a fixed flat jaw with a handle and a square-toothed screw (Fig. 2.5). The movable flat jaw slides in the body of the fixed jaw with the support of a screw. The gap between the flat jaws is used to hold the object to be twisted for screwing or unscrewing.

Fig. 2.5: Adjustable wrench

Water-pump plier

It is a common plier used by plumbers for holding, tightening and loosening work during fixing process.

Steel is used for manufacturing water-pump pliers. These are available in only one standard size of 250 mm length. The maximum width possible between the two jaws is 40 mm (Fig. 2.6).

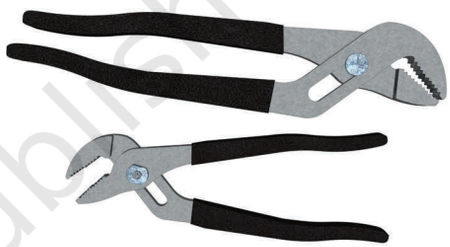


Fig. 2.6: Water-pump pliers

Spanners

This tool is used for tightening and loosening nuts and bolts of standard size. The standard spanners used are:

Ring spanners

These spanners have full circular closed ring at both ends. It is difficult to slip and cause damage. It is made through forging process, with a burnished finish or a chrome-plating (Fig. 2.7a).

Fig. 2.7a: Ring spanner

Open-ended spanners

These types of spanners are open from both sides and are used for tightening and loosening nuts and bolts (Fig. 2.7b).

A spanner having open-ended jaws slides through the nut or bolt with square or hexagonal heads. The bolts or nuts are then turned with the required force to screw or to unscrew. The two jaws have two consecutive sizes like 6 mm and 7 mm or 1/4″ and 5/16″, etc.

Fig. 2.7b: Open-ended spanner

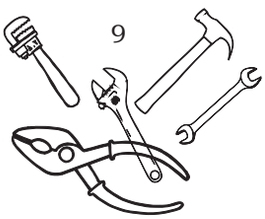


Fig. 2.7c: Combination spanner

Fig. 2.8: Bi-hexagonal spanner

Fig. 2.9: Pipe Cutter

Fig. 2.10: Hand-operated hacksaw

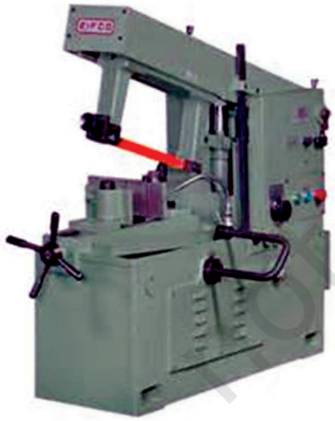


Fig. 2.11: Power hacksaw

Combination spanners

These spanners are open at one end and closed at the other (Fig. 2.7c).

Bi-hexagonal ring spanner

It has a bi-hexagonal shape at both the ends to hold a nut or bolt, the head of which is square or hexagonal. The sizes of the two ends are consecutive like 6 mm and 7 mm, 1/4″ and 5/16″, etc. (Fig. 2.8).

Cutting Tools

Tools that are used for cutting the pipes, fixtures and bolts, etc., are known as cutting tools. Some of the commonly used cutting tools are mentioned below.

Pipe cutter

This is a manual tool used to cut a pipe at the work site, especially when it is difficult to use a hacksaw frame. This tool has a sharp, round cutting wheel which is pressed with to and fro rotary motion for cutting a pipe (Fig. 2.9).

Hacksaw

This tool is generally used with both the hands. It cuts material like plastic pipe, steel rod, angle iron, sheets, iron pipes, etc. It can also be used for cutting the bolt heads and nuts when they are jammed. Important parts of a hacksaw are—handle, frame, blade and adjusting wing nut (Fig. 2.10).

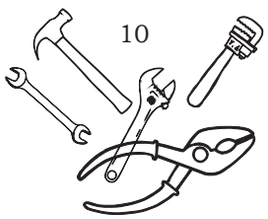
A hand-operated hacksaw is used for site work while a power hacksaw is used in a workshop for cutting heavy pipes quickly (Fig. 2.11).

Pipe bending tools

In most of the plumbing operations, pipes are required to be bent at different angles as per requirement, for which pipe bending tools are used. Some of these tools are mentioned below.

Pipe bending machine

This equipment is used to bend or turn pipes. The size and strength of the machine depends upon the



diameter of the pipe and the type of the pipe material to be bent. The mechanical or hand-operated pipe bending machines are available for 3/8– 1″ diameter pipes. For higher ranges, i.e., 1/2–2″, 1/2 – 3″, 1/2– 4″ and 2– 6″, hydraulic hand-operated machines are used (Fig.2.12).

Fig. 2.12: Pipe bending machine

Threading dies

Threading is crucial for joining pipes and fixtures effectively. A threading die is used for making threads in a pipe where it is to be joined with another pipe or fixture (Fig. 2.13).

Fig. 2.13: Threading die

Other Tools

Apart from the already mentioned holding, fitting, cutting and bending tools, various other tools are also used in plumbing operations. These are listed below.

Chisel

It is made of hard metal and is mostly used for cutting concrete surface and making grooves in the walls with the help of a hammer. (Fig. 2.14)

Fig. 2.14: Chisel

Hammer

These are general purpose workshop hand tools used for straightening of sections, riveting, striking of nails and inserting the component by striking, inserting keyways and fitting by striking. The hammer consists of a head made of hard and tampered steel, and a wooden handle. The head has a flat striking face and the other side is called pein. The peins are classified as per different shapes such as ball pein, cross pein and straight pein. The hammers made of hardened steel are known as engineer's hammers and are usually used while working with steel components. A one-kilogram hammer is the most commonly used hammer (Fig. 2.15).

Fig. 2.15: Hammers

Chain wrench

The common holding tools do not help much in case of large diameter pipes. For these, chain wrenches are used. A chain wrench consists of a toothed block, a

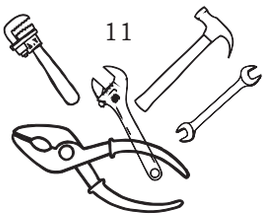


Fig. 2.16: Chain wrench

handle and a chain. The chain is round, grooved and held on the toothed end of the block. The chain grips the pipe fitting and screws or unscrews. The chain wrench is available in 3″, 4″, 6″, 8″ and 12″,with the length 475 mm, 585 mm, 834 mm, 1100 mm and 1360 mm respectively. These sizes are designated by the maximum diameter of the pipe it can hold (Fig. 2.16).

Screwdriver

Fig. 2.17: Screwdriver

This tool is often used by plumbers to fit the screws. Screwdrivers have a sharp tip which can easily fit into various screws. Different types of screwdriver are used for various types of screw. Various types of heads of the screwdriver are used by plumbers (Fig. 2.17).

Files

Fig. 2.18: File

These hand tools are used for a variety of work, like removing of sharp edges, metal removal, shaping of jobs, smoothening of surfaces, finishing, producing different shapes, etc. The file has five parts: tang, heel, face, edge and point or tip. Various types of files of different shapes like hand round, pillar, square, three square, half round, flat, knife edge and needle file are used as per the work (Fig. 2.18).

Pliers

Fig. 2.19: Plier

They are important tools used for holding small objects and for tightening or loosening various parts. Several types of pliers are used by a plumber during work. Pliers can be used for cutting purpose also. Various shapes and sizes of pliers are available in the market. Pliers of different types are shown in Fig. 2.19.

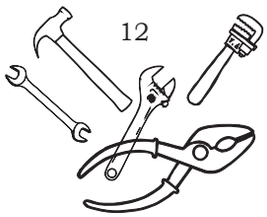
Caulking tools

Fig. 2.20: Caulking tools

For filling the gaps in the wall, caulking tools are used. This tool helps in filling and removing material in the building (Fig. 2.20).

Drill machine

One of the common but important tools used for making a hole in a metal or wood, or concrete surface. A drill



machine (Fig. 2.21) is fitted with a cutting tool like a drill bit. The attachment is tightened with a key.

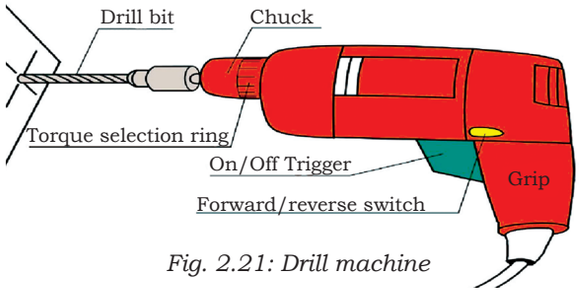


Fig. 2.21: Drill machine

Safety precautions

Before installing the bit in a drill machine, it should be sharpened.

The key in the chuck, a part of the drill machine used for tightening the drill bit, should be removed after tightening.

Drill bits

These are the tools used to make cylindrical holes by cutting the material. Bits are fitted in a tool which rotates it and make the hole. For non-cylindrical shaped holes, specialised bits are used (Fig. 2.22).


Fig. 2.22: Drill bits

Hangers

The purpose of a pipe hanger is to hold or support a pipe or a group of pipes from a slab, beam, ceiling or other structural elements (Fig. 2.23).


Fig. 2.23: Pipe hangers

Measuring tape

It is used for measuring the length of an item. The measuring tape is manufactured in various material like steel, cloth and PVC. The length range available is one metre, two metres, three metres, five metres, 10 metres, 15 metres, etc. (Fig. 2.24).


Fig. 2.24: Measuring tape

Plumb rule and bob

This is a useful tool to ensure verticality and uniformity during construction of walls, columns and wooden frames like doors and windows. It also helps in levelling the surface of the floor. It consists of a holding pipe, thread and a plumb bob made of wood and metal. The plumb bob is connected to the holding pipe with the thread (Fig. 2.25).


Fig. 2.25: Plumb bob

Spirit level

It is used to check the horizontality or levelling of the floor, roof, door, window frame, etc. (Fig. 2.26).


Fig. 2.26: Spirit level

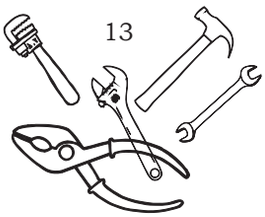


Fig. 2.27: Trowel

Trowel

It is used for mixing cement and sand for masonry work. It is used for plastering the surface (Fig. 2.27).

Fig. 2.28: Spade

Spade

A spade is used for digging purpose and for mixing cement, sand and concrete. It consists of a flat form made of steel with an eye hole to hold the wooden handle. The size of a spade is designated by its width and length of the plank (Fig. 2.28).

Fig. 2.29: Shovel

Shovel

It is used for mixing concrete and also for carrying concrete to mortar pans. Shovels are made of steel sheets. The size is designated by its length and width (Fig. 2.29).

Fig. 2.30: Pickaxe

Pickaxe

It is made of steel and is used to excavate hard soil. One end of the pickaxe is flat whereas, the other end is sharp in design (Fig. 2.30).

Fig. 2.31: Mortar pan

Mortar pan

This is used to carry the excavated material, cement mortar, concrete, etc. It should never be used for measurement of mixed cement mortar, etc. Mild steel sheet is used for making mortar pan (Fig. 2.31).

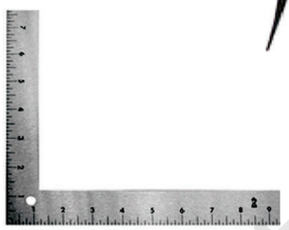


Fig. 2.32: Mason's square

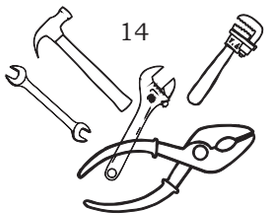
Mason's square

It is used to check rectangularity of external and internal corners. It is made of carbon steel sheet. The dimension is also marked on both the sides, either in inch or centimetre (Fig. 2.32).

Fig. 2.33: Water level tube

Water level tube

This tube is used to check and transfer water levels, etc. Water is poured inside the tube at the time of use. Polythene tubes of varying diameter from 10 to 15 mm, and lengths varying as per the requirement are used (Fig. 2.33).



Rover jumper

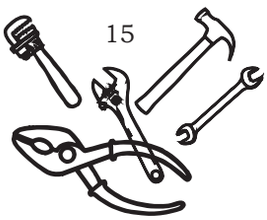
It is used for making a gap in the wall so that plumbing fixtures can be fixed (Fig. 2.34).

Fig. 2.34: Rover jumper

Safety during work

The following precautionary measures may be taken for the safe use of the plumbing tools.

1. Use the correct methods given in the 'Instruction Manual of tools' while using them.
2. Use the appropriate tools required for the specific work or job. For example, do not use pliers instead of a hammer; use only a hacksaw to cut.
3. Keep the tools in working condition and ensure the required maintenance.
4. Ensure that the necessary protective equipment are available.
5. Follow safety methods while using electrical wires.
6. Use kerosene oil for removing dust from rusty nuts.
7. Do not use tools without a handle as they may not give proper grip.
8. Remove burrs or stuck material from the head of the chisel and the edges of tools.
9. Wear safety glasses while using power tools like a drill machine.
10. Keep metal parts lightly lubricated.
11. Do not apply excessive pressure or force.
12. Inspect the tools regularly.
13. Use or wear safety gear (helmet, gloves, goggles, safety shoes, ear plugs, etc.).



Practical Exercises

Activity 1

Draw figures of plumbing tools.

Material Required

1. Pen
2. Pencil
3. Plumbing tools

Procedure

1. Collect the plumbing tools available in your classroom.
2. Make a list of the plumbing tools available.
3. Draw figures of the plumbing tools and label them.

Activity 2

Draw figures of masonry tools.

Material Required

1. Pen
2. Pencil
3. Masonry tools

Procedure

1. Collect the masonry tools available in your classroom.
2. Make a list of the masonry tools available.
3. Draw figures of the masonry tools and label them.

Check Your Progress

A. Answer the following questions

1. List down the different plumbing tools and their uses.
2. Differentiate between the fitting tools and cutting tools.
3. What are the different parts of a drill machine?
4. What are the methods adopted for safe handling of the pipe cutter, pipe bending and drilling machines?

B. Fill in the blanks

1. The bench vice is a type of _____tool.
2. The instrument which is used to check rectangularity of external and internal corners is called _____.
3. For excavating hard soils, _____ is used.
4. _____ is a tool used for making a hole in a metal, wood or concrete.
5. A chisel is used for _____ and joining works.

C. Match the following

Column A	Column B
(1) Spanner	(a) Holding tool
(2) Hacksaw	(b) Fitting tool
(3) Threading dies	(c) Cutting tool
(4) Bench vice	(d) Pipe bending tool