Vertical Turbine Engineering Data

Effective May, 2020

Enclosed Lineshaft Specifications

1. **Scope**

   This specification is for an oil lubricated lineshaft vertical turbine pump with above ground discharge, furnished with suitable driver and accessories to meet the requirements outlined herein or on related drawings. The pump shall be designed and furnished to conform to the latest Hydraulic Institute and AWWA specifications for Lineshaft Turbine Pumps, and shall comply with any and all relevant federal, state, and local health and safety regulations.

2. **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 manufactured by FloWise.

3. **Design Conditions**

Gallons per minute _____ (GPM)		Maximum allowable speed _____ (RPM)	
Total dynamic head _____ (TDH)		Setting depth or overall length _____ (feet or inch)	
Minimum pump efficiency _____ %		Bowl model _____	
Liquid to be pumped _____		Bowl OD _____	

4. **Pump Construction**

   a. **Strainer:**

   A galvanized cone strainer or suction bell of ductile iron ASTM A536 Gr. 65-45-12 with galvanized basket strainer can be provided. It shall have a net inlet area equal to at least four times the impeller inlet area. The maximum opening shall not be more than 75% of the maximum opening of the water passage through the bowl or impeller.

   b. **Suction:**

   The suction case shall be constructed of closed-grained cast iron conforming to ASTM A48 CL30. It shall be free from sand holes, blowholes, or other faults and must be accurately machined and fitted to close tolerances. The suction case shall be provided with a non-soluble food grade grease packed bronze bearing of alloy 907LF.A 416SS ASTM A582 sand collar shall be provided to protect this bearing from abrasives.

   c. **Shaft:**

   The bowl shaft shall be constructed from ASTM582 Type 416 stainless steel. It shall be precision ground and polished with surface finish better than 40RMS.

   d. **Impellers:**

   The impellers shall be constructed from investment casted 304SS ASTM A743/744 CF8 and shall be enclosed or semi-open type. They shall be free from defects and must be accurately cast, machined and back filed for optimum performance and minimum vibration. Impellers shall be balanced to

grade G6.3 of ISO 1940 at minimum. They shall be securely fastened to the bowl shaft with taper locks of 416SS ASTM A582 (or key and split thrust ring of SS).

e. **Bowls:**

The bowls shall be flanged, or threaded type constructed of close-grained cast iron conforming to ASTM A48 CL30. They shall be shell casted 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, whichever is greater. The intermediate bowls shall have vitreous enamel or epoxy lined waterways for maximum efficiency and wear protection. All intermediate bowls shall be of identical design for interchangeability. All the bowls shall be fitted with sleeve type bearings of bronze alloy 907LF.

f. **Discharge:**

The discharge case shall be constructed with ductile iron ASTM A536 Gr. 65-45-12, and furnished with a lower throttle bearing, of alloy 907LF, that extends into the top intermediate bowl, an inner column adapter also constructed with ductile iron ASTM A536 Gr. 65-45-12, and two (2) lip seals.

5. **Column Assembly Construction – Oil Lubricated**

a. **Column Pipe:**

The column pipe shall be furnished in sections not exceeding a nominal length of 20 ft. It shall be of ASTM A53 grade B steel pipe and weight shall be not less than schedule 40. The pipe ends shall be machined with 8 threads per inch with 3/16 taper and faced parallel permitting the ends to butt insuring alignment. The column pipe shall be selected so that friction losses shall not exceed 5 feet per 100 feet of pipe. The pipe shall be connected with threaded sleeve type steel couplings.

b. **Enclosing Tubes:**

The enclosing shall be ASTM A53 Grade A schedule 80 steel pipe in interchangeable section not more than 5 ft. in length. The ends machined square and parallel and shall butt to ensure proper alignment and sealing, they shall be straight within 0.005 in. total indicator reading for a 5 ft. section. Threaded internally to receive the lineshaft bearings. The enclosing tube shall be stabilized and centered in the column pipe by rubber centering spiders spaced at 40 ft. intervals throughout the column pipe assemblies.

c. **Lineshaft Bearings:**

The lineshaft bearings shall be installed no more than every 5 feet to provide proper stabilization of the lineshaft. They shall be bronze material, internally grooved to allow proper lubrication to enclosed lineshaft and threaded externally for connecting oil tube sections.

d. **Lineshafts:**

The lineshafts shall be ASTM A108 Grade C1045 carbon steel, turned, ground and polished with surface finish not to exceed 40 RMS. They shall be furnished in interchangeable sections not over 20 feet in length to properly match the shaft enclosing tube and discharge column. It shall have left-hand threads to tighten during pump operation. To ensure accurate alignment of the shafts, they shall be straight within 0.005 in. total indicator reading for a 10 ft. section and 0.010 in. total indicator reading for a 20 ft. section. The butting faces shall be machined with center relief and square to the axis of the shaft. The lineshaft shall be coupled with 1215 steel couplings. The diameter of the shaft and coupling shall be designed in according with AWWA E101 Standard.

6. **Discharge Head Assembly:**
   a. **Discharge Head:**
      The discharge head shall be constructed from lost foam casting process with ductile iron ASTM A536 Gr. 65-45-12 and free from sand holes, blowholes, or other faults, or fabricated steel, accurately machined with register fit for location of driver and column pipe. The above ground outlet shall be flanged to match ANSI class 125 (for cast iron) or class 150 (for steel). It shall have a 1/2" NPT connection for a pressure gauge. The lifting points shall be located on the upper supporting ribs, to allow for safe installation and removal.
   b. **Stretch Assembly:**
      The stretch assembly shall be constructed of ductile iron ASTM A536 Gr. 65-45-12. The stretch housing shall be internally threaded to accept the top tension tube. The shaft shall be aligned with bronze bearing of alloy 907LF.
   c. **Oil Reservoir:**
      The oil reservoir will be provided with copper line, sight tube and either manual dripper valve or solenoid valve for automatic applications.
   d. **Headshaft:**
      The headshaft shall be C-1045 carbon steel. Impeller adjustment shall be provided at the top of the headshaft by means of an adjusting nut which shall be locked in place.
7. **Suction Pipe:**
   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.
8. **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. 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. Provision shall be made for momentary upthrust equal to 30% of the rated down thrust. The motor shall be premium efficiency, with 1.15 service factor, and suitable for use on_____volt, three phase, 60 Hz electric service.