

22 10 10 – Plumbing Pumps

1. Introduction

- A. This section pertains to all pumps for use in building systems. Pump motors are discussed to the extent that they affect pump application. Applications include but are not limited to:
 - 1. Domestic water booster pumps
 - 2. Recirculation pumps
 - 3. Dewatering sump pumps
 - 4. Sewage ejectors
- B. Designers should coordinate with Duke Office of Project Management and Duke Utilities & Engineering Services, Department of Planning & Engineering (DUES-Engineering) on all phases of projects requiring pumps and pumping equipment. These projects may include, but are not limited to:
 - 1. New buildings
 - 2. Renovations to the existing building
 - 3. Replacement of existing equipment
- C. Designers should coordinate with DUKE FMD to coordinate selection and execution requirements for pumping systems.

2. Design Standards

- A. General Requirements:
 - 1. Preferred manufacturers:
 - a. Bell & Gossett
 - b. Grundfos
 - c. Zoeller
 - d. Taco or owner approved equal
 - 2. All pumping system designs must identify energy efficiency, reliability, serviceability, operational functionality and life-safety issues. This information will allow Duke to fully and accurately evaluate the project and its associated Life Cycle Cost (LCC).

3. All pumping systems except dewatering sump pumps should be designed with full N+1 redundancy, unless otherwise indicated during the design process.
4. All pumps for building services must be installed in dedicated mechanical equipment rooms. Pumps should not be housed in temporary structures or installed in unconditioned spaces.
5. Equip all pumps with suction- and discharge-side pressure gauges and isolation valves. **A single gauge, differential pressure sensing setup is not sufficient.**
6. All pumps must be equipped with proper isolation components, such that the pump may be maintained without service outage to the system.
7. Design all pumping systems with appropriate mechanisms for air separation, air venting and fluid expansion.
8. All equipment must be supported directly by structural members with adequate load-bearing capacity and material integrity, using appropriate anchoring/connection hardware. Under no circumstances may equipment be supported by connections to finish materials. For example, equipment hung from toggle bolts through plaster-on-lath, gypsum board or ACT ceilings is **not acceptable**.

B. Domestic Water Booster Pump Systems:

1. Domestic water booster pumps shall have N+1 capability for serviceability and maintenance
2. A bypass shall be installed with isolation valves and a check valve for automatic operation should a booster pump fail.
3. Pump type shall be variable speed, multi-stage vertical type construction
4. Each pump shall have individual fused disconnects

C. Recirculation pumps:

1. Pump shall be inline wet rotor; designed for potable water circulation
2. Body: 100% lead free bronze
3. Recirculation pump motors over 2 hp must be utilize variable-frequency drives (VFD), automatically controlled based on system differential pressure. Differential pressure sensor(s) should be placed in the furthest (highest head loss) location from the pump.

D. Building Dewatering (Sump) Pumps:

1. Sump pumps should be submersible, single-stage, end suction pump, close coupled to motor with cast iron casing. Pump must be provided with elevated legs for inlet suction flow and vertical discharge connection.
2. Pump system shall be duplex type unless otherwise approved by DUES.
3. Pump motors should be min. 1/2 hp, single phase 115V power.
4. Pump should be controlled via a mechanical float-type switch. Designers must provide a high water level alarm and provide control point to Siemens Insight campus automation system.
5. Sequence of operation for duplex system shall be as follows:
 - a. Get from Sean Saunders
6. Sump pumps in areas that may receive hot water or steam condensate must be rated for high temperature operation, minimum of 140°F.
 - a. Preferred Equipment:
 - i. Zoeller Company Model M137
 - i. Weil Pump Company model 1412 or approved equal

E. Sanitary Sewage (ejector) Pumps:

1. For new construction purposes, designers are encouraged to avoid the use of sewage (ejector) pumps wherever possible. However, where lack of gravity drainage capabilities necessitate the use of such a pump, follow the requirements below:
 - a. Sewage pumps should be duplex-type, cast iron-bodied.
 - b. Provide pumps with alternating lead-lag switching and high water alarm.
 - c. Provide backup/emergency power to sewage pumps.
2. Sequence of operation for duplex system shall be as follows:

- a. Get from Sean Saunders

3. Documentation and Review Requirements

- A. Documentation of factors used in equipment selection must be submitted for review at DD submittal and each subsequent submittal if conditions have changed. Summary of factors shall identify which factors are known and which are assumptions.
- B. Detailed equipment selection, including expected sound levels.
- C. Cost of operations and maintenance shall be included in system Life Cycle Cost Analysis. This information shall be reviewed at DD submittal.

4. Installation and Performance Requirements

- A. All units shall be installed level.
- B. Permanent installation methods must include provisions for isolating pump vibration from structure. Acceptable methods include:
 - 4. Spring mount vibration isolation
 - 5. Concrete housekeeping pads with fully-grouted base
 - 6. Flexible coupling connection to independently-supported system piping
- C. All units shall be installed so that there is sufficient space to perform normal maintenance. This space shall be shown on project drawings.
- D. Pump alignment must be performed for all shaft-coupled pumps. This must be performed prior to connecting any electrical power to the pump motor.
- E. Coordinate all commissioning efforts with DUES. This includes all testing and balancing of systems, all functional performance tests and any other pertinent data obtained during the commissioning phase of the project.