

A. Scope

This specification covers a lineshaft turbine pump with above ground discharge, the lineshaft bearings lubricated by the water being pumped and furnished with suitable driver and accessories as specified herein. The pumping unit shall be designed and furnished in accordance with the latest Hydraulic Institute and AWWA Standards for lineshaft turbine pump.

B. Service Conditions

The pump shall be designed and constructed to operate satisfactorily with a reasonable service life, when installed in a dependable and adequate water resource location. The pump shall be the product of, and manufactured by Goulds Pumps, ITT Industries. Other manufacturers will be considered providing the unit offered is an approved equal in all respects to the brand and model preferred by the customer. Factory pump performance curves for alternate pumps shall be submitted with the bid.

C. Operating Conditions

Design flow conditions: _____ Gallons per minute

Design head: _____ Feet total dynamic head (TDH)

Minimum pump efficiency: _____ Percent

Maximum allowable speed: _____ RPM

Pump bowl setting: _____ Feet

Well diameter I.D.: _____ Inches

D. Pump Construction

- 1. Bowl assembly:** The bowls shall be flanged type constructed of close grained cast iron conform to ASTM A48, class 30. They shall be free from sand holes, blowholes, or other faults and must be accurately machined and fitted to close tolerances. They shall be capable of withstanding a hydrostatic pressure equal to twice the pressure at rated flow or 1.5 times shut-off head, which ever is greater. The intermediate bowls shall have enamel or epoxy lined waterways for maximum efficiency and wear protection. All intermediate bowls shall be of identical design for interchangeability. A discharge bowl shall be used to connect bowl assembly to the discharge column. All the bowls (include the discharge bowl) shall be fitted with sleeve type bearings of bronze alloy C89835.
- 2. Impellers:** The impellers shall be constructed from ASTM B584 Silicon Bronze and shall be the enclosed (or semi-open) type. They shall be free from defects and must be accurately cast, machined and filed for optimum performance and minimum vibration. Impellers shall be balanced to grade G6.3 of ISO 1940 as minimum. They shall be securely fastened to the bowl shaft with taper locks of C1018 steel.
- 3. Suction:** The suction bowl shall be provided with a non-soluble grease packed bronze bearing. A bronze sand collar shall be provided to protect this bearing from abrasives in the pumping fluids. The bearing housing shall have sufficient opening at the bottom for easy removal of the bearing.
- 4. Shaft:** The bowl shaft shall be constructed from ASTM 582 type 416 stainless steel. It shall be precision ground and polished with surface finish better than 40 RMS.

E. Column Assembly-Water Lubricated

- 1. Column pipe:** The column pipe shall be furnished in sections not exceeding a nominal length of 10 ft and shall be connected by threaded-sleeve couplings. Pump speeds between 2200 RPM and 3600 RPM shall have

intermediate column length and bearing spacing no greater than 5 feet. The length of the top and bottom sections shall not be more than 5 ft. The pipes shall be of ASTM A53 grade B steel pipe and the weight shall be not less than schedule 30. The end of the pipe shall be with 8 threads per inch with 3/16" taper per foot thread and faced parallel to butt against the centering spiders of ASTM B584 Silicon Bronze to form accurate alignment. The inside diameter of the pipe shall be such that the head losses shall not be more than 5 feet per 100 feet of pipe based on rated flow of the pump.

2. **Lineshaft:** The lineshaft shall be of ASTM A108 Grade C1045 steel, ground and polished with surface finish not to exceed 40 RMS. They shall be furnished in interchangeable section not over ten feet in length, and shall be coupled with threaded steel couplings machined from solid steel bar. It shall have left-hand thread to tighten during pump operation. The diameter of the shaft and coupling shall be designed in accordance with AWWA E101 Standard. The shaft shall be provided with type 304 stainless steel sleeve to act as a journal at each bearing location. The sleeve shall be placed on a full size shaft without undercutting and secured in position by a suitable adhesive.
3. **Bearing:** Bearing shall be fluted rubber retained in the centering spider by a shoulder on each end of the bearing

F. Discharge Head Assembly-Water Lubricated

1. **Discharge Head:** It shall be of the high profile type to allow shaft coupled above stuffing box and provided for mounting the driver and support the column and bowl assemblies. It shall be of high-grade cast iron, ASTM A48 Class 30, or fabricated steel. The above ground outlet shall be flanged to match ___ inch ANSI class 125 (for cast iron) or class 150 (for steel). It shall have a 1/2" NPT connection for a pressure gauge.
2. **Stuffing Box:** The stuffing box shall be cast iron and shall contain a minimum of five rings of packing. It shall have a pressure relief connection. The packing gland shall be a 316 SS split type secured in place with non-corrosive studs and nuts. The bearing shall be C89835 bronze. A rubber slinger shall be secured to the shaft above the packing gland.
3. **Headshaft:** The head shaft go through the stuffing box shall be of ASTM 582 type 416 stainless steel. It shall be precision ground and polished with surface finish better than 40 RMS.

G. Suction Pipe and Strainer

The suction pipe shall be ___ feet in length and shall have a minimum inside diameter and weight equal to or larger than that of the discharge column pipe. A suitable cone strainer of galvanized steel shall be provided having a free area of at least four times the flow area of the suction pipe.

H. Electric Motor

The motor shall be a heavy duty squirrel cage induction type, NEMA Class B or Class F insulation with WP-1 enclosure, ___ RPM vertical hollow (or solid) shaft motor, with a non-reverse ratchet (or self-release coupling) to prevent reverse rotation of the rotating elements. A thrust bearing of ample capacity to carry the weight of all rotating parts plus the maximum hydraulic thrust load under all conditions of operation calculated L10 life shall be no less than 8800 hours. The motor shall be standard (or premium) efficiency, 1.15 service factor, and suitable for use on ___ volt, three phase, 60 Hz electric service.

An adjusting nut shall be provided at the top of the motor for setting the impeller to bowl running clearance.