

Understanding Pumps and Common Pumping issues

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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.



SSPMA MEMBERS

Barnes Pumps / Crane Pumps & Systems
Champion Pump Company, Inc.
Eco-Flo Products Inc. / Ashland Pump Company
Franklin Electric / Little Giant
Goulds Water Technology, a xylem brand
GP Enterprises Co., Ltd.
Liberty Pumps
Pentair Water
Superior Pump Company
Zoeller Company

SSPMA ASSOCIATE MEMBERS

AK Industries

Alderon Industries

John Crane, Inc.

LevelGuard / Touch Sensor Technologies

See Water, Inc.

SJE-Rhombus

Topp Industries, Inc.

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.





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.

($\frac{1}{2}$ " To Less Than 1" Solids)

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 domestic wastewater from a container containing spherical 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?**

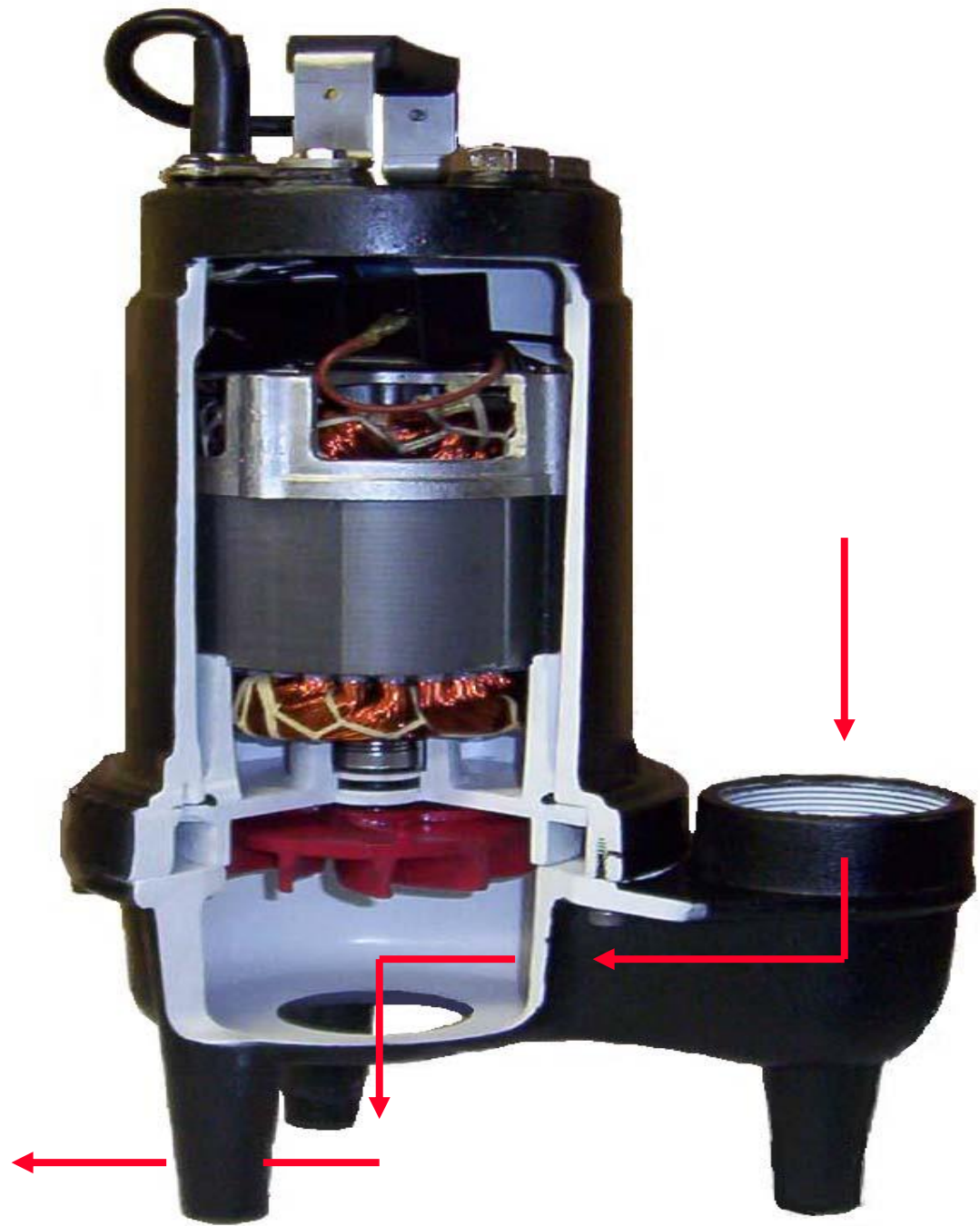
Sewage Pump

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

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

Definition of a sewage solids

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.



- (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:

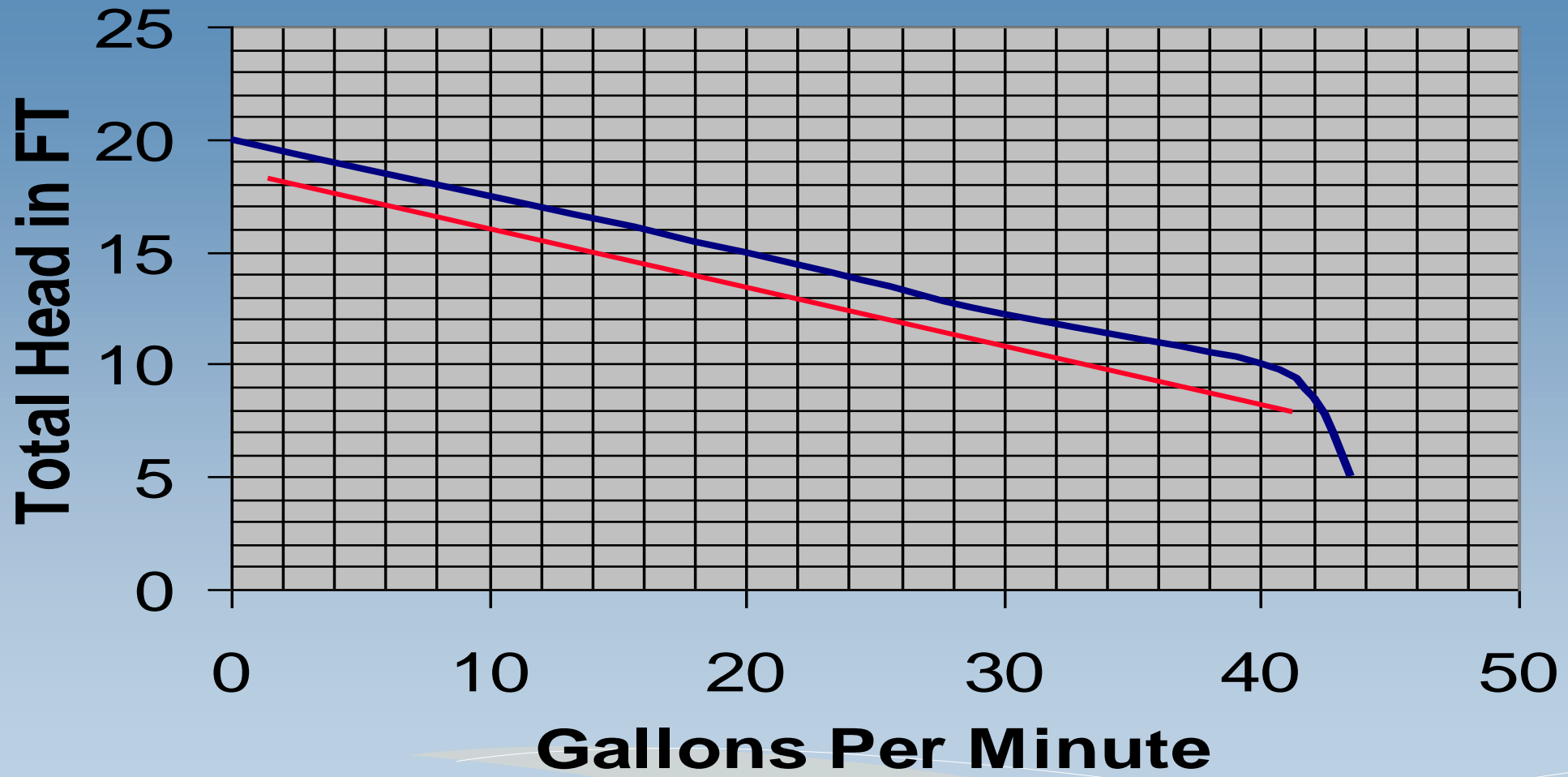
- (a) The test shall not be conducted until test conditions have stabilized.
- (b) Sufficient observations shall be made from 0 to maximum capacity to define the characteristics.

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.



Pumps & Types of Construction

Brass or Bronze

Cast Iron

Aluminum

Plastic

Stainless Steel

Motor Types

Oil filled / Air filled

Shaded Pole

Split Phase

Permanent Split Capacitor

Capacitor Start Capacitor Run

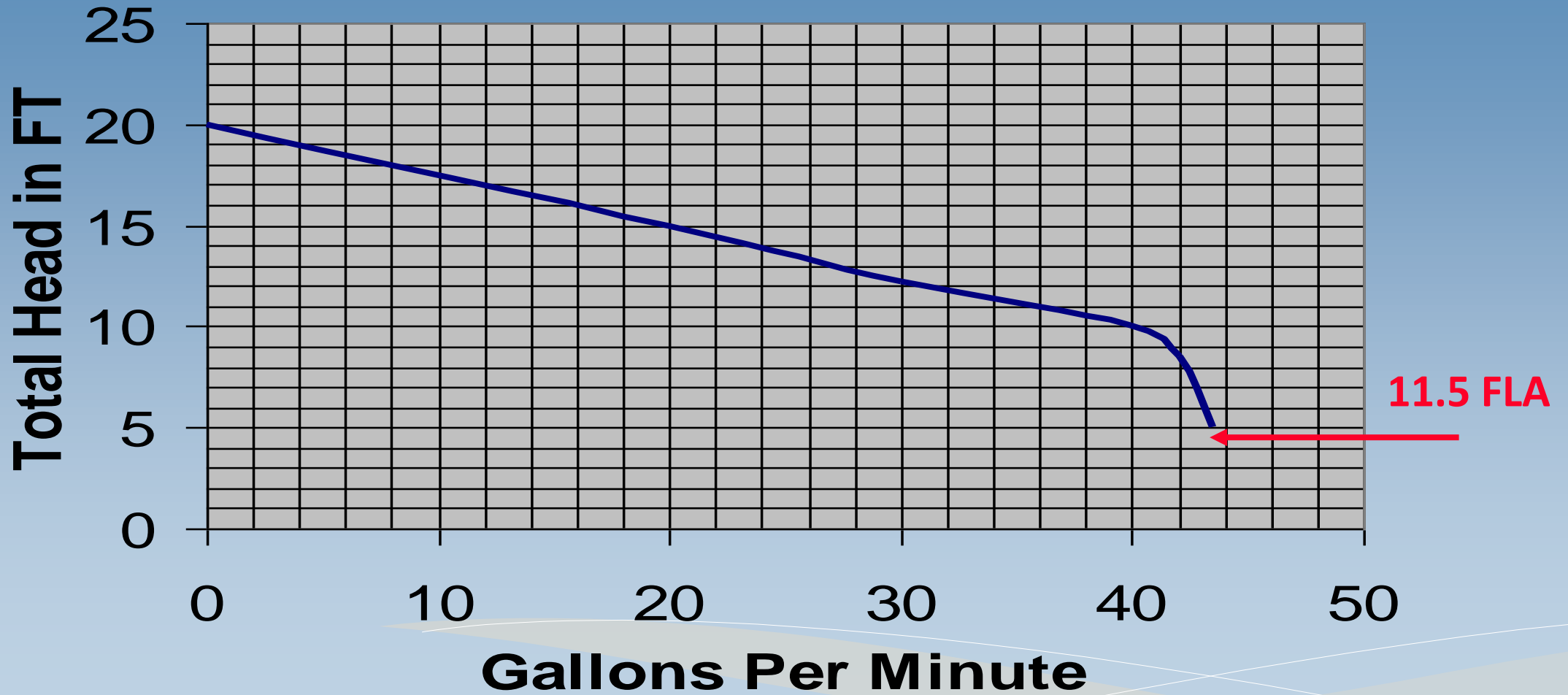
Motors

	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?

- A small device attached to the motor windings, typically made of a bi-metal material that breaks the motor circuit when a preset temperature is reached. Once the motor temperature cools below the preset temperature the overload resets and the pump will restart. FLA or Full Load Rating is the overload rating which correlates to a temperature.

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

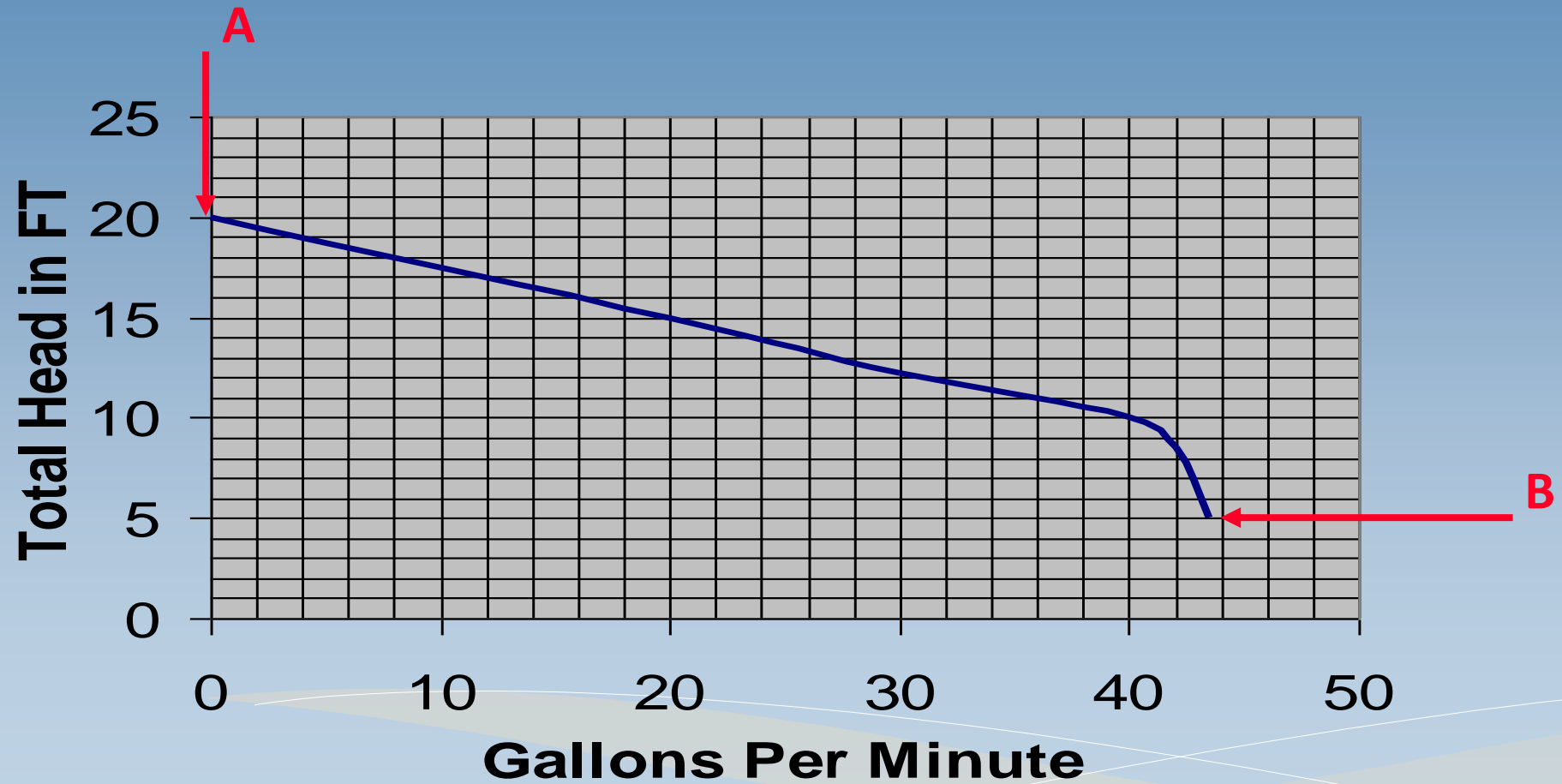
**Service Life of Electrical Equipment Diminishes by
Approximately Half For Every 10 Degrees C
Temperature Increase**

Motors

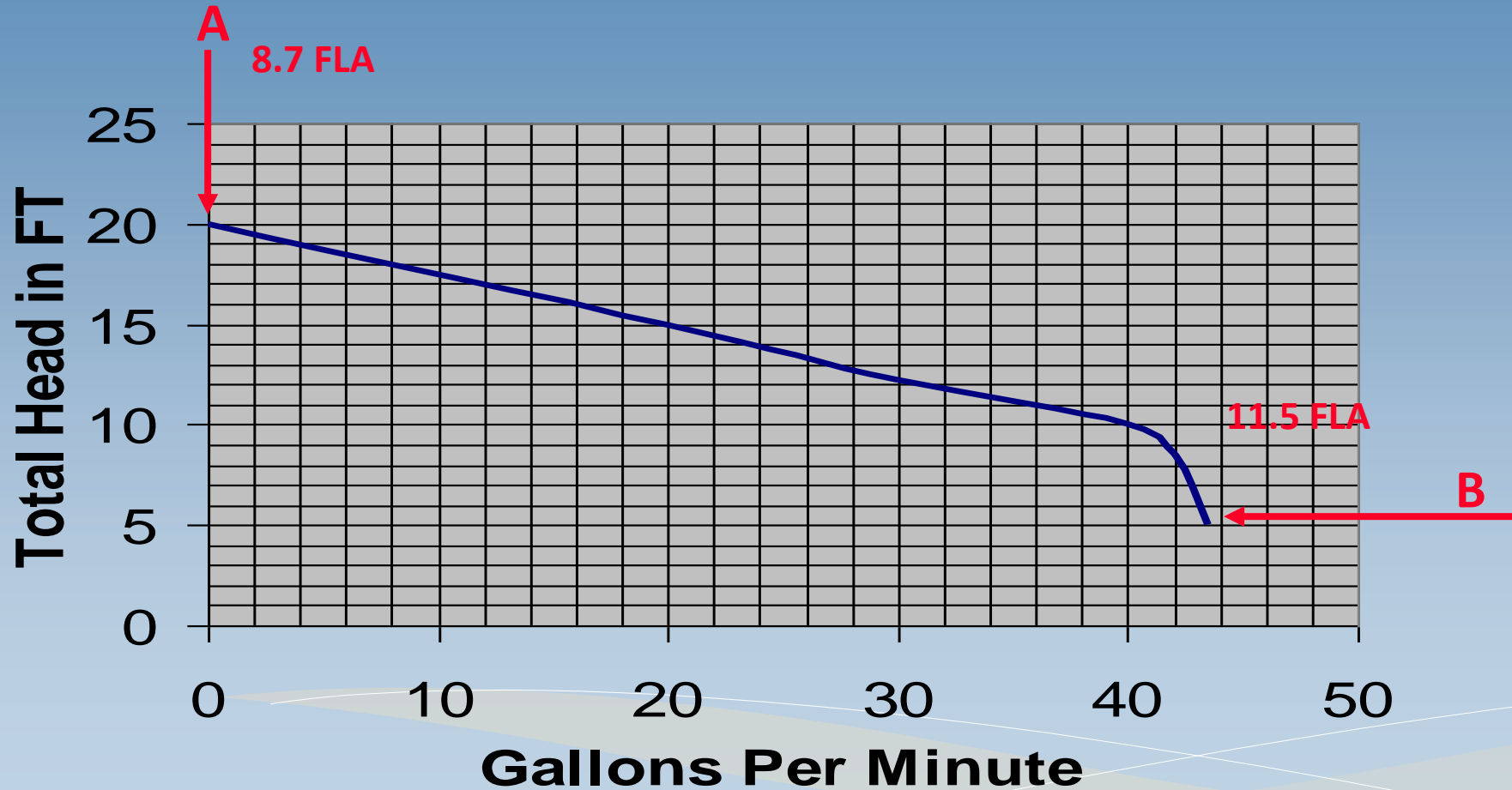
Designed to last 10 years at 100 deg. c.

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

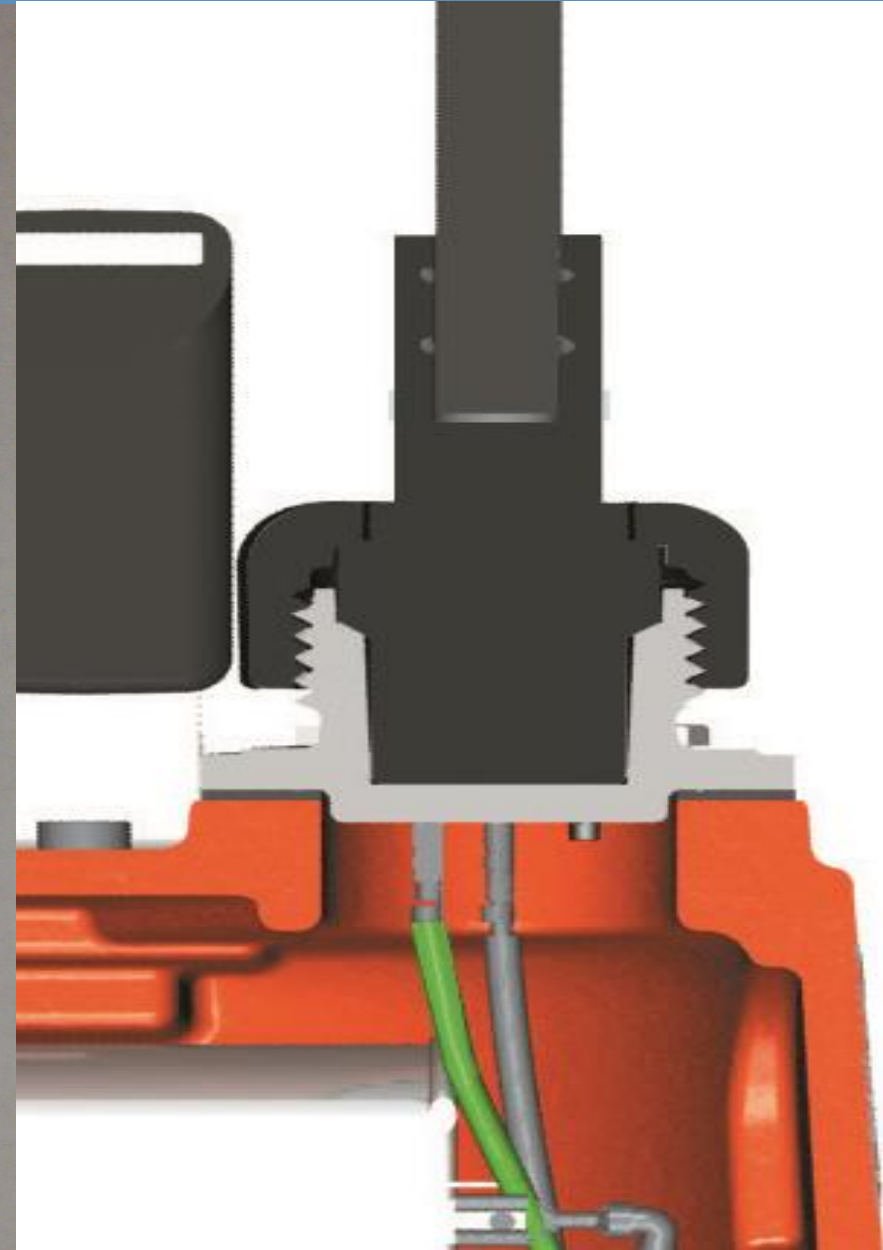
Power Cords



Power Cords Entrances



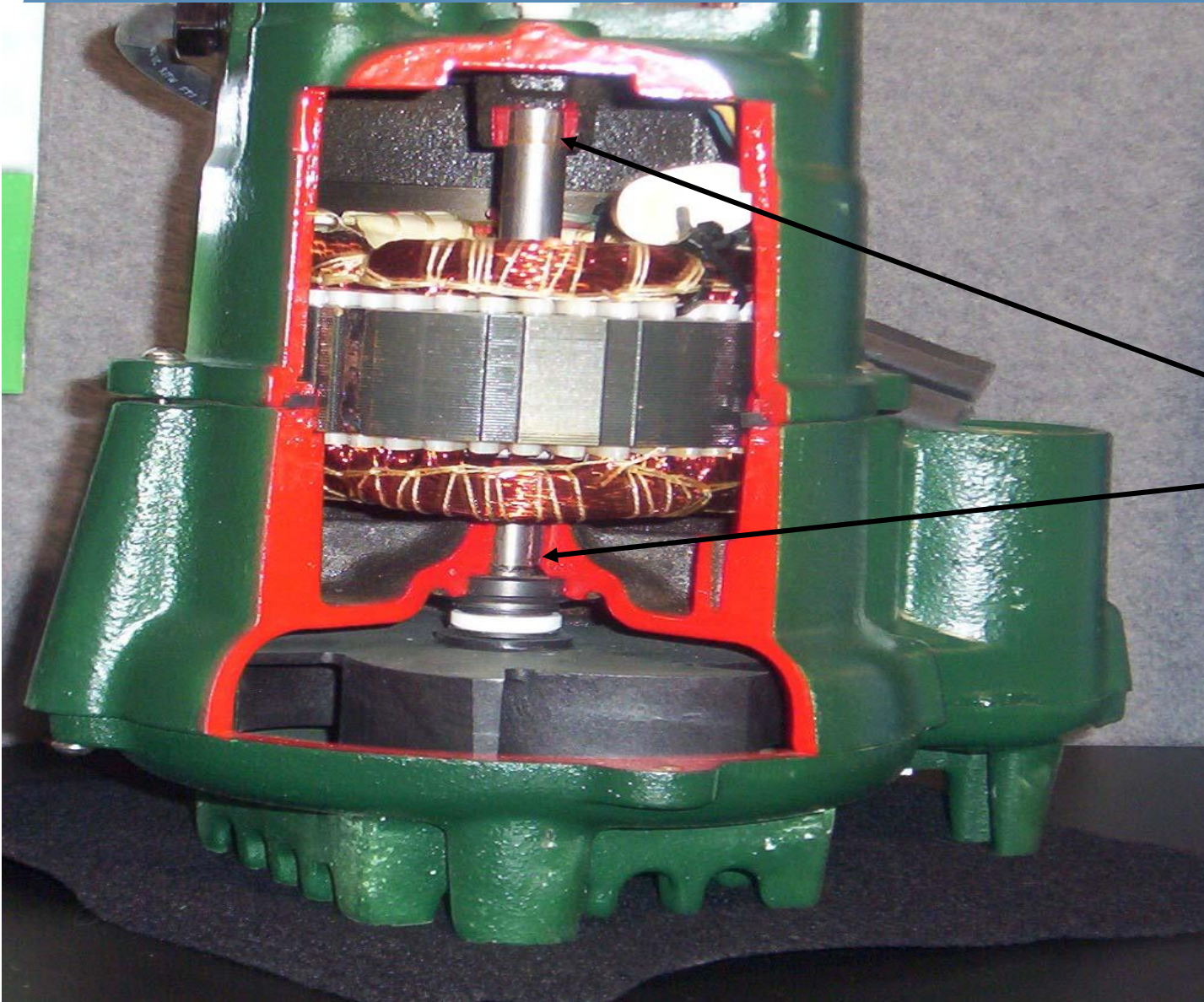
Power Cords Entrances



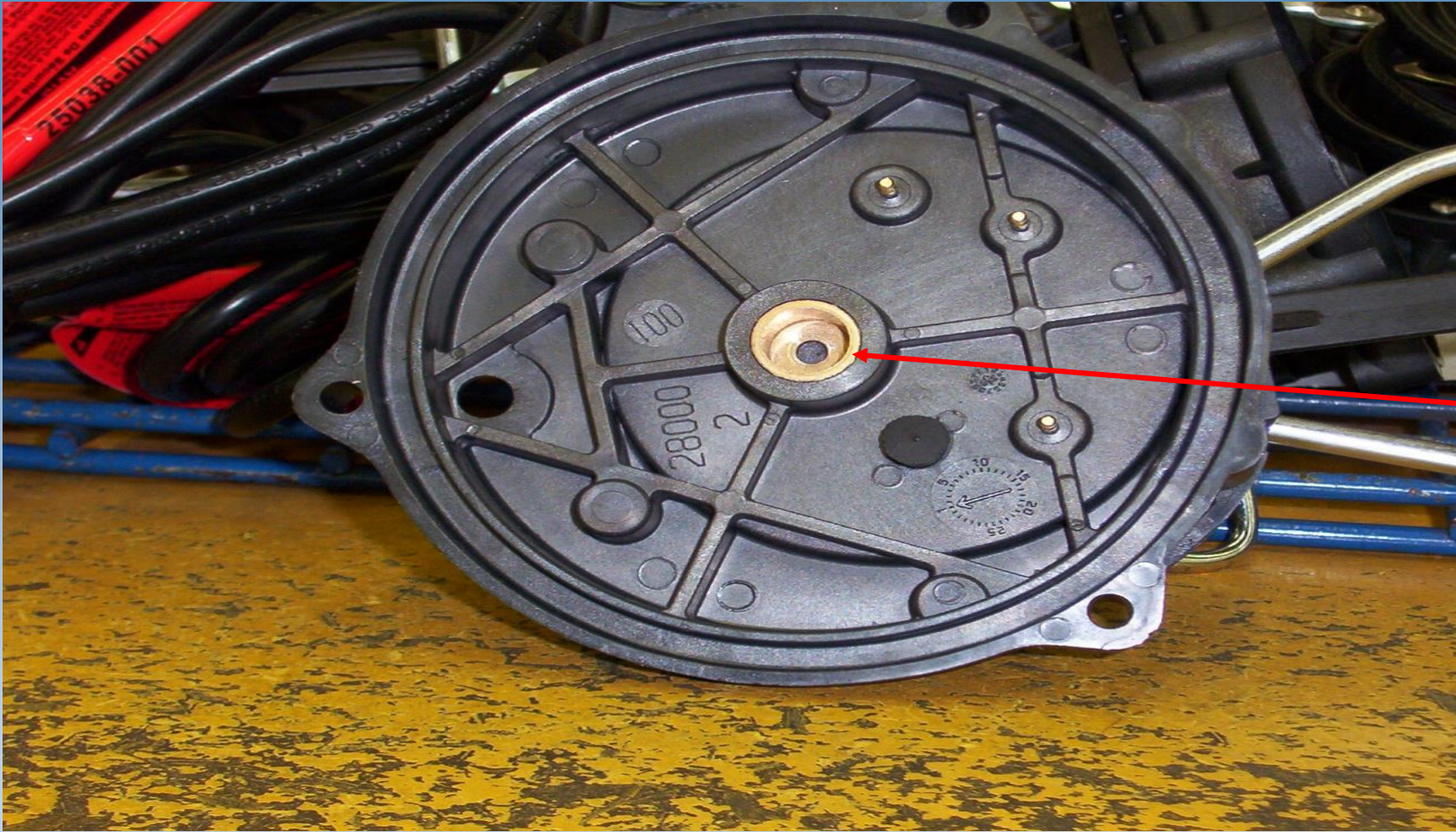
Bearings

Sleeve Bearings

Ball Bearings

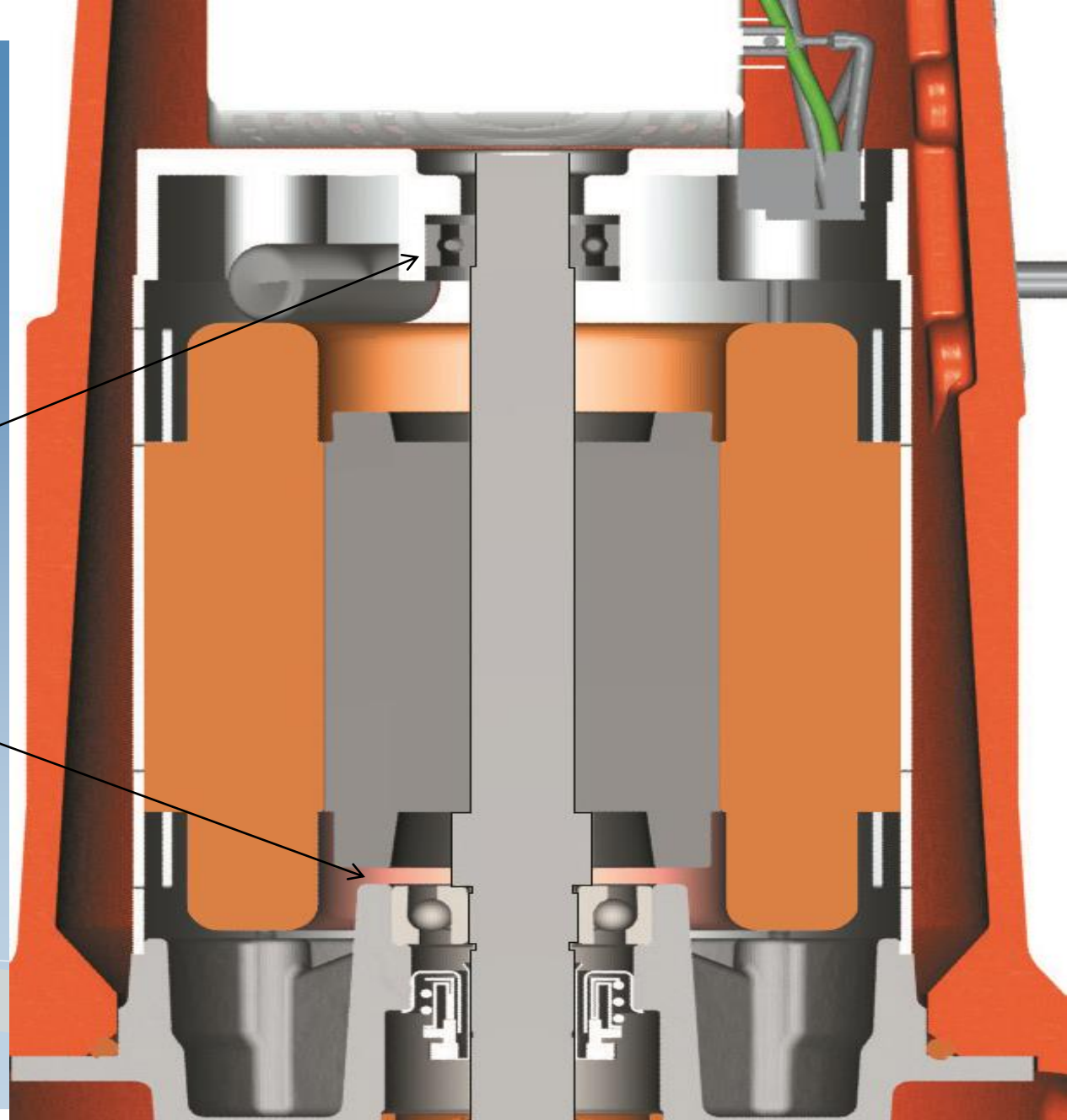


**Sleeve
Bearings**



•Bearings

**Upper &
Lower Ball
Bearings**



• Impellers

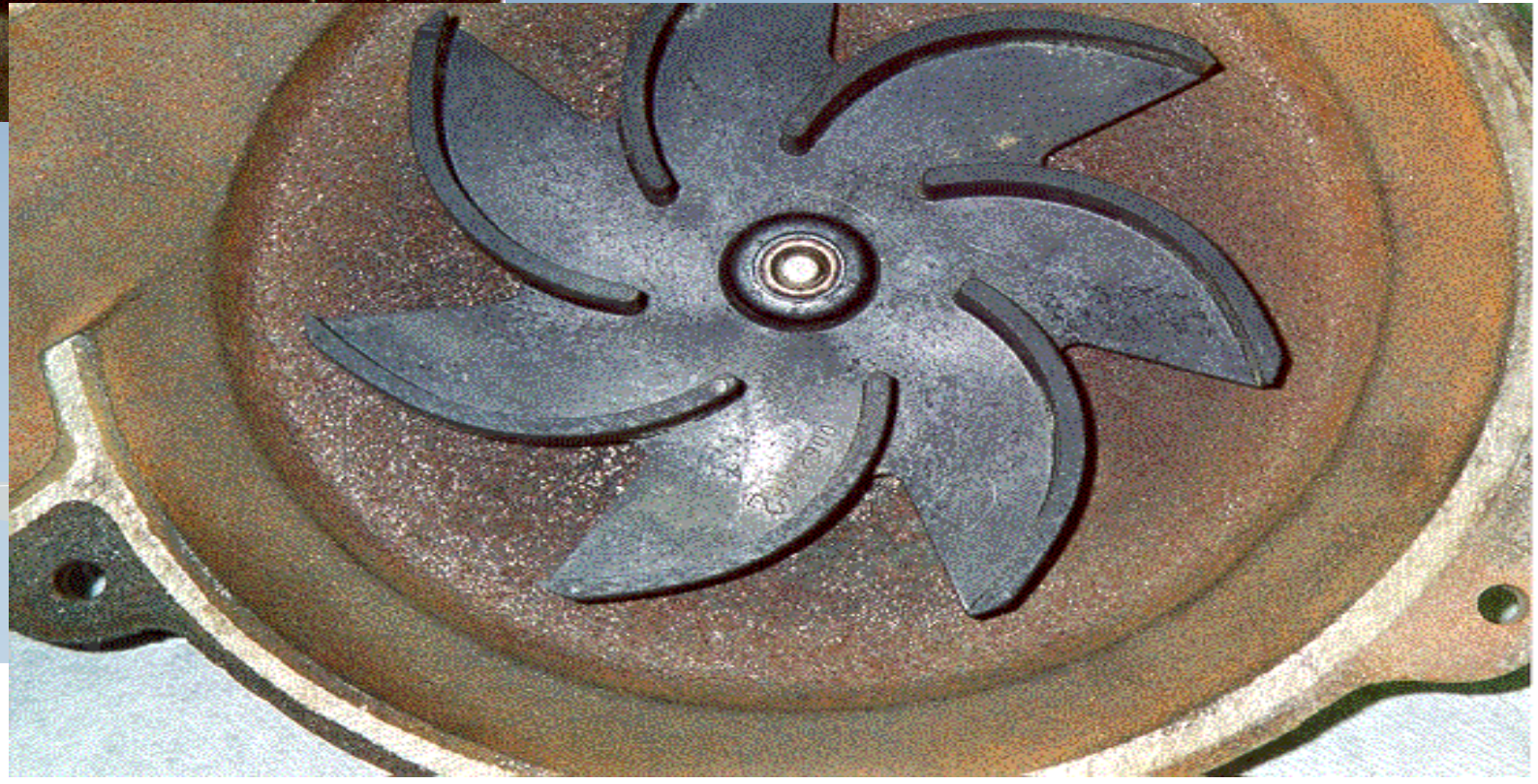
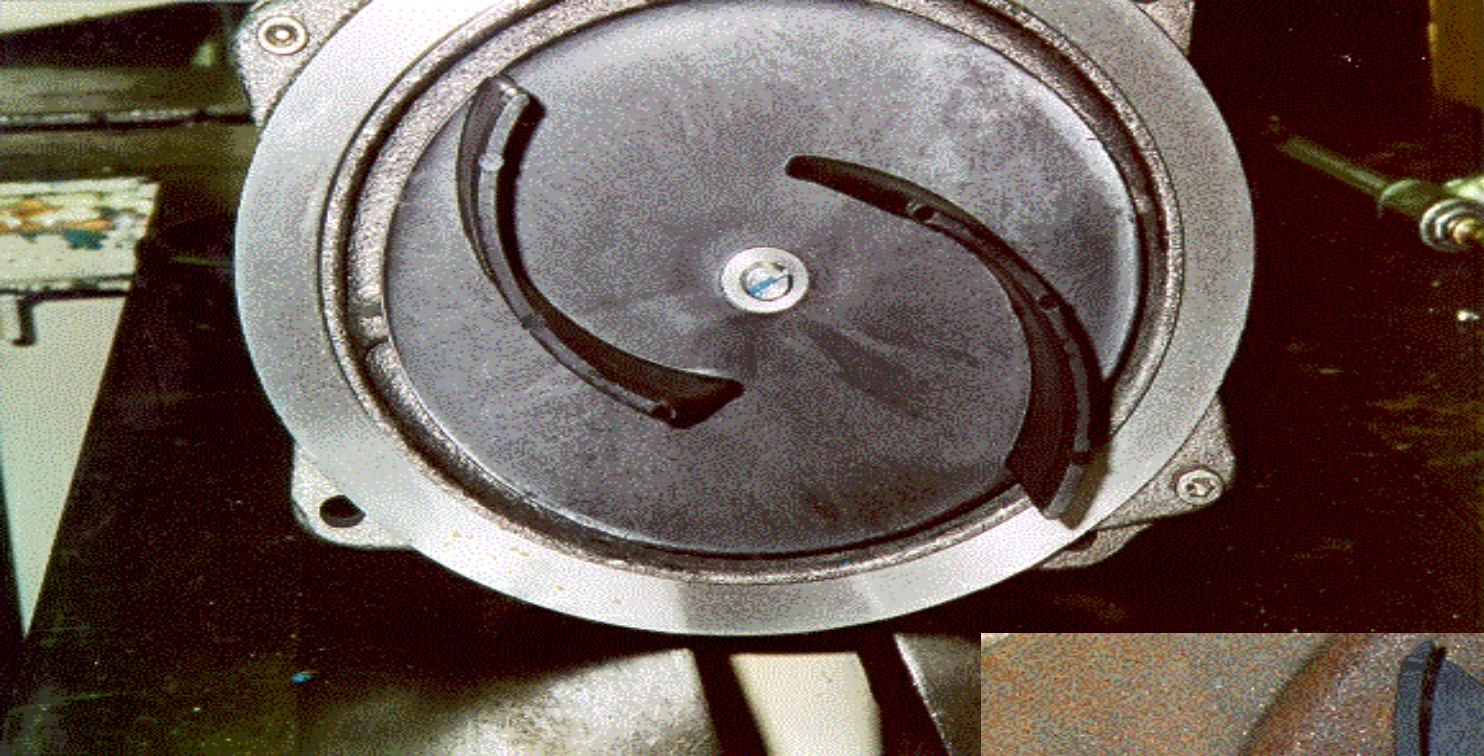
- **Plastic**
- **Cast Iron**
- **Brass**
- **Stainless Steel**
- **Aluminum**
- **Vortex**
- **Non-Clog**
- **Enclosed**
- **Single Vane**

Vortex



Non Clog





Impellers



Seals

Seal Face materials

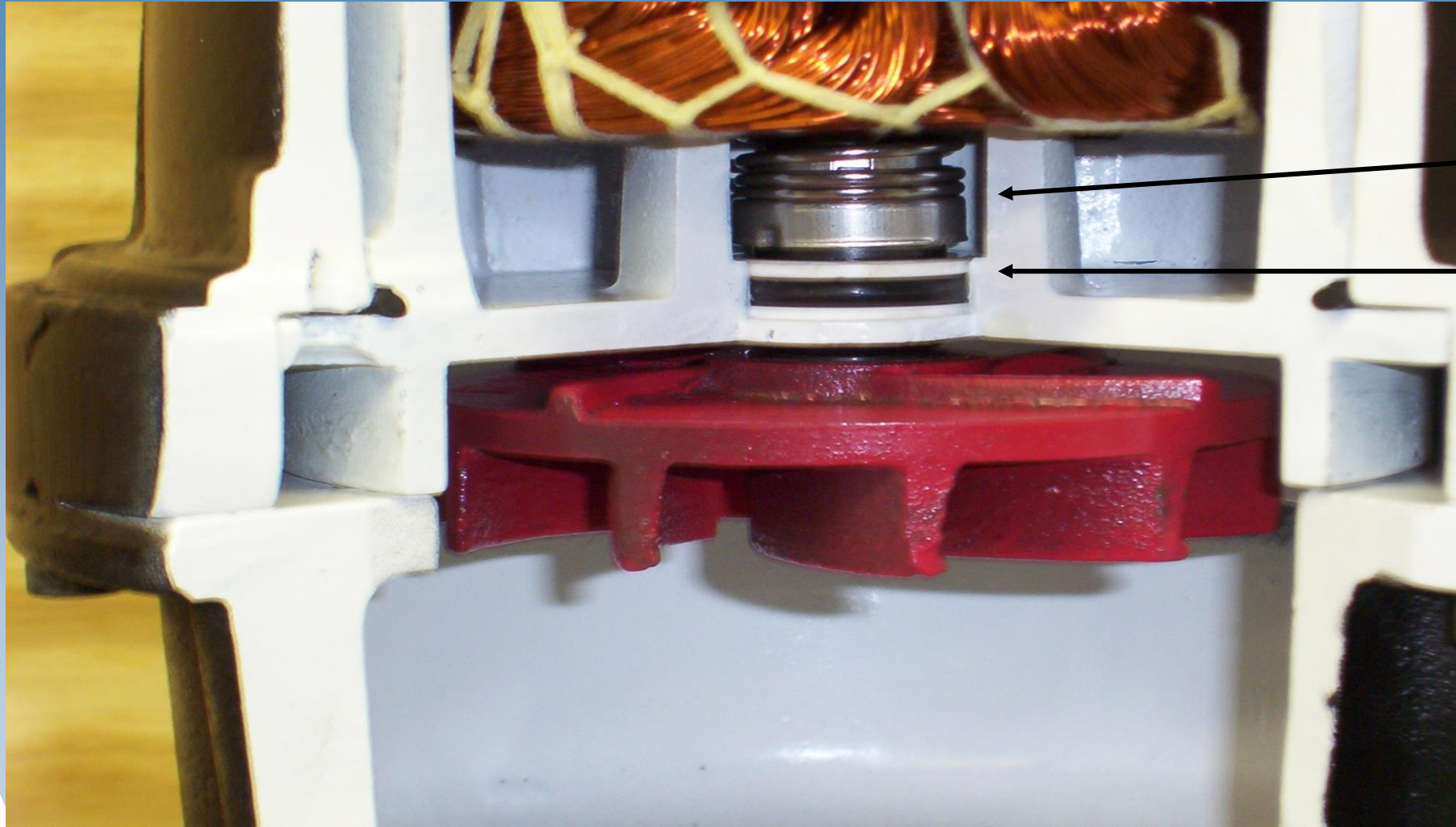
Carbon - Standard

Ceramic – Abrasive resistant \$

Silicon – Upgrade – Thermal Shock resistant \$\$

Tungsten – Toughest \$\$\$



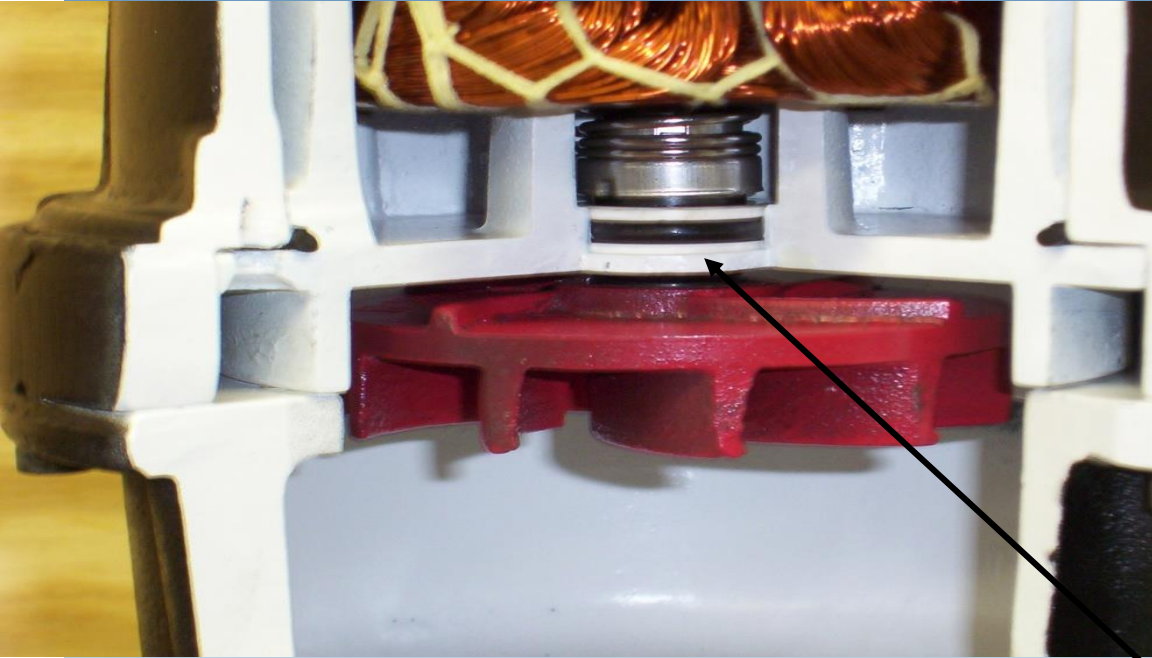


Rotating

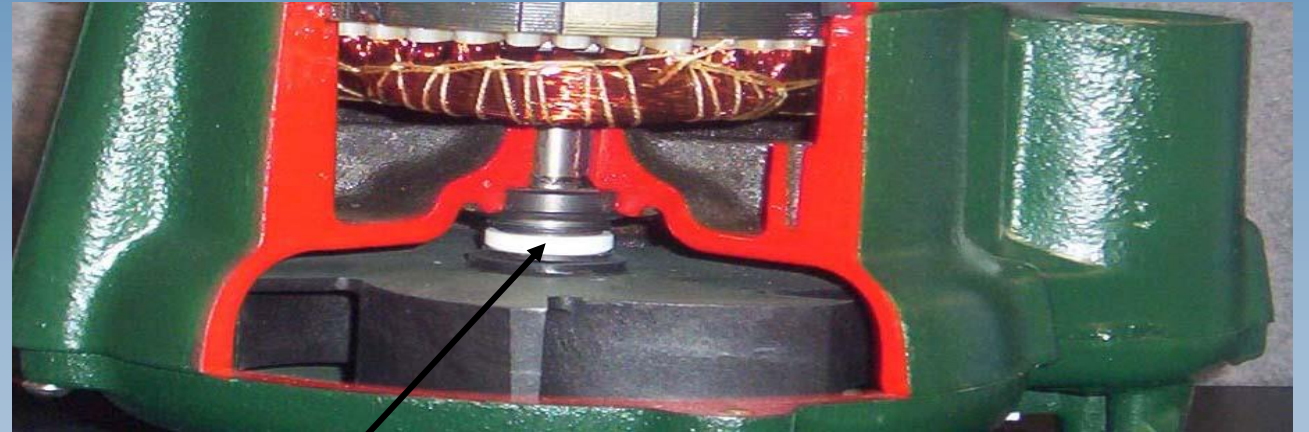
Stationary

Seals

INBOARD

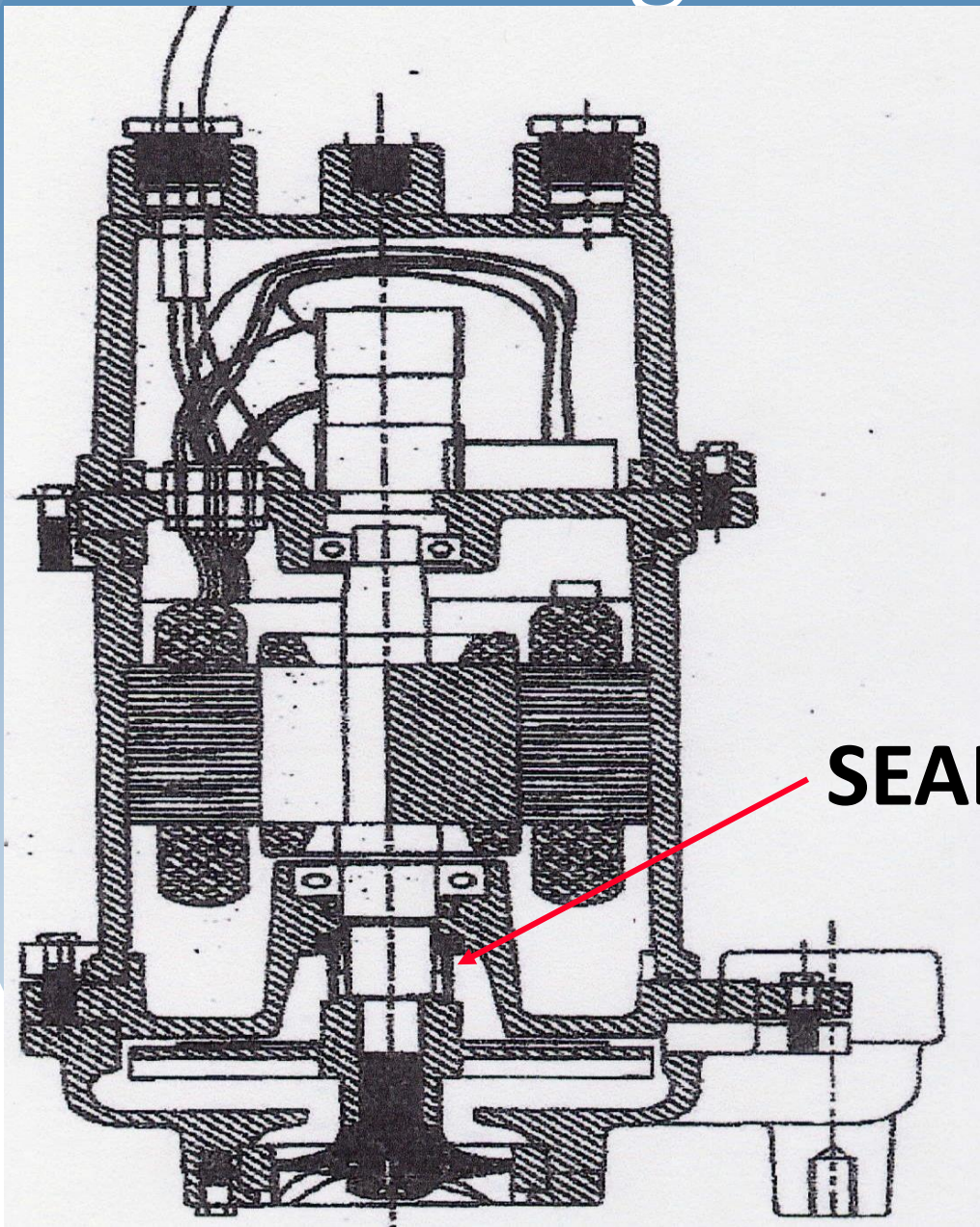


OUTBOARD



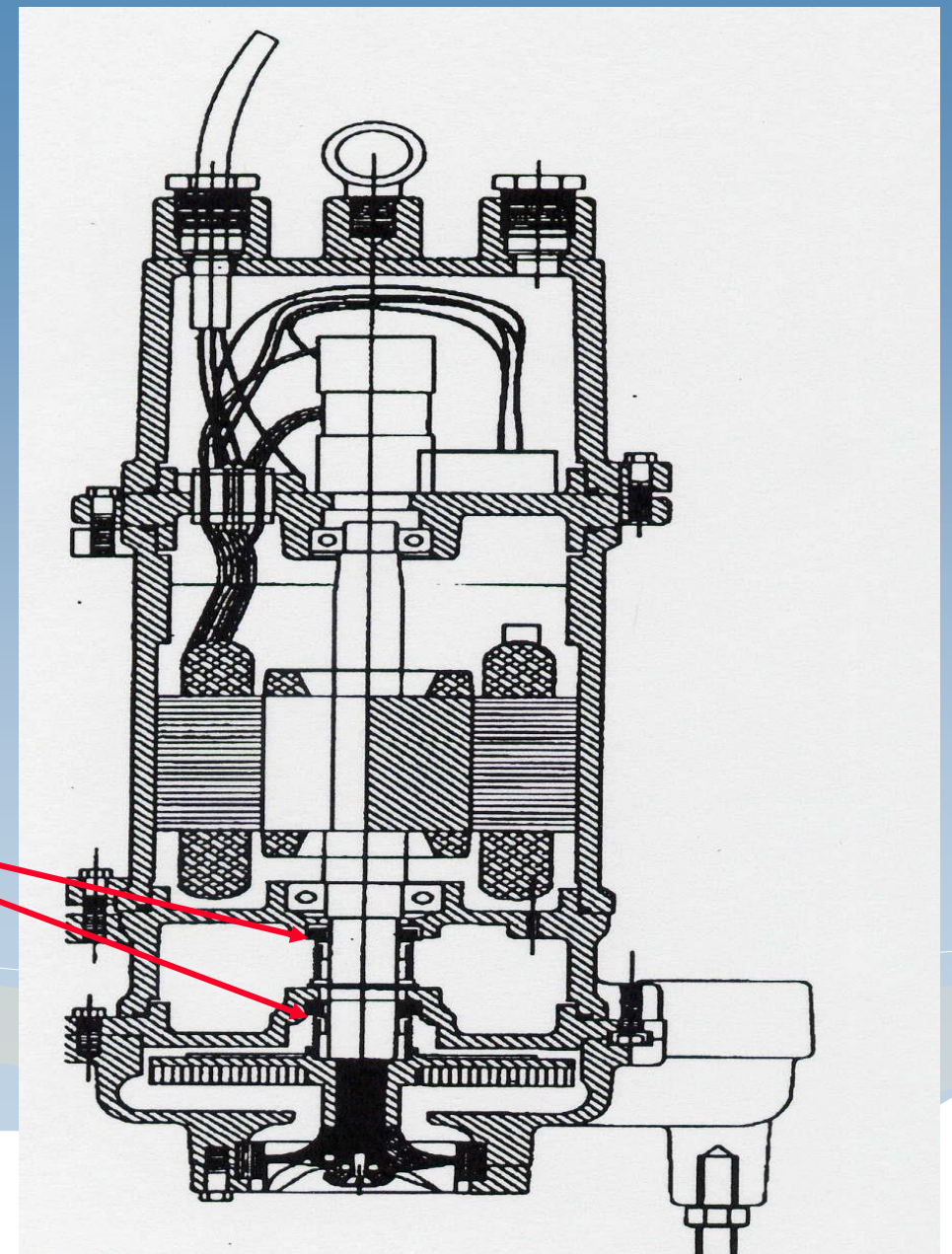
Sealing Area

Single Seal



SEALS

Double Seal



Grinder Pumps

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

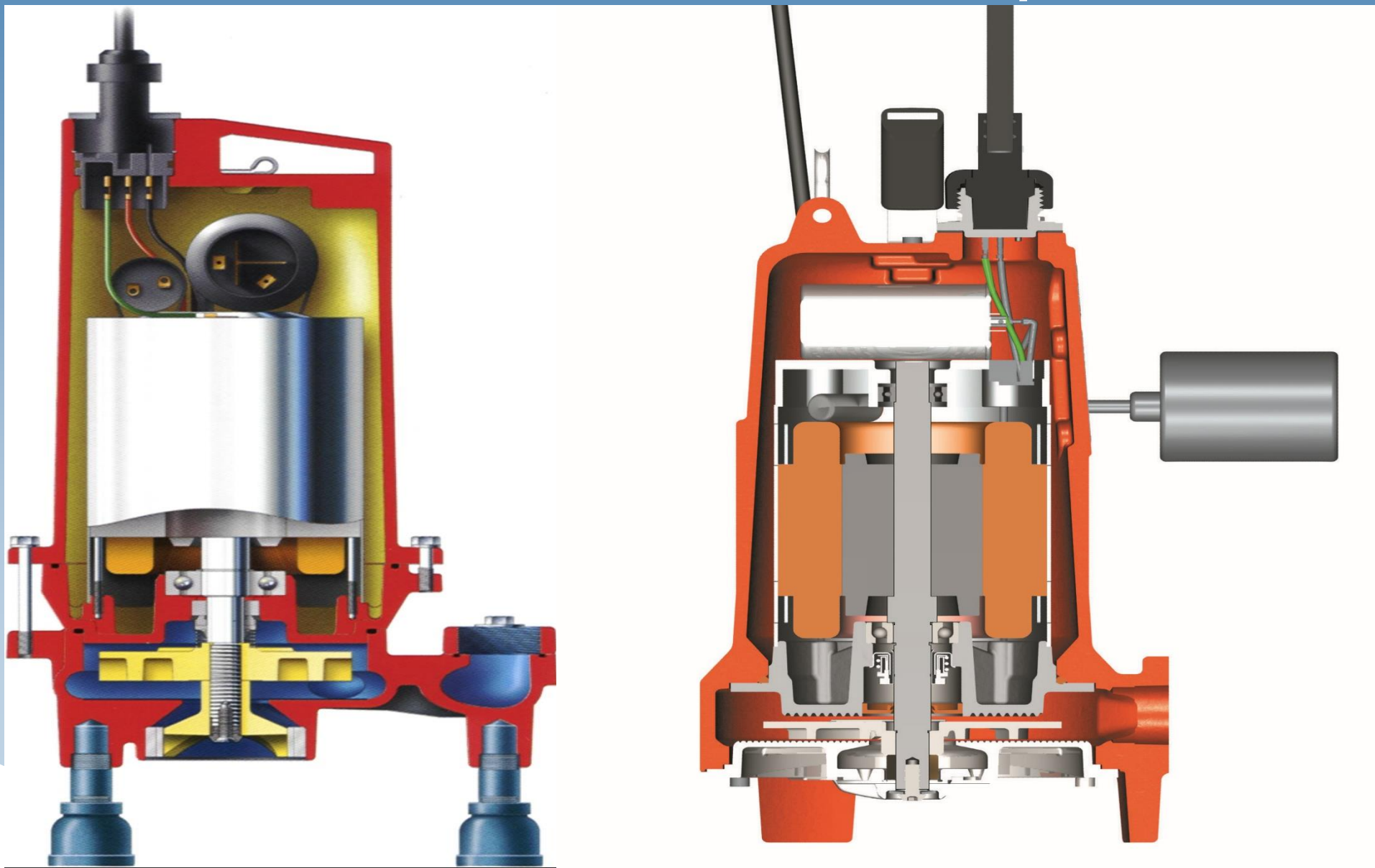
Grinder Pumps

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

Grinder Pumps

- **Never use a grinder pump to pump effluent from a septic tank to a leach field.**
 - Higher pressure, low flow
- **Never use a grinder pump to pump from a facility to a septic tank.**
 - **Septic tanks are designed to receive solids not slurry**

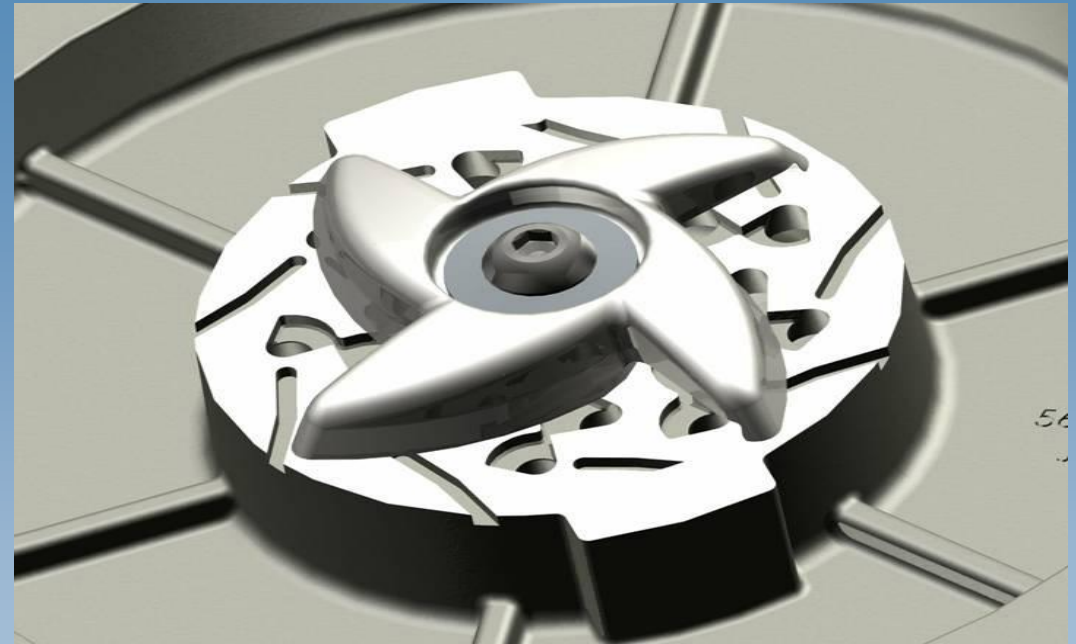
Grinder Pumps



Grinder Pumps

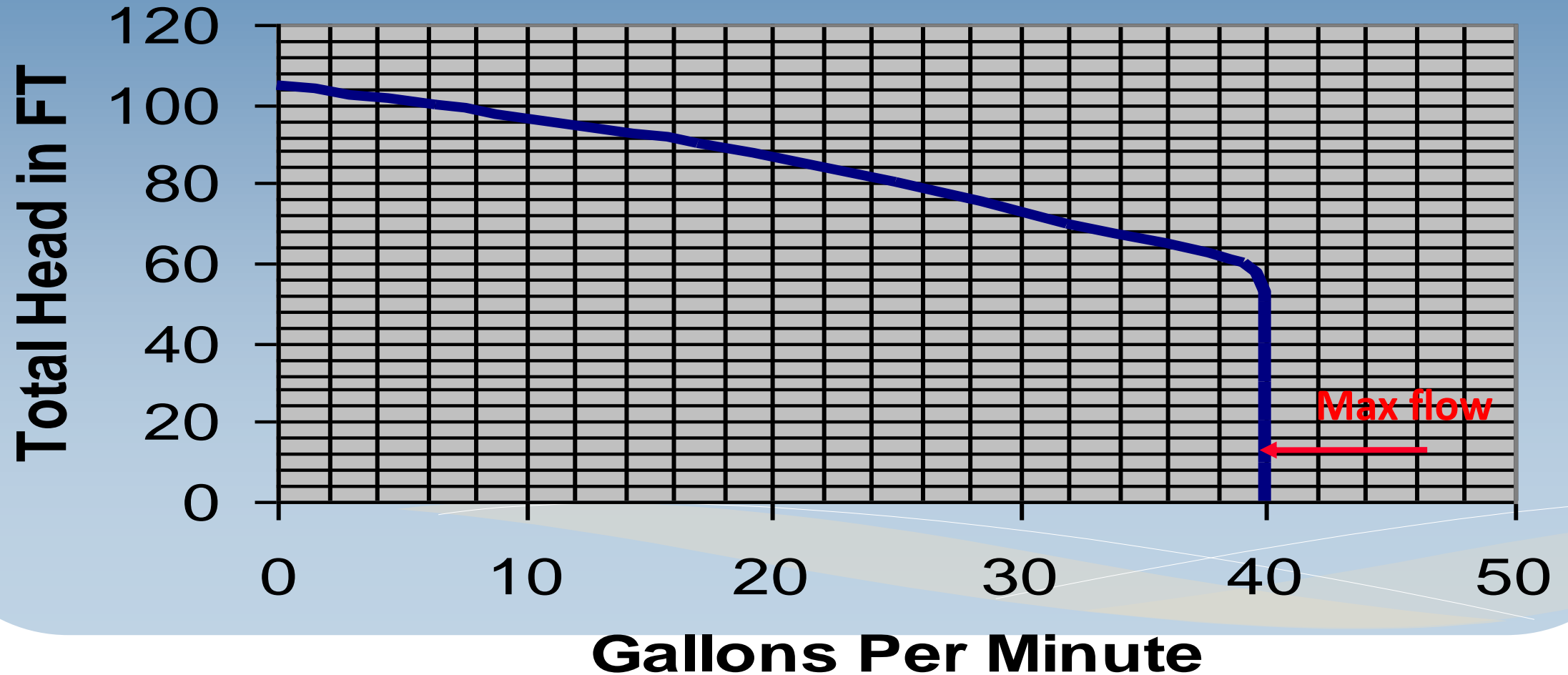


Grinder Pumps

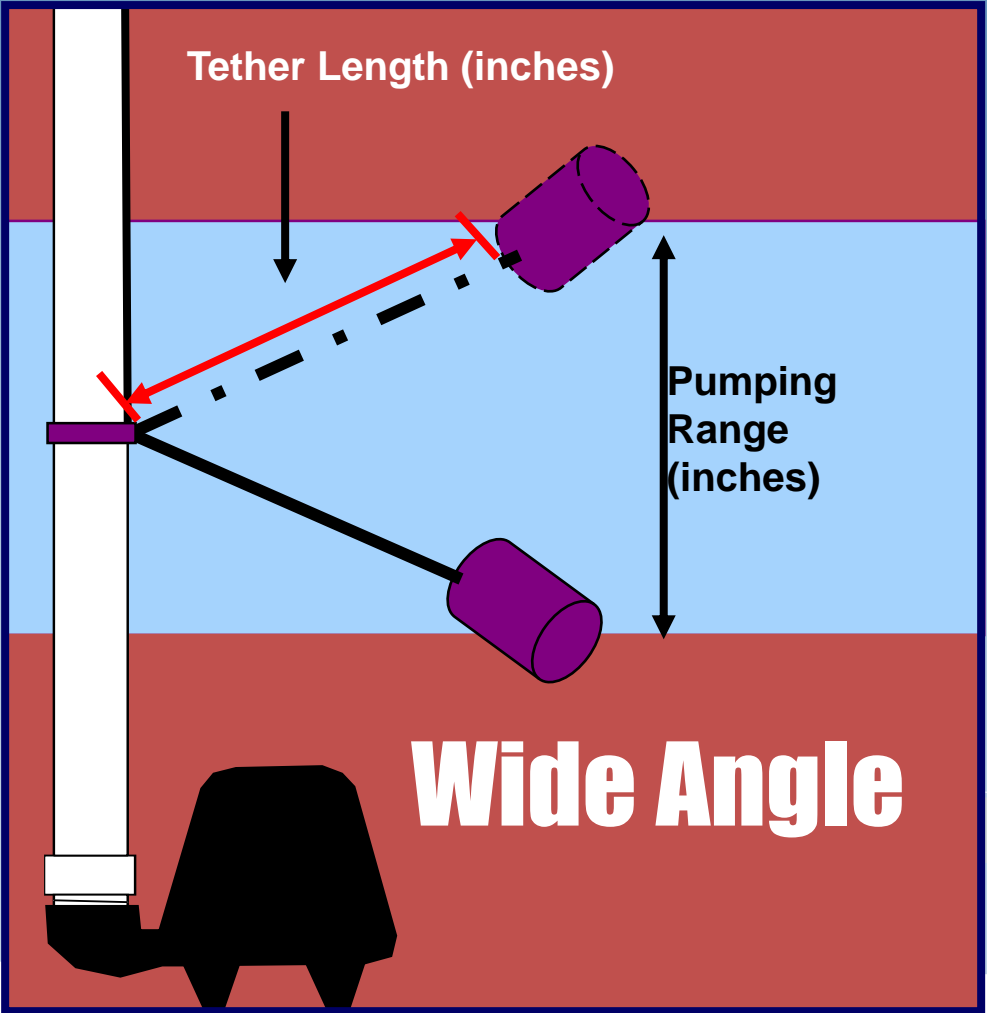


Grinder Pumps

PUMP PERFORMANCE CURVE

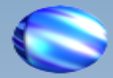


Pump Switch

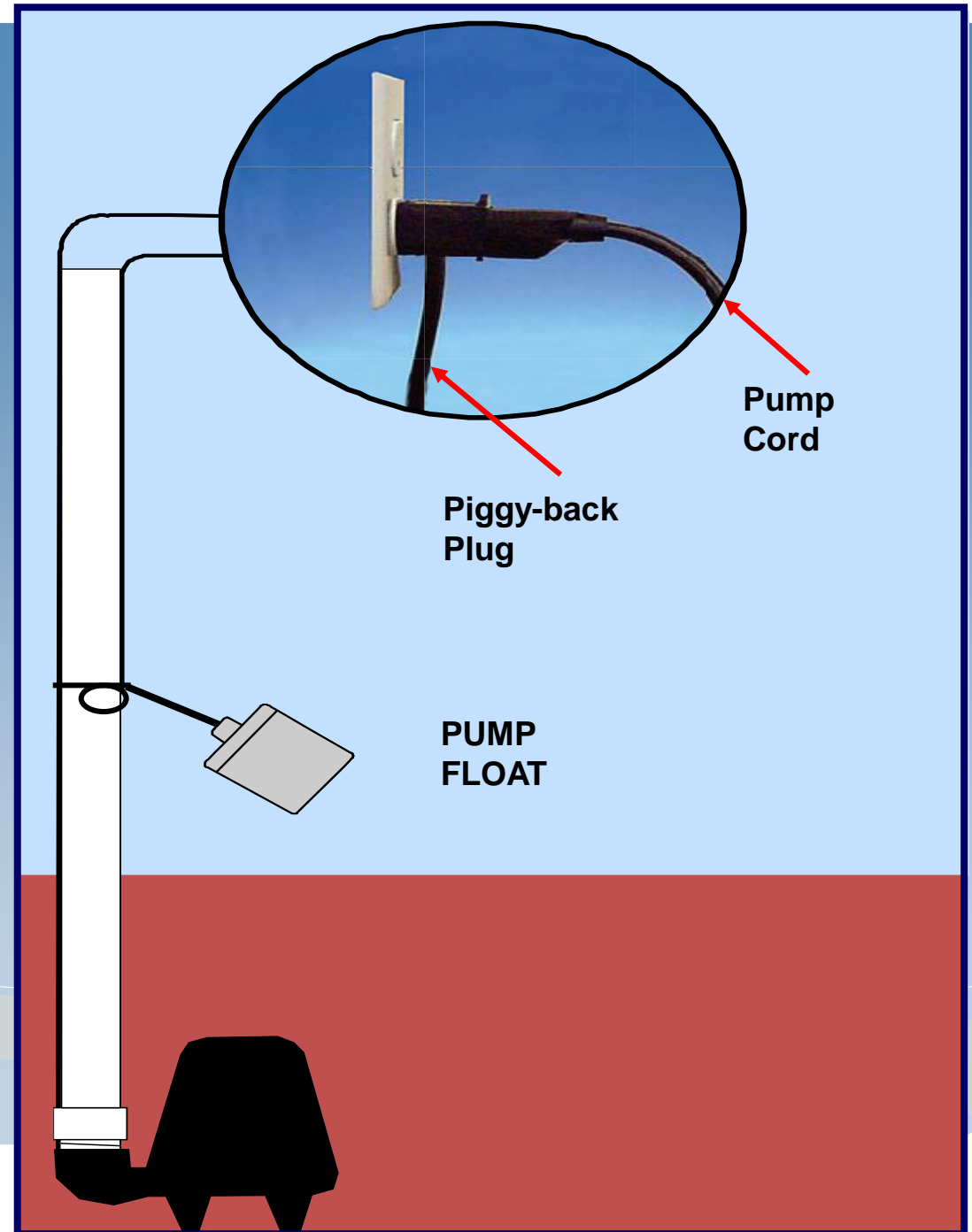


Tether Length	Pumping Range
3.5	6.6
6	8.5
8	11
10	13
12	14
15	17
17	19

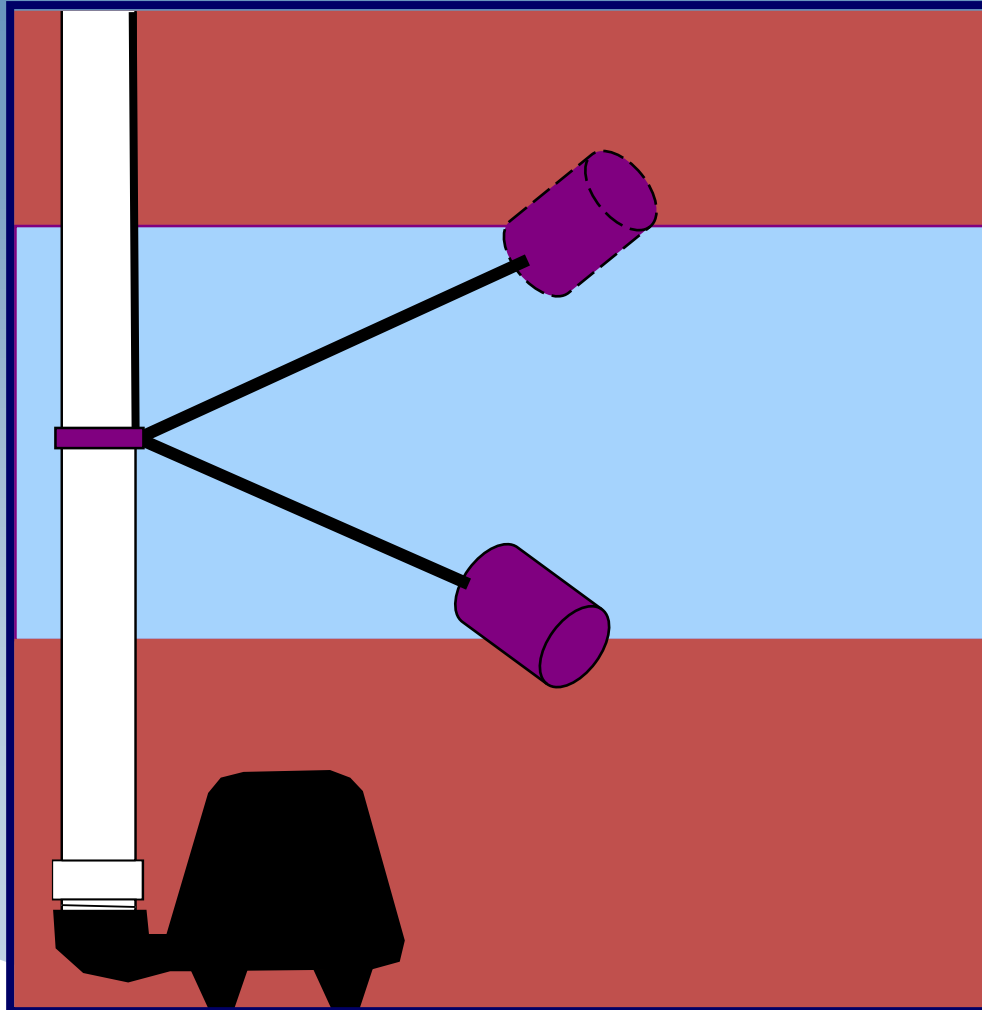
Pump Switch



**Piggy-back
plug option**



Pump Switch



The best location for a switch is for the pump to always be submerged in a septic application!

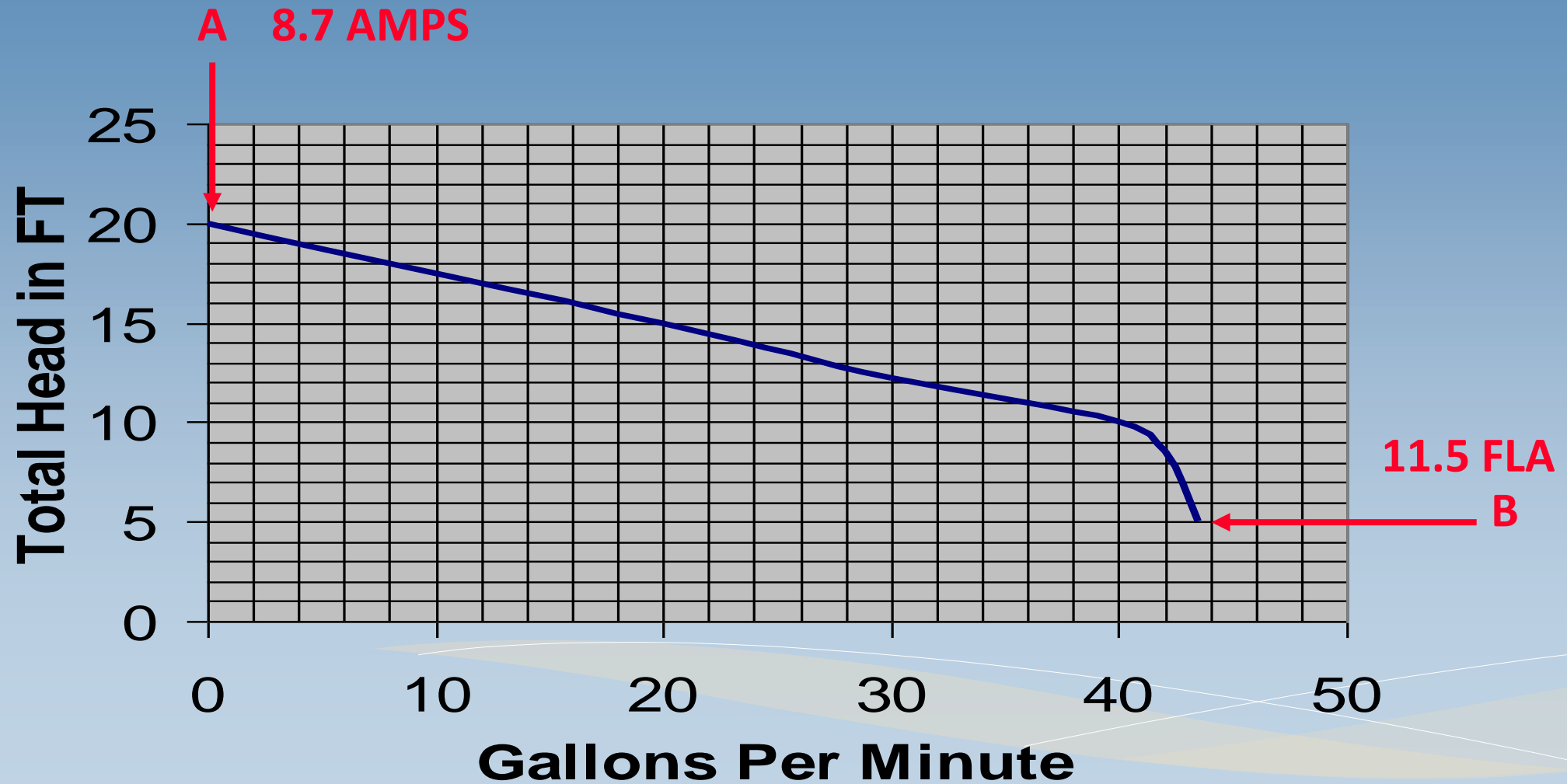
•Why Pumps Don't Work

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







Top Questions To Ask

What do you need to know to ensure you pick the correct pump?

Top Questions

- **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**

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

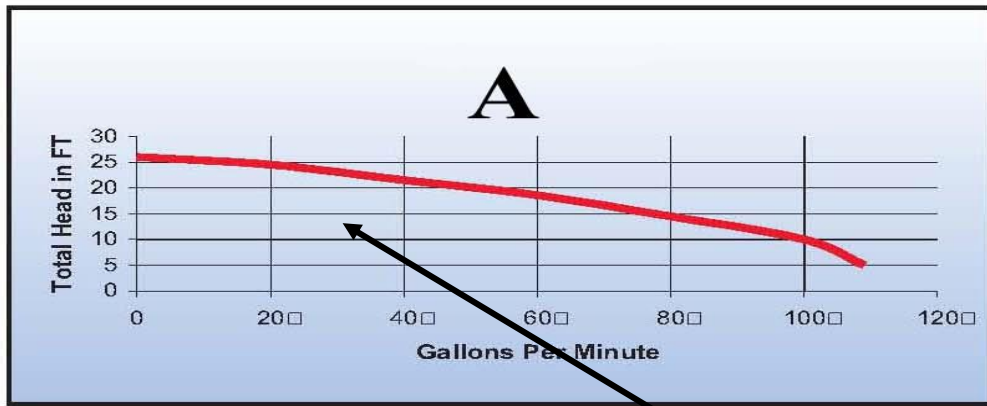
46 GPM through 3” pipe

78 GPM through 4” pipe

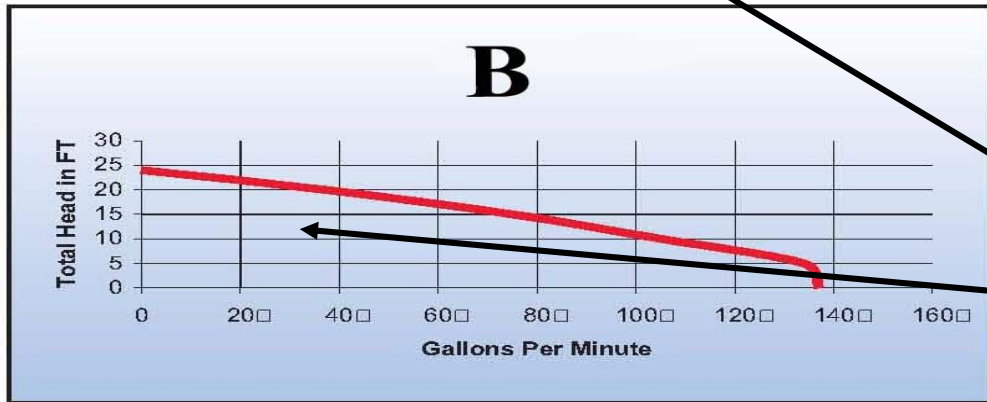
OVERSIZING THE PUMP?

- 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.

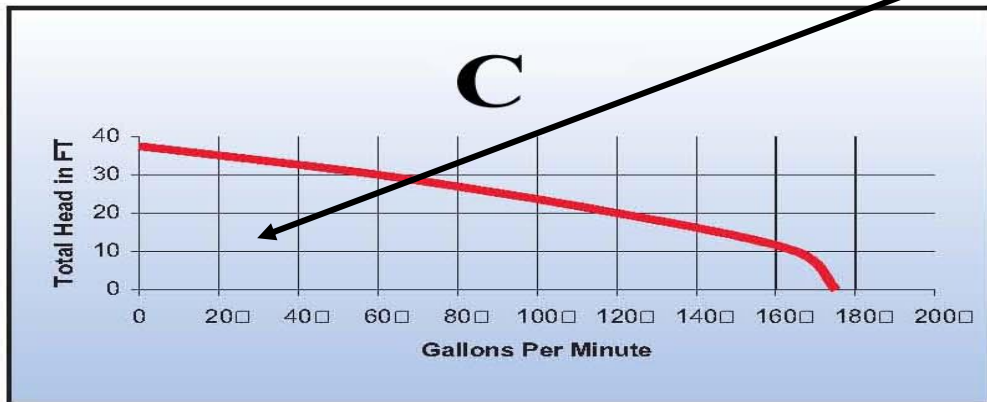
4/10HP



1/2HP

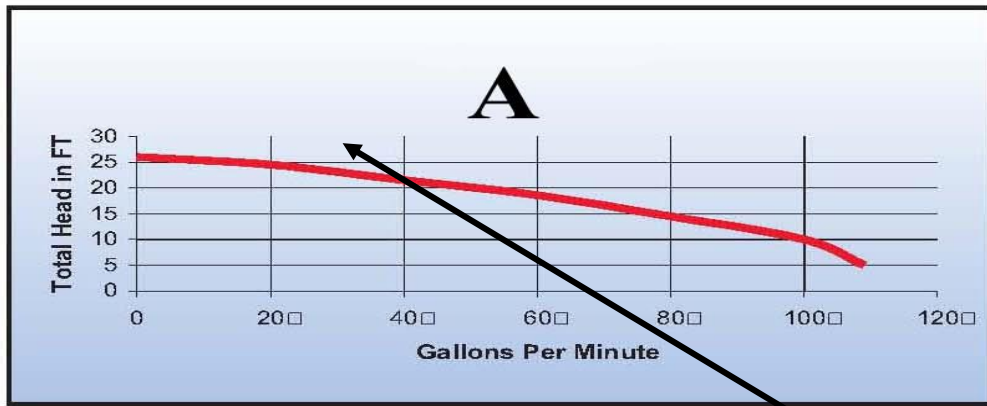


3/4HP

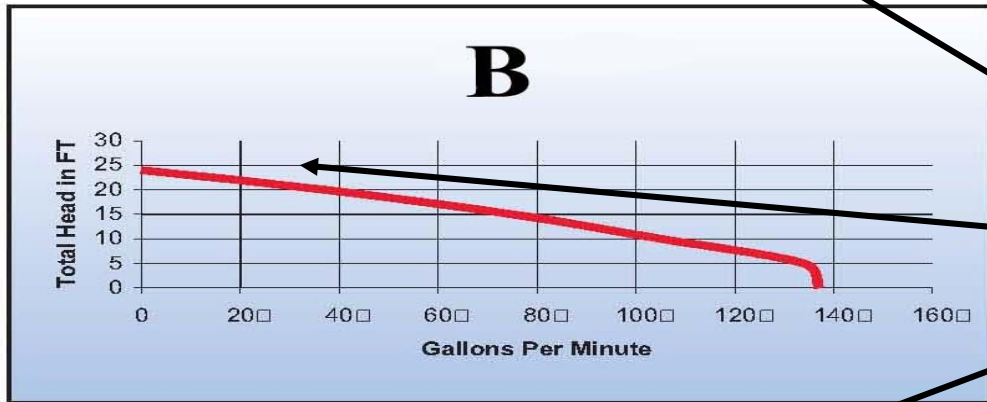


•Which Pump?
30 GPM @ 12 TDH

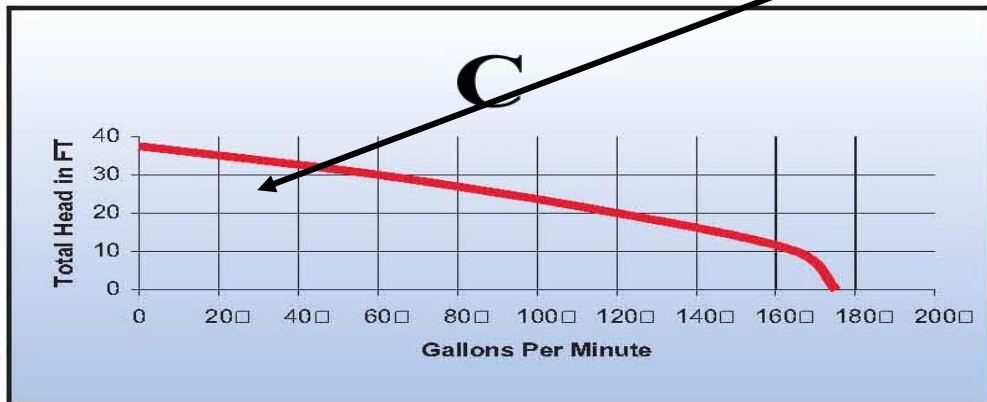
4/10HP



1/2HP

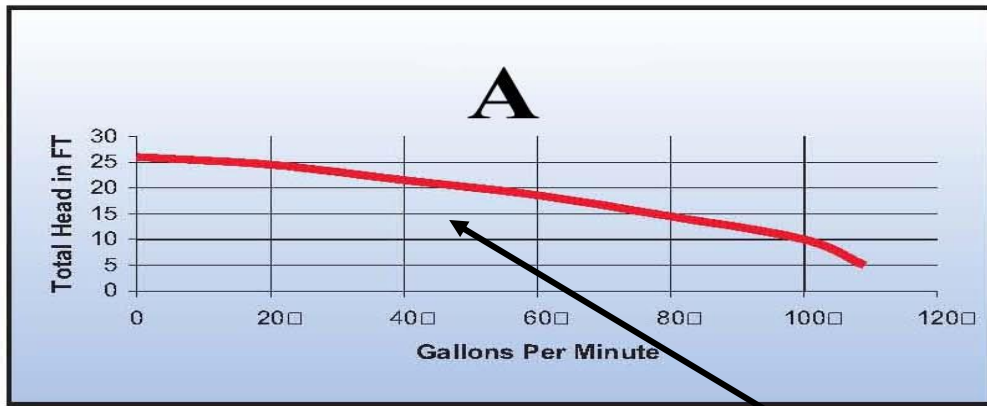


3/4HP

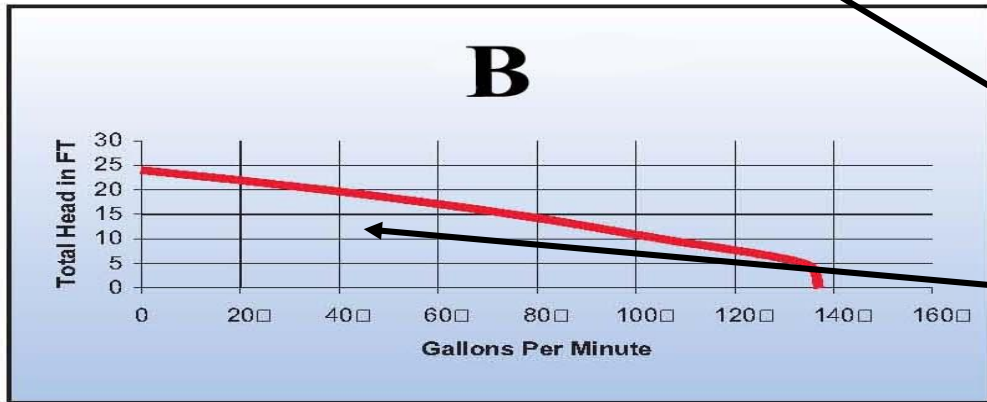


Which Pump?
30 GPM @ 26 TDH

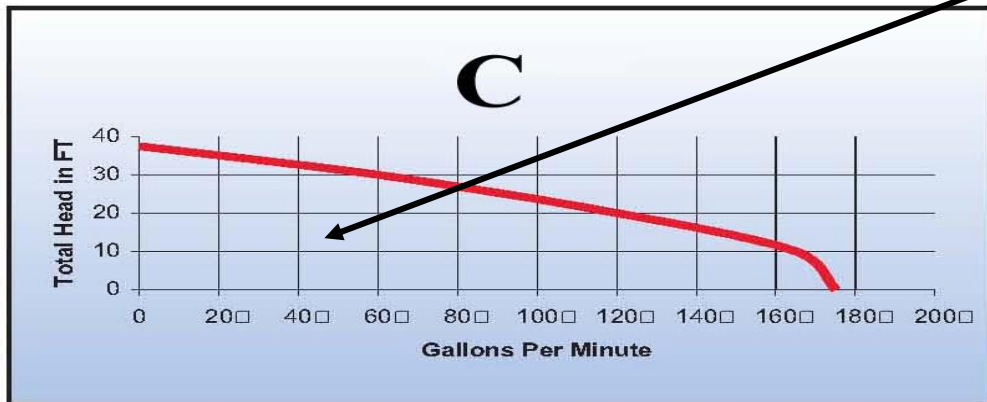
4/10HP



1/2HP



3/4HP



•Which Pump?
46 GPM @ 12 TDH

Sump and Sewage Pump Manufacturers Association

This concludes the education portion
of this session