

Introduction to Plumbing Systems

Introduction to Plumbing Systems – Study Notes

1. What Is a Plumbing System?

- **Definition:** A network of pipes, fixtures, and devices that supply water for consumption, distribute it throughout a building, and remove waste water safely.
 - **Primary Functions**
 1. **Water Supply** – delivers clean, pressurized water to fixtures.
 2. **Drain?Waste?Vent (DWV)** – carries used water away, prevents sewer gases from entering the building, and maintains proper pressure in the drainage lines.
 3. **Stormwater Management** – collects and disposes of rain?water runoff (often separate from DWV).
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2. Main Components

Component	Purpose	Typical Materials
Water Service Line	Connects municipal supply (or well) to the building	Copper, CPVC, PEX, galvanized steel
Main Distribution Pipe	Carries water from service line to interior branches	Copper, PEX, CPVC, HDPE
Branch Pipes	Feed individual fixtures (sinks, toilets, showers)	PEX, CPVC, copper
Fixtures & Appliances	End?points that use water (e.g., faucets, toilets)	Various finishes; internal valves often brass
Shut?off Valves	Isolate sections for repair or maintenance	Brass, bronze
Pressure Regulator	Reduces high municipal pressure to a safe level	Brass, stainless steel
Water Heater	Provides hot water on demand or storage	Steel tank, tankless units
Drain Pipes	Remove wastewater to the sewer or septic system	PVC, ABS, cast iron
Vent Stack	Allows air into the drainage system, equalizes pressure	PVC, cast iron

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Component	Purpose	Typical Materials
Trap (P-trap, S-trap)	Holds water to seal the pipe and block sewer gases	PVC, ABS, brass
Backflow Preventer	Stops contaminated water from flowing back into the clean supply	Brass, stainless steel

3. Basic System Layout

1. Supply Side

- Municipal/Well Source ? Water Meter ? Pressure Regulator ? Main Supply Line ? Branches ? Fixtures

2. Drain/Waste/Vent Side

- Fixture Drain ? Trap ? Horizontal Drain Line ? Vertical Stack ? Main Sewer Line
- **Vent Pipe** runs from the stack upward, exiting the roof.

(A simple schematic can be drawn with a "T" for the main line, branches to each fixture, and a vertical vent line.)

4. Key Concepts & Terminology

Term	Meaning
Static Pressure	Water pressure measured when no water is flowing.
Dynamic (Flow) Pressure	Pressure while water is moving; lower than static due to friction loss.
Friction Loss	Pressure drop caused by water moving through pipe walls; depends on pipe length, diameter, material, and flow rate.
Slope (Drainage Pitch)	Minimum ¼ inch per foot for horizontal drain pipes to ensure gravity flow.
Trap Seal	The water retained in a trap that blocks gases.
Air Admittance Valve (AAV)	Allows air into a DWV system where a vent stack is impractical.
Cross-Connection	Any point where potable water can mix with non-potable water; must be protected against backflow.
Lead-Free	Modern codes require all potable water components to be free of