# SSPMA

## Sump and Sewage Pump Manufacturers Association

Since 1956, we are a North American trade organization of sump, effluent, and sewage pump manufacturers and their suppliers.

**Working together to:**

- □ train wastewater and plumbing professionals, and
- □ create product performance and safety standards.

SSPMA members collaborate with each other and government regulators to educate consumers and professionals on the latest products, their application, proper sizing techniques, safe installation and use, and good maintenance practices.



www.SSPMA.org

**Pumps bearing the "SSPMA-Certified" seal have been tested by the member manufacturer in accordance with SSPMA Industry Standards.**

**The Standards are designed to provide accurate performance data for sump, effluent and sewage pumping equipment, to assist in their proper application and selection.**

# SSPMA MEMBERS

**Barnes Pumps / Crane Pumps & Systems**

**Champion Pump Company, Inc.**

**Eco-Flo Products Inc. / Ashland Pump Company**

**Franklin Electric / Little Giant**

**Glentronics, Inc.**

**Goulds Water Technology, a xylem brand**

**Liberty Pumps**

**Pentair Water**

**Superior Pump Company**

**Zoeller Company**

SSPMA MEMBER

# SSPMA ASSOCIATE MEMBERS

**Alderon Industries**

**John Crane, Inc.**

**SJE-Rhombus**

**Topp Industries, Inc.**

*FOR SUMP, EFFLUENT AND SEWAGE PUMPS*

# RECOMMENDED STANDARDS

SUMP & SEWAGE PUMP MANUFACTURERS ASSOCIATION • P.O. BOX 647 • NORTHBROOK, IL 60065-0647


HANDS-FREE
OPERATION


3€
Don't touch yourself
Ask the Staff.
Thank you . .
3,50€
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DO NOT FREEZE
HELLMANN'S
Light
MAYONNAISE
PARVE
SEE NUTRITION INFORMATION FOR FAT CONTENT


3/4HP
1/2HP
3/4HP

# 1/2HP Sewage

| Company | Type | Model # | HP | RPM | Disc. | Solids | Auto | Cord | TDH | 10' | 20' | 30' | 40' | WT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/2 | 1750 | 2 | 2 | Y | 15 | 25 | 115 | 45 | | | 62 |
| | | | 1/2 | 1750 | 2 | 2 | Y | 15 | 26 | 140 | 50 | | | 84 |
| | | | 1/2 | 1750 | 2 | 2 | N | 15 | 27 | 130 | 65 | | | 75 |
| | | | 1/2 | 3450 | 2 | 2 | N | 15 | 39 | 80 | 80 | 50 | | 80 |
| | | | 1/2 | 3450 | 2 | 2 | Y | 10 | 26 | 100 | 45 | | | 38 |
| | | | 1/2 | 3450 | 2 | 2 | N | 20 | 40 | 105 | 100 | 45 | | 75 |
| | | | 1/2 | 3400 | 2 | 2.00 | Y | 20 | 27 | 105 | 40 | | | 31 |
| | | | 1/2 | 1750 | 2 | 1.50 | N | 20 | 26 | 110 | 40 | | | 70 |
| | | | 1/2 | 1750 | 2 | 2.00 | N | 20 | 27 | 124 | 52 | | | 76 |
| | | | 1/2 | 3500 | 2 | 2.00 | N | 20 | 30 | 110 | 62 | | | 65 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | | 18 | 62 | | | | 23 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 10 | 28 | 130 | 70 | | | 62 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 10 | 20 | 160 | | | | 53 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 10 | 24 | 110 | 30 | | | 55 |
| | | | 1/2 | 3450 | 2 | 2.00 | N | 20 | 44 | | 124 | 69 | 16 | 76 |
| | | | 1/2 | 1750 | 2 | 2 | Y | 10 | 24 | 110 | 40 | | | 42 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 10 | 20 | 85 | | | | 46 |
| | | | 1/2 | 1750 | 2 | 1.25 | Y | 15 | 28 | 100 | 50 | | | 41 |
| | | | 1/2 | 1750 | 2 | 2.00 | N | 20 | 24 | 100 | 35 | | | 87 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 20 | 18 | **60** | | | | 32 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 20 | 23 | 110 | 40 | | | 76 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 20 | 27 | 130 | 65 | | | 42 |
| | | | 1/2 | 3450 | 2 | 2.00 | N | 20 | 37 | 125 | 99 | 40 | | 84 |
| | | | 1/2 | 3450 | 2 | 1.50 | N | 20 | 41 | 90 | 68 | 38 | 5 | 75 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 10 | 21 | 89 | 10 | | | 41 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 10 | 26 | 85 | 38 | | | 50 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 10 | 21 | 89 | 10 | | | 51 |
| | | | 1/2 | 1750 | 2 | 2.00 | Y | 10 | 26 | 95 | 33 | | | 83 |
| | | | 1/2 | 3450 | 2 | 2.00 | N | 20 | 39 | 116 | 83 | 46 | | 86 |

# Sump Pump

**A pump powered by an electric motor for the removal of clear and/or ground water drainage from a sump, pit or low point in a residential, commercial or industrial property.**

**(Less than ½" Solids)**

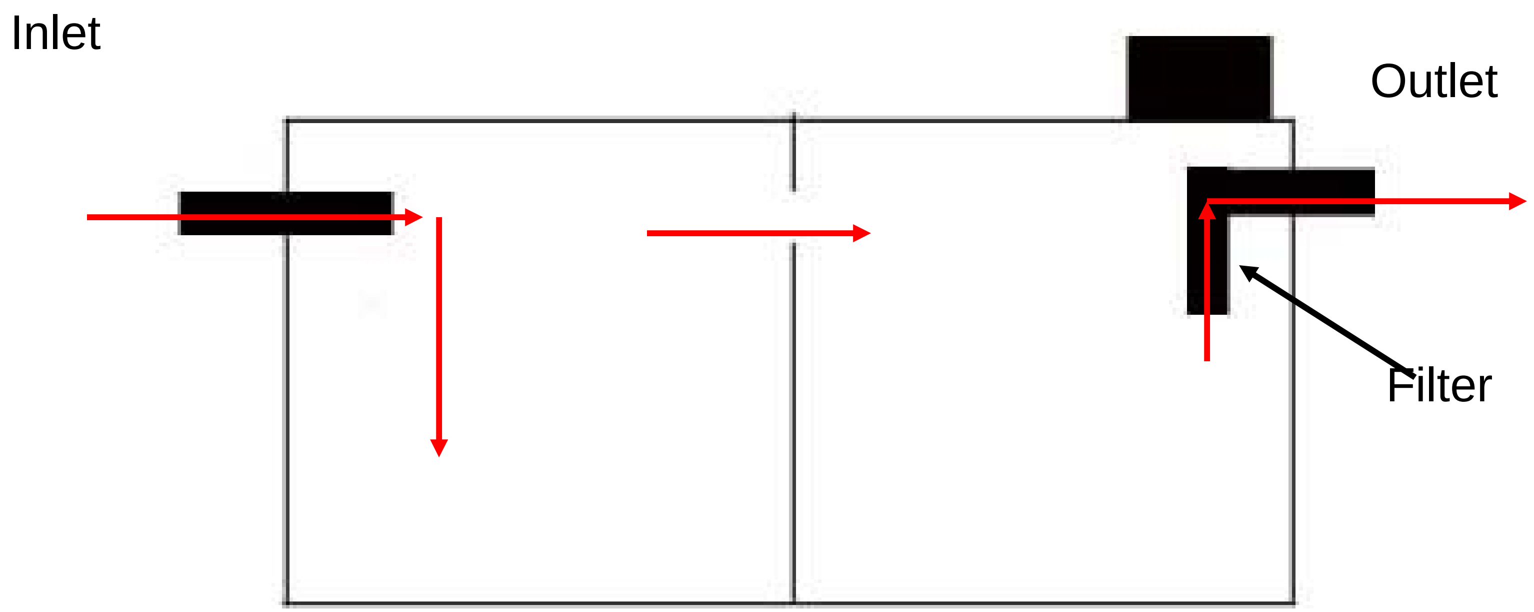
# Effluent Pump

**A pump powered by an electric motor for the removal of natural or artificial pretreated liquid waste discharge from an onsite sewage treatment system.**

**(½" To Less Than 1" Solids)**

# Everybody Know What Effluent Is?

# Septic Tank Effluent



Should an effluent pump be able to pass solids?

What is the difference between a sump pump and an effluent pump?

# Sewage Pump

**A pump powered by an electric motor for the removal of wastewater from a sealed basin containing solids of up to 2" in diameter.**

**(1" Through 2" Solids)**

# Sewage Pump

**Why should a sewage pump be able to pass 1 to 2" Solids?**

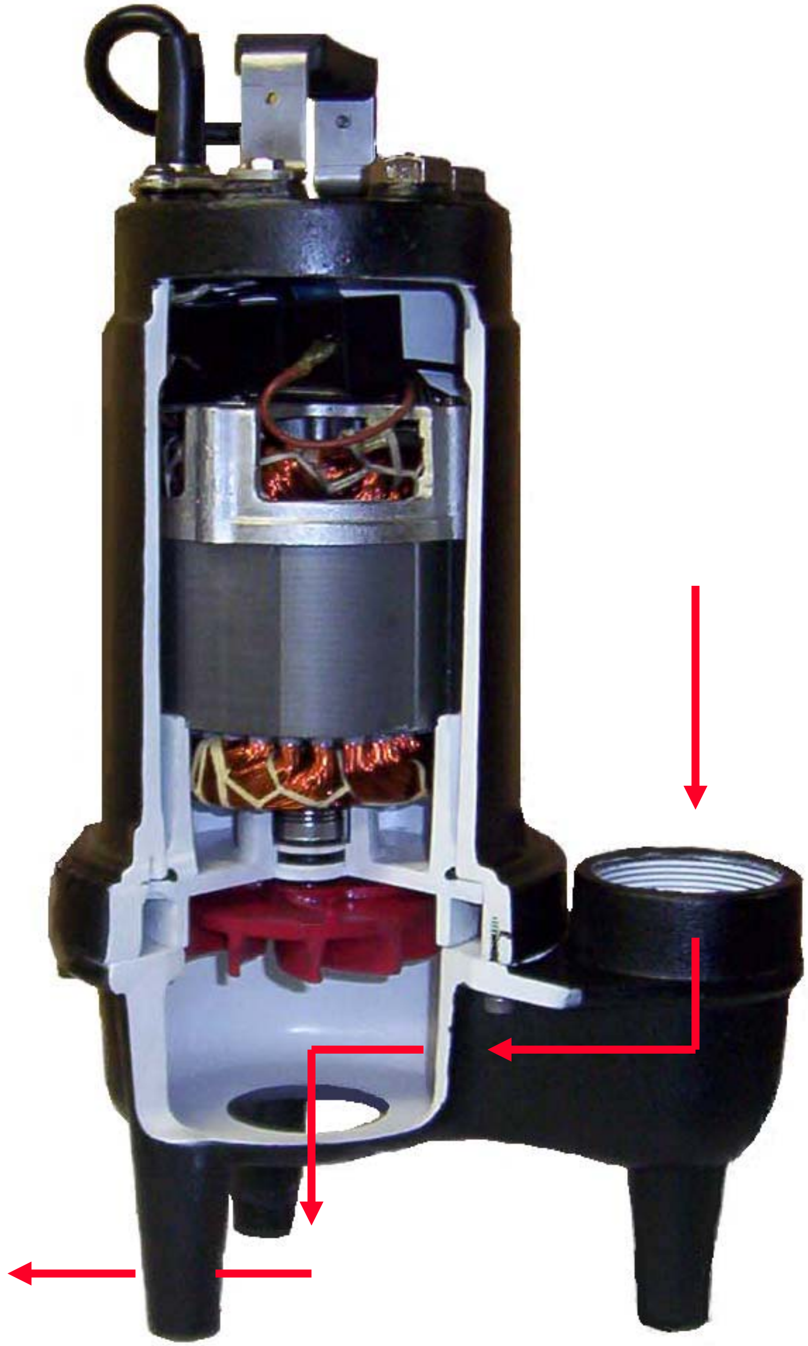
# Sewage Pump

**Can you use a sewage pump as a sump or effluent pump?**

**Can you use a sump or effluent pump as a sewage pump?**

# SSPMA

**A solid is a sphere of a stated size, plus 0.00 or minus 0.02 on the diameter, that will freely pass through the strainer and inlet of the pump or the inlet of the pump with no strainer, through or under the impeller vanes or a combination of both without interference with the surrounding volute housing, and out the discharge opening.**



SSPMA

(c) All readings shall be referenced to the centerline of pump on horizontal pumps, and to the entrance eye of the first stage impeller on vertical units.

**5. Capacity:**

Capacity will be measured in U. S. gallons per hour or per minute or liters per hour or per minute.

**6. Static Sphere Size Test:**

A sphere as described in the definition and made of steel is to be placed in the discharge of a pump and must freely pass from the outlet to the inlet and out the strainer if present with the pump not running. The pump may be moved from the normally installed position only enough to allow the sphere to roll to the inlet and out the strainer if present. The pump orientation from the normally installed position may be changed during the test only if doing so will not increase the clearance between the volute housing and case. The pump shaft may be rotated by hand during the test.

**7. Power:**

Pump shall be tested at nameplate voltage rating. Power will be measured as brake horsepower input to the pump.

**8. Test Setup:**

(a) Test shall be conducted using clear water at temperatures between 50° F (10° C) and 80° F (27° C).

(b) The liquid around the pump shall be relatively quiet and not filled with entrained air whirls, etc., from recirculated discharge.

(c) Manometer lines, if used, shall be arranged for venting to keep them full of water.

**9. Test Procedure:**

(a) The test shall not be conducted until test conditions have stabilized.

(b) Sufficient observations shall be made from 0 to maximum capacity to define the characteristics.

**10. Rating:**

(a) The pumps covered by this Standard shall be rated as capable of delivering a stated capacity in U. S. gallons per hour or gallons per minute, at a stated head in feet, or liters per hour or liters per minute, at a standard head in meters, based on sea level performance.

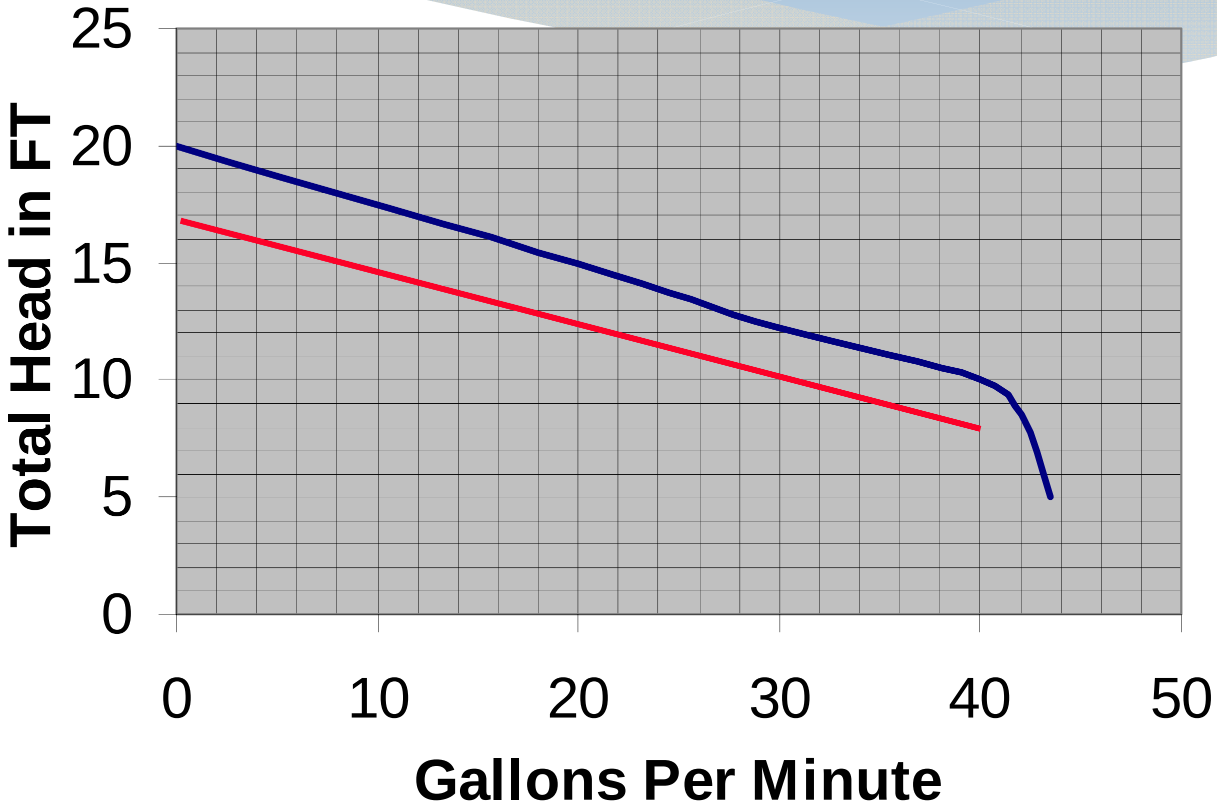
(b) It is recommended that total head be listed in increments of 5 feet starting at 5 feet and/or the metric equivalent (1.524 meters).

(c) Solids-handling capability of pumps will be stated in inches and metric in parenthesis.

**11. Tolerances:**

The capacity of any new production pump shall not be less than 90 percent of rated capacity at stated total heads.

# Curves (20GPM @ 15' TDH)



# Pumps & Types of Construction

**Brass or Bronze**

**Cast Iron**

**Aluminum**

**Plastic**

**Stainless Steel**

# Motors

**Oil filled / Air filled**

**Shaded Pole**

**Split Phase**

**Permanent Split Capacitor**

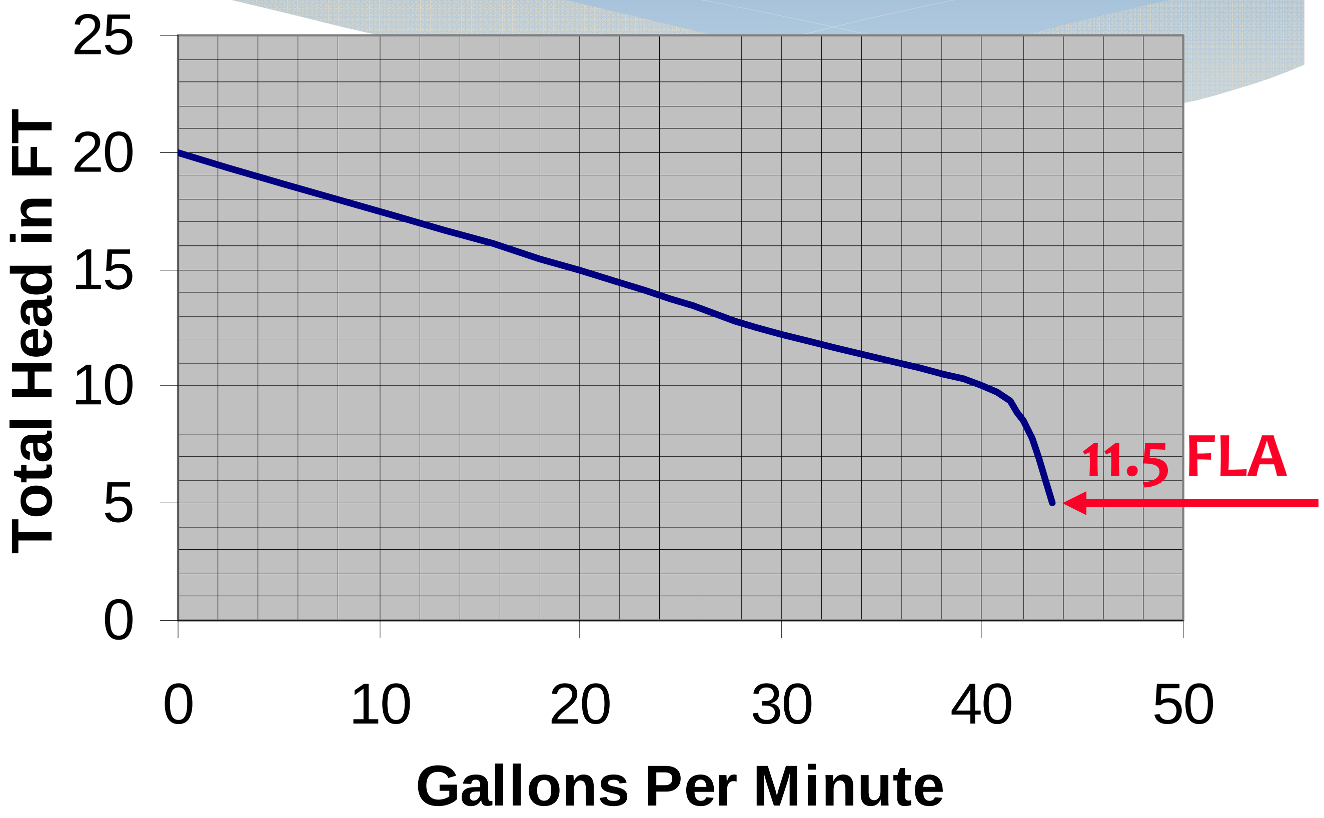
**Capacitor Start Capacitor Run**

# Motors

| | Shaded Pole | Split Phase | Permanent Split Capacitor | Capacitor Start Capacitor Run |
|---|---|---|---|---|
| **Starting Switch** | No | Yes | No | Yes |
| **Starting Torque** | Low | Low | Low | High |
| **Efficiency** | Low | Medium | High | High |

# What is Thermal Overload Protection?

# What Is Full Load Amps?



# Full Load Amps

| | |
|---|---|
| PUMP A | 4.0 |
| PUMP B | 5.2 |
| PUMP C | 8.0 |
| PUMP D | 9.7 |

# Motors

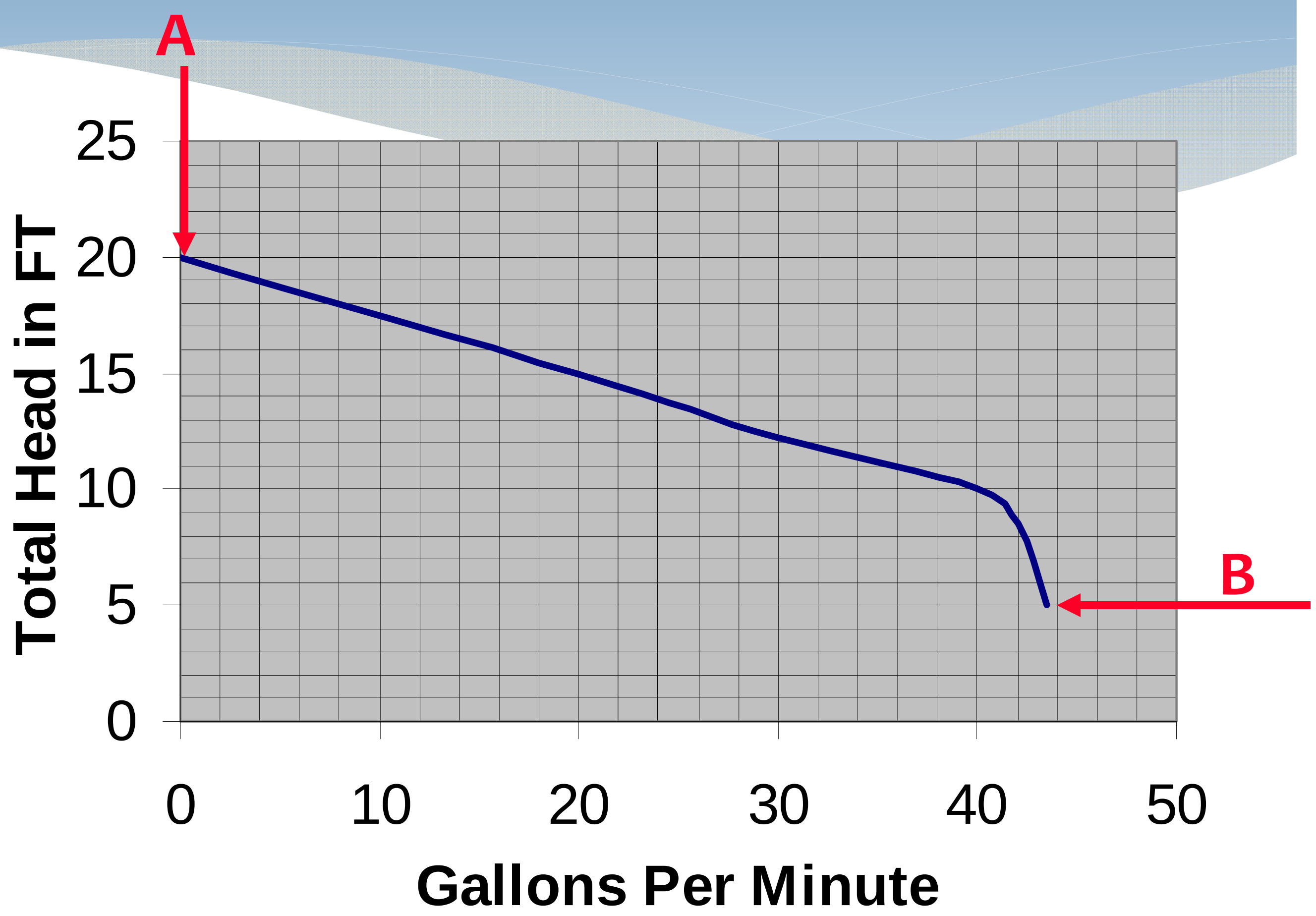
**Service Life of Electrical Equipment Diminishes by Approximately Half For Every 10 Degrees C Temperature Increase**

# Motors

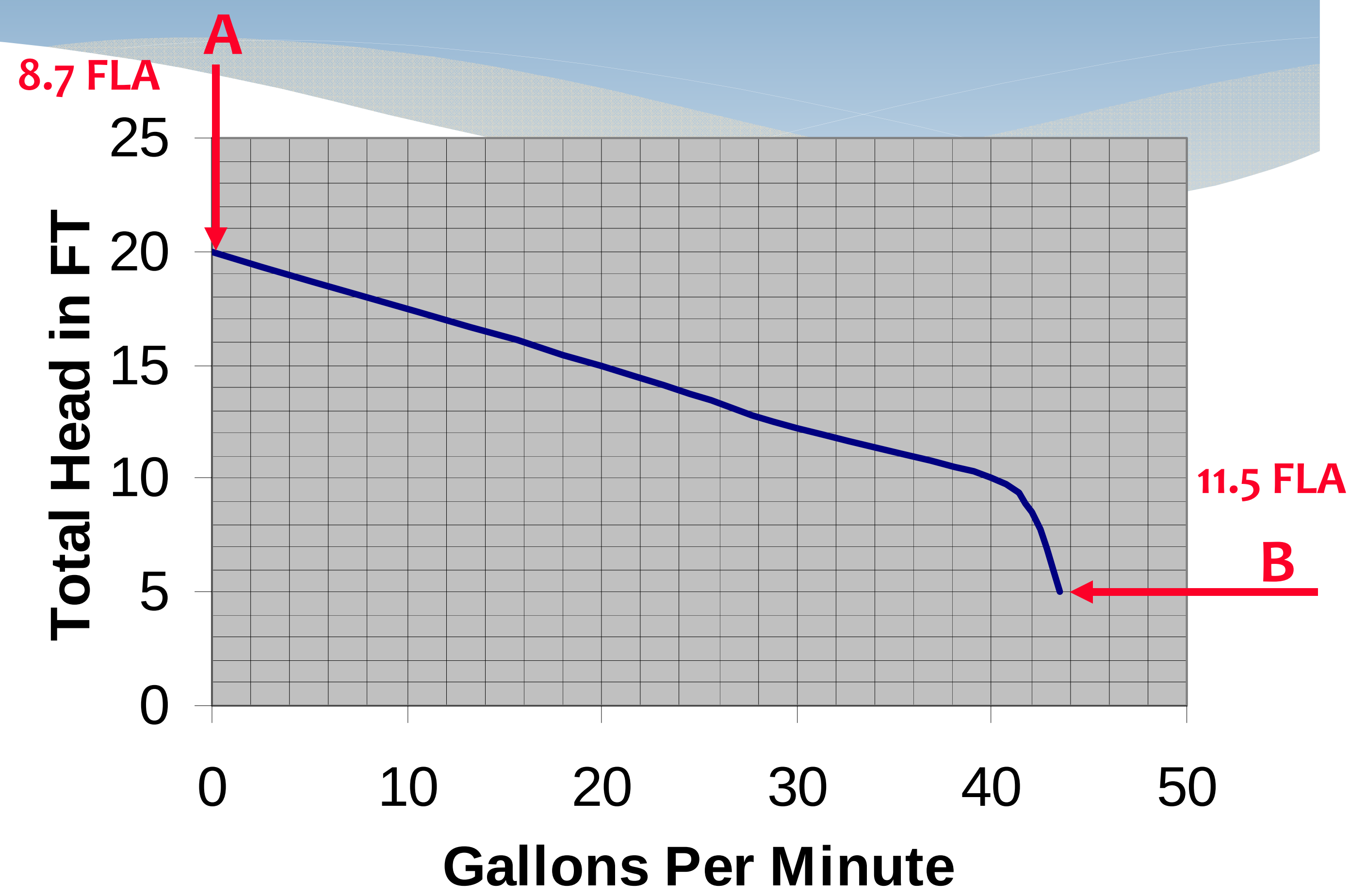
**Designed to last 10 years at 100 deg. c.**

**Will only last 5 years at 105 deg. c.**

# Where Does The Pump Work The Hardest? A or B



# Where Does The Pump Work The Hardest? A or B



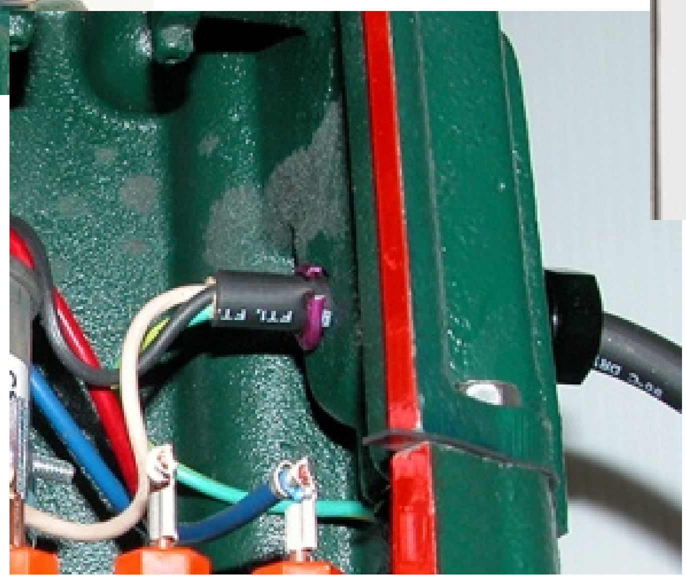
# Power Cords

## SJOOW

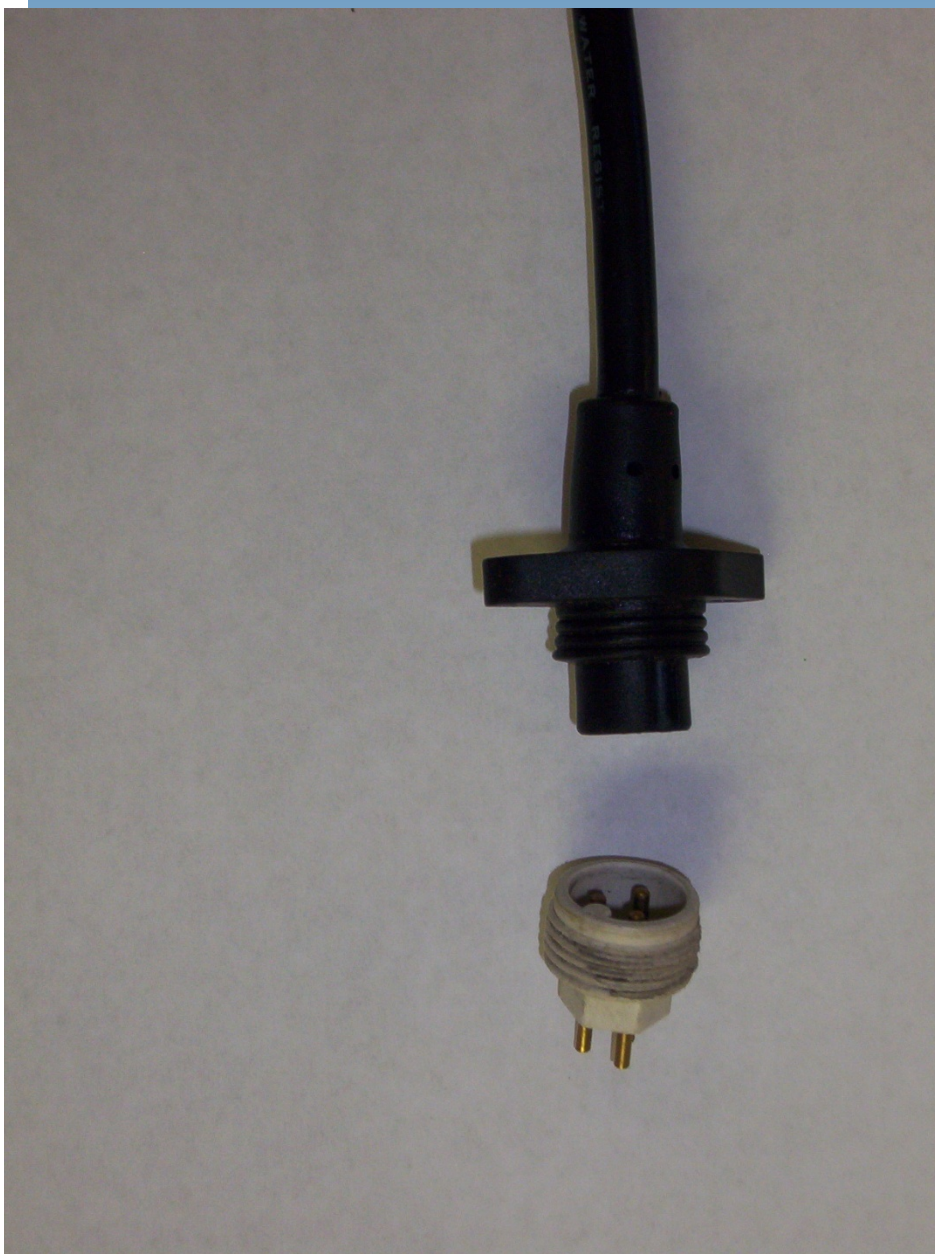
**SJ= Junior Duty 300 Volts**
**O= Oil Resistant Outer Jacket**
**OO= Oil Resistant Outer Jacket & Insulation**
**W= Weather & Water Resistant**
**T= Thermoplastic Jacket**

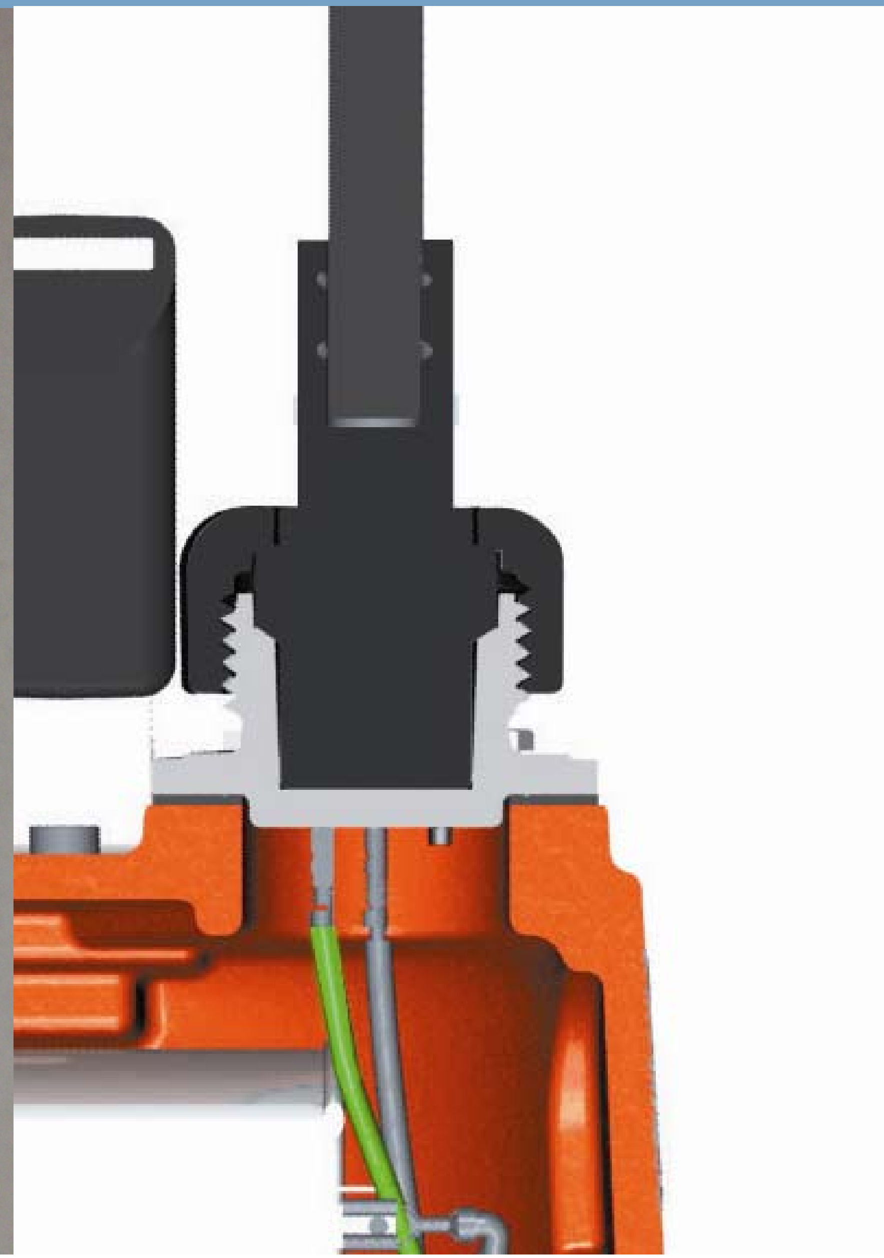
# Power Cords

# Power Cords Entrances



# Power Cords Entrances

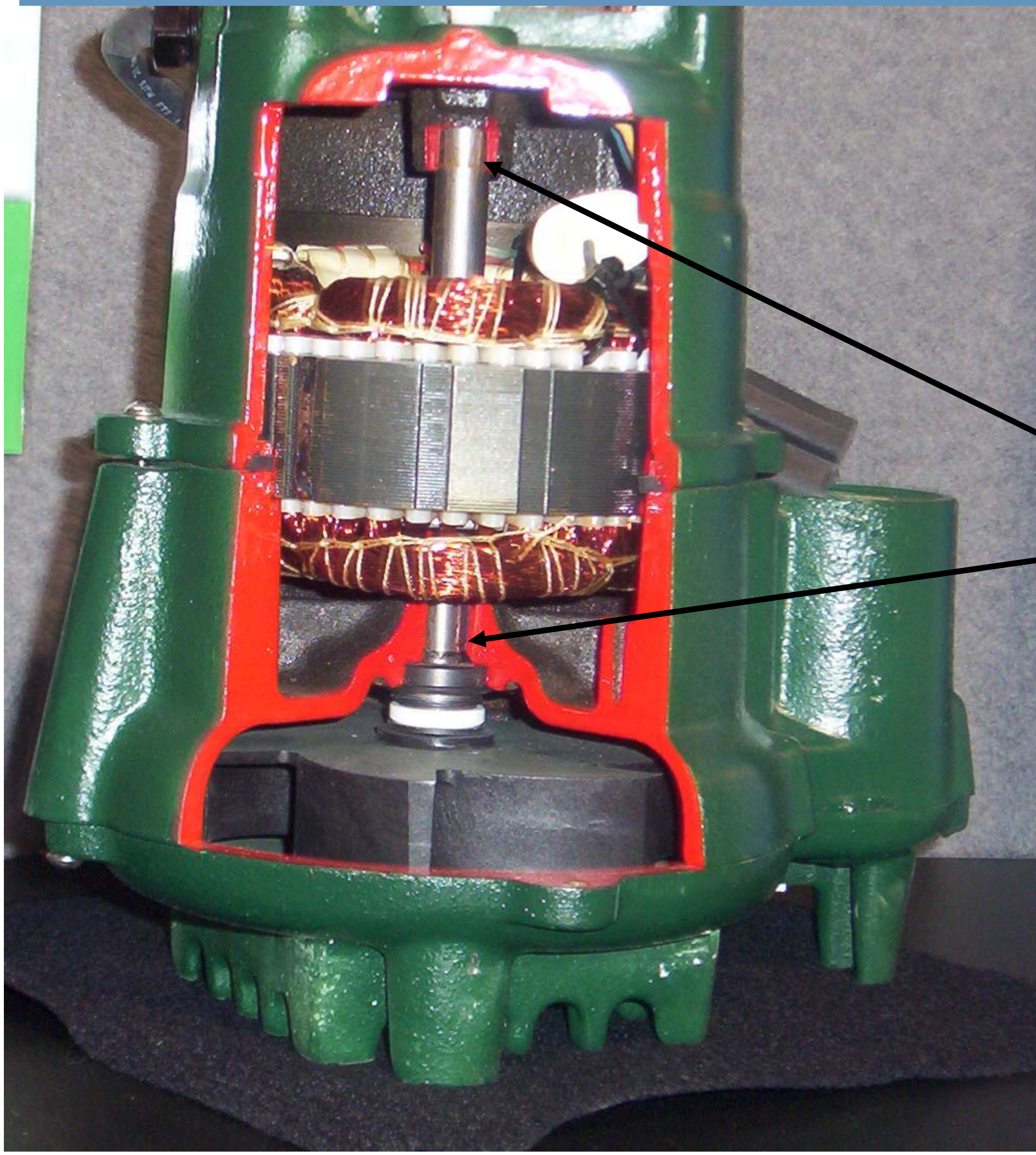




# Bearings

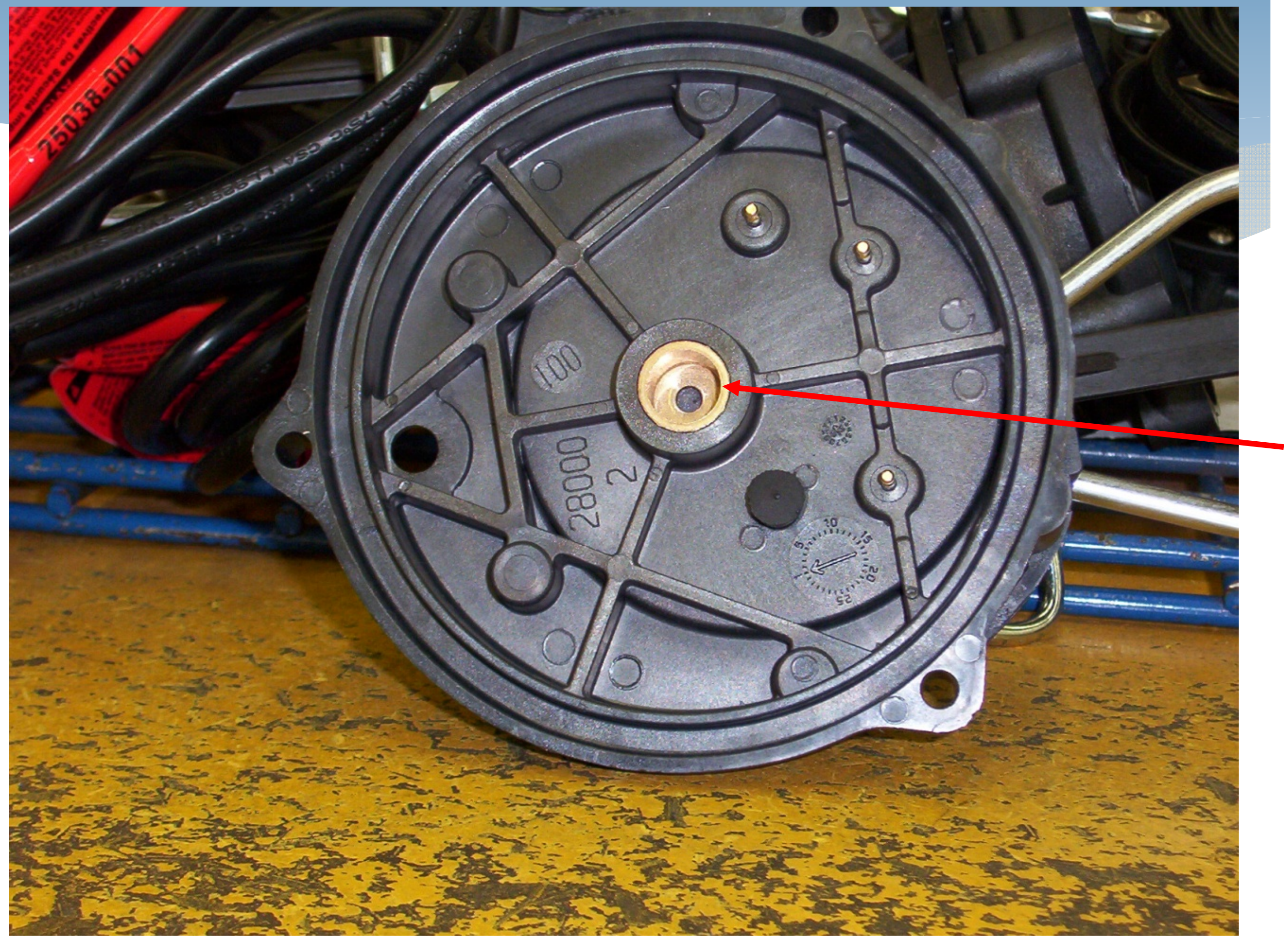
**Sleeve**

**Ball**

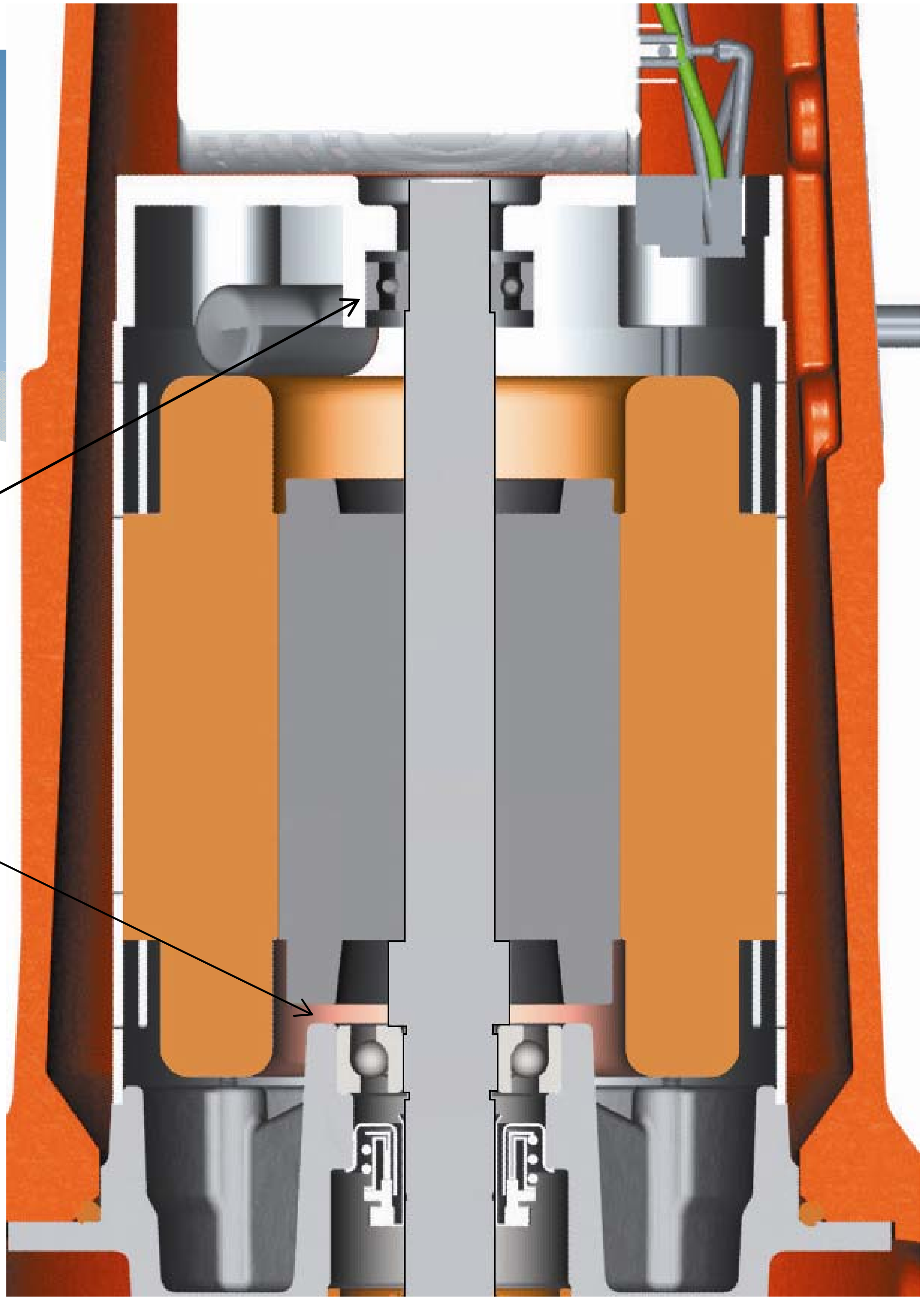


# Sleeve Bearings

SSPMA



# Upper & Lower Ball Bearings

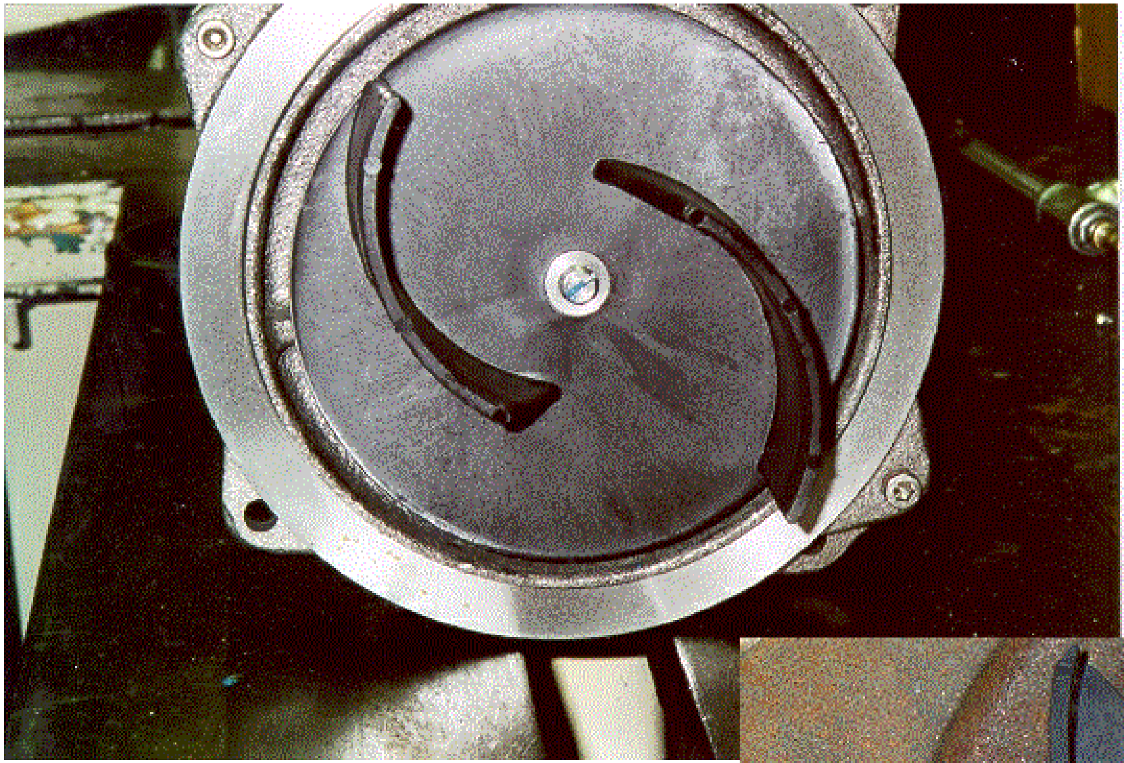


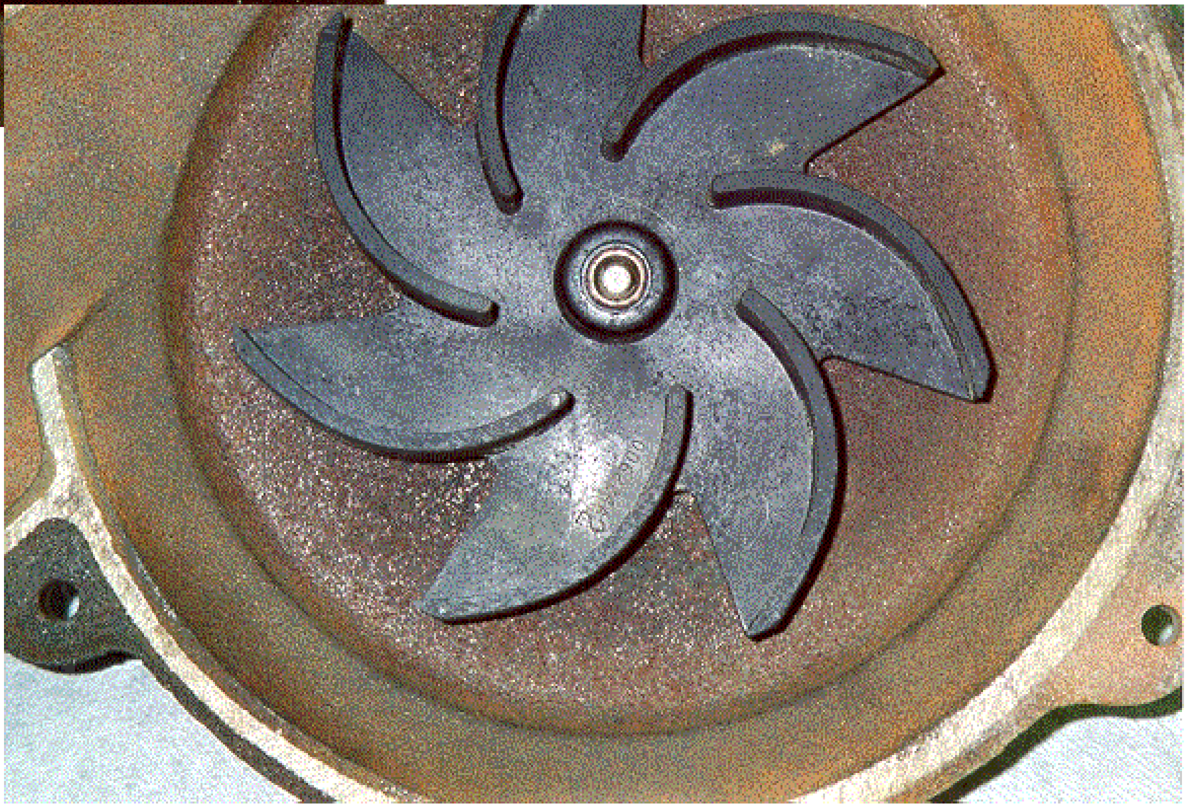
# Impellers

* Plastic
* Cast Iron
* Brass
* Stainless Steel
* Aluminum
* Vortex
* Non-Clog
* Enclosed
* Single Vane

# Vortex

# Non Clog





# Impellers

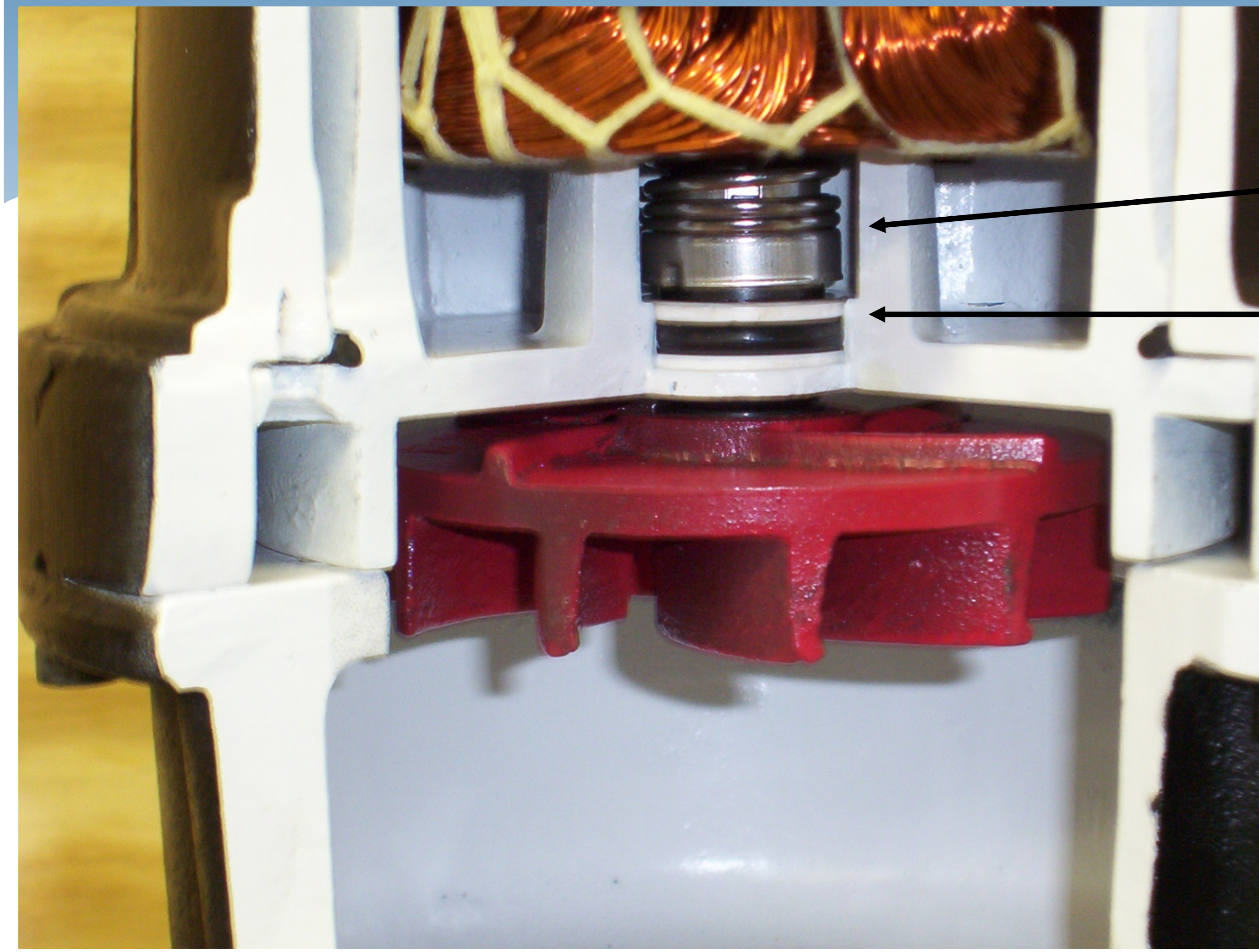
# Seals

**Carbon**

**Silicon**

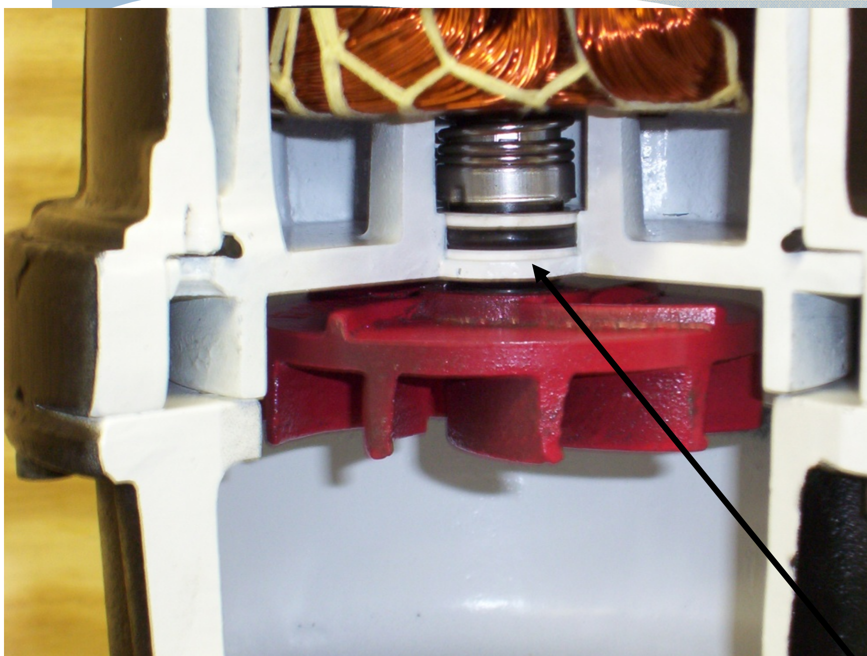
**Tungsten**

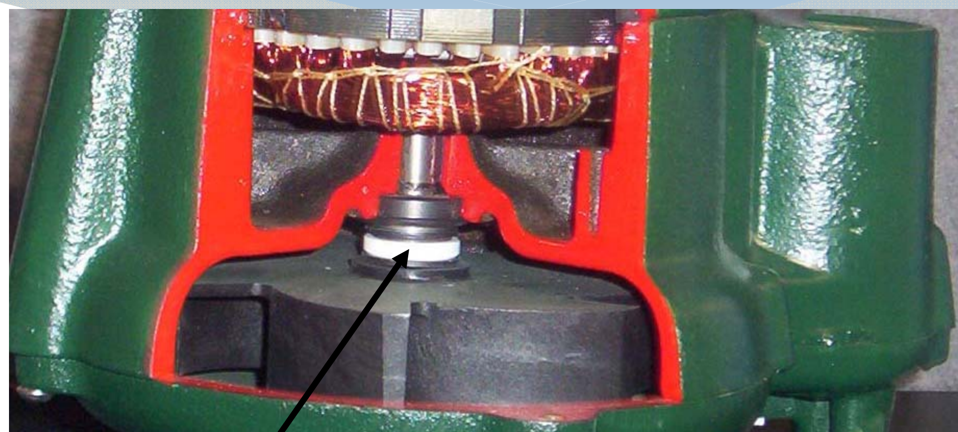
# Seals


Rotating
Stationary

# Seals

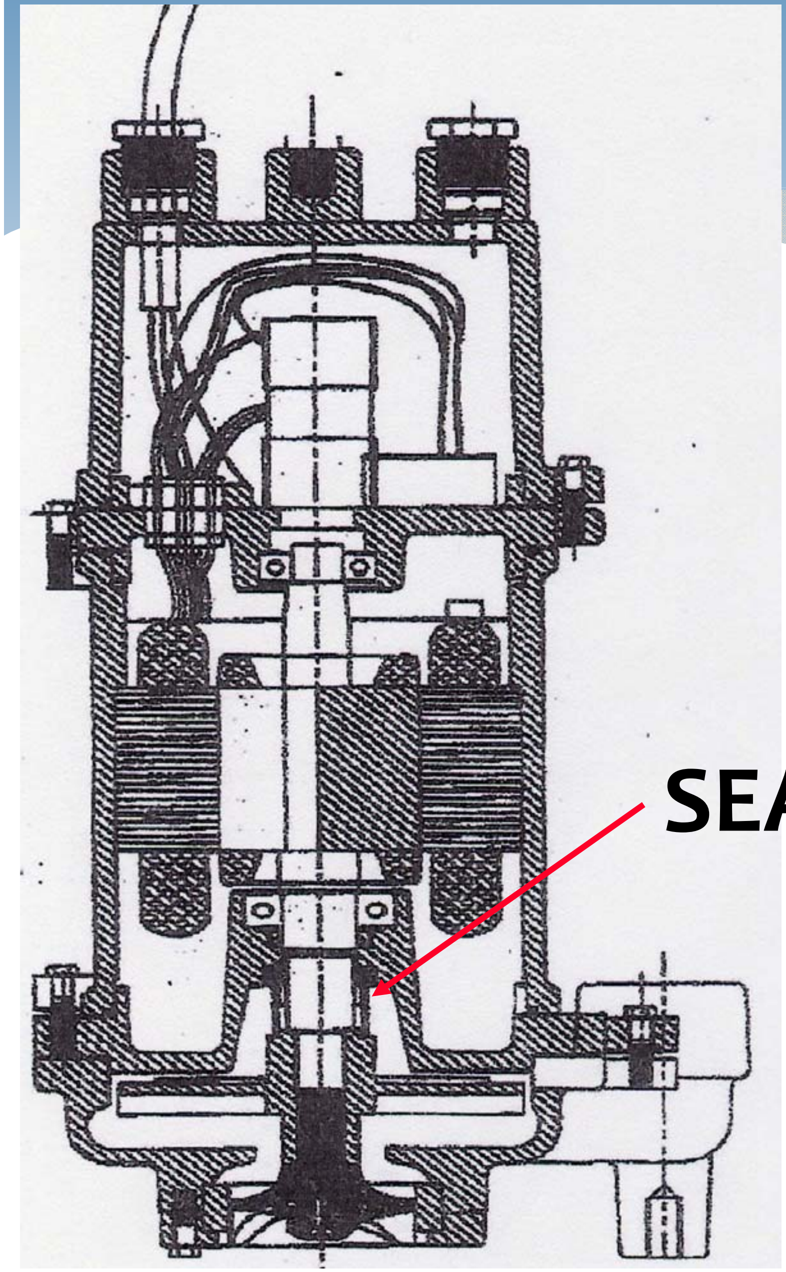
**INBOARD** | **OUTBOARD**



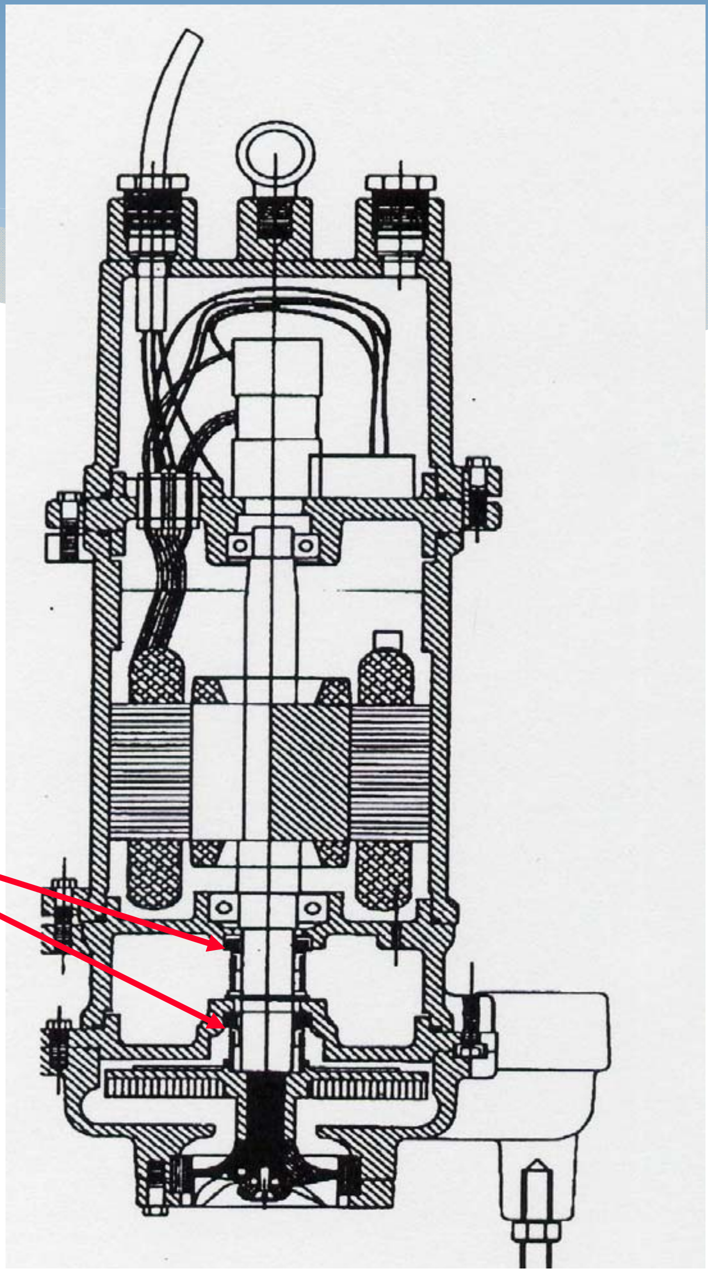


**Sealing Area**

# Single Seal Double Seal



SEALS



# Grinder Pumps

* **What is the difference between a Grinder Pump and a Sewage Ejector?**

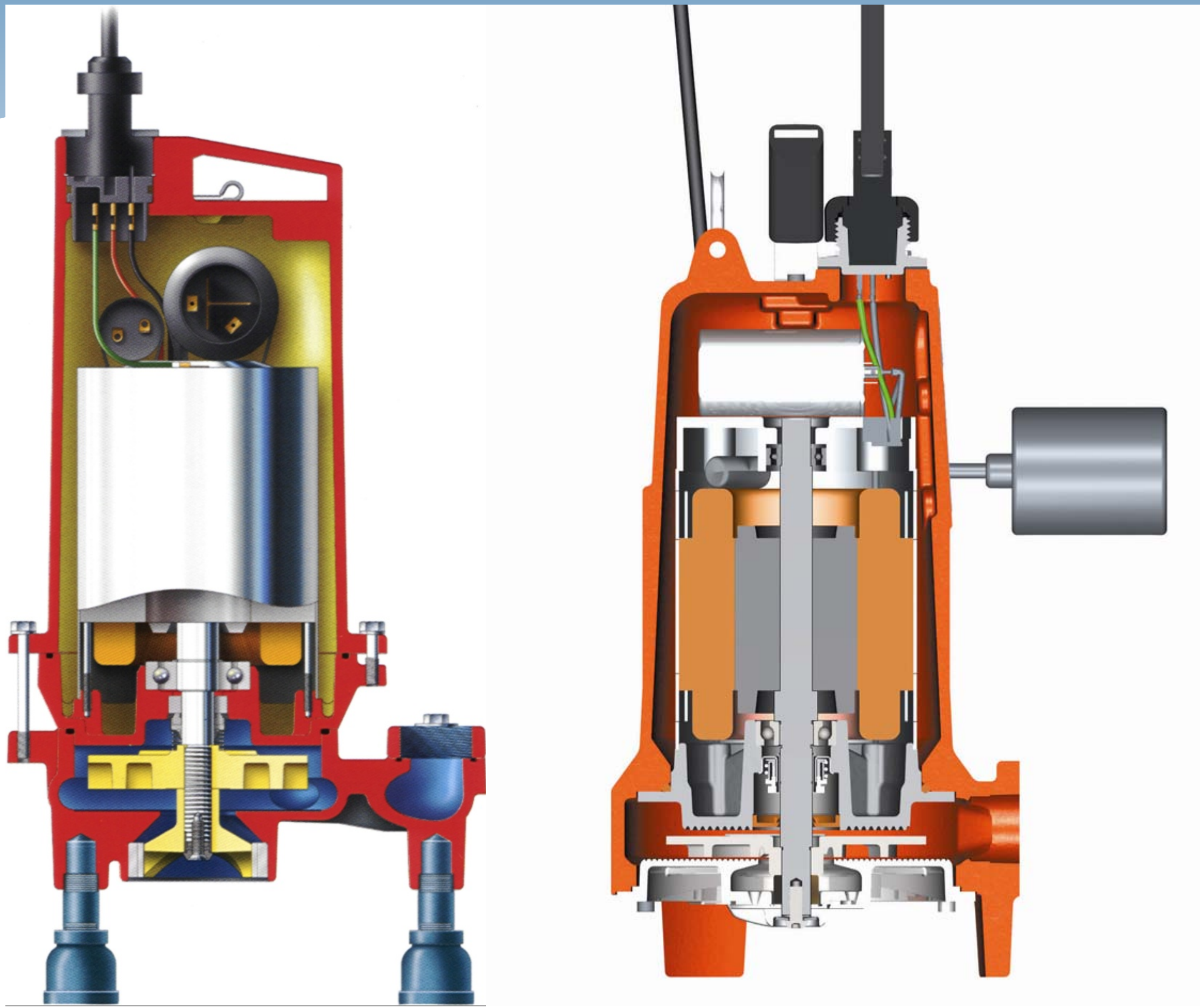
# Grinder Pumps

- **A Grinder Pump cuts the sewage into a slurry before pumping it.**
- **A Sewage ejector pumps the solids**

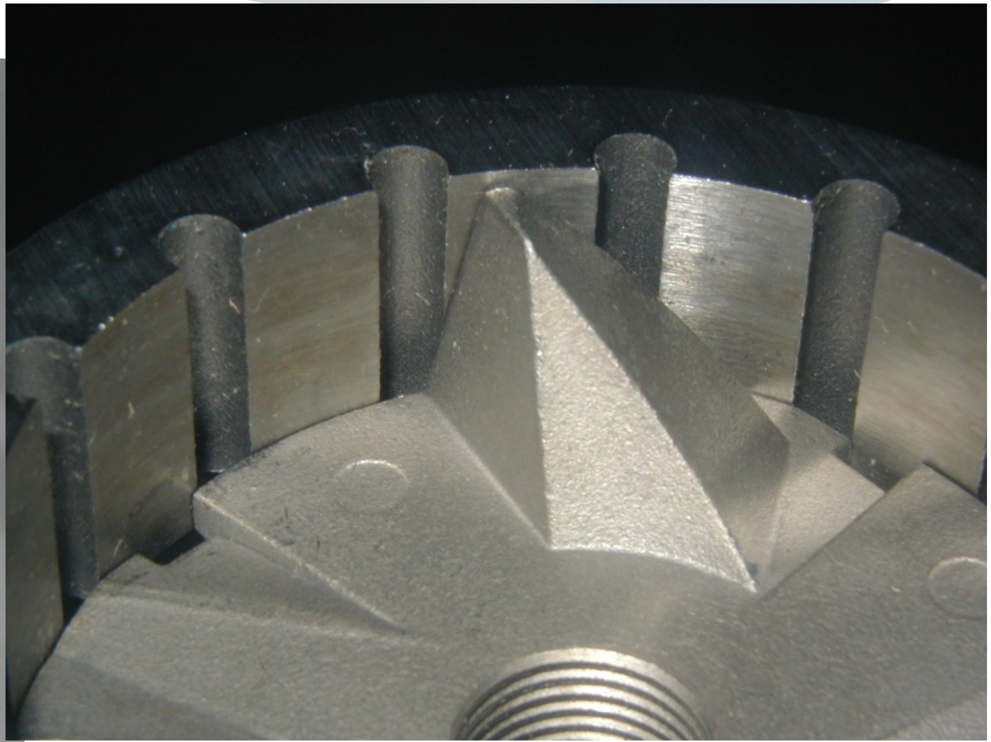
# Grinder Pumps

* **Never need a grinder pump to pump effluent from a septic tank to a leach field.**

# Grinder Pumps

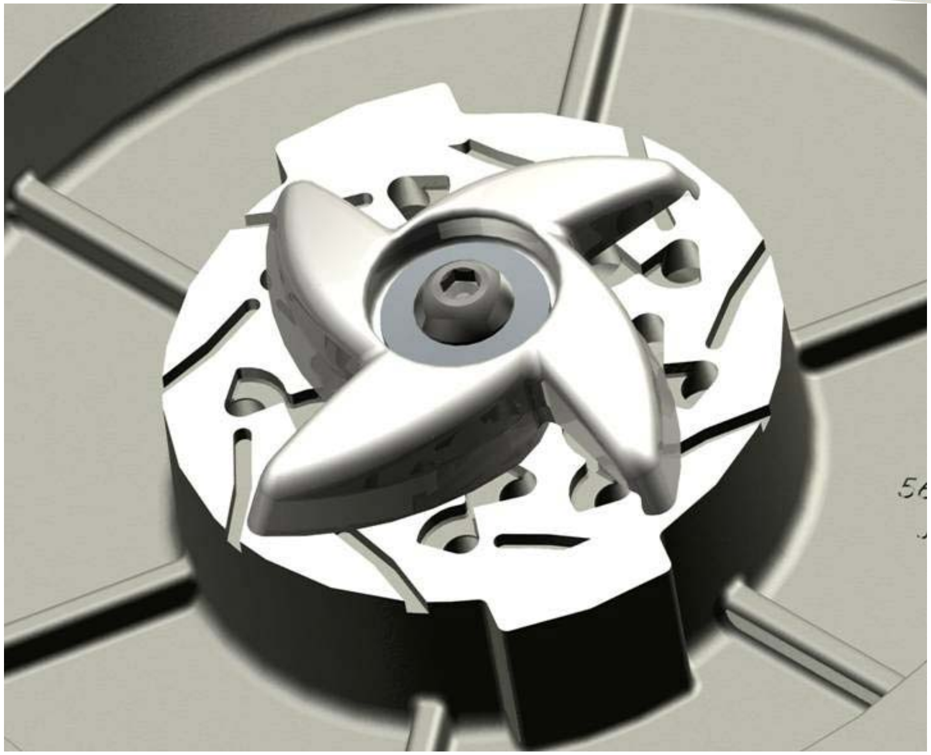


# Grinder Pumps



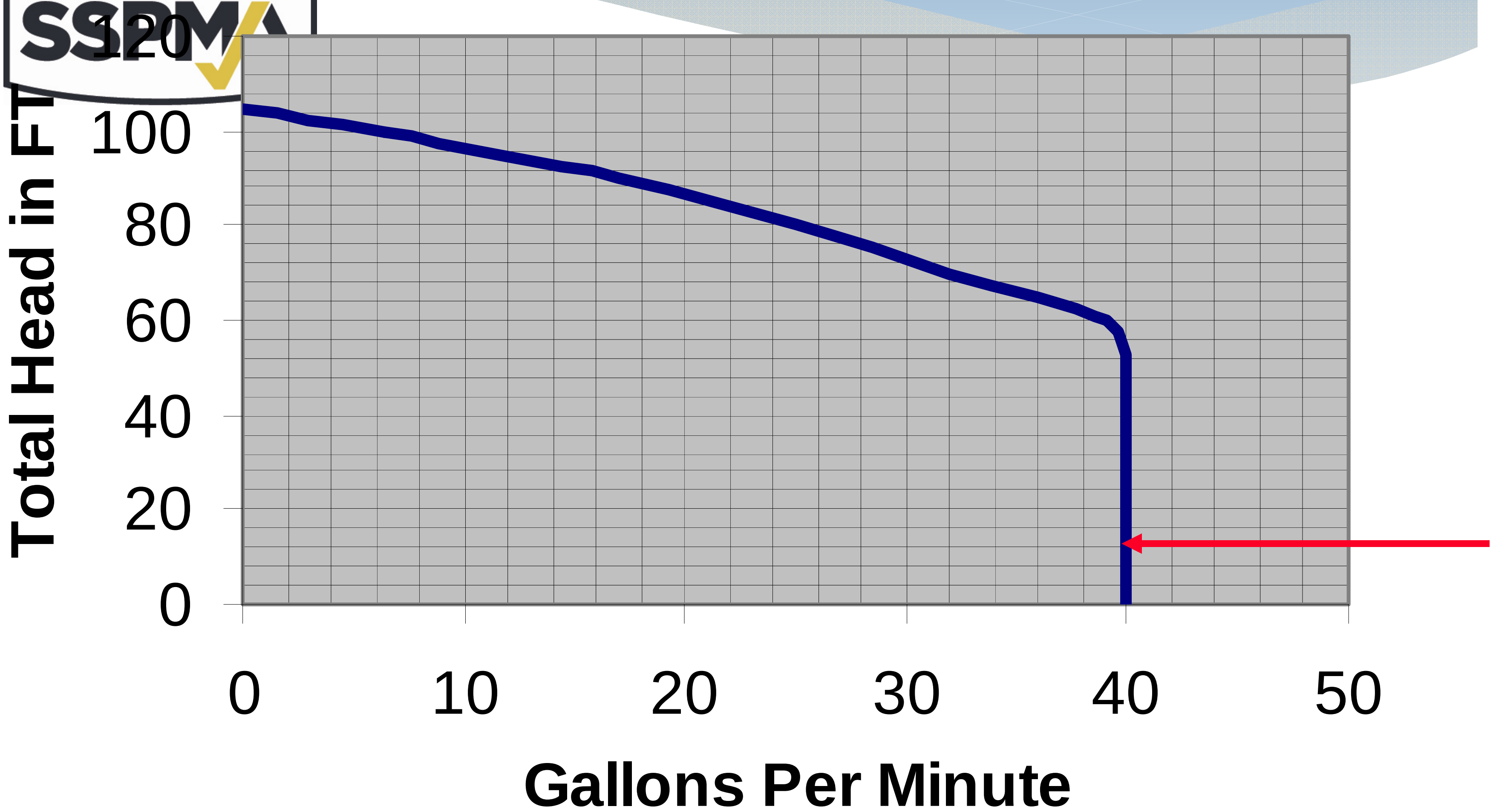
# Grinder Pumps

# Grinder Pumps

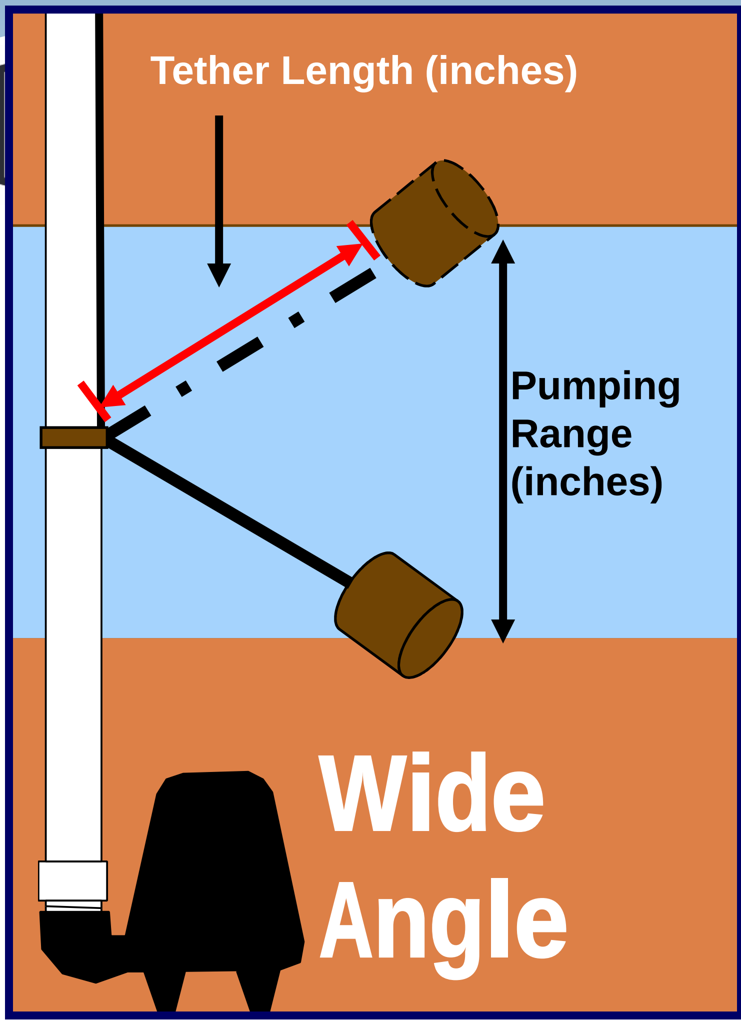


# Grinder Pumps

## PUMP PERFORMANCE CURVE



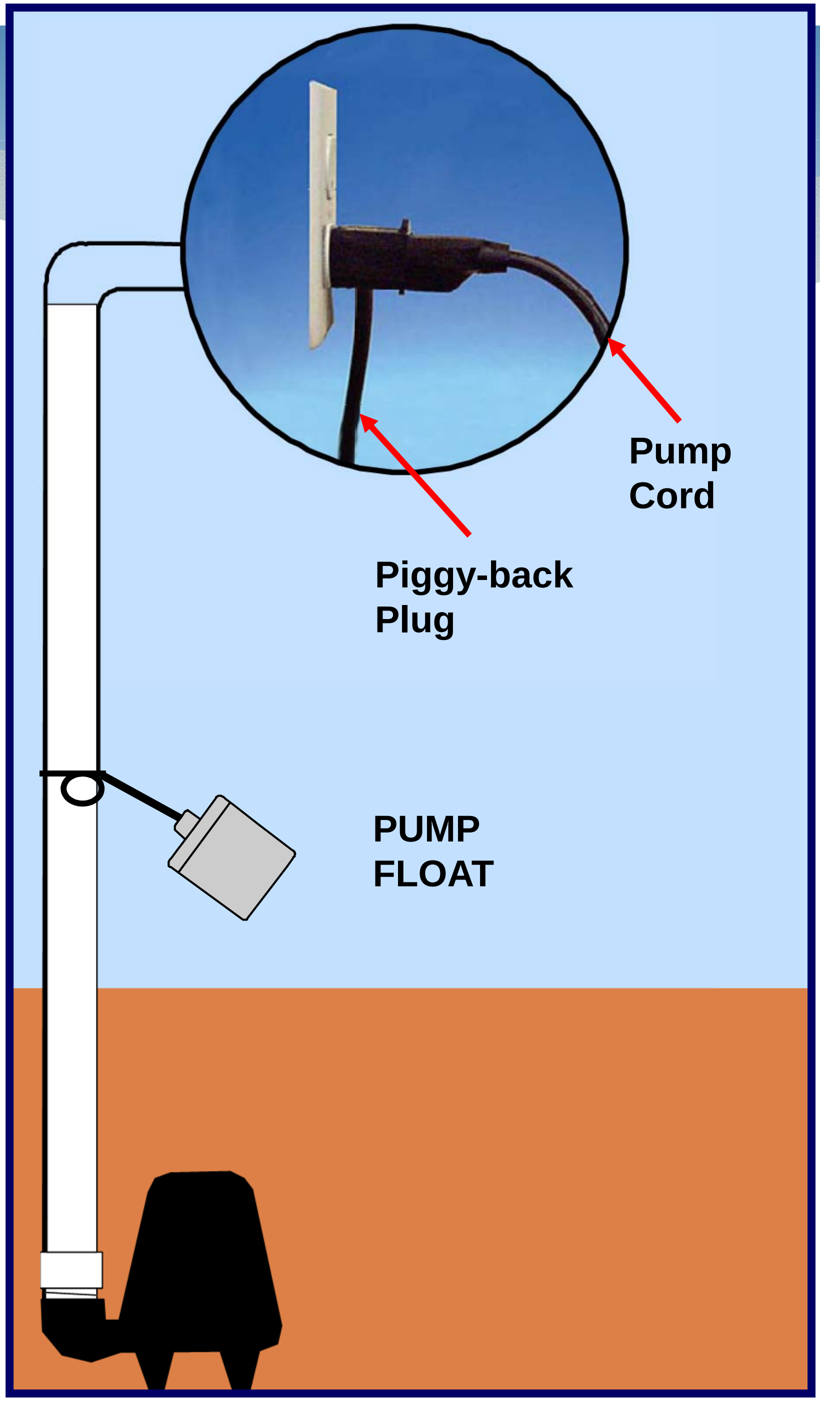
# Pump Switch



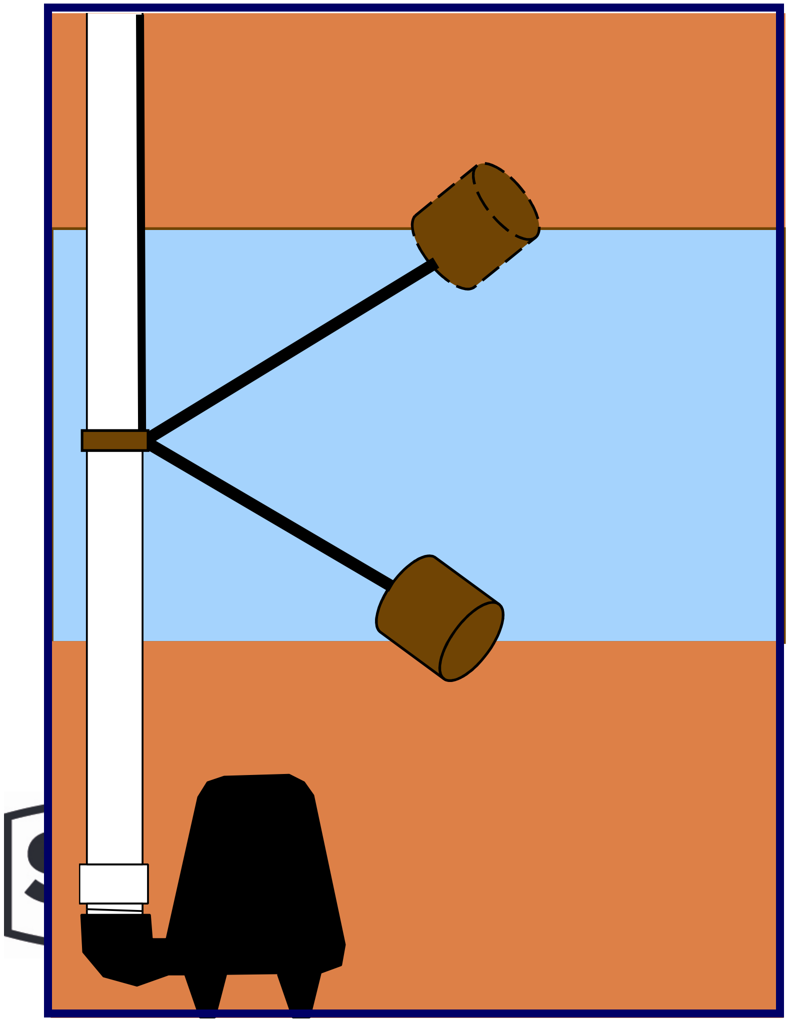

| Tether Length | Pumping Range |
|---|---|
| 3.5 | 6.6 |
| 6 | 8.5 |
| 8 | 11 |
| 10 | 13 |
| 12 | 14 |
| 15 | 17 |
| 17 | 19 |

# Pump Switch

- **Piggy-back plug option**



# Pump Switch



**The Best Location For A Switch Is For The Pump To Always Be Submerged!**

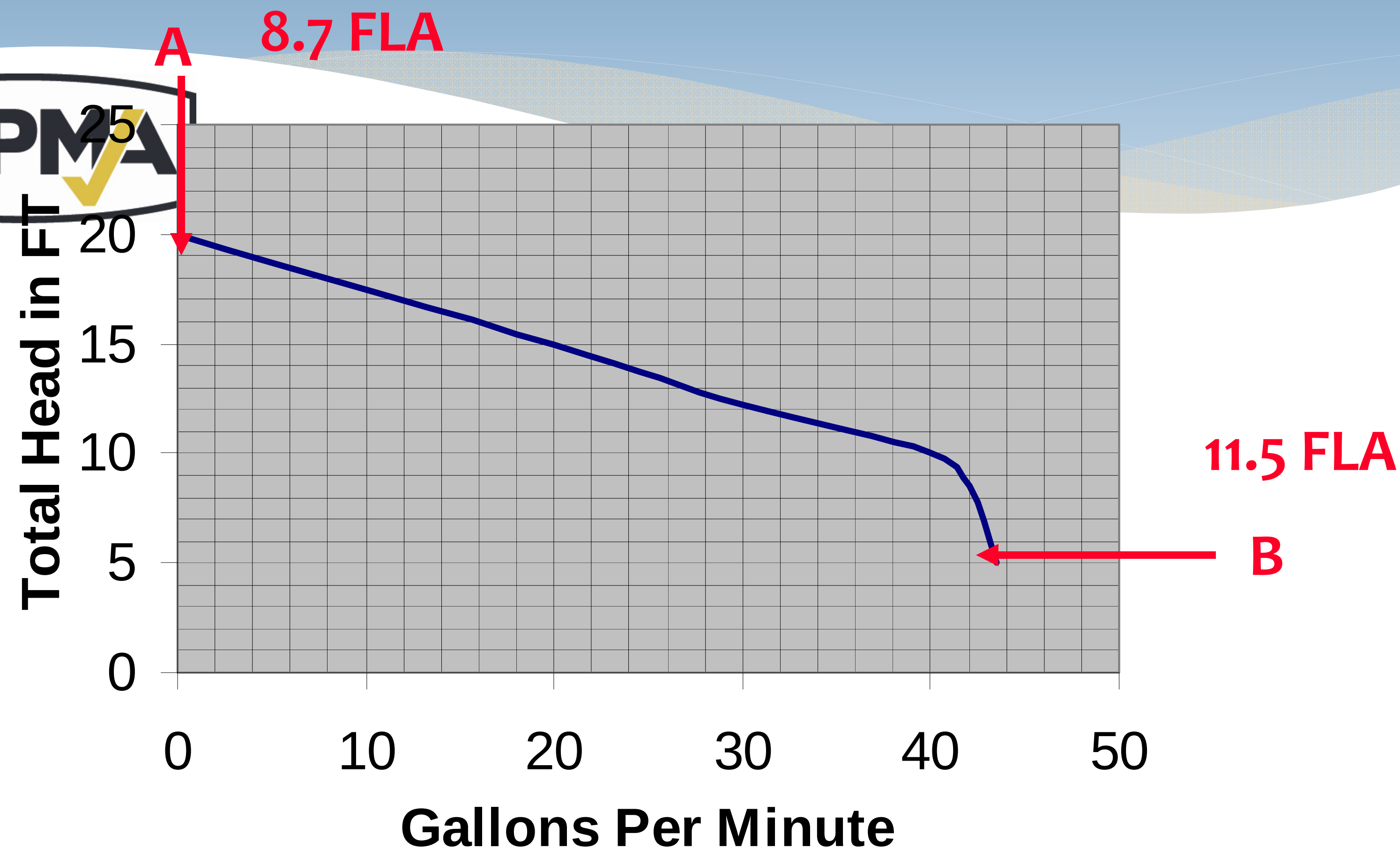
# Why Pumps Don’t Work

What Are Some Reasons Pumps Might Not Work?

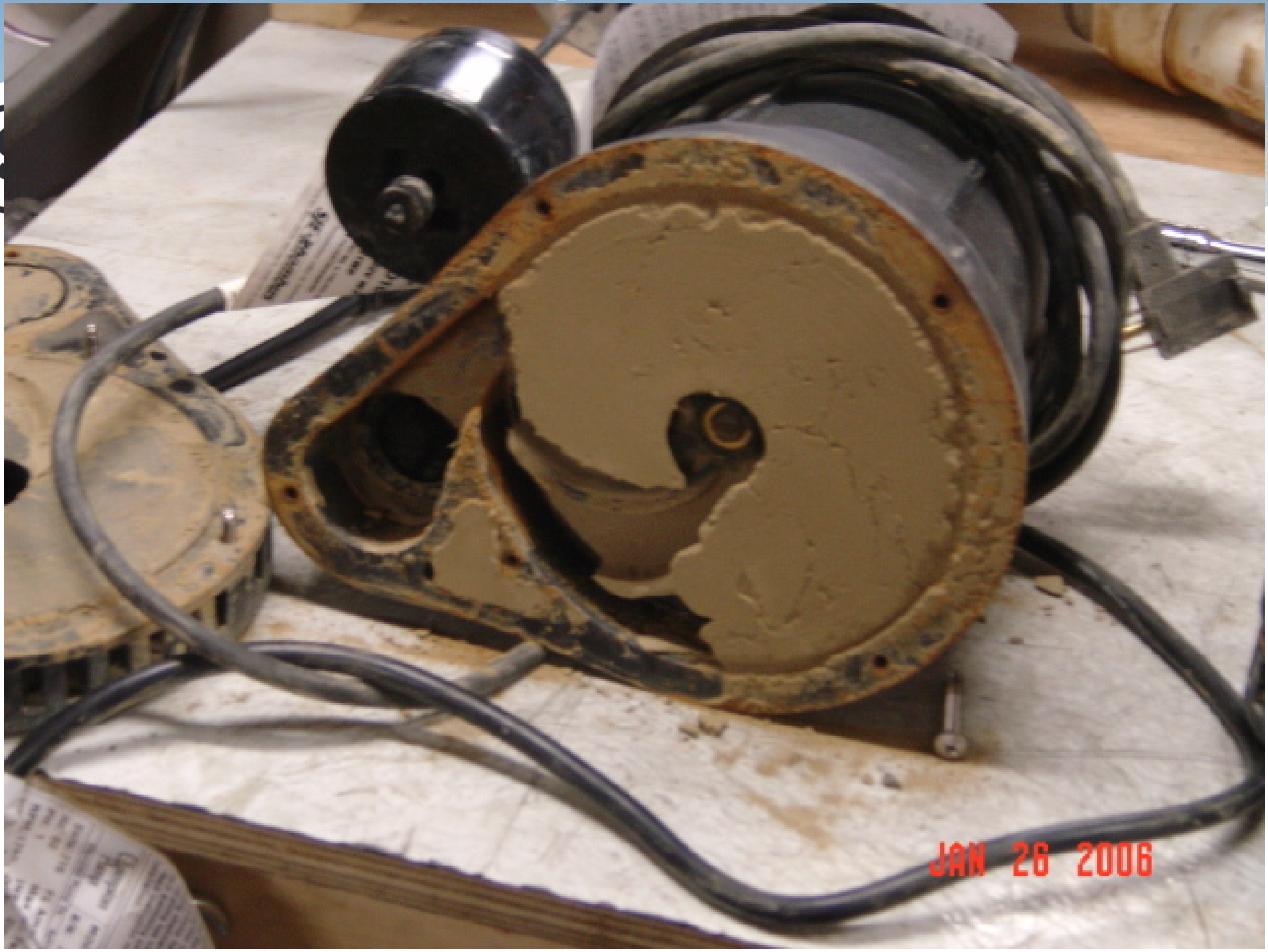
# Why Pumps Don't Work

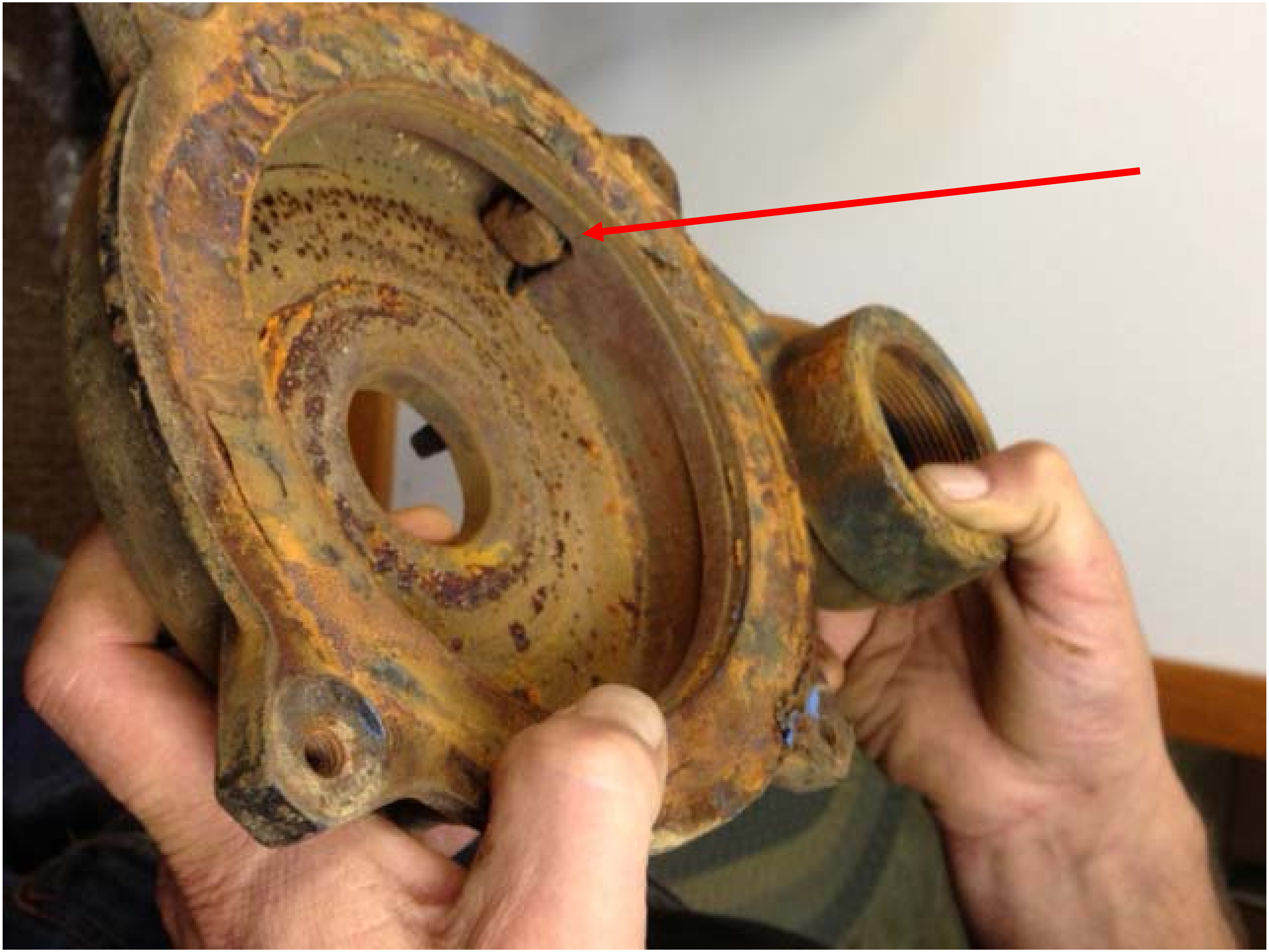
* Pump Sized Correctly
* Switch Or Control Failure
* Check Amps
* Low or Incorrect Voltage
* Tripped Thermal Sensor
* Debris In Volute
* Volute Inlet Blocked
* Discharge Line Could Be Blocked
* Check Valve Could Be Bad
* Pump Could be Air Locked

# Why Pumps Don't Work



# Why Pumps Don't Work





*FOR NEW OR REPLACEMENT*

**EFFLUENT PUMPS**

RECOMMENDED GUIDELINES FOR SIZING EFFLUENT PUMPS

SSPMA Certified PUMP®

SUMP & SEWAGE PUMP MANUFACTURERS ASSOCIATION • P.O. BOX 647 • NORTHBROOK, IL 60065-0647

# Effluent Pump Sizing & Selection


FOR NEW OR REPLACEMENT
**SEWAGE PUMPS**

SIZING GUIDELINES

SUMP AND SEWAGE PUMP MANUFACTURERS ASSOCIATION

SSPMA®

Certified PUMP

# Sewage Pump Sizing & Selection

# Sewage Pump Sizing & Selection

# Top Questions

**If somebody wants to size a pump, what do they need to know?**

# Top Questions

SSPMA

- Pump Capacity Requirements (GPM)
- Solids - Handling Requirements
- Discharge Piping Diameter Preferred
- Voltage & Phase Requirements
- Total Dynamic Head (TDH) Of The Installation
  - What Is The Static Head
  - What Is The Length Of The Discharge Piping

# Top Questions

- Is There A Control Panel Required
  - Simplex Or Duplex System
- Is There A Break A Way System Required
- Basin (Sump) Size

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................ ________ {1}

GPM requirements from Fig. "B" ........................................................... ________ {2} **GPM** ________

Pipe Size ............................................................ ________ {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | | | | |
| 45 Deg. bends | | | | |
| Tee (thru-flow) | | | | |
| Tee (branch flow) | | | | |
| Swing check valve | | | | |
| Gate valve | | | | |
| Disch. Pipe length | | | | {4} |
| | | | | |
| **Systems' total feet of piping** | | | | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... ________ {6}

Multiplied by the number of 100' increments ............... Friction Head ________ {7}
of total system piping to determine Friction Static Head ________ {8}
Head.

TDH ________ {9} **TDH** ________

# Pump Capacity Requirements

**Pump capacity refers to the rate of flow in GPM which is necessary to efficiently maintain the system**

* **List all fixtures involved in the installation.**
* **Using figure A", worksheet, assign a fixture unit value to each.**
* **Determine the total fixture units. {1}**

# SSPMA FIGURE "A"

| Fixture Description | Fixture Unit Value | Fixture Description | Fixture Unit Value |
|---|---|---|---|
| Bathtub, 1-1/2" trap | 2 | Sink, service type | 3 |
| Bathtub, 2" trap | 3 | Sink, scullery | 4 |
| Bidet, 1-1/2" trap | 3 | Sink, surgeons | 3 |
| Dental unit or cuspidor | 1 | Swimming pool (per 1000) gal.) | 1 |
| Drinking fountain | 1 | Urinal | 4** |
| Dishwasher, domestic | 2 | Washing machine | 2 |
| Kitchen sink | 2 | Water closet | 3** |
| Kitchen sink with disposal | 3 | Water Softener | 4 |
| Lavatory, 1-1/2" trap | 1 | Unlisted fixture, 1-1/4" trap | 2 |
| Lavatory, barber/beautician | 2 | Unlisted fixture, 1-1/2" trap | 3 |
| Laundry tray | 2 | Unlisted fixture, 2" trap | 4 |
| Shower | 2 | Unlisted fixture, 2-1/2" trap | 5 |
| Shower, group (per head) | 3 | Unlisted fixture, 3" trap | 6 |
| Bathroom group consisting of lavatory, bathtub or shower, and water closet | | | 6** |

** Add 4 fixture units for each flush valve fixture.

# Pump Sizing Example #1

* Four Bathrooms
* Dishwasher
* Washing Machine
* Laundry Tray
* Water Softener
* Kitchen Sink with Disposal.
* Basement Shower
* 13,000 Gallon Pool
* Bar Sink (1-1/2" Trap)

# FIGURE "A" WORKSHEET

| Fixture Description | Fixture Unit Value | Qty. | Sub. Total Units | Fixture Description | Fixture Unit Value | Qty. | Sub. Total Units |
|---|---|---|---|---|---|---|---|
| Bathtub, 1-1/2" trap | 2 | | | Sink, service type | 3 | | |
| Bathtub, 2" trap | 3 | | | Sink, scullery | 4 | | |
| Bidet, 1-1/2" trap | 3 | | | Sink, surgeons | 3 | | |
| Dental unit or cuspidor | 1 | | | Swimming pool (per 1000) gal.) | 1 | 13 | 13 |
| Drinking fountain | 1 | | | Urinal | 4** | | |
| Dishwasher, domestic | 2 | 1 | 2 | Washing machine | 2 | 1 | 2 |
| Kitchen sink | 2 | | | Water closet | 3** | | |
| Kitchen sink with disposal | 3 | 1 | 3 | Water Softener | 4 | 1 | 4 |
| Lavatory, 1-1/2" trap | 1 | | | Unlisted fixture, 1-1/4" trap | 2 | | |
| Lavatory, barber/beautician | 2 | | | Unlisted fixture, 1-1/2" trap | 3 | 1 | 3 |
| Laundry tray | 2 | 1 | 2 | Unlisted fixture, 2" trap | 4 | | |
| Shower | 2 | 1 | 2 | Unlisted fixture, 2-1/2" trap | 5 | | |
| Shower, group (per head) | 3 | | | Unlisted fixture, 3" trap | 6 | | |
| Bathroom group consisting of lavatory, bathtub or shower, and water closet | | | | | 6** | 4 | 24 |
| | | | | **TOTAL FIXTURE UNITS** | | | **55** |

** Add 4 fixture units for each flush valve fixture.

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................ ***55*** {1}

GPM requirements from Fig. "B" ............................................................ ________ {2} **GPM** ________

Pipe Size ............................................................ ________ {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | | | | |
| 45 Deg. bends | | | | |
| Tee (thru-flow) | | | | |
| Tee (branch flow) | | | | |
| Swing check valve | | | | |
| Gate valve | | | | |
| Disch. Pipe length | | | | {4} |
| | | | | |
| **Systems' total feet of piping** | | | | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... ________ {6}

Multiplied by the number of 100' increments ............... of total system piping to determine Friction Head.

Friction Head ________ {7}

Static Head ________ {8}

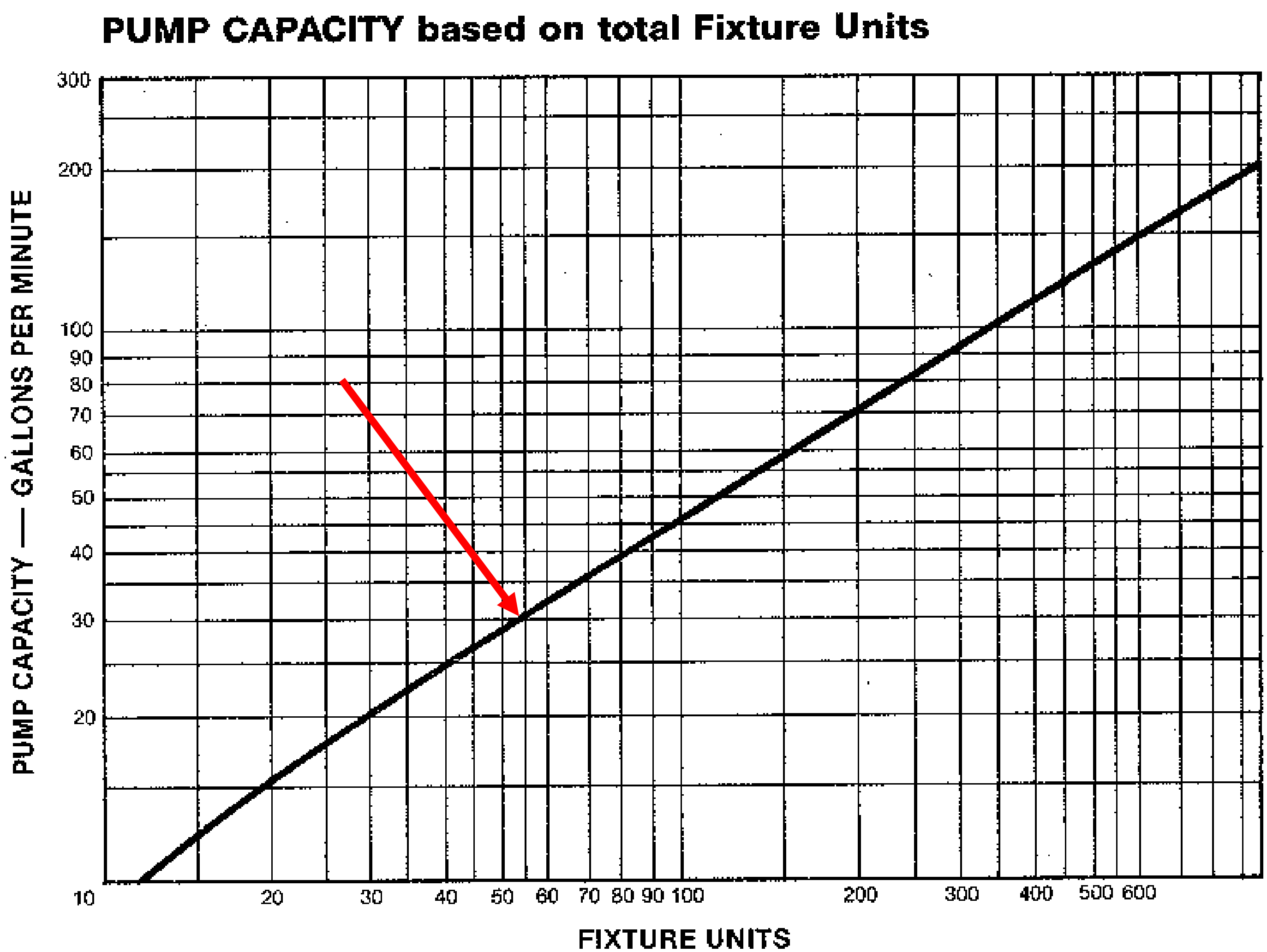
TDH ________ {9} **TDH** ________

# Pump Capacity Requirements

**Pump capacity refers to the rate of flow in GPM which is necessary to efficiently maintain the system**

- **List all fixtures involved in the installation.**
- **Using Figure"A", Worksheet, assign a fixture unit value to each.**
- **Determine the total fixture units. {1}**
- **Use figure "B" and determine the PUMP CAPACITY in GPM. {2}**

# SSPMA FIGURE "B"



# SSPMA FIGURE “B”

**In order to endure sufficient fluid velocity to carry solids (which is generally accepted to be 2 feet per second), the following are minimum required flows**

**21 GPM through 2” pipe**

**46 GPM through 3” pipe**

**78 GPM through 4” pipe**

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................ 55 {1}

GPM requirements from Fig. "B" ........................................................... ***30*** {2} **GPM** ***30***

Pipe Size ........................................................... ________ {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | | | | |
| 45 Deg. bends | | | | |
| Tee (thru-flow) | | | | |
| Tee (branch flow) | | | | |
| Swing check valve | | | | |
| Gate valve | | | | |
| Disch. Pipe length | | | | {4} |
| | | | | |
| **Systems' total feet of piping** | | | | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... ________ {6}

Multiplied by the number of 100' increments ............... Friction Head ________ {7}
of total system piping to determine Friction Static Head ________ {8}
Head.

TDH ________ {9} **TDH** ________

# Total Dynamic Head (TDH)

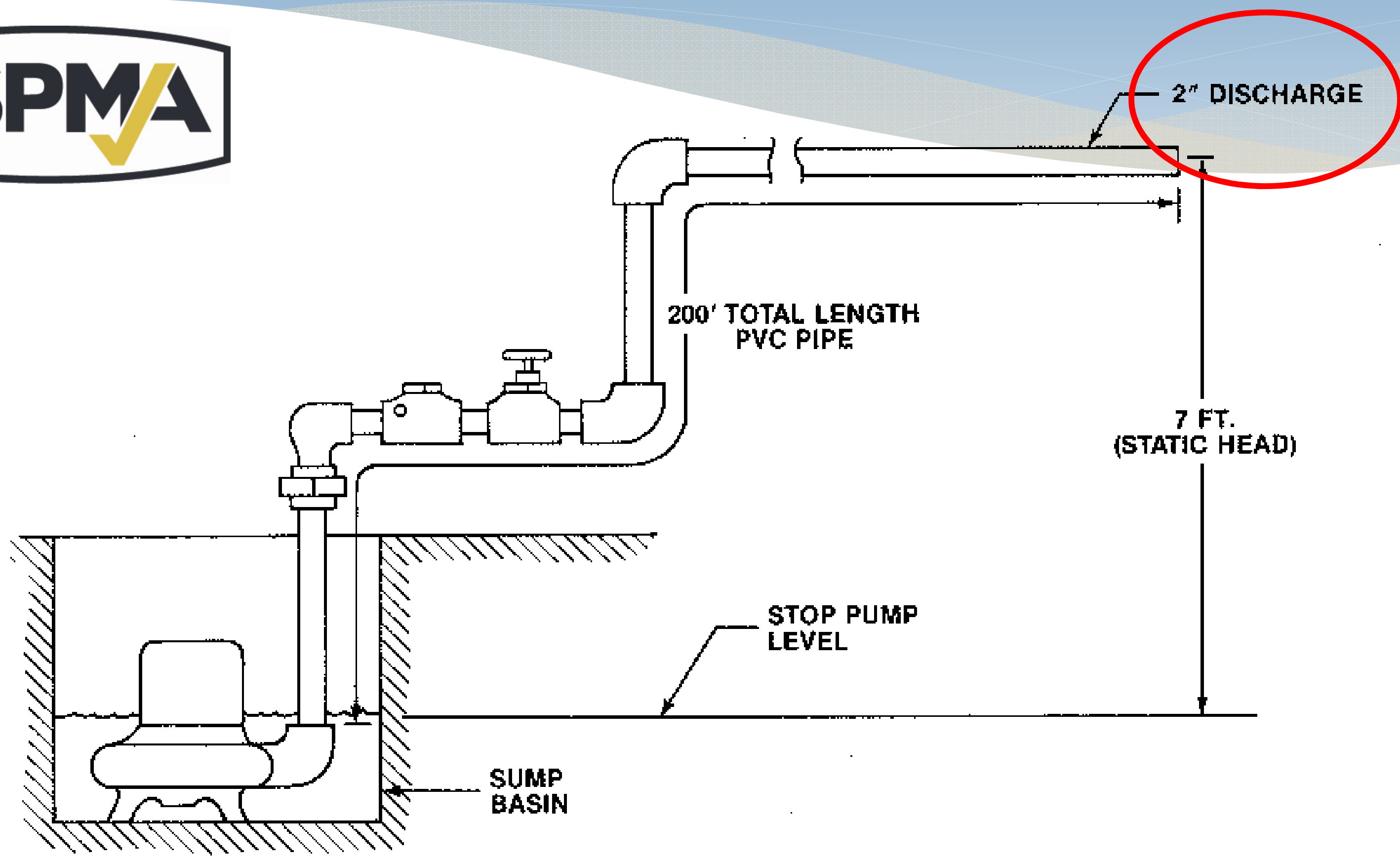
**TDH is a combination of two components- Static Head and Friction Head- and is expressed in feet.**

- **Static Head is the actual vertical distance measured from the minimum water level in the basin to the highest point in the discharge piping.**
- **Friction Head is the additional head created in the discharge system due to resistance to flow within its components.**

# Total Dynamic Head (TDH)

* **Determine discharge piping size {3}.**

# SSPMA FIGURE "C"



# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ........................................... 55 {1}

GPM requirements from Fig. "B" ........................................................ 30 {2} **GPM** **30**

Pipe Size ........................................................ ***2"*** {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | | | | |
| 45 Deg. bends | | | | |
| Tee (thru-flow) | | | | |
| Tee (branch flow) | | | | |
| Swing check valve | | | | |
| Gate valve | | | | |
| Disch. Pipe length | | | | {4} |
| | | | | |
| **Systems' total feet of piping** | | | | {5} |

Friction head per / 100' of pipe from Fig. "E" .............. ________ {6}

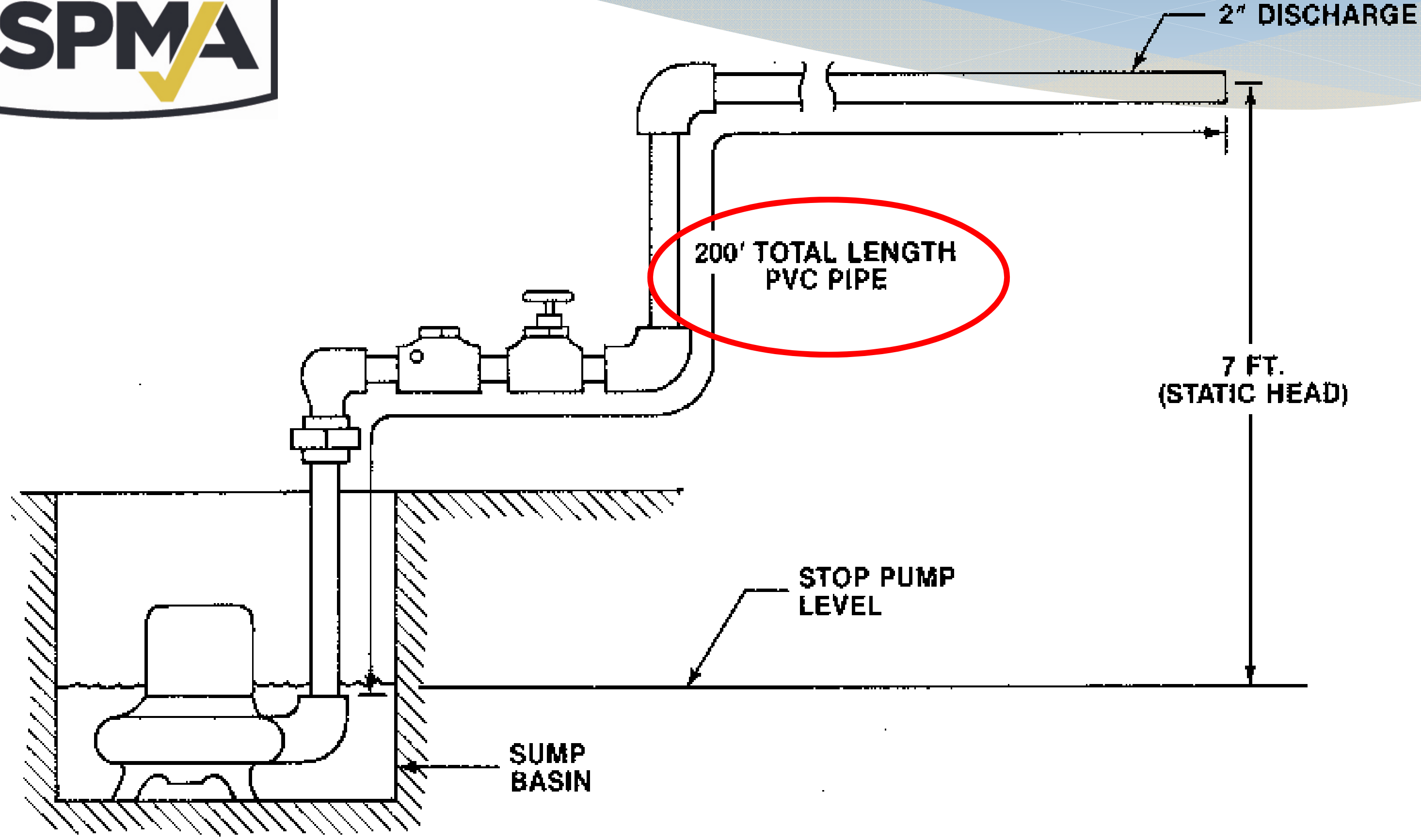
Multiplied by the number of 100' increments .............. Friction Head ________ {7}
of total system piping to determine Friction Static Head ________ {8}
Head.

TDH ________ {9} **TDH** ________

# Total Dynamic Head (TDH)

- Determine discharge piping size {3}.
- Determine length of discharge piping {4}.

# SSPMA FIGURE "C"



# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................ 55 {1}

GPM requirements from Fig. "B" ........................................................... 30 {2} **GPM 30**

Pipe Size ............................................................ 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | | | | |
| 45 Deg. bends | | | | |
| Tee (thru-flow) | | | | |
| Tee (branch flow) | | | | |
| Swing check valve | | | | |
| Gate valve | | | | |
| Disch. Pipe length | | | ***200'*** | {4} |
| | | | | |
| **Systems' total feet of piping** | | | | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... ________ {6}

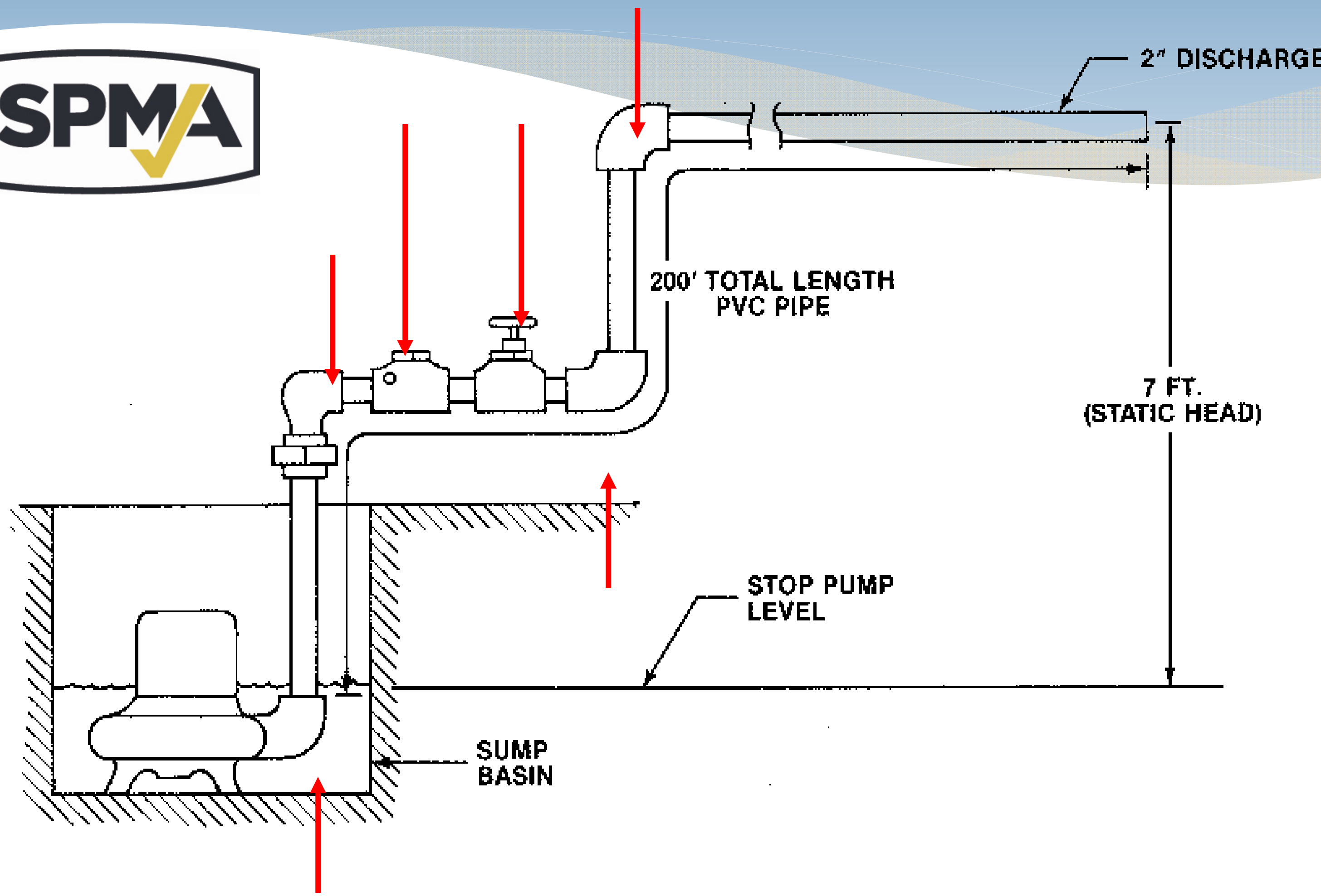
Multiplied by the number of 100' increments ............... Friction Head ________ {7}
of total system piping to determine Friction Static Head ________ {8}
Head.

TDH ________ {9} **TDH** ________

# Total Dynamic Head (TDH)

* Determine discharge piping size {3}.
* Determine length of discharge piping {4}.
* List all fittings and multiply by their factor, Figure "D". Add to length of discharge piping {4} to determine systems total feet of piping {5}.

# SSPMA FIGURE “C”



# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet .............................................. 55 {1}

GPM requirements from Fig. "B" ............................................................ 30 {2} **GPM** **30**

Pipe Size ............................................................ 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | | ***3*** | | |
| 45 Deg. bends | | | | |
| Tee (thru-flow) | | | | |
| Tee (branch flow) | | | | |
| Swing check valve | | ***1*** | | |
| Gate valve | | ***1*** | | |
| Disch. Pipe length | | | 200' | {4} |
| | | | | |
| **Systems' total feet of piping** | | | | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... {6}

Multiplied by the number of 100' increments ............... Friction Head {7}
of total system piping to determine Friction Static Head {8}
Head.

TDH {9} **TDH**

# SSPMA FIGURE "D"

**Friction factors for pipe fittings in terms of equivalent feet of straight pipe**

| Nominal Pipe Size | 90 Deg. Elbow | 45 Deg. Elbow | Tee (Thru-flow) | Tee Branch flow | Swing Check Valve | Gate Valve |
|---|---|---|---|---|---|---|
| 2" | 5.2 | 2.8 | 3.5 | 10.3 | 17.2 | 1.4 |
| 2-1/2" | 6.2 | 3.3 | 4.1 | 12.3 | 20.6 | 1.7 |
| 3" | 7.7 | 4.1 | 5.1 | 15.3 | 25.5 | 2 |

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet .............................................. 55 {1}

GPM requirements from Fig. "B" ........................................................... 30 {2} **GPM 30**

Pipe Size ........................................................... 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | ***5.2*** | 3 | ***15.6*** | |
| 45 Deg. bends | | 0 | ***0*** | |
| Tee (thru-flow) | | 0 | ***0*** | |
| Tee (branch flow) | | 0 | ***0*** | |
| Swing check valve | ***17.2*** | 1 | ***17.2*** | |
| Gate valve | ***1.4*** | 1 | ***1.4*** | |
| Disch. Pipe length | | | 200 | {4} |
| | | | | |
| **Systems' total feet of piping** | | | ***234.2*** | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... ________ {6}

Multiplied by the number of 100' increments ............... Friction Head ________ {7}
of total system piping to determine Friction Static Head ________ {8}
Head.

TDH ________ {9} **TDH** ________

# Total Dynamic Head (TDH)

- Determine discharge piping size {3}.
- Determine length of discharge piping {4}.
- List all fittings and multiply by their factor. Add to length of discharge piping {4} to determine systems total feet of piping {5}.
- Enter friction head per 100’ of pipe from figure “E” {6}.

# SSPMA FIGURE “E”

**Friction head in feet per 100' of Schedule 40 pipe**

| | 2" | | 2-1/2" | | 3" | |
|---|---|---|---|---|---|---|
| GPM | Plastic | Steel | Plastic | Steel | Plastic | Steel |
| 20 | 0.9 | 0.9 | | | | |
| 25 | 1.3 | 1.3 | | | | |
| 30 | 1.8 | 1.8 | 0.6 | 0.8 | | |
| 35 | 2.4 | 2.4 | 0.8 | 1 | | |
| 40 | 3.1 | 3.1 | 1 | 1.3 | | |
| 45 | 3.8 | 3.8 | 1.3 | 1.6 | 0.5 | 0.6 |
| 50 | 4.7 | 4.7 | 1.6 | 1.9 | 0.7 | 0.7 |
| 60 | 6.5 | 6.6 | 2.2 | 2.7 | 0.9 | 0.9 |
| 70 | 8.6 | 8.8 | 2.9 | 3.6 | 1.2 | 1.2 |
| 80 | 11.1 | 11.4 | 3.7 | 4.6 | 1.5 | 1.6 |
| 90 | 13.8 | 14.3 | 4.6 | 5.8 | 1.9 | 2 |
| 100 | 16.8 | 17.5 | 5.6 | 7.1 | 2.3 | 2.4 |
| 125 | | | 8.3 | 10.9 | 3.6 | 3.6 |
| 150 | | | 12 | 15.5 | 4.9 | 5.1 |
| 175 | | | 16.4 | 20.9 | 6.4 | 6.9 |
| 200 | | | | | 8.4 | 8.9 |
| 225 | | | | | 10.5 | 11.2 |

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................ 55 {1}

GPM requirements from Fig. "B" ........................................................ 30 {2}

**GPM** **30**

Pipe Size ........................................................... 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | 5.2 | 3 | 15.6 | |
| 45 Deg. bends | | 0 | 0 | |
| Tee (thru-flow) | | 0 | 0 | |
| Tee (branch flow) | | 0 | 0 | |
| Swing check valve | 17.2 | 1 | 17.2 | |
| Gate valve | 1.4 | 1 | 1.4 | |
| Disch. Pipe length | | | 200 | {4} |
| | | | | |
| **Systems' total feet of piping** | | | 234.2 | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... ***1.8*** {6}

Multiplied by the number of 100' increments ............... of total system piping to determine Friction Head.

Friction Head ________ {7}

Static Head ________ {8}

TDH ________ {9}

**TDH** ________

# Total Dynamic Head (TDH)

* Multiply friction head per / 100’ of pipe by the number of 100’ increments from systems total feet of piping {7}.

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................ 55 {1}

GPM requirements from Fig. "B" .......................................................... 30 {2} **GPM 30**

Pipe Size .......................................................... 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | 5.2 | 3 | 15.6 | |
| 45 Deg. bends | | 0 | 0 | |
| Tee (thru-flow) | | 0 | 0 | |
| Tee (branch flow) | | 0 | 0 | |
| Swing check valve | 17.2 | 1 | 17.2 | |
| Gate valve | 1.4 | 1 | 1.4 | |
| Disch. Pipe length | | | 200 | {4} |
| | | | | |
| **Systems' total feet of piping** | | | 234.2 | {5} |

Friction head per / 100' of pipe from Fig. "E" .............. 1.8 {6}

Multiplied by the number of 100' increments .............. of total system piping to determine Friction Head.

Friction Head *4.22* {7}

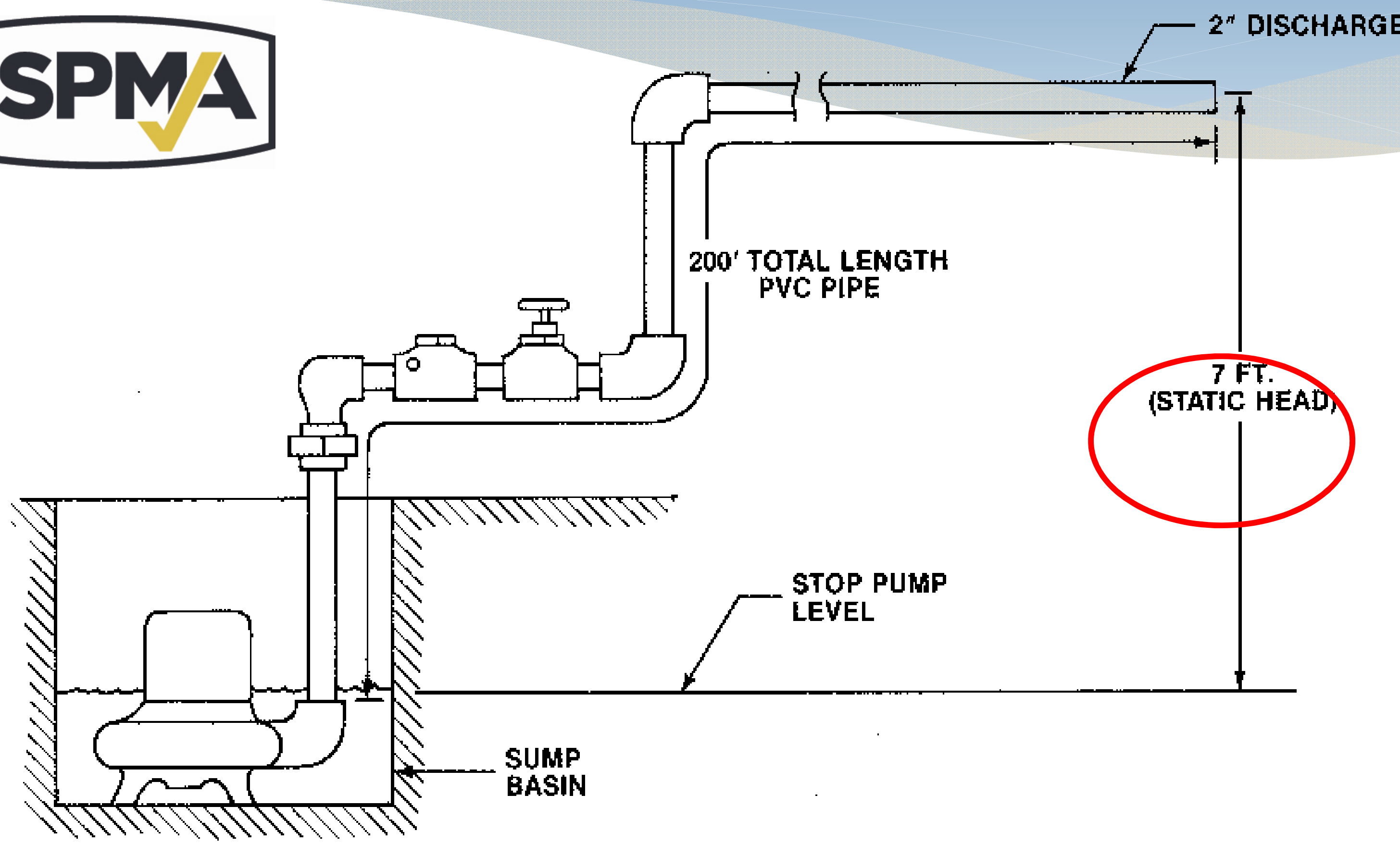
Static Head {8}

TDH {9} **TDH**

# Total Dynamic Head (TDH)

- Multiply friction head per / 100’ of pipe by the number of 100’ increments from systems total feet of piping {7}.
- Enter system static head {8}.

# SSPMA FIGURE "C"



# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................ 55 {1}

GPM requirements from Fig. "B" ........................................................... 30 {2}

**GPM** **30**

Pipe Size .............................................................. 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | 5.2 | 3 | 15.6 | |
| 45 Deg. bends | | 0 | 0 | |
| Tee (thru-flow) | | 0 | 0 | |
| Tee (branch flow) | | 0 | 0 | |
| Swing check valve | 17.2 | 1 | 17.2 | |
| Gate valve | 1.4 | 1 | 1.4 | |
| Disch. Pipe length | | | 200 | {4} |
| | | | | |
| **Systems' total feet of piping** | | | 234.2 | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... 1.8 {6}

Multiplied by the number of 100' increments ............... of total system piping to determine Friction Head.

Friction Head 4.22 {7}

Static Head ***7*** {8}

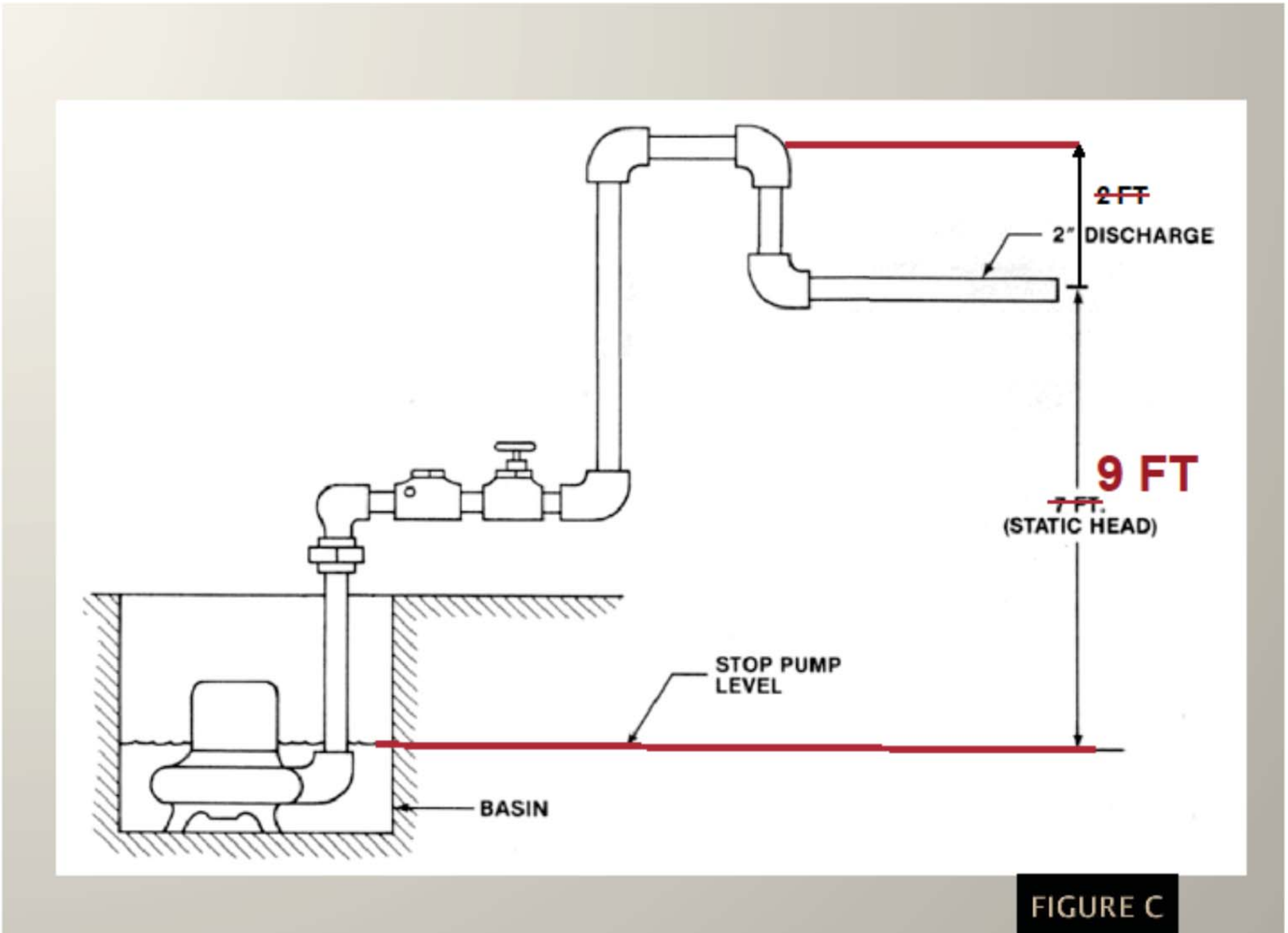
TDH {9}

**TDH**

# CAUTION!

The point of discharge MAY NOT be the highest point in the piping system. A pump must be selected that has a shut-off head greater than the highest point in the pipe system.

# SSPMA FIGURE "C"



# Total Dynamic Head (TDH)

- Multiply friction head per / 100’ of pipe by the number of 100’ increments from systems total feet of piping {7}.
- Enter system static head {8}.
- Add friction head and static head to determine TDH {9}.

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................ 55 {1}

GPM requirements from Fig. "B" ........................................................ 30 {2} **GPM** **30**

Pipe Size .......................................................... 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | 5.2 | 3 | 15.6 | |
| 45 Deg. bends | | 0 | 0 | |
| Tee (thru-flow) | | 0 | 0 | |
| Tee (branch flow) | | 0 | 0 | |
| Swing check valve | 17.2 | 1 | 17.2 | |
| Gate valve | 1.4 | 1 | 1.4 | |
| Disch. Pipe length | | | 200 | {4} |
| | | | | |
| **Systems' total feet of piping** | | | 234.2 | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... 1.8 {6}

Multiplied by the number of 100' increments ............... Friction Head 4.22 {7}
of total system piping to determine Friction Static Head 7 {8}
Head.

TDH ***11.22*** {9} **TDH** **11.22**

# OVERSIZING THE PUMP?

•The most efficient part of the curve is usually in the middle of the curve, away from maximum head or flow

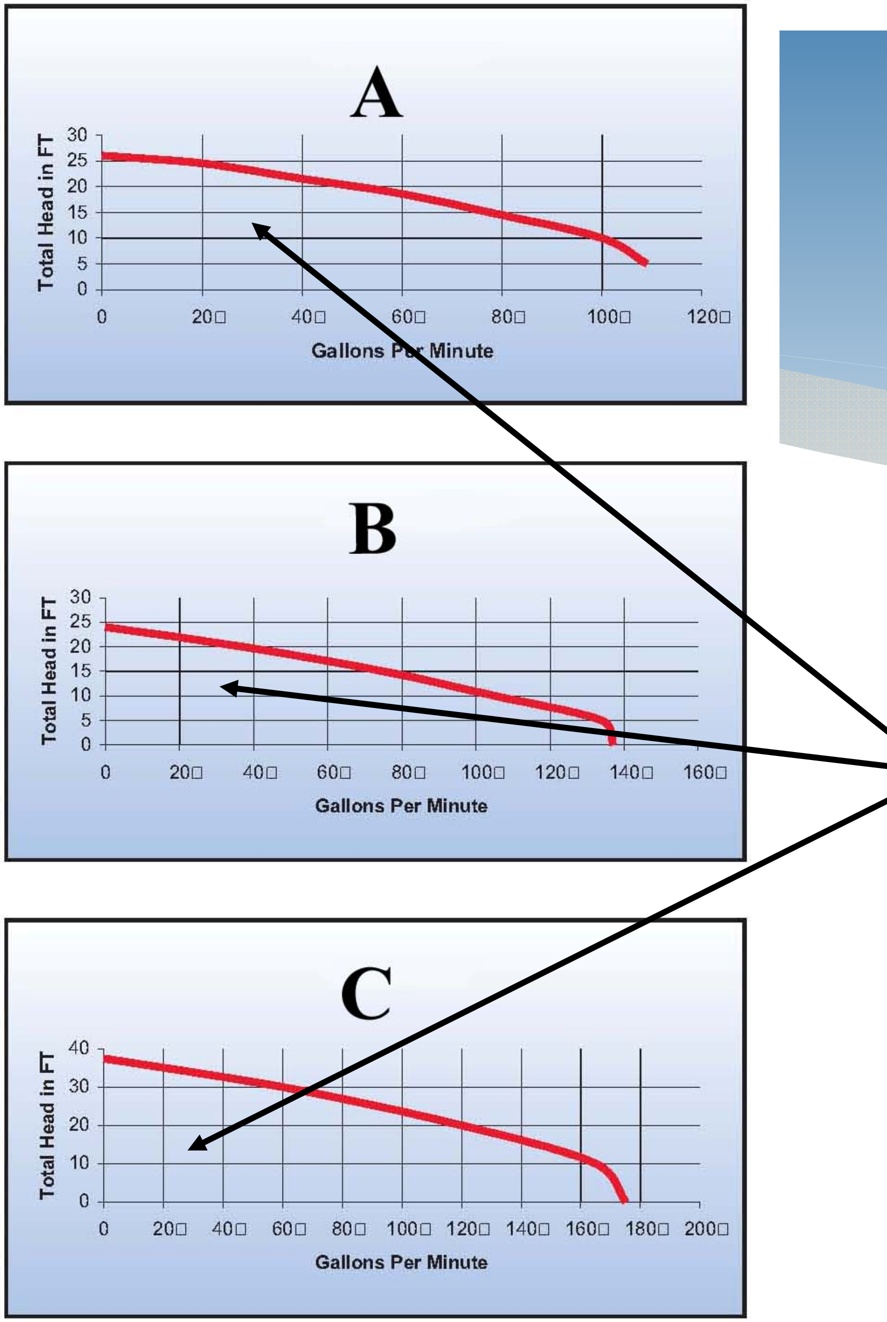
•More horsepower or flow is not always better – especially in smaller basins

•Short cycling may reduce the life of the pump.  A longer pumping cycle will be better for pump longevity.

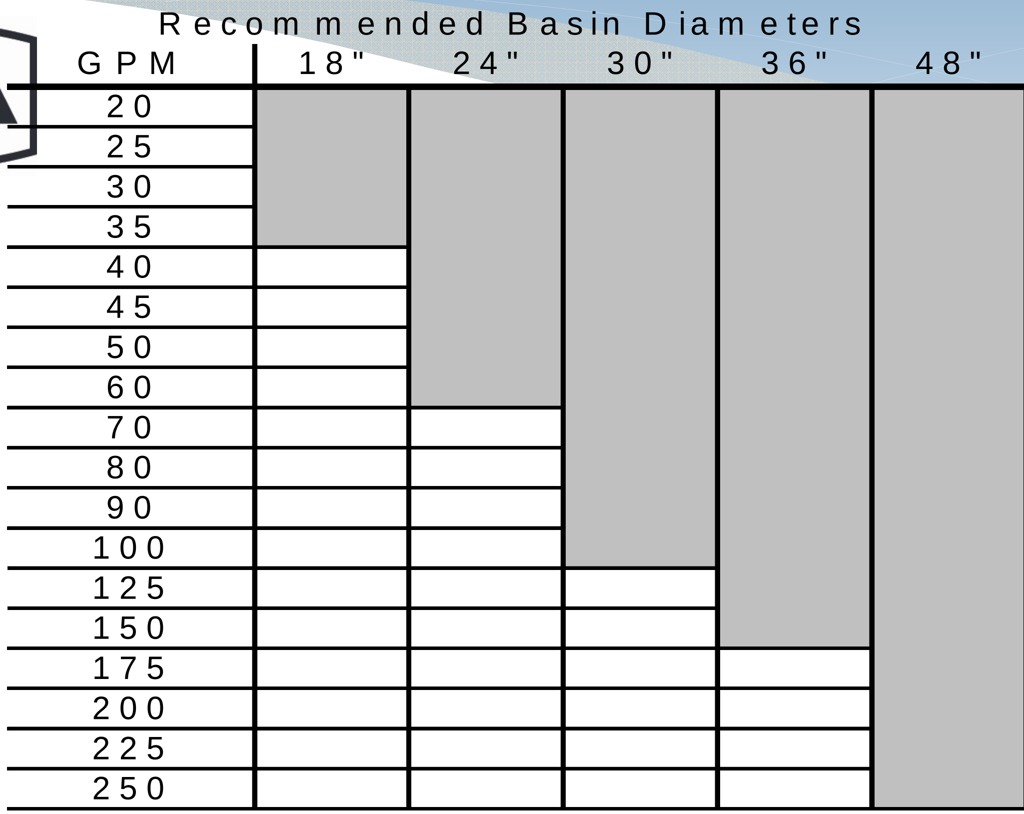
4/10HP

1/2HP

3/4HP

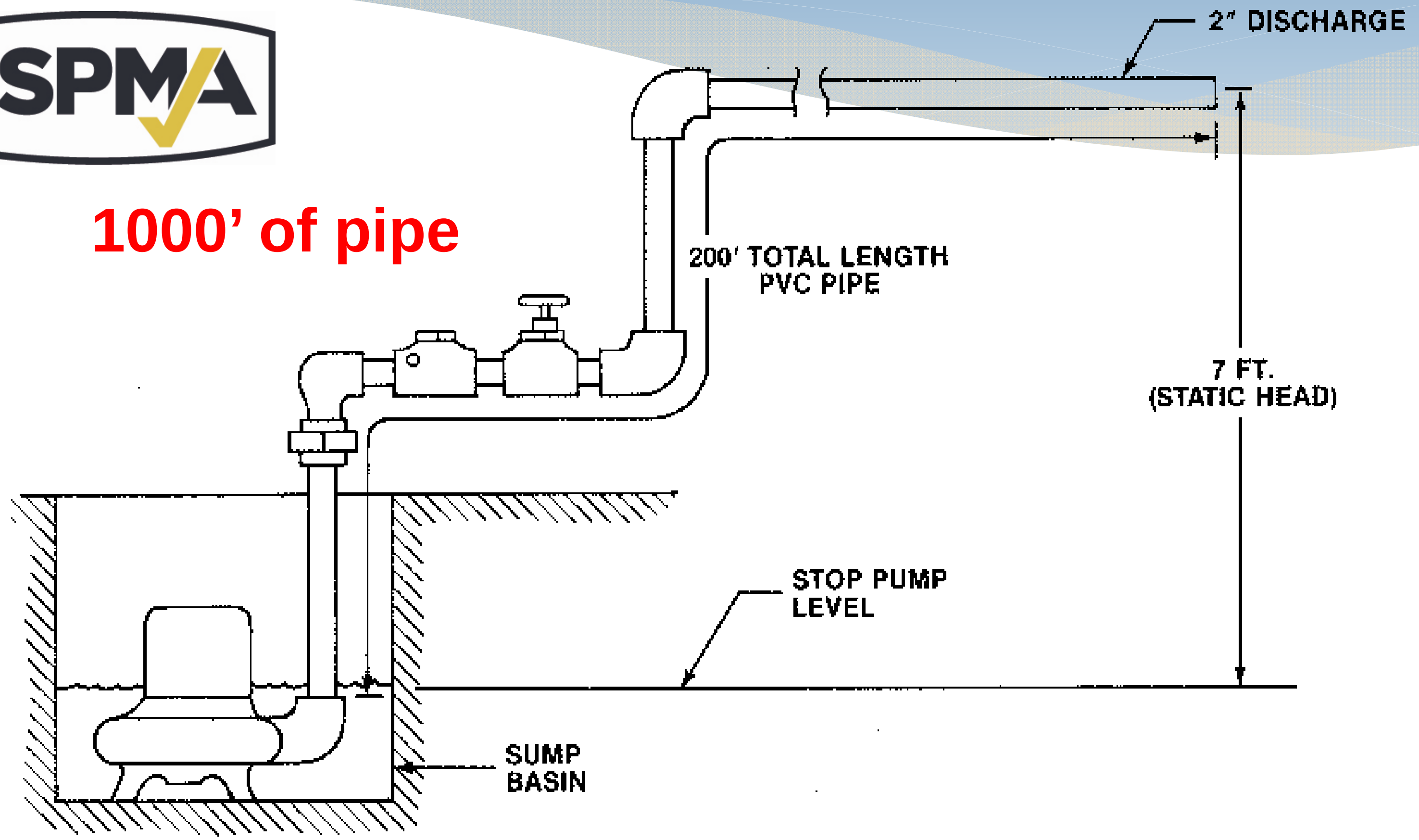


# SSPMA FIGURE “F”



# SSPMA FIGURE "C"

**1000' of pipe**



# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................. 55 {1}

GPM requirements from Fig. "B" ............................................................ 30 {2} **GPM 30**

Pipe Size ............................................................. 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | 5.2 | 3 | 15.6 | |
| 45 Deg. bends | | 0 | 0 | |
| Tee (thru-flow) | | 0 | 0 | |
| Tee (branch flow) | | 0 | 0 | |
| Swing check valve | 17.2 | 1 | 17.2 | |
| Gate valve | 1.4 | 1 | 1.4 | |
| Disch. Pipe length | | | **1000** | {4} |
| | | | | |
| **Systems' total feet of piping** | | | | {5} |

Friction head per / 100' of pipe from Fig. "E" .............. 1.8 {6}

Multiplied by the number of 100' increments of total system piping to determine Friction Head. ..............

Friction Head ______ {7}

Static Head 7 {8}

TDH ______ {9} **TDH** ______

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet ............................................. 55 {1}

GPM requirements from Fig. "B" ........................................................... 30 {2} **GPM 30**

Pipe Size ............................................................ 2" {3}

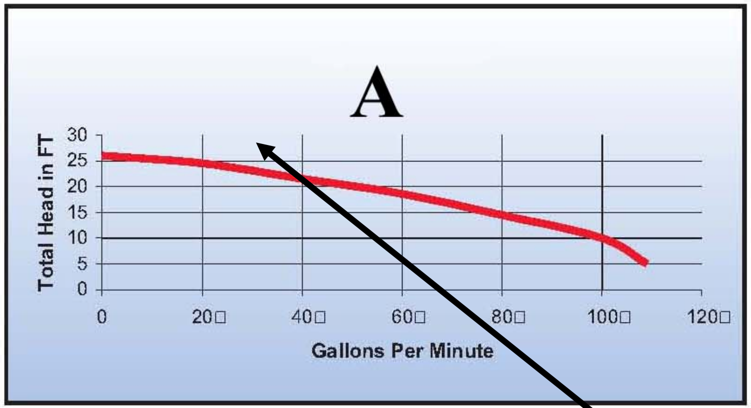
| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | 5.2 | 3 | 15.6 | |
| 45 Deg. bends | | 0 | 0 | |
| Tee (thru-flow) | | 0 | 0 | |
| Tee (branch flow) | | 0 | 0 | |
| Swing check valve | 17.2 | 1 | 17.2 | |
| Gate valve | 1.4 | 1 | 1.4 | |
| Disch. Pipe length | | | 1000 | {4} |
| | | | | |
| **Systems' total feet of piping** | | | **1034.2** | {5} |

Friction head per / 100' of pipe from Fig. "E" ............... 1.8 {6}

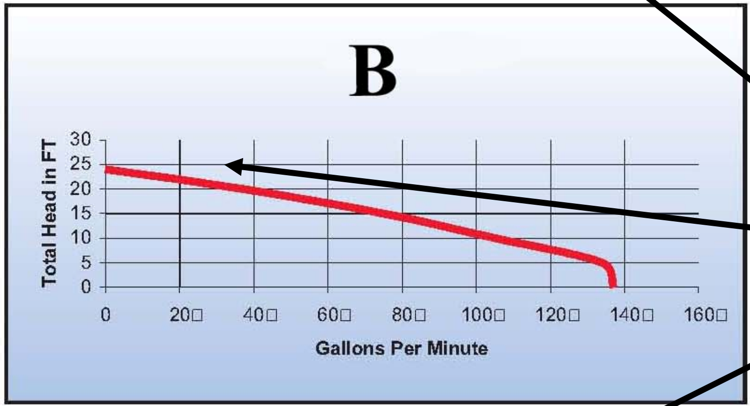
Multiplied by the number of 100' increments ............... Friction Head 18.6156 {7}
of total system piping to determine Friction Static Head 7 {8}
Head.

TDH ***26'*** {9} **TDH 26'**

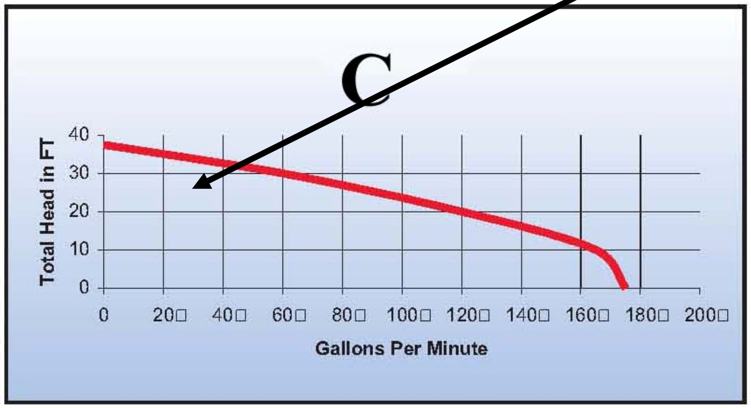
4/10HP




1/2HP




3/4HP



# Minimum Pump Capacity

**2’ Per Second To Carry Solids**

12 GPM in 1-1/2” Pipe

21 GPM in 2” Pipe

46 GPM in 3” Pipe

# SSPMA FIGURE "E"

**Friction head in feet per 100' of Schedule 40 pipe**

| | 2" | | 2-1/2" | | 3" | |
|---|---|---|---|---|---|---|
| GPM | Plastic | Steel | Plastic | Steel | Plastic | Steel |
| 20 | 0.9 | 0.9 | | | | |
| 25 | 1.3 | 1.3 | | | | |
| 30 | 1.8 | 1.8 | 0.6 | 0.8 | | |
| 35 | 2.4 | 2.4 | 0.8 | 1 | | |
| 40 | 3.1 | 3.1 | 1 | 1.3 | | |
| 45 | 3.8 | 3.8 | 1.3 | 1.6 | 0.5 | 0.6 |
| 50 | 4.7 | 4.7 | 1.6 | 1.9 | 0.7 | 0.7 |
| 60 | 6.5 | 6.6 | 2.2 | 2.7 | 0.9 | 0.9 |
| 70 | 8.6 | 8.8 | 2.9 | 3.6 | 1.2 | 1.2 |
| 80 | 11.1 | 11.4 | 3.7 | 4.6 | 1.5 | 1.6 |
| 90 | 13.8 | 14.3 | 4.6 | 5.8 | 1.9 | 2 |
| 100 | 16.8 | 17.5 | 5.6 | 7.1 | 2.3 | 2.4 |
| 125 | | | 8.3 | 10.9 | 3.6 | 3.6 |
| 150 | | | 12 | 15.5 | 4.9 | 5.1 |
| 175 | | | 16.4 | 20.9 | 6.4 | 6.9 |
| 200 | | | | | 8.4 | 8.9 |
| 225 | | | | | 10.5 | 11.2 |

# SIZING WORKSHEET

**System Requirements**

Total fixture units from Fig. "A" work sheet .............................................. 55 {1}

GPM requirements from Fig. "B" ........................................................... ~~30~~ 46 {2} **GPM 30**

Pipe Size ..................................................................... 2" {3}

| Friction factors from Fig. "D" | Factor | Qty. | Total | |
|---|---|---|---|---|
| 90 Deg. bends | 5.2 | 3 | 15.6 | |
| 45 Deg. bends | | 0 | 0 | |
| Tee (thru-flow) | | 0 | 0 | |
| Tee (branch flow) | | 0 | 0 | |
| Swing check valve | 17.2 | 1 | 17.2 | |
| Gate valve | 1.4 | 1 | 1.4 | |
| Disch. Pipe length | | | 1000 | {4} |
| | | | | |
| **Systems' total feet of piping** | | | **1034.2** | {5} |

Friction head per / 100' of pipe from Fig. "E" .............. ~~1.8~~ .5 {6}

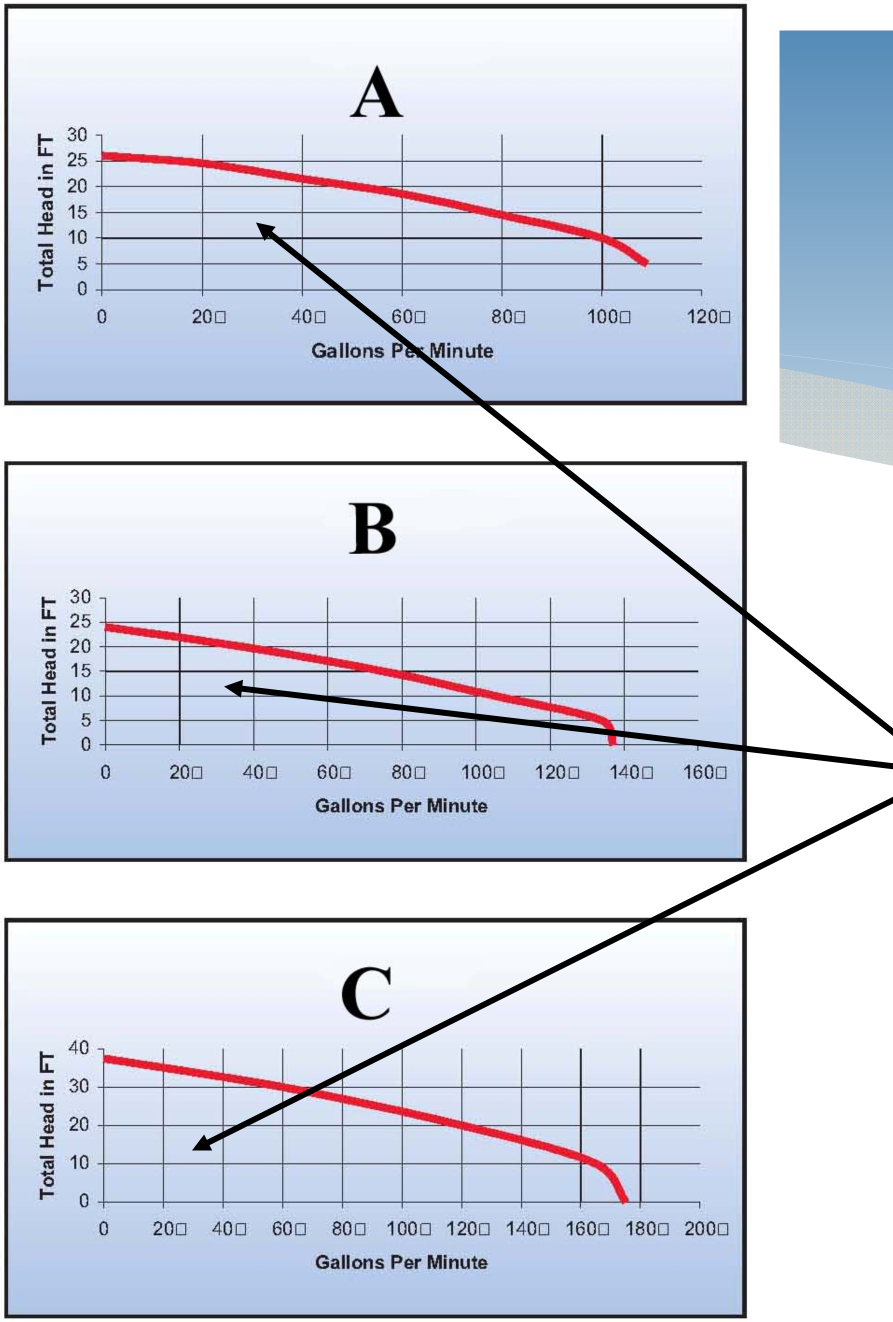
Multiplied by the number of 100' increments .............. Friction Head ~~18.6156~~ 5.17 {7}
of total system piping to determine Friction Static Head 7 {8}
Head.

TDH ~~26'~~ 12.17 {9} **TDH 26'**

4/10HP

1/2HP

3/4HP



# Congratulations!