

Water Supply & Sanitary Engineering (DI05006021)

Unit 9: House Plumbing

Lecture 39: Jointing Methods and Traps

GTU Diploma Engineering

Agenda

- Importance of Proper Pipe Jointing
- Methods of Jointing (Threaded, Soldered, Solvent Weld, Flanged)
- Introduction to Plumbing Traps
- The Water Seal
- Types of Traps (P, S, Q, Gully, Intercepting)
- Summary

Importance of Proper Pipe Jointing

- A plumbing system is only as strong as its weakest joint.
- Improper joints lead to leaks, pressure loss, water damage to structures, and contamination of water supply.
- Joints must be completely watertight, and in the case of drainage, gastight.
- The method of jointing is dictated entirely by the pipe material (e.g., metal vs. plastic) and the specific application.

Joining Methods: Threaded Joints

- Primarily used for Galvanized Iron (GI) pipes and some heavy plastic pipes.
- Process: Pipe ends are cut with a die to create external (male) threads, which screw into internal (female) threads of fittings.
- Sealing: Requires a sealing material like Teflon (PTFE) tape or pipe dope (joint compound) wrapped around the male threads to ensure a watertight seal.
- Advantages: Very strong, mechanical connection. Can be disassembled if needed.

Joining Methods: Soldering (Sweating)

- The standard method for joining rigid Copper pipes.
- Process: Pipe and fitting are cleaned with emery cloth, coated with flux (paste), fitted together, and heated with a propane torch.
- Action: Solder (a metal alloy, typically lead-free) is applied to the joint. Capillary action draws the molten solder into the microscopic gap between the pipe and fitting.
- Result: A permanent, highly durable, leak-proof metallic bond.

Joining Methods: Solvent Welding

- Used for plastic pipes like PVC, CPVC, and ABS.
- Process: The pipe and fitting are cleaned, often with a primer. Solvent cement is then applied to both surfaces.
- Action: The cement temporarily softens and dissolves the surface layer of the plastic. When pushed together, the two pieces chemically fuse.
- Result: The joint becomes a single piece of plastic, stronger than the pipe itself, once cured.

Joining Methods: Flanged and Compression Joints

- Flanged Joints: Used for large diameter pipes or connecting to equipment like pumps. Pipes have flat flanges bolted together with a gasket in between for sealing.
- Compression Joints: Used for copper, PEX, or plastic without heat or glue. A nut compresses a brass or plastic ring (ferrule) against the pipe to create a seal.
- Push-Fit (Push-to-Connect) Fittings: Modern mechanical fittings where a stainless steel ring grips the pipe and an O-ring provides a seal (e.g., SharkBite).

Introduction to Traps

- A trap is a U-shaped or S-shaped fitting installed in the sanitary drainage system below or within a plumbing fixture.
- Primary Function: To retain a small quantity of wastewater after every use, forming a 'Water Seal'.
- Purpose of Water Seal: Prevents foul, toxic, and explosive sewer gases (like hydrogen sulfide and methane) from entering the building.
- It also catches heavy objects (like jewelry) and prevents them from entering the main sewer.

The Water Seal

- The water seal is the vertical depth of water between the crown weir and the dip of the trap.
- Depth: Typically ranges from 50 mm to 75 mm for standard fixtures. Deep seal traps may have 100 mm depth.
- Trap Failure (Loss of Seal) can occur due to:
 - 1. Siphonage: Negative pressure in the drain pipe sucks the water out.
 - 2. Evaporation: If a fixture is unused for a long time.
 - 3. Back Pressure: Positive pressure blowing the seal out into the room.

Types of Traps: By Shape

- P-Trap: Shaped like the letter 'P'. Discharges into a horizontal pipe. The most common and most reliable trap used under sinks.
- S-Trap: Shaped like an 'S'. Discharges downwards into the floor. Prone to self-siphonage and is banned in many modern plumbing codes.
- Q-Trap: Similar to an S-trap but discharges at a 45-degree angle. Rarely used today.
- Bottle Trap: Has a vertical cylindrical shape, retaining water at the bottom. Used in modern washbasins for aesthetic reasons.

Types of Traps: By Application

- Floor Trap (Nahni Trap): Installed in floors of bathrooms, kitchens, and wash areas to collect surface wash water. Has a grating to keep out debris.
- Gully Trap: Placed outside the building to collect wastewater from sinks, baths, and rain pipes before connecting to the main sewer. Disconnects wastewater from foul sewer gases.
- Intercepting Trap: Provided at the junction of house sewer and municipal sewer. Prevents municipal sewer gases from entering the house drainage system.

Summary

- Jointing methods (Threading, Soldering, Solvent Welding, Compression) are specific to the pipe material and application.
- Proper jointing ensures leak-proof and structurally sound plumbing.
- Traps are essential U-shaped fittings that maintain a water seal.
- The water seal acts as a physical barrier against hazardous sewer gases.
- P-traps are standard for fixtures, while Gully and Intercepting traps provide macro-level protection for the building.

Next Lecture Preview

- Principles of designing a house drainage plan.
- Two-pipe and one-pipe drainage systems.
- General plumbing operations and maintenance.
- Safety precautions in plumbing works.