



### Unit 3– Topic 5

Designing an effective water storage system requires careful consideration of various components, such as pipes, valves, and safety devices, to ensure safe and efficient operation. Here are some key factors to consider for each component:

#### 1. Pipe Selection:

- Material: Pipes can be made of different materials, such as PVC, CPVC, copper, galvanized steel, or stainless steel, each with its own advantages and disadvantages in terms of cost, durability, and resistance to corrosion or scaling.
- Diameter: The pipe diameter should be sized appropriately based on the required flow rate and pressure requirements of the system.
- Pressure Rating: Pipes should be rated for the maximum operating pressure of the system, with a suitable safety factor.
- Joining Methods: Consider the appropriate joining methods (e.g., threaded, solvent-welded, or flanged) based on the pipe material and installation requirements.

#### 2. Valve Selection:

- Type: Valves can be gate valves, globe valves, check valves, butterfly valves, or ball valves, each suitable for specific applications and flow control requirements.
- Material: Valve materials should be compatible with the water quality and operating conditions of the system.
- Size: Valve sizes should match the pipe sizes and flow requirements.
- Pressure Rating: Valves should be rated for the maximum operating pressure of the system, with a suitable safety factor.
- Actuator Type: Determine if manual, electric, or pneumatic actuators are required for valve operation.



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### **3. Safety Devices:**

- **Pressure Relief Valves:** Install pressure relief valves to protect the system from excessive pressure buildup, which could lead to ruptures or equipment damage.
- **Air Release Valves:** These valves are necessary to release trapped air from the system, preventing air pockets that can cause water hammer or other operational issues.
- **Backflow Prevention Devices:** Install backflow preventers, such as air gaps, double check valves, or reduced pressure zone devices, to prevent contamination of the water supply from backflow.
- **Overflow Protection:** Incorporate overflow pipes, overflow tanks, or alarms to prevent overflowing and potential flooding.
- **Level Indicators or Sensors:** Install level indicators or sensors to monitor water levels and prevent overflow or dry-run conditions.

### **4. Additional Considerations:**

- **System Layout:** Properly design the layout of the water storage system, considering factors like pipe runs, elevation changes, and accessibility for maintenance.
- **Insulation and Heat Tracing:** In colder climates, insulate pipes and consider heat tracing to prevent freezing.
- **Corrosion Protection:** If necessary, incorporate cathodic protection or corrosion-resistant coatings to prevent corrosion in metal components.
- **Monitoring and Control Systems:** Implement monitoring and control systems, such as programmable logic controllers (PLCs) or supervisory control and data acquisition (SCADA) systems, for efficient operation and maintenance.



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It's essential to follow local building codes, industry standards, and best practices when designing and installing a water storage system. Consulting with professional engineers or experienced contractors can ensure a safe, reliable, and code-compliant system.