

The contractor shall furnish and install as shown in the plans and described in these specifications, PACO (close coupled type LC, frame mounted type LF, close coupled vertically mounted type LCV) high performance end suction pumps designed to deliver the scheduled flow rate at the specified total dynamic head (in feet).

Efficiency – Pump(s) shall meet or exceed the efficiency shown in the pump schedule.

NPSH(R) – To insure cavitation-free operation, each pump's NPSH Requirement must be low enough to permit stable, continuous operation at 120% or greater of best efficiency point.

Noise – Each pump shall be capable of continuous operation without producing noise in excess of the Hydraulic Institute and OSHA guidelines.

Casing – Pump casing shall be close grain cast iron fitted with a replaceable (**lead-free bronze, cast iron**) case wear ring. Pumps with a specific speed greater than 1600 shall have double-volute casings with suction splitter to reduce radial loading and shaft deflection. All pumps shall be of the back pull-out design so that the rotating element can be removed from the casing without disconnecting the suction or discharge piping.

Impeller – Pump impeller shall be of the enclosed type of cast (**lead-free bronze, iron**) and shall be statically and dynamically balanced. Impeller diameter shall be trimmed for the specific design conditions.

Shaft Sealing – Pump shaft shall be fitted with (**a leakless mechanical seal, non-asbestos shaft packing**) suitable for the temperatures and pressures indicated.

Motor – Motor shall be of the horsepower and speed shown in the pump schedule. Pumps requiring larger horsepower shall not be acceptable. Pump shall be (flexible, close) coupled to a (**3, 1**) phase, (**60, 50**) Hertz, _____ volt, (**horizontal, vertical**), (**ODP, TEFC, Explosion Proof**) motor with (**1.15, 1.0**) service factor. 40°C ambient.

For bearing frame mounted (type LF) pumps, add the following two paragraphs:

Bearing Frame – Pump shall be mounted on a heavy-duty cast-in-one-piece cast iron bearing frame. Shaft shall be of (**carbon steel, stainless steel**). Pump bearings shall be (**permanently sealed, regreaseable, oil-lubed**).

Base, Coupling and Guard – Pump and motor shall be mounted on a channel steel base, adequately reinforced against deflection. Pump shall be connected to the drive motor by a flexible coupling capable of withstanding all torsional, radial and axial loads. Coupling and exposed rotating components of the pump and motor shall be protected by an OSHA approved guard.

For close coupled vertically mounted (type LCV pumps), add the following two paragraphs:

Pump Support – The pump shall be supported from below by a cast iron or fabricated steel mounting stand that shall be bolted directly to the suction connection of the pump. Supporting the casing from the side or top shall not be required, nor allowed.

Suction Elbow – The pump shall be provided with a (**long radius, reducing, standard radius**) suction elbow that shall be separate from the support stand. Integrally cast elbows and stands shall not be required, nor allowed.

Optional Features Recommended for Specification

To ensure quality pump installation, PACO further recommends that you specify the following items. If it is decided that these features be specified, special attention should be given to ensure that the required quality is reflected in submittals received.

Cast Iron Base (Close Coupled) – To ensure full benefit of the pump back pull-out feature, entire pumping unit shall be mounted on a cast iron drip rim base using cap screws. Pumps shall not be secured with floor studs.

Cast Iron Base (Frame Mounted) – Entire pumping unit shall be mounted on a cast iron base with drip rim. Base shall have enclosed ends and access to permit grouting.

Drip Pan (Packed Pump) – All pumps with shaft packing shall be supplied on a base having a drip pan with drain connection.

High Efficiency Motors – For additional energy savings, high efficiency motors should be specified. Desired efficiency should be stated by motor size.

Energy Evaluation – If pumps other than those in the schedule are offered, the pump supplier shall submit an energy evaluation for the engineer's approval prior to manufacture of the pumps. This evaluation shall compare proposed equipment to the specified efficiency and show that the total job operating cost will be lower or meet the operating cost at specified efficiency.