

City of Albany
Alameda County, California

**GUIDELINES FOR THE DESIGN AND CONSTRUCTION
OF PRIVATE WASTEWATER PUMPING SYSTEMS**

GENERAL

These guidelines are for privately owned and maintained sanitary sewage (wastewater) pumping systems installed in the City of Albany (City). Pumping applications vary from site to site and may require special design. When required, the owner shall furnish a pumping system design prepared by a California registered professional engineer. The City and its Engineer accept no responsibility for the design, construction, operation, or maintenance of privately owned and operated wastewater pumping systems.

All design and installation shall be done in conformance with the general requirements of the Cal OSHA, current applicable electrical and building codes, and City requirements. All equipment and accessories shall be standard manufactured items, and shall be specifically manufactured for wastewater use by a company regularly engaged in the manufacturing and assembly of similar units for a minimum of five (5) years. The manufacturer's specifications for pump systems, including electrical controllers, sumps, etc., shall be submitted to the City Engineer for review and approval prior to the start of any work.

For uses other than residential, per Section 710.9 of the Uniform Plumbing Code, installations require dual pump (duplex system) designed to function independently in case of overload or mechanical failure.

All pumping system submittals shall meet the minimum requirements set forth in these guidelines, unless otherwise approved by the City Engineer.

PUMPS

Unless otherwise approved, the pump shall be one of the three types described below:

1. Centrifugal, non-clog, vertical column with enclosed shaft.
2. Submersible, centrifugal, non-clog.
3. Submersible, centrifugal, grinder pump.

If pump types 1) or 2) are used, the pumps shall have a minimum capacity of 45 GPM when pumping against the required head at LWL without surcharge unless otherwise approved by the City Engineer. The impeller shall be a non-clog type and shall be capable of passing a 2-inch sphere. The minimum pump discharge shall be 2 inches in diameter. If a submersible grinder pump is used, the pump shall have a minimum capacity of 16 gpm when pumping against the required head at LWL without surcharge for a pump discharge of 1 ¼ inches in diameter. The grinder shall be constructed of long-lasting, low-maintenance material that is capable of reducing all components in normal domestic sewage (including a reasonable amount of "foreign objects," such as paper, wood, plastic, glass, rubber, etc.) to finely divided particles which will pass freely through the passages of the pump.

The submittal must demonstrate that the velocities and pump cycling times meet the minimum requirements of the manufacturer. The applicant is responsible for submitting pump system curves, data and calculations showing that the pumps will perform as intended.

For installations with dual pumps (duplex system), an alternator shall be provided to automatically sequence the starting of the lead and lag pumps on each operating cycle so that each pump is assured of equal operation time.

Pumps shall be rated as explosion proof, designed for Class 1, Group D, Division 1 hazardous locations. The pump shall carry the Underwriters Laboratories label for this use.

As an alternate to explosion-proof submersible pumps, the installer may substitute a pump not rated for such use; however, the following additional requirements shall be met:

1. Installation of an additional low-level control wired to a redundant fail-safe circuit cutoff in the control panel that would automatically shut off the pump before the motor is exposed.
2. All relays for each level control circuit and alarm circuits shall be intrinsically safe.
3. Installation of a low water level alarm system on a separate circuit from the pump motor.

PUMP SUMP

The sump shall be cylindrical in configuration with a minimum diameter of 30 inches, and shall have a minimum distance of 16 inches between the HWL and LWL and a maximum distance of 24 inches between the HWL and LWL. Special approval is required for reduced diameter sumps or vertical “pumps-on” dimensions which are not in the specified range. The pump sump inlet invert shall be 6 inches above the HWL.

The pump sump shall be made of one of the following materials:

1. Asphalt-coated steel (prefabricated 3/16-inch steel plate).
2. Fiberglass. All fiberglass tanks shall be filament wound, minimum ¼ -inch wall thickness with tank interior surface protected with a minimum 0.10-inch thick, resin-rich, corrosion barrier and shall have anti-flotation flanges if the tank is 200 gallons or larger in capacity.

The pump sump shall be provided with a 4-inch minimum inlet stub and an outlet stub (if located on sump) the size of the pump discharge. The sump shall be designed to prevent excessive pumps cycling (switching on and off). Sump shall be designed so that pumps will run a minimum of 30 seconds. If the pump sumps are located exterior to the building or in an area subject to pedestrian or vehicular traffic the inlet and discharge pipes and electrical connections shall connect to the side of the basin. Penetrations for these connections shall be standard with the sump manufacturer. Pipes and conduits shall be fitted with manufactured hubs to prevent water from infiltrating or leaking from the sump. The sump shall be a watertight structure.

The pump sump cover shall not be less than ½ -inch epoxy coated steel plate or heavy cast iron made to accommodate the pump (if a column type) with an opening for the electrical conduits, vent, and an inspection plate. The cover shall be designed to resist the maximum dead and live

loads, including impact. Sump covers in driveways or parking areas shall be traffic rated. (H-20)

The sump cover shall be securely anchored to the pump sump by stainless steel bolts, and all joints between the component parts shall be sealed with gasketed covers that are gas tight.

The pump sump shall be securely anchored with concrete or by other suitable means to prevent against flotation. When required by the City Engineer the applicant shall submit buoyancy (anti flotation) calculations prepared by a California registered professional engineer. Pump sump covers shall be installed at an elevation and location sufficiently high that will insure that the cover will not become inundated during wet weather.

MOTOR

Motors for column-type pumps shall be a drip-proof vertical type, shall be totally enclosed weather protected, and shall conform to the standards of NEMA.

Submersible pump motors for explosion proof pumps shall be constructed with the windings operating in a sealed environment containing clean dielectric oil, with thermal overload protection. There shall be a moisture-sensing probe in the inner-seal chamber to detect moisture and warn of impending outer-seal failure. The motor shall conform to the standards of NEMA as to the enclosure, type of mounting, and basic electric design.

LEVEL CONTROLS

The pump's level controls shall be the ball and rod mechanical float or solid core mercury switches seated within polypropylene shell(s) with neoprene covered cable, or an approved equal. High water set point shall not be less than six (6) inches below invert of inlet pipe into the pump tank, and a high water alarm shall be set above the high water set point.

For nonexplosion-proof submersible pumps, the level control for the low water set point shall be positioned so that the motor is fully submerged at all times. A redundant low water pump level control shall be mounted below the low water pump level control and shall de-energize power to the pump in both the manual and automatic modes. Each pump level control shall be wired directly and independently to terminals within the control panel.

INTRINSICALLY SAFE CIRCUITS

The level control and all alarm system circuits shall be listed by the Underwriters Laboratory as intrinsically safe. The circuits shall reduce the power to the pilot devices and alarms to a value incapable of releasing sufficient thermal or electrical energy to ignite a hazardous environment.

ALARM SYSTEM

All private pumping systems shall be furnished with alarm systems. The alarm system shall be mounted within the building that is served by the pump and shall provide a visible pilot light, and an audible alarm with silencer to alert the occupant. The alarm system shall be on a separate circuit from the pump motor. A high water alarm system shall be provided for a high water condition. A low water level alarm system shall be required only for nonexplosion rated sanitary sewage submersible pumps to ensure the pump is never exposed during draw down. The alarm system shall remain latched should the high water or low water condition occur until cleared by the occupant.

CONTROL PANEL

The pump manufacturer shall supply a completely self-contained motor control panel with short circuit and overload protection for the pump.

The panel shall be mounted external to the pump tank. The panel shall have a NEMA I classification when mounted inside the building served or a NEMA 4X enclosure when mounted outside the building served. The control panel shall include a thermal magnetic circuit breaker and disconnect as required by the National Electrical Code (NEC), a magnetic starter for the pump motor, a control transformer to supply 115 volts for the control circuit, fuse, terminal strip with box lugs and wiring color coded to NEC requirements.

ELECTRICAL WORK

All electrical work shall conform to the requirements of the NEC as adopted by the City. Power requirements shall be as recommended and approved by Pacific Gas and Electric Company. Exterior pump and float cables shall be installed in rigid conduits and shall be connected directly to the panel or a water tight junction box.

HIGH WATER OVERFLOW PIPE

The installation of a high water overflow pipe is optional. If installed, the pipe shall be the same size as the discharge line and shall extend to an area where the sewage can be collected and disposed of. A check valve shall be installed in the line to keep foreign objects from entering the system.

VENT

The sump shall be vented by a two (2) inch or larger diameter vent extended to a point ten (10) feet above the sump cover with a return bend or cover at the top of the vent. Pipe material shall be schedule 80 PVC or cast iron.

DISCHARGE LINE

The pressure portion of the discharge line, including the gate valve, check valve, cleanout and mechanical couplings, shall be equal in size to the pump discharge. The discharge line connecting the check valve, gate valve, cleanout and mechanical couplings shall be hard drawn copper tubing type DWV or PVC Schedule 80. The remaining discharge line to the gravity portion of the private side sewer shall be hard drawn copper tubing type DWV with long radius bends or Schedule 80 PVC with long radius bends. There shall be a minimum twelve (12) inch vertical drop at the junction with the gravity line. Trenching and backfill shall conform to City Standard Specifications including depth and bedding requirements for side sewers.

The gravity portion of the discharge line shall meet the City requirements for side sewers.

SUBMITTALS FOR PRIVATE WASTEWATER PUMPING SYSTEMS

The applicant shall submit, as a minimum, the information required on the attached forms entitled "Private Wastewater Pumping System" consisting of three (3) pages. The application for a private pumping system shall include a plot plan showing the relative locations of the sump, the control panel, adjacent structures and connection to the gravity sewer. Additional information shall be submitted when required by the City Engineer.

ATTACHMENT: Application Form