

Preliminary Plat of Oak Springs

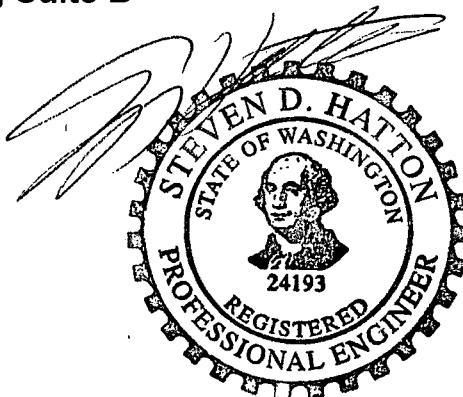
THURSTON COUNTY
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DEVELOPMENT SERVICES

**Individual STEP System
Connection Evaluation**

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Lacey, WA 98503
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October 14, 2013

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**Project No: 13-046
Project Name: Plat of Oak Springs
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PROJECT DESCRIPTION

The project proposes to subdivide approximately 20 acres into 90 single family residential lots. The project lies east of Marvin Road SE south of the plat of Evergreen Heights. Access to the property and along which sanitary sewer will be extended is obtained through county roads within the plat of Evergreen Heights. The property consists of a single tax parcel, #11825240000 at 3146 Marvin Road SE. The project is located in the southeast quarter of the northwest quarter of Section 25, Township 18 North, Range 1 West. Neighboring properties are either largely vacant or existing single family developments. The zoning for the site is Low Density Residential with 3-6 units per acre.

The proponent proposes to construct individual septic tank effluent pumped (STEP) systems within the subdivision. All piping, tankage, and pumping shall be in accordance with requirements of the City of Lacey. Effluent from individual tanks on each single family lot will be collected in new 2-inch diameter forcemains located in the proposed public streets serving the subdivision. The forcemain will exit the property in a single location at the north end of the project at Accalia Drive SE.

Effluent from all homes in Oak Springs will be pumped approximately 600 feet in a newly constructed 4-inch STEP main through Division 2 of the plat of Evergreen Heights. This plat is served by a 50,000 gallon community STEP tank located at 8825 28th Way SE. The pump discharging from this tank enters a 4-inch diameter PVC STEP main that extends to the west within the plat of Evergreen Heights, joining flows from a second 50,000 gallon community STEP tank located at 8524 28th Way SE.

These two community STEP tanks flow within the same 4-inch PVC STEP to the north along Woodgrove Drive SE and 27th Avenue SE leading into the plat of McAllister Park at Mugho Street SE. The STEP main continues through the plat of McAllister Park north and westerly until it discharges into an 8-inch STEP main located in Marvin Road.

PRELIMINARY STEP SYSTEM SIZING

Evergreen Heights discharges via a 4-inch PVC forcemain that connects to an existing 4-inch main on Mugho Street at the southern edge of McAllister Park. This 4-inch STEP main in turn joins a 6-inch main in Bedington Drive thence to an 8-inch main in 19th Avenue that extends westerly to an 8-inch main located in Marvin Road.

"Downstream" forcemains were determined to be too small to accommodate both community STEP systems in Evergreen Heights operating their 63 gpm pumps simultaneously. Therefore, peak emergency storage was provided at each station equivalent to a design peak flow over the design run time. In the event that both community system pumps do operate concurrently, the added storage allows for the reduced capacity of the pumps under the additional pumping head.

City of Lacey Engineering provided the following discharge peak flow head data in 2008 for various elevations at the STEP main in Marvin Road. (See Appendix B).

Elevation	160	170	180	190	200	210
PSI	49	43	38	32	27	22

The elevation at the intersection of 19th Avenue and Marvin Road is approximately 185. Consequently, peak discharge head at Marvin Road and 19th Avenue is estimated at 35 psi. Additional head due to friction loss from flows in the STEP mains along 19th Avenue, Bedington Drive, Mugho Street, and within

the plat of Evergreen Heights must be added to the 35 psi discharge head. This total discharge head is the pressure in the system that both individual and community STEP pumps must operate against. Head at average daily flow is only 22 psi at Elevation 185.

The Design Pumping Capacity of the two community STEP tanks in Evergreen Heights is 63 gpm each.

Cumulative Individual Flow = 6 ½% of total connections x Ave. Pump Capacity
City of Lacey individual STEP pumps produce approximately 7 gpm (P10 OSI 05)

Total Flow (Q) = # cumul conn * 6 ½% * 7 gpm + 63 gpm

Peak Flow Calculation:

Reach	ID (in)	L(ft)	Cumul. # Conn.	Cumul. Indiv. Flow (GPM)	Total Q (GPM)	Head (ft)
19 th Avenue	7.98"	1,950	650	301	364	5.5
Lower Bedington	6.09"	750	275	126	189	2.4
Lower Mugho	4.25"	1,250	225	105	168	18.3
Upper Mugho	4.23"	1,100	140	63	126	9.7
EH Phase I	4.23"	320	0	0	105	2.0
EH Phase II	4.23"	1,600	0	0	105	10.0
Oak Springs	4.23"	600	90	42	42	0.7

Total Head (ft) 48.6

$$\text{Head} = \left(\frac{Q}{130} \right)^{1.85} \frac{10.46 L}{D^{4.87}}$$

Total Discharge Head = Main HGL + Friction + Vertical

$$\begin{aligned} &= (35 \text{ psi}) + 185 + 48.6' + (256.01 - 245.97) \\ &= 324.5 \text{ HGL} \end{aligned}$$

Design Head = 324.5' – 245.97 = 78.5' TDH

Original EH2 Pump Design Point	63 gpm @ 63' TDH
With addition of Oak Springs	<u>63 gpm @ 79' TDH</u>

Individual STEP pumps are Orenco PF100511. These are high head, low flow effluent pumps with ½ HP motors. The pump will deliver 7 gpm at 150 ft of TDH. Standard City specified pumps for the individual lots in Oak Springs will be acceptable. See pump curves in Appendix B.

Evaluate the two community pumps in Evergreen Heights.

Check flow conditions at Average Daily Flow. City reported in 2008 that line pressures drop to 22 psi versus 35 psi during average daily flow. Total flow drops from 6 ½% connections to 3 ½%. In order to bracket operations of both individual and community pumps, it is relevant to check pump operation during average flow conditions.

Average Flow Calculation:

Reach	ID (in)	L(ft)	Cumul. # Conn.	Cumul. Indiv. Flow (GPM)	Total Q (GPM)	Head (ft)
19 th Avenue	7.98"	1,950	650	161	224	2.3
Lower Bedington	6.09"	750	275	70	133	1.2
Lower Mugho	4.25"	1,250	225	56	119	9.7
Upper Mugho	4.23"	1,100	140	35	98	6.1
EH Phase I	4.23"	320	0	0	91	1.5
EH Phase II	4.23"	1,600	0	0	91	7.7
Oak Springs	4.23"	600	90	28	28	0.3

Total Head (ft) 28.8

Revised head loss calculation at 3 ½% of connections = 28.8'

Design head = (22 psi) + 185 + 28.8' + (256.01- 245.97) – 245.97 = 28.7'

Low flow design point: 63 gpm at 29' TDH

Pump installed in EH1 and EH2 Community STEP Tanks is an Orenco P5015 HHF, 1 ½ hp high head effluent pump. The original design point was 63 gpm at 63 ft of TDH with an average flow condition of 23 ft TDH. With the proposed addition of up to 90 individual STEP pumps into the system, the revised pumping head for the two Evergreen Heights Community STEP Tanks will be a peak of 63 gpm at 79 ft TDH and an average pumping head of 29 ft TDH.

The existing Evergreen Heights Community STEP pumps have a design peak flow of 63 gpm. Under proposed conditions with the installed equipment, expected capacity will decline to 59 gpm at full buildout of the homes in Oak Springs. See pump curves in Appendix A.

Recommend assessing capacity of Evergreen Heights Community STEP pumps just prior to permitting to confirm discharge conditions. Existing capacity is very close to the proposed capacity needs and discharge conditions in the STEP main at Marvin Road have a great deal of influence on final pump selection. Condition the preliminary plat on this additional evaluation. Possible mitigation may include upsizing the pumps in the two community tanks.

APPENDIX A – Existing Community STEP Systems Equipment Data

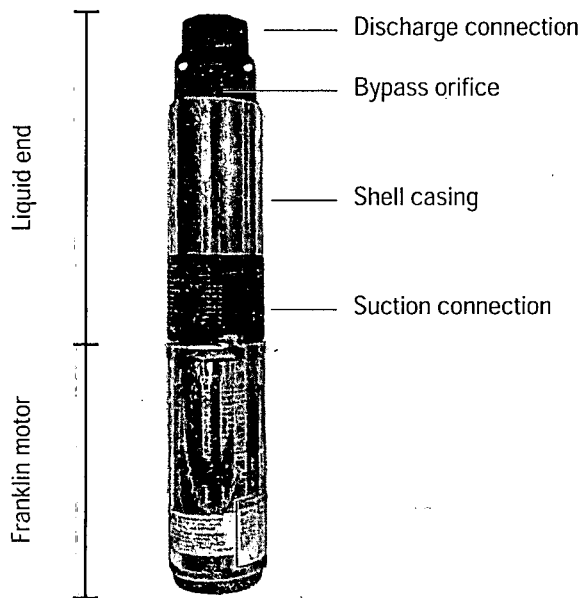
P Series High-Head Effluent Pumps

Technical Data Sheet

Applications

Our submersible High-Head Effluent Pumps are designed to transport screened effluent (with low TSS counts) from septic tanks or separate dosing tanks to collection and treatment systems. All our pumps are constructed of lightweight, corrosion-resistant stainless steel and engineered plastics; all are field-serviceable and repairable with common tools; and all standard P Series models are UL and CSA listed for use with effluent.

Orenco High-Head Effluent Pumps are used in a variety of applications, including drainfields, packed bed filters, mounds, aerobic units, effluent irrigation, effluent sewers, wetlands, lagoons, and more.



Actual view

Features/Unique Specifications

To specify this pump for your installation, require the following:

- Minimum 24-hour run-dry capability without water lubrication;
- 1/8-inch bypass orifice to ensure flow recirculation for motor cooling and to prevent air bind;
- Floating stack design to protect against upthrust and increase pump life;
- Repairable (nondisposable) liquid end for better long-term cost of ownership;
- Corrosion-resistant construction;
- Franklin motor rated for continuous use and frequent cycling;
- Type SOOW motor cable (suitable for Class I, Division 1 and 2 applications);
- Optional 5-year extended warranty against defects in materials or workmanship.

Standard Models

See specifications (on back) for a complete list. Call Orenco or your nearest distributor for three-phase specifications.

Nomenclature

P □ □ □ □ □ - □ □

Cord length:
Blank = 10'
20 = 20'
30 = 30'

Voltage:
1 = 115 (1/2 hp only)
2 = 230

Phase:
1 = single-phase
3 = three-phase

Horsepower:
05 = 1/2 hp
07 = 3/4 hp
10 = 1 hp
15 = 1-1/2 hp
20 = 2 hp
30 = 3 hp
50 = 5 hp

Nominal flow (gpm):
10
20
30
50

Pump (P Series)



Orenco Systems®
Incorporated

1-800-348-9843

P Series High-Head Effluent Pumps (continued)

Specifications

	Hp ¹	Amps ²	Nom. Flow (gpm)	Discharge (in.)	Length (in.)	MLL ³ (in.)	Cable ⁴	Listings	Rated Cycles/Day
P1005	0.50	12/6	10.0	1.25	22.50	20	SOOW	UL/CSA	300
P1007	0.75	8.0	10.0	1.25	25.00	22	SOOW	UL/CSA	300
P1010	1.00	9.8	10.0	1.25	28.00	24	SOOW	UL/CSA	100
P2005	0.50	12/6 ⁵	20.0	1.25	22.75	20	SOOW	UL/CSA	300
P2010	1.00	9.8	20.0	1.25	27.00	25	SOOW	UL/CSA	100
P2015	1.50	13.1	20.0	1.25	32.50	28	SOOW	UL/CSA	100
P3005	0.50	12/6	30.0	1.25	21.50	22	SOOW	UL/CSA	300
P3007	0.75	8.0	30.0	1.25	24.00	24	SOOW	UL/CSA	300
P3010	1.00	9.8	30.0	1.25	26.50	27	SOOW	UL/CSA	100
P3015	1.50	13.1	30.0	1.25	32.50	29	SOOW	UL/CSA	100
P3020	2.00	13.2	30.0	1.25	34.50	25	SOOW	CSA	100
P3030	3.00	17.0	30.0	1.25	43.75	44	SOOW	CSA	100
P3050	5.00	27.5	30.0	1.25	67.00	66	SOOW	CSA	100
P5005	0.50	13.2/6.6	50.0	2.00	20.50	22	SOOW	UL/CSA	300
P5007	0.75	8.0	50.0	2.00	24.75	24	SOOW	UL/CSA	300
P5010	1.00	9.8 ⁵	50.0	2.00	28.00	27	SOOW	UL/CSA	100
P5015	1.50	13.1	50.0	2.00	33.25	29	SOOW	UL/CSA	100
P5030	3.00	17.0	50.0	2.00	49.00	48	SOOW	CSA	100
P5050	5.00	27.5	50.0	2.00	63.50	50	SOOW	CSA	100
AdvanTex Pump									
PAX	0.50	12/6	10.0	1.25	19.75	18	SOOW	UL/CSA	300

1. All 1/2 horsepower pumps are available in 115 and 230 voltage models.

2. Maximum sustained amperage (service factor load). The paired amperage numbers for 1/2 hp pumps are for 115 and 230 volts respectively. All other numbers are for 230 volts.

3. Minimum liquid level.

4. SOOW type is suitable for Class I, Division 1 and 2 applications.

5. Actual running amperage may exceed the motor's nameplate amperage by 20% (UL778).

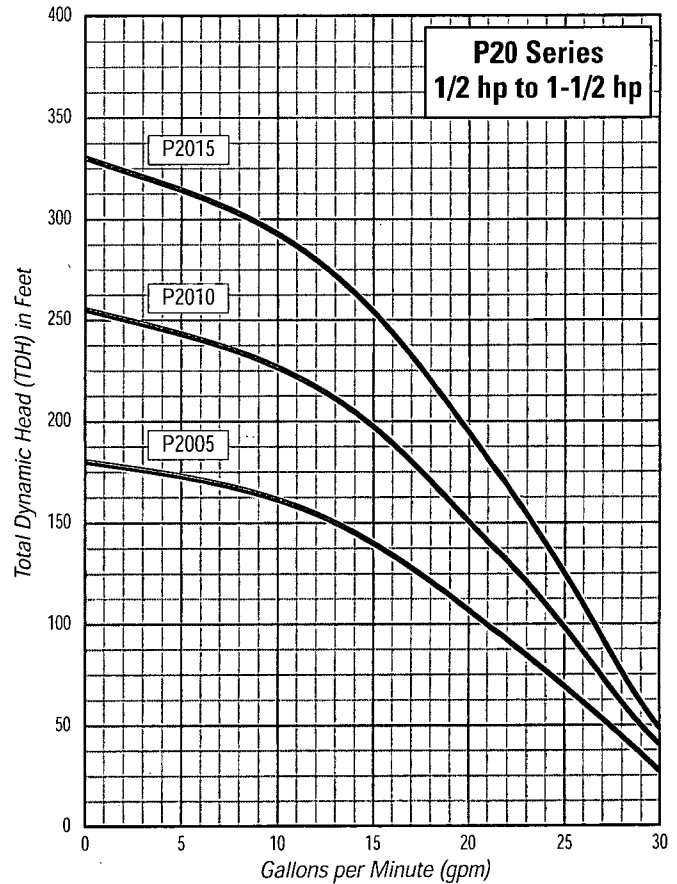
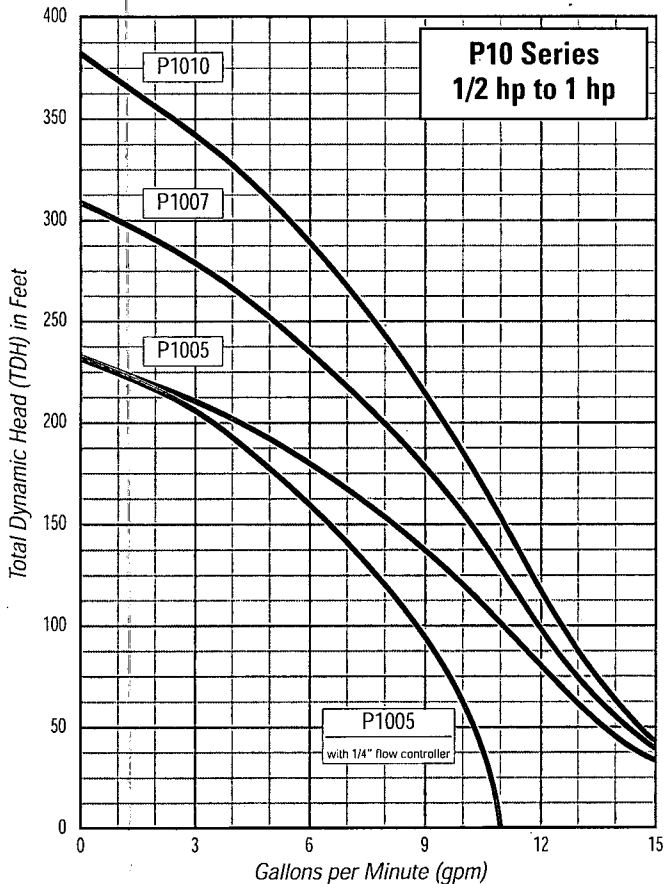
Materials of Construction

Discharge:	Fiberglass-reinforced thermoplastic or stainless steel (P50)	Intake Screen:	Polypropylene
Discharge Bearing:	Nylon polymer	Suction Connection:	Fiberglass-reinforced thermoplastic
Diffusers:	Polycarbonate	Drive Shaft:	7/16 inch hexagonal stainless steel
Impellers:	Acetal	Coupling:	Stainless steel
Thrust Pads:	(Proprietary)	Shell:	Stainless steel
Motor:	Franklin motor exterior constructed of stainless steel. Constant lubrication through water-filled design. Hermetically sealed motor assures moisture-free windings. All thrust absorbed by Kingsbury type thrust bearing. Rated for continuous duty. Protected against thermal overload and equipped with surge arrestors for added security. NEMA standard 2-wire or 3-wire (2, 3, and 5 hp) motor with ground. Control box required for 3-wire motors.		

P Series Pump Curves

Using a Pump Curve

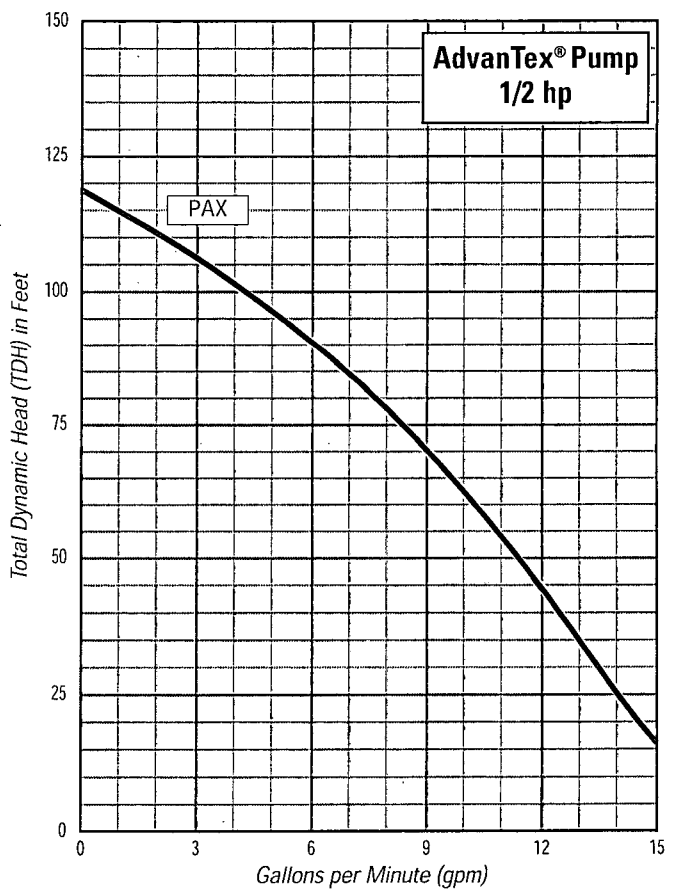
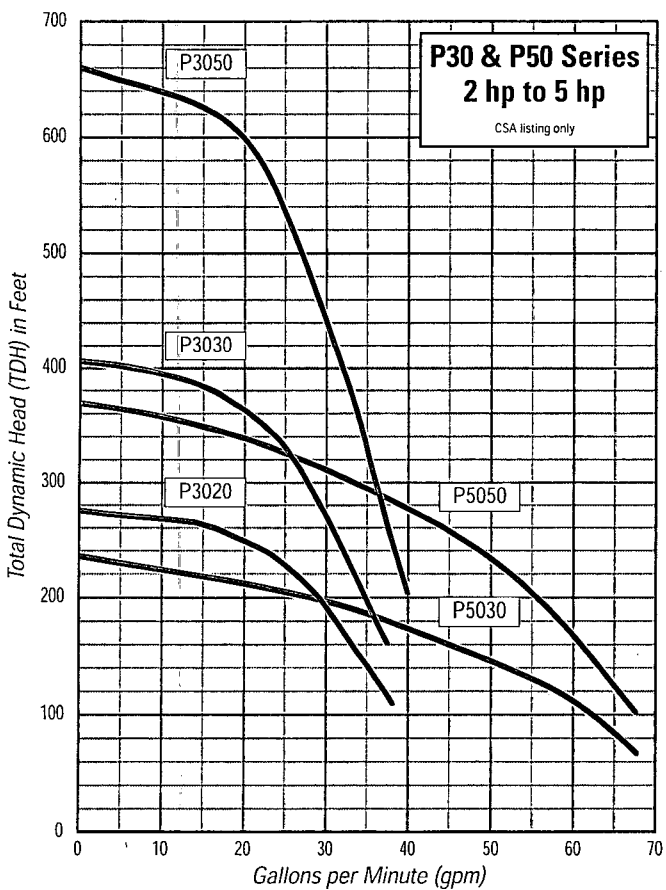
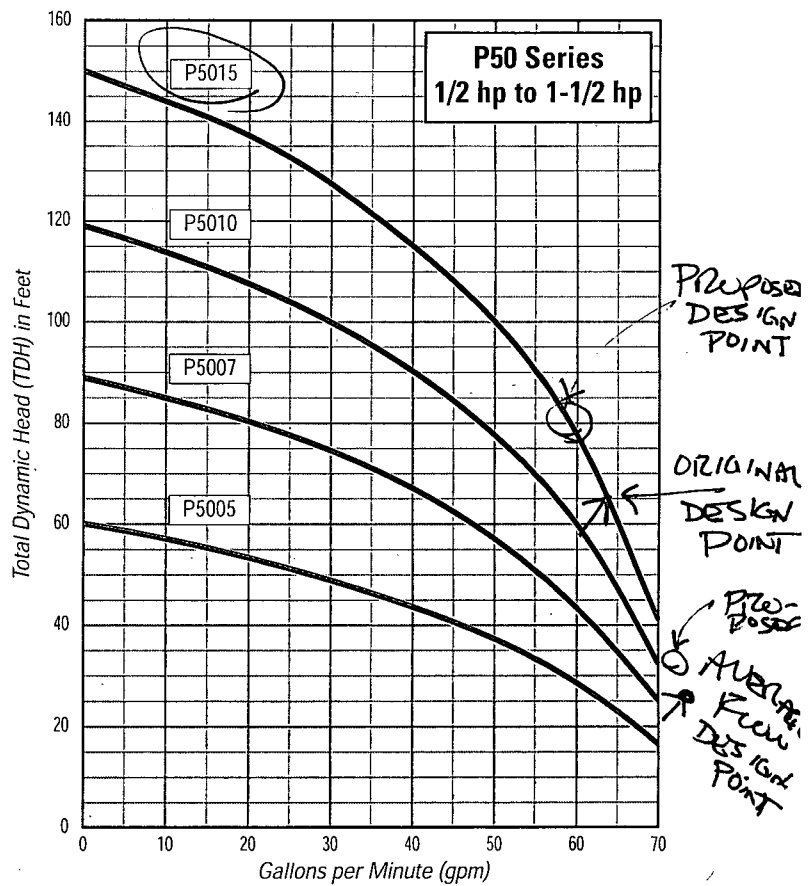
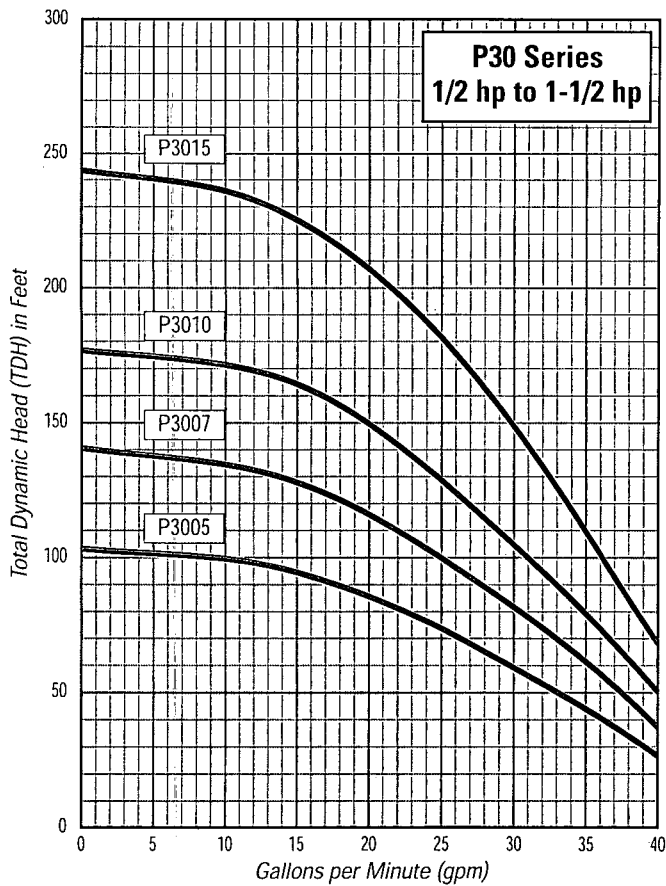
A *pump curve* helps you determine the best pump for your system. Pump curves show the relationship between flow (gpm) and pressure (TDH), providing a graphical representation of a pump's optimal performance range. Pumps perform best at their *nominal flow rate*—the value, measured in gpm, expressed by the first two numerals in an Orenco pump nomenclature.



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APPENDIX B – Individual STEP Systems Equipment Data

APPROVED TANK
MAUFACTURERS
ARE EVERGREEN-
PRECAST INC. AND
SOUND PLACEMENT
SERVICES INC.

ALL RISER LIDS SHALL
BE INSTALLED TO FINISH
GRADE. THE BACKFILL
MATERIAL SHALL BE
PLACED UP THE SIDES
OF THE TANK TO WITHIN
10" OF FINISH GRADE
COVERING THE TOP OF
THE TANK

ORENCO LID WITH
STAINLESS STEEL BOLTS
MODEL: FL24-4B

24" DIA. RIBBED
PVC RISER
MODEL: RR24xx+RLA

CONSEAL CS102
CONCRETE SEALANT

STANDARD PVC
INLET TEE & PIPE

4" NEOPRENE TY-SEAL
GASKET SEAL (ASTMC564)

IMPORTED SAND
OR PEA GRAVEL
BACKFILL

6" PEA
GRAVEL

PVC SPLICE BOX
W/CORD GRIPS
MODEL: SB3-HS

8" PVC PIPE AND
8" ORENCO CAP
MODEL: FL08G

IMPORTED
SAND OR
PEA GRAVEL
BACKFILL

LID
ADAPTER
RLA24

LIQUID LEVEL

GLUED
JOINT

CHECK VALVE
MODEL: PPSC-10

ORENCO EFFLUENT PUMP
MODEL: PF100511

ORENCO LID WITH
STAINLESS STEEL BOLTS
MODEL: FL30G-4B

30" DIA. X MIN. 18" HIGH
RIBBED PVC RISER WITH 1
NEOPRENE GROMMET
MODEL: RR30xxRLA+S+10

DISCHARGE ASSEMBLY
MODEL: HV100BFCPR-80

TEES FOR EXTENDABLE
HANDLES FOR BIO-TUBE
AND LEVEL CONTROL
FLOAT ASSEMBLY

1 1/4" EFFLUENT DISCHARGE

FLEXIBLE HOSE MAX
DEPTH 14"
MODEL: HVX100PR-80

LEVEL CONTROL FLOAT
ASSEMBLY
MODEL: MFAB-Y,G-27B-LACEY
FLOAT SETTINGS 17" & 21"

IMPORTED SAND OR PEA
GRAVEL BACKFILL

BIOTUBE PUMP VAULT
MODEL: PVU57-1819L

S.T.E.P.S.

(SEPTIC TANK EFFLUENT PUMP SYSTEM)
SIDE VIEW TYPICAL 1,500 GALLON TANK

GENERAL NOTES:

1. ALL TANKS SHALL BE INSTALLED ON 6 INCHES OF PEA GRAVEL. THE BACKFILL MATERIAL FOR THE SIDES OF THE TANK SHALL BE IMPORTED SAND OR PEA GRAVEL COMPACTED IN 2 FOOT LIFTS TO 90% COMPACTION. NO NATIVE MATERIAL SHALL BE USED TO BACKFILL AROUND THE TANK.
2. PIPING FROM THE MAINLINE TO THE SERVICE BOX SHALL BE 1 1/4" SCHEDULE 80 PVC BEDDED IN IMPORTED SAND 4" BELOW THE PIPE AND 6" ABOVE THE PIPE.
3. PIPING FROM THE SERVICE BOX TO THE PUMP SHALL BE 1" SCHEDULE 80 PVC.
4. FOR PIPE ZONE BEDDING SEE DETAIL 7-20.
5. TANK COMPONENTS SHALL BE ORENCO PSA10-S1DS-LACEY.
6. WHEN REQUIRED A STAINLESS STEEL CABLE SHALL BE ADDED TO THE BIO-TUBE VAULT FOR EASE OF REMOVAL.
7. MAXIMUM RISER HEIGHT SHALL BE 48".

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

1,500 GALLON
S.T.E.P. SYSTEM

APPROVED

CITY ENGINEER

Ken A. Schenck

DWG. NO.

7-7

DES

DWN

CKD

DATE

WHO

WHO

RAS

8/27/09

PF Series 4" (100 mm) Submersible Effluent Pumps

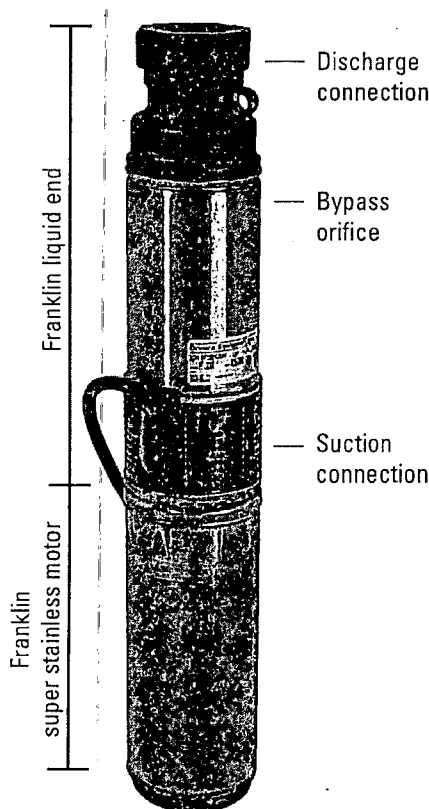


Orencia Systems
Incorporated
800-348-9843

Applications

Our 4" (100 mm) Submersible Effluent Pumps are designed to transport screened effluent (with low TSS counts) from septic tanks or separate dosing tanks. All our pumps are constructed of lightweight, corrosion-resistant stainless steel and engineered plastics; all are field-serviceable and repairable with common tools; and all 60-Hz PF Series models are CSA certified to the U.S. and Canadian safety standards for effluent pumps, meeting UL requirements.

Orencia's Effluent Pumps are used in a variety of applications, including pressurized drainfields, packed bed filters, mounds, aerobic units, effluent irrigation, effluent sewers, wetlands, lagoons, and more. These pumps are designed to be used with a Biotube® pump vault or after a secondary treatment system.



US
LR80980
LR2053896



Powered by
Franklin Electric

Features/Specifications

To specify this pump for your installation, require the following:

- Minimum 24-hour run-dry capability with no deterioration in pump life or performance*
- 1/8-inch (3-mm) bypass orifice (patent pending) to ensure flow recirculation for motor cooling and to prevent air bind
- Liquid end repair kits available for better long-term cost of ownership
- TRI-SEAL™ floating impeller design on 10, 15, 20, and 30 gpm (0.6, 1.3, and 1.9 L/sec) models; floating stack design on 50 and 75 gpm (3.2 and 4.7 L/sec) models
- Super stainless Franklin Electric motor, rated for continuous use and frequent cycling
- Type SOOW 600-V motor cable (suitable for Class I, Division 1 and Division 2 applications)
- Five-year warranty on pump or retrofit liquid end from date of manufacture against defects in materials or workmanship

* Not applicable for 5-hp (3.73 kW) models

Standard Models

See specifications chart, pages 2-3, for a list of standard pumps. For a complete list of available pumps, call Orencia.

Nomenclature

PF -

Cord length, ft (m):
Blank = 10 (3) 20' = 20 (6)
30 = 30 (9) 50 = 50 (15)

Voltage, nameplate:
1 = 115² 200 = 200
2 = 230³ 4 = 460

Frequency:
1 = single-phase 60 Hz 3 = three-phase 60 Hz
5 = single-phase 50 Hz

Horsepower (kW):
03 = 1/8 hp (0.25) 05 = 1/4 hp (0.37)
07 = 3/8 hp (0.56) 10 = 1 hp (0.75)
15 = 1-1/2 hp (1.11) 20 = 2 hp (1.50)
30 = 3 hp (2.24) 50 = 5 hp (3.73)

Nominal flow, gpm (L/sec):
10 = 10 (0.6) 15 = 15 (1.0)
20 = 20 (1.3) 30 = 30 (1.9)
50 = 50 (3.2) 75 = 75 (4.7)

Pump (PF Series)

¹ Note: 20-foot cords are available only for single-phase pumps through 1-1/2 hp

² 1/2-hp (0.37kW) only

³ 220 volts for 50 Hz pumps

PF Series 4" Submersible Effluent Pumps

Specifications, 60 Hz

Pump Model	Design gpm (l/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material ¹	Length, in. (mm)	Min. liquid level, ² in. (mm)	Weight, ³ lb (kg)	Rated cycles/day
PF100511	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100512	10 (0.6)	0.50 (0.37)	1	230	240	6.3	6.3	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF10053200	10 (0.6)	0.50 (0.37)	3	200	208	3.8	3.8	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100712 ^{4,5}	10 (0.6)	0.75 (0.56)	1	230	240	8.3	8.3	8	1 ¼ in. GFP	25.9 (658)	17 (432)	30 (14)	300
PF10073200 ^{4,5}	10 (0.6)	0.75 (0.56)	3	200	208	5.1	5.2	8	1 ¼ in. GFP	25.4 (645)	17 (432)	31 (14)	300
PF101012 ^{5,6}	10 (0.6)	1.00 (0.75)	1	230	240	9.6	9.6	9	1 ¼ in. GFP	27.9 (709)	18 (457)	33 (15)	100
PF10103200 ^{5,6}	10 (0.6)	1.00 (0.75)	3	200	208	5.5	5.5	9	1 ¼ in. GFP	27.3 (693)	18 (457)	37 (17)	300
PF102012 ^{5,6,7,8}	10 (0.6)	2.00 (1.49)	1	230	240	12.1	12.1	18	1 ¼ in. SS	39.5 (1003)	22 (559)	48 (22)	100
PF102032 ^{5,6,8}	10 (0.6)	2.00 (1.49)	3	230	240	7.5	7.6	18	1 ¼ in. SS	37.9 (963)	20 (508)	44 (20)	300
PF10203200 ^{5,6,8}	10 (0.6)	2.00 (1.49)	3	200	208	8.7	8.7	18	1 ¼ in. SS	37.9 (963)	20 (508)	44 (20)	300
PF150311	15 (1.0)	0.33 (0.25)	1	115	120	8.7	8.8	3	1 ¼ in. GFP	19.5 (495)	15 (380)	23 (10)	300
PF150312	15 (1.0)	0.33 (0.25)	1	230	240	4.4	4.5	3	1 ¼ in. GFP	19.5 (495)	15 (380)	23 (10)	300
PF200511	20 (1.5)	0.50 (0.37)	1	115	120	12.3	12.5	4	1 ¼ in. GFP	22.3 (566)	18 (457)	25 (11)	300
PF200512	20 (1.5)	0.50 (0.37)	1	230	240	6.4	6.5	4	1 ¼ in. GFP	22.5 (572)	18 (457)	26 (12)	300
PF20053200	20 (1.5)	0.50 (0.37)	3	200	208	3.7	3.8	4	1 ¼ in. GFP	22.3 (566)	18 (457)	26 (12)	300
PF201012 ^{4,5}	20 (1.5)	1.00 (0.75)	1	230	240	10.5	10.5	7	1 ¼ in. GFP	28.4 (721)	20 (508)	33 (15)	100
PF20103200 ^{4,5}	20 (1.5)	1.00 (0.75)	3	200	208	5.8	5.9	7	1 ¼ in. GFP	27.8 (706)	20 (508)	33 (15)	300
PF201512 ^{4,5}	20 (1.5)	1.50 (1.11)	1	230	240	12.4	12.6	9	1 ¼ in. GFP	34.0 (864)	24 (610)	41 (19)	100
PF20153200 ^{4,5}	20 (1.5)	1.50 (1.11)	3	200	208	7.1	7.2	9	1 ¼ in. GFP	30.7 (780)	20 (508)	35 (16)	300
PF300511	30 (1.9)	0.50 (0.37)	1	115	120	11.8	11.8	3	1 ¼ in. GFP	21.3 (541)	20 (508)	28 (13)	300
PF300512	30 (1.9)	0.50 (0.37)	1	230	240	6.2	6.2	3	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF30053200	30 (1.9)	0.50 (0.37)	3	200	208	3.6	3.6	3	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF300712	30 (1.9)	0.75 (0.56)	1	230	240	8.5	8.5	5	1 ¼ in. GFP	24.8 (630)	21 (533)	29 (13)	300
PF30073200	30 (1.9)	0.75 (0.56)	3	200	208	4.9	4.9	5	1 ¼ in. GFP	24.6 (625)	21 (533)	30 (14)	300
PF301012 ⁴	30 (1.9)	1.00 (0.75)	1	230	240	10.4	10.4	6	1 ¼ in. GFP	27.0 (686)	22 (559)	32 (15)	100
PF30103200 ⁴	30 (1.9)	1.00 (0.75)	3	200	208	5.8	5.8	6	1 ¼ in. GFP	26.4 (671)	22 (559)	33 (15)	300
PF301512 ^{4,5}	30 (1.9)	1.50 (1.11)	1	230	240	12.6	12.6	8	1 ¼ in. GFP	32.8 (833)	24 (610)	40 (18)	100
PF30153200 ^{4,5}	30 (1.9)	1.50 (1.11)	3	200	208	6.9	6.9	8	1 ¼ in. GFP	29.8 (757)	22 (559)	34 (15)	300
PF301534 ^{4,5}	30 (1.9)	1.50 (1.11)	3	460	480	2.8	2.8	8	1 ¼ in. GFP	29.5 (685)	22 (559)	34 (15)	300
PF302012 ^{5,6,7}	30 (1.9)	2.00 (1.49)	1	230	240	11.0	11.0	10	1 ¼ in. SS	35.5 (902)	26 (660)	44 (20)	100
PF30203200 ^{5,6}	30 (1.9)	2.00 (1.49)	3	200	208	9.3	9.3	10	1 ¼ in. SS	34.0 (864)	24 (610)	41 (19)	300
PF303012 ^{5,6,7,8}	30 (1.9)	3.00 (2.23)	1	230	240	16.8	16.8	14	1 ¼ in. SS	44.5 (1130)	33 (838)	54 (24)	100
PF303032 ^{5,6,8}	30 (1.9)	3.00 (2.23)	3	230	240	10.0	10.1	14	1 ¼ in. SS	44.3 (1125)	27 (686)	52 (24)	300
PF305012 ^{5,6,7,8}	30 (1.9)	5.00 (3.73)	1	230	240	25.6	25.8	23	1 ¼ in. SS	66.5 (1689)	53 (1346)	82 (37)	100
PF305032 ^{5,6,8}	30 (1.9)	5.00 (3.73)	3	230	240	16.6	16.6	23	1 ¼ in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF30503200 ^{5,6,8}	30 (1.9)	5.00 (3.73)	3	200	208	18.7	18.7	23	1 ¼ in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF500511	50 (3.2)	0.50 (0.37)	1	115	120	12.1	12.1	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF500512	50 (3.2)	0.50 (0.37)	1	230	240	6.2	6.2	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF500532	50 (3.2)	0.50 (0.37)	3	230	240	3.0	3.0	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF50053200	50 (3.2)	0.50 (0.37)	3	200	208	3.7	3.7	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF500534	50 (3.2)	0.50 (0.37)	3	460	480	1.5	1.5	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF500712	50 (3.2)	0.75 (0.56)	1	230	240	8.5	8.5	3	2 in. SS	23.7 (602)	25 (635)	31 (14)	300
PF500732	50 (3.2)	0.75 (0.56)	3	230	240	3.9	3.9	3	2 in. SS	23.7 (602)	25 (635)	32 (15)	300
PF50073200	50 (3.2)	0.75 (0.56)	3	200	208	4.9	4.9	3	2 in. SS	23.1 (587)	26 (660)	32 (15)	300

Continued on next page

PF Series 4" Submersible Effluent Pumps

Specifications, 60 Hz (continued)

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material ¹	Length, in. (mm)	Min. liquid level, ² in. (mm)	Weight, ³ lb (kg)	Rated cycles/day
PF500734	50 (3.2)	0.75 (0.56)	3	460	480	1.8	1.8	3	2 in. SS	34.8 (884)	25 (635)	31 (14)	300
PF501012	50 (3.2)	1.00 (0.75)	1	230	240	10.1	10.1	4	2 in. SS	27.0 (686)	26 (660)	35 (16)	100
PF50103200	50 (3.2)	1.00 (0.75)	3	200	208	5.7	5.7	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF501034	50 (3.2)	1.00 (0.75)	3	460	480	2.2	2.2	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF501512 ⁴	50 (3.2)	1.50 (1.11)	1	230	240	12.5	12.6	5	2 in. SS	32.5 (826)	30 (762)	41 (19)	100
PF50153200 ⁴	50 (3.2)	1.50 (1.11)	3	200	208	7.0	7.0	5	2 in. SS	29.3 (744)	26 (660)	35 (16)	300
PF503012 ^{4, 5, 7, 8}	50 (3.2)	3.00 (2.23)	1	230	240	17.7	17.7	8	2 in. SS	43.0 (1092)	37 (940)	55 (25)	100
PF50303200 ^{4, 5, 8}	50 (3.2)	3.00 (2.23)	3	200	208	13.1	13.1	8	2 in. SS	43.4 (1102)	30 (762)	55 (25)	300
PF503034 ^{4, 5, 8}	50 (3.2)	3.00 (2.23)	3	460	480	5.3	5.3	8	2 in. SS	40.0 (1016)	31 (787)	55 (25)	300
PF505012 ^{5, 6, 7, 8}	50 (3.2)	5.00 (3.73)	1	230	240	26.2	26.4	13	2 in. SS	65.4 (1661)	55 (1397)	64 (29)	300
PF505032 ^{5, 6, 7, 8}	50 (3.2)	5.00 (3.73)	3	230	240	16.5	16.5	13	2 in. SS	59.3 (1506)	49 (1245)	64 (29)	300
PF751012	75 (4.7)	1.00 (0.75)	1	230	240	9.9	10.0	3	2 in. SS	27.0 (686)	27 (686)	34 (15)	100
PF751512	75 (4.7)	1.50 (1.11)	1	230	240	12.1	12.3	4	2 in. SS	33.4 (848)	30 (762)	44 (20)	100

Specifications, 50 Hz,

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material ¹	Length, in. (mm)	Min. liquid level, ² in. (mm)	Weight, ³ lb (kg)	Rated cycles/day
PF100552	10 (0.6)	0.50 (0.37)	1	220	230	3.9	4.1	6	1 ¼ in. GFP	23.0 (584)	17 (432)	26 (12)	300
PF100752 ^{4, 5}	10 (0.6)	0.75 (0.56)	1	220	230	6.2	6.2	9	1 ¼ in. GFP	26.8 (658)	17 (432)	30 (14)	300
PF101552 ^{5, 6}	10 (0.6)	1.50 (1.11)	1	220	230	10.5	11.4	18	1 ¼ in. SS	39.5 (1003)	22 (559)	46 (21)	300
PF300552	30 (1.9)	0.50 (0.37)	1	220	230	4.1	4.1	4	1 ¼ in. GFP	22.5 (572)	19 (483)	26 (12)	300
PF300752	30 (1.9)	0.75 (0.56)	1	220	230	6.1	6.1	5	1 ¼ in. GFP	24.8 (630)	19 (483)	29 (13)	300
PF301052	30 (1.9)	1.00 (0.75)	1	220	230	7.4	7.4	7	1 ¼ in. GFP	28.4 (721)	20 (508)	32 (15)	100
PF301552 ^{4, 5}	30 (1.9)	1.50 (1.11)	1	220	230	9.3	9.3	8	1 ¼ in. GFP	35.4 (899)	24 (610)	40 (18)	100
PF500552	50 (3.2)	0.50 (0.37)	1	220	230	4.0	4.0	2	2 in. SS	20.3 (516)	25 (635)	29 (13)	300
PF500752	50 (3.2)	0.75 (0.56)	1	220	230	6.3	6.4	3	2 in. SS	23.7 (602)	25 (635)	31 (14)	300
PF501052	50 (3.2)	1.00 (0.75)	1	220	230	7.3	7.4	4	2 in. SS	27.0 (686)	26 (660)	35 (16)	100
PF501552	50 (3.2)	1.50 (1.11)	1	220	230	9.1	9.1	5	2 in. SS	32.5 (826)	30 (762)	42 (19)	100
PF751052	75 (3.2)	1.00 (0.75)	1	220	230	7.3	7.3	4	2 in. SS	30.0 (762)	27 (686)	34 (15)	100

¹ GFP = glass-filled polypropylene; SS = stainless steel. The 1 ¼-in. NPT GFP discharge is 2 ½ in. octagonal across flats; the 1 ¼-in. NPT SS discharge is 2 ½ in. octagonal across flats; and the 2-in. NPT SS discharge is 2 ½ in. hexagonal across flats. Discharge is female NPT threaded, U.S. nominal size, to accommodate Orenco® discharge hose and valve assemblies. Consult your Orenco Distributor about fittings to connect hose and valve assemblies to metric-sized piping.

² Minimum liquid level is for single pumps when installed in an Orenco Biotube® Pump Vault or Universal Flow Inducer. In other applications, minimum liquid level should be top of pump. Consult Orenco for more information.

³ Weight includes carton and 10-ft (3-m) cord.

⁴ High-pressure discharge assembly required.

⁵ Do not use cam-lock option (O) on discharge assembly.

⁶ Custom discharge assembly required for these pumps. Contact Orenco.

⁷ Capacitor pack (sold separately or installed in a custom control panel) required for this pump. Contact Orenco.

⁸ Torque locks are available for all pumps, and are supplied with 3-hp and 5-hp pumps.

PF Series High-Head Effluent Pumps

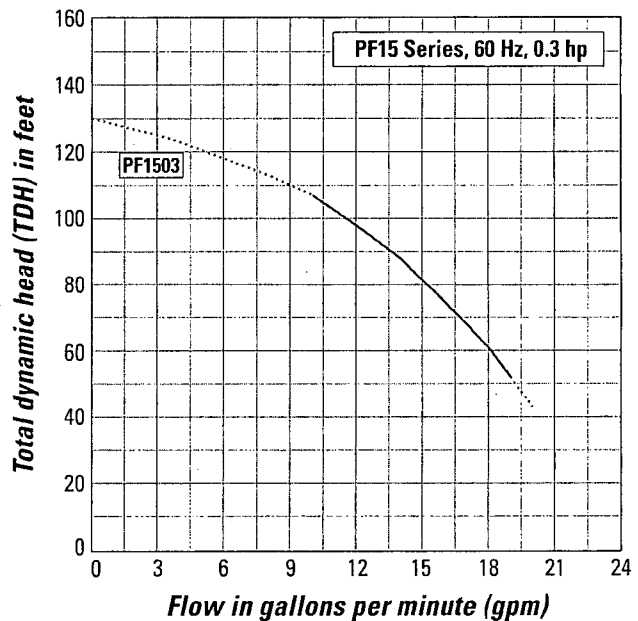
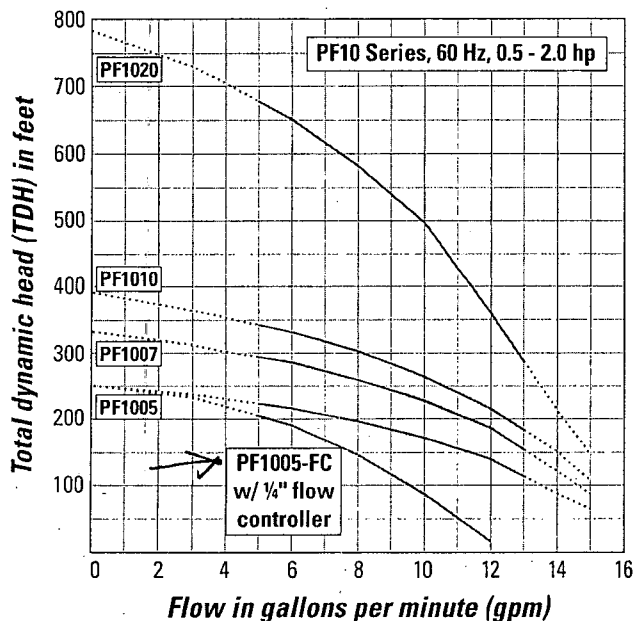
Materials of Construction

Discharge:	Glass-filled polypropylene or stainless steel
Discharge bearing:	Engineered thermoplastic (PEEK)
Diffusers:	Glass-filled PPO (Noryl GFN3)
Impellers:	Celcon® acetal copolymer on 10-, 20, and 30-gpm models; 50-gpm impellers are Noryl GFN3
Intake screen:	Polypropylene
Suction connection:	Stainless steel
Drive shaft:	7/16 inch hexagonal stainless steel, 300 series
Coupling:	Sintered stainless steel, 300 series
Shell:	Stainless steel, 300 series
Motor:	Franklin motor exterior constructed of stainless steel. Motor filled with deionized water and propylene glycol for constant lubrication. Hermetically sealed motor housing ensures moisture-free windings. All thrust absorbed by Kingsbury-type thrust bearing. Rated for continuous duty. Single-phase motors and 200 and 230 V 3-phase motors equipped with surge arrestors for added security. Single-phase motors through 1.5 hp (1.11 kW) have built-in thermal overload protection, which trips at 203-221° F (95-105° C).

Using a Pump Curve

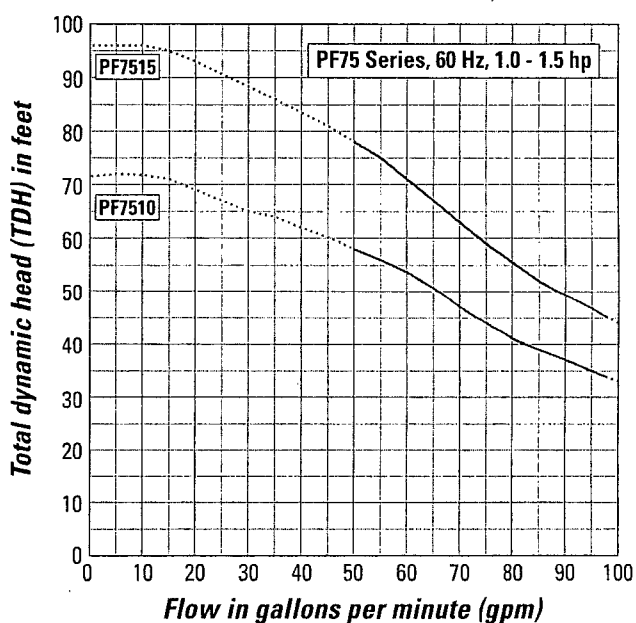
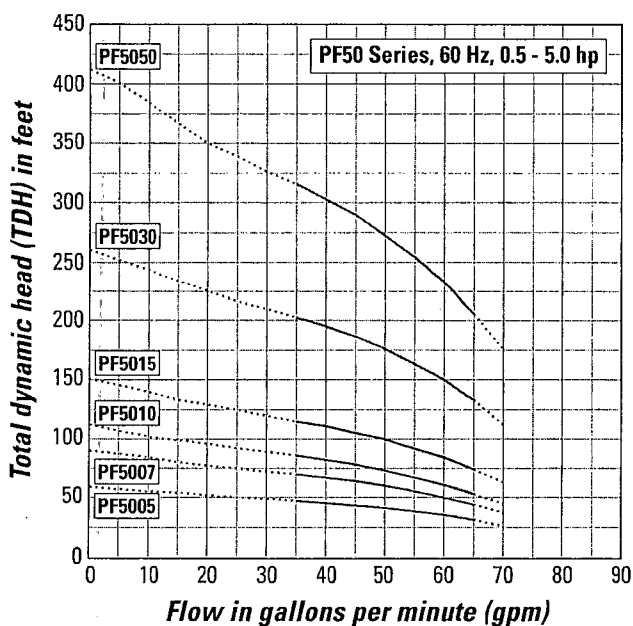
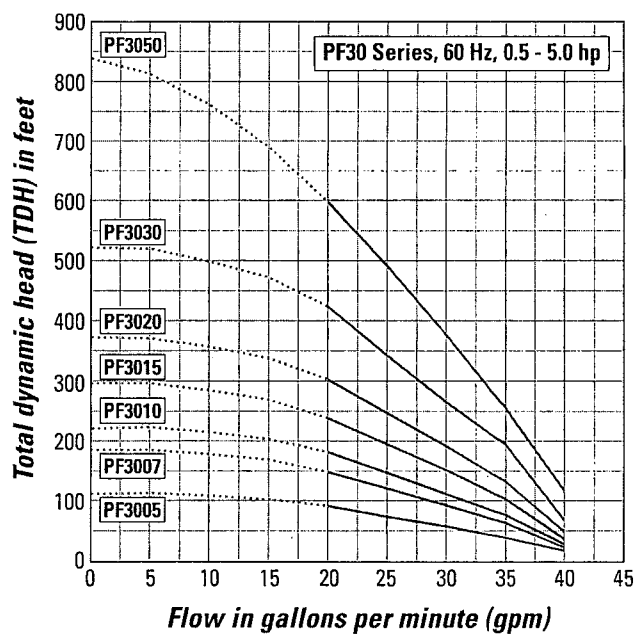
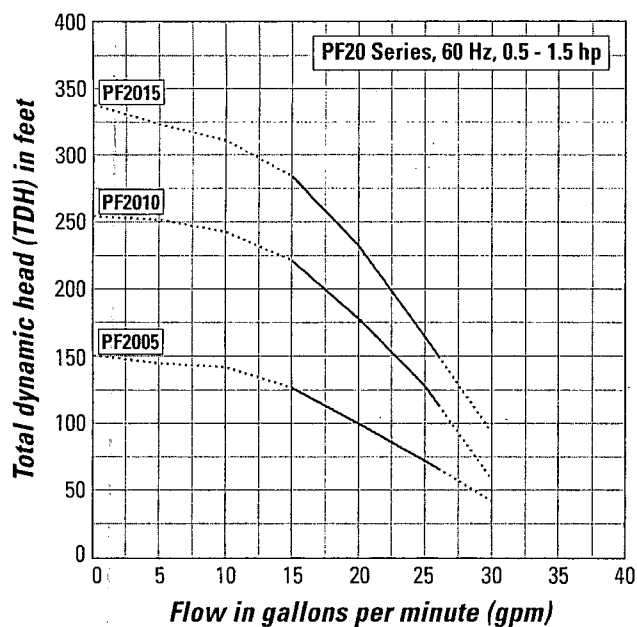
A *pump curve* helps you determine the best pump for your system. Pump curves show the relationship between flow (gpm or L/sec) and pressure (total dynamic head, or TDH), providing a graphical representation of a pump's optimal performance range. Pumps perform best at their *nominal flow rate*—the value, measured in gpm, expressed by the first two numerals in an Orenco pump nomenclature. The graphs in this section show optimal pump operation ranges with a solid line. Flow flow rates outside of these ranges are shown with a dashed line. For most accurate pump specification, use Orenco's PumpSelect™ software.

Pump Curves, 60 Hz Models



PF Series High-Head Effluent Pumps

60 Hz Models (continued)



PF Series High-Head Effluent Pumps

Pump Curves, 50 Hz Models

