

Monday, April 8, 2019

# Double Suction Pump Specification: Coupler & Bases

Monday Morning Minutes | by Norm Hall, April 8, 2019

Today, we turn our attention to the parts of a double suction pump you can see when you walk by it; the coupler, the base, and the body. What can we say about cast iron and steel? All we can say is what you need to know.

## Coupler and Coupler Guard

The coupler connects the pump shaft and the motor shaft. The following are true for any coupler supplied with a double suction pump function.

The coupler should:

- prevent motor damage from affecting the pump and vice versa
- be acceptable for use with variable speed drives
- lend itself to ease of service.

Bell & Gossett (B&G) uses center drop out couplers for best serviceability. They are easy for the owner to understand and replace if necessary, and are readily available in major metropolitan areas. There are a few things the engineer should remember to point out in the specification and expect to find in submittals.

We want a safe environment for our client and the contractors they choose to hire. For that reason, B&G uses ANSI and OSHA coupler guards to protect people near an operating pump.

Double suction pumps normally involve larger horsepower motors. We spend a great deal of time aligning them at startup. If the contractor moves the motor during the service of the pump, the pump and motor should be re-aligned. It makes sense to employ a coupler style and base dimension that allows pump service without disturbing the motor alignment. You



do need to be careful and specify this correctly the first time since it may change the base dimensions and, often times, cannot be added later if your client wants it.

#### **Coupler and Coupler Guard Specification:**

- An ANSI B15.1 and OSHA 1910.219 compliant coupling guard shall shield the coupler during operation. Coupler guard shall be dual designed and contain viewing windows for inspection of the coupling.
- A flexible style spacer coupling, capable of absorbing torsional vibration and of operating in variable speed applications, shall be employed between the pump and motor. The coupler shall allow for removal and service of pump's wetted end without disturbing pump volute or movement of the pump's motor and electrical connections.

## **Pump Base Plate**

The base plate of double suction pumps is made of steel or cast iron. There is always a question of whether to grout the base or not. Manufacturers may or may not require grouting. In fact, B&G requires grouting on some pump styles and not on others. The purpose of grouting is that it helps to form the mass required to help protect against vibration and helps keep the pump aligned. R. L. Deppmann recommends your specification include grouting in section 3.0 installation.

#### **Base Plate Specification:**

- Base plate shall be welded structural steel fully enclosed at sides and ends, with securely welded cross members. The minimum base plate stiffness shall conform to ANSI/HI 1.3-2000, section 1.3.5.3 for *Horizontal Base Plate Design*. First modal frequency of the base shall be no less than 20% higher than the maximum operating speed (29.7 Hz at 1780RPM) of the unit.

## **General Construction and Vibration Limits**

The double suction pumps we typically use employ a National Electrical Manufacturers Association (NEMA) T frame motor and flexible style, spacer coupler. This pump is a single stage design which means it does not have multiple impellers as you may see on very large, high pressure, industrial applications or smaller pressure boosters. If we specify bronze and stainless fitted; multiple manufacturers may bid the pumps.

I like to keep the standard pump specification to lower pressure (175 PSIG) and lower temperature (250°F) applications. The pump body for these applications will be cast iron. It is important to have the right trim openings in the casing or volute. If not, you will have to show them all in the details of the piping. The volute shall include; priming port, gauge ports on bosses near nozzles, and vent and drain ports. *(If you have a higher working pressure or higher temperatures, there are many parts of your specification that will need to change. Pumps will just be one of them.)*

### **General Construction and Vibration Limit Specification:**

The Hydraulic Institute (HI) provides a standard for testing pumps. In our industry, the normal acceptable vibration limit meets the Hydraulic Institute ANSI/HI 1.1-1.5, section 1.4.6.1.1 for recommended acceptable unfiltered field vibration limits.

- The pumps shall be long coupled, base mounted, single stage, double suction, vertical split case design, in cast iron bronze fitted construction specifically designed for quiet operation. Suitable for standard operations at 300° F and 175 PSIG working pressure or optional operation up to 300 PSIG working pressure. Working pressures shall not be de-rated at temperatures up to 300F.
- Pump volute shall be of a cast iron ASTM A159 material (35,000 psi) design with an integrally cast pump discharge and an integrally cast pump suction. Flanges shall be extra heavy-duty design and will be of 250# thickness while capable of being drilled for 125# ANSI flat face use. Volute shall have integrally cast support feet, gauge ports at nozzles, and vent and drain ports.
- The pumps shall be long coupled, base mounted, single stage, double suction, vertical split case design, in cast iron bronze fitted construction specifically designed for quiet operation. Suitable for standard operations at 300° F and 175 PSIG working pressure or optional operation up to 300 PSIG working pressure. Working pressures shall not be de-rated at temperatures up to 300F.
- The pump(s) vibration limits shall conform to Hydraulic Institute ANSI/HI 1.1-1.5, section 1.4.6.1.1 for recommended acceptable unfiltered field vibration limits (as measured per HI 1.4.6.5.2, Figure 1.108) for pumps with rolling contact bearings. Pump manufacturer shall be ISO-9001 certified.
- Each pump shall be factory hydrostatically tested to 1.5 times maximum working pressure for 10 minutes per Hydraulic Institute standards and name-plated before shipment. It shall then be thoroughly cleaned and painted with at least one coat of high-grade paint prior to shipment.

## Bell & Gossett Offers Even More

There are some features built into the B&G pumps that other manufacturers may not offer. These are important features for your client when servicing the pump! Our base plate on the e-HSC is fitted with dog-point jacking screws for easy adjustment and alignment.

B&G also offers monitoring ports for bearing temperature and vibration measurement if you choose to have them installed on the pump.

### **B&G Specification:**

- Base plate shall be fitted with dog-point jacking screws for horizontal adjustment only parallel and perpendicular to pump/motor shafts.
- Bearings housings should include ports for measurement of temperature and vibration (in two axes). Bearing temperature measurement shall be measured at outer raceway of the bearing.

Remember that these benefits may not be available by other manufacturers.

Need to catch up? Check out last week's post on the Double Suction Pump Specification for Rotating Pump Elements.

Next week, the R. L. Deppmann Monday Morning Minutes will look at efficiency specifications and offer the complete specification as a word document for Double Suction Pumps.