



AURORA PUMP A member of PENTAIR PUMP GROUP

# AURORA PUMP

BULLETIN 660A/REV. E

## 660 SERIES SINGLE STAGE NON-CLOG VORTEX PUMPS

CAPACITIES TO 2600 G.P.M.  
HEADS TO 160 FEET  
TEMPERATURES TO 250°F  
DISCHARGE SIZES 3" THRU 6"



MODEL 664A



MODEL 662A



MODEL 663A



MODEL 661A

**motralec**

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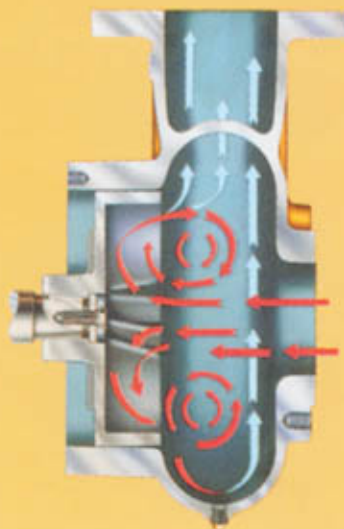
[www.motralec.com](http://www.motralec.com)



## 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 sulphate. A 28% Hi-Chrome Iron is available for highly abrasive mixtures. This product coupled with a complete line of Aurora Non-Clog Pumps provides a single source availability unique in the centrifugal pumping industry.

### PRINCIPLE OF OPERATION



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

MODELS 661A 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.

MODELS 662A are vertically mounted and utilize 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 thru 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

- 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 pull out
- Dynamically balanced impeller
- Centerline discharge casing
- Suction elbow w/handhole (Model 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 (Model 662A-663A)
- Discharge position No. 1
- Rodding hole in casing
- Coupling guard (Model 661A)

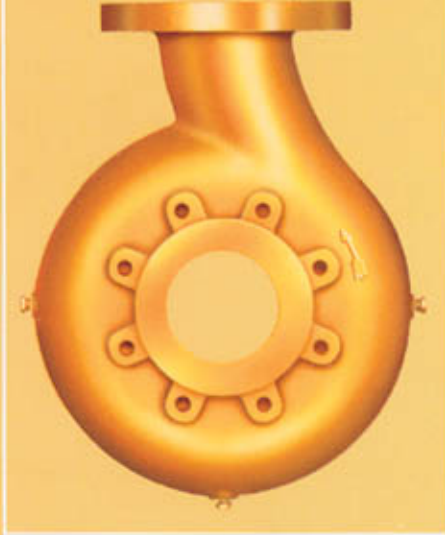
#### OPTIONAL

- 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)



## PUMP FEATURES AND RANGE CHARTS

### CENTERLINE DISCHARGE



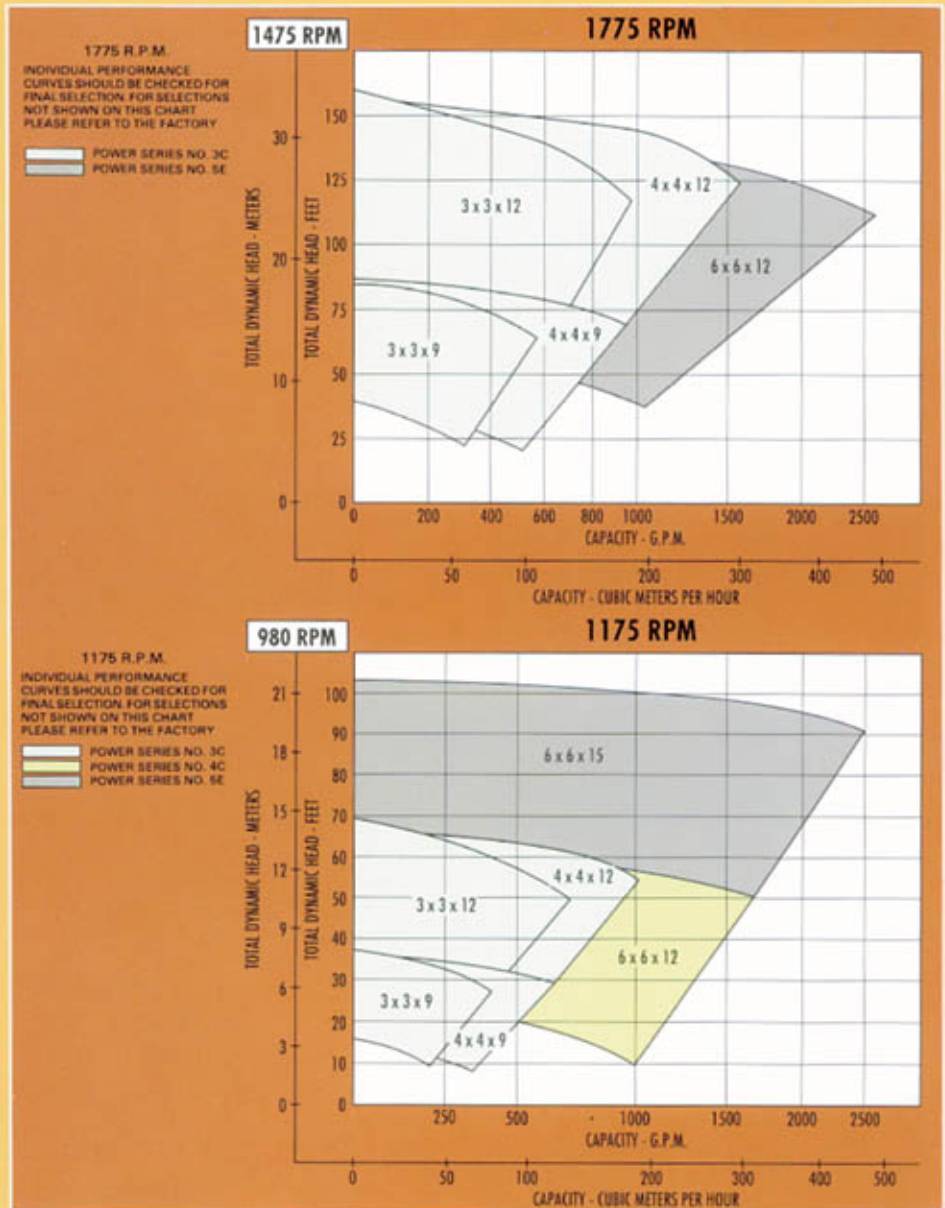
### EXCLUSIVE SPLIT PACKING BOX OPTION WITH LEAKAGE ACCUMULATOR IS AVAILABLE *ONLY* FROM AURORA PUMP

OPTIONAL: 661A-662A-663A-664A



### SPECIAL PUMP FEATURES

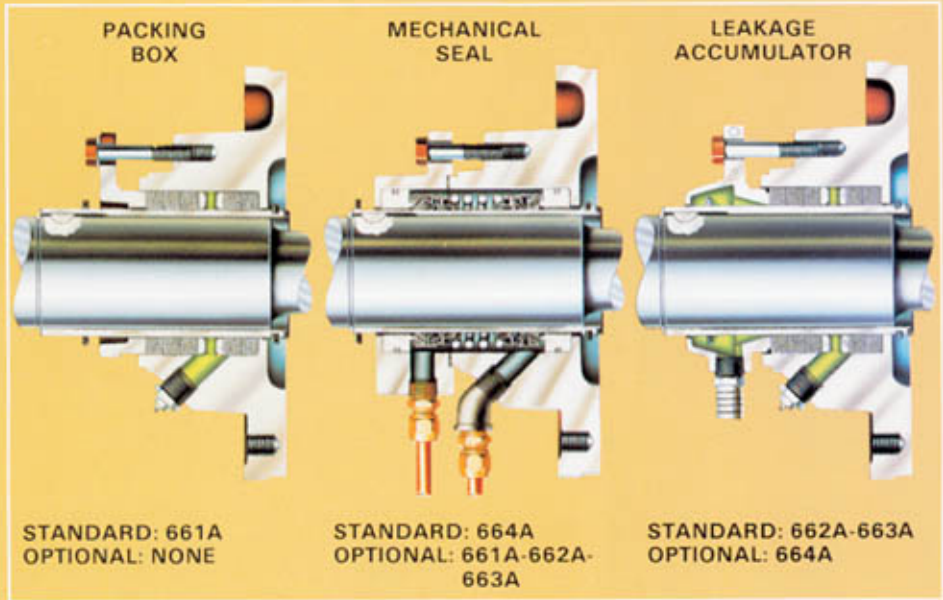
MODELS 661A are horizontally baseplate mounted with a driver flexibly coupled to the pump. SUPPORT of various pump components is important. Inadequate mounting designs impose unnecessary stress and strain on the entire pump and installation. The top centerline discharge casing is one solution. AURORA 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.





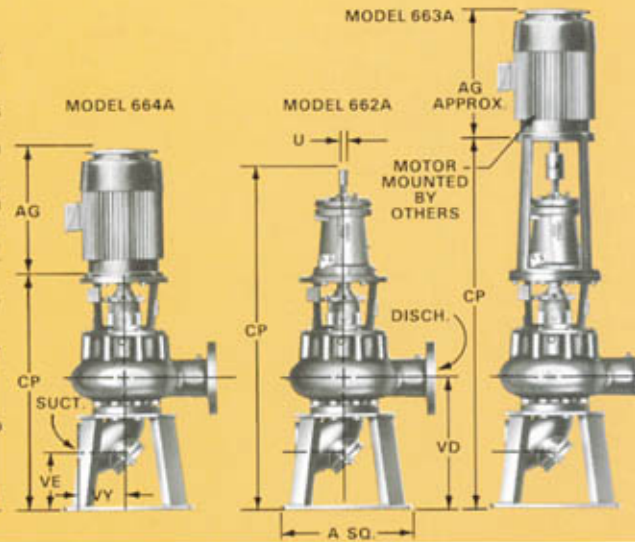
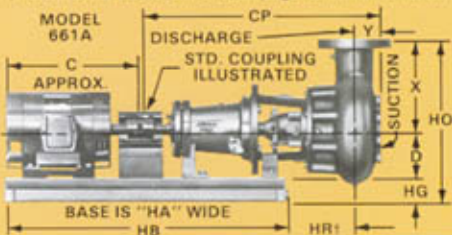
# OPTIONAL EQUIPMENT AND DIMENSIONS

**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 be removed to disassemble the insert from the pump assembly. **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 speedy seal maintenance. Single mechanical seals are available. **LEAKAGE ACCUMULATOR** for vertical pump models with packed stuffing boxes collects seepage for easy drain off. The gland halves are dowel aligned.



## 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.

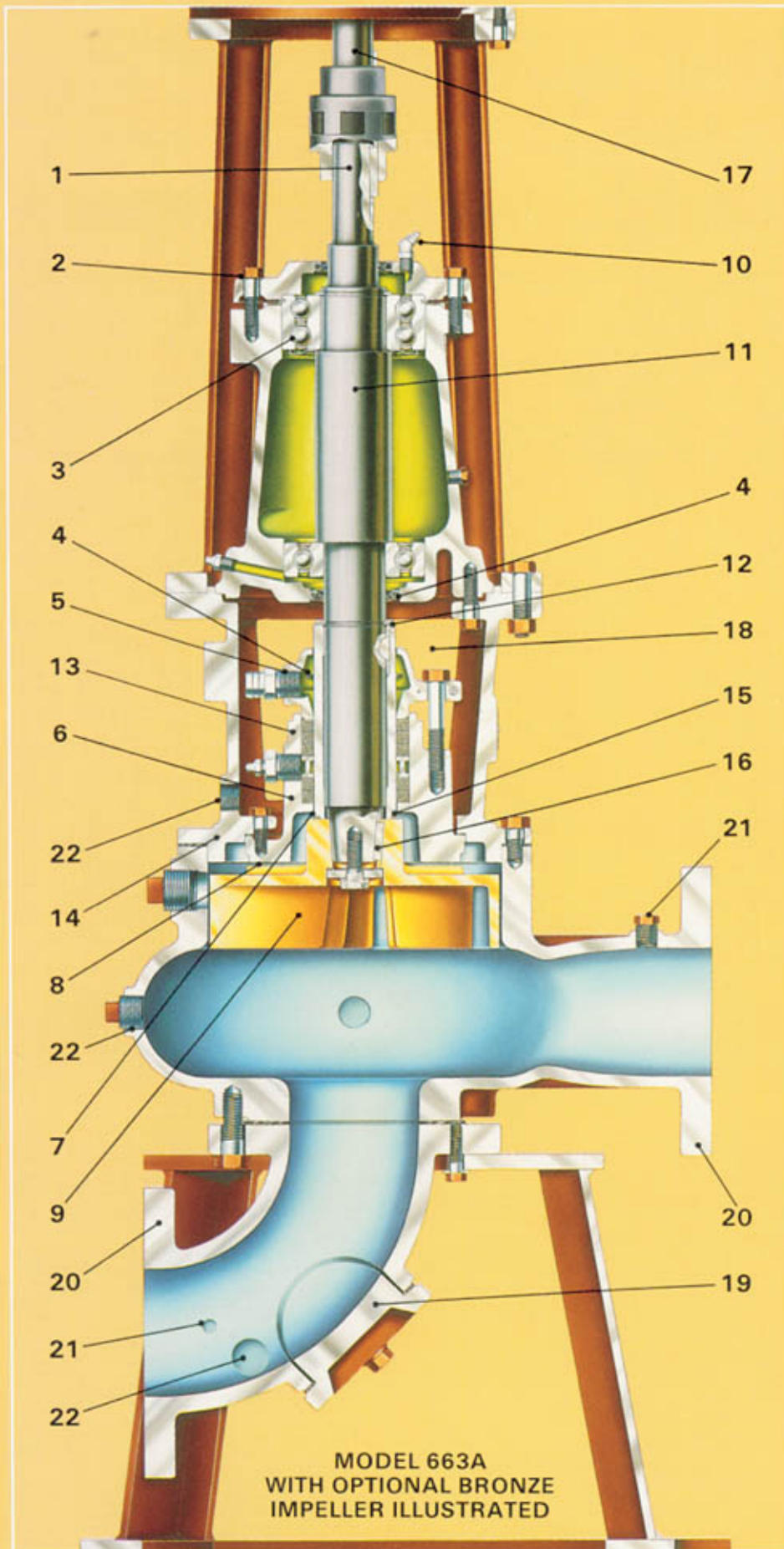


MOTOR FRAME (note B)	HORSEPOWER		WGT. IN LBS.	C	AG
	1750	1150			
143T	1	3/4	40	12	11
145T	1-1/2	1	45	13	12
182T	3	1-1/2	72	13	13
184T	5	—	85	14	14
213T	7-1/2	—	150	16	16
215T	10	5	190	18	17
254T	15	7-1/2	230	21	19
256T	20	10	250	23	21
284T	25	15	350	24	22
286T	30	20	380	25	23
324T	40	25	475	26	24
326T	50	30	525	28	26
364T	—	40	630	29	25
364TS	60	—	630	27	25
365T	—	50	690	30	25
365TS	75	—	690	28	25
404T	—	60	830	33	28
404TS	100	—	830	30	28
405T	—	75	915	34	28
405TS	125	—	915	31	28
444T	—	100	1000	38	32
444TS	150	—	1000	34	32
445T	—	125	1100	40	32
445TS	—	—	—	36	—

661A-662A-663A-664A — DIMENSIONS — PUMP *Add 2" w/Frame 284 HPH or larger																	661A — DIMENSIONS — BASE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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## PUMP FEATURES



**1 LIFTING EYE** tap in shaft end simplifies disassembly.

**2 EXTERNAL SHAFT ADJUSTMENT** simplifies correctly orientating the impeller within the casing during scheduled maintenance.

**3 DOUBLE ROW THRUST BEARINGS** are added protection for high loads. Average bearing life is 10 years.

**4 WATER SLINGER**, and grease seals protect both bearings from moisture.

**5 LEAKAGE ACCUMULATOR GLAND** option to siphon off packing leakage.

**6 STUFFING BOXES** are machined for mechanical seals or packing. Either may be used without modification.

**7 GASKETS** protect shaft from pumped liquid corrosion and contamination.

**8 IMPELLER WIPER VANES** minimize stuffing box pressure and clogging.

**9 IMPELLER VANES** brought well into the inlet eye to pick up liquid early and to minimize clogging.

**10 GREASE LUBRICATION** purges old grease from both bearings.

**11 RUGGED SHAFT** with taper for easy impeller removal and minimum deflection.

**12 HARDENED STAINLESS STEEL SLEEVE** on packed pumps is securely key locked to the shaft.

**13 .002 MAXIMUM SHAFT DEFLECTION** at stuffing box face extends packing and mechanical seal life.

**14 BACK PULLOUT DESIGN** for pump maintenance, does not disturb suction or discharge piping.

**15 SNAP RING** groove is provided for a snap ring to aid in sleeve removal during preventative maintenance period.

**16 STEEL IMPELLER KEY**, capscrew and washer secures impeller to shaft.

**17 NEMA STANDARD "HP"** mounting face and shaft extension motors.

**18 LARGE ACCESS OPENINGS** provide adequate visibility and working room.

**19 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.

**20 DISCHARGE** flanges can be located in 45° increments for 8 different positions. (suction in 90°-vert. pumps)

**21 STANDARD GAUGE TAPS** are conveniently located at both the discharge and suction flange openings.

**22 STANDARD DRAIN TAPS** are located conveniently in the adapter bracket, suction elbow, and casing.



# ENGINEERING SPECIFICATIONS

STUFFING BOX, SHAFT AND BEARING 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	3-9/32	3-9/32	4-25/32	SHAFT	Dia. at Impeller (Average of Taper)	1-7/16	1-7/8	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 Dia. Sleeve for Packing	2-1/2	2-1/2	3-3/4		Diameter 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
	Dia. of Mech. Seal (Bore)	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 Dia. Sleeve for Mechanical Seal	2-1/4	2-1/4	3-5/8					
M. SEAL					BEARINGS				

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 rotational 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 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 dust proof housing. The housing is to have a register fit and then bolted to the pump casing to insure 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 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.

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

DESCRIPTION	FITTED	MATERIAL OF CONSTRUCTION
Impeller	Iron	Cast Iron ASTM A48
Gland	Iron	Cast Iron ASTM A48
Packing	Iron	Graphite/Teflon
Insert	Iron	Lubricated Acrylic Yarn
Lant. Ring	Iron	Cast Iron ASTM A48
	Stainless	Teflon
Sleeve (Pack)	Iron	Stainless Steel AISI 316
Sleeve (Seal)	Iron	Hard. Stn. Steel AISI 440C
Sleeve (Seal)	Stainless	Bronze ASTM B62
Impeller Screw	Iron	Stainless Steel AISI 316
Shaft	Iron	Steel SAE Grade 5
Frame	Iron	Steel SAE 1045
Casing	Iron	Cast Iron ASTM A48
Cover	Iron	Cast Iron ASTM A48
Supnorts	Iron	Cast Iron ASTM A48
		Steel

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 a 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 insure 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 . . . . . dia. 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 req'd.).

The Engineering Specification has been condensed from a very comprehensive specification. Additional information is available from any Aurora Pump Sales Office. Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information, without notice.

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