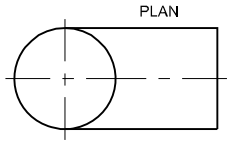
Development of a pipe elbow joint

Objectives: At the end of this lesson you shall be able to
- **develop and layout the pattern for 90° elbow joining two equal diameter pipe by parallel line method.**

Develop the pattern for a 90° elbow of equal diameter pipes by parallel line method:

Draw plan as shown in Fig 1.

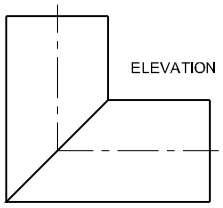
Fig 1



WLN1342111

Below this, draw the front elevation as shown in Fig 2.

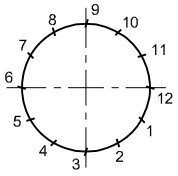
Fig 2



WLN1342112

Divide the circle in the plan into twelve equal parts and number the points 0 to 12 as shown in Fig 3.

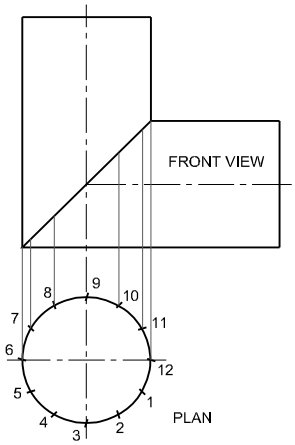
Fig 3



WLN1342113

Draw the perpendicular line from these points towards the front view and number 1 to 12 as shown in Fig 4.

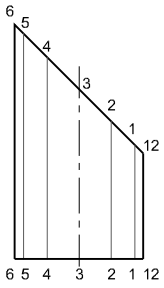
Fig 4



WLN1342114

Now you find that the vertical lines are cutting at six different points top and bottom in the elevation line. Number them as shown in Fig 5.

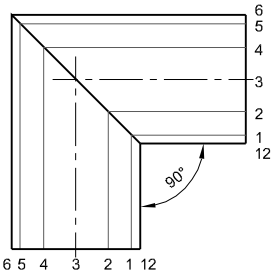
Fig 5



WLN1342115

Draw horizontal parallel lines from each point and number them as shown in Fig 6.

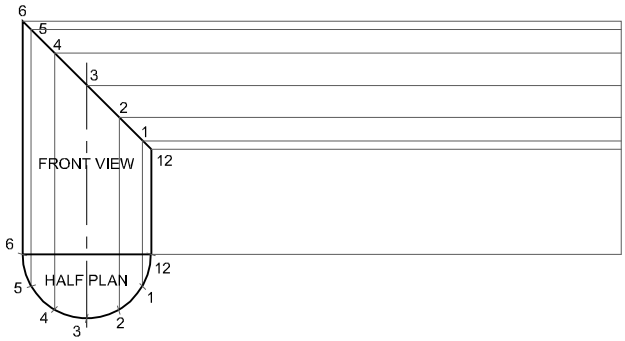
Fig 6



WLN1342116

Extend the front elevation base line as shown in Fig 7.

Fig 7



WLN1342117

Take the distance equal to one division of plan and mark twelve times on base line by a compass and draw perpendicular lines from each point as shown in Fig 8.

Now you find that each horizontal line and corresponding vertical line meet at a point. Number the points as 1 to 12 as shown in Fig 9.

Fig 8

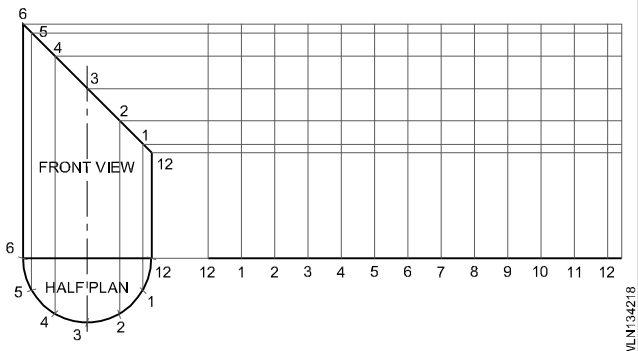
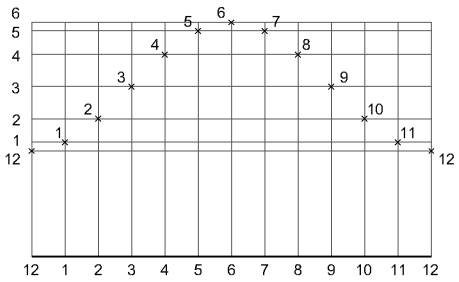
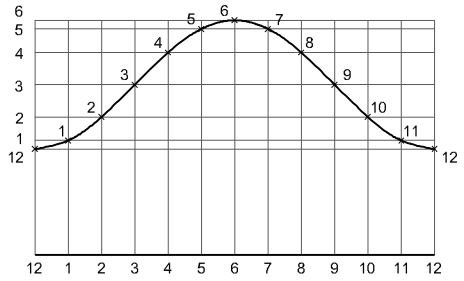


Fig 9



Join these points by free hand curve as shown in Fig 10.

Fig 10



Development of a pipe "T" joint

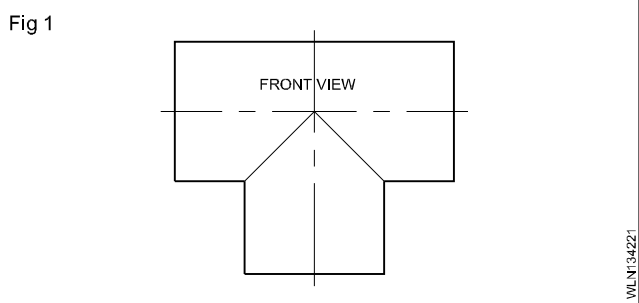
Objective: At the end of this lesson you shall be able to

- **develop and layout the pattern for 90° "T" pipe of equal diameter by parallel line method.**

Develop the pattern for a 90° "T" pipe of equal diameter by parallel line method:

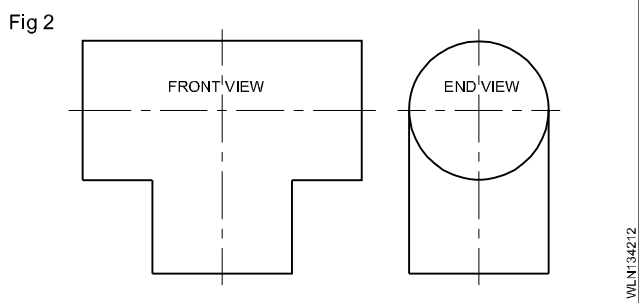
Draw the front view as shown in Fig 1.

Fig 1



Draw the side view as shown in Fig 2.

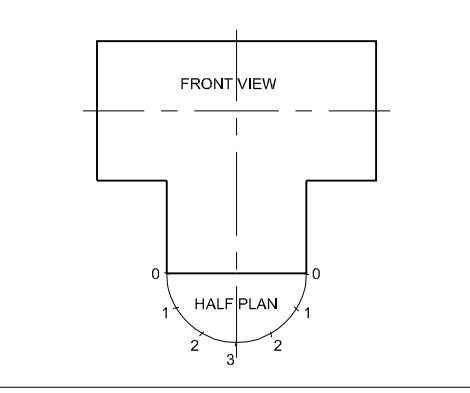
Fig 2



Draw a semi-circle on the base line of the front elevation. (Fig 3)

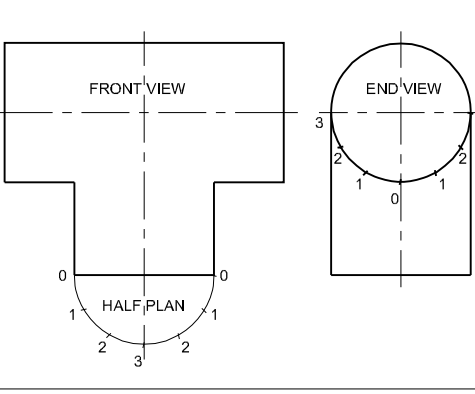
Divide the semi-circle into six equal parts and number them as 0, 1, 2, 3, 2, 1, 0. (Fig 3)

Fig 3



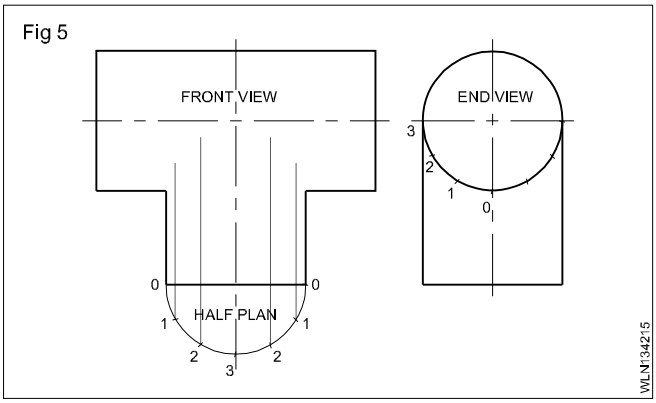
Divide a semi-circle in side view into six equal parts and number as 3, 2, 1, 0, 1, 2, 3 as shown in Fig 4.

Fig 4



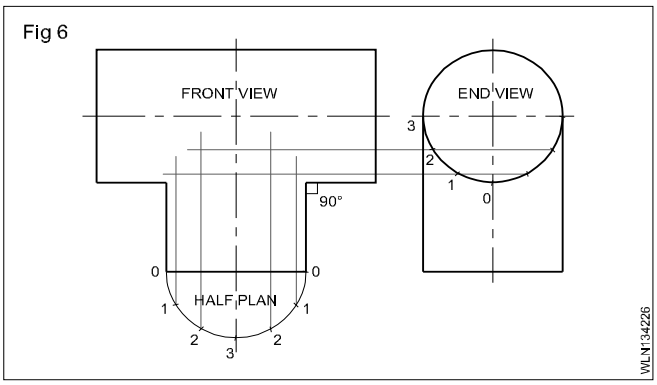
Draw the perpendicular lines from each point of the semi-circle of the view as shown in Fig 5.

Fig 5



Draw horizontal lines from the side view towards the front view as shown in Fig 6.

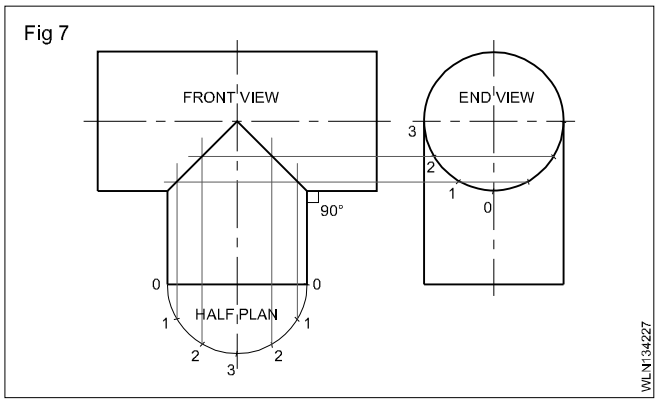
Fig 6



Now the vertical lines of the front view and the horizontal lines of side meet at their respective points.

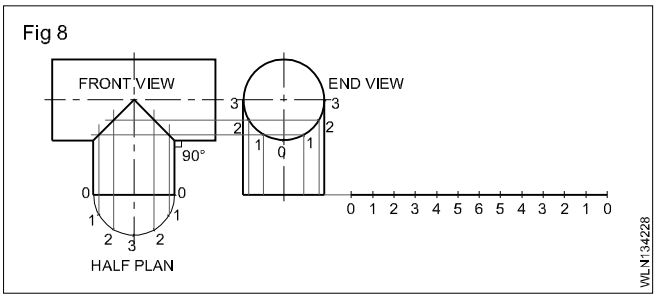
Join these points to get the line of intersection of "T" pipe as shown in Fig 7.

Fig 7



Extend the base line of the side view and mark the end point as 0. (Fig 8)

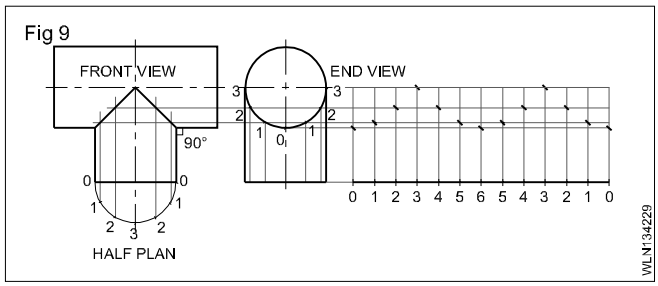
Fig 8



Take one division of the semi-circle in side view and transfer it 12 times on the base line starting from: 0: and number as 0, 1, 2, 3, 2, 1, 0, 1, 2, 3, 2, 1, 0 as shown in Fig 9.

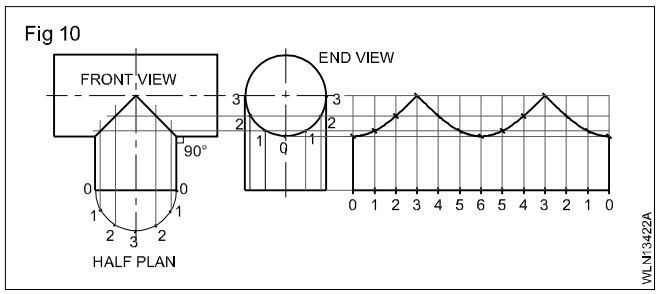
Draw perpendicular lines from these points and draw horizontal lines from the points on the line of intersection of "T". These line meet at their respective points. (Fig 9)

Fig 9



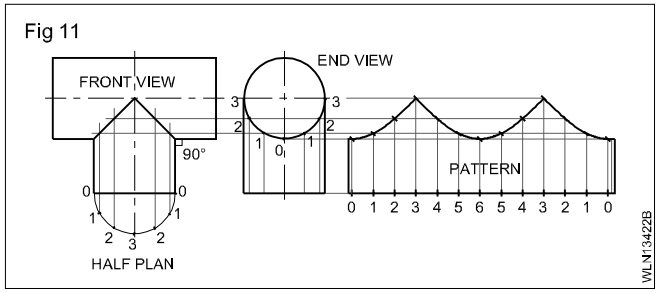
Join these points by free hand curve. (Fig 10)

Fig 10



Provide locked grooved joint allowance as shown in Fig 11.

Fig 11

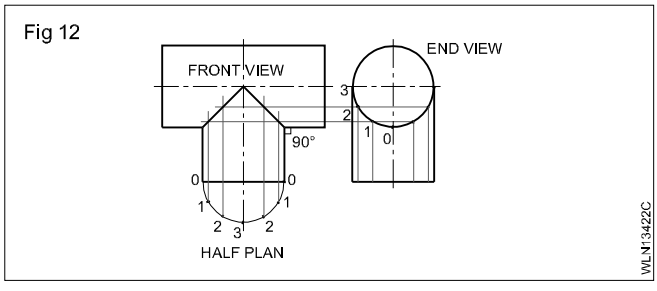


Check the pattern once again and cut. Thus you get the pattern for branch pipe.

For main pipe, develop and layout the pattern as follows:

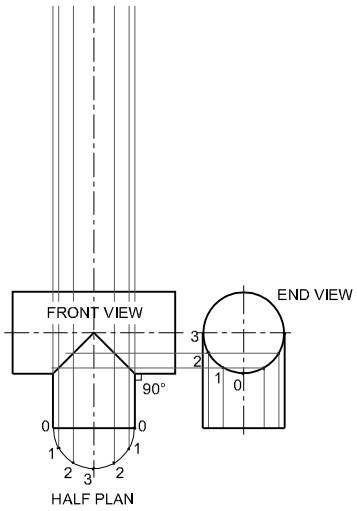
Draw the front view and end view. (Fig 12)

Fig 12



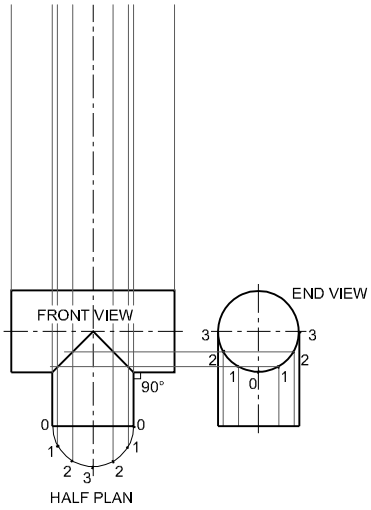
Extend the vertical lines 0, 1, 2, 3, 1, 0 of branch pipe from the front view as shown in Fig 13.

Fig 13



Extend the two extreme end vertical lines of the main pipe from the front view as shown in Fig 14.

Fig 14



On one of these lines, take point "0" as starting point and mark points 0, 1, 2, 3, 2, 1, 0, 1, 2, 3, 2, 1, 0 at equal distances equal to one division of the semi-circle and draw horizontal lines from these points. (Fig 15)

Now these horizontal lines meet the vertical lines at their respective points as shown in Fig 16.

Join these points by free hand curve and get the pattern for the main pipe. (Fig 17)

Provide the locked grooved joint allowances as shown in Fig 17.

Fig 15

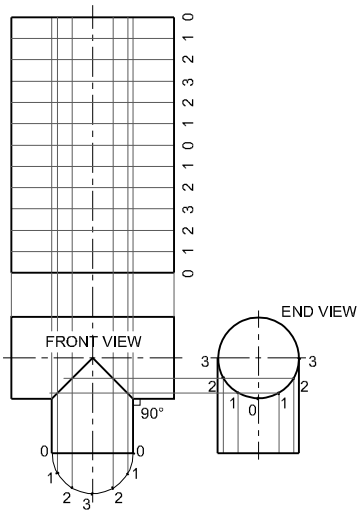


Fig 16

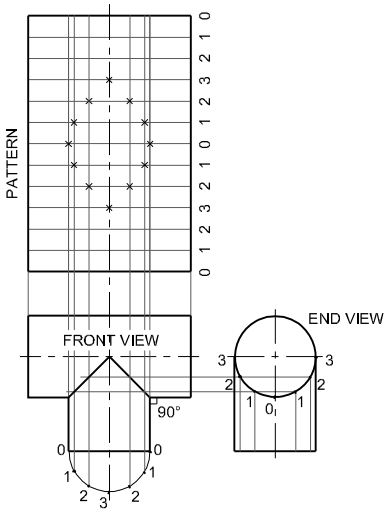
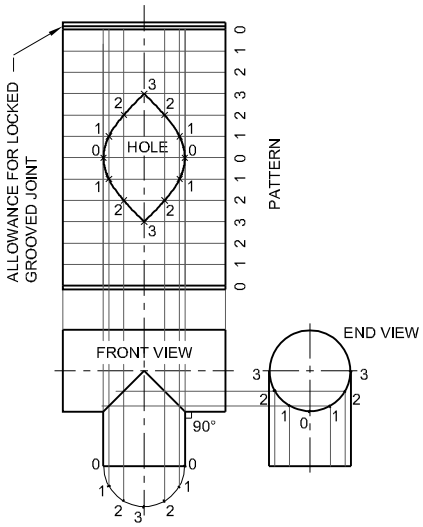


Fig 17



Pipe development for "Y" joint

Objectives: At the end of this lesson you shall be able to
- **develop and able to layout the pattern for "Y" joint pipes intersecting at 120°**
- **develop and layout the pattern for "Y" joint pipes branching at 90°.**

Development of "Y" joint pipes intersecting at 120°: Draw the development of intersecting cylinders of dia. 30 mm at 120°. (Fig 1)

All the cylindrical pipes are of same diameter and intersecting each at equal angles. Hence in this case the development of all the pipes are same and so the development of one pipe will represent other pipes.

- Draw the plan and elevation of the pipe 'A' and mark the division on the plan. (Fig 1b)
- Draw the vertical projectors from the plan to front view to meet the line of intersection.
- Draw horizontal projectors from these points on to the development.
- Mark the intersecting points and join with a smooth curve to complete the required development.

Development of 'Y' joint branching at 90°: Three cylindrical pipes of X, Y, Z form a 'Y' piece. (Fig 2) Draw the lateral surface development of each pipe.

In the three pipes XYZ, Y & Z are similar in size and shape, hence their developments are also similar.

- Draw the development of pipe 'X' as in the previous exercise.
- Draw the elevation and plan of pipe 'Y' as shown.
- Divide the plan circle into 16 equal parts.
- Project the points to the elevation.
- Draw the rectangle ABCD in which AB is equal to D.
- Draw the development of pipe Y as shown in Fig 2.

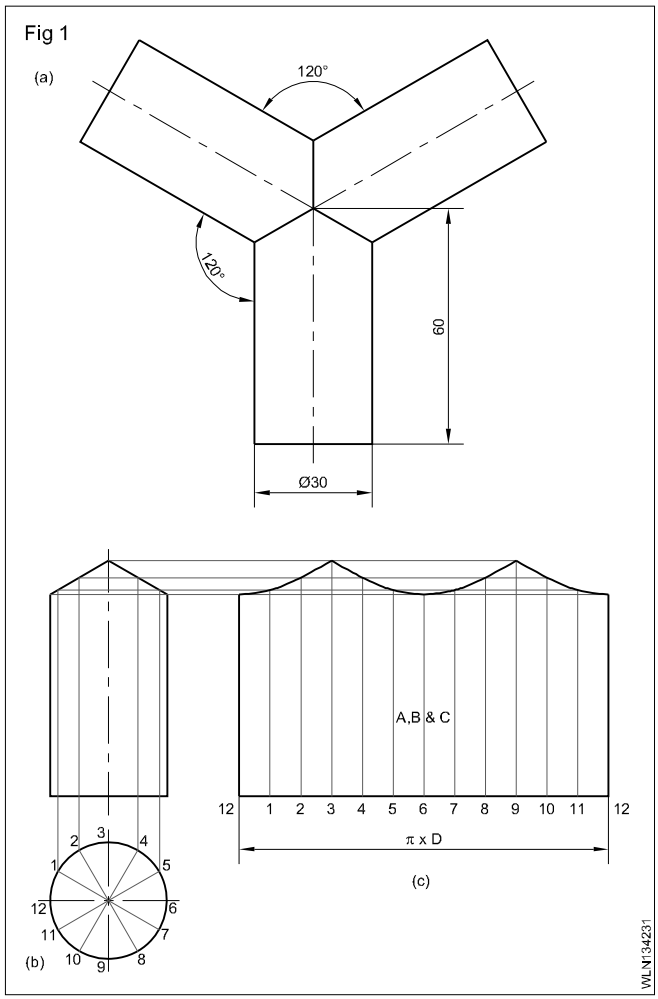
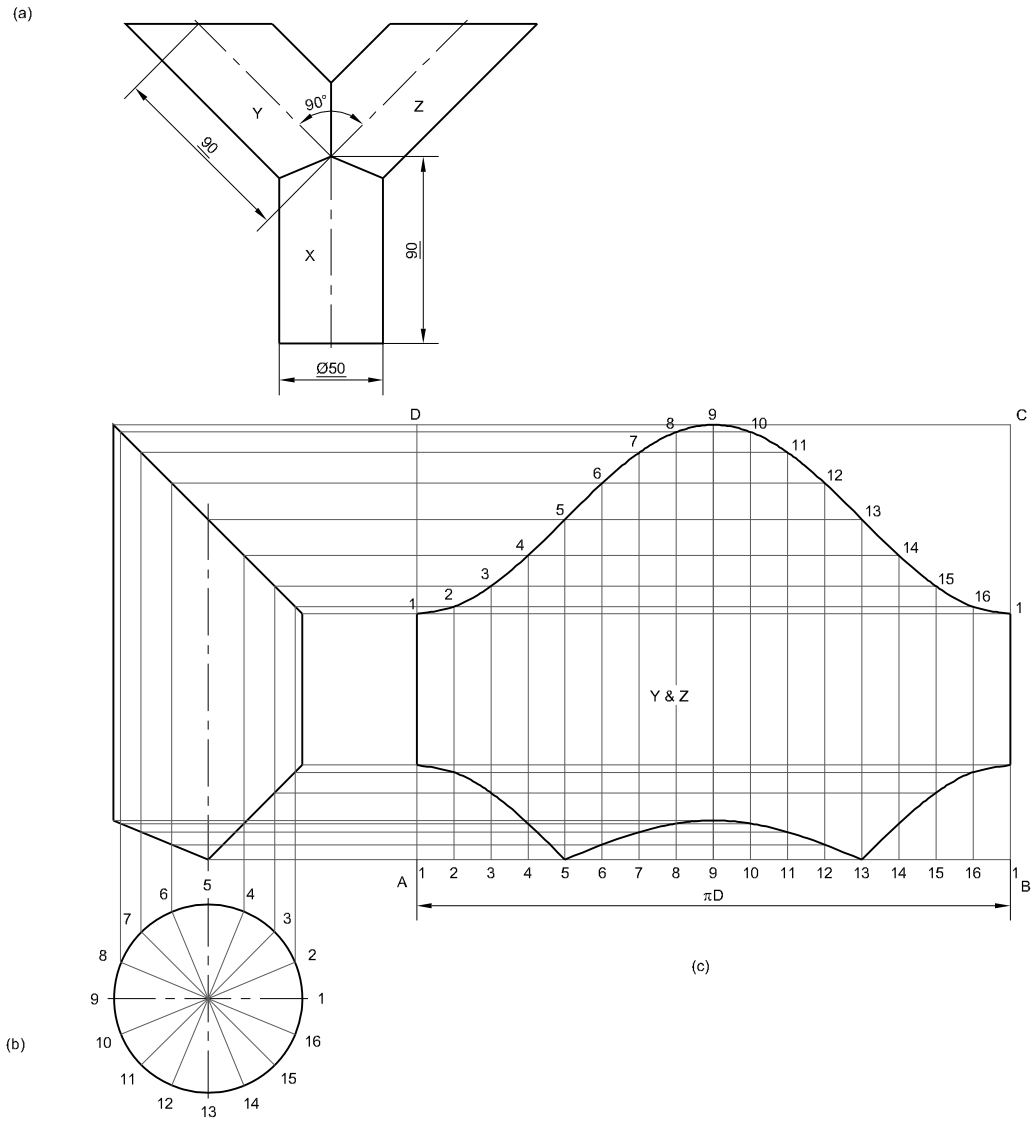


Fig 2



Development of 45° and 90° branch pipe

Objective: At the end of this lesson you shall be able to

- **prepare the development of pipe for 45° and 90° branch pipe.**

Procedure for development of 45° branch pipe: Refer Fig 1. Draw a center line AB.

Mark the points C, D, E and F taking the radius and the length of the given pipe with the center line AB as reference line.

On the line "CD" locate the position of the 45° branch pipe. This will be "G".

Draw a 45° angle at the point "G".

Choose a suitable height and mark the height of the branch pipe (GI) in 45° line from point G.

From I, draw a horizontal line on both sides (XX'). This XX' will be the base line for drawing development.

From I, plot the outside diameter of the branch pipe IJ on the line XX'.

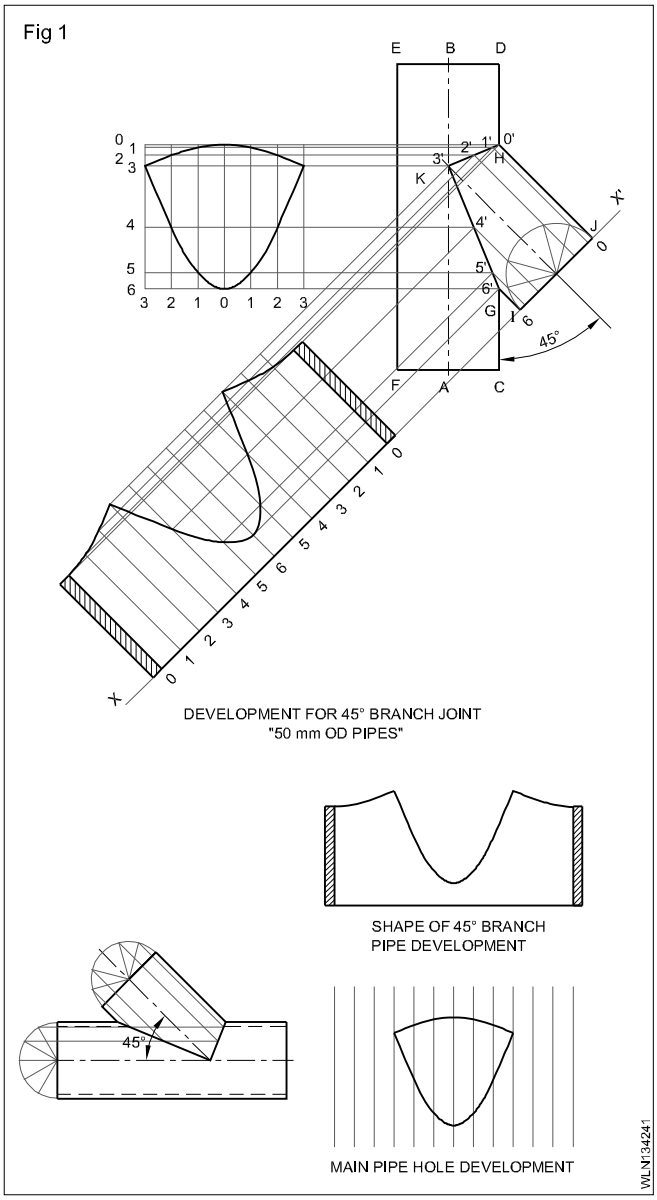
Draw a center line for the branch pipe. This line will cut the main pipe's center line AB at K.

Join GK. Draw a perpendicular line to GK at K which meets CD at H. Join KH. Now IHKHJ will be the shape (outline) of the branch pipe.

Draw a semi-circle equal to the branch pipe outside diameter.

Divide the semi-circle into 6 equal parts as 0-1; 1-2; 2-3; 3-4; 4-5 & 5-6.

Fig 1



Draw vertical lines from these points 1, 2, 3, 4, 5. Already there will be two vertical lines IG from the points 6 and JH from point 0. These vertical lines will cut the branch pipe lines 'GK' and 'KH' at points 6', 5', 4', 3', 2', 1', & 0'. Note that points 6' and G as points 0' and H are the same points. In the base line XX' plot 12 points equal to the distance of '0-1' as 0, 1, 2, 3, 4, 5, 6, 5, 4, 3, 2, 1, 0.

Draw vertical lines to XX' from these 13 points.

Draw horizontal lines parallel to XX' from points 6', 5', 4', 3', 2', 1', 0'. These 7 horizontal lines will cut the 13 vertical lines from the base line at 13 points.

Join the 13 cutting points with a regular smooth curve. Now the required development for the 45° branch pipe will be ready. Give allowance of 3 to 5 mm at the edges of the development. (Fig 1)

For developing a hole in the base pipe: Above the main pipe, draw 7 lines parallel to AB namely 3, 2, 1, 0, 1, 2, 3 equal to the distance of 0-1 on the semi circle.

Draw vertical lines from 0', 1', 2', 3', 4', 5', 6'. These vertical lines will intercept the 7 horizontal lines. Join the intercepting points with a smooth curve. The required development for hole is now ready.

Manifold system

Objectives: At the end of this lesson you shall be able to
- **explain the necessity of the manifold system and its types**
- **describe the construction of the manifold system**
- **explain the advantages and disadvantages of the manifold system**
- **describe the care and maintenance of the manifold system.**

When large volumes of oxygen and acetylene gas are required on a temporary or permanent basis for many welding and cutting operations in a workshop, a manifold system is most suitable one.

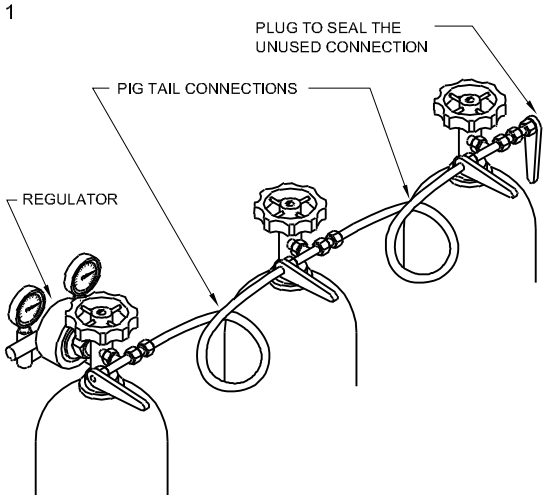
Types

– Portable manifold system

– Stationary manifold system

Portable manifold system means two or three cylinders are coupled with a suitable apparatus - namely 'PIG TAIL' and connected to a main distribution pipe. (Fig 1) Separate arrangements are made for oxygen and acetylene gases.

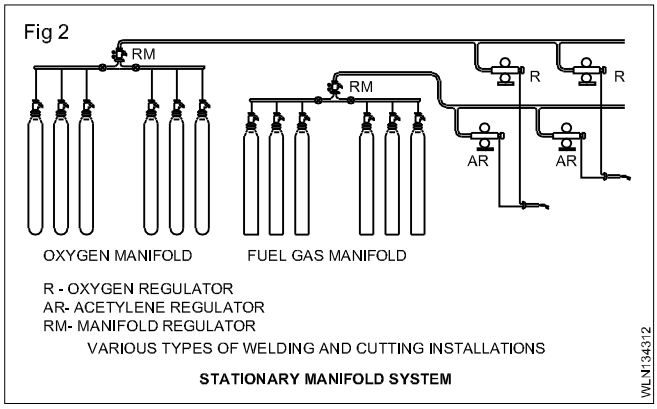
Fig 1



PORTABLE MANIFOLD SYSTEM (EXTENDABLE)

When the demand is even more, many cylinder are coupled together, and this is called stationary 'MANIFOLD' system. (Fig 2) Separate manifold systems are installed for oxygen and acetylene. These manifolds usually have two banks of cylinders. One bank is kept in reserve while the other one is in use.

Fig 2



STATIONARY MANIFOLD SYSTEM

The use of such manifolds reduces substantially the cost of handling the cylinders inside the workshop.

These manifolds are fitted with master regulators which reduce the cylinder pressure to about 15 kg/cm^2 for feeding into the distribution pipe to the various consuming points. The consuming points are fitted with an outlet value, stop-valves and regulators for individual pressure control at the site for gas welding or cutting operations.