

VERTICAL TURBINE AND PROPELLER PUMPS



PENTAIR FAIRBANKS NIJHUIS

VERTICAL TURBINE AND PROPELLER PUMPS

Model 7000 Series Turbine Pump

Model 8200 Series Axial Flow Propeller Pump

Model 8300 Series Mixed Flow Propeller Pump

VERTICAL TURBINE PUMPS

Vertical Turbine Pumps have wide head ranges and bowl sizes up to 57" (1447.8 mm). These pumps are ideal for applications where surface equipment is prohibited, or where there are sound restrictions, such as in parks or residential areas.

AXIAL FLOW PROPELLER PUMPS

Axial Flow Propeller Pumps from Fairbanks Nijhuis are designed for high volume fluid movement at low discharge pressures. Used extensively for pumping water from lakes, cooling ponds, tanks, rivers and oceans, typical applications include raw

water intake, dewatering, storm water removal and flood control. Fairbanks Nijhuis vertical axial flow propeller pump applications are found in a variety of markets including urban and rural municipal water, government, industrial and irrigation and more.

VERTICAL MIXED FLOW PUMPS

Vertical Mixed Flow Pumps are typically used wherever a moderate volume of liquid needs to be pumped upward at moderate pressure. The advantages of mixed flow pumps include minimum footprint, no priming required (because the pump bowl assembly is submerged) and Net Positive Suction Head Available (NPSHA) at the lowest level to satisfy the NPSHA requirements of the pump. In addition, vertical mixed flow pumps are easily adaptable to various design codes, can be modified for changing hydraulic conditions and generally experience less wear due to the lower operating speeds they require.



PUMP SELECTION

SPECS AT A GLANCE

As shown below, pump bowls vary widely. Turbine bowls can be staged in a series to produce discharge pressures exceeding the outputs shown. Each of our pump models can be driven by vertical hollow-shaft motors, vertical solid-shaft motors, or through right-angle gears by an internal combustion engine, steam turbine or horizontal motor.

PUMP DECISION FACTORS

Selection of a turbine, mixed flow, or axial flow pump requires an assessment of capacity and discharge head requirements, as well as:

- ◆ Total pump thrust
- ◆ Net Positive Suction Head Available (NPSHA) and submergence
- ◆ Allowable bowl pressure

- ◆ Allowable pump shaft stretch
- ◆ Horsepower required throughout the pump's operating range
- ◆ Allowable discharge head hanging weight
- ◆ Sump requirements

In addition, it is also important to consider:

- ◆ The parameters of the liquid being pumped
- ◆ Allowable solid size
- ◆ Type of lineshaft lubrication
- ◆ Type of lineshaft sealing
- ◆ Elevation
- ◆ Driver requirements
- ◆ Materials of construction

VTSH Pumps	7000 Series Vertical Turbine Pumps	8200 Series Axial Flow Propeller Pump	8300 Series Mixed Flow Propeller Pump
Capacities (GPM)	40 to 50,000 GPM	500 to 1,000,000 GPM	600 to 250,000 GPM
Capacities (m ³ /h)	9 to 11,356 m ³ /h	113 to 227,124 m ³ /h	136 to 56,781 m ³ /h
Heads (ft)	10 to 2,000 ft	2 to 80 ft	1.5 to 100 ft
Heads (m)	3 to 609 m	.6 to 24 m	.5 to 30 m
Pump Bowls (inches)	4" to 57"	8" to 152"	10" to 72"
Pump Bowls (mm)	101 to 1,447 mm	203 to 3,860 mm	254 to 1,828 mm
Applications			
Raw Water Intake	•	•	•
Dewatering	•	•	•
Liquid Transfer	•	–	–
Cooling Water Circulation	•	–	–
Booster Service	•	–	–
Storm Water Removal	•	•	•
Flood Control	•	•	•
Marine	•	–	–
Process Services	•	–	–
Volatile Fluids	•	–	–
Condensate	•	–	–
Fuel Pumps	•	–	–

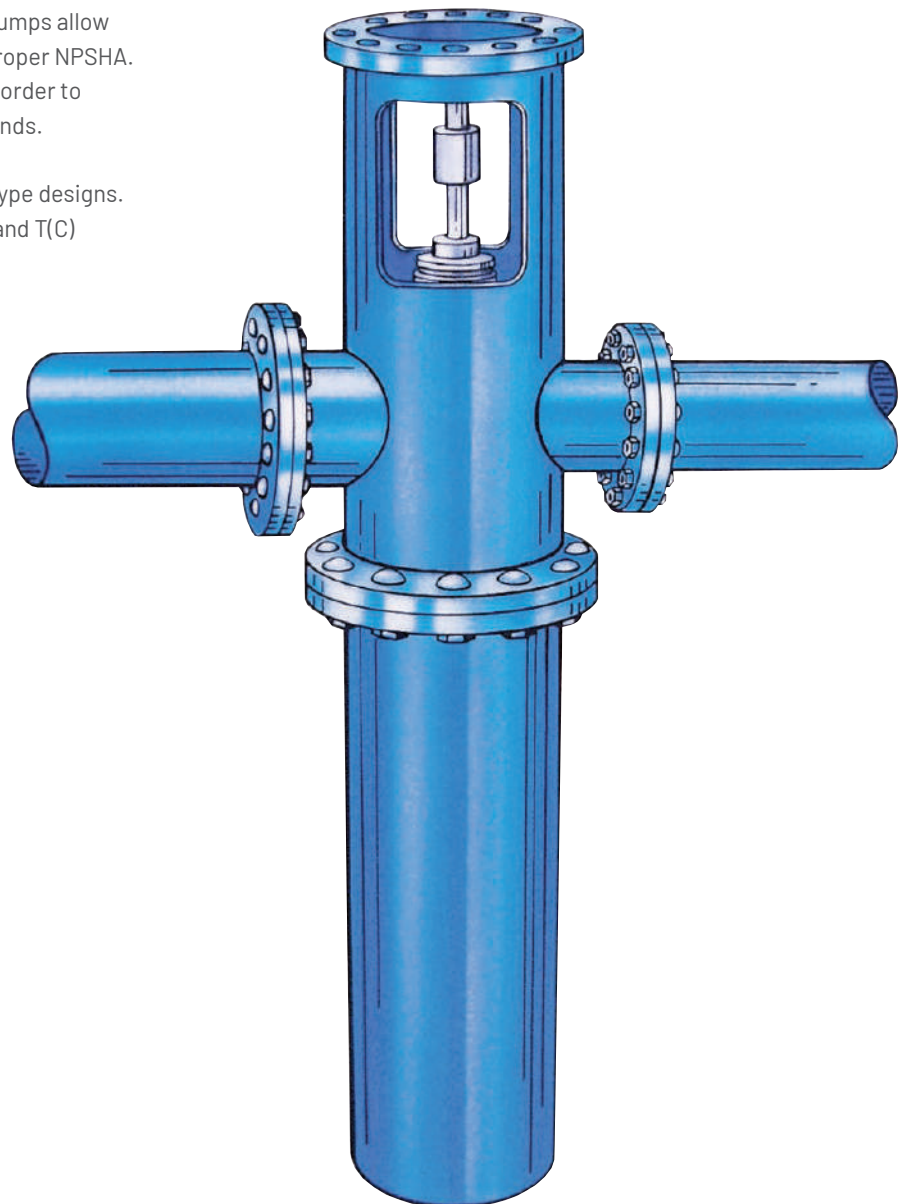


CAN PUMPS

In situations where the NPSHA is low, in high pressure systems, where suction pressures are variable and/or critical, or where differences in the elevation of suction and discharge piping are needed, vertical turbine pumps can be incorporated with a “can”. Can pumps are frequently used in pipeline (in-line), water booster, boiler feed, condensate, product loading and unloading, and volatile liquids handling applications. These may also be referred to as pot, tank, or barrel pumps.

Can pumps are designed to accommodate different discharge head and can configurations, and to allow suction and discharge locations above- or below-grade. Featuring a compact design with minimal footprint, can pumps allow the turbine suction bowl to be submerged for proper NPSHA. Discharge heads are sealed to the can flange in order to accommodate temperature and pressure demands.

The discharge head can be of “C”, “D”, “L”, or “T” type designs. Can pumps can be supplied with CT, DT, D, L, F and T(C) discharge heads.



TURBINE BOWL ASSEMBLIES

1. BOWL CASTINGS

Are manufactured of heavy-duty, high quality cast iron, and feature a minimum 30,000 PSI (2068.9 Bar) tensile strength, with smooth passages designed for efficient operation. Optional coated passages can also be used to further increase pump efficiency.

2. ENCLOSED IMPELLERS

Are precision-cast, matched to the pump bowls and are dynamically balanced to avoid vibration. A top shaft adjusting nut (or adjustable coupling) makes it easy to adjust impeller-to-bowl clearance.

3. SUCTION BEARINGS

Are grease-packed and fitted with a sand collar to keep grit and other abrasives out of the bearing, ensuring long life.

4. CAST IRON SUCTION BELL

With integrally cast guide vanes provides a smooth flow into the first stage impeller and reduces the formation of vortices, further contributing to efficient operation.

5. BOWL BEARINGS

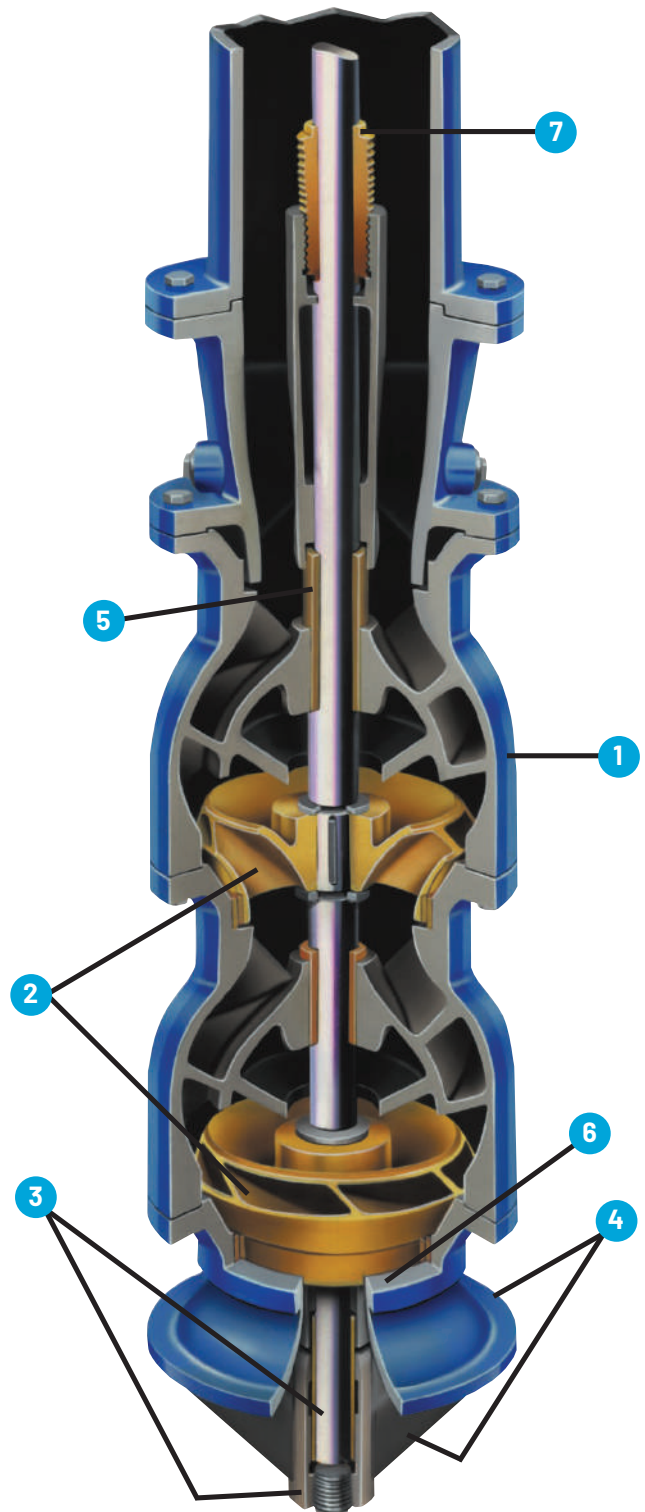
Are lubricated with the liquid pumped and assure accurate shaft alignment.

6. RENEWABLE IMPELLER AND BOWL WEAR RINGS

Are standard on 8" to 21" pumps and offered as an option on larger models. Wear ring replacement allows a worn and inefficient unit to be restored to near original condition, extending the unit's lifespan by many years.

7. CONNECTOR BEARINGS

Are employed when an enclosed lineshaft is used. Connector bearings are lubricated with water, oil, or grease, depending upon the lubricant used in the enclosing tube.



AXIAL AND MIXED FLOW BOWL ASSEMBLIES

Mixed flow pumps are very similar to axial flow pumps; however, they impart a radial motion and swirling momentum to fluid as it moves through the rotor section. Axial and mixed flow bowls have small footprints, so they are used widely in residential wells, municipal water works, and industrial applications.

1. BOWLS

Are heavy-duty cast iron with smooth passageways to increase efficient operation.

2. INTERMEDIATE AND DISCHARGE BOWL BEARINGS

Are product-lubricated and designed to carry extreme loads for maximum service life. The suction bowl bearing is grease-packed and fitted with a sand collar to keep out sand and grit.

3. SUCTION BELL

Reduces vortexing and entrance losses through three or four integrally-cast guide vanes to keep passages clog-free.

4. DISCHARGE DIFFUSER VANES

Provide a smooth flow entering the discharge column.

5. AXIAL FLOW PROPELLERS

Have well rounded leading edges, a design feature that keeps stringy materials from accumulating and increases solids-handling abilities.

6. MIXED FLOW PROPELLERS

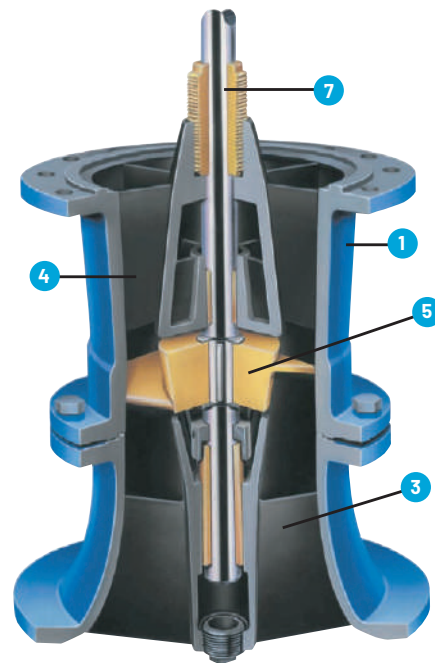
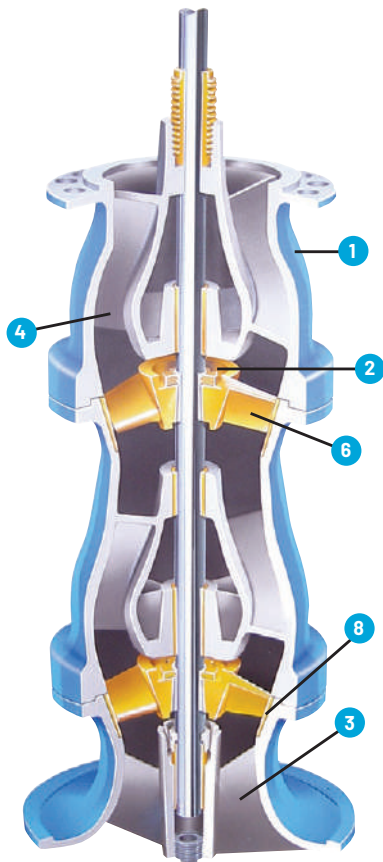
Also feature well rounded edges and a hydrofoil design to help large diameter solids pass. All propellers are dynamically balanced to eliminate vibration.

7. BOWL SHAFTS

Have large diameters needed to transmit the required drive torque.

8. BOWL LINERS (OPTIONAL)

Provide a renewable wear surface and maintain the clearance between the propeller and bowl. Replacement of bowl liners restores worn units to their original condition.



DISCHARGE HEADS

CAST IRON DISCHARGE HEADS

Constructed of rugged cast iron to meet sanitary requirements and support the column, lineshaft and bowl assemblies, discharge heads can accommodate any drive source. Large openings make it easy to access the stuffing box or mechanical seal and smooth passageways keep friction low and operation efficient. The integrally-cast discharge flange can be either a 125 lb. (56.699 kg) or 250 lb. (113.4 kg) design.

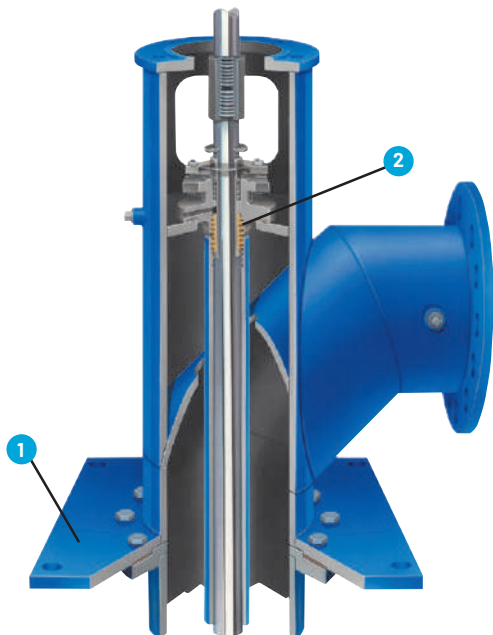
The discharge head is designed to be adaptable to threaded or flanged column. Additional features include:

1. SOLEPLATES (OPTIONAL)

Made from cast-iron or steel are used to mount the discharge heads. Once the soleplate is leveled and grouted in place, the pump can be removed for maintenance and then reset without realignment.

2. WATER FLUSH LUBRICATION

Allows an external water source to flow through the shaft enclosing tube to lubricate lineshaft bearings. A renewable wear sleeve protects the shaft throughout the stuffing box area, and packing or mechanical seals are used to seal the shaft.



FABRICATED DISCHARGE HEADS

Formed from high quality steel, fabricated discharge heads are designed to accept the column, shaft, and bowl weight as well as the hydraulic thrust. The flanged discharge is available through 300 lb. (136.08 kg). The three-segment elbow design smooths the fluid flow and reduces friction losses, increasing efficiency. Heads are gusseted for a rigid base to eliminate vibration and maximize smooth operation.

1. SHAFT SEALING

Can occur using most mechanical seals. When mechanical seals are used with a vertical solid shaft driver, a spacer coupling is required to simplify seal maintenance and replacement.

2. TWO-PIECE TOP SHAFT CONSTRUCTION

Is supplied for ease of vertical solid shaft driver removal.

3. UNDERGROUND DISCHARGE ELBOWS

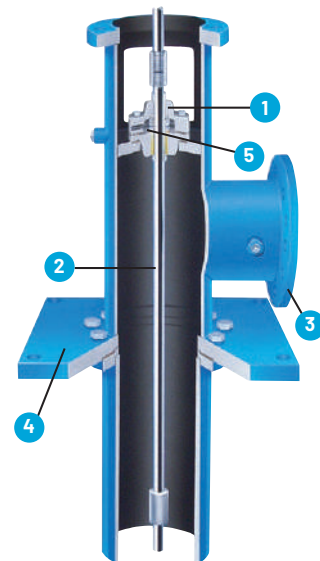
Are fabricated from high quality steel, and available with either flanged or plain-end discharge. The centerline of discharge may be located any distance below grade.

4. FABRICATED STEEL PEDESTAL

Serves as the mounting base for the driver, and provides access to the stuffing box or mechanical seal area. Air release connections are provided above the base plate.

5. PACKING BOX

Is product-lubricated and available through 400 PSI (27.586 Bar). A leakage drain connection is provided in the head to eliminate liquid build up in the packing box.



COLUMN AND LINESHAFT ASSEMBLIES

Two main pump styles are available based on lineshaft design and the corresponding lubrication systems. Open lineshaft pumps are product-lubricated, where the fluid being pumped lubricates the shaft bearings. Enclosed lineshaft pumps use oil, grease, or external water flush for lubrication. Additional features are outlined below.

1. DISCHARGE COLUMN

Is threaded steel in standard sizes through 14" (355.6 mm) diameter. Where greater strength or ease of assembly and disassembly are required, a flanged column pipe (seen in the open lineshaft image) is also available in these sizes. A welded flanged column is supplied as standard in column sizes 16" (406.4 mm) and larger.

2. ALIGNMENT

Is maintained on enclosed lineshaft applications by butting the pipe together within the sleeve-type pipe coupling. When an open lineshaft is used, pipe ends are butted on the bearing retainer flange.

3. AN ENCLOSING TUBE

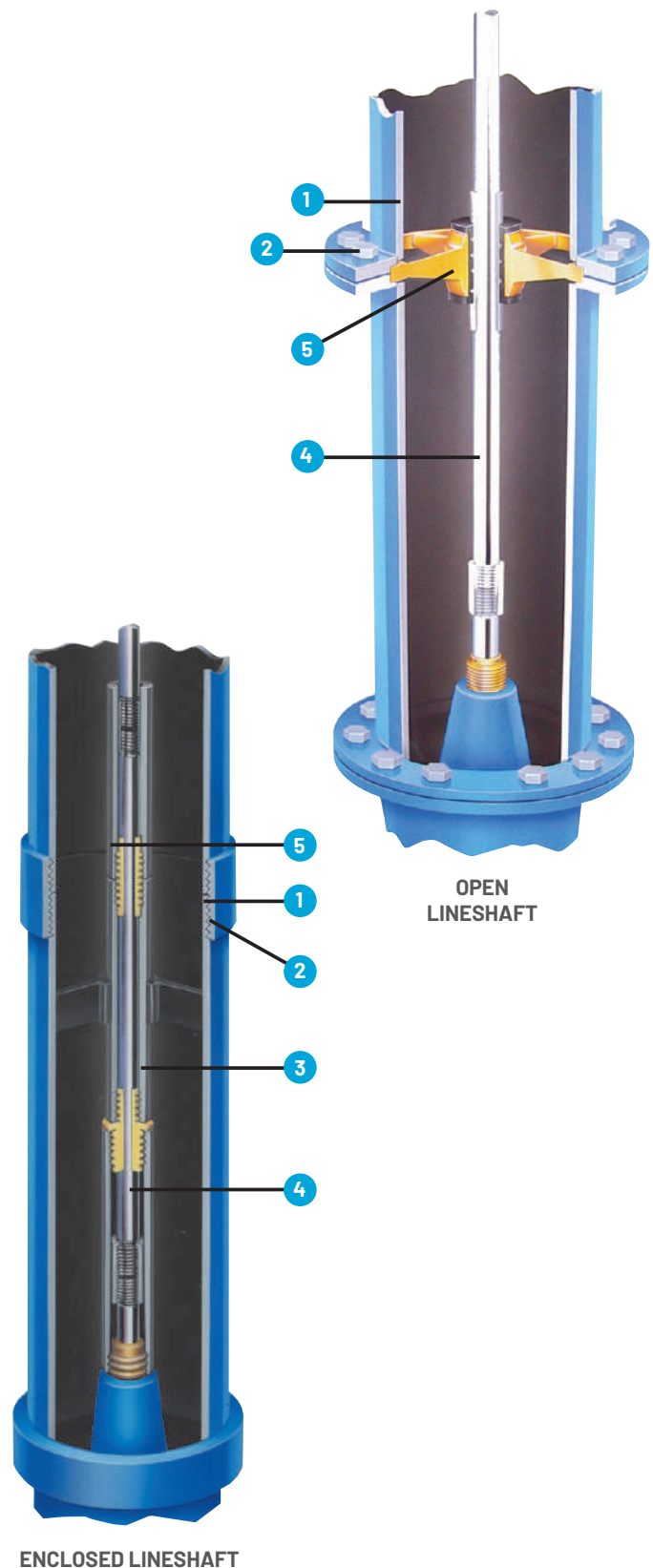
Is used to protect the lineshaft and bearings from the fluid being pumped. Note that interchangeable sections in five feet lengths (1524 mm) have machined ends with bronze connector bearings. Deep set turbines with an enclosed lineshaft utilize a tube stabilizer approximately every 50 feet (15.24 m) of setting.

4. THE LINESHAFT

Is precision-ground, high tensile strength steel with an extra strong threaded coupling. Shaft size and bearing spacing are determined by horsepower and thrust requirements.

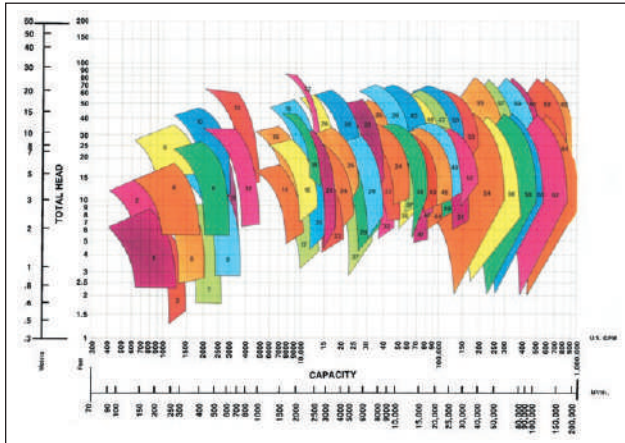
5. BEARINGS

Are neoprene spiral grooved rubber in open lineshaft configurations through 14" (355.6 mm) and are held in place by bearing retainers, allowing the shaft and renewable shaft sleeve to rotate. In 16" (406.4 mm) column and larger sizes, a spider/bearing hub is welded in place just below the upper column flange. On enclosed lineshaft models, connector bearings are used.



AXIAL FLOW AND MIXED FLOW PERFORMANCE DATA

1. AXIAL FLOW PERFORMANCE – 8200 SERIES

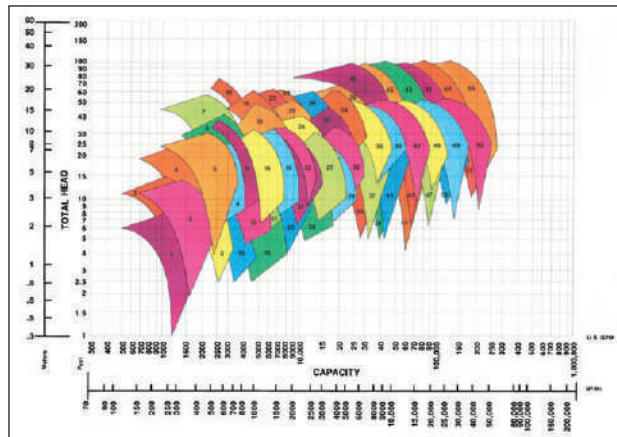


Shown are performance curves according to discharge head size, RPMs and single or double-staged bowls.

Number	Inches	Meters	RPM	Stages	Number	Inches	Meters	RPM	Stages
1	8"	200 mm	1170 RPM	1-STG	35	42"	1070 mm	435 RPM	2-STG
2	8"	200 mm	1170 RPM	2-STG	36	48"	1220 mm	350 RPM	1-STG
3	10"	255 mm	880 RPM	1-STG	37	48"	1220 mm	390 RPM	1-STG
4	8"	200 mm	1770 RPM	1-STG	38	48"	1220 mm	435 RPM	1-STG
5	10"	255 mm	1170 RPM	1-STG	39	42"	1070 mm	500 RPM	2-STG
6	8"	200 mm	1770 RPM	2-STG	40	48"	1220 mm	435 RPM	2-STG
7	12"	305 mm	880 RPM	1-STG	41	54"	1370 mm	290 RPM	1-STG
8	10"	255 mm	1770 RPM	1-STG	42	54"	1370 mm	320 RPM	1-STG
9	12"	305 mm	1170 RPM	1-STG	43	54"	1370 mm	350 RPM	1-STG
10	10"	255 mm	1770 RPM	2-STG	44	60"	1520 mm	270 RPM	1-STG
11	12"	305 mm	1170 RPM	2-STG	45	60"	1520 mm	320 RPM	1-STG
12	12"	305 mm	1770 RPM	1-STG	46	54"	1370 mm	320 RPM	1-STG
13	12"	305 mm	1770 RPM	2-STG	47	60"	1520 mm	320 RPM	2-STG
14	20"	510 mm	705 RPM	1-STG	48	63"	1600 mm	270 RPM	1-STG
15	20"	510 mm	705 RPM	2-STG	49	63"	1600 mm	320 RPM	1-STG
16	20"	510 mm	880 RPM	1-STG	50	63"	1600 mm	320 RPM	2-STG
17	24"	610 mm	580 RPM	1-STG	51	72"	1830 mm	235 RPM	1-STG
18	20"	510 mm	1170 RPM	1-STG	52	72"	1830 mm	270 RPM	1-STG
19	20"	510 mm	880 RPM	2-STG	53	72"	1830 mm	270 RPM	2-STG
20	24"	610 mm	705 RPM	1-STG	54	84"	2130 mm	*	1-STG*
21	24"	610 mm	880 RPM	1-STG	55	84"	2130 mm	*	1-STG*
22	20"	510 mm	1170 RPM	2-STG	56	104"	2640 mm	*	1-STG*
23	30"	760 mm	500 RPM	1-STG	57	104"	2640 mm	*	2-STG*
24	30"	760 mm	580 RPM	1-STG	58	110"	2790 mm	*	1-STG*
25	30"	760 mm	500 RPM	1-STG	59	110"	2790 mm	*	2-STG*
26	24"	610 mm	880 RPM	2-STG	60	116"	2950 mm	*	1-STG*
27	36"	920 mm	435 RPM	1-STG	61	116"	2950 mm	*	2-STG*
28	30"	760 mm	580 RPM	1-STG	62	132" & 144"	3350 & 3660 mm	-	1-STG
29	36"	920 mm	580 RPM	1-STG	63	132" & 144"	3350 & 3660 mm	-	2-STG
30	30"	760 mm	705 RPM	2-STG	64	152"	3860 mm	*	1-STG*
31	36"	920 mm	580 RPM	2-STG	65	152"	3860 mm	*	2-STG*
32	42"	1070 mm	390 RPM	1-STG					
33	42"	1070 mm	435 RPM	1-STG					
34	42"	1070 mm	500 RPM	1-STG					

*Various RPMs

2. MIXED FLOW PERFORMANCE – 8300 SERIES

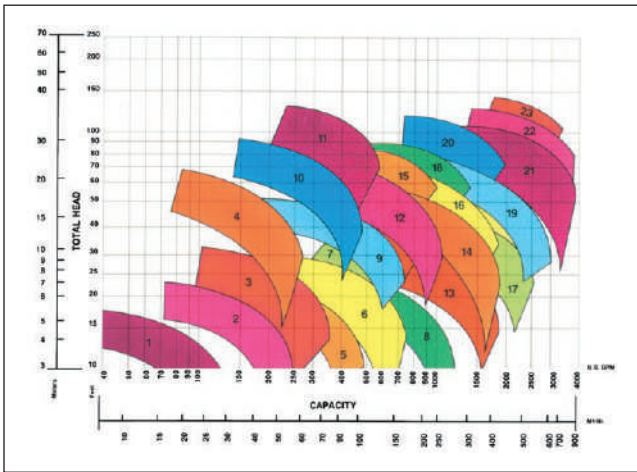


Shown are performance curves according to discharge head size, RPMs and single or double-staged bowls.

Number	Inches	Meters	RPM	Stages	Number	Inches	Meters	RPM	Stages
1	10"	255 mm	880 RPM	1-STG	29	30"	760 mm	500 RPM	1-STG
2	10"	255 mm	1170 RPM	1-STG	30	24"	610 mm	705 RPM	2-STG
3	10"	255 mm	880 RPM	2-STG	31	30"	760 mm	500 RPM	2-STG
4	10"	255 mm	1170 RPM	2-STG	32	30"	760 mm	580 RPM	1-STG
5	10"	255 mm	1770 RPM	1-STG	33	30"	760 mm	435 RPM	1-STG
6	12"	305 mm	880 RPM	1-STG	34	30"	760 mm	580 RPM	2-STG
7	10"	255 mm	1170 RPM	2-STG	35	30"	760 mm	500 RPM	2-STG
8	12"	305 mm	1170 RPM	2-STG	36	30"	760 mm	580 RPM	1-STG
9	12"	305 mm	1170 RPM	1-STG	37	30"	760 mm	500 RPM	1-STG
10	14"	355 mm	705 RPM	1-STG	38	36"	920 mm	390 RPM	1-STG
11	12"	305 mm	1770 RPM	1-STG	39	36"	920 mm	500 RPM	1-STG
12	14"	355 mm	880 RPM	1-STG	40	36"	920 mm	435 RPM	1-STG
13	12"	305 mm	1170 RPM	2-STG	41	30"	760 mm	580 RPM	2-STG
14	14"	355 mm	1170 RPM	2-STG	42	42"	1070 mm	435 RPM	1-STG
15	16"	405 mm	880 RPM	2-STG	43	42"	1070 mm	390 RPM	1-STG
16	14"	355 mm	1170 RPM	1-STG	44	42"	1070 mm	350 RPM	1-STG
17	16"	405 mm	880 RPM	1-STG	45	36"	920 mm	500 RPM	2-STG
18	16"	405 mm	705 RPM	1-STG	46	48"	1220 mm	350 RPM	1-STG
19	16"	405 mm	1170 RPM	1-STG	47	48"	1220 mm	320 RPM	1-STG
20	20"	510 mm	880 RPM	1-STG	48	42"	1070 mm	435 RPM	2-STG
21	20"	510 mm	705 RPM	1-STG	49	60"	1520 mm	290 RPM	1-STG
22	20"	510 mm	880 RPM	1-STG	50	60"	1520 mm	250 RPM	1-STG
23	16"	405 mm	1170 RPM	2-STG	51	48"	1220 mm	350 RPM	2-STG
24	20"	510 mm	880 RPM	2-STG	52	72"	1830 mm	250 RPM	1-STG
25	20"	510 mm	705 RPM	2-STG	53	72"	1830 mm	220 RPM	1-STG
26	24"	610 mm	580 RPM	2-STG	54	60"	1520 mm	290 RPM	2-STG
27	24"	610 mm	705 RPM	1-STG	55	72"	1830 mm	250 RPM	2-STG
28	24"	610 mm	580 RPM	1-STG					

TURBINE PERFORMANCE DATA – 7000 SERIES

3. TURBINE PERFORMANCE – HIGH RPM

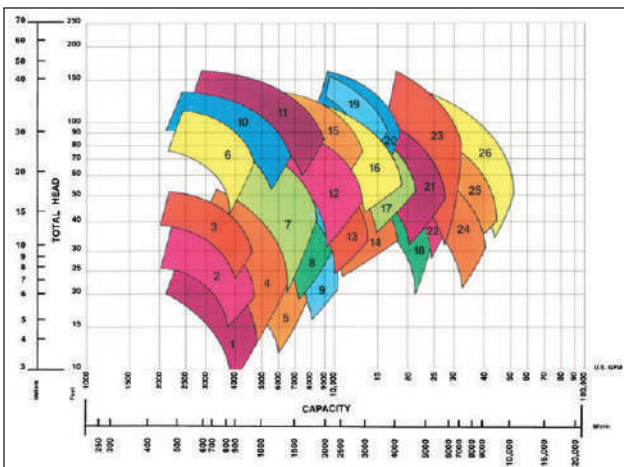


Shown are performance curves according to the bowl sizes and types in the Vertical Turbine line ranging from 1200–3600 RPM.

Number	Bowl Sizes/Type	RPM
1	6M	3600 RPM
2	7M	3600 RPM
3	8M	3600 RPM
4	6M	1800 RPM
5	10M	1200 RPM
6	11M	1200 RPM
7	12L	1200 RPM
8	11H	1200 RPM
9	10M	1800 RPM
10	7M	1800 RPM
11	8M	1800 RPM
12	11M	1800 RPM

Number	Bowl Sizes/Type	RPM
13	13H	1200 RPM
14	11H	1800 RPM
15	12L	1800 RPM
16	12H	1800 RPM
17	15H	1200 RPM
18	12M	1800 RPM
19	13H	1800 RPM
20	14M	1800 RPM
21	15H	1800 RPM
22	16HC	1800 RPM
23	18MC	1800 RPM

4. TURBINE PERFORMANCE – LOW RPM



Shown are performance curves according to the bowl sizes and types in the Vertical Turbine line ranging from 440–1800 RPM.

Number	Bowl Sizes/Type	RPM
1	20H	720 RPM
2	21H	900 RPM
3	17H	1200 RPM
4	20H	900 RPM
5	23H	720 RPM
6	17M	1800 RPM
7	20H	1200 RPM
8	23H	900 RPM
9	26H	720 RPM
10	17H	1800 RPM
11	21H	1800 RPM
12	23H	1200 RPM
13	26H	900 RPM
14	20H	720 RPM

Number	Bowl Sizes/Type	RPM
15	27M	1200 RPM
16	26H	1200 RPM
17	30H	900 RPM
18	48HC	440 RPM
19	50M	1200 RPM
20	28XHC	1200 RPM
21	30H	900 RPM
22	48HC	500 RPM
23	36XHC	900 RPM
24	51H	440 RPM
25	57H	500 RPM
26	57H	580 RPM



YOUR PUMP PARTNER FOR THE ENTIRE BUILDING

Protecting legacies like yours for generations

In your daily work, you need a trusted source of rugged reliability in mission-critical applications. Generations of our engineers have built, maintained, and evolved pumps to protect buildings like yours around the globe. With over 200 years of expertise and standing by our promises, we have built a robust portfolio that covers your needs.

Whether it's fire suppression for safety or HVAC and boosting applications for comfort, your building is covered with dynamic water movement solutions that fit your needs.

Because every decision counts when selecting pump equipment that protects your building and the people inside.



**EXPLORE OUR PUMP
PORTFOLIO**

**FIRE SUPPRESSION • HVAC
PRESSURE BOOSTING**



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