

**SPECIFICATIONS - DETAILED PROVISIONS**  
**Section 11931 - Horizontal Centrifugal Water Pumps**

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**ATTACHMENT**

**[MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION](#)**



**SECTION 11931**  
**HORIZONTAL CENTRIFUGAL WATER PUMPS**

**PART 1 - GENERAL**

1.01 PUMP - GENERAL

The pump shall be a single-stage, horizontal extended shaft, horizontally split case, double suction type centrifugal pump. Pump shall be Goulds Model 3405, Peerless Type A, or approved equal. Pumps for electric motor drivers shall have no mounting bedplate, but shall be furnished complete with shaft coupling and safety guard.

1.02 CERTIFIED PUMP CURVES

The Contractor shall submit certified pump curves, for approval by the Engineer, for each different pumping unit to be furnished herein, showing head versus capacity, bowl efficiency versus capacity, NPSHR versus capacity, and BHP versus capacity; each curve shall be continuous over the full operating range from zero (0) flow up to the maximum flow permissible through each pump, and each curve shall be based upon the maximum RPM listed. Each curve shall state the RPM speed of the pumping unit, and shall be furnished full-size on 8 1/2" x 11" paper. The Contractor shall provide pumps capable of meeting all aspects of the Pumping Unit Design Data specified in the Special Conditions Section (SC-1) of this Specification, and as shown on the Drawings.

1.03 NPSH REQUIREMENTS

The pumping equipment to be furnished shall be designed and shall operate in accordance with the available Net Positive Suction Head (N.P.S.H.A.) listed in the Special Conditions Section of this Specification.

1.04 PUMPING UNIT FABRICATION DRAWINGS

Before the order is placed for the pumping units and appurtenances, the Contractor shall submit to the Engineer for acceptance, detailed fabrication drawings of said pumping unit material. The Engineer shall give an early acceptance or correction of the submittals.

## **PART 2 - PRODUCTS**

### **2.01 PUMP CASE**

The case shall be of close grained, gray cast iron, free from blow holes, sand pockets, and other detrimental defects, and shall be horizontally split and so arranged that the top half of said case can be removed without disturbing the rotating element of the suction and discharge piping. The suction and discharge nozzles shall extend horizontally and shall be on opposite sides in the lower half casing. The water passageways in said case shall be smooth so as to allow freedom from cavitation and permit maximum efficiency. The internally wetted portions of the pump casing shall be fusion-bonded epoxy coated in accordance with AWWA Standard C-213. The pump is to be sized such that inlet velocity shall not exceed 14 feet per second. Said case shall be equipped with suitable lifting lugs or eyebolts and shall be drilled and tapped for vent, priming, drain, and gage connections. The suction and discharge flanges shall be American Standard, drilled and faced. Said case shall be hydrostatically tested at 250 psi, 1.5 times the shut-off discharge pressure, or at a pressure prescribed by the Engineer, whichever is highest.

### **2.02 IMPELLER**

The impeller shall be of high grade bronze and shall be of the double suction type, cast in one piece, with vanes formed by accurately placed cores, and with surfaces suitably hand finished for maximum efficiency in accordance with modern practice.

Said impeller shall be effectively balanced with approved hydraulic balancing devices so that end thrust on the pump bearings is minimal. Said impeller shall also be accurately keyed to the shaft and individually fixed in an axial position by shaft sleeve nuts, or other positive positioning devices and shall be held tightly to the shaft in such a manner that the said impeller will not become loose should the pump rotate in reverse direction.

Suitable thrust collars, or other devices, shall be provided to carry any unbalanced thrust the pump or driver might develop, and to insure proper positioning of the impeller in the case.

### **2.03 WEARING RINGS**

Renewable bronze wearing rings shall be provided on the casing only. Said rings shall form a single step-type passageway. Rings shall fit with clearances so as to permit only a minimum of recirculation.

The table below lists nominal clearances for various sizes of pumps. Tolerances shall be 0.002 inch.

**Table of Wear Ring Clearances**

<b>Size of Pump (Discharge Outlet Diameter-inches)</b>	<b>Nominal Wear Ring Clearance (inches)</b>
4	0.012
5	0.014
6	0.016
8	0.018
10	0.020
12 & 14	0.022
16	0.024
18	0.026

A positive means shall be provided so that the said wearing rings will not rotate, or change position with respect to their support.

#### 2.04 STUFFING BOXES

The stuffing boxes shall be large and deep and shall hold a minimum of five (5) rows of soft, graphited, braided, non-asbestos packing and a bronze lantern water seal ring.

The packing gland shall be horizontally split in two halves so as to facilitate removal for repacking. Gland bolts shall be made of stainless steel with brass nuts.

#### 2.05 SHAFT

The shaft shall be made of high grade stainless steel AISI-303 S.S. or better, and shall be turned, ground, and polished to highly accurate dimensions. Said shaft shall be designed with a high safety factor so as to easily withstand the torsional loads and other stresses to which it may be subjected. Said shaft shall be so designed that no detrimental vibrational stresses will occur. The shaft shall be threaded to allow axial adjustment of the impeller by means of threaded sleeves or sleeve nuts.

#### 2.06 SHAFT SLEEVES

The shaft shall be protected through the stuffing boxes by means of removable bronze shaft sleeves, threaded to the shaft and secured by set screws.

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Said sleeves shall be so designed as to prevent leakage between the shaft and said sleeves, and rotation of the shaft within said sleeves. The sleeves shall present a smooth surface to the packing material so that packing pressure may be kept to a minimum.

2.07 SHAFT COUPLING

The shaft coupling shall be P. X. Dodge Paraflex or Woods. Flanges shall have no projecting bolts or nuts, and outer surface of the coupling shall be accurately machined and dressed. Coupling shall have a manufacturer's rating in excess of the brake horsepower requirement of the pump, and the recommended operating speed range of the coupling shall include the normal RPM of the pump.

2.08 BEARINGS

The bearings shall be of the sleeve or shell type or ball and face type, and shall be so designed as to allow their complete removal with the removal of the rotating element. Bearings shall be designed for minimum B-10 life of 20,000 hours continuous duty. The outboard bearing shall be angular-contact ball thrust type, and the inboard bearings shall be a single-row radial type ball bearing. Bearings shall be grease lubricated and shall be designed to operate for extended periods of use without adding extra lubrication.

2.09 MISCELLANEOUS FITTINGS

Drain connections shall be provided at all low points in the pump volutes, as well as at the drip pockets underneath the stuffing boxes and all other points where drainage should be possible. The volutes shall be provided with air vents so that the pump can be freed from air pockets. Stuffing boxes shall be provided with in and out connections, and all other miscellaneous items as required shall be provided.

At least two (2) jack screws shall be provided on opposite ends of the upper casing to facilitate upper casing separation.

Packing lubrication water shall be plumbed from discharge piping beyond the downstream check valve to the stuffing box fittings of the upper casing.

**PART 3 - EXECUTION**

3.01 EQUIPMENT TESTING

The purpose of equipment testing is to demonstrate that the pump units meet the specified requirements.

- A. Tests shall be performed on the actual assembled unit over the entire operating range on the certified performance curve. Prototype model tests will not be acceptable.
- B. All pumps 10 to 50 horsepower shall be factory-tested in accordance with the above specifications. Pumps larger than 50 horsepower may be subject to a "factory witness test" attended by a District representative. The District shall be notified at least 2 weeks in advance such that a representative can witness the pump testing. Certified test results shall be submitted to the Engineer for approval prior to shipment.
- C. Pump curves shall reflect data secured during actual test runs and shall be signed by a responsible representative of the pump manufacture. Test reports and procedures shall conform to applicable requirements of the Hydraulic Institute Standards.

### 3.02 INSTALLATION

The Contractor shall install all pumping equipment in strict accordance with the manufacturer's instructions. Care shall be used in handling to avoid bumping, twisting, dropping, or otherwise damaging the equipment.

All pump manufacturers shall furnish the services of factory-trained personnel as required to examine the installation, supervise start-up of equipment installed, and repair the equipment at no additional expense to the District.

### 3.03 FIELD ACCEPTANCE TEST

The contractor under this specification shall have full responsibility for the proper installation and performance of said pumping equipment, including furnishing the services of a pumping equipment Field Service Engineer to inspect equipment installation, and to adjust, if necessary, any portion of the pumping equipment required herein. The manufacturer's Field Service Engineer shall assist the District in the proper conduct of pumping unit field acceptance tests. The pump units shall perform in the field as shown on the certified pump curves furnished by the Contractor. Tests shall also demonstrate operation without cavitation, vibration, overheating of moving parts, and excessive noise. The Contractor and pump manufacturer shall make necessary corrections to achieve smooth pump operation. In the event the tests reveal noncompliance of the workmanship or equipment, the Contractor shall either make alterations as necessary or replace the pumps in order to meet the requirements of the specifications at no additional cost to the District.

### 3.04 CERTIFICATION OF INSTALLATION

The Contractor shall submit the attached "Manufacturer's Certificate of Proper Installation" to the District confirming that all pumping equipment was inspected, operation checked, and installation approved in writing by the respective pumping equipment representative.

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3.05 WARRANTY

All pumping equipment shall carry an extended warranty for a two year period from the date of **acceptance**. All warranties shall be turned into the District prior to project completion.

3.06 MAINTENANCE BOND FOR PUMPING EQUIPMENT

The contractor or his supplier shall provide a maintenance bond (see EMWD standard form C-14 or C-14.1) from a bonding company acceptable to the District equal to 100% of the pumping equipment value (including motors, pumps and pump assemblies) for a two (2) year term starting when the District has accepted the contracted work. Equipment and/or components failing within this period due to deficiency in design, workmanship or material shall be removed, replaced, and reinstalled at no cost to the District, and said replacement shall be guaranteed for two years continuous service. The maintenance bond shall be submitted to the District prior to the performance test of the pump(s).

**END OF SECTION 11931**



**MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION**

OWNER: \_\_\_\_\_ EQPT SERIAL NO: \_\_\_\_\_  
EQPT TAG NO: \_\_\_\_\_ EQPT/SYSTEM: \_\_\_\_\_  
PROJECT NO: \_\_\_\_\_ SPEC. SECTION: \_\_\_\_\_

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- Installed in accordance with Manufacturer's recommendations.
- Inspected, checked, and adjusted.
- Serviced with proper initial lubricants.
- Electrical and mechanical connections meet quality and safety standards.
- All applicable safety equipment has been properly installed.
- System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate his equipment and (iii) authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

By Manufacturer's Authorized Representative: \_\_\_\_\_  
(Authorized Signature)

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