SPRUHAN ENGINEERING, P.C.

SEWER LIFTING STATION CALCS

500 SCHOOL STREET, MANSFIELD, MA.

Prepared By:
Spruhan Engineering, P.C.
80 Jewett St (Suite 1), Newton, MA.
Tel: 617-816-0722
Email: edmond@spruhaneng.com

Date: July 6, 2020.

- **Flow Determination:**
  - Proposed Factory, Industrial Plant, Warehouse, or dry Storage space with cafeteria.

  - Based on Mass DEP Standards: 20 G.P.D. per Person.
    - Expected Max Number of employees = 50.

      - Therefore: 50 x 20 = 1,000 G.P.D.
      - 1,000 G.P.D. = 41.66 G.P.H = **.69 G.P.M.**

- **Pumping Chamber:**

  - Storage Capacity of tank should be large enough to contain 24 Hours of sewage.

    - Since 1,000 G.P.D. Is required, Use 1,500 G.P.D. for a security factor of 1.5
      - Therefore, Use a **1,500 Gallon Chamber.**

- **Total Dynamic Head (TDH):**

  - Static Head loss (ΔH):

    - Bottom of Pump Chamber Elevation =133.5'
    - Discharge Pipe Elevation = 143.7'
    - Pump Off Elevation = 134.5'

      - **ΔH = 143.7-134.5= 9.2 Ft**

  - Head Loss (hf)

    - $hf=(L)10.5\ Q^{1.95}/C\ D^{-4.87}$
      - L= Force Main Lenght =379.5'
      - Q= Flow (G.P.M) = .69 G.P.M
      - C= Hazen-Williams Coefficient= 100 (Cpmservative number)
      - D= Pipe Diameter (in.) = 2 In
        - **Therefore hf= .014 ft/ft**

- Minor Losses (hm)
  - $hm = \Sigma k(v^2/2g)$
  - $\Sigma k = 1.6$
  - $V = Q/A = (.69\ G.P.M * (.0022\ ft^3/s)/G.P.M) / (\pi 1^2/(12x12)) = .07\ ft/ft$
    - $hm = .00013 ft/ft$

  Therefore $TDH = \Delta H + hf + hm = 9.22\ Ft$

❖ Pump Selection:

For Q= .69 G.P.M., TDH = 9.22 Ft

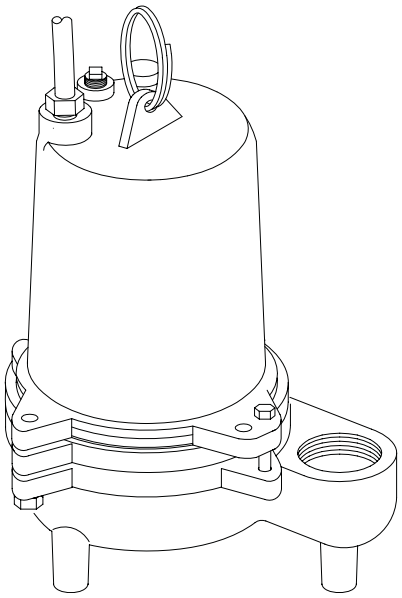
(See attached pup curve information for selected Barnes SE411 HT Submersible Pump)

Series SE-HT

2" Spherical Solids Handling
High Temperature - Manual & Automatic

BARNES®
www.cranepumps.com

1½", 2" & 3" Discharge



Series: SE-HT (SE411HT & SE421HT)
.4HP, 1750RPM, 60Hz

Submersible Wastewater Pump Association SWPA MEMBER

Sample Specifications: Section 1 Page 4.

DESCRIPTION:

SUBMERSIBLE NON-CLOG SEWAGE PUMP DESIGNED FOR **HIGH TEMPERATURE** RAW SEWAGE APPLICATIONS

DISCHARGE		2" NPT, Female, Vertical
LIQUID TEMPERATURE		200°F (93°C) Continuous
VOLUTE		Cast Iron ASTM A-48, Class 30
MOTOR HOUSING		Cast Iron ASTM A-48, Class 30
SEAL PLATE		Cast Iron ASTM A-48, Class 30
IMPELLER:	*Design*	2 Vane, Open with pump out vanes on back side, Dynamically Balanced, ISO G6.3
	Material	Cast Iron ASTM A-48, Class 30
SHAFT		416 Stainless Steel
SQUARE RINGS		Buna-N
HARDWARE		300 Series Stainless Steel
PAINT		Air Dry Enamel
SEAL:	*Design*	Single Mechanical, Oil Filled Reservoir, Secondary Exclusion Seal
	Material	Carbon/Ceramic/Buna-N Hardware -300 Series Stainless
CORD ENTRY		15 ft. (5m) Cord with plug On 115 volt, Pressure Gromment for sealing and strain relief
SPEED		1750 RPM (Nominal)
UPPER BEARING		Single Row, Ball, Oil Lubricated
	Load	Radial
LOWER BEARING		Single Row, Ball, Oil Lubricated
	Load	Radial & Thrust
MOTOR:	*Design*	NEMA L Torque Curve, Oil Filled, Squirrel Cage Induction
	Insulation	Class F
SINGLE PHASE		Permanent Split Capacitor (PSC) Includes Overload Protection in Motor
LEVEL CONTROL		**"A" -** Wide Angle, PVC, Mechanical, 15 ft (5m) cord with Piggy-Back Plug, N/O **"AU"-** Wide Angle, Polypropylene, Mechanical, N/O, Integral to pump. ON and OFF Points are adjustable
OPTIONAL EQUIPMENT		Seal Material, Additional Cord, Strainer

RECOMMENDED:

Accessories	Break Away Fitting (BAF) Check Valve Control Panel
Seal Kit PN	085202
Service Kit PN	085201

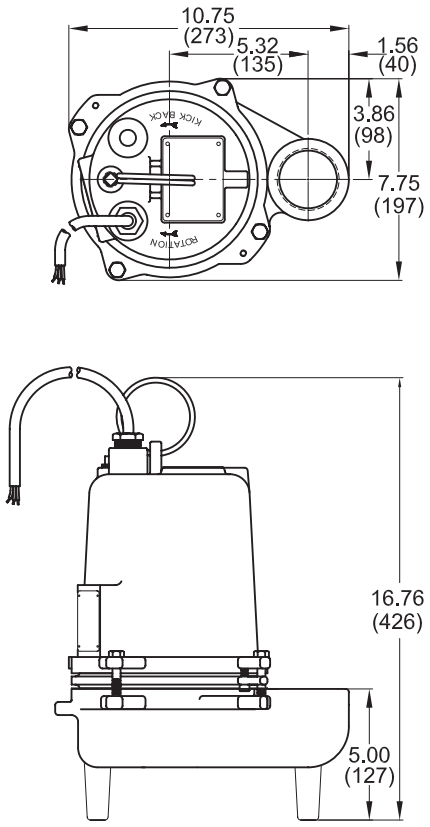
Series SE-HT

2" Spherical Solids Handling
Manual & Automatic - High Temperature

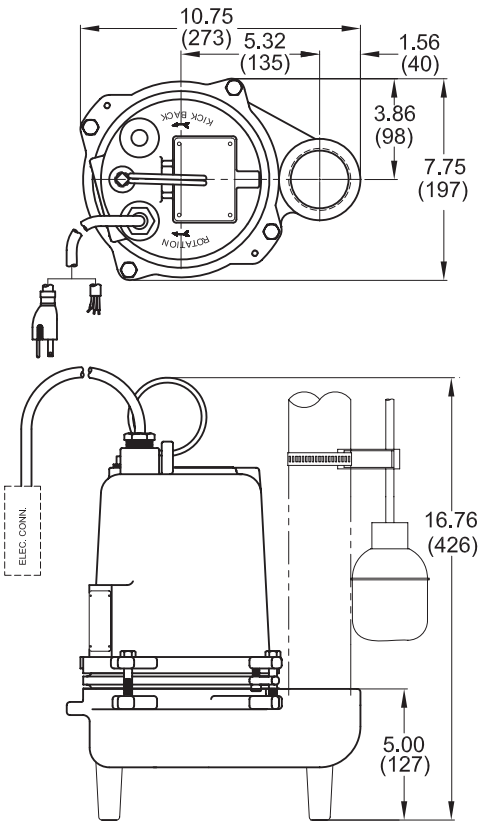
1½", 2" & 3" Discharge

inches (mm)

SE411HT, SE421HT



SE411HTA



MODEL NO	PART NO	HP	VOLT	PH/Hz	RPM (Nom)	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	CORD O.D inch (mm)
SE411HT	096764	0.4	115	1 / 60	1750	A	10.0	26.0	14/3	SOOW	0.560 (14.2)
SE411HTA	096765	0.4	115	1 / 60	1750	A	10.0	26.0	14/3	SOOW	0.560 (14.2)
SE421HT	096767	0.4	230	1 / 60	1750	A	4.0	13.0	14/3	SOOW	0.560 (14.2)

Mechanical Switch on SE-HTA, cord 14/2, SJOW, 0.370 (9.4mm) O.D. Piggy-Back Plug
Mechanical Switch on SE-HTAU, cord 14/2, SJOW, 0.370 (9.4mm) O.D.

IMPORTANT !

1.) PUMP MAY BE OPERATED "DRY" FOR EXTENDED PERIODS WITHOUT DAMAGE TO MOTOR AND/OR SEALS.
2.) THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION I HAZARDOUS LOCATIONS.
3.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.
4.) MUST USE A **HIGH TEMPERATURE** WIDE ANGLE LEVEL CONTROL IN HIGH TEMPERATURE APPLICATIONS.

Series SE-HT

Performance Curve

.4HP, 1750RPM, 60Hz, High Temperature

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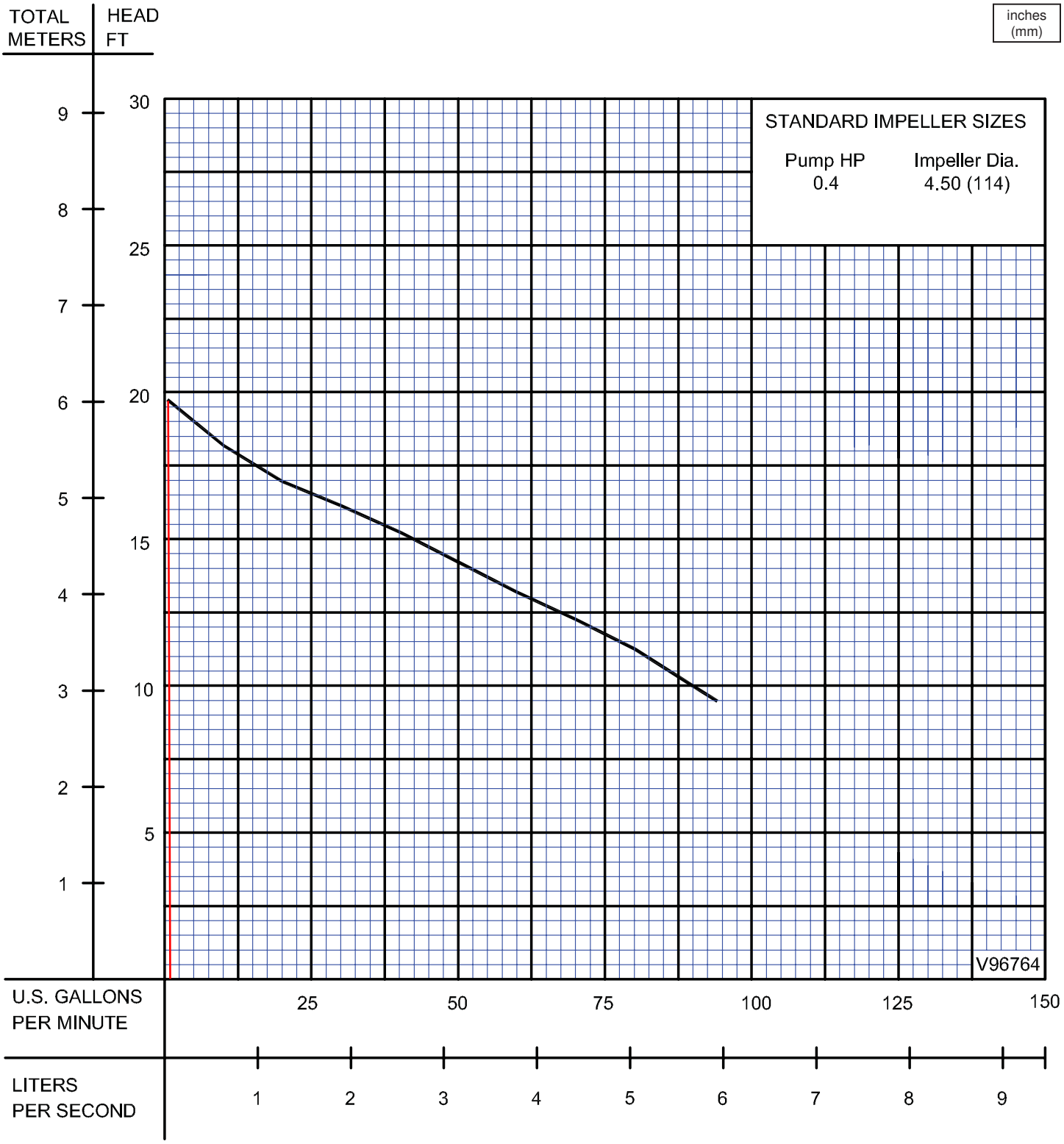
1½", 2" & 3" Discharge



Testing is performed with water, specific gravity 1.0 @ 68º F @ (20°C), other fluids may vary performance

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