

SECTION 151630
PROPELLER PUMPS (S-38)

1. DESCRIPTION

This specification shall govern all work required for furnishing, installing and placing into operation the propeller pumps required to complete the project.

2. GENERAL

Pumps shall be designed for handling pre-treated domestic wastewater and suitable for high volume and low head operation. Pumps shall be single stage, 12", vertical, water lubricated, propeller type. Each pump shall include a bowl assembly, column, open line shaft, and above ground discharge head. Pumps shall be Fairbanks Morse 12" Model 8211, 1770 RPM, with B-1369.5 vane or approved equal. Three pumps shall be required.

3. PUMP CONSTRUCTION

Bowl Assembly

Pumps bowls shall be flanged, and free from sand and blow holes. The suction bell shall have a flared inlet with a grease packed lower bearing. It shall be fitted with guide vanes to minimize entrance losses. A sand cap shall be provided to prevent entrance of sand into the suction bell bearing. Suction bowls shall be provided without a strainer.

The discharge bowl shall be provided with a bearing immediately above the propeller and a connector bearing above the diffuser vanes. A discharge bowl bearing by-pass shall be provided in the bearing cavity for drainage and pressure relief.

Propellers shall be statically and dynamically balanced.

Pump shaft shall be 1.44" diameter. Propeller shall be attached to the pump shaft by longitudinal key ways and annular keyways fitted with snap rings to prevent axial movement.

Column and Bearing Retainer

Column shall be threaded, size 12" diameter, with butt joint connections weighing 43.77 lbs./ft. A 6 1/8" long sleeve type column coupling, with an O.D. of 13 7/8" shall be used to connect the column pieces. Non-revolvable lineshaft bearings pressed into stationary bearing retainers and clamped between column butt joint connections shall be provided.

Line Shaft (Open)

Line shaft shall be a minimum diameter of 1" size per ANSI - B 58.1 and shall provide satisfactory operation without excessive vibration or distortion and furnished in sections of uniform length not exceeding 10 feet. Bearings shall be lubricated with pump fluid. The lineshaft shall be coupled with threaded steel shaft couplings machined from solid bar stock. A replaceable lineshaft sleeve having a maximum diameter of 1 1/8" shall be provided at each lineshaft bearing journal.

Discharge and Packing Box

The discharge elbow shall be of the above ground configuration and shall

terminate in a 125 lb. ANSI cast iron flange with tapped holes. The pump mounting plate shall be 33 3/4" x 33 3/4" to cover an opening which will permit the withdrawal of the complete pump unit. Thickness shall be 1" and designed to adequately support the entire pump and assembly during operation. The discharge assembly shall have a 162" BD and be designed to provide a mounting surface for the electric motor as provided in "Electrical Equipment" of the standard specification. The assembly shall have adequate space for the maintenance of the shaft sealing arrangement. An open lineshaft packing box rated for a minimum working pressure of 175 PSI shall be provided. A packing box bushing, arranged for grease lubrication of the packing shall be provided. A packing gland shall be provided to compress packing. A shaft slinger shall be provided to prevent pumped fluid from traveling up the shaft into the driver.

4. PUMP MATERIALS

All materials designated are ASTM unless otherwise noted and are for description of chemistry.

Bowl Assembly

<u>DESCRIPTION</u>	<u>MATERIAL</u>	<u>SPECIFICATION</u>
Snap Ring	Stainless Steel	A564-(632)
Column Pipe	Steel	A120
Shaft Coupling	Steel	AISI-C1215
Pump Shaft	416 Stainless Steel	A582-416
Discharge Bowl	Cast Iron	A48-CLASS 30
Discharge Bowl Bearing	Bronze	B505-(932)
Intermediate Bowl Bearing	Bronze	B505-(932)
Intermediate Bowl	Cast Iron	A48-CLASS 30
Cap Screw	Steel	SAE Bolt Steel
Nut	Steel	SAE Bolt Steel
Propeller	Bronze	B145-(836)
Suction Bell	Cast Iron	A48-CLASS 30
Suction Bell Bearing	Bronze	B505-(932)
Companion Flange	Cast Iron	A48-CLASS 30
Capscrew	Steel	SAE Bolt Steel
Nut	Steel	SAE Bolt Steel
Connector Bearing	Bronze	B505-(932)

Column and Lineshaft

<u>DESCRIPTION</u>	<u>MATERIAL</u>	<u>SPECIFICATION</u>
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Lineshaft	Steel	AISI-1045
Column	Steel	A120
Bearing Retainer	Bearing	B145-(836)
Lineshaft Bearing	Rubber	Neoprene
Snap Ring	Cadmium Plated Steel	SAE 1060-1090
Column Pipe	Steel	A 120
Lineshaft Sleeve	Stainless Steel	AISI-304
Tapered Bottom Column Pipe	Steel	A283-Grade D
Shaft Coupling	Steel	AISI-C1215
Pump Shaft	Stainless Steel	A582-416
Connector Bearing	Bronze	B505-(932)

Discharge and Packing Box

<u>DESCRIPTION</u>	<u>MATERIAL</u>	<u>SPECIFICATION</u>
Adjusting Nut	Steel	A108-12L14
Water Slinger	Rubber	Neoprene
Above Ground Discharge Head	Cast Iron	A48-CLASS 30
Pipe Plug	Cast Iron	A48-CLASS 30
Gland Stud	Brass	Common Bolt Brass
Gland Nut	Brass	Common Bolt Brass
Packing Box Gland	Bronze	B145-(836)
Packing Box Gasket	Tag Board	D1170-G3111
Top Shaft Sleeve	Stainless Steel	AISI-304
Packing	Graphite Filled Asbestos	
Column Flange Gasket	Tag Board	D1170-G3111
Packing Box	Cast Iron	A48-CLASS 30
Packing Box Bushing	Bronze	B505-(932)
Top Column Flange	Cast Iron	A48-CLASS 30
Top Shaft	Steel	AISI-1045
Top Column	Steel	A120
Top Enclosing Tube Bearing	Bronze	B145-(836)
Top Enclosing Tube	Steel	A120

Underground Elbow	Steel	A283-Grade D, A120
Enclosing Tube Adapter	Cast Iron	A48-CLASS 30
Pedestral	Steel	A283-Grade D, A120
Enclosing Tube Tension Nut	Bronze	B145-(836)
Base Plate	Steel	A283-Grade D
Motor Adapter Plate	Steel	A283-Grade D

5. OPERATING CONDITIONS

At Wet Well Water Surface Elevation of 14.0

4100 GPM @ 11.0' TDH* with 65% efficiency

At wet well water surface elevation 8.0
3750 GPM @ 16.0' TDH* with 74% efficiency

*TDH does not include losses for

- (1) 10 feet of column pipe
- (2) Discharge elbow
- (3) Mechanical friction of 10' of lineshaft

6. OPERATION OF PUMPS

General

Control panel and liquid level sensors shall be in accordance with "Electrical Materials" in the standard specification.

Pump Sequence

<u>Water Surface Elevation</u>	<u>Pumping Status</u>
7.0	All Pumps off
9.0	Submersible on
12.0	Submersible off and lead on
14.0	Lag on and alarm on

7. - WARRANTY

The pump manufacturer shall provide the City with a written one year warranty against defective pump and assembly.

8. - MANUAL

The pump supplier or manufacturer shall provide five copies of an operations manual for the pumps. Each manual shall include but not be limited to the following items:

- a. Certified pump curve for each pump
- b. Parts and assembly diagram with part numbers for ordering
- c. Maintenance schedule and procedures
- d. General operations

9. - MEASUREMENT AND PAYMENT

Measurement for propeller pumps shall be made as a lump sum and shall include but not be limited to all three propeller pumps and assembly complete in place.

Payment shall be made at the unit price bid and shall fully compensate the Contractor for all equipment, labor, materials, and incidentals required for furnishing and installing pumps and assembly.