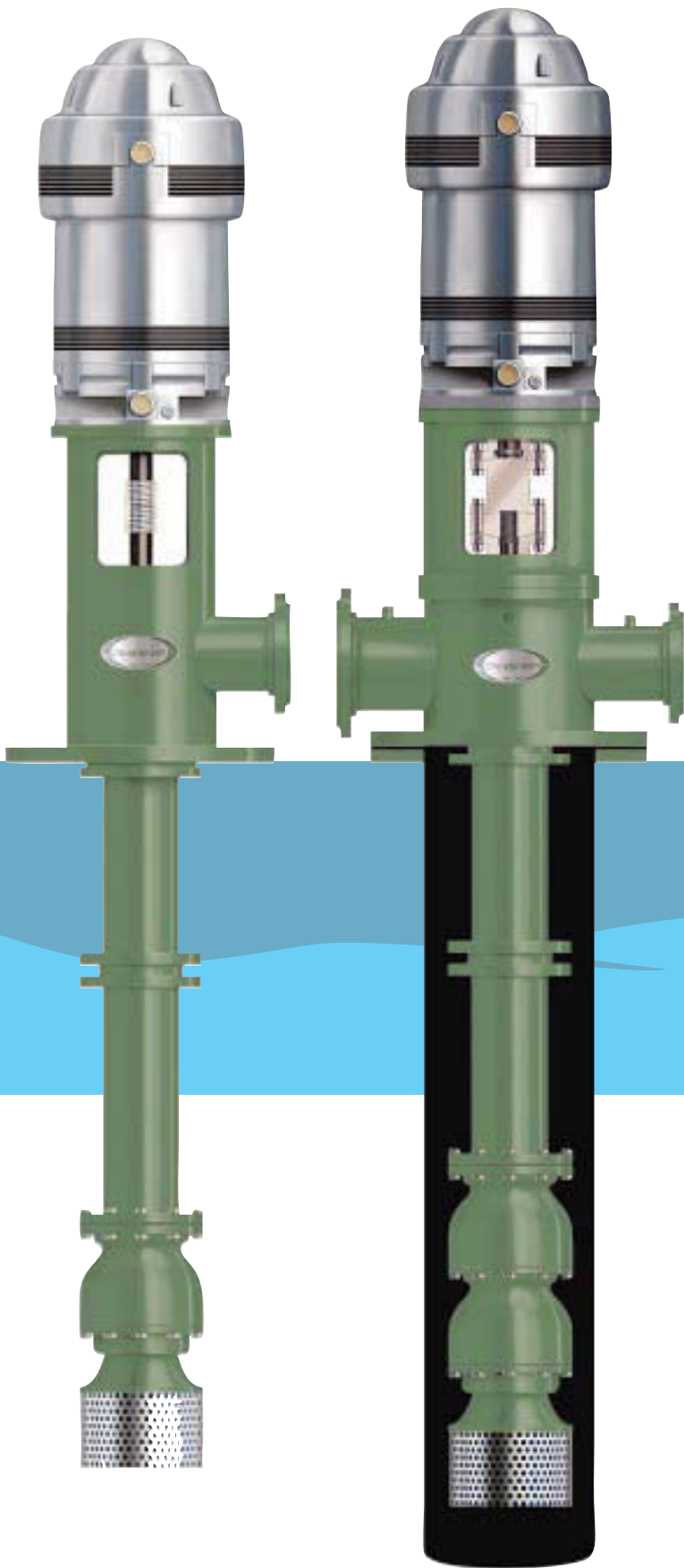


# VERTICAL TURBINE PUMPS

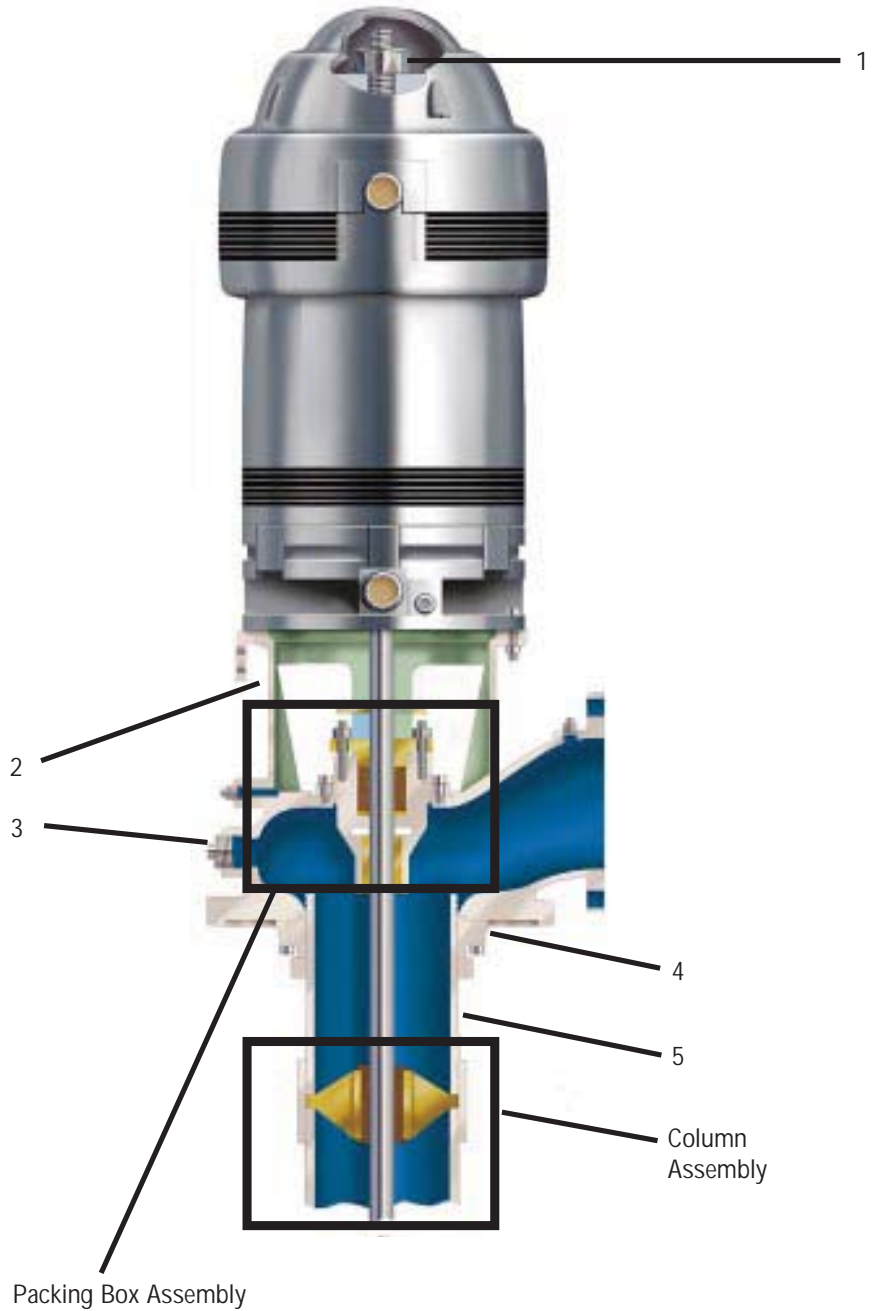


**Inno**  
PUMPS

# LINESHAFT

## Water Lubrication

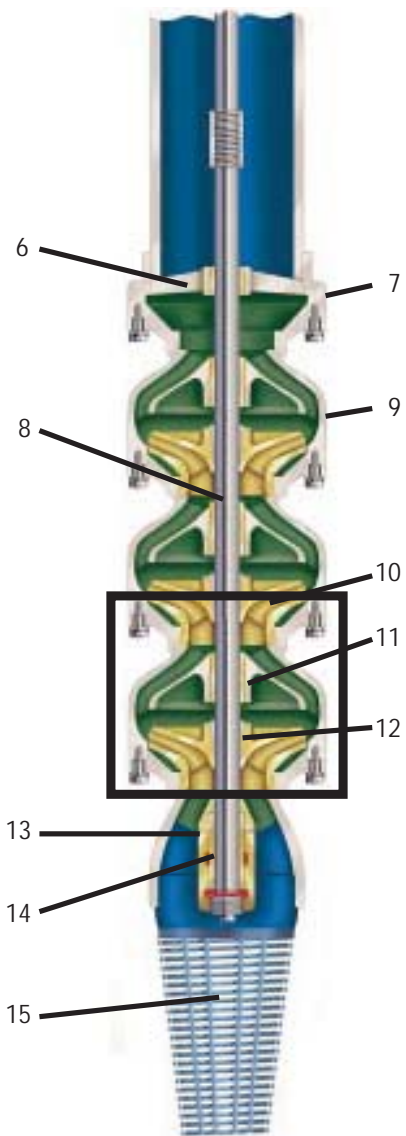
- 1 Adjusting Nut**  
Permits exact impeller adjustment for maximum performance.
- 2 Discharge Head**  
Heavy duty head provides maximum accessibility to service packing box assembly. Two piece head shaft is standard.
- 3 Prelube Connection**
- 4 Column Adapter**  
Accepts threaded or flanged column.
- 5 Adjusting Nipple**  
Threads directly into column adapter. Headshaft stickup set exactly by threading head on column as required.
- 6 Discharge Bowl Bearing**  
Bronze.
- 7 Discharge Bowl**  
Close grained cast iron.
- 8 Pump Shaft**  
Oversized high strength polished stainless steel.
- 9 Intermediate Bowls**  
Close grained cast iron. Waterways glass lined for maximum efficiency.
- 10 Impellers**  
Silicon bronze, designed for maximum efficiency. Precision balanced for smooth operation.
- 11 Intermediate Bowl Bearings**  
Bronze or rubber for long pump life under any well conditions.
- 12 Lock Collets**  
Steel construction secures impeller to pump shaft.
- 13 Sand Collar**  
Accurately located at suction bowl bearing to eliminate possible sand buildup.
- 14 Suction Bowl Bearing**  
Bronze. Grease packed for long trouble-free life.
- 15 Tail Pipe or Strainer-Optional**  
Optional tail pipe cut to desired length for best suction conditions. Strainer provides protection from large solids.



**Headshaft**  
Stainless Steel.

**Bronze Packing Gland**  
Cast Iron Box

**Throttle Bushing**  
Extra length bronze for better shaft support, longer packing life.

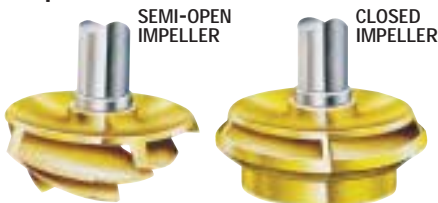


### Glass Lined Bowls

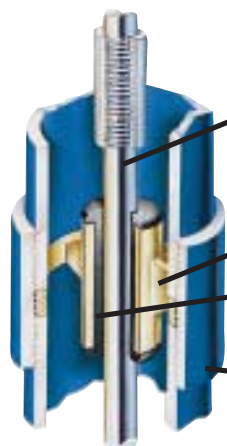
Heavy duty Class 30 cast iron intermediate bowls with standard feature of vitra-glass lined waterways for maximum efficiency and wear protection.



### Impellers



### Column Assembly



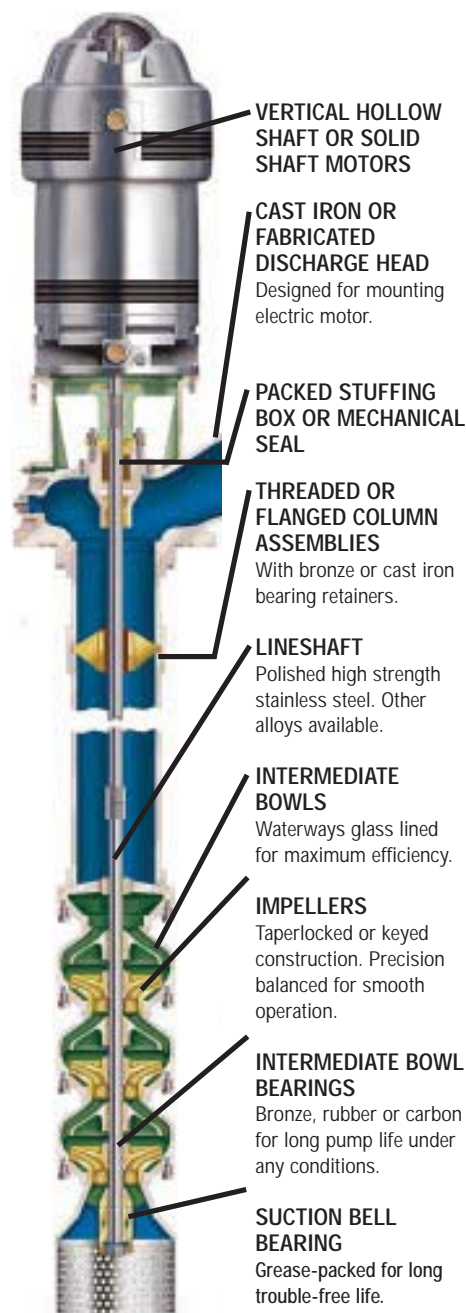
- Lineshaft**  
High strength steel. Ground and polished for exact bearing fit. Available in carbon steel or stainless steel.
- Bearing Retainer**  
Bronze.
- Lineshaft Bearings**  
Fluted rubber, designed to flush sand and grit rapidly.
- Column Pipe and Couplings**  
Parallel thread, accurately machined for easy installation, accurate alignment.

## LINESHAFT SHORT SET TURBINE

- Capacities to 9000 GPM (2043 m<sup>3</sup>/h)
  - Heads to 1400 feet (427 m)
- Consult factory for higher capacities

### Design Flexibility

Christensen offers a wide variety of design options to suit most any short set turbine applications.



- VERTICAL HOLLOW SHAFT OR SOLID SHAFT MOTORS**
- CAST IRON OR FABRICATED DISCHARGE HEAD**  
Designed for mounting electric motor.
- PACKED STUFFING BOX OR MECHANICAL SEAL**
- THREADED OR FLANGED COLUMN ASSEMBLIES**  
With bronze or cast iron bearing retainers.
- LINESHAFT**  
Polished high strength stainless steel. Other alloys available.
- INTERMEDIATE BOWLS**  
Waterways glass lined for maximum efficiency.
- IMPELLERS**  
Taperlocked or keyed construction. Precision balanced for smooth operation.
- INTERMEDIATE BOWL BEARINGS**  
Bronze, rubber or carbon for long pump life under any conditions.
- SUCTION BELL BEARING**  
Grease-packed for long trouble-free life.

# LINESHAFT

## OIL LUBRICATION

### 1 Adjusting Nut

Permits exact impeller adjustment for maximum performance.

### 2 Large Capacity Manual or Solenoid Oiler

Assures constant oil supply.

### 3 Discharge Head

Heavy duty head provides maximum accessibility to service tube tension assembly. Two piece head shaft is standard.

### 4 Lock Ring

Positively locks adjusting nipple to discharge head.

### 5 Adjusting Nipple

Threads directly into column adapter. Headshaft stickup set exactly by threading head on column as required.

### 6 Tube Adapter Bushing

Bronze.

### 7 Double Bowl Seal-Optional

Provides positive sealing of developed head.

### 8 Pump Shaft

Oversized high strength polished stainless.

### 9 Discharge Bowl

Close grained cast iron. Relief ports insure positive bearing lubrication.

### 10 Discharge Bowl Bearing

Bronze. Close tolerance fit for minimum leakage.

### 11 Impellers

Silicon bronze. Designed for maximum efficiency. Precision balanced for smooth operation.

### 12 Intermediate Bowls

Close grained cast iron. Waterways glass lined for maximum efficiency.

### 13 Intermediate Bowl Bearings

Bronze or rubber for long pump life under any well conditions.

### 14 Lock Collets

Steel construction secures impeller to pump shaft.

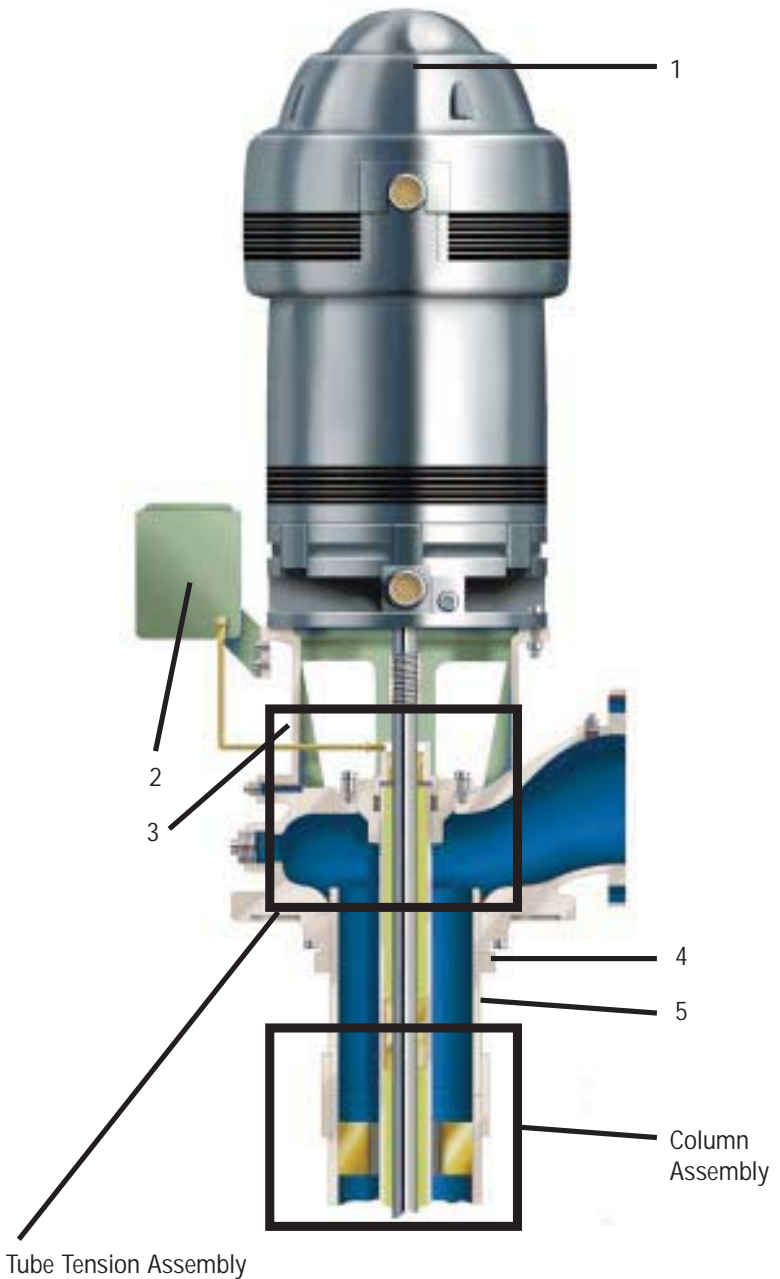
### 15 Sand Collar

Accurately located at suction bowl bearing to eliminate possible sand buildup.

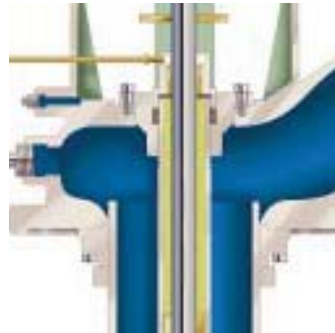
### 16 Suction Bowl Bearing

Bronze. Grease packed for long trouble-free life.

### 17 Tail Pipe or Strainer-Optional



Tube Tension Assembly



**Headshaft**  
Steel.

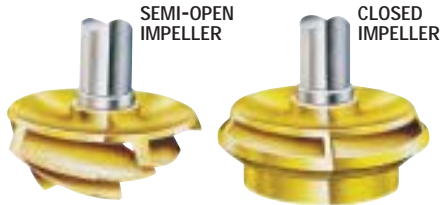
**Tube Tension Nut**  
Heavy Duty Cast Iron.

**Tension Nut Bushing**  
Bronze construction. Spiral groove insures positive lubrication to lineshaft bearings.

**Heavy Duty Tension Plate**  
For positive alignment of lineshaft bearings.

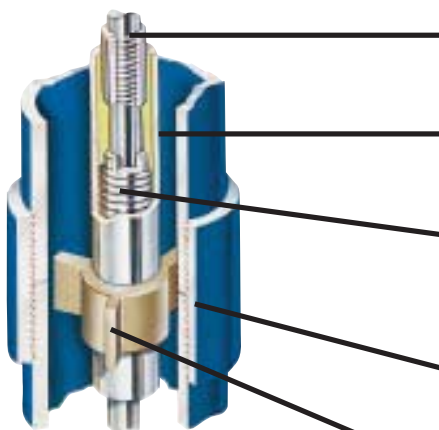
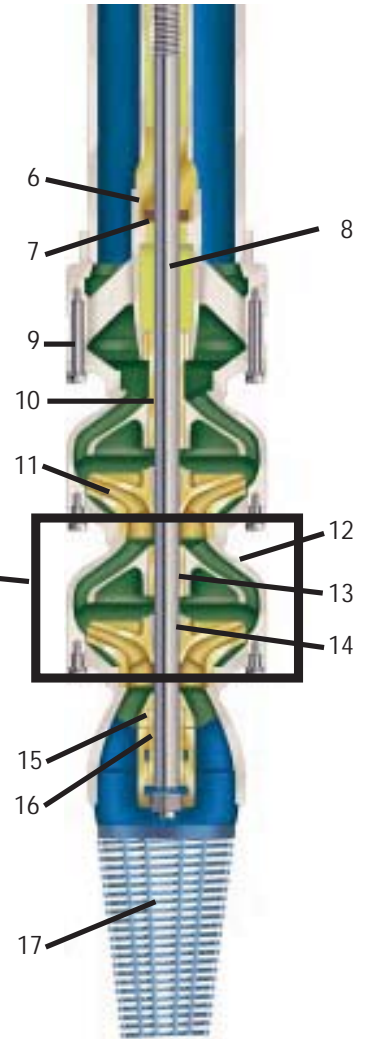


## Impellers



## Glass Lined Bowls

Heavy duty Class 30 cast iron intermediate bowls with standard feature of lined waterways for maximum efficiency and wear protection.



Bronze Construction

## Column Assembly

### Lineshaft

High strength steel. Ground and polished for exact bearing fit.

### Enclosing Tube

Extra heavy steel tubing for positive bearing alignment.

### Enclosed Lineshaft Bearings

Bronze Construction—  
High strength bearing bronze, spiral grooved for positive lubrication.

### Column Pipe and Couplings

Parallel thread, accurately machined for easy installation, accurate alignment.

### Tube Centering Spider

Stabilizes enclosing tube for smoother operation.



Type "F"  
Head



Type "U"  
Discharge  
Located  
Underground



Type "T"  
Suction Inlet  
Located in the  
Head



Type "L"  
(Can)  
Suction Inlet  
Located in  
the Can

## Standard Materials of Construction

No.	Description	Material
1	Discharge Head	C.I. ASTM A48, CL 30B
2	HeadShaft	Water Lube
		Oil Lube
3	Adjusting Nut	Stainless-ASTM A582, Type 416
4	Gib Key	Steel-AISI C1045
5	Tension Nut	Ductile Iron-ASTM A536, Gr. 65-45-12
6	Tension Nut Bushing	Mild Steel-ASTM A108, Gr. 1018
7	Tension Plate	Oil Lube Only
8	Oiler Body	Cast Iron-ASTM A48, CL 30B
9	Stuffing Box	Oil Lube Only
10	Stuffing Box Bushing	Water Lube
11	Stuffing Box Stud	Cast Iron-ASTM A48, CL 30B
12	Stuffing Box Stud Nut	Bronze-ASTM B584 C903
13	Stuffing Box Washer	Oil Lube Only
14	Stuffing Box Gasket	Cast Iron-ASTM A48, CL 30B
15	Stuffing Box Split Gland	Oil Lube Only
16	Stuffing Box Slinger	Water Lube
17	Packing	Aluminum SAE 329 or Steel
18	Column Nipple	Cast Iron-ASTM A48, CL 30B
19	Lock Ring	Bronze-ASTM B584 C903
20	Reducer - Bushing	Water Lube
21	Companion Flange	Water Lube
22	Companion Flange Gasket	Water Lube
23	Nameplate	Stainless-ASTM A276, Type 316
24	Sole Plate	Water Lube
25	Column Pipe	Water Lube
26	Column Coupling	Water Lube
27	Tube Nipple	Water Lube
28	Enclosing Tube	Bronze Construction
29	Oil Tube Coupling	Steel-SCH80, ASTM A120, Gr. B
30	Lineshaft Bearing	Bronze Construction
31	Lineshaft	W/L-Chrome Spot
		W/L-Stainless
		Oil Lube
32	Lineshaft Chrome Spot	Steel-AISI C1045
33	Lineshaft Coupling	Water Lube
		Stainless
34	Water Lube Retainer	Retainer
		Insert
35	Tube Centering Spider	Stainless-ASTM A582, Type 416
36	Discharge Bowl	Steel-AISI C1045
37	Discharge Bushing	Water Lube Only
38	Throttle Bushing	Chrome Facing-Rockwell #76
39	Intermediate Bowl	Mild Steel-ASTM A108, Gr. 1018
40	Top Inter Bowl	Stainless-ASTM A582, Type 416
41	Inter Bowl Bushing	Bronze
		Rubber
42	Wear Rings - Optional	Inter Bowl
		Impeller
43	Impeller	Bronze-ASTM B584 C903
44	Taper Lock	Bronze-ASTM B584 C903
45	Suction Bowl	Silicon Bronze-ASTM B584 C873
46	Suction Bushing	Mild Steel-ASTM A108, Gr. 1018
47	Sand Collar	Cast Iron-ASTM A48, CL 30B
48	Suction Strainer	Bronze-ASTM B584 C903
49	Plug	Hot Galvanized-ASTM A123
50	Screw Bearing	Bronze Construction
		Bronze-ASTM B584 C903
51	Bowl Shaft	Steel-ASTM A108, Gr. 1211
52	Hex Bolt	Stainless-ASTM A582, Type 416
53	Lock Washer	Steel-SAEJ 429, Gr. 8
54	Suction Adapter	Submersible Only
		Ductile Iron-ASTM A536, Gr. 65-45-12
55	Adapter Plate	Cast Iron-ASTM A48, CL 40B
56	Motor Coupling	Ductile Iron-ASTM A536, Gr. 65-45-12
57	Motor Mounting Bolts	Submersible Only
58	Suction Screen	Stainless Steel-ASTM A582, Type 416
59	Cable Guard	Submersible Only
60	Discharge Bearing	Submersible Only
61	Discharge Bearing Plug	Submersible Only
62	Upthrust Washer	Submersible Only