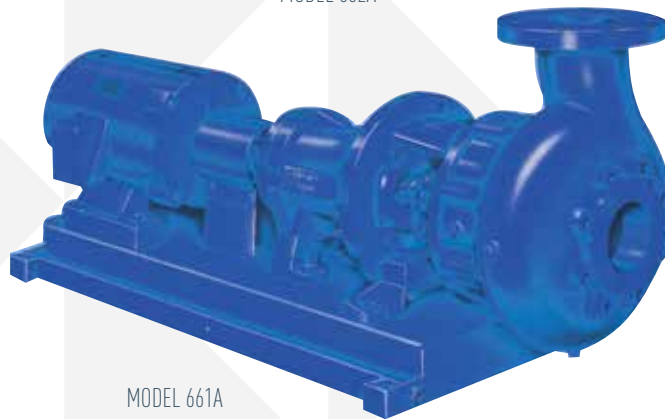




MODEL 662A



MODEL 664A



MODEL 661A



MODEL 663A

AURORA[®] 660 SERIES SINGLE STAGE SOLIDS HANDLING VORTEX PUMPS

AURORA® 660 SERIES

Single Stage Solids Handling Vortex Pumps

Capacities to 2600 GPM

Heads to 160 Feet

Temperatures to 250°F

Discharge Sizes 3" through 6"

Introduction and Principle of Operation Vortex Pumps

The application difficulties inherent in the pumping of heavy concentrations of solid materials are solved with the introduction of the Aurora Vortex Pump. The Vortex design is suited primarily to the pumping of sludge or slurry but may be readily applied to food processing and other diverse applications ranging from acetic acid to zinc sulfate. A 28% Hi-Chrome iron is available for highly abrasive mixtures. This product, coupled with a complete line of Aurora solids handling pumps, provides a single source availability unique in the centrifugal pumping industry.

The Model 660 pump operates on the vortex principle. The vortex action created by the impeller is similar to a hurricane in that the liquid is constantly swirling upon entering the casing. The majority of the liquid does not contact the impeller, but is instead caught up in the mainstream of the casing and is discharged by centrifugal force. The design easily handles stringy material. The unique impeller design and the fact that the material pumped does not flow through the impeller in a conventional manner requires special consideration of the engineer. Refer to Bulletin 670 for wet pit pump details.

Model 661A pumps are horizontally baseplate mounted with a driver flexibly coupled to the pump. This easy-to-service design is recommended where floor space is readily available or where flooding of the installation is not possible.

Model 662A pumps are vertically mounted and use flexible shafting between the driver and the pump. This model is frequently used on lift station applications where flooding of the installation is possible. The driver is remote.

Models 663A and 664A are vertically mounted with an elevated driver coupled directly to the pump (Model 663A through a flexible coupling). 663A-664A are popular for installations where floor space is limited and flooding is marginal.

Quick Reference 660 Series Feature Selector

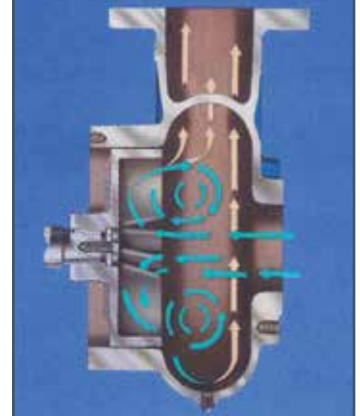
Standard Features

- 3" to 6" sphere and slurry handling capability
- All iron fitted pump construction
- Regreaseable bearings
- Double row outboard thrust bearing
- Single row inboard radial bearing
- Hardened stainless steel (450 min. Brinell) shaft sleeve (pumps with packing)
- Taper shaft fit at impeller
- Steel impeller key
- Carbon steel shaft
- Back impeller pullout
- Dynamically balanced impeller
- Centerline discharge casing
- Suction elbow with handhole (Models 662A-663A-664A)
- Flush connection behind impeller
- Hydrostatic test all pumps
- Interwoven graphite/Teflon® lubricated acrylic yarn packing
- Lantern ring
- Gasket sealed pump shaft
- Leakage accumulator packing gland (Models 662A-663A)
- Discharge position No. 1
- Rodding hole in casing
- Coupling guard (Model 661A)

Optional Features

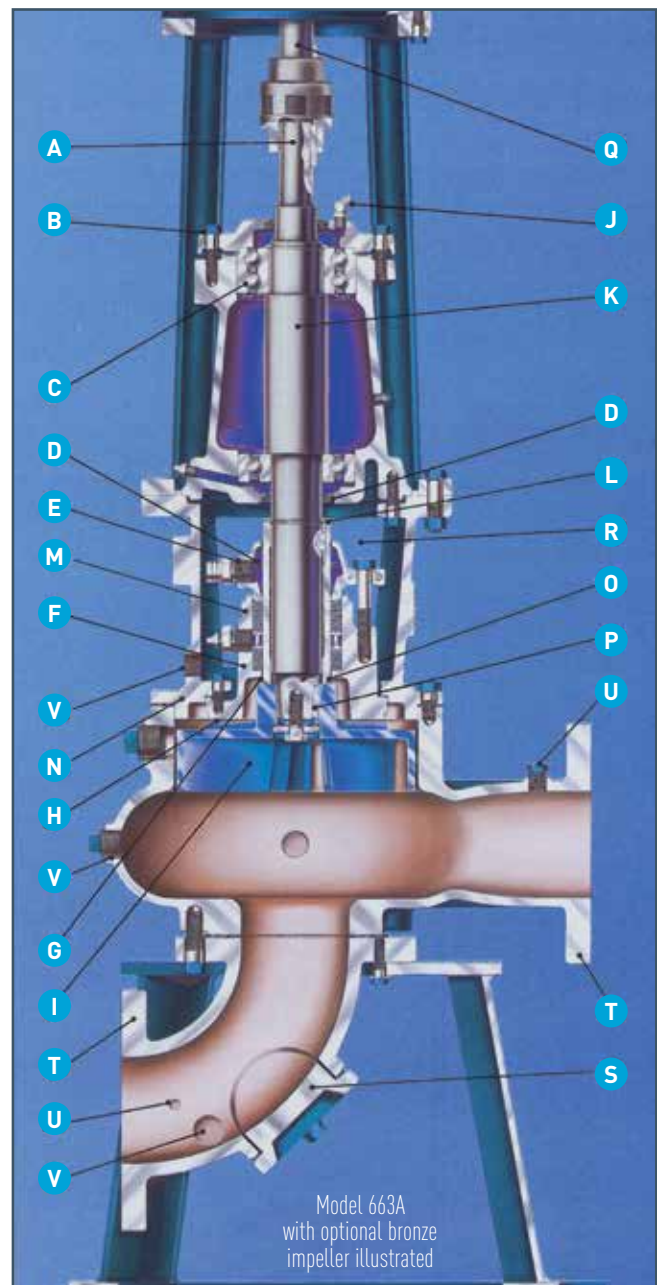
- Removable split packing box
- Single mechanical seal
- Stainless steel shaft
- External stuffing box piping with filter or valve
- Automatic stuffing box grease seal lubricator
- Spacer type coupling (Model 661A only)
- Flexible shaft drive with or without guard (Model 662A only)
- Water Seal Unit Assembly (see Bulletin 680)
- Constant liquid level system (APCO-Matic Variable Speed — see Bulletin 700)
- Certified test report—witnessed or unwitnessed (clear water)
- Special alloy pump construction (stainless steel) (hi-chrome iron)
- Alternate discharge positions
- Alloy shaft sleeve (standard with mechanical seal)
- Double mechanical seal (standard Model 664A)
- Suction increasing elbow with clean out (Models 662A-663A-664A)

Principle of Operation



Pump Features

- A. Lifting Eye**
tap in shaft end simplifies disassembly.
- B. External Shaft Adjustment**
simplifies correctly orientating the impeller within the casing during scheduled maintenance.
- C. Double Row Thrust Bearings**
are added protection for high loads. Average bearing life is ten years.
- D. Water Slinger**
and grease seals protect both bearings from moisture.
- E. Leakage Accumulator Gland**
option to siphon off packing leakage.
- F. Stuffing Boxes**
are machined for mechanical seals or packing. Either may be used without modification.
- G. Gaskets**
protect shaft from pumped liquid corrosion and contamination.
- H. Impeller Wiper Vanes**
minimize stuffing box pressure and clogging.
- I. Impeller Vanes**
brought well into the inlet eye to pick up liquid early and to minimize clogging.
- J. Grease Lubrication**
purges old grease from both bearings.
- K. Rugged Shaft**
with taper for easy impeller removal and minimum deflection.
- L. Hardened Stainless Steel Sleeve**
on packed pumps is securely key locked to the shaft.
- M. .002 Maximum Shaft Deflection**
at stuffing box face extends packing and mechanical seal life.
- N. Back Pullout Design**
for pump maintenance; does not disturb suction or discharge piping.
- O. Snap Ring**
groove is provided for a snap ring to aid in sleeve removal during preventive maintenance period.
- P. Steel Impeller Key,**
capscrew and washer secure impeller to shaft.
- Q. NEMA Standard HP**
mounting face and shaft extension motors.
- R. Large Access Openings**
provide adequate visibility and working room.
- S. Oval Cleanout**
in elbow is hand size and located to provide visibility and accessibility to the suction. A rodding hole in the side of the casing is provided.
- T. Discharge**
flanges can be located in 45° increments for eight different positions (suction in 90°-vert. pumps).
- U. Standard Gauge Taps**
are conveniently located at both the discharge and suction flange openings.
- V. Standard Drain Taps**
are located conveniently in the adapter bracket, suction elbow and casing.



Pump Details

Special Pump Features

MODEL 661A pumps are horizontally baseplate mounted with a driver flexibly coupled to the pump. SUPPORT of various pump components is important. Inadequate mounting designs impose unnecessary stress and strain on the entire pump and installation. The top centerline discharge casing is one solution. AURORA VORTEX pumps are designed to provide the best available component support. HORIZONTAL 661A UNITS are supported at both pump and coupling end. This, with centerline discharge support, provides protection against pipe strain and maintains casing support when the drive end of the pump is removed for servicing. The rear support foot greatly simplifies shaft coupling alignment. On VERTICAL 663A UNITS, the steel motor base has a VORTEX pump registered fit at the motor end and is fastened to a separate pump adapter. This exclusive arrangement assures alignment and concentrates loads on the separate pump adapter thereby eliminating strain and misalignment of the bearing housing. On 662A-663A-664A UNITS the steel base provides a rigid support for the complete pump unit. 664A is close coupled.



CENTERLINE DISCHARGE



Split Packing Boxes

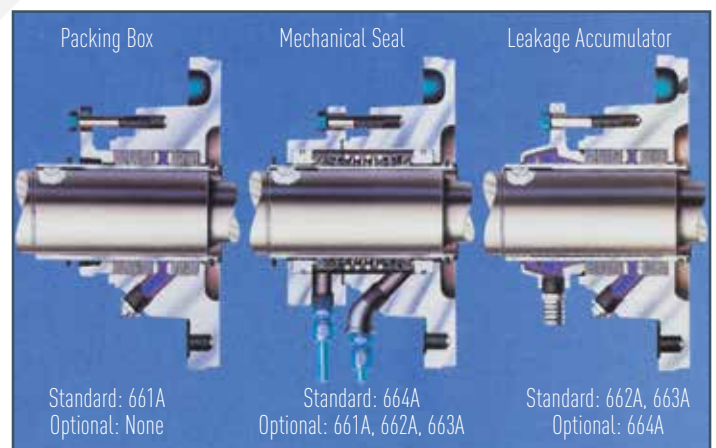
Split packing boxes separate vertically through the packing insert to simplify packing replacement and shaft sleeve inspection. The insert halves are doweled, register aligned and gasketed to prevent leakage. Only six bolts need to be removed to disassemble the insert from the pump assembly.

Double Mechanical Seals

Double mechanical seals must be recommended for gritty or abrasive applications. Seal faces are protected by clear water under pressure, injected directly into the seal cavity. The seal box design allows for speedy seal maintenance. Single mechanical seals are available.

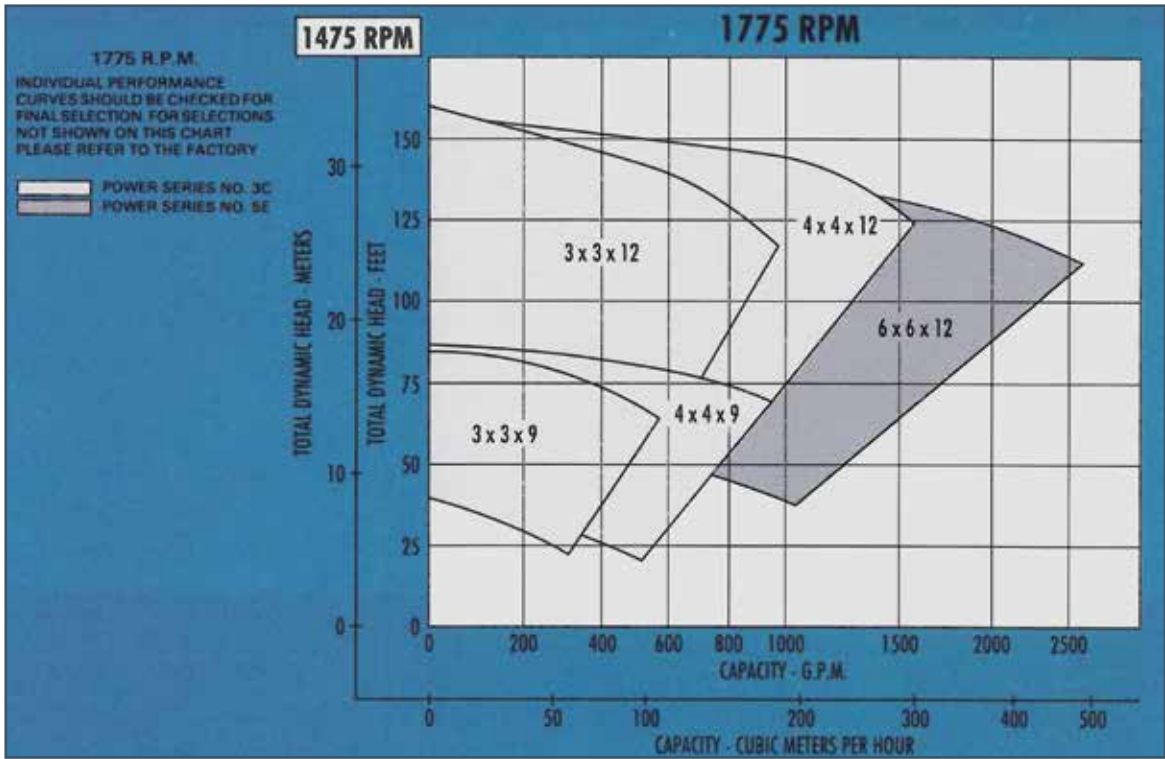
Leakage Accumulator

Leakage accumulator for vertical pump models with packed stuffing boxes collects seepage for easy drain-off. The gland halves are dowel-aligned.

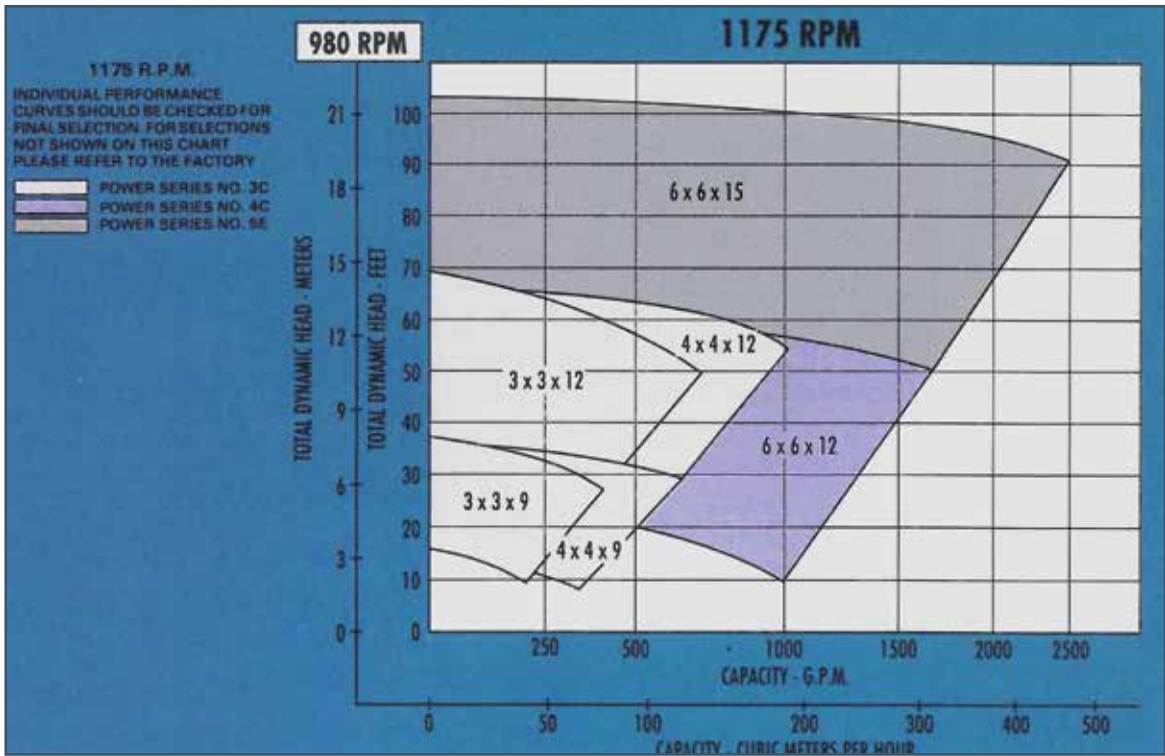


Performance Data

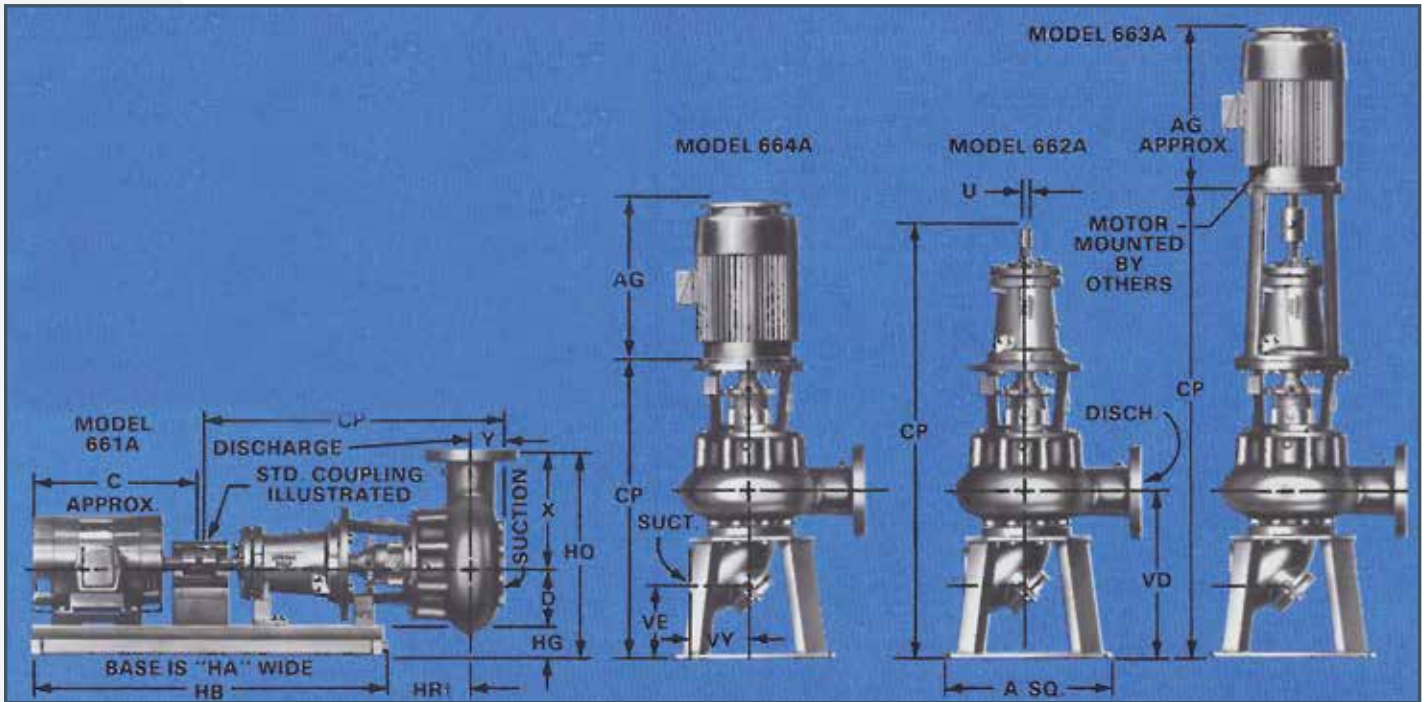
1775 RPM



1175 RPM



Dimensional Details



Notes:

1. Dimensions and weights are approximate.
2. Refer to factory for base dimensions when spacer couplings are specified.
3. Not for construction purposes unless certified.
4. Frame sizes shown are for open drip-proof motors only.
5. Suction and discharge flanges are American Standard 125#.
6. Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
7. Add pump, base and motor weight for unit weight.
8. Horizontal motors are "T" frame as shown - Vertical motors are "HP" frame.
- † Refer to individual dimension page for HR dimension

661A, 662A, 663A, 664A - Dimensions - Pump *Add 2" w/frame 284 HPH or larger																	661A - Dimensions - Base									
Pump Size	Pwr. Src.	Pump Weight			CP								Motor Frame										Base Wt. Lbs.			
Disch.	Suct.	Case	661A	662A	663A	A	D	U	X	Y	661A	662A	663A	664A	VD	VE	VY	143T thru 184T	Base	HA	HB	HG	HO			
3	3	9	3C	212	288	321	17	8	1-1/4	10	3-1/8	28-11/16	42	45-5/8	28-11/16	16-7/16	7-3/4	5-1/2	143T thru 184T	5	17-1/4	36-1/2	3	21	59	
				213T-215T	6	17-1/4	42-1/2	3	21	68																
				254T	8	20-1/2	42-1/2	3	21	96																
				256T-284T	9	20-1/2	48-1/2	3	21	109																
4	4	9	3C	232	318	351	17	8	1-1/4	11	3-3/8	29-15/16	43-7/16	47-1/16	30-1/8	16-7/8	6-15/16	6-1/2	182T-184T	5	17-1/4	36-1/2	3	22	59	
				213T-215T	6	17-1/4	42-1/2	3	22	68																
				254T	8	20-1/2	42-1/2	3	22	96																
				256T-284T-286T	9	20-1/2	48-1/2	3	22	109																
3	3	12	3C	289	365	398	17	8	1-1/4	13	3-1/8	28-3/4	42-1/16	45-11/16	28-3/4	16-7/16	7-3/4	5-1/2	324T	11	26-3/4	46-1/2	4	23	164	
				213T-215T	6	17-1/4	42-1/2	3	24	68																
				254T	8	20-1/2	42-1/2	3	24	96																
				256T-284T-286T	9	20-1/2	48-1/2	3	24	109																
4	4	12	3C	317	402	435	17	8	1-1/4	13	3-3/8	30-1/4	43-3/4	47-3/8	30-7/16	16-7/8	6-15/16	6-1/2	326T thru 365T	12	26-3/4	54-1/2	4	25	192	
				215T	6	17-1/4	42-1/2	3	24	68																
				254T	8	20-1/2	42-1/2	3	24	96																
				256T-284T-286T	9	20-1/2	48-1/2	3	24	109																
6	6	12	4C	455	687	754	24	13-1/2	1-1/4	14	4-5/8	31-3/4	51-5/16	55-1/16	38-1/8	24-3/16	11-1/2	8	326T thru 365T	12	26-3/4	54-1/2	4	25	192	
				404TS-404T	15	30-3/4	54-1/2	4-1/2	25-1/2	291																
				254T-256T-284T	10	20-1/2	56-1/2	3	30-1/2	128																
				286T-324T	13	26-3/4	64-1/2	4	31-1/2	235																
6	6	12	5E	797	1060	1292	24	13-1/2	2-3/8	14	4-5/8	42-3/4	62-5/16	*65-7/8	39-5/16	24-3/16	11-1/2	8	326T thru 365T	13	26-3/4	64-1/2	4	31-1/2	235	
				254T-256T	14	26-3/4	72-1/2	4	31-1/2	268																
				254T-286T-324T	14	26-3/4	72-1/2	4	31-1/2	268																
				326T thru 445T	18	30-3/4	82-1/2	4-1/2	32	441																
6	6	15	5E	914	1166	1398	24	13-1/2	2-3/8	16	4-5/8	42-3/4	62-5/16	*65-7/8	39-5/16	24-3/16	11-1/2	8	254T-256T	14	26-3/4	72-1/2	4	33-1/2	268	
				284T-286T-324T	14	26-3/4	72-1/2	4	33-1/2	268																
				326T thru 445T	18	30-3/4	82-1/2	4-1/2	34	441																

Engineering Specifications

Furnish and install as shown on the plans, Aurora® Model _____ (horizontal-661A) (vertical-663A flexible coupled) (vertical-662A open shaft) (vertical-664A close coupled) type vortex pump. The pump shall be capable of delivering a capacity of _____ GPM when operating against a total dynamic head of _____ feet. The pump shall also deliver a maximum of _____ GPM when operating against a head of _____ feet. The minimum shut-off head acceptable will be _____ feet.

The pump shall operate at a maximum speed of _____ RPM. A unit operating at a lesser rotative speed will be considered, but in no event will a pump operating at more than the maximum speed specified be acceptable.

The pump casing shall be of the top centerline design and will be constructed of cast iron and shall be of sufficient thickness to withstand stresses and strains at full operating pressures. Casings shall be subject to a hydrostatic pressure test of 150 lbs. A rodding hole is to be provided in casing to facilitate casing and impeller cleanout. The casing design shall allow for rear pullout.

The bearing housing is to be of cast iron and shall be furnished with a set of regreaseable bearings for both radial and thrust loads. A double row thrust bearing is to be provided to ensure maximum bearing life under extreme thrust loads. The bearings shall have an average life of 100,000 hours and shall be mounted in a machined, moisture and dustproof housing. The housing is to have a register fit and then bolted to the pump casing to ensure permanent alignment. An extra deep (split) packing box simplifying packing replacement and shaft sleeve inspection is to be provided and must be so arranged with a lantern ring for either grease lubrication or tapped connections for water sealing from an outside source. A 3/8" drain opening must be provided to facilitate removal of seepage.

The impeller is to be of cast iron and shall be capable of passing a maximum sphere size of _____ inches. The impeller shall be dynamically balanced before assembly into the pump and shall be securely fastened to the shaft by means of a steel key and impeller locknut.

The pump shaft shall be constructed of high-grade carbon steel having a tapered impeller extension and accurately machined. The minimum diameter acceptable between bearings will be 2-3/8 inches. The pump shaft shall be protected from wear by a corrosion and wear-resisting hardened stainless steel shaft sleeve having a 450 minimum Brinell hardness. An O-ring type gasket must be provided between the impeller hub and the shaft sleeve to prevent pumped liquid from corroding the shaft.

Model 661A Horizontal

The pump and motor shall be mounted on a common (steel) (steel drip rim) base. Alignment shall be checked in accordance with the Standards of the Hydraulic Institute after installation and there shall be no strain transmitted to the pumps.

Model 662A Vertical Open Shaft, 663A Vertical Flexible Coupled and 664A Close Coupled Vertical Pumps

The pump shall be supported by a fab. steel pedestal base. The pedestal shall have openings large enough to permit access to the suction line. An optional handhole of not less than 3" in diameter must be provided in the suction elbow on 3", 4" and 6" pumps. The pedestal must be of sufficient height so that the suction elbow will not touch the floor or foundation upon which it stands.

Vertical flexible coupled 663A pumps shall be furnished with fab. steel motor bracket which is to be bolted to a separate pump adapter. The motor bracket must be machined with a register fit to ensure proper alignment of motor shaft and pump shaft. 664A is coupled directly to the motor shaft extension.

Vertical open shaft pumps are to be driven through flexible shafting with _____ diameter tubing, and intermediate bearings. Shafting must be of sufficient size to transmit required horsepower and must be provided with a slip spline which will permit removal of the pump rotating assembly without removing any section of intermediate shafting, bearings, suction or discharge piping (_____ sections required).

Engineering Specifications

Stuffing Box, Shaft and Bearings Dimensions *Indicates Back-to-Back Bearings Qty. 2												
Area	Description	Power Series			Area	Description	Power Series					
		3C	4C	5E			3C	4C	5E			
Stuffing Box	Stuffing box bore diameter	Packing	3-9/32	3-9/32	4-25/32	Shaft	Diameter at impeller (average of taper)	1-7/16	1-7/16	2-1/4		
	Stuffing box depth		2-3/4	2-3/4	3-1/2		Diameter at shaft sleeve	1-7/8	1-7/8	3-1/4		
	Outside diameter sleeve for packing		2-1/2	2-1/2	3-3/4		Dia. between bearings (max. shaft dia.)	2-3/8	3-5/16	4-1/8		
	Total number of packing rings with lantern ring		5	5	5		Diameter at coupling end	1-1/4	1-1/4	2-3/8		
	No. of rings in front of lantern ring		2	2	2		Max. deflection at stuffing box face	.002"	.002"	.002"		
	Packing size		3/8	3/8	1/2		Bearings	Bearing no. (inboard radial)	6310	6311	6317	
	Width of lantern ring		5/8	5/8	3/4			Bearing no. (outboard thrust)	3310	3309	7315*	
	Distance from box to nearest obstruction		2-15/16	2-15/16	2-3/4			Bearing Centers	7-9/32	7-3/4	12-11/16	
	Diameter of mechanical seal bore		M Seal	3-9/32	3-9/32			4-25/32	Minimum life of bearing under worst conditions of load	2 years	2 years	2 years
	Length of mechanical seal			3-1/4	3-1/4			4-7/16				
Outside diameter, sleeve for mechanical seal	2-1/4	2-1/4	3-5/8									

Materials of Construction		
Description	Fitted	Material of Construction
Impeller	Iron	Cast iron ASTM A48
Gland	Iron	Cast iron ASTM A48
Packing	Iron	Graphite/Teflon® Lubricated acrylic yarn
Insert	Iron	Cast iron ASTM A48
Lantern ring	Iron Stainless	Teflon Stainless steel AISI 316
Sleeve (pack)	Iron	Hard Stn. Steel AISI 4400
Sleeve (seal)	Iron	Bronze ASTM B62
Sleeve (seal)	Stainless	Stainless steel AISI 316
Impeller screw	Iron	Steel SAE Grade 5
Shaft	Iron	Steel SAE 1045
Frame	Iron	Cast iron ASTM A48
Casing	Iron	Cast iron ASTM A48
Cover	Iron	Cast iron ASTM A48
Supports	Iron	Steel

Limitations (maximum)	
Hydrostatic test pressure	125 psi
Case working pressure	100 psi
Suction pressure	100 psi
Temperature packing	250° F
Temperature mech. seal	225° F
Operating speed	1775 RPM



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