

WELDING TECHNIQUES FOR HDPE PIPES

Butt Fusion welding is a time saving, highly economical, simple and widely accepted reliable method of joining HDPE pipes. It is a permanent jointing method by homogeneous fusion of pipe material under heat and pressure. It is performed within the temperature range of fusion of HDPE material. Perfectly homogeneous joints having the same properties as the pipe and the fitting are as strong as the parent pipe and can resist longitudinal loads.

Welding Equipments: Following are the commonly used equipments required for welding of HDPE pipes

- Hydraulic or Manually (Screw) operated Welding Jack
- Heating Mirrors with (preferably) or with out Temperature Control Unit

Welding Jack consists of a platform on which two sets of clamping arrangements for the pipes are rigidly mounted. When one of the clamping arrangements remains stationary, the other one is movable.

The movement of the platform is achieved either manually by screw operation or by hydraulic system. The hydraulic unit again could either be a manual one or an electrically operated one.

Heating Mirror is a metallic plate heated upto required temperature usually by 220 Volts electrical coil embedded inside. The contact surfaces of the Heating Mirror are covered with PTFE cloth, commercially known as Teflon, to avoid sticking of the molten material to its surface.



Welding Procedure:

1. Before starting of the welding procedure, the pipe ends opposite to the welding zones are to be loosely sealed to prevent the cooling of welding surfaces through the air draughts within the pipes.
2. The pipes are then to be mounted on the Welding Jack. When one is being firmly held on the stationary clamping arrangements, the other one is mounted on the movable side.
3. The pipes are then to be leveled and aligned properly. The ends should be cut square and slightly scraped prior to welding to remove the oxidized layer.
4. Meanwhile the Heating Mirror which is already getting heated up, should be checked for its attainment of desired temperature of 200 degree to 220 degree C.
5. Heating Mirror is then to be placed between the two pipe ends and is rested firmly with its weight properly balanced on the platform of the Hydraulic Jack. The pipes ends are then to be brought in contacts with the surfaces of the mirror from either side and held against it with only a contact pressure of 0.2 kg/sq cm per unit area of the pipe surfaces. This pressure should be on and above the Drag Pressure required for the movement of the pipes.
6. When the rim of the molten material begins to form around the periphery of the pipes, the contact pressure is reduced almost to value of the drag pressure to allow proper fusion and is maintained for a time period known as Heat Soak or Absorption Time. The reason for reduction of the initial pressure mainly are (i) high pressure results in excessive formation of molten ring which tends to get shift away more than the heating surface and (ii) low pressure helps better heat transmission in the pipe wall along the axis and which on the other hand helps for better fusion.



7. When the peripheral ring of the molten material is clearly visible, the pipes are moved away momentarily and the heating mirror removed as quickly as possible ensuring that there are no damages to the welding surfaces.
8. Immediately there after the pipe ends are to be brought in contact to each other and held against initial welding pressure which is slowly increased to final welding pressure. During this time the molten ends will form a double roll back bead against the pipe wall. The deep groove in the bead of the weld line should slowly be pushed back towards outside and bead height diminished.
9. After jointing, a double bead will be present all the way around the pipe circumferences. The shape of this bead gives first indication as to the uniformity of the weld. The weld bead formed on both the sides of the centre of the weld should be round as far as possible. It should have a uniform and regular shape all round the periphery. It should also be seen carefully for the axial alignment of the welded pipes. The surface of the weld bead should be smooth.
10. The weld thereafter be allowed to cool down completely at the elevated welding pressure and the welded pipes can be taken out of the clamps of the Welding Jack then. The actual cooling time depends on the heat input in the pipes for fusion, welding cross-section and the atmospheric temperature.
11. The weld joint should thereafter not be subjected to any external pressure for a period at least twice the weld time.