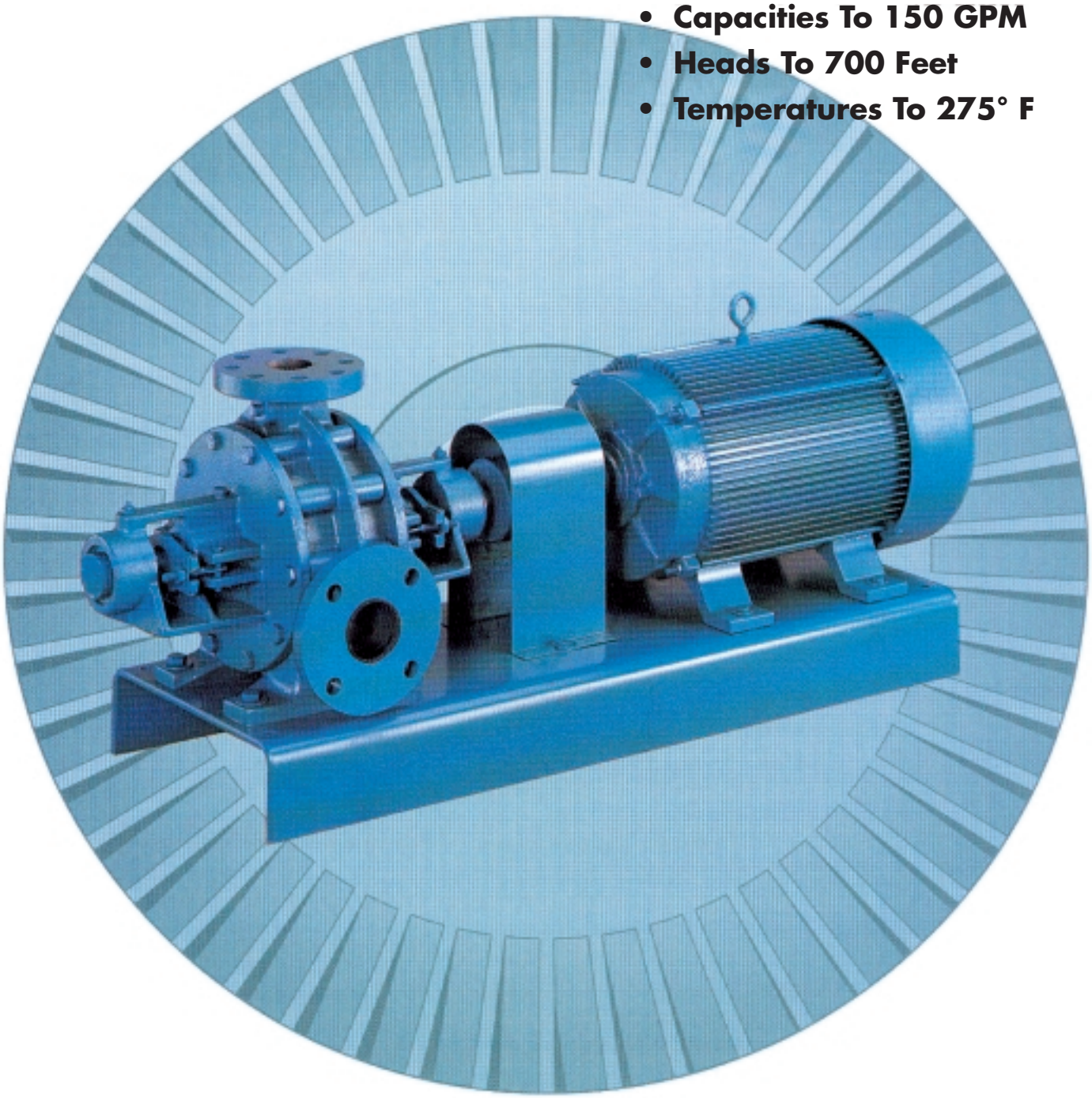
110A Series "APCO"
One & Two Stage Turbine Type Pumps

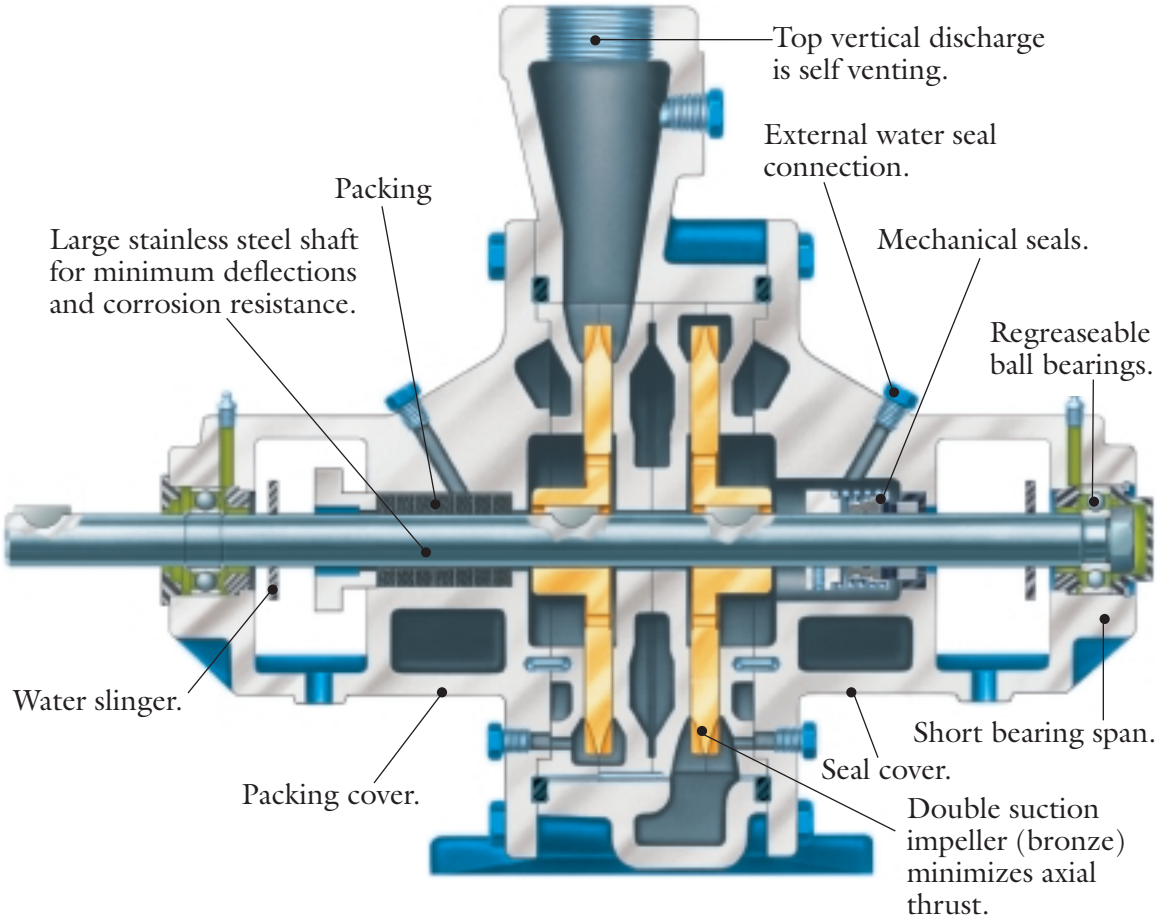
- **Capacities To 150 GPM**
- **Heads To 700 Feet**
- **Temperatures To 275° F**



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AURORA®
Pentair Pump Group

110A Series Pumps



Typical Two-Stage Unit Shown

Applications

- Boiler Feed
- Condensate Return
- Cooling Systems
- High Pressure Spray
- Booster Systems
- Jockey Pumps
- Chlorine Injection
- Chemical Feed Systems
- Laundry and Dry Cleaning Systems
- Laser Cooling
- Electrostatic Discharge Machines
- TV Tube and CRT Manufacturing
- Car Washes

Benefits

- Reliability
- Years of Field-proven Service
- Reduce Energy Consumption
- Trouble-free Operation
- High Performance
- Save Space
- Versatility
- Complete Technical Support
- Low Flow/High Head Capabilities

Introduction

Apco regenerative turbine pumps are field-proven throughout the world. Apco pumps are ideal for handling: (1) high head/low flow requirements, (2) liquids entrained with gases and vapors (up to 20%), and (3) constant flows.

You are assured of reliable pumping service because every Apco is tested to insure consistent performance.

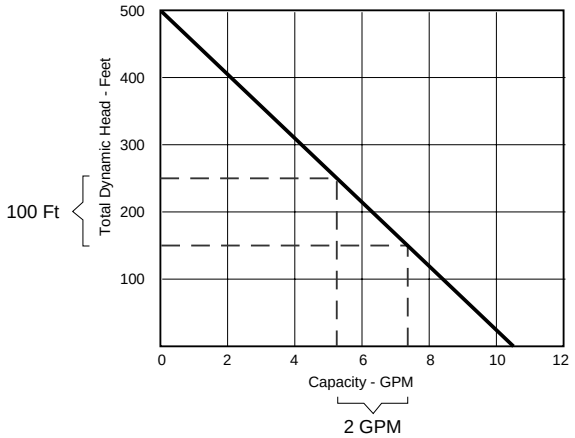
Apco pumps are designed for those special applications where high head and low flow are required by the system. Boiler feed systems, for example, require high pressure to get low flows of water into the pressurized steam boiler.

Conventional centrifugal pumps, in contrast, must operate close to shut off or operate at high speed to meet these high head/low flow requirements. These mis-applications can cause high vibration, mechanical damage, frequent maintenance, and excessive energy use.

Apco pumps thrive in high head/low flow applications so you save on operating costs (less maintenance, downtime and energy costs).

Increase System Reliability with Constant Flow

Apco pumps assure constant flow when you need it. The steep performance curve allows for minimal changes in the capacity even with large pressure variations.



The curve above shows that with a 100 foot change in head, the capacity varies only 2 gallons per minute. You get a virtually constant flow over wide pressure variations to ensure reliable system operation.

The constant flow characteristics make the Apco ideal for cooling systems where it is vital that sufficient flow is maintained to dissipate heat despite changes in pressure.

Pressure variations occur for a number of reasons. The most common designed-in variations are caused by automatic pop-off valves and similar control devices.

With Apco pumps, you can always depend on the same capacity despite variations in head pressure and achieve increased system reliability.

Standard

Bronze fitted construction
Hydraulically balanced bronze impeller
Right or left hand rotation
Regreaseable ball bearings
Short bearing span
Mechanical seals or graphite impregnated acrylic packing
416 hardened stainless steel shaft
Floating impellers
Removable channel rings
VIP Test – Every pump is given a hydrostatic test at 1-1/2 times rated pressure along with a running test for head and capacity performance check.

Optional

All iron, bronze ring or all bronze construction
316 stainless steel or monel shaft
External sealing line to stuffing box
Lantern ring (5 & 6 series 110)
Formed steel or drip-rim bases
Bypass with manual shut-off valves
Bypass with relief valve
Self-priming features
Certified performance test data can be supplied consisting of head, capacity and horsepower readings taken over the full operating range of the pump.

Selection Charts

1750 R.P.M.

CAPACITY GPM	TOTAL DYNAMIC HEAD IN FEET																							
	10	20	30	40	50	60	70	80	100	115	130	145	160	180	200	220	240	260	280	300	350	400	450	500
2	B4	B4	A35	A35	A35	A4	A4	A4	C4	D4	D4	D4	D4	D4	D4	D5 1	D5 1	D5 1	D4T 1	D4T 1	D4T 1	E4T 1	G4T 3	D5T 3
5	C4	C4	D4	D4	D4	D4	D4	D4	D4	E4	F4 1	F4 1	F4 1	F4 1	G4 1	G4 1	G4 1	F4T 1	F4T 2	F4T 2	G4T 2	G4T 3	G4T 3	G5T 5
10	F4	F4	F4	F4	F4	G4	G4	G4	G4 1	G4 1	G4 1	G4 1	I4 1	I4 1	G4T 1	G4T 2	G4T 2	I4T 2	I4T 3	H5 3	H5 5	G5T 5	G5T 5	H5T 5
15	G4	G4	G4	H4	H4	H4 1	H4 1	H4 1	I4 1	I4A 1	I4A 2	I4A 2	I4T 2	I4T 2	I4TA 3	I4TA 3	I4TA 3	I4TA 3	I5 5	I5 5	I5 5	H5T 5	H5T 5	I5T 7
20	H4	H4	H4	H4	H4	I4 1	I4A 1	I4A 1	I4A 1	I4A 1	I4TA 2	I4TA 3	I4TA 3	I4TA 3	I4TA 3	I5 5	I5 5	I5 5	I5 5	I5 5	L5 7	I5T 7	D6T 10	D6T 10
25	I4A	I4A	I4A	I4A 1	I4A 1	M4 1	M4 1	M4 1	M4 2	M4 2	R4 3	I5 3	I5 3	I5 3	J5 5	J5 5	K5 7	L5 7	L5 10	L5 10	L5 10	I5T 7	D6T 10	E6T 15
30	I4A	I4A	M4 1	M4 1	M4 1	M4 1	M4 1	M4 1	P4 3	R4 3	J5 3	J5 5	J5 5	K5 5	K5 5	L5 7	L5 7	L5 7	L5 10	L5 10	E6T 10	E6T 15	E6T 15	E6T 15
35	M4	M4	M4 1	M4 1	M4 1	M4 1	P4 2	P4 2	P4 3	R4 3	K5 5	K5 5	L5 5	L5 5	L5 7	L5 7	L5 7	L5 7	G6 10	G6 10	E6T 10	E6T 15	F6T 15	G6T 20
40	M4	M4	M4 1	M4 1	P4 1	P4 2	P4 2	P4 2	R4 3	L5 5	L5 5	L5 5	L5 7	L5 7	L5 7	L5	G6 10	G6 10	G6 10	E6T 10	F6T 15	F6T 15	G6T 20	G6T 20
50	P4 1	P4 1	P4 1	P4 1	R4 2	R4 2	R4 3	L5 3	L5 5	L5 5	L5 5	L5 5	L5 5	P5 10	P5 10	H6 10	F6T 10	F6T 10	F6T 10	G6T 15	G6T 15	G6T 15	G6T 20	
60	R4 1	R4 1	R4 1	R4 2	L5 3	L5 3	L5 3	L5 5	L5 5	P5 7	P5 7	P5 10	P5 10	P5 10	H6 10	J6 15	G6T 15	G6T 15	G6T 15	G6T 15	G6T 15	J6T 25	J6T 25	
70	L5 2	L5 3	L5 3	L5 3	L5 3	N5 3	N5 3	N5 5	P5 7	P5 7	P5 7	P5 10	P5 10	H6 10	J6 15	J6 15	G6T 15	G6T 15	H6T 15	H6T 15	J6T 20	J6T 25	K6T 30	
80	M5 1	M5 1	N5 2	N5 3	N5 3	N5 3	P5 5	P5 7	P5 7	P5 7	P5 7	P5 10	H6 10	J6 10	J6 15	H6T 15	H6T 15	H6T 15	H6T 15	J6T 20	J6T 20	K6T 25		
90	N5 2	N5 2	N5 2	P5 5	P5 5	P5 5	P5 5	P5 7	P5 7	P5 7	P5 7	J6 10	J6 10	J6 10	K6 15	H6T 15	H6T 15	J6T 20	J6T 20	J6T 20	K6T 25	K6T 25		
100	N5 2	P5 5	P5 5	P5 5	P5 5	P5 5	P5 5	P5 7	P5 7	J6 10	J6 10	J6 10	J6 10	K6 15	J6T 15	J6T 15	J6T 20	J6T 20	J6T 20	J6T 20	K6T 25			
120	P5 5	P5 5	P5 5	P5 5	P5 5	P5 5	J6 7	J6 7	J6 7	J6 10	K6 10	K6 10	J6T 15	J6T 15	J6T 15	J6T 15	K6T 20	K6T 20	K6T 20					
150	J6 5	J6 5	J6 5	J6 5	J6 5	K6 7	K6 7	K6 7	K6T 10	K6T 15	K6T 15	K6T 15												

DESIGN DETAILS

AREA	DIMENSIONS	110-SERIES PUMP MODEL				
		A35-I4A D4T-I4TA	M4-R4	D5-I5 D5T-I5T	J5-P5	G6-K6 D6T-K6T
STUFFING BOX	PACKING RINGS PER BOX	4	5	7	7	8
	PACKING SIZE (SQUARE)	〃	〃	〃	〃	〃
SHAFT	OUTSIDE DIA. OF SHAFT	.590	.787	.787	.984	1.181
BALL BEARINGS	INBOARD RADIAL	202	204	204	205	206
	OUTBOARD THRUST	300K	303K	303K	304K	305K

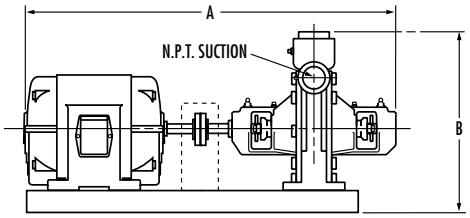
3500 R.P.M.

CAPACITY GPM	TOTAL DYNAMIC HEAD IN FEET								
	50	100	150	200	250	300	350	400	450
2	B4	B4	B4	B4	A35 1	A35 1	A4 1	A4 1	A4 2
4	B4	A35	A35	A35 1	A4 1	A4 1	D4 3	D4 5	D4 5
6	A35	A4	A4	C4 1	D4 3	D4 3	D4 3	D4 5	D4 5
8	C4	C4	C4 1	D4 3	D4 3	D4 3	D4 3	D4 5	D4 5
10	C4	D4 2	D4 2	D4 3	D4 3	D4 3	D4 3		
12	D4 1	D4 2	D4 2	D4 3	D4 3				
14	D4 1	D4 2	D4 2						
15	D4 1	D4 2							

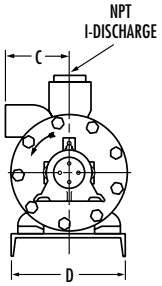
Dimensions

Type 4 & 5 Series

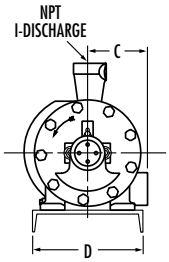
4R, 4RA, 5R, 5RA



4R, 4RA, 5R, 5RA

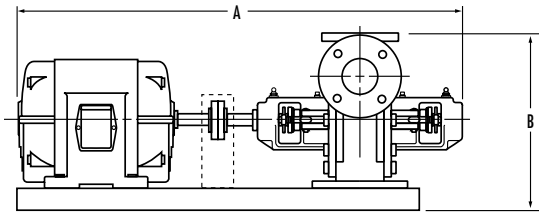


4RTL, 5RTL

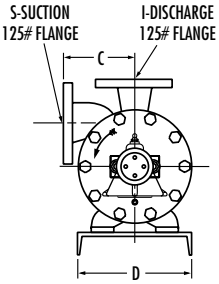


Type 6 Series

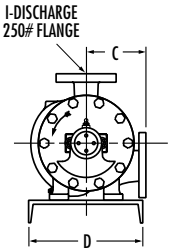
6RA, 6RTL, 6RATL



6RA



6RTL, 6RATL



1. Dimensions and weights are approximate.
2. Dimensions are in inches and may vary ±1/8".
3. Not for construction purposes unless certified.
4. Frame sizes shown are for open dripproof motors only.
5. Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
6. All flanges are standard flat face.

NOTES:
1. Selections indicate pump size in upper portion and motor H.P. in lower portion of each block.
2. A35, A4, B4, C4 and D4 pumps are also available for 3500 R.P.M. operation. See table on page 4.
3. Maximum suction pressure is based on suction flange pressure rating.
4. All limitations are based on standard pumps constructed of standard materials and handling water.

SINGLE STAGE													TWO STAGE				
4R	A35, A4, B4, C4, D4, E4 F4, G4, H4, I4, I4A				4RA	M4, P4, R4				NEMA Motor Frame	1750 R.P.M. H.P.	4RTL	D4T, E4T, F4T, G4T, I4T, I4TA				
Unit Wgt.	Disch. 1		Suct. 1		Unit Wgt.	Disch. 1		Suct. 1				Unit Wgt.	Disch. 1		Suct. 1		
	A	B	C	D		A	B	C	D				A	B	C	D	
86	24	12	4	7	125	27	11	4	9	56		125	25	11	4	9	
66	22	13	4	7	108	25	12	4	9	143T	1	105	23	12	4	9	
71	23	13	4	7	113	26	12	4	9	145T	1 -2	110	24	12	4	9	
95	24	13	4	9	126	27	12	4	10	182T	3	126	25	13	4	10	
100	25	13	4	9	131	28	13	4	10	184T	5	131	26	13	4	10	
161	27	14	4	10	195	30	14	4	12	213T	7	195	28	14	4	12	
181	29	14	4	10	215	32	14	4	12	215T	10	215	30	14	4	12	
5R	D5, E5, F5, G5, H5, I5				5RA	J5, K5, L5, M5, N5, P5				NEMA Motor Frame	1750 R.P.M. H.P.	5RTL	D5T, E5T, F5T, G5T, H5T, I5T				
Unit Wgt.	Disch. 1		Suct. 1		Unit Wgt.	Disch. 1		Suct. 2				Unit Wgt.	Disch. 1		Suct. 1		
	A	B	C	D		A	B	C	D				A	B	C	D	
125	28	15	5	9						56							
111	26	15	5	10	128	28	15	5	10	143T	1	128	28	15	5	10	
116	27	15	5	10	133	29	15	5	10	145T	1 -2	133	29	15	5	10	
126	28	15	5	10	143	30	15	5	10	182T	3	143	30	15	5	10	
133	29	15	5	10	148	31	15	5	10	184T	5	148	31	15	5	10	
195	31	16	6	12	214	33	16	5	12	213T	7	214	33	16	5	12	
219	33	16	5	12	234	35	16	5	12	215T	10	234	35	16	5	12	
332	26	18	5	13	347	38	18	5	13	254T	15	346	38	18	5	13	
357	38	18	5	13	381	40	18	5	13	256T	20	381	40	18	5	13	
6RA	G6, H6, J6, K6				NEMA Motor Frame	1750 R.P.M. H.P.	6RTL	D6T, E6T, F6T				6RATL	G6T, H6T, J6T, K6T				
Unit Wgt.	Disch. 2		Suct. 3				Unit Wgt.	Disch. 2		Suct. 2		Unit Wgt.	Disch. 2		Suct. 3		
	A	B	C	D				A	B	C	D		A	B	C	D	
245	35	18	6	12	182T	3	264	35	17	6	12	325	38	17	7	15	
249	36	18	6	12	184T	5	369	36	17	6	12	330	39	17	7	15	
341	38	19	6	13	213T	7	361	38	18	6	13	390	41	17	7	15	
361	40	19	6	13	215T	10	381	40	18	6	13	410	43	17	7	15	
436	43	19	6	13	254T	15	456	43	18	6	13	490	46	17	7	15	
475	45	18	6	15	256T	20	495	45	17	6	15	515	48	17	7	15	
545	46	19	6	15	284T	25	565	46	18	6	15	585	49	18	7	15	
575	48	19	6	15	286T	30	595	47	18	6	15	649	50	19	7	18	

Engineering Specifications

The contractor shall furnish (and install as shown on the plans) an Apco regenerative turbine type pump model……size……(Bronze Fitted) (Bronze Ring) (All Iron) (All Bronze). Each pump shall have a capacity of…… G.P.M. when operating at a total head of……feet at the specified temperature, viscosity, specific gravity, and NPSH. The speed of the pump shall not exceed 1750 R.P.M. (Models A35, A4, B4, C4 and D4 can also be operated at 3500 R.P.M.) The pump is to be furnished with (mechanical seals) (packing). The pump shall be of vertically split case design with removable bearing housings and the channel rings shall be replaceable without replacing the bearing housings. The suction and discharge connections shall be cast integral with the casing. The discharge shall be in a vertical position and the pump shall be self-venting. The casing and bearing housings shall be cast of 30,000 pound tensile strength cast iron. The impeller(s) shall be located on the stainless steel shaft between grease lubricated ball bearings. The impeller shall be hydraulically self-centering and no external adjustment shall be necessary. Each pump shall be tested prior to shipment. The pump shall be mounted on a (steel drip rim) (steel) baseplate and flexibly coupled to a……HP……phase…… hertz……voltage…… R.P.M., horizontal (dripproof) (totally enclosed) (explosion proof) motor. The motor shall be sized to prevent overloading at the highest head condition listed in the specifications.

MAXIMUM DIFFERENTIAL PRESSURE – P.S.I.		
PUMP SIZES	R4	90
	J6, K6	100
	P4	110
	I4A, M4, I4TA, P5, H6	125
	I4, I4T, H5, I5, M5, N5, G6	150
	L5	175
	A35, A4, B4, C4, D4, E4, F4, G4, H4, G4T	200
	K5	220
	G5	225
	J5	230
	F4T, D5, E5, F5, H5T, I5T, J6T, K6T	250
	D4T, E4T, D5T, E5T, F5T, G5T, D6T, E6T, F6T, G6T, H6T	300

NOTE: Maximum differential pressure based on allowable shaft deflection for standard shafts.

MAXIMUM HORSEPOWER	
E4, F4, G4, H4, I4, I4A, D4T, E4T, F4T, G4T, I4T, I4TA	4
A35, A4, B4, C4, D4	7-1/2
M4, P4, R4, D5, E5, F5, G5, H5, I5, D5T, E5T, F5T, G5T, H5T, I5T	10
J5, K5, L5, M5, N5, P5	20
G6, H6, J6, K6, D6T, E6T, F6T, G6T, H6T, J6T, K6T	40

Description	Material of Construction
Retainer	Nylon
Bearing Covers	Cast Iron — ASTM A48
Casing	Cast Iron — ASTM A48
Channel Rings	Cast Iron — ASTM A48
Glands	Cast Iron — ASTM A48
Impellers	Bronze — ASTM B62
Packing	Graphited Teflon Fiber
Shaft	Stainless Steel — AISI 416

Limitations

Max. hydrostatic test pressure ..... 450 P.S.I.
except G6-H6-J6-K6 ..... 265 P.S.I.
Max. case working pressure ..... 300 P.S.I.
except G6-H6-J6-K6 ..... 175 P.S.I.
Max. suction pressure ..... 175 P.S.I.
except two stage 116 SERIES
with optional 250 lb. suction flange ..... 300 P.S.I.
Max. recommended packing box pressure ..... 100 P.S.I.
Max. recommended mechanical seal chamber pressure ..... 250 P.S.I.
except 114A, 4R, 4RTL ..... 150 P.S.I.
Box or seal chamber pressure equals – single stage:
suction pressure plus 60% differential pressure. Two stage: 1st stage equals – suction pressure plus 30% differential, 2nd stage equals – suction pressure plus 80% differential.
Max. temperatures
*Packing ..... 275° F
Std. mechanical seal ..... 225° F
Hi-temp mechanical seal ..... 275° F
*Packing.....Suction lift requires lantern ring, 115 and 116 Series only.

NOTE: 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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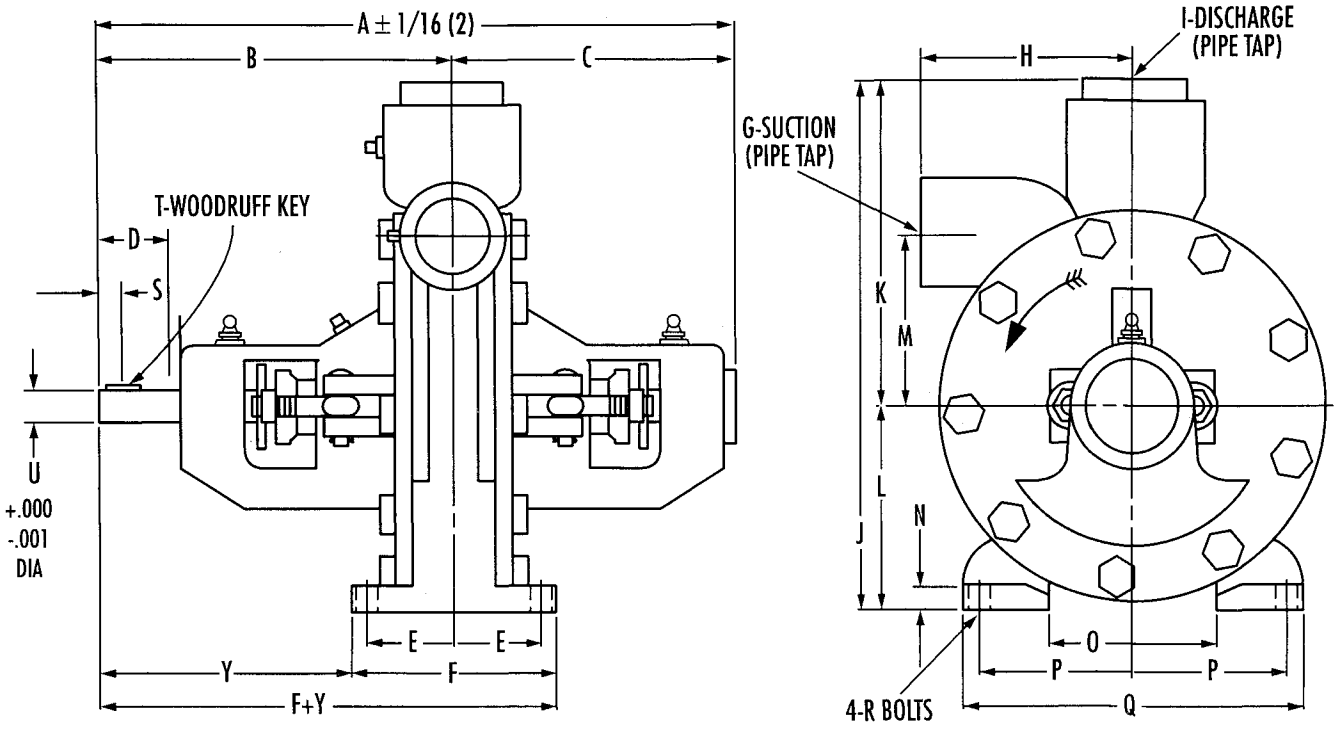
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AURORA®
Pentair Pump Group

AP-110A/Rev. B 11.93

SINGLE STAGE APCO PUMPS
RIGHT HAND PUMP ILLUSTRATED



PUMP MODELS	A	B	C	D	E	F	G	H	I	J	K	L	M
A35, A4, B4, C4, D4, E4 F4, G4, H4, I4, I4A	10-1/2 (267)	5-15/16 (151)	4-9/16 (116)	1 (25)	1-23/32 (44)	4-1/2 (114)	1-1/4 (32)	4 (102)	1-1/4 (32)	9-3/4 (248)	6-1/4 (159)	3-1/2 (89)	3 (76)
M4, P4, R4	14-1/8 (359)	8-1/8 (206)	6 (152)	1-13/16 (46)	2-1/8 (54)	5-1/4 (133)	1-1/2 (38)	4 (102)	1-1/2 (38)	8-7/8 (225)	5-3/8 (137)	3-1/2 (89)	3 (76)
D5, E5, F5, G5, H5, I5	14-11/16 (373)	8-3/8 (213)	6-5/16 (160)	1-1/2 (38)	2 (51)	5 (127)	1-1/4 (32)	5-1/8 (130)	1-1/4 (32)	12-1/4 (311)	7-1/2 (191)	4-3/4 (121)	4 (102)
J5, K5, L5, M5, N5, P5	16-5/8 (422)	9-5/16 (237)	7-5/16 (186)	2 (51)	2-5/8 (67)	6-1/4 (159)	2 (51)	5-1/8 (130)	1-1/2 (38)	12-1/4 (311)	7-1/2 (191)	4-3/4 (121)	4 (102)

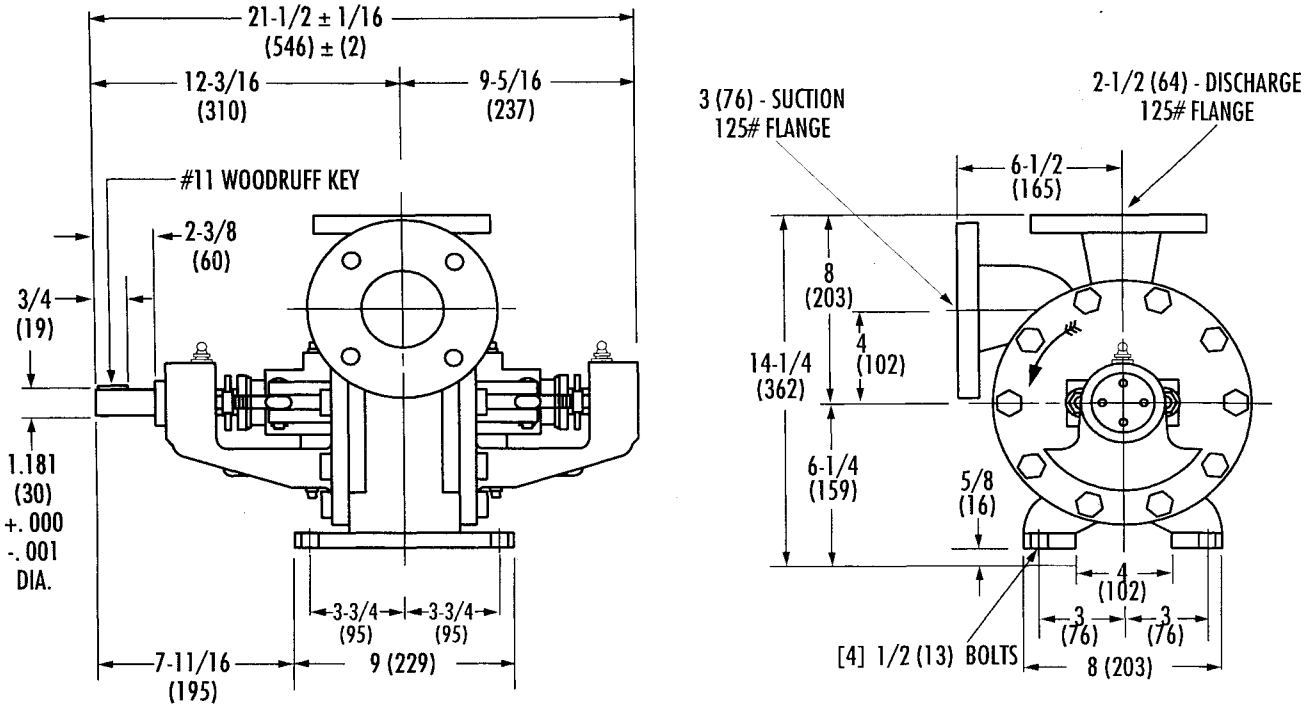
PUMP MODELS	N	O	P	Q	R	S	T	U	Y	F+Y
A35, A4, B4, C4, D4, E4 F4, G4, H4, I4, I4A	1/2 (13)	3 (76)	2-3/4 (70)	6-1/2 (165)	5/16 (8)	3/8 (10)	#404	.590 (15)	3-11/16 (94)	8-3/16 (208)
M4, P4, R4	1/2 (13)	3 (76)	2-3/4 (70)	6-1/2 (165)	5/16 (8)	1/2 (13)	#505	.787 (20)	5-1/2 (140)	10-3/4 (273)
D5, E5, F5, G5, H5, I5	9/16 (14)	4 (102)	3-1/2 (89)	8 (203)	3/8 (10)	1/2 (13)	#505	.787 (20)	5-7/8 (149)	10-7/8 (276)
J5, K5, L5, M5, N5, P5	9/16 (14)	4 (102)	3-1/2 (89)	8 (203)	3/8 (10)	1/2 (13)	#806	.984 (25)	6-1/4 (159)	12-1/2 (318)

NOTES:

1. All dimensions in inches. (mm)
2. Dimensions may vary ± 1/8. (3)
3. Not for construction purposes unless certified.
4. Packed pump illustration shown.

AURORA TYPE 6RA, 6RAS,

SINGLE STAGE APCO PUMPS
RIGHT HAND PUMP ILLUSTRATED

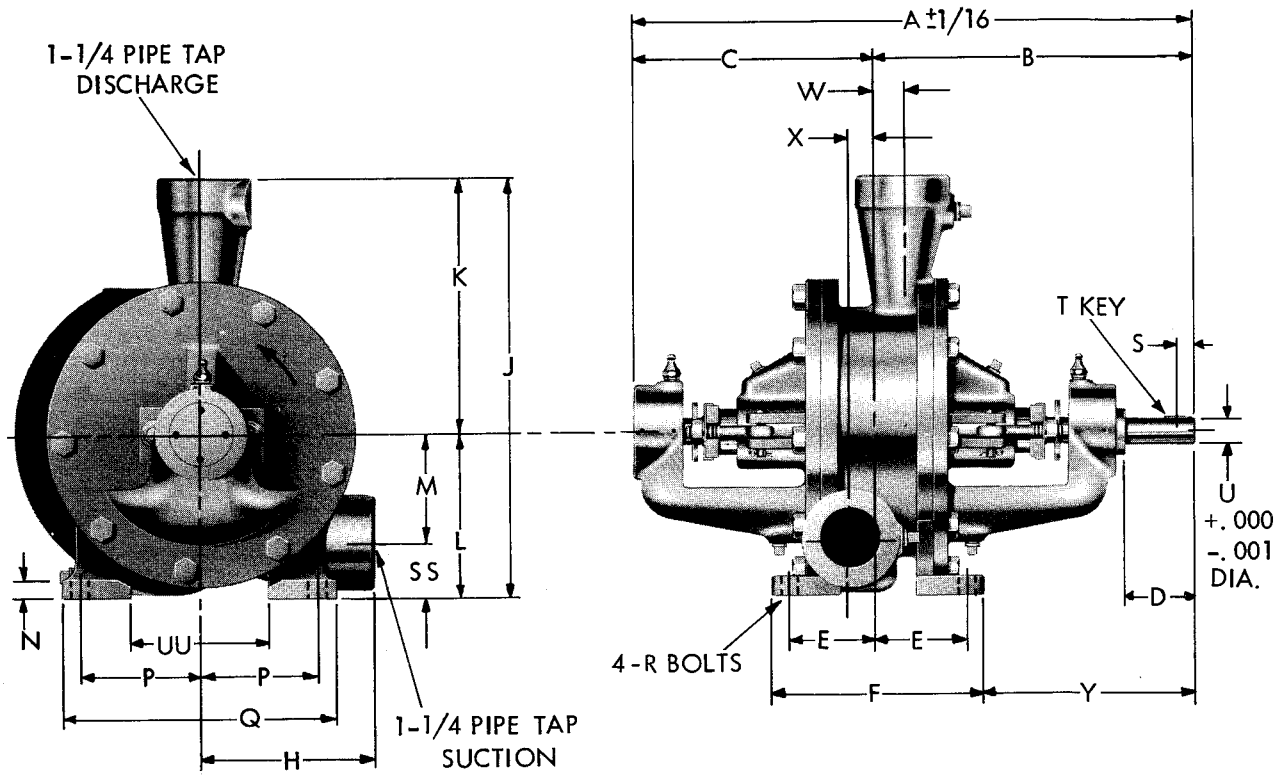


PUMP MODEL	G6	H6	J6	K6

NOTES:

1. All dimensions in inches (mm).
2. Dimensions may vary +/- 1/8 (3).
3. Not for construction purposes unless certified.
4. Flanges in accordance with 125# American standard.

TWO STAGE APCO PUMPS
RIGHT HAND PUMP ILLUSTRATED

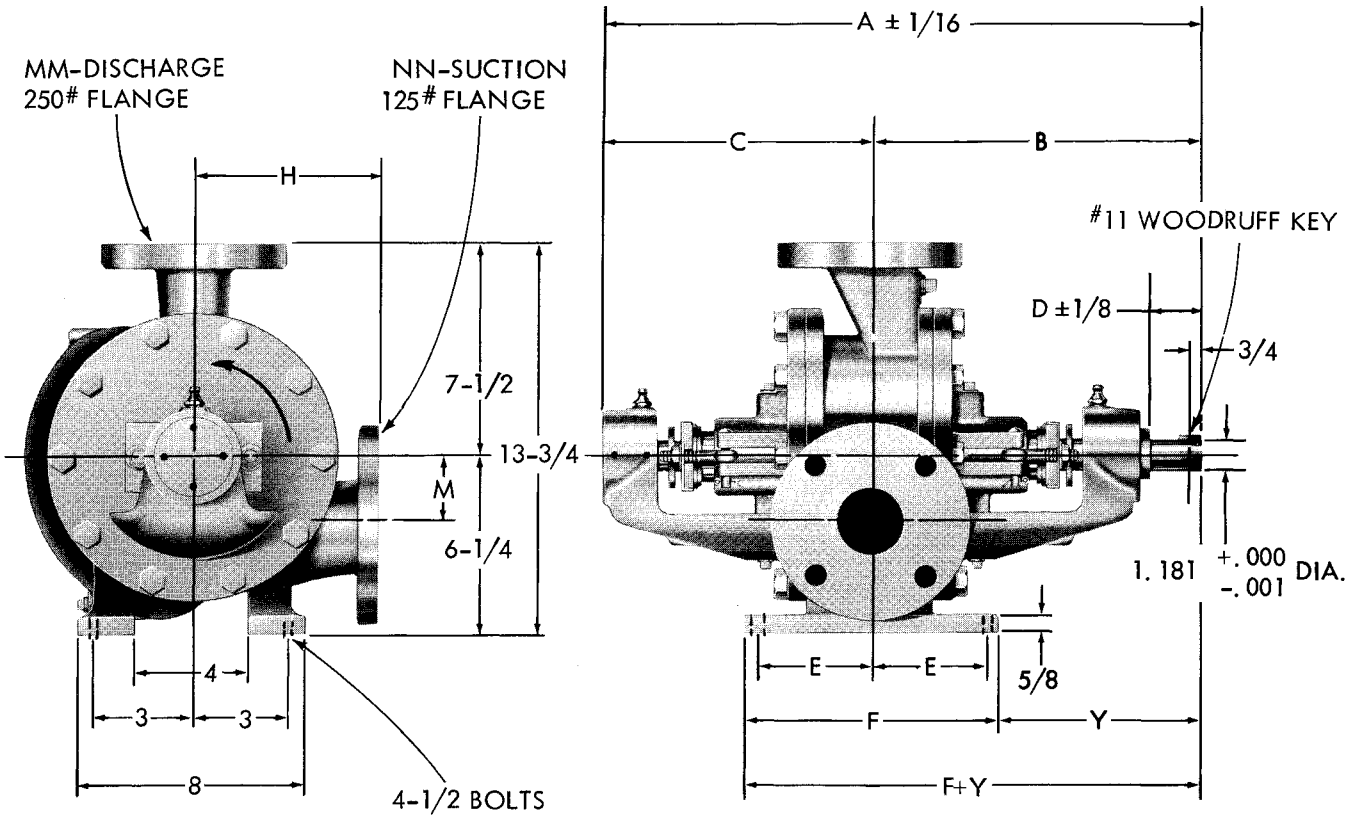


PUMP MODELS	A	B	C	D	E	F	H	J	K	L	M	N
D4T, E4T, F4T, G4T, I4T, I4TA	11-15/16	6-3/4	5-3/16	1-3/16	2-1/8	5-1/4	4-1/2	8-7/8	5-3/8	3-1/2	2	1/2
D5T, E5T, F5T, G5T, H5T, I5T	16-7/16	9-3/8	7-1/16	2	2-5/8	6-1/4	5-1/8	12-1/4	7-1/2	4-3/4	3-1/8	9/16

PUMP MODELS	P	Q	R	S	T	U	W	X	Y	SS	UU
D4T, E4T, F4T, G4T, I4T, I4TA	2-3/4	6-1/2	5/16	3/8	#3 WOODRUFF	.590	11/16	5/8	4-1/8	1-1/2	3
D5T, E5T, F5T, G5T, H5T, I5T	3-1/2	8	3/8	1/2	#6 WOODRUFF	.787	3/4	1/2	6-1/4	1-5/8	4

NOTES:
1. All dimensions in inches.
2. Dimensions may vary ± 1/8.
3. Not for construction purposes unless certified.

AURORA TYPE 6RTL & 6RTLS SERIES
TWO STAGE APCO PUMPS
RIGHT HAND PUMP ILLUSTRATED

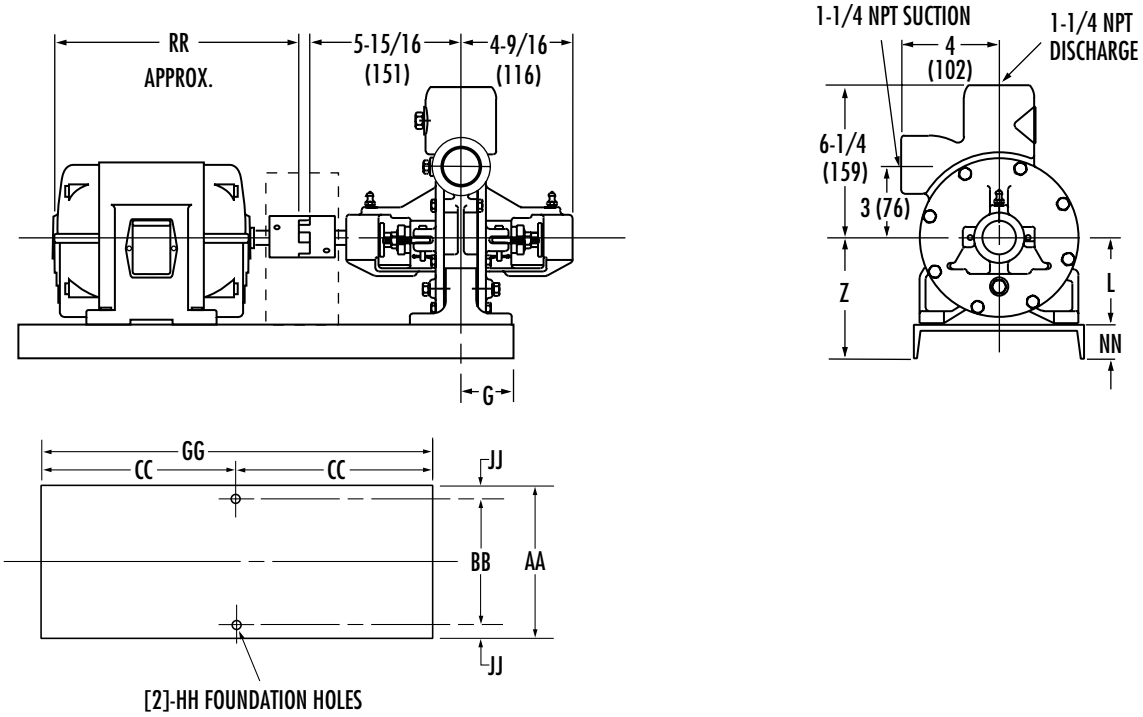


PUMP MODEL	A	B	C	D	E	F	H	M	Y	MM	NN	F+Y
D6T, E6T, F6T	21-1/2	12-3/16	9-5/16	2-3/8	3-3/4	9	6-1/2	2-3/8	7-11/16	2	2-1/2	16-11/16
G6T, H6T, J6T, K6T	24-3/4	13-13/16	10-15/16	2-1/2	5-1/4	12	7	2	7-13/16	2-1/2	3	19-13/16

NOTES:
1. All dimensions in inches.
2. Dimensions may vary ± 1/8.
3. Not for construction purposes unless certified.
4. Flanges in accordance with 125# or 250# American Standard.

AURORA 114A SERIES
TYPE 4R AND 4RS
SINGLE STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	A35	A4	B4	C4	D4	E4	F4	G4	H4	I4	I4A



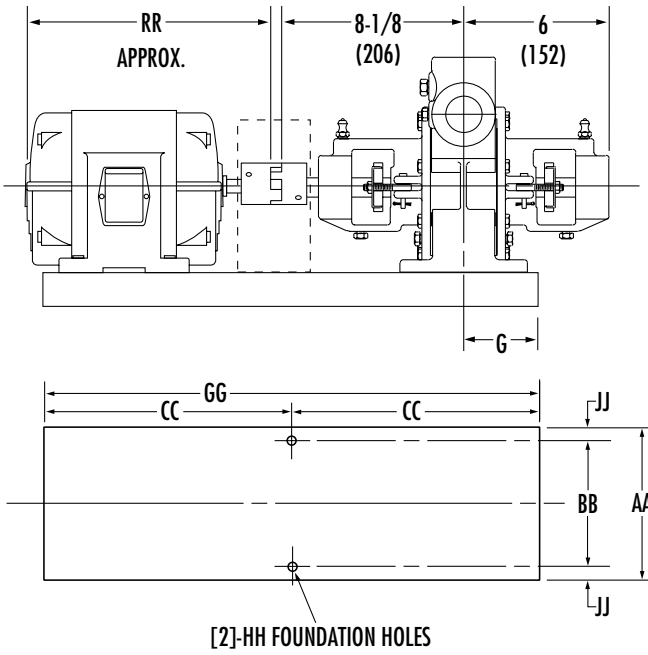
FRAME	G	L	Z	AA	BB	CC	GG	HH	JJ	NN	RR
56	2-3/4 (70)	3-1/2 (89)	5-1/2 (140)	7 (178)	5 (127)	9 (229)	18 (457)	1/2 (13)	1 (25)	2 (51)	13 (330)
143T	2-3/4 (70)	3-1/2 (89)	6 (152)	9 (229)	7 (178)	10-1/2 (267)	21 (533)	1/2 (13)	1 (25)	2-1/2 (64)	12 (305)
145T	2-3/4 (70)	3-1/2 (89)	6 (152)	9 (229)	7 (178)	10-1/2 (267)	21 (533)	1/2 (13)	1 (25)	2-1/2 (64)	13 (330)
182T	2-3/4 (70)	4-1/2 (114)	7-1/8 (181)	10 (254)	7 (178)	12 (305)	24 (610)	5/8 (16)	1-1/2 (38)	2-5/8 (67)	13 (330)
184T	2-3/4 (70)	4-1/2 (114)	7-1/8 (181)	10 (254)	7 (178)	12 (305)	24 (610)	5/8 (16)	1-1/2 (38)	2-5/8 (67)	14 (356)
213T	2-3/4 (70)	5-1/4 (133)	7-5/8 (194)	10 (254)	7 (178)	13 (330)	26 (660)	5/8 (16)	1-1/2 (38)	2-5/8 (67)	16 (406)
215T	2-3/4 (70)	5-1/4 (133)	7-5/8 (194)	10 (254)	7 (178)	13 (330)	26 (660)	5/8 (16)	1-1/2 (38)	2-5/8 (67)	18 (457)

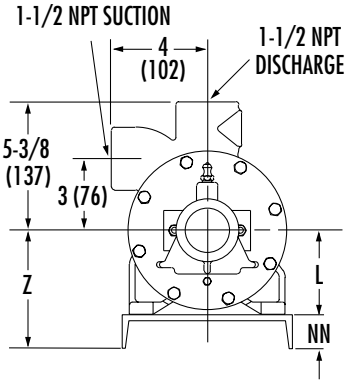
NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 114A SERIES
TYPE 4RA AND 4RAS

SINGLE STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	M4	P4	R4





RIGHT HAND PUMP ILLUSTRATED

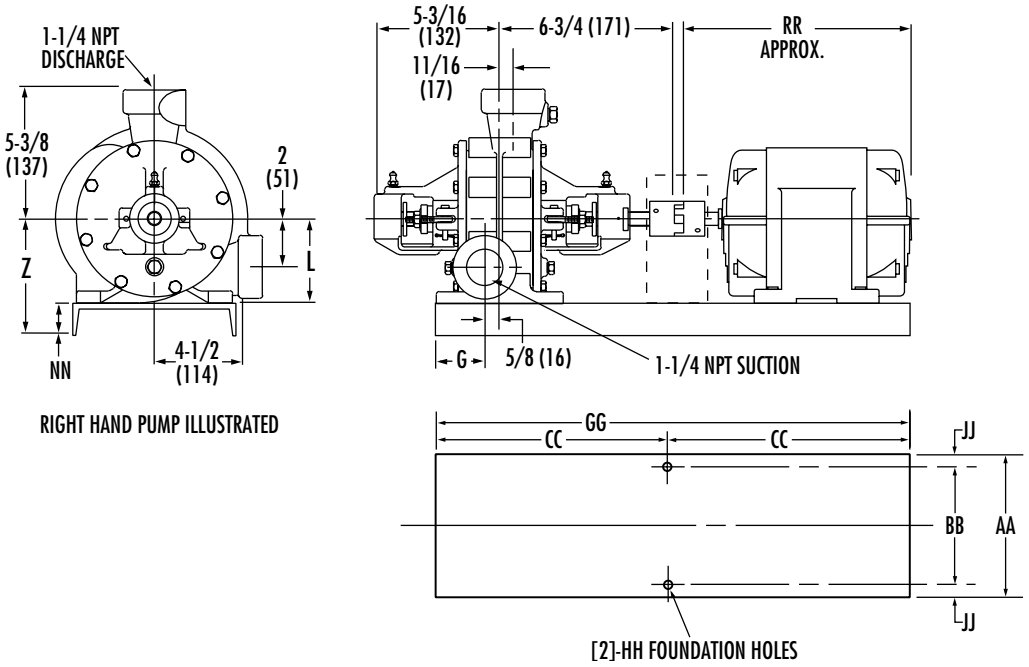
FRAME	G	L	Z	AA	BB	CC	GG	HH	JJ	NN	RR
56	3-3/8 (86)	3-1/2 (89)	6 (152)	9 (229)	7 (178)	10-1/2 (267)	21 (533)	1/2 (13)	1 (25)	2-1/2 (64)	13 (330)
143T	3-3/8 (86)	3-1/2 (89)	6 (152)	9 (229)	7 (178)	12 (305)	24 (610)	1/2 (13)	1 (25)	2-1/2 (64)	12 (305)
145T	3-3/8 (86)	3-1/2 (89)	6 (152)	9 (229)	7 (178)	12 (305)	24 (610)	1/2 (13)	1 (25)	2-1/2 (64)	13 (330)
182T	3-3/8 (86)	4-1/2 (114)	7-1/8 (181)	10 (254)	7 (178)	12 (305)	24 (610)	5/8 (16)	1-1/2 (38)	2-5/8 (67)	13 (330)
184T	3-3/8 (86)	4-1/2 (114)	7-1/8 (181)	10 (254)	7 (178)	12 (305)	24 (610)	5/8 (16)	1-1/2 (38)	2-5/8 (67)	14 (356)
213T	3-3/8 (86)	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	13-1/2 (343)	27 (686)	5/8 (16)	1-1/2 (38)	3 (76)	16 (406)
215T	3-3/8 (86)	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	13-1/2 (343)	27 (686)	5/8 (16)	1-1/2 (38)	3 (76)	18 (457)

NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 114A SERIES
TYPE 4RTL AND 4RTLS

TWO STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	D4T	E4T	F4T	G4T	I4T	I4TA



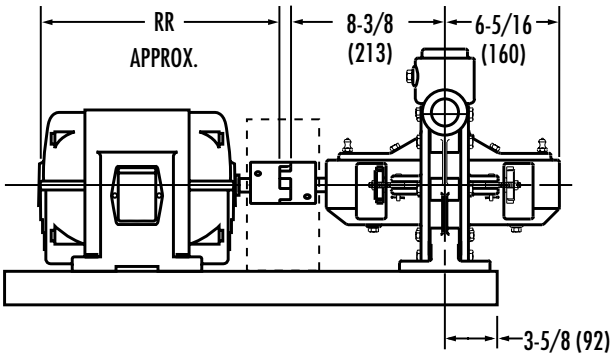
RIGHT HAND PUMP ILLUSTRATED

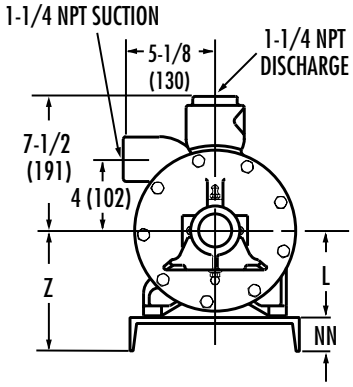
FRAME	G	L	Z	AA	BB	CC	GG	HH	JJ	NN	RR
56	2-1/8 (54)	3-1/2 (89)	6 (152)	9 (229)	7 (178)	10-1/2 (267)	21 (533)	1/2 (13)	1 (25)	2-1/2 (64)	13 (330)
143T	2-1/8 (54)	3-1/2 (89)	6 (152)	9 (229)	7 (178)	10-1/2 (267)	21 (533)	1/2 (13)	1 (25)	2-1/2 (64)	12 (305)
145T	2-1/8 (54)	3-1/2 (89)	6 (152)	9 (229)	7 (178)	10-1/2 (267)	21 (533)	1/2 (13)	1 (25)	2-1/2 (64)	13 (330)
182T	3 (76)	4-1/2 (114)	7-1/8 (181)	10 (254)	7 (178)	12 (305)	24 (610)	5/8 (16)	1-1/2 (38)	2-5/8 (67)	13 (330)
184T	3 (76)	4-1/2 (114)	7-1/8 (181)	10 (254)	7 (178)	12 (305)	24 (610)	5/8 (16)	1-1/2 (38)	2-5/8 (67)	14 (356)
213T	3 (76)	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	13-1/2 (343)	27 (686)	5/8 (16)	1-1/2 (38)	3 (76)	16 (406)
215T	3 (76)	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	13-1/2 (343)	27 (686)	5/8 (16)	1-1/2 (38)	3 (76)	18 (457)

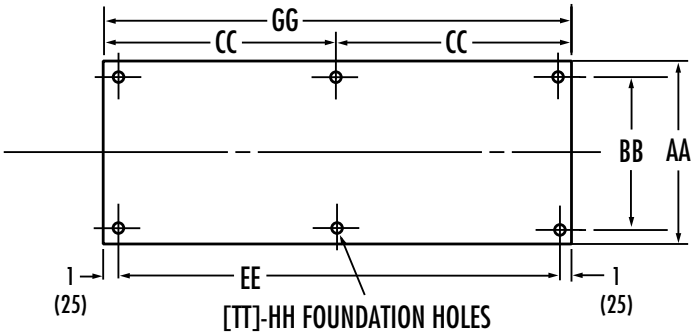
NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 115A SERIES
TYPE 5R AND 5RS
SINGLE STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	D5	E5	F5	G5	H5	I5







FRAME	L	Z	AA	BB	CC	EE	GG	HH	NN	RR	TT
56	4-3/4 (121)	7-1/4 (184)	9 (229)	7 (178)	10-1/2 (267)	-	21 (533)	1/2 (13)	2-1/2 (64)	13 (330)	2
143T	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	12 (305)	-	24 (610)	5/8 (16)	2-5/8 (67)	12 (305)	2
145T	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	12 (305)	-	24 (610)	5/8 (16)	2-5/8 (67)	13 (330)	2
182T	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	12 (305)	-	24 (610)	5/8 (16)	2-5/8 (67)	13 (330)	2
184T	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	14 (356)	2
213T	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	13-1/2 (343)	-	27 (686)	5/8 (16)	3 (76)	16 (406)	2
215T	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	15 (381)	-	30 (762)	5/8 (16)	3 (76)	18 (457)	2
254T	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	-	36 (914)	38 (965)	3/4 (19)	4 (102)	21 (533)	4
256T	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	-	36 (914)	38 (965)	3/4 (19)	4 (102)	23 (584)	4

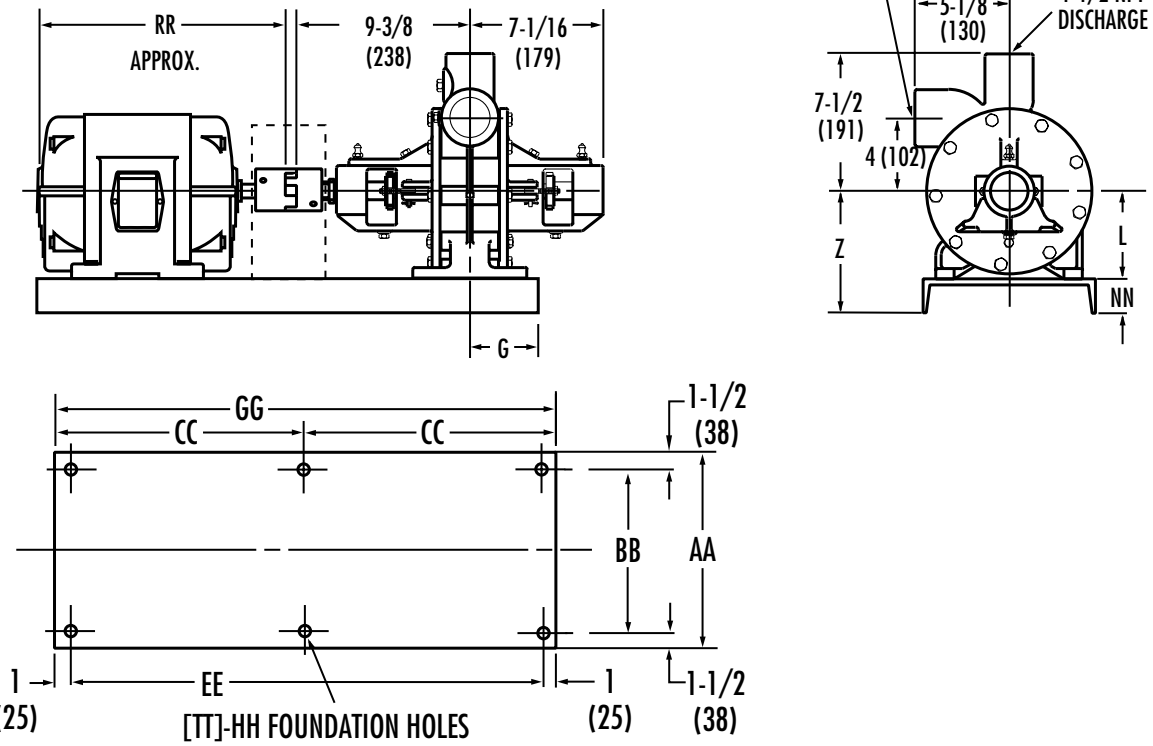
NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA®
Pentair Pump Group

AURORA 115A SERIES
TYPE 5RA AND 5RAS

SINGLE STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	J5	K5	L5	M5	N5	P5



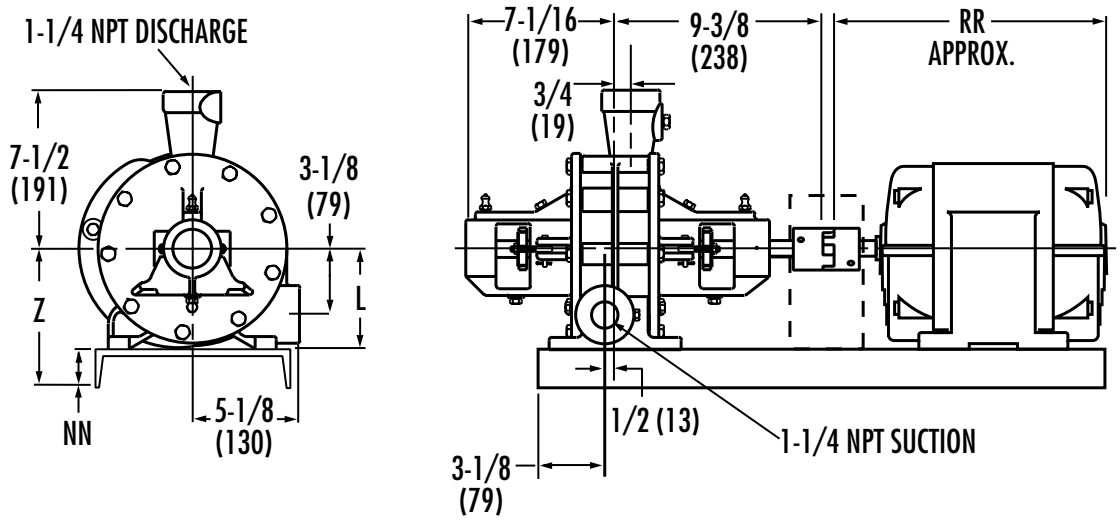
FRAME	G	L	Z	AA	BB	CC	EE	GG	HH	NN	RR	TT
143T	3-5/8 (92)	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	12 (305)	2
145T	3-5/8 (92)	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	13 (330)	2
182T	3-5/8 (92)	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	13 (330)	2
184T	3-5/8 (92)	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	14 (356)	2
213T	3-5/8 (92)	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	15 (381)	-	30 (762)	5/8 (16)	3 (76)	16 (406)	2
215T	3-5/8 (92)	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	15 (381)	-	30 (762)	5/8 (16)	3 (76)	18 (457)	2
254T	3-5/8 (92)	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	-	36 (914)	38 (965)	3/4 (19)	4 (102)	21 (533)	4
256T	3-5/8 (92)	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	-	36 (914)	38 (965)	3/4 (19)	4 (102)	23 (584)	4

NOTES:

1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 115A SERIES
TYPE 5RTL AND 5RTLS
TWO STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	D5T	E5T	F5T	G5T	H5T	I5T



FRAME	L	Z	AA	BB	CC	EE	GG	HH	NN	RR	TT
143T	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	12 (305)	2
145T	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	13 (330)	2
182T	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	13 (330)	2
184T	4-3/4 (121)	7-3/8 (187)	10 (254)	7 (178)	13 (330)	-	26 (660)	5/8 (16)	2-5/8 (67)	14 (356)	2
213T	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	15 (381)	-	30 (762)	5/8 (16)	3 (76)	16 (406)	2
215T	5-1/4 (133)	8-1/4 (210)	12 (305)	9 (229)	15 (381)	-	30 (762)	5/8 (16)	3 (76)	18 (457)	2
254T	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	-	36 (914)	38 (965)	3/4 (19)	4 (102)	21 (533)	4
256T	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	-	36 (914)	38 (965)	3/4 (19)	4 (102)	23 (584)	4

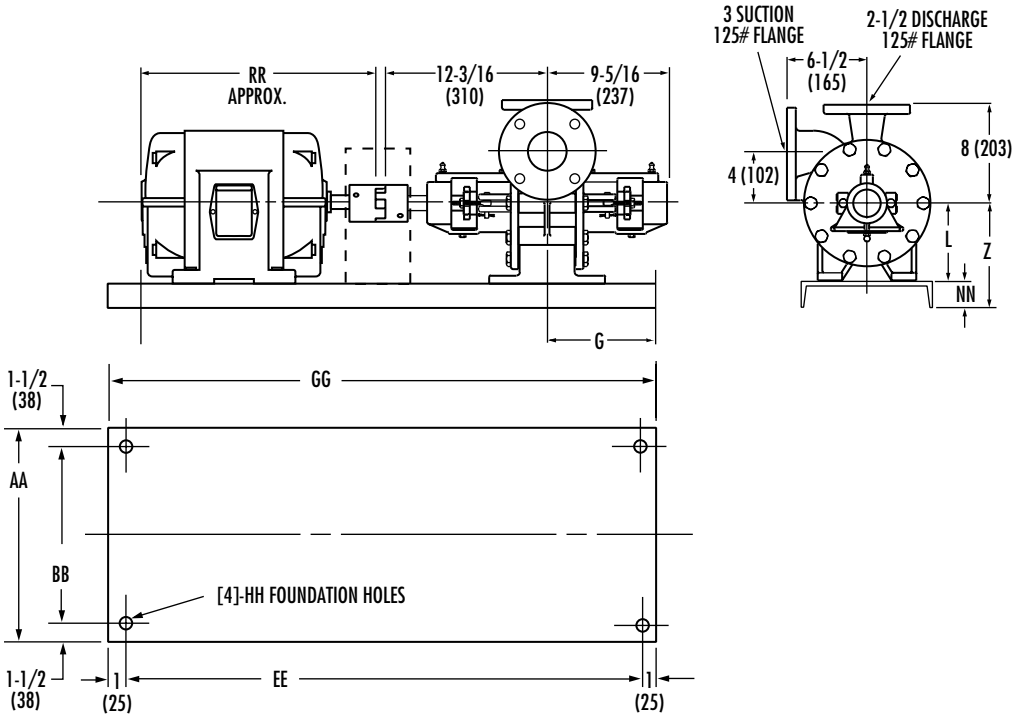
NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is located on the opposite side of the motor shown. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA®
Pentair Pump Group

AURORA 116A SERIES
TYPE 6RA AND 6RAS

SINGLE STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	G6	H6	J6	K6



FRAME	G	L	Z	AA	BB	EE	GG	HH	NN	RR
182T	6-1/2 (165)	6-1/4 (159)	9-1/4 (235)	12 (305)	9 (229)	36 (914)	38 (965)	5/8 (16)	4 (102)	13 (330)
184T	6-1/2 (165)	6-1/4 (159)	9-1/4 (235)	12 (305)	9 (229)	36 (914)	38 (965)	5/8 (16)	4 (102)	14 (356)
213T	6-1/2 (165)	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	36 (914)	38 (965)	3/4 (19)	4 (102)	16 (406)
215T	6-1/2 (165)	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	36 (914)	38 (965)	3/4 (19)	4 (102)	18 (457)
254T	6-1/2 (165)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	21 (533)
256T	6-1/2 (165)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	23 (584)
284TS	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	22 (533)
284T	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	24 (610)
286TS	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19))	3-3/8 (86)	24 (610)
286T	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	26 (660)

NOTES:

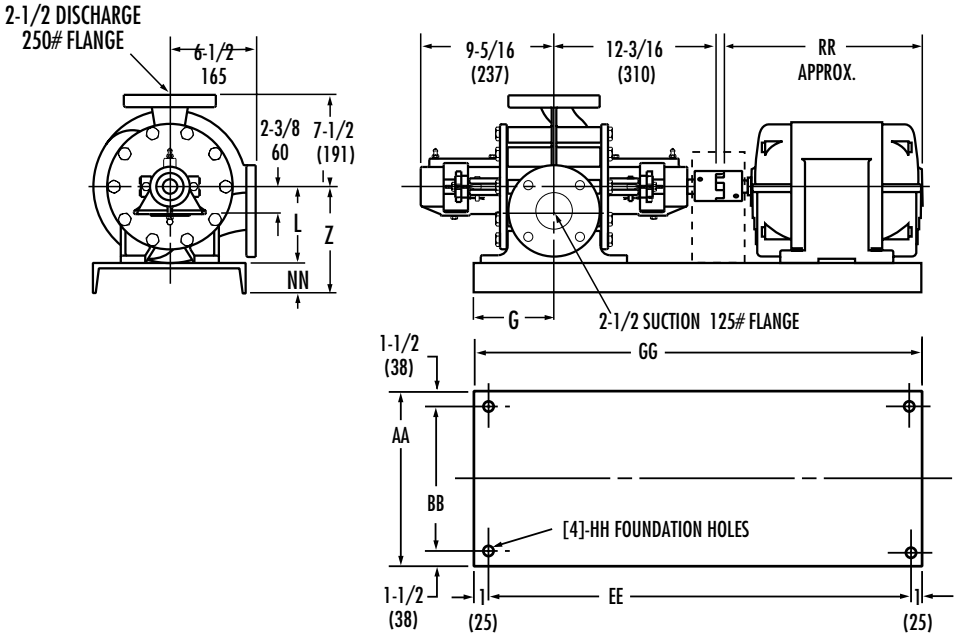
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Flanges in accordance with 125# ANSI Standard.
6. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

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AURORA 116A SERIES
TYPE 6RTL AND 6RTLS

TWO STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	D6T	E6T	F6T



FRAME	G	L	Z	AA	BB	EE	GG	HH	NN	RR
182T	6-1/2 (165)	6-1/4 (159)	9-1/4 (235)	12 (305)	9 (229)	36 (914)	38 (965)	5/8 (16)	3 (76)	13 (330)
184T	6-1/2 (165)	6-1/4 (159)	9-1/4 (235)	12 (305)	9 (229)	36 (914)	38 (965)	5/8 (16)	3 (76)	14 (356)
213T	6-1/2 (165)	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	36 (914)	38 (965)	3/4 (19)	4 (102)	16 (406)
215T	6-1/2 (165)	6-1/4 (159)	10-1/4 (260)	13 (330)	10 (254)	36 (914)	38 (965)	3/4 (19)	4 (102)	18 (457)
254T	6-1/2 (165)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	21 (533)
256T	6-1/2 (165)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	23 (584)
284TS	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	22 (559)
284T	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	24 (610)
286TS	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	24 (610)
286T	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	25 (635)

NOTES:

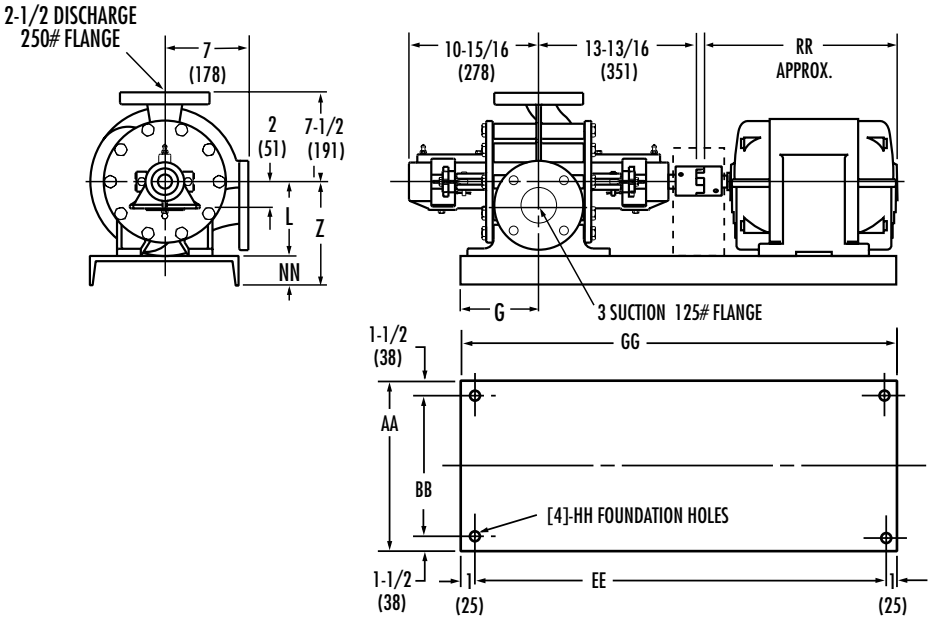
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Flanges in accordance with 125# & 250# ANSI Standard.
6. Conduit box is located on the opposite side of the motor shown. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

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Dated JANUARY 2003

AURORA 116A SERIES
TYPE 6RATL AND 6RATLS

TWO STAGE APCO PUMPS
ON STEEL BASE

PUMP MODELS	G6T	H6T	J6T	K6T



FRAME	G	L	Z	AA	BB	EE	GG	HH	NN	RR
182T	8 (203)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	36 (914)	38 (965)	3/4 (19)	3-3/8 (86)	13 (330)
184T	8 (203)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	36 (914)	38 (965)	3/4 (19)	3-3/8 (86)	14 (356)
213T	8 (203)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	38 (965)	40 (1016)	3/4 (19)	3-3/8 (86)	16 (406)
215T	8 (203)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	38 (965)	40 (1016)	3/4 (19)	3-3/8 (86)	18 (457)
254T	6-1/2 (165)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	42 (1067)	44 (1118)	3/4 (19)	3-3/8 (86)	21 (533)
256T	6-1/2 (165)	6-1/4 (159)	9-5/8 (244)	15 (381)	12 (305)	46 (1168)	48 (1219)	3/4 (19)	3-3/8 (86)	23 (584)
284TS	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	46 (1168)	48 (1219)	3/4 (19)	3-3/8 (86)	22 (559)
284T	6-1/2 (165)	7 (178)	10-3/8 (264)	15 (381)	12 (305)	46 (1168)	48 (1219)	3/4 (19)	3-3/8 (86)	24 (610)
286TS	6-1/2 (165)	7 (178)	11 (279)	18 (457)	15 (381)	46 (1168)	48 (1219)	3/4 (19)	4 (102)	24 (610)
286T	6-1/2 (165)	7 (178)	11 (279)	18 (457)	15 (381)	46 (1168)	48 (1219)	3/4 (19)	4 (102)	25 (635)
324TS	6-1/2 (165)	8 (203)	12 (305)	18 (457)	15 (381)	46 (1168)	48 (1219)	3/4 (19)	4 (102)	25 (635)
324T	6-1/2 (165)	8 (203)	12 (305)	18 (457)	15 (381)	46 (1168)	48 (1219)	3/4 (19)	4 (102)	26 (660)
326TS	6-1/2 (165)	8 (203)	12 (305)	18 (457)	15 (381)	48 (1219)	50 (1270)	3/4 (19)	4 (102)	26 (660)
326T	6-1/2 (165)	8 (203)	12 (305)	18 (457)	15 (381)	48 (1219)	50 (1270)	3/4 (19)	4 (102)	28 (711)

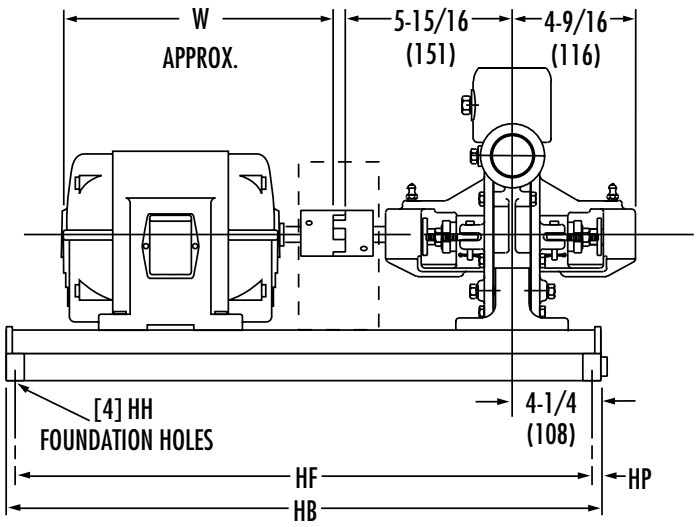
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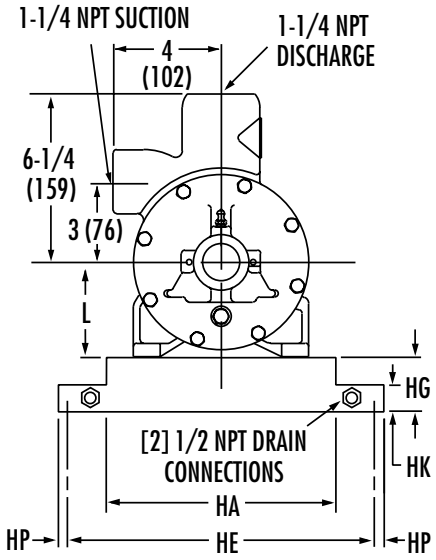
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6. Conduit box is located on the opposite side of the motor shown. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 114A SERIES
TYPE 4R AND 4RS

SINGLE STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	A35	A4	B4	C4	D4	E4	F4	G4	H4	I4	I4A





RIGHT HAND PUMP ILLUSTRATED

MOTOR FRAME	BASE NO.	L	W
48	1	3-1/2 (89)	10 (254)
56	1	3-1/2 (89)	13 (330)
143T	1	3-1/2 (89)	11 (279)
145T	1	3-1/2 (89)	12 (305)
182T	2	4-1/2 (114)	13 (330)
184T	2	4-1/2 (114)	14 (356)

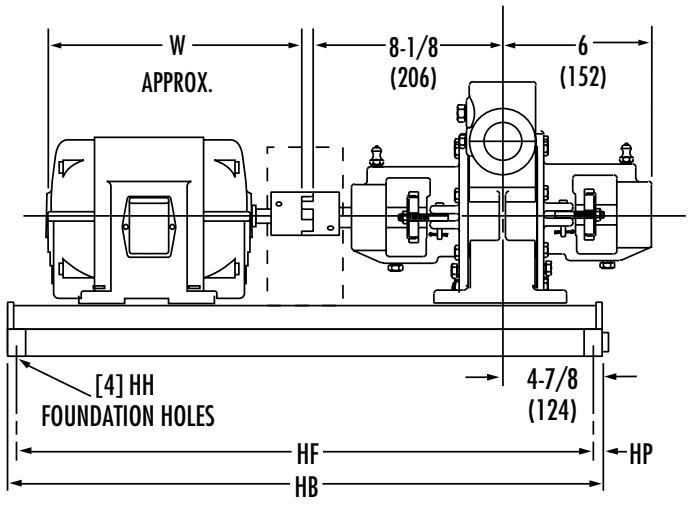
MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
48	1	9 x 22	9 (229)	22-1/2 (572)	13-3/4 (349)	21-1/4 (540)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
56	1	9 x 22	9 (229)	22-1/2 (572)	13-3/4 (349)	21-1/4 (540)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
143T	1	9 x 22	9 (229)	22-1/2 (572)	13-3/4 (349)	21-1/4 (540)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
145T	1	9 x 22	9 (229)	22-1/2 (572)	13-3/4 (349)	21-1/4 (540)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
182T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (540)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
184T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (540)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)

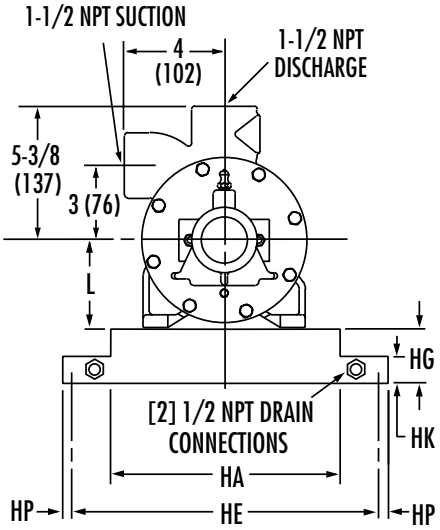
NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 114A SERIES
TYPE 4RA AND 4RAS

SINGLE STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	M4	P4	R4





RIGHT HAND PUMP ILLUSTRATED

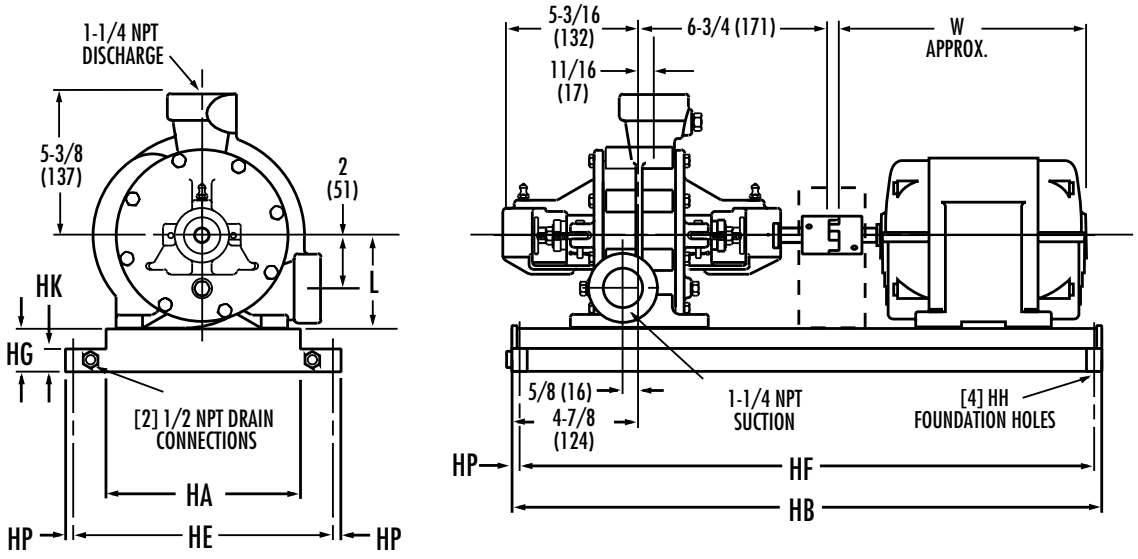
MOTOR FRAME	BASE NO.	L	W
56	1	3-1/2 (89)	13 (330)
143T	2	3-1/2 (89)	11 (279)
145T	2	3-1/2 (89)	12 (305)
182T	2	4-1/2 (114)	13 (330)
184T	3	4-1/2 (114)	14 (356)

MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
56	1	9 x 22	9 (229)	22-1/2 (572)	13-3/4 (349)	21-1/4 (540)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
143T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
145T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
182T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
184T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)

NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 114A SERIES
TYPE 4RTL AND 4RTLS
TWO STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	D4T	E4T	F4T	G4T	I4T	I4TA



MOTOR FRAME	BASE NO.	L	W
56	1	3-1/2 (89)	13 (330)
143T	2	3-1/2 (89)	12 (305)
145T	2	3-1/2 (89)	13 (330)
182T	2	4-1/2 (114)	13 (330)
184T	2	4-1/2 (114)	14 (356)

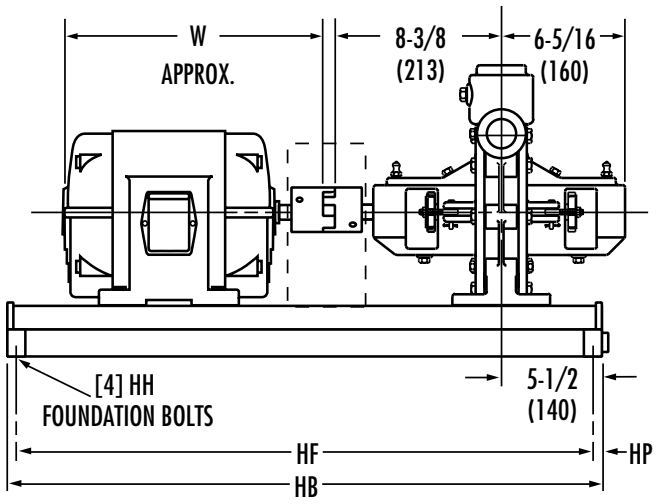
MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
56	1	9 x 22	9 (229)	22-1/2 (572)	13-3/4 (349)	21-1/4 (540)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
143T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
145T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
182T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
184T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)

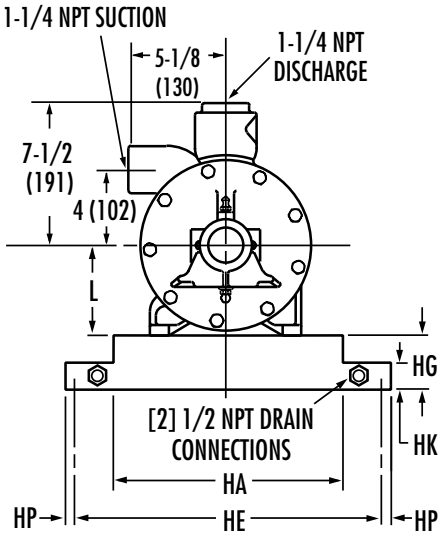
NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 115A SERIES
TYPE 5R AND 5RS

SINGLE STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	D5	E5	F5	G5	H5	I5





MOTOR FRAME	BASE NO.	L	W
56	2	4-3/4 (121)	13 (330)
143T	2	4-3/4 (121)	12 (305)
145T	2	4-3/4 (121)	13 (330)
182T	3	4-3/4 (121)	13 (330)
184T	3	4-3/4 (121)	14 (356)
213T	4	5-1/4 (133)	16 (406)
215T	5	5-1/4 (133)	18 (457)

MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
56	2	9 x 26	9 (229)	26-1/4 (667)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
143T	2	9 x 26	9 (229)	26-1/4 (667)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
145T	2	9 x 26	9 (229)	26-1/4 (667)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
182T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
184T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
213T	4	11 x 30	11 (279)	30-1/2 (775)	15-7/8 (403)	29-1/8 (740)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
215T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)

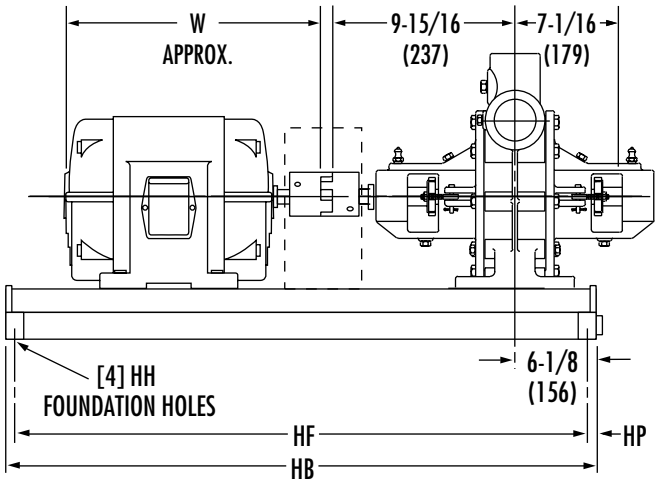
NOTES:

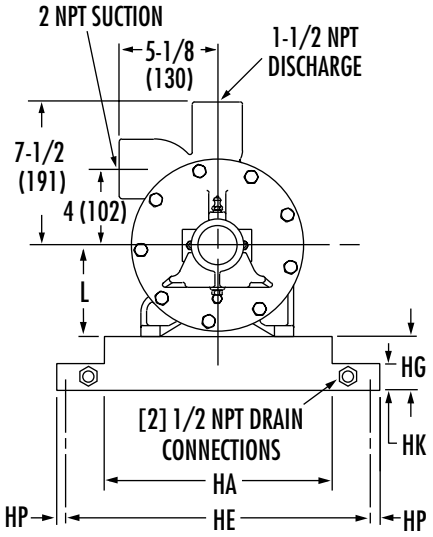
1. All dimensions in inches (mm).
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4. Coupling gap may vary 1/8" (3) to 1" (25).
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AURORA 115A SERIES
TYPE 5RA AND 5RAS

SINGLE STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	J5	K5	L5	M5	N5	P5





RIGHT HAND PUMP ILLUSTRATED

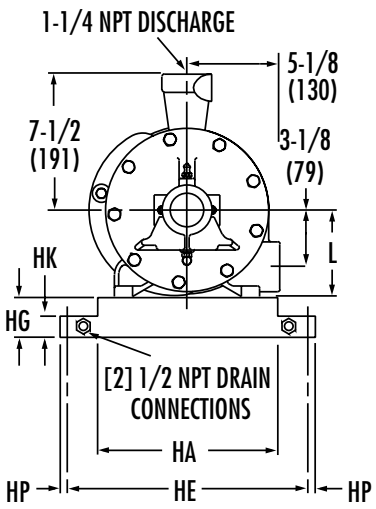
MOTOR FRAME	BASE NO.	L	W
143T	2	4-3/4 (121)	12 (305)
145T	3	4-3/4 (121)	13 (330)
182T	3	4-3/4 (121)	13 (330)
184T	3	4-3/4 (121)	14 (356)
213T	5	5-1/4 (133)	16 (406)
215T	5	5-1/4 (133)	18 (457)
254T	7	6-1/4 (159)	21 (533)

MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
143T	2	9 x 26	9 (229)	26-1/2 (673)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
145T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
182T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
184T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
213T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
215T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
254T	7	14 x 36	14 (356)	36-1/2 (927)	19 (483)	35 (889)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)

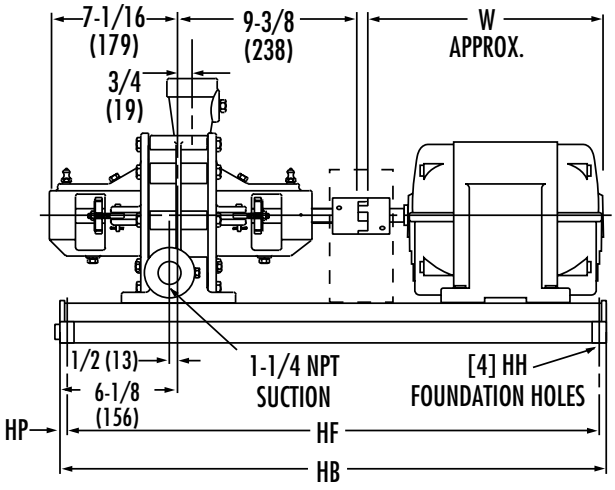
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4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 115A SERIES
TYPE 5RTL AND 5RTLS
TWO STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	D5T	E5T	F5T	G5T	H5T	I5T



RIGHT HAND PUMP ILLUSTRATED



MOTOR FRAME	BASE NO.	L	W
143T	2	4-3/4 (121)	12 (305)
145T	3	4-3/4 (121)	13 (330)
182T	3	4-3/4 (121)	13 (330)
184T	3	4-3/4 (121)	14 (356)
213T	5	5-1/4 (133)	16 (406)
215T	5	5-1/4 (133)	18 (457)
254T	7	6-1/4 (159)	21 (533)

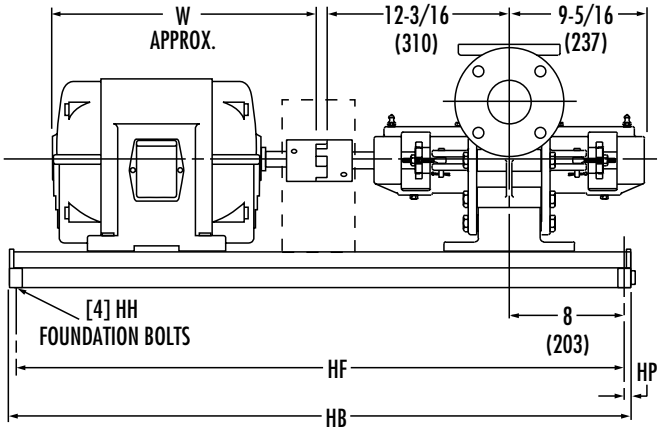
MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
143T	2	9 x 26	9 (229)	26-1/4 (667)	13-3/4 (349)	25-1/4 (641)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
145T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
182T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
184T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
213T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
215T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
254T	7	14 x 36	14 (356)	36-1/2 (927)	19 (483)	35 (889)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)

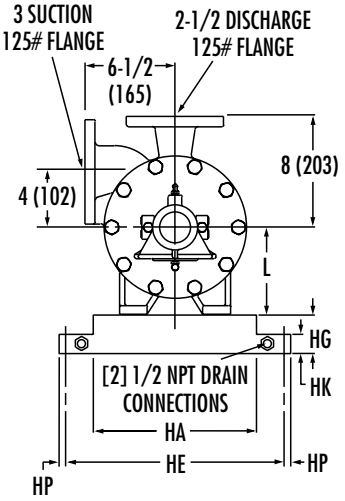
NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 116A SERIES
TYPE 6RA AND 6RAS

SINGLE STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	G6	H6	J6	K6





RIGHT HAND PUMP ILLUSTRATED

MOTOR FRAME	BASE NO.	L	W
143T	3	6-1/4 (159)	12 (305)
145T	3	6-1/4 (159)	13 (330)
182T	3	6-1/4 (159)	13 (330)
184T	5	6-1/4 (159)	14 (356)
213T	5	6-1/4 (159)	16 (406)
215T	6	6-1/4 (159)	18 (457)
254T	8	6-1/4 (159)	21 (533)
256T	8	6-1/4 (159)	23 (584)

MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
143T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
145T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
182T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
184T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
213T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
215T	6	11 x 42	11 (279)	42-1/2 (1080)	15-7/8 (403)	41-1/8 (1045)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
254T	8	14 x 42	14 (356)	42-1/2 (1080)	19 (483)	41 (1041)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)
256T	8	14 x 42	14 (356)	42-1/2 (1080)	19 (483)	41 (1041)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)

NOTES:

1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA SERIES 110

SELECTION TABLE
1750 R.P.M.

Supersedes Section 110 Page 395
Dated JULY 1969

PUMP SIZES A35 THROUGH R4

PUMP SIZE	TOTAL DYNAMIC HEAD	PSI (BARS)	4.4 (0.3)	8.6 (0.6)	13 (0.9)	17.3 (1.2)	21.5 (1.5)	26 (1.8)	30 (2.1)	34.5 (2.4)	43 (3.0)	50 (3.4)	54 (3.7)	65 (4.5)	73.5 (5.1)	86.5 (6.0)	49.5 (3.4)	108 (7.4)	130 (9.0)	151.5 (10.4)	173 (11.9)	195 (13.4)
		FEET (METERS)	10 (3)	20 (6)	30 (9)	40 (12)	50 (15)	60 (18)	70 (21)	80 (24)	100 (31)	115 (35)	125 (38)	150 (46)	170 (52)	200 (61)	230 (70)	250 (76)	300 (91)	350 (107)	400 (122)	450 (137)
A35	G.P.M.		3.6	3.2	2.8	2.5	2.1	1.8	1.5	1.2												
	M^3/HR		(0.8)	(0.7)	(0.6)	(0.6)	(0.5)	(0.4)	(0.3)	(0.3)												
	B.H.P.		.04	.05	.06	.07	.08	.09	.10	.11												
A4	G.P.M.		4.4	4.0	3.7	3.3	3.0	2.6	2.3	1.9	1.2											
	M^3/HR		(1.0)	(0.9)	(0.8)	(0.7)	(0.7)	(0.6)	(0.5)	(0.4)	(0.3)											
	B.H.P.		.06	.08	.09	.11	.12	.14	.15	.17	.20											
B4	G.P.M.		2.5	2.3	2.0	1.8	1.6	1.4	1.2	1.0	.6											
	M^3/HR		(0.6)	(0.5)	(0.5)	(0.4)	(0.4)	(0.3)	(0.3)	(0.2)	(0.1)											
	B.H.P.		.03	.04	.05	.06	.07	.08	.09	.10	.11											
C4	G.P.M.		6.2	5.6	5.4	4.6	4.4	4.2	3.4	3.2	2.3	1.5										
	M^3/HR		(1.4)	(1.3)	(1.2)	(1.0)	(1.0)	(1.0)	(0.8)	(0.7)	(0.5)	(0.3)										
	B.H.P.		.08	.09	.10	.12	.13	.15	.18	.20	.25	.28										
D4	G.P.M.		8.3	7.7	7.3	6.6	6.2	5.6	5.1	4.7	3.7	2.9	2.5	1.2								
	M^3/HR		(1.9)	(1.7)	(1.7)	(1.5)	(1.4)	(1.3)	(1.2)	(1.1)	(0.8)	(0.7)	(0.6)	(0.3)								
	B.H.P.		.12	.18	.20	.20	.23	.25	.30	.34	.40	.45	.49	.59								
E4	G.P.M.		10.2	9.9	9.4	9.0	8.5	8.0	7.5	7.1	6.2	5.5	5.0	3.7	2.8							
	M^3/HR		(2.3)	(2.2)	(2.1)	(2.0)	(1.9)	(1.8)	(1.7)	(1.6)	(1.4)	(1.2)	(1.1)	(0.8)	(0.6)							
	B.H.P.		.22	.25	.28	.30	.32	.34	.38	.40	.46	.50	.54	.63	.71							
F4	G.P.M.		14.2	13.5	12.8	12.1	11.5	11.0	10.5	9.8	8.7	7.5	7.2	5.8	4.8	3.0						
	M^3/HR		(3.2)	(3.1)	(2.9)	(2.7)	(2.6)	(2.5)	(2.4)	(2.2)	(2.0)	(1.7)	(1.6)	(1.3)	(1.1)	(0.7)						
	B.H.P.		.27	.29	.30	.35	.40	.42	.45	.50	.60	.70	.75	.83	.95	1.1						
G4	G.P.M.		17.5	16.8	15.9	15.0	14.5	13.7	13.0	12.4	11.0	10.2	9.5	7.9	6.5	4.9	3.0					
	M^3/HR		(4.0)	(3.8)	(3.6)	(3.4)	(3.3)	(3.1)	(3.0)	(2.8)	(2.5)	(2.3)	(2.2)	(1.8)	(1.5)	(1.1)	(0.7)					
	B.H.P.		.25	.30	.35	.40	.42	.48	.50	.52	.70	.75	.80	1.0	1.2	1.4	1.5					
H4	G.P.M.		24.5	23.3	22.5	20.8	20.0	18.6	17.0	15.8	12.8	9.5	8.5									
	M^3/HR		(5.6)	(5.3)	(5.1)	(4.7)	(4.5)	(4.2)	(3.9)	(3.6)	(2.9)	(2.2)	(1.9)									
	B.H.P.		.35	.40	.45	.60	.65	.70	.75	.80	.85	1.0	1.1									
I4	G.P.M.		27.5	26.2	25.0	24.0	23.0	21.2	20.0	18.9	16.1	14.5	13.0	10.0	7.0							
	M^3/HR		(6.2)	(6.0)	(5.7)	(5.5)	(5.2)	(4.8)	(4.5)	(4.3)	(3.7)	(3.3)	(3.0)	(2.3)	(1.6)							
	B.H.P.		.40	.45	.50	.60	.70	.75	.85	.95	1.1	1.2	1.3	1.4	1.5							
I4A	G.P.M.		37.0	35.8	34.0	32.5	31.0	29.1	27.0	25.5	21.6	18.5	16.1	11.0								
	M^3/HR		(8.4)	(8.1)	(7.7)	(7.4)	(7.0)	(6.6)	(6.1)	(5.8)	(4.9)	(4.2)	(3.7)	(2.5)								
	B.H.P.		.75	.90	.95	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.8								
M4	G.P.M.		51.0	48.0	45.2	43.0	40.0	36.5	33.2	30.0	22.0	16.0	10.0									
	M^3/HR		(11.6)	(10.9)	(10.3)	(9.8)	(9.1)	(8.3)	(7.5)	(6.8)	(5.0)	(3.6)	(2.3)									
	B.H.P.		.80	1.0	1.2	1.3	1.4	1.5	1.6	1.75	2.0	2.3	2.5									
P4	G.P.M.		59.0	56.5	54.0	51.0	48.5	46.0	42.0	40.0	33.0	27.0	24.0	10.0								
	M^3/HR		(13.4)	(12.8)	(12.3)	(11.6)	(11.0)	(10.4)	(9.5)	(9.1)	(7.5)	(6.1)	(5.5)	(2.3)								
	B.H.P.		1.0	1.1	1.2	1.4	1.5	1.7	1.8	1.9	2.2	2.5	2.6	3.0								
R4	G.P.M.		69.0	66.0	63.0	60.0	57.5	54.0	50.0	47.0	40.0	35.0	32.0	22.5	12.5							
	M^3/HR		(15.7)	(15.0)	(14.3)	(13.6)	(13.1)	(12.3)	(11.4)	(10.7)	(9.1)	(7.9)	(7.3)	(5.1)	(2.8)							
	B.H.P.		1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.0	2.5	3.0	3.2	3.5	3.8							

SUCTION & DISCHARGE SIZES		
PUMP SIZE	**SUCTION**	**DISCHARGE**
A35-14A	1-1/4 (32)	1-1/4 (32)
M4-R4	1-1/2 (38)	1-1/2 (38)

NOTES:

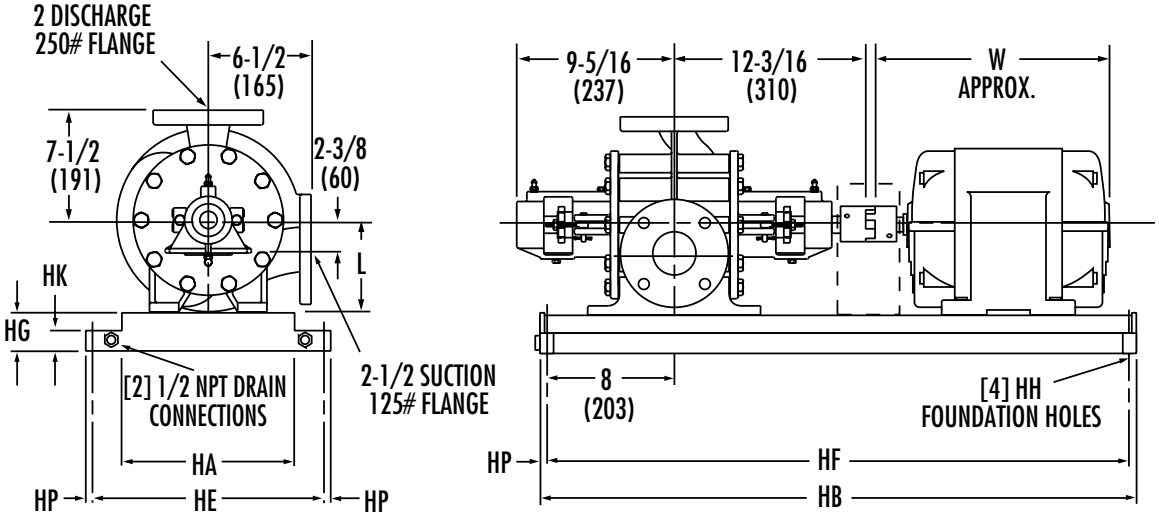
1. Above table shows the operating range of each size pump based on 20 (6096.0) feet suction lift at sea level. Greater suction lift is permissible but the performance will be altered slightly.
2. Two pumps can be connected in series, thereby developing twice the head of a single pump requiring twice the horsepower. Usually the arrangement calls for both pumps mounted on one side of the motor; however, by using an extended shaft motor one pump can be mounted on either side.
3. Pump efficiency can be computed by this formula
$$\frac{\text{G.P.M. x total head for water x specific gravity}}{3960 \times \text{B.H.P.}}$$
4. Performance based on pumping clear water at normal temperatures.
5. Liquids of higher viscosity than water require slightly additional B.H.P.; also pump capacity is slightly reduced. Where viscosity exceeds 600" Saybolt Universal, refer to factory for recommendations.

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AURORA 116A SERIES
TYPE 6RTL AND 6RTLS

TWO STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	D6T	E6T	F6T



RIGHT HAND PUMP ILLUSTRATED

MOTOR FRAME	BASE NO.	L	W
143T	3	6-1/4 (159)	12 (305)
145T	3	6-1/4 (159)	13 (330)
182T	3	6-1/4 (159)	13 (330)
184T	5	6-1/4 (159)	14 (356)
213T	5	6-1/4 (159)	16 (406)
215T	6	6-1/4 (159)	18 (457)
254T	8	6-1/4 (159)	21 (533)
256T	8	6-1/4 (159)	23 (584)

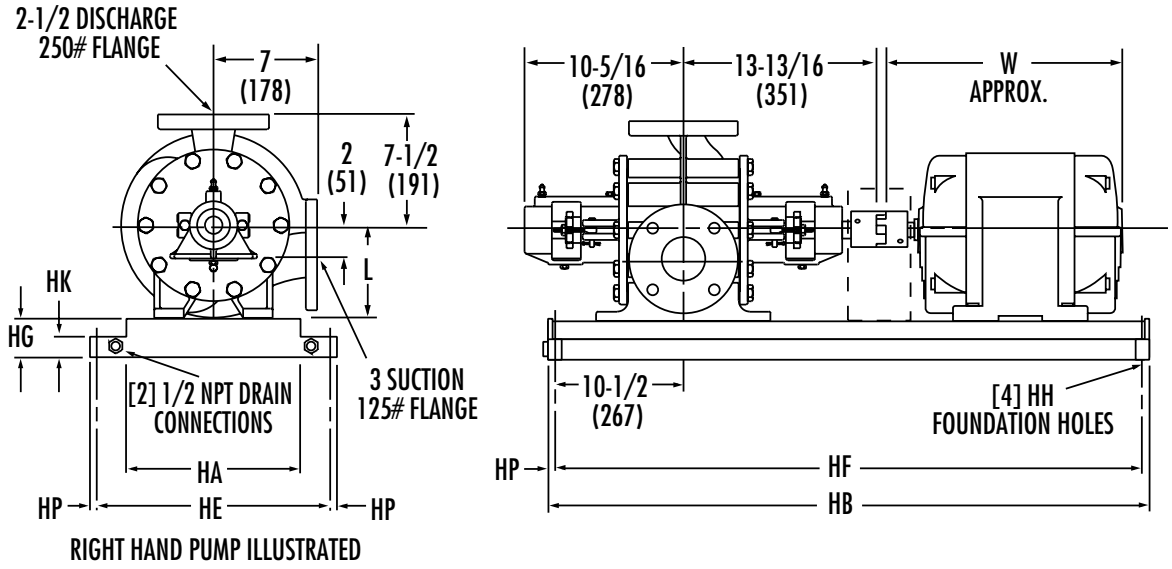
MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
143T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
145T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
182T	3	9 x 33	9 (229)	33-1/2 (851)	13-3/4 (349)	32-1/4 (819)	3 (76)	3/4 (19)	1-1/2 (38)	5/8 (16)
184T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
213T	5	11 x 36	11 (279)	36-1/2 (927)	15-7/8 (403)	35-1/8 (892)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
215T	6	11 x 42	11 (279)	42-1/2 (1080)	15-7/8 (403)	41-1/8 (1045)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
254T	8	14 x 42	14 (356)	42-1/2 (1080)	19 (483)	41 (1041)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)
255T	8	14 x 42	14 (356)	42-1/2 (1080)	19 (483)	41 (1041)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)

NOTES:

1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA 116A SERIES
TYPE 6RATL AND 6RATLS
TWO STAGE APCO PUMPS
ON STEEL DRIP RIM BASE

PUMP MODELS	G6T	HGT	J6T	K6T



RIGHT HAND PUMP ILLUSTRATED

MOTOR FRAME	BASE NO.	L	W
213T	6	6-1/4 (159)	16 (406)
215T	6	6-1/4 (159)	18 (457)
254T	9	6-1/4 (159)	21 (533)
256T	9	6-1/4 (159)	23 (584)
284TS	9	7 (178)	22 (559)
284T	9	7 (178)	24 (610)
286TS	9	7 (178)	24 (610)
286T	9	7 (178)	25 (635)
324T	12	8 (203)	26 (660)

MOTOR FRAME	BASE NO.	BASE SIZE	HA	HB	HE	HF	HG	HH	HK	HP
213T	6	11 x 42	11 (279)	42-1/2 (1080)	15-7/8 (403)	41-1/8 (1045)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
215T	6	11 x 42	11 (279)	42-1/2 (1080)	15-7/8 (403)	41-1/8 (1045)	3 (76)	7/8 (22)	1-1/2 (38)	11/16 (17)
254T	9	14 x 48	14 (356)	48-1/2 (1232)	19 (483)	47 (1194)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)
256T	9	14 x 48	14 (356)	48-1/2 (1232)	19 (483)	47 (1194)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)
284T	9	14 x 48	14 (356)	48-1/2 (1232)	19 (483)	47 (1194)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)
284TS	9	14 x 48	14 (356)	48-1/2 (1232)	19 (483)	47 (1194)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)
286T	9	14 x 48	14 (356)	48-1/2 (1232)	19 (483)	47 (1194)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)
286TS	9	14 x 48	14 (356)	48-1/2 (1232)	19 (483)	47 (1194)	3 (76)	1 (25)	1-1/2 (38)	3/4 (19)
324T	12	18 x 54	18 (457)	54-1/2 (1384)	25-1/8 (638)	52-7/8 (1343)	4 (102)	1-1/8 (29)	2 (51)	13/16 (21)

NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

AURORA SERIES 110

SELECTION TABLE
1750 R.P.M.

Supersedes Section 110 Page 395
Dated JULY 1969

PUMP SIZES A35 THROUGH R4

PUMP SIZE	TOTAL DYNAMIC HEAD	PSI (BARS)	4.4 (0.3)	8.6 (0.6)	13 (0.9)	17.3 (1.2)	21.5 (1.5)	26 (1.8)	30 (2.1)	34.5 (2.4)	43 (3.0)	50 (3.4)	54 (3.7)	65 (4.5)	73.5 (5.1)	86.5 (6.0)	49.5 (3.4)	108 (7.4)	130 (9.0)	151.5 (10.4)	173 (11.9)	195 (13.4)
		FEET (METERS)	10 (3)	20 (6)	30 (9)	40 (12)	50 (15)	60 (18)	70 (21)	80 (24)	100 (31)	115 (35)	125 (38)	150 (46)	170 (52)	200 (61)	230 (70)	250 (76)	300 (91)	350 (107)	400 (122)	450 (137)
A35	G.P.M.		3.6	3.2	2.8	2.5	2.1	1.8	1.5	1.2												
	M^3/HR		(0.8)	(0.7)	(0.6)	(0.6)	(0.5)	(0.4)	(0.3)	(0.3)												
	B.H.P.		.04	.05	.06	.07	.08	.09	.10	.11												
A4	G.P.M.		4.4	4.0	3.7	3.3	3.0	2.6	2.3	1.9	1.2											
	M^3/HR		(1.0)	(0.9)	(0.8)	(0.7)	(0.7)	(0.6)	(0.5)	(0.4)	(0.3)											
	B.H.P.		.06	.08	.09	.11	.12	.14	.15	.17	.20											
B4	G.P.M.		2.5	2.3	2.0	1.8	1.6	1.4	1.2	1.0	.6											
	M^3/HR		(0.6)	(0.5)	(0.5)	(0.4)	(0.4)	(0.3)	(0.3)	(0.2)	(0.1)											
	B.H.P.		.03	.04	.05	.06	.07	.08	.09	.10	.11											
C4	G.P.M.		6.2	5.6	5.4	4.6	4.4	4.2	3.4	3.2	2.3	1.5										
	M^3/HR		(1.4)	(1.3)	(1.2)	(1.0)	(1.0)	(1.0)	(0.8)	(0.7)	(0.5)	(0.3)										
	B.H.P.		.08	.09	.10	.12	.13	.15	.18	.20	.25	.28										
D4	G.P.M.		8.3	7.7	7.3	6.6	6.2	5.6	5.1	4.7	3.7	2.9	2.5	1.2								
	M^3/HR		(1.9)	(1.7)	(1.7)	(1.5)	(1.4)	(1.3)	(1.2)	(1.1)	(0.8)	(0.7)	(0.6)	(0.3)								
	B.H.P.		.12	.18	.20	.20	.23	.25	.30	.34	.40	.45	.49	.59								
E4	G.P.M.		10.2	9.9	9.4	9.0	8.5	8.0	7.5	7.1	6.2	5.5	5.0	3.7	2.8							
	M^3/HR		(2.3)	(2.2)	(2.1)	(2.0)	(1.9)	(1.8)	(1.7)	(1.6)	(1.4)	(1.2)	(1.1)	(0.8)	(0.6)							
	B.H.P.		.22	.25	.28	.30	.32	.34	.38	.40	.46	.50	.54	.63	.71							
F4	G.P.M.		14.2	13.5	12.8	12.1	11.5	11.0	10.5	9.8	8.7	7.5	7.2	5.8	4.8	3.0						
	M^3/HR		(3.2)	(3.1)	(2.9)	(2.7)	(2.6)	(2.5)	(2.4)	(2.2)	(2.0)	(1.7)	(1.6)	(1.3)	(1.1)	(0.7)						
	B.H.P.		.27	.29	.30	.35	.40	.42	.45	.50	.60	.70	.75	.83	.95	1.1						
G4	G.P.M.		17.5	16.8	15.9	15.0	14.5	13.7	13.0	12.4	11.0	10.2	9.5	7.9	6.5	4.9	3.0					
	M^3/HR		(4.0)	(3.8)	(3.6)	(3.4)	(3.3)	(3.1)	(3.0)	(2.8)	(2.5)	(2.3)	(2.2)	(1.8)	(1.5)	(1.1)	(0.7)					
	B.H.P.		.25	.30	.35	.40	.42	.48	.50	.52	.70	.75	.80	1.0	1.2	1.4	1.5					
H4	G.P.M.		24.5	23.3	22.5	20.8	20.0	18.6	17.0	15.8	12.8	9.5	8.5									
	M^3/HR		(5.6)	(5.3)	(5.1)	(4.7)	(4.5)	(4.2)	(3.9)	(3.6)	(2.9)	(2.2)	(1.9)									
	B.H.P.		.35	.40	.45	.60	.65	.70	.75	.80	.85	1.0	1.1									
I4	G.P.M.		27.5	26.2	25.0	24.0	23.0	21.2	20.0	18.9	16.1	14.5	13.0	10.0	7.0							
	M^3/HR		(6.2)	(6.0)	(5.7)	(5.5)	(5.2)	(4.8)	(4.5)	(4.3)	(3.7)	(3.3)	(3.0)	(2.3)	(1.6)							
	B.H.P.		.40	.45	.50	.60	.70	.75	.85	.95	1.1	1.2	1.3	1.4	1.5							
I4A	G.P.M.		37.0	35.8	34.0	32.5	31.0	29.1	27.0	25.5	21.6	18.5	16.1	11.0								
	M^3/HR		(8.4)	(8.1)	(7.7)	(7.4)	(7.0)	(6.6)	(6.1)	(5.8)	(4.9)	(4.2)	(3.7)	(2.5)								
	B.H.P.		.75	.90	.95	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.8								
M4	G.P.M.		51.0	48.0	45.2	43.0	40.0	36.5	33.2	30.0	22.0	16.0	10.0									
	M^3/HR		(11.6)	(10.9)	(10.3)	(9.8)	(9.1)	(8.3)	(7.5)	(6.8)	(5.0)	(3.6)	(2.3)									
	B.H.P.		.80	1.0	1.2	1.3	1.4	1.5	1.6	1.75	2.0	2.3	2.5									
P4	G.P.M.		59.0	56.5	54.0	51.0	48.5	46.0	42.0	40.0	33.0	27.0	24.0	10.0								
	M^3/HR		(13.4)	(12.8)	(12.3)	(11.6)	(11.0)	(10.4)	(9.5)	(9.1)	(7.5)	(6.1)	(5.5)	(2.3)								
	B.H.P.		1.0	1.1	1.2	1.4	1.5	1.7	1.8	1.9	2.2	2.5	2.6	3.0								
R4	G.P.M.		69.0	66.0	63.0	60.0	57.5	54.0	50.0	47.0	40.0	35.0	32.0	22.5	12.5							
	M^3/HR		(15.7)	(15.0)	(14.3)	(13.6)	(13.1)	(12.3)	(11.4)	(10.7)	(9.1)	(7.9)	(7.3)	(5.1)	(2.8)							
	B.H.P.		1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.0	2.5	3.0	3.2	3.5	3.8							

SUCTION & DISCHARGE SIZES		
PUMP SIZE	**SUCTION**	**DISCHARGE**
A35-14A	1-1/4 (32)	1-1/4 (32)
M4-R4	1-1/2 (38)	1-1/2 (38)

NOTES:

1. Above table shows the operating range of each size pump based on 20 (6096.0) feet suction lift at sea level. Greater suction lift is permissible but the performance will be altered slightly.
2. Two pumps can be connected in series, thereby developing twice the head of a single pump requiring twice the horsepower. Usually the arrangement calls for both pumps mounted on one side of the motor; however, by using an extended shaft motor one pump can be mounted on either side.
3. Pump efficiency can be computed by this formula
$$\frac{\text{G.P.M. x total head for water x specific gravity}}{3960 \times \text{B.H.P.}}$$
4. Performance based on pumping clear water at normal temperatures.
5. Liquids of higher viscosity than water require slightly additional B.H.P.; also pump capacity is slightly reduced. Where viscosity exceeds 600" Saybolt Universal, refer to factory for recommendations.

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Dated JULY 1969

AURORA SERIES 110

SELECTION TABLE
1750 R.P.M.

PUMP SIZE D4T THROUGH I5

PUMP SIZE	TOTAL DYNAMIC HEAD	PSI (BARS)	4.4 (0.3)	8.6 (0.6)	13 (0.9)	17.3 (1.2)	21.5 (1.5)	26 (1.8)	30 (2.1)	34.5 (2.4)	43 (3.0)	50 (3.4)	54 (3.7)	65 (4.5)	73.5 (5.1)	86.5 (6.0)	49.5 (3.4)	108 (7.4)	130 (9.0)	151.5 (10.4)	173 (11.9)	195 (13.4)
		FEET (METERS)	10 (3)	20 (6)	30 (9)	40 (12)	50 (15)	60 (18)	70 (21)	80 (24)	100 (30)	115 (35)	125 (38)	150 (46)	170 (52)	200 (61)	230 (70)	250 (76)	300 (91)	350 (107)	400 (122)	450 (137)
D4T		G.P.M.	8.7	8.4	8.2	7.7	7.6	7.4	7.2	6.8	6.4	6.0	5.7	5.1	4.6	3.9	3.2	2.7	1.5			
		M^3/HR	(2.0)	(1.9)	(1.9)	(1.7)	(1.7)	(1.7)	(1.6)	(1.5)	(1.5)	(1.4)	(1.3)	(1.2)	(1.0)	(0.9)	(0.7)	(0.6)	(0.3)			
		B.H.P.	.30	.33	.37	.40	.41	.42	.44	.46	.48	.50	.56	.60	.65	.75	.85	.90	1.2			
E4T		G.P.M.	10.6	10.4	10.2	9.8	9.4	9.1	8.8	8.2	8.0	7.7	7.2	6.5	6.1	5.3	4.5	4.1	3.1	2.2	1.3	
		M^3/HR	(2.4)	(2.4)	(2.3)	(2.2)	(2.1)	(2.1)	(2.0)	(1.9)	(1.8)	(1.7)	(1.6)	(1.5)	(1.4)	(1.2)	(1.0)	(0.9)	(0.7)	(0.5)	(0.3)	
		B.H.P.	.30	.35	.37	.40	.45	.49	.50	.51	.53	.60	.70	.80	.90	1.0	1.2	1.3	1.5	1.7	1.8	
F4T		G.P.M.	14.5	14.0	13.8	13.3	13.0	12.7	12.3	11.9	11.3	10.8	10.5	9.8	8.9	8.0	7.2	6.3	5.2	4.0	2.8	1.4
		M^3/HR	(3.3)	(3.2)	(3.1)	(3.0)	(3.0)	(2.9)	(2.8)	(2.7)	(2.6)	(2.5)	(2.4)	(2.2)	(2.0)	(1.8)	(1.6)	(1.4)	(1.2)	(0.9)	(0.6)	(0.3)
		B.H.P.	.50	.58	.63	.70	.75	.80	.91	.95	.98	1.0	1.0	1.1	1.2	1.4	1.5	1.6	1.9	2.0	2.2	2.6
G4T		G.P.M.	18.2	18.0	17.5	16.7	16.2	15.9	15.2	14.8	14.0	13.7	13.2	12.2	11.5	10.5	9.4	8.9	7.2	5.6	3.9	2.1
		M^3/HR	(4.1)	(4.1)	(4.0)	(3.8)	(3.7)	(3.6)	(3.5)	(3.4)	(3.2)	(3.1)	(3.0)	(2.8)	(2.6)	(2.4)	(2.1)	(2.0)	(1.6)	(1.3)	(0.9)	(0.5)
		B.H.P.	.50	.55	.60	.70	.73	.75	.80	.90	1.0	1.0	1.1	1.2	1.3	1.4	1.7	1.8	2.0	2.3	2.8	3.0
H4T		G.P.M.	25.0	24.5	23.7	23.0	22.5	21.5	21.0	20.5	19.2	18.0	17.5	16.0	14.2	12.0	9.5	7.8				
		M^3/HR	(5.7)	(5.6)	(5.4)	(5.2)	(5.1)	(4.9)	(4.8)	(4.7)	(4.4)	(4.1)	(4.0)	(3.6)	(3.2)	(2.7)	(2.2)	(1.8)				
		B.H.P.	.70	.75	.80	.90	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.1	2.3				
I4T		G.P.M.	30.0	29.0	28.5	27.5	27.0	26.5	25.2	24.5	23.2	22.5	21.0	19.6	17.5	16.0	13.0	12.0	8.5			
		M^3/HR	(6.8)	(6.6)	(6.5)	(6.2)	(6.1)	(6.0)	(5.7)	(5.6)	(5.3)	(5.1)	(4.8)	(4.5)	(4.0)	(3.6)	(3.0)	(2.7)	(1.9)			
		B.H.P.	.90	1.0	1.0	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.7	1.8	1.9	2.1	2.3	2.5	3.0			
I4TA		G.P.M.	38.5	37.5	36.5	36.0	35.0	34.5	33.5	33.0	31.0	30.0	29.0	26.5	25.0	21.2	17.0	15.5				
		M^3/HR	(8.7)	(8.5)	(8.3)	(8.2)	(7.9)	(7.8)	(7.6)	(7.5)	(7.0)	(6.8)	(6.6)	(6.0)	(5.7)	(4.8)	(3.9)	(3.5)				
		B.H.P.	1.0	1.1	1.2	1.3	1.5	1.7	1.8	1.9	2.0	2.2	2.4	2.6	2.7	2.9	3.0	3.2				
D5		G.P.M.	6.7	6.6	6.4	6.3	6.2	6.0	5.8	5.7	5.4	5.1	5.0	4.5	4.2	3.7	3.2	2.7	2.0			
		M^3/HR	(1.5)	(1.5)	(1.5)	(1.4)	(1.4)	(1.4)	(1.3)	(1.3)	(1.2)	(1.2)	(1.1)	(1.0)	(1.0)	(0.8)	(0.7)	(0.6)	(0.5)			
		B.H.P.	.45	.48	.50	.52	.54	.56	.58	.60	.65	.70	.72	.75	.78	.80	.90	1.0	1.2			
E5		G.P.M.	10.3	10.1	9.8	9.7	9.5	9.3	9.1	8.9	8.5	8.2	7.9	7.3	7.0	6.3	5.6	5.3	4.2	3.2	2.1	
		M^3/HR	(2.3)	(2.3)	(2.2)	(2.2)	(2.2)	(2.1)	(2.1)	(2.0)	(1.9)	(1.9)	(1.8)	(1.7)	(1.6)	(1.4)	(1.3)	(1.2)	(1.0)	(0.7)	(0.5)	
		B.H.P.	.55	.56	.58	.59	.60	.63	.67	.70	.75	.78	.80	.85	.90	1.0	1.1	1.2	1.3	1.5	1.7	
F5		G.P.M.	17.6	17.0	16.5	16.0	15.6	15.2	14.5	14.0	13.0	12.2	11.8	10.5	9.5	8.0	6.5	5.5	3.0			
		M^3/HR	(4.0)	(3.9)	(3.7)	(3.6)	(3.5)	(3.5)	(3.3)	(3.2)	(3.0)	(2.8)	(2.7)	(2.4)	(2.2)	(1.8)	(1.5)	(1.2)	(0.7)			
		B.H.P.	.40	.43	.47	.50	.55	.60	.70	.75	.90	1.0	1.0	1.2	1.3	1.5	1.7	1.8	2.0			
G5		G.P.M.	22.0	21.5	21.0	20.5	20.0	19.4	19.0	18.5	18.0	17.0	16.8	15.5	14.5	13.0	12.0	10.5	8.3	6.3	3.5	
		M^3/HR	(5.0)	(4.9)	(4.8)	(4.7)	(4.5)	(4.4)	(4.3)	(4.2)	(4.1)	(3.9)	(3.8)	(3.5)	(3.3)	(3.0)	(2.7)	(2.4)	(1.9)	(1.4)	(0.8)	
		B.H.P.	.80	.83	.87	.90	.95	.98	1.0	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.1	2.2	2.8	3.2	
H5		G.P.M.	24.0	23.7	23.5	23.1	23.0	22.6	22.1	21.8	21.2	20.8	19.4	18.5	17.6	16.5	15.4	14.5	12.5	10.5		
		M^3/HR	(5.5)	(5.4)	(5.3)	(5.2)	(5.2)	(5.1)	(5.0)	(5.0)	(4.8)	(4.7)	(4.4)	(4.2)	(4.0)	(3.7)	(3.5)	(3.3)	(2.8)	(2.4)		
		B.H.P.	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.5	1.8	1.9	2.0	2.3	2.5	2.9	3.3		
I5		G.P.M.	37.2	36.6	36.0	35.5	35.0	34.0	33.5	33.0	32.0	31.0	30.0	28.5	27.0	25.2	23.0	22.2	19.0	16.0		
		M^3/HR	(8.4)	(8.3)	(8.2)	(8.1)	(7.9)	(7.7)	(7.6)	(7.5)	(7.3)	(7.0)	(6.8)	(6.5)	(6.1)	(5.7)	(5.2)	(5.0)	(4.3)	(3.6)		
		B.H.P.	1.2	1.3	1.3	1.4	1.5	1.7	2.0	2.3	2.4	2.4	2.5	2.7	2.9	3.3	3.7	3.8	4.0	5.0		

NOTES:

1. Above table shows the operating range of each size pump based on 20 (6096.0) feet suction lift at sea level. Greater suction lift is permissible but the performance will be altered slightly.
2. Two pumps can be connected in series, thereby developing twice the head of a single pump requiring twice the horsepower. Usually the arrangement calls for both pumps mounted on one side of the motor; however, by using an extended shaft motor one pump can be mounted on either side.
3. Pump efficiency can be computed by this formula
   $$\frac{\text{G.P.M. x total head for water x specific gravity}}{3960 \times \text{B.H.P.}}$$
4. Performance based on pumping clear water at normal temperatures.
5. Liquids of higher viscosity than water require slightly additional B.H.P.; also pump capacity is slightly reduced. Where viscosity exceeds 600" Saybolt Universal, refer to factory for recommendations.

SUCTION & DISCHARGE SIZES		
PUMP SIZE	**SUCTION**	**DISCHARGE**
D4T-I5	1-1/4 (32)	1-1/4 (32)

AURORA®
Pentair Pump Group

AURORA SERIES 110

SELECTION TABLE
1750 R.P.M.

PUMP SIZES J5 THROUGH I5T

PUMP SIZE	TOTAL DYNAMIC HEAD	PSI (BARS)	4.4 (0.3)	8.6 (0.6)	13 (0.9)	17.3 (1.2)	21.5 (1.5)	26 (1.8)	30 (2.1)	34.5 (2.4)	43 (3.0)	50 (3.4)	54 (3.7)	65 (4.5)	73.5 (5.1)	86.5 (6.0)	99.5 (6.9)	108 (7.4)	130 (9.0)	151.5 (10.4)	173 (11.9)	195 (13.4)	216.5 (14.9)	238 (16.4)
		FEET (METERS)	10 (3)	20 (6)	30 (9)	40 (12)	50 (15)	60 (18)	70 (21)	80 (24)	100 (30)	115 (35)	125 (38)	150 (46)	170 (52)	200 (61)	230 (70)	250 (76)	300 (91)	350 (107)	400 (122)	450 (137)	500 (152)	550 (168)
J5	G.P.M.		43.5	43.0	42.0	41.5	40.5	39.5	38.2	37.6	36.0	35.0	33.5	31.2	30.0	27.0	23.5	21.5	18.0	13.0	8.0			
	M^3/HR		(9.9)	(9.8)	(9.5)	(9.4)	(9.2)	(9.0)	(8.7)	(8.5)	(8.2)	(7.9)	(7.6)	(7.1)	(6.8)	(6.1)	(5.3)	(4.9)	(4.1)	(3.0)	(1.8)			
	B.H.P.		1.3	1.3	1.4	1.4	1.5	1.8	2.0	2.1	2.4	2.5	2.7	2.9	3.4	3.7	4.0	4.5	5.0	5.5	6.2			
K5	G.P.M.		53.0	52.0	51.0	50.0	48.5	47.0	46.5	45.5	43.5	42.0	41.0	37.5	36.0	33.0	29.0	27.5	22.5	17.0	12.0	6.0		
	M^3/HR		(12.0)	(11.8)	(11.6)	(11.4)	(11.0)	(10.7)	(10.6)	(10.3)	(9.9)	(9.5)	(9.3)	(8.5)	(8.2)	(7.5)	(6.6)	(6.2)	(5.1)	(3.9)	(2.7)	(1.4)		
	B.H.P.		1.3	1.4	1.5	1.7	2.0	2.3	2.4	2.5	2.6	2.7	2.9	3.1	3.5	4.0	4.8	5.0	5.9	6.5	7.5	8.2		
L5	G.P.M.		72.5	71.0	68.0	67.0	65.0	63.0	62.0	60.5	58.0	55.0	53.0	50.0	47.0	43.0	39.0	37.0	31.0	24.0	18.0			
	M^3/HR		(16.5)	(16.1)	(15.4)	(15.2)	(14.8)	(14.3)	(14.1)	(13.7)	(13.2)	(12.5)	(12.0)	(11.4)	(10.7)	(9.8)	(8.9)	(8.4)	(7.0)	(5.5)	(4.1)			
	B.H.P.		2.0	2.2	2.4	2.5	2.6	2.8	3.0	3.2	3.7	3.8	4.0	4.8	5.2	5.6	6.7	7.0	8.0	9.0	10.5			
M5	G.P.M.		82.0	78.0	76.0	72.0	69.0	67.0	62.0	58.0	50.0	40.0	30.0											
	M^3/HR		(18.6)	(17.7)	(17.3)	(16.4)	(15.7)	(15.2)	(14.1)	(13.2)	(11.4)	(9.1)	(6.8)											
	B.H.P.		1.3	1.5	1.7	1.9	2.0	2.1	2.4	2.6	3.0	3.4	3.7											
N5	G.P.M.		108.0	103.0	98.0	92.5	87.0	82.0	76.0	72.0	63.0	56.0	51.0	40.0	34.0	18.0								
	M^3/HR		(24.5)	(23.4)	(22.3)	(21.0)	(19.8)	(18.6)	(17.3)	(16.4)	(14.3)	(12.7)	(11.6)	(9.1)	(7.7)	(4.1)								
	B.H.P.		1.3	1.4	1.9	2.3	2.6	2.7	3.0	3.5	4.0	4.4	5.0	6.0	6.2	7.0								
P5	G.P.M.		148.0	142.0	136.0	132.0	127.0	121.0	116.0	111.0	100.0	93.0	86.0	75.0	64.0	45.0								
	M^3/HR		(33.6)	(32.2)	(30.9)	(30.0)	(28.8)	(27.5)	(26.3)	(25.2)	(22.7)	(21.1)	(19.5)	(17.0)	(14.5)	(10.2)								
	B.H.P.		2.3	2.5	3.0	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.5	8.0	10.0								
D5T	G.P.M.		6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	5.9	5.8	5.7	5.6	5.4	5.0	4.9	4.5	4.2	3.7	3.2	2.9	2.4
	M^3/HR		(1.6)	(1.5)	(1.5)	(1.5)	(1.5)	(1.5)	(1.4)	(1.4)	(1.4)	(1.3)	(1.3)	(1.3)	(1.3)	(1.2)	(1.1)	(1.1)	(1.0)	(1.0)	(0.8)	(0.7)	(0.7)	(0.5)
	B.H.P.		0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.5	1.7	1.9	1.9	2.0
E5T	G.P.M.		10.3	10.1	10.0	9.9	9.8	9.7	9.6	9.5	9.3	9.0	8.8	8.7	8.4	8.0	7.6	7.5	6.9	6.2	5.7	4.9	4.3	3.7
	M^3/HR		(2.3)	(2.3)	(2.3)	(2.2)	(2.2)	(2.2)	(2.2)	(2.2)	(2.1)	(2.0)	(2.0)	(2.0)	(1.9)	(1.8)	(1.7)	(1.7)	(1.6)	(1.4)	(1.3)	(1.1)	(1.0)	(0.8)
	B.H.P.		1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.8	1.9	2.0	2.2	2.4	2.7	2.8
F5T	G.P.M.		17.5	17.3	17.0	16.8	16.5	16.2	15.6	15.4	15.0	14.6	14.2	13.5	12.8	12.1	11.4	10.8	9.3	7.9	6.2	5.0	3.5	2.0
	M^3/HR		(4.0)	(3.9)	(3.9)	(3.8)	(3.7)	(3.7)	(3.5)	(3.5)	(3.4)	(3.3)	(3.2)	(3.1)	(2.9)	(2.7)	(2.6)	(2.5)	(2.1)	(1.8)	(1.4)	(1.1)	(0.8)	(0.5)
	B.H.P.		1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.5	1.5	1.6	1.8	1.9	2.0	2.1	2.5	2.7	3.1	3.4	3.8	3.9
G5T	G.P.M.		22.3	22.0	21.7	21.5	21.2	21.0	20.9	20.5	20.0	19.5	19.1	18.8	18.3	17.5	16.8	16.2	15.0	13.7	12.5	11.5	10.0	8.8
	M^3/HR		(5.1)	(5.0)	(4.9)	(4.9)	(4.8)	(4.8)	(4.7)	(4.7)	(4.5)	(4.3)	(4.3)	(4.3)	(4.2)	(4.0)	(3.8)	(3.7)	(3.4)	(3.1)	(2.8)	(2.6)	(2.3)	(2.0)
	B.H.P.		1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.0	2.1	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.9	3.1	3.5	4.0	4.5	5.0
H5T	G.P.M.		24.5	24.2	24.0	23.7	23.5	23.2	23.0	22.8	22.5	22.3	21.9	21.2	21.0	20.3	19.2	18.9	17.9	17.0	16.0	14.5	13.5	12.5
	M^3/HR		(5.6)	(5.5)	(5.5)	(5.4)	(5.3)	(5.3)	(5.2)	(5.2)	(5.1)	(5.1)	(5.0)	(4.8)	(4.8)	(4.6)	(4.4)	(4.3)	(4.1)	(3.9)	(3.6)	(3.3)	(3.1)	(2.8)
	B.H.P.		2.0	2.1	2.2	2.2	2.3	2.4	2.5	2.7	2.8	2.9	3.0	3.0	3.1	3.2	3.5	3.6	4.0	4.2	4.5	5.0	5.2	6.0
I5T	G.P.M.		37.6	37.5	37.1	36.4	36.5	36.2	36.0	35.5	34.5	33.2	32.6	32.0	31.9	31.0	28.5	28.0	27.0	25.0	23.0	21.3	19.0	17.2
	M^3/HR		(8.5)	(8.5)	(8.4)	(8.3)	(8.3)	(8.2)	(8.2)	(8.1)	(7.8)	(7.5)	(7.4)	(7.3)	(7.2)	(7.0)	(6.5)	(6.4)	(6.1)	(5.7)	(5.2)	(4.8)	(4.3)	(3.9)
	B.H.P.		2.2	2.2	2.3	2.5	2.7	2.8	2.9	3.0	3.0	3.0	3.0	3.1	3.1	3.5	3.9	4.0	4.3	5.0	6.0	7.1	7.5	8.0

NOTES:

1. Above table shows the operating range of each size pump based on 20 (6096.0) feet suction lift at sea level. Greater suction lift is permissible but the performance will be altered slightly.
2. Two pumps can be connected in series, thereby developing twice the head of a single pump requiring twice the horsepower. Usually the arrangement calls for both pumps mounted on one side of the motor; however, by using an extended shaft motor one pump can be mounted on either side.
3. Pump efficiency can be computed by this formula
   $$\frac{\text{G.P.M. x total head for water x specific gravity}}{3960 \times \text{B.H.P.}}$$
4. Performance based on pumping clear water at normal temperatures.
5. Liquids of higher viscosity than water require slightly additional B.H.P.; also pump capacity is slightly reduced. Where viscosity exceeds 600" Saybolt Universal, refer to factory for recommendations.

SUCTION & DISCHARGE SIZES		
PUMP SIZE	**SUCTION**	**DISCHARGE**
J5-P5	2 (51)	1-1/2 (38)
D5T-I5T	1-1/4 (32)	1-1/4 (32)

AURORA SERIES 110

SELECTION TABLE
1750 R.P.M.

PUMP SIZES G6 THROUGH KGT

PUMP SIZE	TOTAL DYNAMIC HEAD	PSI (BARS)	4.4 (0.3)	8.6 (0.6)	13 (0.9)	17.3 (1.2)	21.5 (1.5)	26 (1.8)	30 (2.1)	34.5 (2.4)	43 (3.0)	50 (3.4)	54 (3.7)	65 (4.5)	73.5 (5.1)	86.5 (6.0)	99.5 (6.9)	108 (7.4)	130 (9.0)	151.5 (10.4)	173 (11.9)	195 (13.4)	216.5 (14.9)	238 (16.4)
		FEET (METERS)	10 (3)	20 (6)	30 (9)	40 (12)	50 (15)	60 (18)	70 (21)	80 (24)	100 (30)	115 (35)	125 (38)	150 (46)	170 (52)	200 (61)	230 (70)	250 (76)	300 (91)	350 (107)	400 (122)	450 (137)	500 (152)	550 (168)
G6	G.P.M.		105.0	102.0	97.0	92.5	90.0	88.0	83.0	80.0	74.0	69.0	67.0	60.5	56.0	50.0	42.0	40.0	30.0					
	M^3/HR		(23.8)	(23.2)	(22.0)	(21.0)	(20.4)	(20.0)	(18.8)	(18.2)	(16.8)	(15.7)	(15.2)	(13.7)	(12.7)	(11.4)	(9.5)	(9.1)	(6.8)					
	B.H.P.		1.8	1.9	2.1	2.3	2.5	2.7	3.0	3.5	4.0	5.0	5.1	6.0	7.0	7.5	7.9	8.0	10.1					
H6	G.P.M.		131.0	127.0	123.0	118.0	116.0	111.0	109.0	102.0	98.0	93.0	89.0	81.0	75.0	60.0	30.0							
	M^3/HR		(29.8)	(28.8)	(27.9)	(26.8)	(26.3)	(25.2)	(24.8)	(23.2)	(22.3)	(21.1)	(20.2)	(18.4)	(17.0)	(13.6)	(6.8)							
	B.H.P.		2.0	2.4	2.6	2.9	3.0	3.2	3.5	3.9	4.8	5.4	5.9	7.0	7.6	8.4	9.9							
J6	G.P.M.		174.0	167.0	157.0	151.0	146.0	141.0	135.0	128.0	120.0	111.0	108.0	97.5	87.0	73.0	58.0							
	M^3/HR		(39.5)	(37.9)	(35.7)	(34.3)	(33.2)	(32.0)	(30.7)	(29.1)	(27.3)	(25.2)	(24.5)	(22.1)	(19.8)	(16.6)	(13.2)							
	B.H.P.		2.9	3.2	3.5	3.8	4.2	4.9	5.3	6.0	6.8	7.4	8.0	8.6	10.0	12.0	12.3							
K6	G.P.M.		203.0	191.0	178.0	170.0	163.0	157.0	152.0	145.0	135.0	130.0	124.0	114.0	106.0	98.0	69.0							
	M^3/HR		(46.1)	(43.4)	(40.4)	(38.6)	(37.0)	(35.7)	(34.5)	(32.9)	(30.7)	(29.5)	(28.2)	(25.9)	(24.1)	(22.3)	(15.7)							
	B.H.P.		3.0	3.5	4.0	4.5	5.0	5.5	5.9	6.5	7.5	8.0	8.3	9.8	10.5	11.5	13.0							
D6T	G.P.M.		48.5	47.7	47.0	46.0	45.0	44.6	44.0	43.2	42.2	40.5	39.5	38.6	37.9	36.5	34.5	32.8	31.0	28.0	26.3	23.2	21.5	18.3
	M^3/HR		(11.0)	(10.8)	(10.7)	(10.4)	(10.2)	(10.1)	(10.0)	(9.8)	(9.6)	(9.2)	(9.0)	(8.8)	(8.6)	(8.3)	(7.8)	(7.4)	(7.0)	(6.4)	(6.0)	(5.3)	(4.9)	(4.2)
	B.H.P.		1.3	1.5	1.8	2.0	2.2	2.4	2.5	2.6	2.7	2.8	2.8	2.9	3.0	3.5	3.7	4.0	4.7	5.2	5.5	6.5	7.2	7.9
E6T	G.P.M.		64.0	63.0	62.5	62.0	60.5	59.0	58.0	57.5	56.5	55.5	55.0	52.5	51.0	49.0	46.0	45.0	41.5	39.0	36.0	32.0	29.0	26.0
	M^3/HR		(14.5)	(14.3)	(14.2)	(14.1)	(13.7)	(13.4)	(13.2)	(13.1)	(12.8)	(12.6)	(12.5)	(11.9)	(11.6)	(11.1)	(10.4)	(10.2)	(9.4)	(8.9)	(8.2)	(7.3)	(6.6)	(5.9)
	B.H.P.		2.0	2.5	3.0	3.5	4.0	4.5	4.9	5.2	5.5	5.7	5.9	6.2	6.5	7.0	7.5	8.0	9.0	10.0	11.0	12.0	13.0	15.0
F6T	G.P.M.		68.5	68.0	67.5	67.0	66.0	65.0	64.0	63.0	62.0	61.0	60.5	59.0	57.5	55.0	52.5	51.0	47.0	43.0	39.0	34.0	30.0	23.0
	M^3/HR		(15.6)	(15.4)	(15.3)	(15.2)	(15.0)	(14.8)	(14.5)	(14.3)	(14.1)	(13.9)	(13.7)	(13.4)	(13.1)	(12.5)	(11.9)	(11.6)	(10.7)	(9.8)	(8.9)	(7.7)	(6.8)	(5.2)
	B.H.P.		6.2	6.5	6.7	6.0	7.0	7.2	7.4	7.5	7.6	7.6	7.6	8.0	8.1	8.2	8.5	9.5	10.0	11.0	12.0	13.0	13.5	14.9
G6T	G.P.M.		103.0	101.0	100.0	98.0	94.0	92.0	91.0	89.0	87.0	84.0	82.0	78.0	75.0	72.0	67.5	65.0	59.0	52.5	48.0	43.0	37.0	32.0
	M^3/HR		(23.4)	(22.9)	(22.7)	(22.3)	(21.3)	(20.9)	(20.7)	(20.2)	(19.8)	(19.1)	(18.6)	(17.7)	(17.0)	(16.4)	(15.3)	(14.8)	(13.4)	(11.9)	(10.9)	(9.8)	(8.4)	(7.3)
	B.H.P.		2.5	2.8	3.1	3.5	3.9	4.1	4.3	4.7	5.5	5.8	6.0	7.0	7.8	8.5	9.5	10.0	12.0	13.5	14.5	15.9	17.0	19.5
H6T	G.P.M.		128.0	125.0	123.0	121.0	120.0	118.0	117.0	114.0	110.5	108.0	105.0	102.0	98.0	94.0	89.0	85.0	78.0	62.0	43.0	27.0		
	M^3/HR		(29.1)	(28.4)	(27.9)	(27.5)	(27.3)	(26.8)	(26.6)	(25.9)	(25.1)	(24.5)	(23.8)	(23.2)	(22.3)	(21.3)	(20.2)	(19.3)	(17.7)	(14.1)	(9.8)	(6.1)		
	B.H.P.		3.5	3.9	4.5	4.8	5.0	5.2	5.7	6.0	6.5	7.0	7.5	8.0	8.5	9.8	11.0	11.5	13.0	15.2	17.3	18.0		
J6T	G.P.M.		175.0	170.0	165.0	161.0	157.5	152.0	150.0	148.0	140.5	137.0	134.0	127.0	122.0	116.0	109.0	104.0	95.0	83.0	70.5	55.0	32.0	
	M^3/HR		(39.7)	(38.6)	(37.5)	(36.6)	(35.8)	(34.5)	(34.1)	(33.6)	(31.9)	(31.1)	(30.4)	(28.8)	(27.7)	(26.3)	(24.8)	(23.6)	(21.6)	(18.8)	(16.0)	(12.5)	(7.3)	
	B.H.P.		5.0	5.5	5.9	6.2	6.5	7.0	7.5	8.0	9.0	9.8	10.0	10.5	12.0	13.0	14.5	15.0	17.0	19.5	22.0	24.5	26.0	
K6T	G.P.M.		206.0	202.0	195.0	189.0	183.0	180.0	176.0	170.0	164.0	159.0	155.0	149.0	140.0	135.0	127.0	124.0	114.0	105.0	95.0	78.0	31.0	
	M^3/HR		(46.8)	(45.9)	(44.3)	(42.9)	(41.6)	(40.9)	(40.0)	(38.6)	(37.2)	(36.1)	(35.2)	(33.8)	(31.8)	(30.7)	(28.8)	(28.2)	(25.9)	(23.8)	(21.6)	(17.7)	(7.0)	
	B.H.P		6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	12.5	14.0	15.0	17.0	17.5	19.8	22.0	24.0	26.0	26.0	

NOTES:

1. Above table shows the operating range of each size pump based on 20 (6096.0) feet suction lift at sea level. Greater suction lift is permissible but the performance will be altered slightly.
2. Two pumps can be connected in series, thereby developing twice the head of a single pump requiring twice the horsepower. Usually the arrangement calls for both pumps mounted on one side of the motor; however, by using an extended shaft motor one pump can be mounted on either side.
3. Pump efficiency can be computed by this formula
   $$\frac{\text{G.P.M. x total head for water x specific gravity}}{3960 \times \text{B.H.P.}}$$
4. Performance based on pumping clear water at normal temperatures.
5. Liquids of higher viscosity than water require slightly additional B.H.P.; also pump capacity is slightly reduced. Where viscosity exceeds 600" Saybolt Universal, refer to factory for recommendations.

SUCTION & DISCHARGE SIZES		
PUMP SIZE	SUCTION	DISCHARGE
G6-K6	3 (76)	2-1/2 (63)
D6T-F6T	2-1/2 (63)	2 (51)
G6T-K6T	3 (76)	2-1/2 (64)

INSTRUCTION AND REPAIR MANUAL

MODEL 114A-115A-116A and 120B
SINGLE STAGE and TWO STAGE

6

NOTE

This repair manual is applicable to pump models 114A-115A-116A and 120B single and two stage. All photos and exploded views illustrate two stage and models.

ATTENTION: SAFETY WARNINGS:

Read and understand all warnings before installation or servicing pump.

OPERATIONAL LIMITS: *

Maximum Operating Pressure:	300 psi at Temperatures to 225°F (107°C)
Maximum Operating Temperature:	275°F (135°C)

* See ANSI B16.4 for pressure-temperature ratings of class 125 threaded fittings.

* See ASTM A126/ANSI B16.1 for pressure/temperature ratings of flanges.

ELECTRICAL SAFETY:

Warning: Electrical Shock Hazard

All electrical connections are to be made by a qualified electrician in accordance with all codes and ordinances. Failure to follow these instructions could result in serious personal injury, death or property damage.

Warning: Electrical Overload Hazard

Insure all motors have properly sized overload protection. Failure to follow these instructions could result in serious personal injury, death or property damage.

Warning: Sudden Start-Up Hazard

Disconnect and lockout power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

HIGH TEMPERATURE SAFETY:

Warning: Hot Surface Hazard

If pumping hot water, insure guards or proper insulation is installed to protect against skin contact to hot piping or pump components. Failure to follow these instructions could result in serious personal injury, death or property damage.

Warning: Spraying Water Hazard

When servicing pump replace all gaskets and seals. Do not re-use old gaskets or seals. Failure to follow these instructions could result in serious personal injury, death or property damage.

HIGH PRESSURE SAFETY:

Warning: High Pressure Hazard

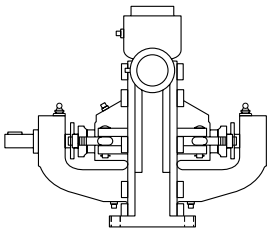
The pump is rated at a maximum of 300 psi at 225°F. Do not exceed this pressure. Install properly sized pressure relief valves in system. Failure to follow these instructions could result in serious personal injury, death or property damage.

Warning: Expansion Hazard

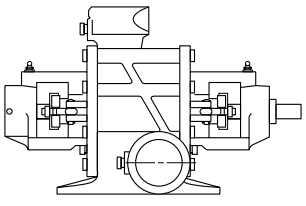
Water expands when heated. Install properly sized thermal expansion tanks and relief valves. Failure to follow these instructions could result in serious personal injury, death or property damage.

SERVICE

Your Aurora pump requires no maintenance other than periodic inspection, occasional cleaning and lubrication of bearings. The intent of inspection is to prevent breakdown, thus obtaining optimum service life.



MODEL 115A
SINGLE STAGE



MODEL 120B
TWO STAGE

AURORA®
Pentair Pump Group

LUBRICATION OF BEARINGS

Regreaseable bearings will require periodic lubrication and can be accomplished by using the zerk or lubrication fittings in the bearing arm. Lubricate the bearings at regular intervals using a grease of high quality. Polyurea base grease is recommended as bearing lubricant for pumps operating in both wet and dry locations. Mixing of different brands of grease should be avoided due to possible chemical reactions between the brands which could damage the bearings. Accordingly, avoid grease of vegetable or animal base which can develop acids, as well as grease containing rosin, graphite, talc and other impurities. Under no circumstances should grease be reused.

Over lubrication should be avoided as it may result in overheating and possible bearing failure. Under normal application, adequate lubrication is assured if the amount of grease is maintained at 1/3 to 1/2 the capacity of the bearing and adjacent space surrounding it. Approximately 1/2 ounce of grease is required to maintain this level.

In dry locations, each bearing will need lubrication at least every 4,000 hours of running time or every 6 to 12 months, whichever is more frequent. In wet locations the bearings should be lubricated at least after every 2,000 hours of running time or every 4 to 6 months, whichever is more frequent. A unit is considered to be installed in a wet location if the pump and motor are exposed to dripping water, to the weather, or to heavy condensation such as is found in unheated and poorly ventilated underground locations.

The motor which drives your Aurora Pump, may or may not, require lubrication. Consult the manufacturer's recommendations for proper maintenance instructions.

REPAIRS

Before starting any work, insure the electrical power is locked out, the system pressure has been lowered to 0 psi and temperature of the unit is at a safe level.

⚠ Warning: Sudden Start-Up Hazard

Disconnect and lockout power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

⚠ Warning: Hot Surface Hazard

If pumping hot water, insure guards or proper insulation is installed to protect against skin contact to hot piping or pump components. Failure to follow these instructions could result in serious personal injury, death or property damage.

⚠ Warning: High Pressure Hazard

The pump is rated at a maximum of 175 psi at 150°F. Do not exceed this pressure. Install properly sized pressure relief valves in system. Failure to follow these instructions could result in serious personal injury, death or property damage.

⚠ Warning: Spraying Water Hazard

When servicing pump replace all gaskets and seals. Do not re-use old gaskets or seals. Failure to follow these instructions could result in serious personal injury, death or property damage.

The pump may be disassembled using the illustrations and text provided. Although complete disassembly is covered, it will seldom be necessary to completely disassemble your Aurora pump.

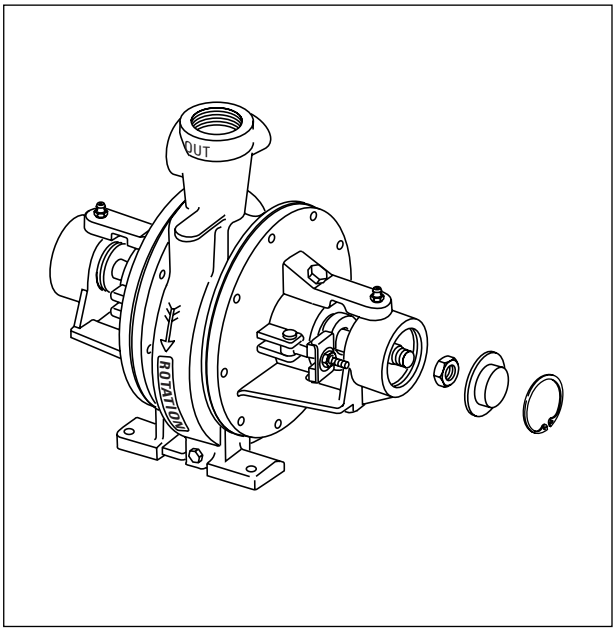
The illustrations accompanying the disassembly instructions show the pump at various stages of disassembly. The illustrations are intended to aid in the correct identification of the parts mentioned in the text.

Inspect removed parts at disassembly to determine if they can be reused. Ball bearings that turn roughly or show wear should be replaced. Cracked castings should never be reused. Scored or worn pump shafts should be replaced. Gaskets should be replaced at reassembly simply as a matter of economy. They are much less expensive to replace routinely than to replace singly as the need arises. While motors and motor controls are often returned to the manufacturer for repairs it is usually more practical and economical to repair the pump at the job site or the pump repair shop.

Cleaning of most parts can be accomplished with the use of clean rags.

⚠ Warning: Use of Solvents

We do not recommend the use of solvents or petroleum cleaners for cleaning the parts because of the fire danger. Failure to follow these instructions could result in serious personal injury, death or property damage.



A. Outboard end of two stage turbine pump with packing. Internal retaining ring, outboard retainer and jam nut shown in foreground.

DISASSEMBLY OF THE PUMP. READ AND UNDERSTAND ALL SAFETY WARNINGS AT THE BEGINNING OF THE MANUAL BEFORE BEGINNING INSTALLATION OR ANY REPAIR WORK. Disassemble only what is needed to make repairs or accomplish inspection. See figures 2 and 3 for single stage pumps. See figures 4 and 5 for two stage pumps.

1. Remove the grease fittings (1) and the pipe plugs (2 and 3). Remove the retaining ring (49) from the outboard cover bearing arm. Remove the outboard retainer (5) by gripping with pliers and twisting. Using a socket wrench, remove the jam nut (6), holding the pump shaft at the inboard end. (See picture A).

CAUTION

Do not apply a wrench or holding tool directly to the shaft, the shaft must not be scratched. Hold the shaft by securing the coupling. Scratching or marring the shaft may result in damage to the mechanical seal or bearings when they are removed later in the disassembly (see Figure 1 following).

2. Remove the coupling and pump coupling key (8) from the shaft. Pry off the inboard retainer (7).

PACKING

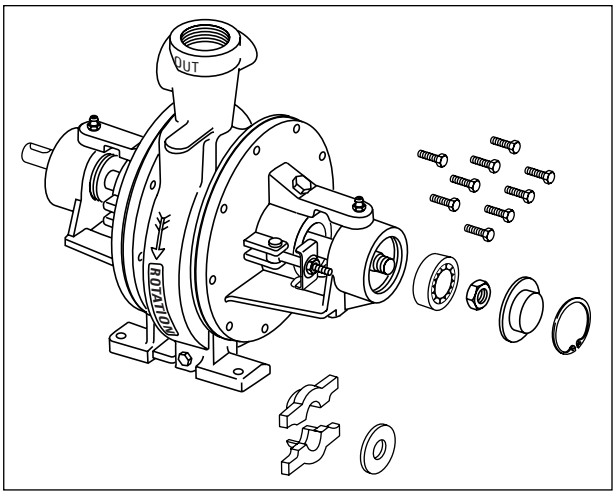
3. On pumps with packing remove the gland nuts (10), washers (11) and clamps (12). Remove the split gland (13). Release the cotter pins (14), and remove the clevis pins (15) and swing bolts (16). On 114A type 4R and 4RTL pumps, the packing gland (13) is one piece and no clamps (12) or washers (11) are required. This gland is removed identically to the slinger washer (22) as outlined in the next step.

4. Remove the cover capscrews (17). Remove the covers (18 and 19 or 20 and 21) by sliding cover back off the shaft (33). Two screwdrivers of small pry bars inserted between each cover and the casing (42) will be required to remove the bearings (29 and 30), which are mounted in the covers, from the shaft.

CAUTION

Removing the covers should be done cautiously. Rough handling could damage either the shaft, mechanical seal, cover gasket or the cover itself and cause needless expense.

When the covers are slid off the shaft, the slinger (22) (and the gland (13) on the 114A 4R and 4RTL pumps) will be released and can be removed.



B. Outboard end, two stage pump with packing. Cover is shown loosened for removal. The internal retaining ring, outboard retainer, jam nut, and bearing are shown as removed.

MECHANICAL SEALS

5. If the pump assembly is equipped with a mechanical seal (24) the seal components should now be removed (see Figures 3 and 5).

   a. Slide the mechanical seal off of shaft. The 114A type 4R and 4RTL standard seal spring does not fit on the step of the drive collar but instead is equipped with a spring cap that rests forward of the step on the drive collar. (See Figure 1.)

   b. If necessary, remove the flexible cup and the stationary seat which will have remained in the cover when it was withdrawn.

   c. Release the set screw (25) and slip the drive collars (26) off the shaft.

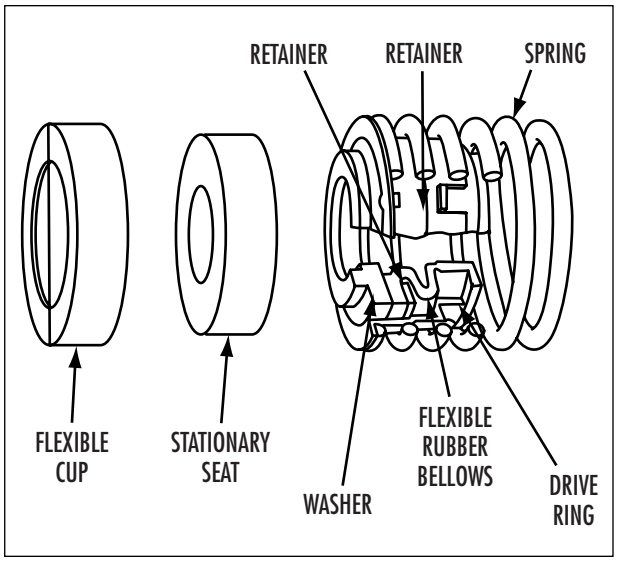


Figure 1. Mechanical Seal

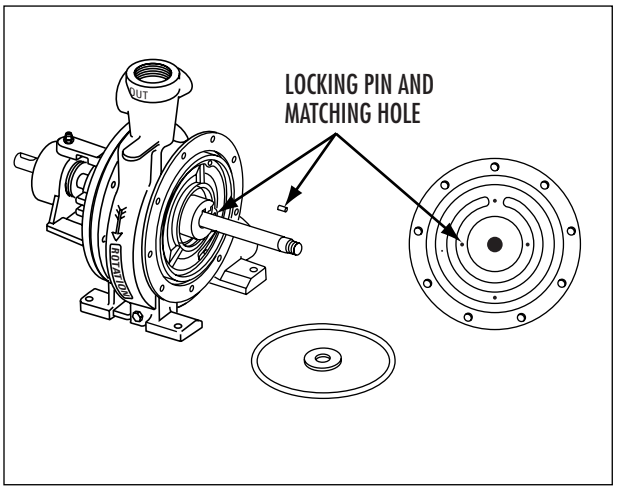
NOTE

Before removing this part, scribe a small mark on the shaft just behind the collars. This will aid in correctly positioning them during reassembly.

6. Remove the cover gaskets (23) and bearing (29) from the outboard cover. Press out the bore retainer (30) from the outboard cover.

7. Remove the cover gaskets (23) and bearing (9) from the inboard cover. Press out the bore retainer (30) from the inboard cover.

8. Remove the outboard channel ring (34). To make removal easier, tap lightly around the casing (42) and against the ring near the outer diameter, and then pull on the shaft. If the channel ring is tight in the casing, it may be driven out from the opposite side by means of a heavy hammer cushioned by a wood block, or, if such facilities are available, pressed out hydraulically. Remove the cover lock pin (32) from the outboard channel ring. Remove the inboard channel ring (35) by similar appropriate means. Remove the cover lock pin (32) from the inboard channel ring. Remove impeller(s) (37), shaft (33) and spacer (39 & 40) assembly. On two stage pumps, remove the spacer key (41) from the casing.



C. The pump with the packing type cover removed. The cover gasket and water slinger are in the foreground.

9. Slide the impeller(s) (37), off the shaft (33). Remove the impeller key(s) (38). Remove the spacers (39 and 40) on two stage pumps.

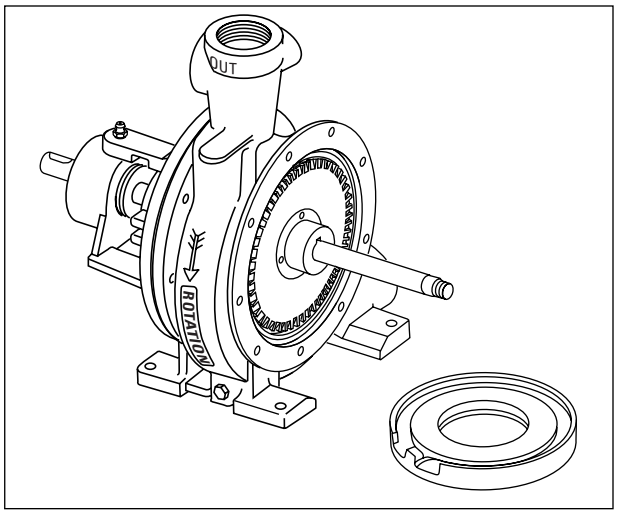
10. Remove the suction and discharge pipe plugs (43 and 44) from the casing (42).

11. If required, remove the name plate pins (45) and name plate (46).

REASSEMBLY. Clean and inspect all parts thoroughly prior to reassembly. Replace worn or damaged parts. Check that all mating surfaces are free of nicks and burrs.

Inspect the shaft and bearings carefully for signs of excessive wear. Reassembly operations cover the entire pump. Reassembly will generally be in reverse order of disassembly but not exactly so. If disassembly was not complete, use for reference those steps which apply to your particular repair program. If the pump was removed from the baseplate, consult the installation section of this manual before operating again. Reassemble the pump as follows.

1. Subassembly inboard impeller key (38) and inboard impeller (37) on two stage pumps.



D. The pump with the outboard channel ring removed. The shape of the waterway and the location of the intake and discharge ports can be seen.

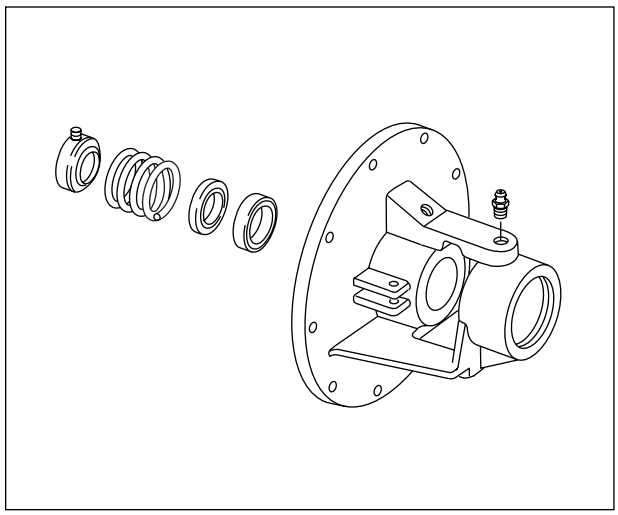
2. Press cover lock pins (32) into channel rings (34 and 35). Set inboard channel ring (35) into position in the casing (42). On two stage pumps, position spacer key (41) in slot at bottom of pump casing. Make a sub assembly of the shaft (33) with inboard impeller (37) and spacer rings (39 & 40). Align matching slots in the spacer rings with spacer key (41) and slide the assembly into the casing, shaft coupling end first. During this time, make sure that the suction and discharge openings in the rings and spacers line up with the suction and discharge posts in the bore of the casing. Position outboard channel ring (34) and slide into casing. Position cover gaskets (23) on each side of the casing.

MECHANICAL SEALS

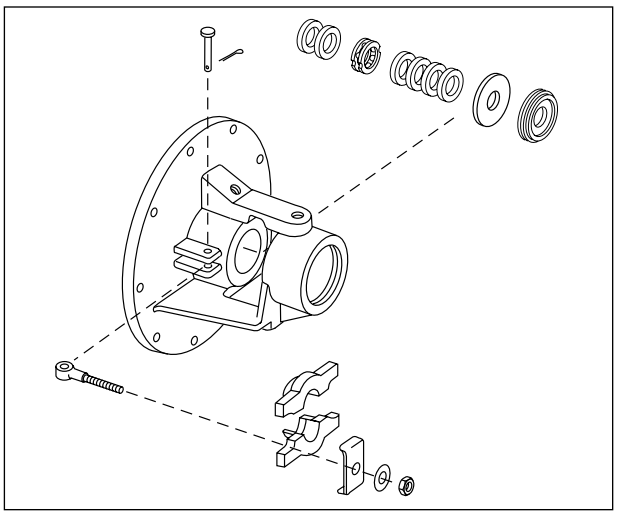
3. If unit is equipped with mechanical seals, (a) slide drive collars (26) onto shaft, locate in accordance with scribed mark (see disassembly instructions) and secure with set screw (25); (b) subassembly flexible cup and stationary seat to cover (20 and 21).

⚠ Warning: Spraying Water Hazard

When servicing pump replace all gaskets and seals. Do not re-use old gaskets or seals. Failure to follow these instructions could result in serious personal injury, death or property damage.



E. Seal cover with mechanical seal and drive collar with setscrew.



F. Packing cover with packing, optional lantern ring, swing bolts and gland halves. Water slinger and bore retainer also shown.

NOTE

The mechanical seal (24) (See Figures 1, 3 and 5) cannot be installed as an assembly. It is necessary to have the seal seat properly in place before the balance of parts can be added.

Thoroughly inspect the seal cavity in the cover checking for burrs or nicks which could damage the flexible cup of the mechanical seal. Apply a film of liquid dishwashing detergent to the flexible cup and seal seat. Insert seal in the cup and install with cup down.

NOTE

If it is not possible to insert seat with fingers, place cardboard protecting ring, furnished with seal, over lapped face of seat and press into place with a piece of tubing having end cut square. Tubing should be slightly larger than the diameter of the shaft. Remove cardboard ring after seat is firmly seated.

Apply a film of dishwashing detergent to allow remaining seal parts to be pushed onto shaft. Check the proper sequence of assembly as indicated in Figure 1.

PACKING

If a packing type unit is being reassembled, subassemble packings (27) and optional lantern ring (28) to stuffing box cavity of cover.

4. Press in bore retainer (30) into bearing arm of outboard cover (18 or 20). Slip cover assembly over shaft.

CAUTION

Proceed with care — do not damage mechanical seal parts if these are used.

As shaft end emerges from the stuffing box or seal cavity, slip slinger (and gland 114A 4R and 4RTL only) into place over shaft between housing and bearing arm. Position cover to casing making sure lock pins (32) are engaged and secure to the channel ring. Tighten outboard cover to casing using capscrew (17). (See picture C.)

5. Press bearing (29) into bearing arm and onto shaft being cautious not to damage bearing races, balls and cage. Assemble and tighten jam nut (6) to outboard end of shaft. Place outboard retainer (5) into bore and secure using outboard retaining ring (49).

6. Assemble inboard cover (19 or 21) to casing following the procedures outlined in Step 4.

7. Slide the bearing tolerance ring (50) onto the shaft until it engages the undercut on the shaft. Press the bearing (9) onto the shaft and into the bearing bore until it rests lightly against the bore retainer (30).

   If you encounter a problem pressing the bearing on the shaft, use a short piece of plastic pipe with an inside diameter slightly larger than the shaft diameter. Place one end of the pipe against the inner race of the bearing and tap the other end lightly with a soft headed mallet until the bearing is in position.

8. Press the inboard retainer (7) onto the bearing arm. Assemble pipe plugs (44, 43, 3 and 2) and grease fittings (1) to the covers.

9. Assemble swing bolts (16) using clevis pins (15) and cotter pins (14). Assemble glands (13) using clamps (12) washers (11) and nuts (10). Do not tighten nuts.

10. Grease bearings as previously outlined and insure shaft is free turning prior to starting pump.

⚠ Warning: Pump Mounting

Before starting to remount the pump with an electric motor or drive, read and understand all the warnings listed below.

ELECTRICAL SAFETY:

⚠ Warning: Electrical Shock Hazard

All electrical connections are to be made by a qualified electrician in accordance with all codes and ordinances. Failure to follow these instructions could result in serious personal injury, death or property damage.

⚠ Warning: Electrical Overload Hazard

Insure all motors have properly sized overload protection. Failure to follow these instructions could result in serious personal injury, death or property damage.

⚠ Warning: Sudden Start-Up Hazard

Disconnect and lockout power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

HIGH PRESSURE SAFETY:

⚠ Warning: High Pressure Hazard

The pump is rated at a maximum of 300 psi at 225°F. Do not exceed this pressure. Install properly sized pressure relief valves in system. Failure to follow these instructions could result in serious personal injury, death or property damage.

⚠ Warning: Expansion Hazard

Water expands when heated. Install properly sized thermal expansion tanks and relief valves. Failure to follow these instructions could result in serious personal injury, death or property damage.

IMPORTANT

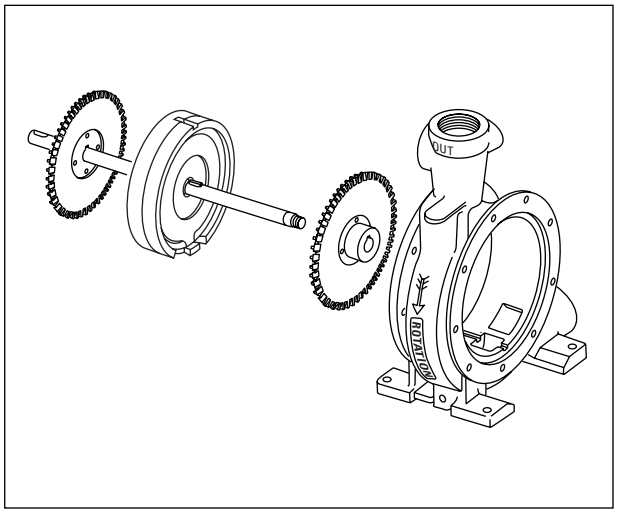
After the pump is mounted to the base and reconnected to the electric motor through a flexible coupling, it is important to check for parallel and angular alignment of the coupling in accordance with the coupling manufacturers recommendation. Proper alignment will reduce the possibility of coupling noise or vibration of the pumping unit.

STARTING PUMP AFTER REASSEMBLY. Do not start pump until all air and vapor has been bled and there is liquid in the pump to provide the necessary lubrication. It is possible that the mechanical seal may drip during first few minutes of operation.

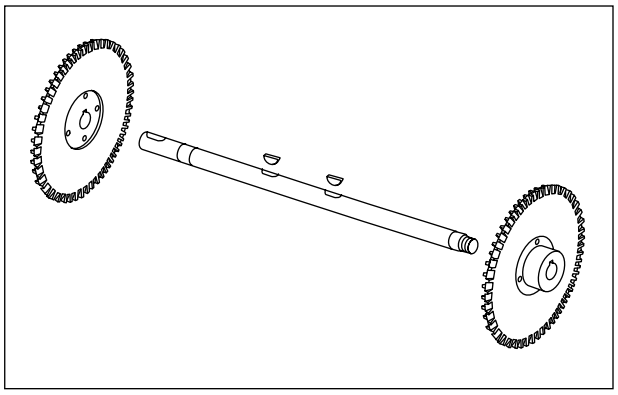
NOTE

Do not overtighten packing; final adjustment must be made after pump is operating.

When adjusting packing, turn both nuts down evenly a flat or two at a time. Let packing work in, then tighten the gland nut another flat or two. This process should be continued until drip rate is approximately 20 to 30 drops per minute. Overtightening a gland will cause the stuffing box to heat up and will also cause excessive wear on the shaft.



G. The pump with the shaft, impellers and spacer rings removed. The outboard impeller has been slipped of the shaft.



H. The shaft, impellers and impeller keys for a two stage pump.

A LIST OF PARTS
MODEL 114A-115A-116A AND 120B SINGLE STAGE PUMPS
(See Figures 2 and 3)

1. Grease Fitting
2. Pipe Plug
3. Pipe Plug
5. Outboard Retainer
6. Jam Nut
7. Inboard Retainer
8. Key
9. Bearing
10. Nut
11. Washer
12. Clamp
13. Gland
14. Cotter Pin
15. Clevis Pin
16. Swing Bolt
17. Capscrew
18. Cover, Packing, RH
19. Cover, Packing, LH
20. Cover, Seal, RH
21. Cover, Seal, LH
22. Slinger
23. "O" Ring
24. Seal
25. Setscrew
26. Collar
27. Packing
28. Lantern Ring (optional)
29. Bearing
30. Bore Retainer
32. Pin
33. Shaft
34. Channel Ring O.B.
35. Channel Ring I.B.
37. Impeller
38. Key
42. Casing
43. Pipe Plug
44. Pipe Plug
45. Drive Screw
46. Nameplate
49. Internal Retaining Ring
50. Tolerance Ring

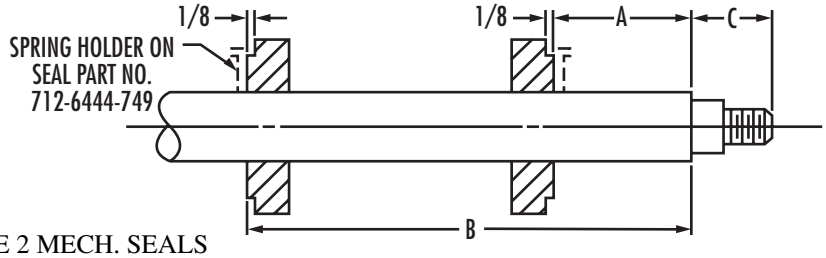
A LIST OF PARTS
MODEL 114A-115A-116A AND 120B TWO STAGE PUMPS
(See Figures 4 and 5)

1. Grease Fitting
2. Pipe Plug
3. Pipe Plug
5. Outboard Retainer
6. Jam Nut
7. Inboard Retainer
8. Key
9. Bearing
10. Nut
11. Washer
12. Clamp
13. Gland
14. Cotter Pin
15. Clevis Pin
16. Swing Bolt
17. Capscrew
18. Cover, Packing, RH
19. Cover, Packing, LH
20. Cover, Seal, RH
21. Cover, Seal, LH
22. Slinger
23. "O" Ring
24. Seal
25. Setscrew
26. Collar
27. Packing
28. Lantern Ring (optional)
29. Bearing
30. Bore Retainer
32. Pin
33. Shaft
34. Channel Ring O.B.
35. Channel Ring I.B.
37. Impeller
38. Key
39. Spacer
40. Spacer
41. Key
42. Casing
43. Pipe Plug
44. Pipe Plug
45. Drive Screw
46. Nameplate
49. Internal Retaining Ring
50. Tolerance Ring

NOTE

WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL.

ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR, OR THE FACTORY AT NORTH AURORA, ILLINOIS.



JOHN CRANE TYPE 2 MECH. SEALS

PUMP SERIES	SHAFT NUMBER	SEAL NUMBER	COLLAR NUMBER	A	B	C
A35-I4A*	728 7258	712 6444	224 0083	2-7/16	5-1/8	21/32
M4-R4	728 7266	712 0707	224 0082	2-5/8	7-7/16	29/32
D4T-I4TA	728 7259	712 6444	224 0083	2-7/16	6-3/8	21/32
D5-I5	728 7260	712 0707	224 0082	3	7-5/8	29/32
J5-P5	728 7267	712 6452	224 0227	3-1/4	9-1/4	31/32
D5T-I5T	728 7261	712 0707	224 0082	3	9-1/8	29/32
G6-K6	728 7264	712 0713	224 0084	4-3/16	11-11/16	1-1/8
D6T-F6T	728 7263	712 0713	224 0084	4-3/16	11-11/16	1-1/8
G6T-K6T	728 7265	712 0713	224 0084	4-3/16	14-15/16	1-1/8
121	728 7273	712 0707	224 0082	2-11/16	7	29/32
122	728 7274	712 0707	224 0082	2-11/16	9	29/32

* When using replacement seal 712-6444-749, do not change location of collars. Place back of spring holder against collar as shown above.

NOTES: 1. The dimensions shown apply only to seal part numbers indicated.
2. Dimensions not for certification.

SINGLE STAGE PUMPS

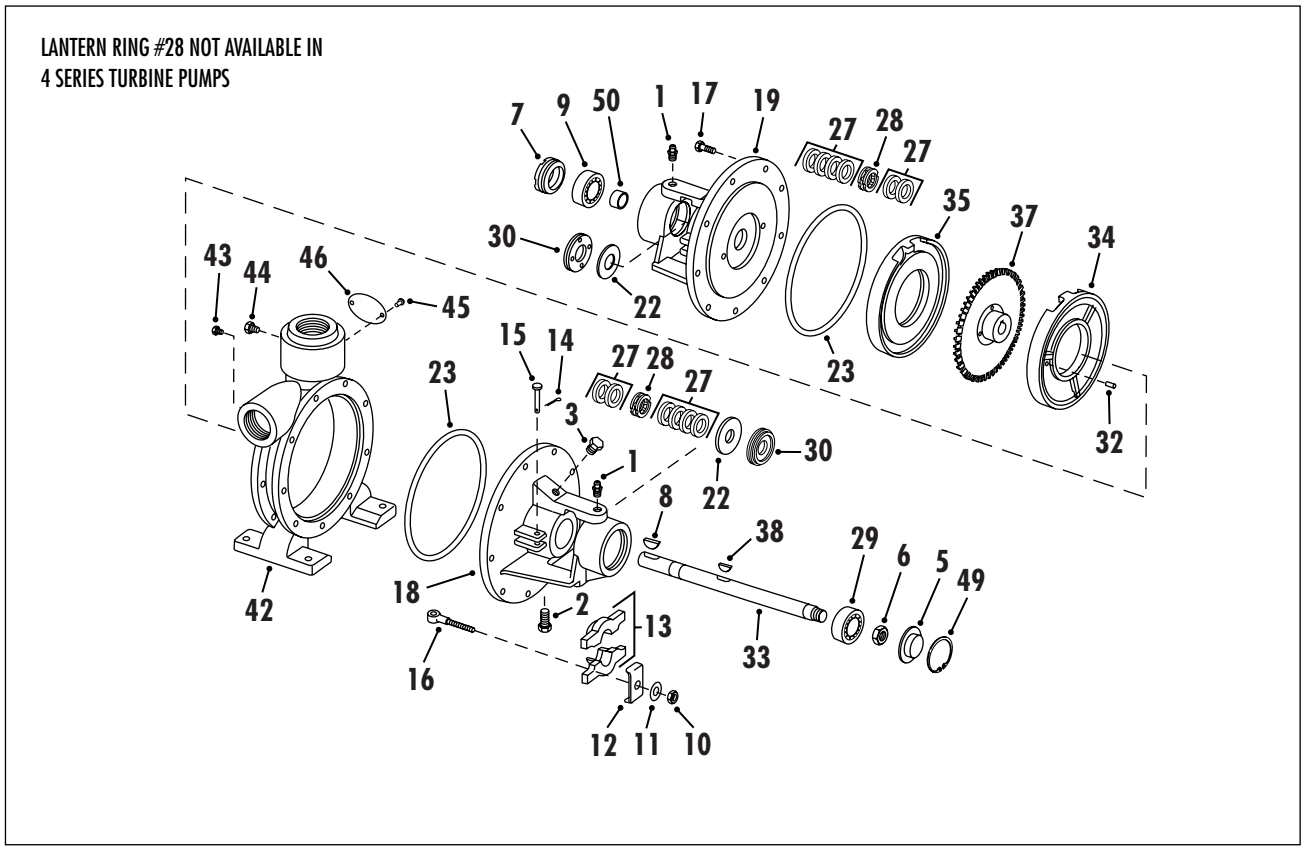


Figure 2. Pump Exploded View (Standard Packing)

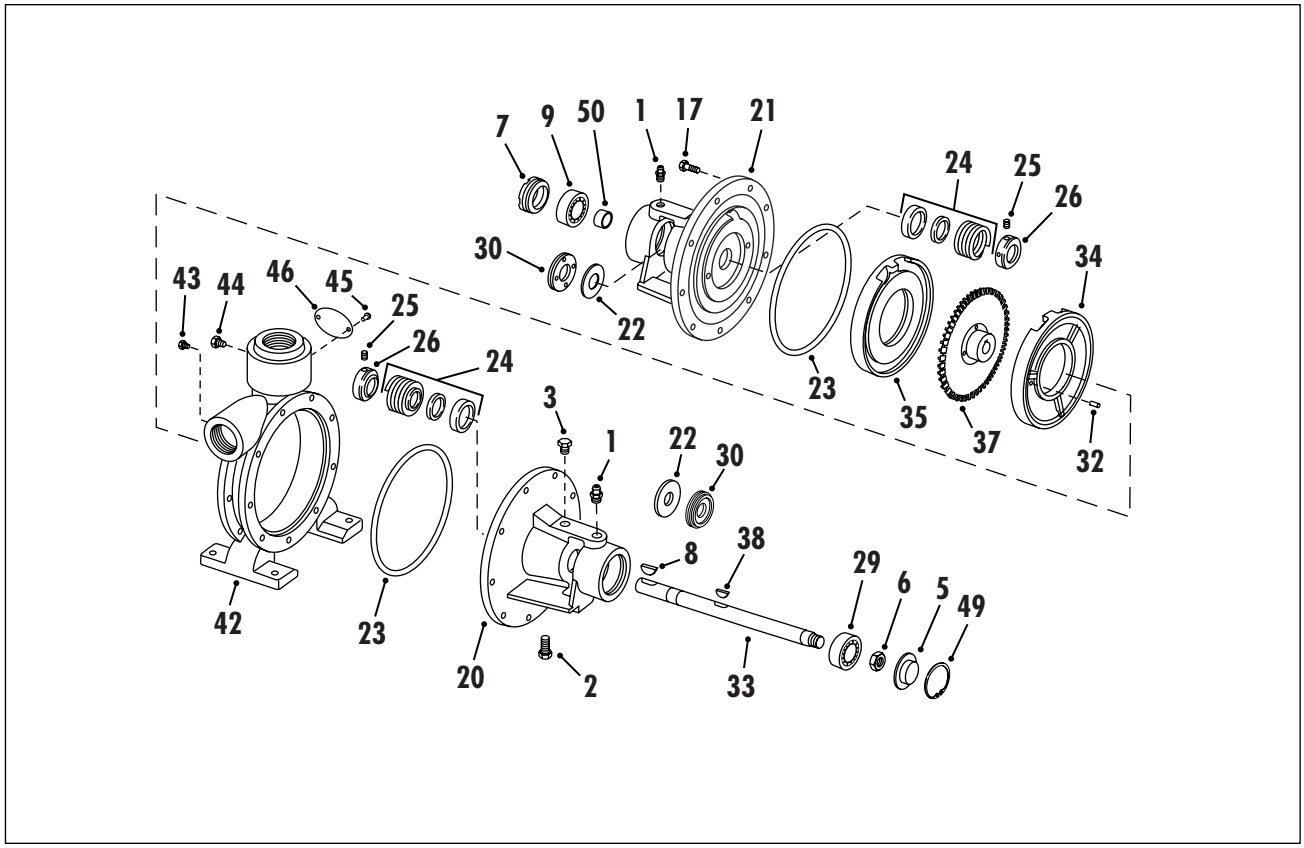


Figure 3. Pump Exploded View (Mechanical Seal)

TWO STAGE PUMPS

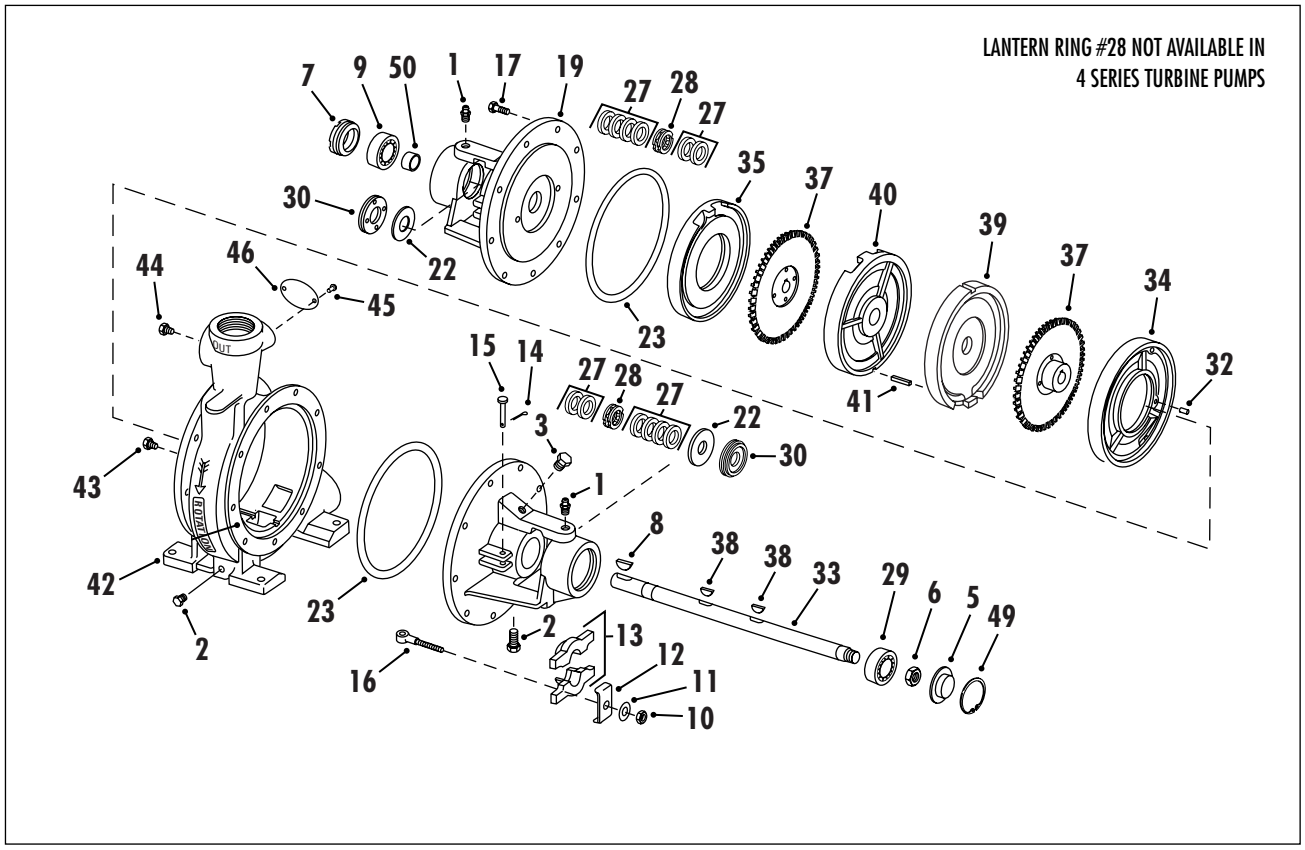


Figure 4. Pump Exploded View (Standard Packing)

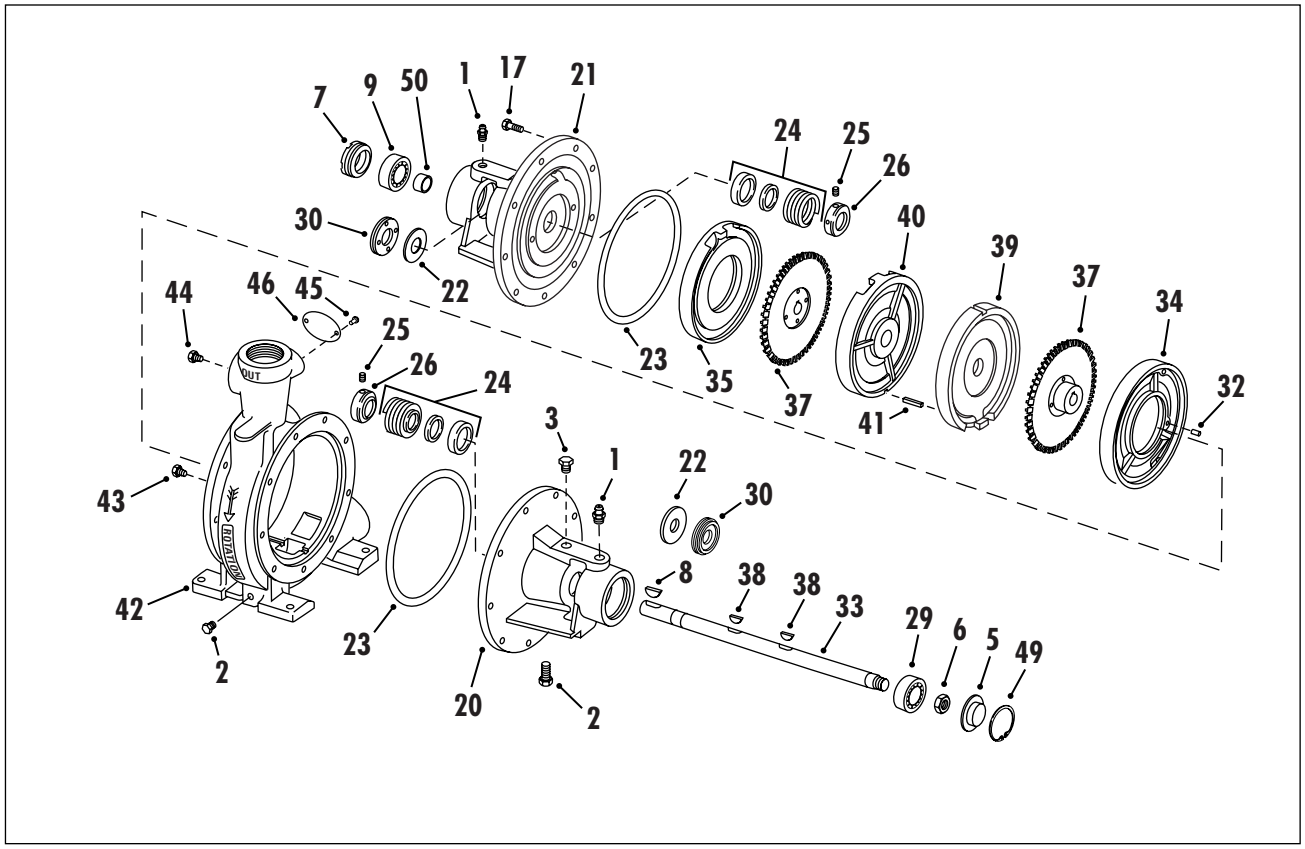


Figure 5. Pump Exploded View (Mechanical Seal)

AP-SECT.6 - ITEM 110A (3.04)

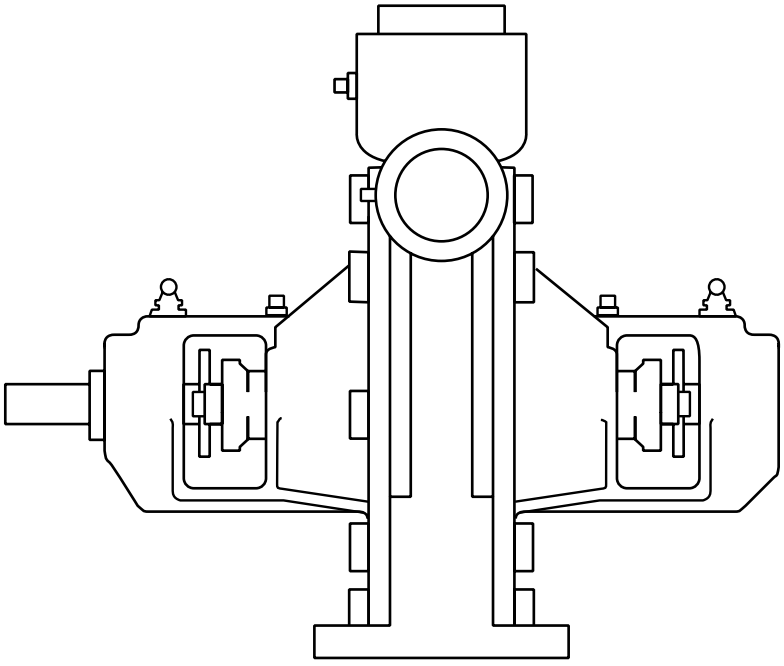
AURORA®
Pentair Pump Group

NOTE:
Aurora Pump reserves the right to make revisions to its products and their specifications, this bulletin and related information without notice

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SUPERSEDES 110P PAGE 1
DATED JANUARY 1999

110A SERIES
REPAIR PARTS INDEX



READ AND UNDERSTAND THE PUMP AND MOTOR INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL, DISASSEMBLE OR REPAIR THE PUMP

AURORA®
PENTAIR PUMP GROUP

REFERENCE NOTES

REPAIR PARTS INDEX

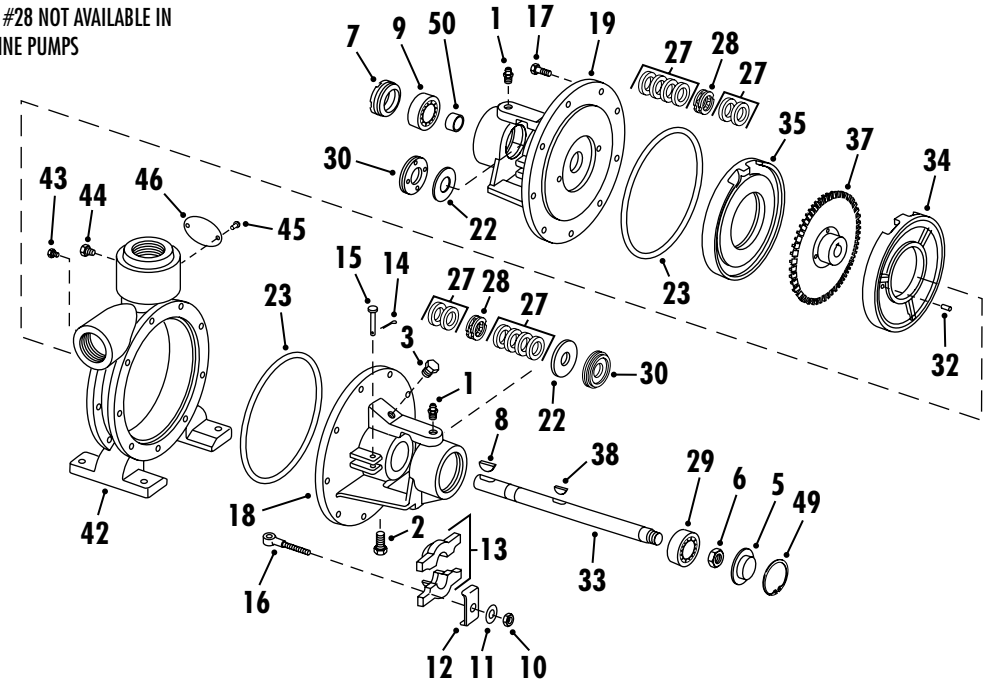
PUMP MODEL	PUMP SIZE	PAGES
114A SINGLE STAGE	A35 A4 B4 C4 D4 E4 F4 G4 H4 I4 14A	6, 7 & 9
	M4 P4 R4	8 & 9
114A TWO STAGE	D4T E4T F4T G4T I4T I4TA	6, 7 & 9
115A SINGLE STAGE	D5 E5 F5 G5 H5 I5	10 & 11
115A SINGLE STAGE	J5 K5 L5 M5 N5 P5	12 & 13
115A TWO STAGE	D5T E5T F5T G5T H5T I5T	10 & 11
116A SINGLE STAGE	G6 H6 J6 K6	14 & 15
116A TWO STAGE	D6T E6T F6T G6T H6T J6T K6T	

REPAIR PARTS KITS FOR ALL PUMP SIZES MAY BE FOUND ON PAGES 9, 11, 13 AND 15 OF THIS MANUAL.

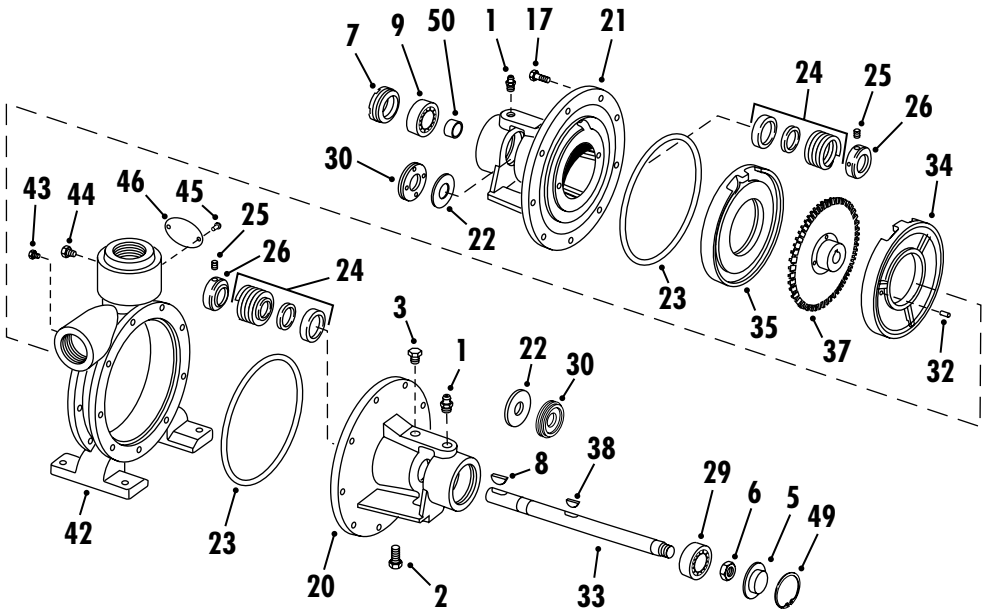
110A SERIES
MODEL 114A-115A-116A
SINGLE STAGE PUMPS

PIECE NUMBERS

LANTERN RING #28 NOT AVAILABLE IN
4 SERIES TURBINE PUMPS

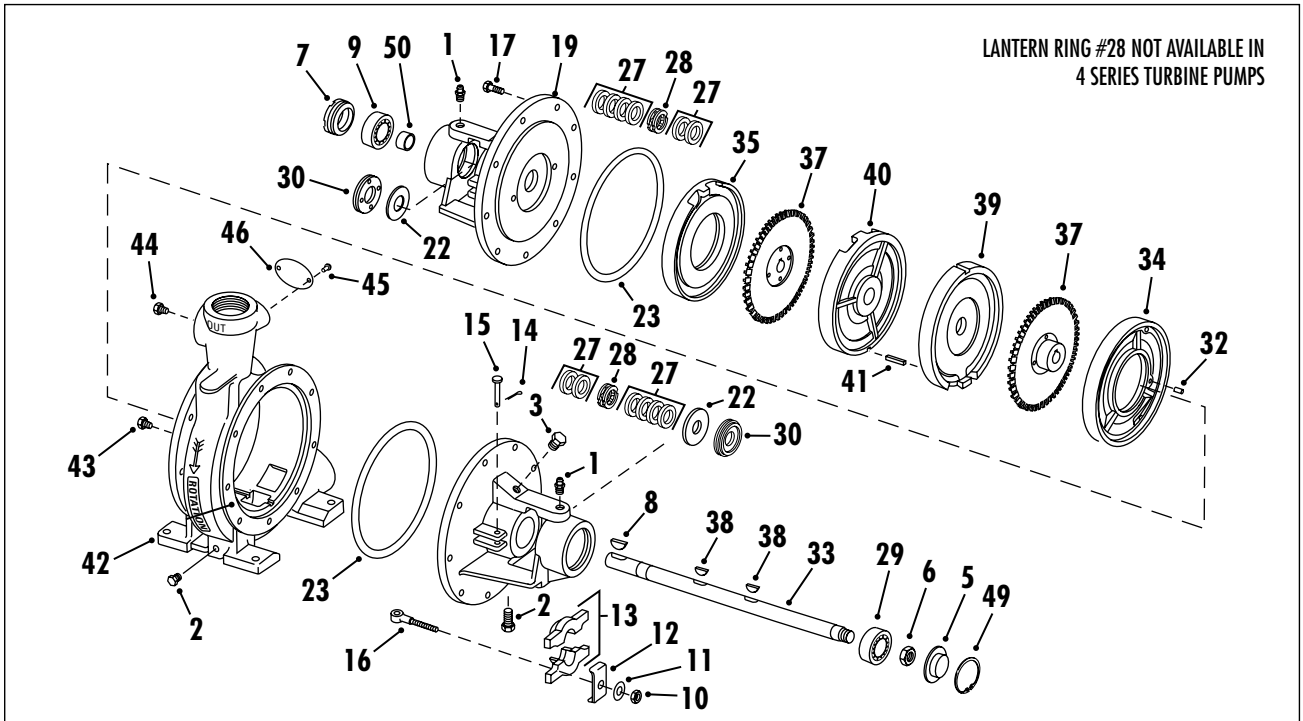


SINGLE STAGE WITH PACKING

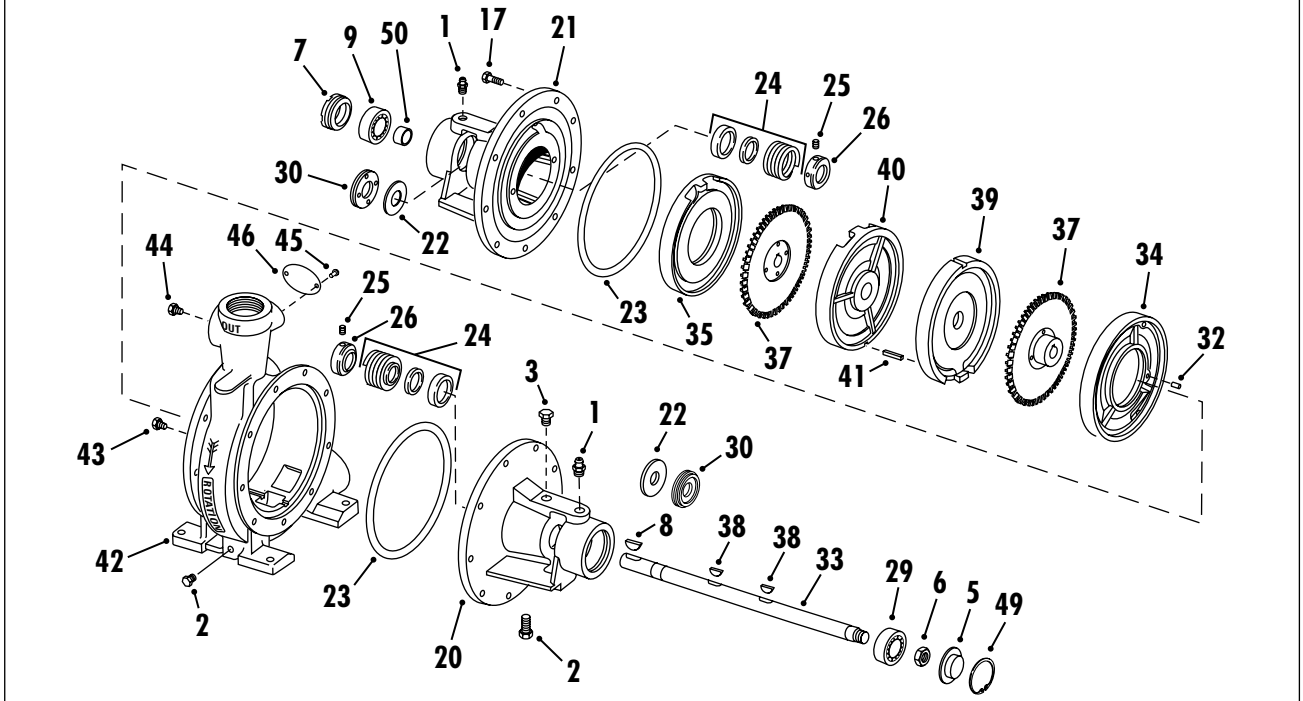


SINGLE STAGE WITH SEALS

PIECE NUMBERS



TWO STAGE WITH PACKING



TWO STAGE WITH SEALS

110A SERIES
MODELS 114A
A35-I4A & D4T-I4TA

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
1	GREASE FITTING	2	508-0001	651	651	651	
2	PIPE PLUG	2	600-0001	087	190	087	
3	PIPE PLUG	2	600-0001	087	190	087	
5	OUTBOARD RETAINER	1	672-0040	500	500	500	
6	JAM NUT	1	544-0308	080	080	080	
7	INBOARD RETAINER	1	672-0041	500	500	500	
8	COUPLING KEY	1	472-0003	087	087	087	
9	BALL BEARING	1	068-1903	647	647	647	
10	GLAND NUT						
	(SEE 16A)	4	544-0105		190	080	
11	GLAND WASHER						
	(SEE 16A)	4	908-0062		190	360	
12	GLAND CLAMP	NOT REQUIRED					
13	GLAND	2	372-0208	662	660	661	
14	COTTER PIN	4	592-0405	087	087	087	
15	CLEVIS PIN	4	592-0452	360	360	360	
16	SWING BOLT	4	100-2015		190	360	
16A	SWING BOLT ASSY.						
	(10, 11, 16)	4	099-0001	644		644	
17	CAPSCREW	16	168-0256	082	190	082	
18	PACKING COVER, RH	1	260-5095	010	208	010	
19	PACKING COVER, LH	1	260-5096	010	208	010	
20	SEAL COVER, R.H.	1	260-5093	010	208	010	
21	SEAL COVER, L.H.	1	260-5094	010	108	010	
22	WATER SLINGER	2	764-1000	478	478	478	
23	COVER GASKET	2	364-1198	478	478	478	
24	MECHANICAL SEAL	2	712-6444	749		749	
		2	712-0703		754		
25	SETSCREW	4	724-0077	113	113	113	
26	DRIVE COLLAR	2	224-0083	208	208	087	
27	PACKING	8	564-0026	802	802	802	
29	BALL BEARING	1	068-0151	647	647	647	
30	BORE RETAINER	2	672-0042	500	500	500	
32	COVER LOCK PIN	2	592-0632	104	104	104	
33	SHAFT A35-I4A*	1	728-7258	629	629	629	
	SHAFT D4T-I4TA*	1	728-7259	629	629	629	
34	CHANNEL A35	1	676-1392	370	208	370	
	RING A4	1	676-1358	370	208	370	
	B4	1	676-1360	370	208	370	
	C4	1	676-1362	370	208	370	

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
	D4	1	676-1364	370		370	
	D4	1	676-1686		208		
	E4	1	676-1366	010	208	010	
	F4	1	676-1368	010	208	010	
	G4	1	676-1370	010	208	010	
	H4	1	676-1372	010	208	010	
	I4	1	676-1374	010	208	010	
	I4A	1	676-1378	010	208	010	
35	CHANNEL A35	1	676-1393	370	208	370	
	RING A4	1	676-1359	370	208	370	
	B4	1	676-1361	370	208	370	
	C4	1	676-1363	370	208	370	
	D4	1	676-1365	370		370	
	D4	1	686-1687		208		
	E4	1	676-1367	010	208	010	
	F4	1	676-1369	010	208	010	
	G4	1	676-1371	010	208	010	
	H4	1	676-1373	010	208	010	
	I4	1	676-1375	010	208	010	
	I4A	1	676-1379	010	208	010	
37	IMPELLER A35	*	444-0786	199	199	053	
	A4	*	444-0784	199	199	053	
	B4	*	444-0786	199	199	053	
	C4	*	444-0788	199	199	053	
	D4-D4T	*	444-0790	199	199	053	
	E4-E4T	*	444-0792	199	199	053	
	F4-F4T	*	444-0794	199	199	053	
	G4-G4T	*	444-0796	199	199	053	
	H4	*	444-0798	199	199	053	
	I4-I4T	*	444-0800	199	199	053	
	I4A-I4TA	*	444-0802	199	199	053	
	*A35-I4A – ONE REQUIRED (SINGLE STAGE)						
	*D4T-I4TA – TWO REQUIRED (TWO STAGE)						
38	IMPELLER KEY	*	472-0105	100	100	100	
39	SPACER						
	(PART OF PC NO. 40)						

* INCLUDES SHAFT AND TOLERANCE RING PC. NO. 50

110A SERIES
MODELS 114A
A35-I4A & D4T-I4TA

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL			
				B.F.	A.B.	A.I.	
40	SPACER D4T	1	772-0109	370	208	370	
	E4T	1	772-0110	010	208	010	
	F4T	1	772-0111	010	208	010	
	G4T	1	772-0112	010	208	010	
	I4T	1	772-0114	010	208	010	
	I4TA	1	772-0115	010	208	010	
41	SPACER KEY	1	472-1011	104	104	104	
42	CASING A35-I4A	1	180-0608	010	208	010	
	CASING D4T-I4TA	1	180-1854	010	208	010	
43	PIPE PLUG	1	600-0002	087	190	087	
44	PIPE PLUG	1	600-0002	087	190	087	
45	NAMEPLATE PIN	2	708-0013	365	365	365	
46	NAMEPLATE	1	532-0014	324	324	324	
49	INTERNAL						
	RET. RING	1	676-2092	088	088	088	
50	TOLERANCE RING	1	676-2105	114	114	114	

NOTE: For A35-I4A and D4T-I4TA repair parts kits, refer to page 9.

110A SERIES
MODELS 114A
M4-R4

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
1	GREASE FITTING	2	508-0001	651	651	651	
2	PIPE PLUG	2	600-0001	087	190	087	
3	PIPE PLUG	2	600-0001	087	190	087	
5	OUTBOARD RETAINER	1	672-0056	500	500	500	
6	JAM NUT	1	544-0316	080	080	080	
7	INBOARD RETAINER	1	672-0049	500	500	500	
8	COUPLING KEY	1	472-0006	087	087	087	
9	BALL BEARING	1	068-1905	647	647	647	
10	GLAND NUT						
	(SEE 16A)	4	544-0105		190		
11	WASHER	NOT REQUIRED					
12	GLAND CLAMP						
	(SEE 16A)	4	204-0120		190		
13	SPLIT GLAND	2	372-0097		208		
		2	372-0194	010		010	
14	COTTER PIN	4	592-0405	087	087	087	
15	CLEVIS PIN	4	592-0452	360	360	360	
16	SWING BOLT	4	100-2015		190		
16A	SWING BOLT ASSY.						
	(10, 12, 16)	4	099-0004	644		644	
17	CAPSCREW	16	168-0256	087	190	082	
18	PACKING COVER, R.H.	1	260-5099	010	208	010	
19	PACKING COVER, L.H.	1	260-5100	010	208	010	
20	SEAL COVER, R.H.	1	260-5097	010	208	010	
21	SEAL COVER, L.H.	1	260-5098	010	208	010	
22	WATER SLINGER	2	764-1002	478	478	478	
23	COVER GASKET	2	364-1198	478	478	478	
24	MECHANICAL SEAL	2	712-0707	755	754	758	
25	SETSCREW	4	724-0077	104	104	104	
26	DRIVE COLLAR	2	224-0082	208	208	087	
27	PACKING	10	564-0029	802	802	802	
29	BALL BEARING	1	068-0154	647	647	647	
30	BORE RETAINER	2	672-0050	500	500	500	
32	COVER LOCK PIN	2	592-0632	104	104	104	
33	SHAFT M4-R4*	1	728-7266	629	629	629	

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
34	CHANNEL M4	1	676-1430	010	208	010	
	RING P4	1	676-1432	010	208	010	
	R4	1	676-1434	010	208	010	
35	CHANNEL M4	1	676-1431	010	208	010	
	RING P4	1	676-1433	010	208	010	
	R4	1	676-1435	010	208	010	
37	IMPELLER M4	1	444-2666	199	199	053	
	P4	1	444-2667	199	199	053	
	R4	1	444-2668	199	199	053	
38	IMPELLER KEY	1	472-0107	100	100	100	
42	CASING M4-R4	1	180-1853	010	208	010	
43	PIPE PLUG	1	600-0002	087	190	087	
44	PIPE PLUG	1	600-0002	087	190	087	
45	NAMEPLATE PIN	2	708-0013	365	365	365	
46	NAMEPLATE	1	532-0014	324	324	324	
49	INTERNAL						
	RET. RING	1	676-2093	088	088	088	
50	TOLERANCE	1	676-2106	114	114	114	
	RING						

* INCLUDES SHAFT AND TOLERANCE RING PC. NO. 50

110A SERIES
MODELS 114A
A35-I4A & D4T-I4TA
M4-R4
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	B.R.
	REPAIR PARTS KIT						
	THE FOLLOWING KITS						
	INCLUDE PIECE NUMBERS						
	5, 6, 7, 8, 9, 22, 23, 29, 30, 32, 33,						
	34, 35, 37, 38, 39, 40, 41, 49, 50						
	PACKED PUMP KITS ALSO						
	INCLUDE PIECE NO. 10, 12,						
	13, 14, 15, 16, 27						
	MECHANICAL SEAL KITS						
	ALSO INCLUDE						
	PIECE NUMBERS 24, 25, 26.						
	KITS WITH PACKING						
	A35		476-0485	644	643	642	554
	A4		476-0486	644	643	642	554
	B4		476-0487	644	643	642	554
	C4		476-0488	644	643	642	554
	D4		476-0489	644	643	642	554
	E4		476-0490	644	643	642	554
	F4		476-0491	644	643	642	554
	G4		476-0492	644	643	642	554
	H4		476-0493	644	643	642	554
	I4		476-0494	644	643	642	554
	I4A		476-0495	644	643	642	554
	M4		476-0496	644	643	642	554
	P4		476-0497	644	643	642	554
	R4		476-0498	644	643	642	554
	D4T		476-0499	644	643	642	554
	E4T		476-0500	644	643	642	554
	F4T		476-0501	644	643	642	554
	G4T		476-0502	644	643	642	554
	I4T		476-0503	644	643	642	554
	I4TA		476-0504	644	643	642	554
	KITS WITH MECHANICAL SEALS						
	A35S		476-0525	644	643	642	554
	A4S		476-0526	644	643	642	554
	B4S		476-0527	644	643	642	554
	C4S		476-0528	644	643	642	554
	D4S		476-0529	644	643	642	554
	E4S		476-0530	644	643	642	554
	F4S		476-0531	644	643	642	554
	G4S		476-0532	644	643	642	554

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	B.R.
	KITS WITH MECHANICAL SEALS (CONTINUED)						
	H4S		476-0533	644	643	642	554
	I4S		476-0534	644	643	642	554
	I4AS		476-0535	644	643	642	554
	M4S		476-0536	644	643	642	554
	P4S		476-0537	644	643	642	554
	R4S		476-0538	644	643	642	554
	D4TS		476-0539	644	643	642	554
	E4TS		476-0540	644	643	642	554
	F4TS		476-0541	644	643	642	554
	G4T		476-0542	644	643	642	554
	I4TS		476-0543	644	643	642	554
	I4TAS		476-0544	644	643	642	554

110A SERIES
MODELS 115A
D5-I5 & D5T-I5T

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
1	GREASE FITTING	2	508-0001	651	651	651	
2	PIPE PLUG	2	600-0001	087	190	087	
3	PIPE PLUG	2	600-0001	087	190	087	
5	OUTBOARD RETAINER	1	672-0048	500	500	500	
6	JAM NUT	1	544-0316	080	080	080	
7	INBOARD RETAINER	1	672-0049	500	500	500	
8	COUPLING KEY	1	472-0006	087	087	087	
9	BALL BEARING	1	068-1905	647	647	647	
10	GLAND NUT						
	(SEE 16A)	4	544-0107		190		
11	WASHER	NOT REQUIRED					
12	GLAND CLAMP						
	(SEE 16A)	4	204-0120		190		
13	SPLIT GLAND	2	372-0097		208		
		2	372-0194	010		010	
14	COTTER PIN	4	592-0405	087	087	087	
15	CLEVIS PIN	4	592-0457	360	360	360	
16	SWING BOLT	4	100-0216		190		
16A	SWING BOLT ASSY.						
	(10, 12, 16)	4	099-0002	644		644	
17	CAPSCREW	18	168-0380	082	190	082	
18	PACKING COVER, R.H.	1	260-5104	010	208	010	
19	PACKING COVER, L.H.	1	260-5103	010	208	010	
20	SEAL COVER, R.H.	1	260-5102	010	208	010	
21	SEAL COVER L.H.	1	260-5101	010	208	010	
22	WATER SLINGER	2	764-1002	478	478	478	
23	COVER GASKET	2	364-1063	478	478	478	
24	MECHANICAL SEAL	2	712-0707	755	754	758	
25	SETSCREW	4	724-0077	104	104	104	
26	DRIVE COLLAR	2	224-0082	208	208	087	
27	PACKING	14	564-0029	802	802	802	
28	LANTERN RING	2	676-1476	512	512	512	
29	BALL BEARING	1	068-0154	647	647	647	
30	BORE RETAINER	2	672-0050	500	500	500	
32	COVER LOCK PIN	2	592-0632	104	104	104	
33	SHAFT D5-I5*	1	728-7260	629	629	629	
	SHAFT D5T-I5T*	1	728-7261	629	629	629	
34	CHANNEL RING D5	1	676-1322	010	208	010	
	E5	1	676-1323	010	208	010	
	F5	1	676-1326	010	208	010	
	G5	1	676-1328	010	208	010	

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
34	CHANNEL RING H5	1	676-1330	010	208	010	
	I5	1	676-1317	010	208	010	
35	CHANNEL RING D5	1	676-1321	010	208	010	
	E5	1	676-1324	010	208	010	
	F5	1	676-1325	010	208	010	
	G5	1	676-1327	010	208	010	
	H5	1	676-1329	010	208	010	
	I5	1	676-1318	010	208	010	
37	IMPELLER D5-D5T	*	444-1701	199	199	053	
	E5-E5T	*	444-1701	199	199	053	
	F5-F5T	*	444-1702	199	199	053	
	G5-G5T	*	444-1703	199	199	053	
	H5-H5T	*	444-1704	199	199	053	
	I5-I5T	*	444-1704	199	199	053	
	*D5-I5 ONE REQUIRED (SINGLE STAGE)						
	*D5T-I5T TWO REQUIRED (TWO STAGE)						
38	IMPELLER KEY	*	472-0108	100	100	100	
39	SPACER D5T	1	772-0080	010	208	010	
	ET5	1	772-0084	010	208	010	
	F5T	1	772-0092	010	208	010	
	G5T	1	772-0096	010	208	010	
	H5T	1	772-0072	010	208	010	
	I5T	1	772-0076	010	208	010	
40	SPACER D5T	1	772-0078	010	208	010	
	E5T	1	772-0082	010	208	010	
	F5T	1	772-0090	010	208	010	
	G5T	1	772-0094	010	208	010	
	H5T	1	772-0070	010	208	010	
	I5T	1	772-0074	010	208	010	
41	SPACER KEY	1	472-1011	113	113	113	
42	CASING D5-I5	1	180-1855	010	208	010	
	CASING D5T-I5T	1	180-1857	010		010	
		1	180-0570		208		
43	PIPE PLUG	1	600-0002	087	190	087	
44	PIPE PLUG	1	600-0002	087	190	087	
45	NAMEPLATE PIN	2	708-0013	365	365	365	
46	NAMEPLATE	1	532-0014	324	324	324	
49	INT. RET. RING	1	676-2093	088	088	088	
50	TOLERANCE RING	1	676-2106	114	114	114	

* INCLUDES SHAFT AND TOLERANCE RING PC. NO. 50

110A SERIES
MODELS 115A
D5-I5 & D5T-I5T

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	B.R.
	REPAIR PARTS KIT						
	THE FOLLOWING KITS						
	INCLUDE PIECE NUMBERS						
	5, 6, 7, 8, 9, 22, 23, 29, 30, 32, 33,						
	34, 35, 37, 38, 39, 40, 41, 49, 50						
	PACKED PUMP KITS ALSO						
	INCLUDE PIECE NO. 10, 12,						
	13, 14, 15, 16, 27						
	MECHANICAL SEAL KITS						
	ALSO INCLUDE						
	PIECE NUMBERS 24, 25, 26.						
	KITS WITH PACKING						
	D5		476-0474	644	643	642	554
	E5		476-0475	644	643	642	554
	F5		476-0473	644	643	642	554
	G5		476-0476	644	643	642	554
	H5		476-0477	644	643	642	554
	I5		476-0478	644	643	642	554
	D5T		476-0479	644	643	642	554
	E5T		476-0480	644	643	642	554
	F5T		476-0481	644	643	642	554
	G5T		476-0482	644	643	642	554
	H5T		476-0483	644	643	642	554
	I5T		476-0484	644	643	642	554
	KITS WITH MECHANICAL SEALS						
	D5S		476-0545	644	643	642	554
	E5S		476-0546	644	643	642	554
	F5S		476-0547	644	643	642	554
	G5S		476-0548	644	643	642	554
	H5S		476-0549	644	643	642	554
	I5S		476-0550	644	643	642	554
	D5TS		476-0557	644	643	642	554
	E5TS		476-0558	644	643	642	554
	F5TS		476-0559	644	643	642	554
	G5TS		476-0560	644	643	642	554
	H5TS		476-0561	644	643	642	554
	I5TS		476-0562	644	643	642	554

110A SERIES
MODELS 115A
J5-P5

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
1	GREASE FITTING	2	508-0001	651	651	651	
2	PIPE PLUG	2	600-0001	087	190	087	
3	PIPE PLUG	2	600-0001	087	190	087	
5	OUTBOARD RETAINER	1	672-0059	500	500	500	
6	JAM NUT	1	544-0318	080	080	080	
7	INBOARD RETAINER	1	672-0060	500	500	500	
8	COUPLING KEY	1	472-0011	087	087	087	
9	BALL BEARING	1	068-1906	647	647	647	
10	GLAND NUT						
	(SEE 16A)	4	544-0107		190		
11	WASHER	NOT REQUIRED					
12	GLAND CLAMP						
	(SEE 16A)	4	204-0120		190		
13	SPLIT GLAND	2	372-0095		208		
		2	372-0195	010		010	
14	COTTER PIN	4	592-0405	087	087	087	
15	CLEVIS PIN	4	592-0457	360	360	360	
16	SWING BOLT	4	100-0216		190		
16A	SWING BOLT ASSY.						
	(10, 12, 16)	4	099-0002	644		644	
17	CAPSCREW	18	168-0380	082	190	082	
18	PACKING COVER, R.H.	1	260-5108	010	208	010	
19	PACKING COVER, L.H.	1	260-5107	010	208	010	
20	SEAL COVER, R.H.	1	260-5109	010	208	010	
21	SEAL COVER L.H.	1	260-5110	010	208	010	
22	WATER SLINGER	2	764-1004	478	478	478	
23	COVER GASKET	2	364-1063	478	478	478	
24	MECHANICAL SEAL	2	712-6452	755	754	758	
25	SETSCREW	4	724-0077	104	104	104	
26	DRIVE COLLAR	2	224-0227	208	208	087	
27	PACKING	14	564-0051	802	802	802	
28	LANTERN RING	2	676-1114	512	512	512	
29	BALL BEARING	1	068-0155	647	647	647	
30	BORE RETAINER	2	672-0061	500	500	500	
32	COVER LOCK PIN	2	592-0632	104	104	104	
33	SHAFT J5-P5*	1	728-7267	629	629	629	
34	CHANNEL RING J5	1	676-1333	010	208	010	
	K5	1	676-1335	010	208	010	
	L5	1	676-1337	010	208	010	
	M5	1	676-1386	010	208	010	
	N5	1	676-1388	010	208	010	
34	CHANNEL RING P5	1	676-1390	010	208	010	
35	CHANNEL RING J5	1	676-1332	010	208	010	
	K5	1	676-1334	010	208	010	
	L5	1	676-1336	010	208	010	
	M5	1	676-1387	010	208	010	
	N5	1	676-1389	010	208	010	
	P5	1	676-1391	010	208	010	
37	IMPELLER J5	1	444-2671	199	199	053	
	K5	1	444-2670	199	199	053	
	L5	1	444-2675	199	199	053	
	M5	1	444-2674	199	199	053	
	N5	1	444-2673	199	199	053	
	P5	1	444-2672	199	199	053	
38	IMPELLER KEY	1	472-0112	100	100	100	
42	CASING J5-P5	1	180-1856	010		010	
		1	180-0448		208		
43	PIPE PLUG	1	600-0002	087	190	087	
44	PIPE PLUG	1	600-0002	087	190	087	
45	NAMEPLATE PIN	2	708-0013	365	365	365	
46	NAMEPLATE	1	532-0014	324	324	324	
49	INT. RET. RING	1	676-2094	088	088	088	
50	TOLERANCE RING	1	676-2107	114	114	114	

* INCLUDES SHAFT AND TOLERANCE RING PC. NO. 50

110A SERIES
MODELS 115A
J5-P5

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	B.R.
	REPAIR PARTS KIT						
	THE FOLLOWING KITS						
	INCLUDE PIECE NUMBERS						
	5, 6, 7, 8, 9, 22, 23, 29, 30, 32, 33,						
	34, 35, 37, 38, 39, 40, 41, 49, 50						
	PACKED PUMP KITS ALSO						
	INCLUDE PIECE NO. 10, 12,						
	13, 14, 15, 16, 27						
	MECHANICAL SEAL KITS						
	ALSO INCLUDE						
	PIECE NUMBERS 24, 25, 26.						
	KITS WITH PACKING						
	J5		476-0506	644	643	642	554
	K5		476-0507	644	643	642	554
	L5		476-0508	644	643	642	554
	M5		476-0509	644	643	642	554
	N5		476-0510	644	643	642	554
	P5		476-0511	644	643	642	554
	KITS WITH MECHANICAL SEALS						
	J5S		476-0551	644	643	642	554
	K5S		476-0552	644	643	642	554
	L5S		476-0553	644	643	642	554
	M5S		476-0554	644	643	642	554
	N5S		476-0555	644	643	642	554
	P5S		476-0556	644	643	642	554

110A SERIES
MODELS 116A
D6-K6 & D6T-K6T

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
1	GREASE FITTING	2	508-0001	651	651	651	
2	PIPE PLUG	2	600-0001	087	190	087	
3	PIPE PLUG	2	600-0001	087	190	087	
5	OUTBOARD RETAINER	1	672-0053	500	500	500	
6	JAM NUT	1	544-0320	080	080	080	
7	INBOARD RETAINER	1	672-0054	500	500	500	
8	COUPLING KEY	1	472-0013	087	087	087	
9	BALL BEARING	1	068-1907	647	647	647	
10	GLAND NUT						
	(SEE 16A)	4	544-0109		190		
11	WASHER	NOT REQUIRED					
12	GLAND CLAMP						
	(SEE 16A)	4	204-0120		190		
13	SPLIT GLAND	2	372-0104		208		
		4	372-0159	010		010	
14	COTTER PIN	4	592-0405	087	087	087	
15	CLEVIS PIN	4	592-0462	360	360	360	
16	SWING BOLT	4	100-2010		190		
16A	SWING BOLT ASSY.						
	(10, 12, 16)	4	099-0003	644		664	
17	CAPSCREW	20	168-0488	082	190	082	
18	PACKING COVER, R.H.	1	260-5106	010	208	010	
19	PACKING COVER, L.H.	1	260-5106	010	208	010	
20	SEAL COVER, R.H.	1	260-5105	010	208	010	
21	SEAL COVER L.H.	1	260-5105	010	208	010	
22	WATER SLINGER	2	764-1005	478	478	478	
23	COVER GASKET	2	364-1065	478	478	478	
24	MECHANICAL SEAL	2	712-0713	755	754	758	
25	SETSCREW	4	724-0077	104	104	104	
26	DRIVE COLLAR	2	224-0084	208	208	087	
27	PACKING	16	564-0064	802	802	802	
28	LANTERN RING	2	676-1471	512	512	512	
29	BALL BEARING	1	068-0156	647	647	647	
30	BORE RETAINER	2	672-0055	500	500	500	
32	COVER LOCK PIN	2	592-0632	104	104	104	
33	SHAFT G-H-J-K6*	1	728-7264	629	629	629	
	SHAFT D-E-F6T*	1	728-7263	629	629	629	
	SHAFT G-H-J-K6T*	1	728-7265	629	629	629	
34	CHANNEL RING D6T	1	676-1406	010	208	010	
	E6T	1	676-1408	010	208	010	
	F6T	1	676-1402	010	208	010	

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
34	CHANNEL G6-G6T	1	676-0239	010		010	
	RING G6-G6T	1	676-1410		208		
	H6-H6T	1	676-0241	010		010	
	H6-H6T	1	676-1412		208		
	J6-J6T	1	676-0243	010		010	
	J6-J6T	1	676-1414		208		
	K6-K6T	1	676-0245	010		010	
	K6-K6T	1	676-1404		208		
35	CHANNEL D6T	1	676-1407	010	208	010	
	RING E6T	1	676-1409	010	208	010	
	F6T	1	676-1403	010	208	010	
	G6-G6T	1	676-0240	010		010	
	G6-G6T	1	676-1411		208		
	H6-H6T	1	676-0242	010		010	
	H6-H6T	1	676-1413		208		
	J6-J6T	1	676-0244	010		010	
	J6-J6T	1	676-1415		208		
	K6-K6T	1	676-0246	010		010	
	K6-K6T	1	676-1405		208		
37	IMPELLER D6T	*	444-0737	199	199	053	
	E6T	*	444-0729	199	199	053	
	F6T	*	444-0727	199	199	053	
	G6-G6T	*	444-0731	199	199	053	
	H6-H6T	*	444-0733	199	199	053	
	J6-J6T	*	444-0735	199	199	053	
	K6-K6T	*	444-0774	199	199	053	
	*D6-K6 - ONE REQUIRED (SINGLE STAGE)						
	*D6T-K6T - TWO REQUIRED (TWO STAGE)						
38	IMPELLER KEY	*	472-0115	100	100	100	
39	SPACER D6T	1	772-0051	010	208	010	
	E6T	1	772-0054	010	208	010	
	F6T	1	772-0049	010	208	010	
	G6T	1	772-0217	010		010	
	G6T	NOT REQUIRED IN AB					
	H6T	1	772-0219	010		010	
	H6T	NOT REQUIRED IN AB					
	J6T	1	772-0221	010		010	
	J6T	NOT REQUIRED IN AB					
	K6T	1	772-0223	010		010	
	K6T	NOT REQUIRED IN AB					
40	SPACER D6T	1	772-0052	010	208	010	

* INCLUDES SHAFT AND TOLERANCE RING PC. NO. 50

110A SERIES
MODELS 116A
D6-K6 & D6T-K6T

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
40	SPACER E6T	1	772-0053	010	208	010	
	F6T	1	772-0050	010	208	010	
	G6T	1	772-0128		208		
	G6T	1	772-0218	010		010	
	H6T	1	772-0127		208		
	H6T	1	772-0220	010		010	
	J6T	1	772-0126		208		
	J6T	1	772-0222	010		010	
	K6T	1	772-0125		208		
	K6T	1	772-0224	010		010	
40	SPACER KEY	1	472-1013	104	104	104	
	CASING G-H-J-K6	1	180-1859	010		010	
		1	180-0453		208		
	CASING D-E-F6T	1	180-1861	010	208	010	
	CASING G-H-J-K6T	1	180-1860	010	208	010	
43	PIPE PLUG	1	600-0002	087	190	087	
44	PIPE PLUG	1	600-0002	087	190	087	
45	NAMEPLATE PIN	2	708-0013	365	365	365	
46	NAMEPLATE	1	532-0014	324	324	324	
49	INT. RET. RING	1	676-2095	088	088	088	
50	TOLERANCE RING	1	676-2108	114	114	114	

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.	A.B.	A.I.	
	REPAIR PARTS KIT						
	THE FOLLOWING KITS						
	INCLUDE PIECE NUMBERS						
	5, 6, 7, 8, 9, 22, 23, 29, 30, 32, 33,						
	34, 35, 37, 38, 39, 40, 41, 49, 50						
	PACKED PUMP KITS ALSO						
	INCLUDE PIECE NO. 10, 12,						
	13, 14, 15, 16, 27						
	MECHANICAL SEAL KITS						
	ALSO INCLUDE						
	PIECE NUMBERS 24, 25, 26.						
	KITS WITH PACKING						
	G6		476-0512	644	643	642	554
	H6		476-0513	644	643	642	554
	J6		476-0514	644	643	642	554
	K6		476-0515	644	643	642	554
	D6T		476-0516	644	643	642	554
	E6T		476-0517	644	643	642	554
	F6T		476-0518	644	643	642	554
	G6T		476-0519	644	643	642	554
	H6T		476-0520	644	643	642	554
	J6T		476-0521	644	643	642	554
	K6T		476-0522	644	643	642	554
	KITS WITH MECHANICAL SEALS						
	G6S		476-0563	644	643	642	554
	H6S		476-0564	644	643	642	554
	J6S		476-0565	644	643	642	554
	K6S		476-0566	644	643	642	554
	D6TS		476-0567	644	643	642	554
	E6TS		476-0568	644	643	642	554
	F6TS		476-0569	644	643	642	554
	G6TS		476-0570	644	643	642	554
	H6TS		476-0571	644	643	642	554
	J6TS		476-0572	644	643	642	554
	K6TS		476-0573	644	643	642	554

AP-110P-REPAIR 3.01

AURORA®

PENTAIR PUMP GROUP

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NOTE:
Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information without notice

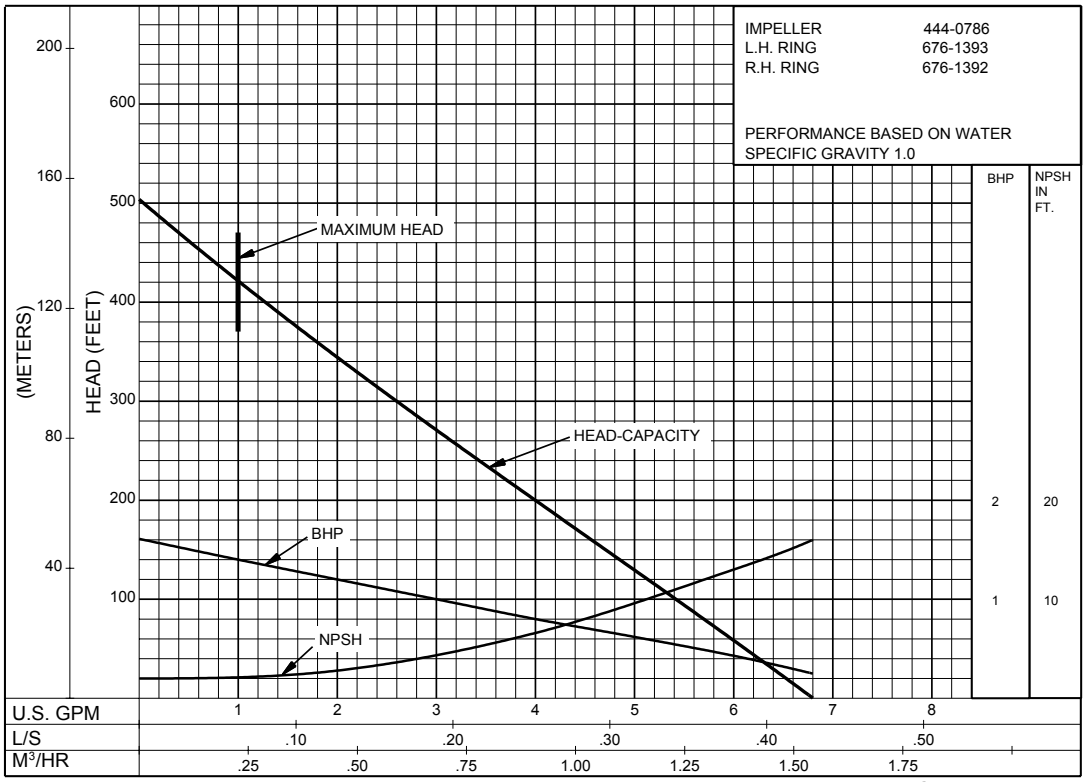
Performance Curves for the 110 Series

MODEL/SIZE	R.P.M.	CATALOG PAGE	PDF PAGE
1-1/4 x 1-1/4 x 4 (A35)	3500/1750	401	3
1-1/4 x 1-1/4 x 4 (A4)	3500/1750	402	4
1-1/4 x 1-1/4 x 4 (B4)	3500/1750	403	5
1-1/4 x 1-1/4 x 4 (C4)	3500/1750	404	6
1-1/4 x 1-1/4 x 4 (D4)	3500/1750	405	7
1-1/4 x 1-1/4 x 4 (E4)	1750	406	8
1-1/4 x 1-1/4 x 4 (F4)	1750	406	8
1-1/4 x 1-1/4 x 4 (G4)	1750	407	9
1-1/4 x 1-1/4 x 4 (H4)	1750	407	9
1-1/4 x 1-1/4 x 4 (I4)	1750	408	10
1-1/4 x 1-1/4 x 4 (I4A)	1750	408	10
1-1/2 x 1-1/2 x 4 (M4)	1750	409	11
1-1/2 x 1-1/2 x 4 (P4)	1750	409	11
1-1/2 x 1-1/2 x 4 (R4)	1750	410	12
1-1/4 x 1-1/4 x 4 (D4T)	1750	411	13
1-1/4 x 1-1/4 x 4 (E4T)	1750	411	13
1-1/4 x 1-1/4 x 4 (F4T)	1750	412	14
1-1/4 x 1-1/4 x 4 (G4T)	1750	412	14
1-1/4 x 1-1/4 x 4 (I4T)	1750	413	15
1-1/4 x 1-1/4 x 4 (I4TA)	1750	413	15
1-1/4 x 1-1/4 x 5 (D5)	1750	415	17
1-1/4 x 1-1/4 x 5 (E5)	1750	415	17
1-1/4 x 1-1/4 x 5 (F5)	1750	416	18
1-1/4 x 1-1/4 x 5 (G5)	1750	416	18
1-1/4 x 1-1/4 x 5 (H5)	1750	417	19
1-1/4 x 1-1/4 x 5 (I5)	1750	417	19
1-1/2 x 2 x 5 (J5)	1750	418	20
1-1/2 x 2 x 5 (K5)	1750	418	20
1-1/2 x 2 x 5 (L5)	1750	419	21
1-1/2 x 2 x 5 (M5)	1750	419	21
1-1/2 x 2 x 5 (N5)	1750	420	22
1-1/2 x 2 x 5 (P5)	1750	420	22
1-1/4 x 1-1/4 x 5 (D5T)	1750	421	23
1-1/4 x 1-1/4 x 5 (E5T)	1750	421	23
1-1/4 x 1-1/4 x 5 (F5T)	1750	422	24
1-1/4 x 1-1/4 x 5 (G5T)	1750	422	24
1-1/4 x 1-1/4 x 5 (H5T)	1750	423	25

Continued next page

MODEL/SIZE	R.P.M.	CATALOG PAGE	PDF PAGE
1-1/4 x 1-1/4 x 5 (I5T)	1750	423	25
2-1/2 x 3 x 6 (G6)	1750	425	27
2-1/2 x 3 x 6 (H6)	1750	425	27
2-1/2 x 3 x 6 (J6)	1750	426	28
2-1/2 x 3 x 6 (K6)	1750	426	28
2 x 2-1/2 x 6 (D6T)	1750	427	29
2 x 2-1/2 x 6 (E6T)	1750	427	29
2 x 2-1/2 x 6 (F6T)	1750	428	30
2-1/2 x 3 x 6 (G6T)	1750	429	31
2-1/2 x 3 x 6 (H6T)	1750	429	31
2-1/2 x 3 x 6 (J6T)	1750	430	32
2-1/2 x 3 x 6 (K6T)	1750	430	32

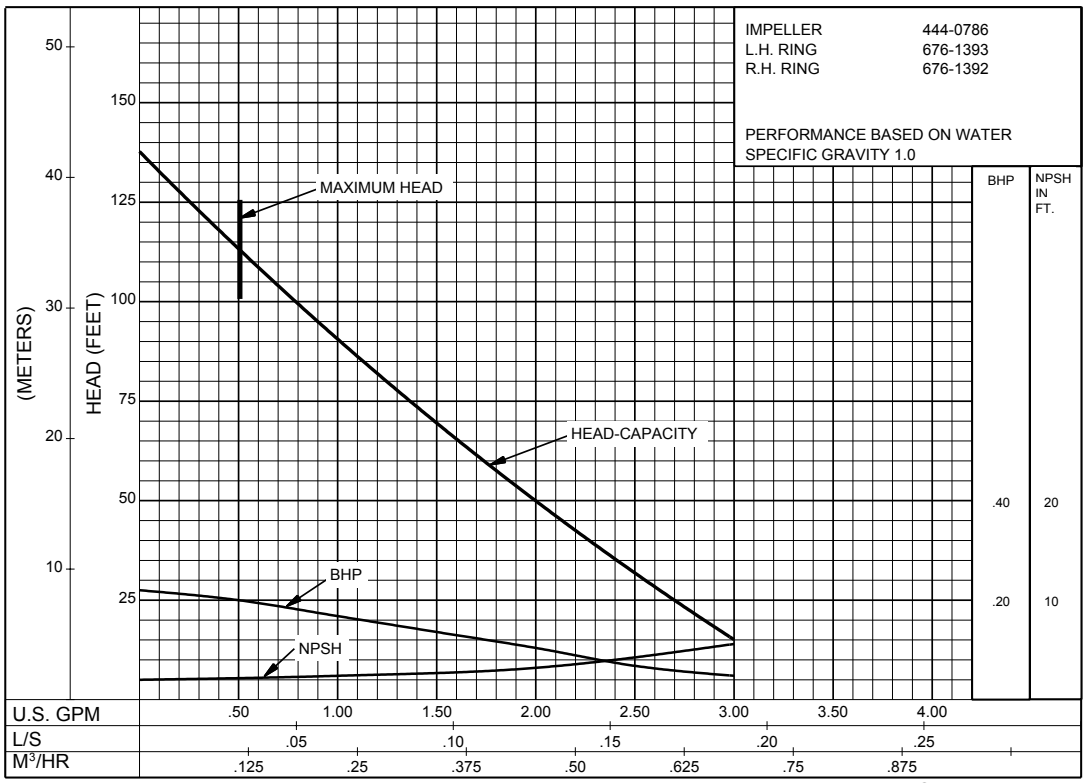
SIZE : A35 **TYPE : 110A** **R. P. M. : 3500**



PC-153387A

3500 R.P.M

SIZE : A35 **TYPE : 110A** **R. P. M. : 1750**



PC-153388A

1750 R.P.M

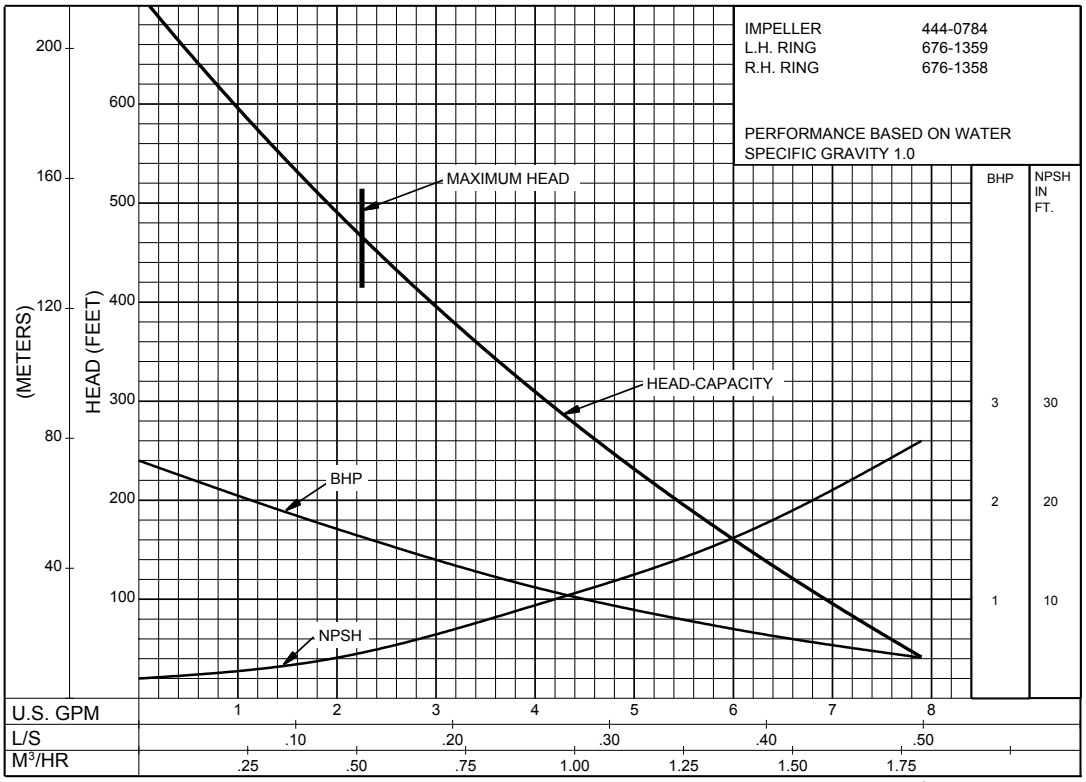
1-1/4 x 1-1/4 x 4 SERIES 110A

SINGLE STAGE

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Dated November 1993

3500 R.P.M

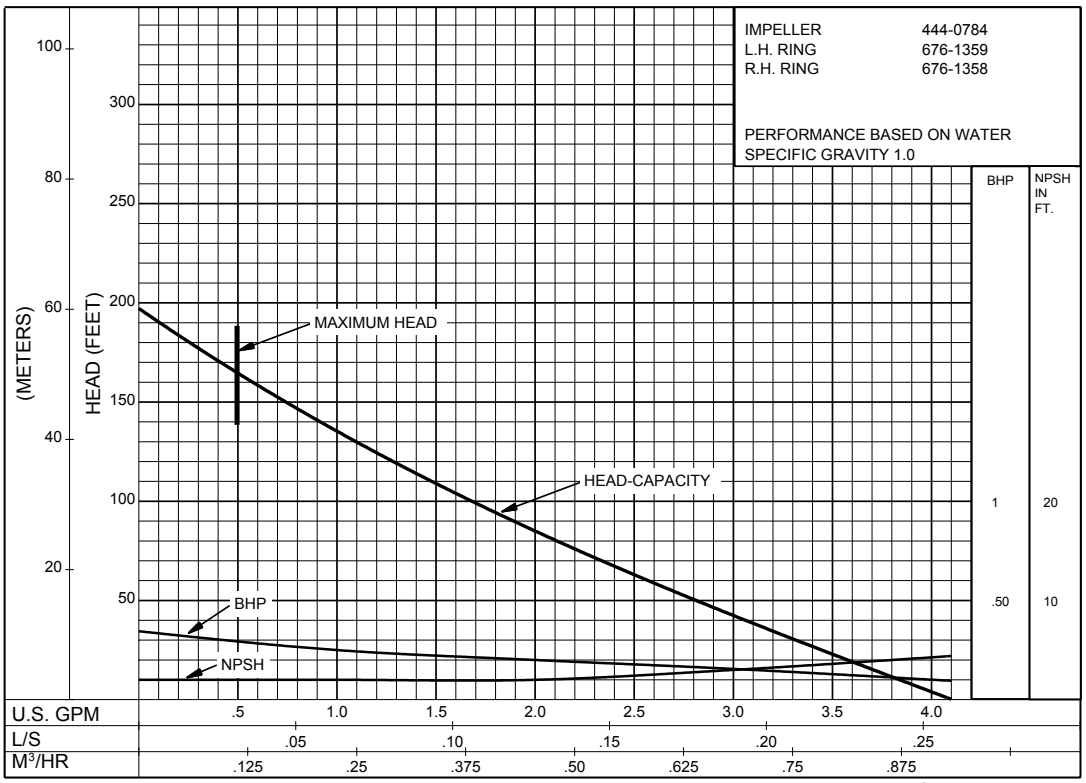
SIZE : A4 **TYPE : 110A** **R. P. M. : 3500**



PC-153389A

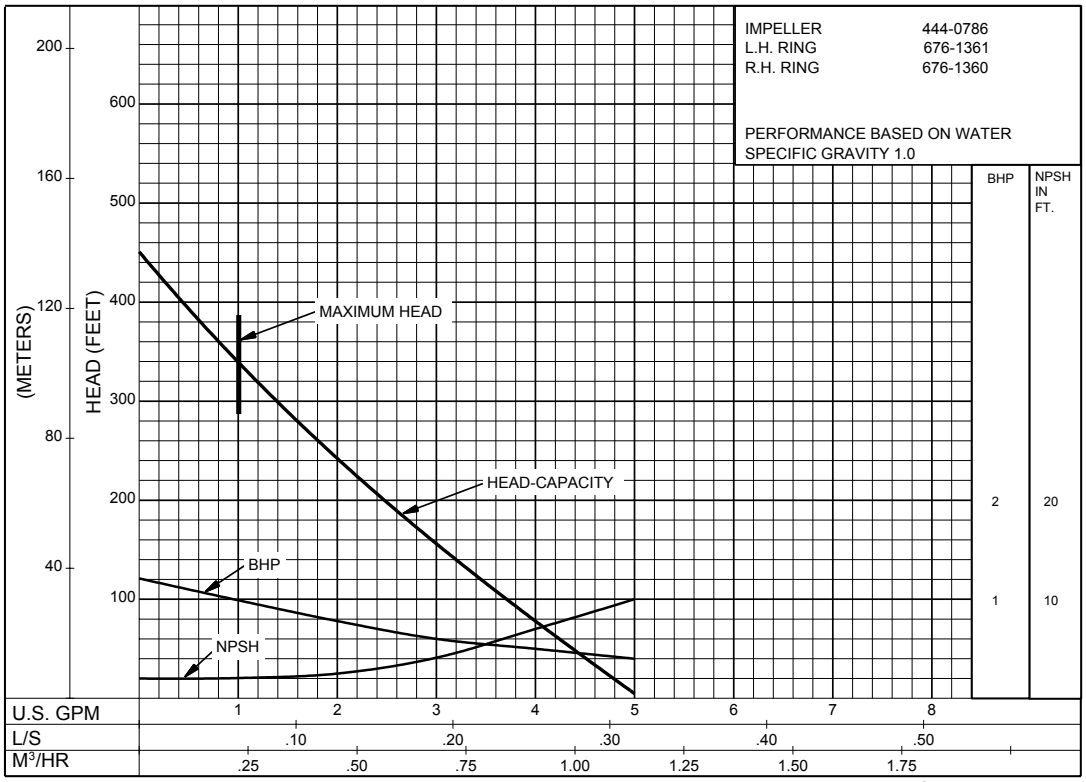
1750 R.P.M

SIZE : A4 **TYPE : 110A** **R. P. M. : 1750**



PC-153390A

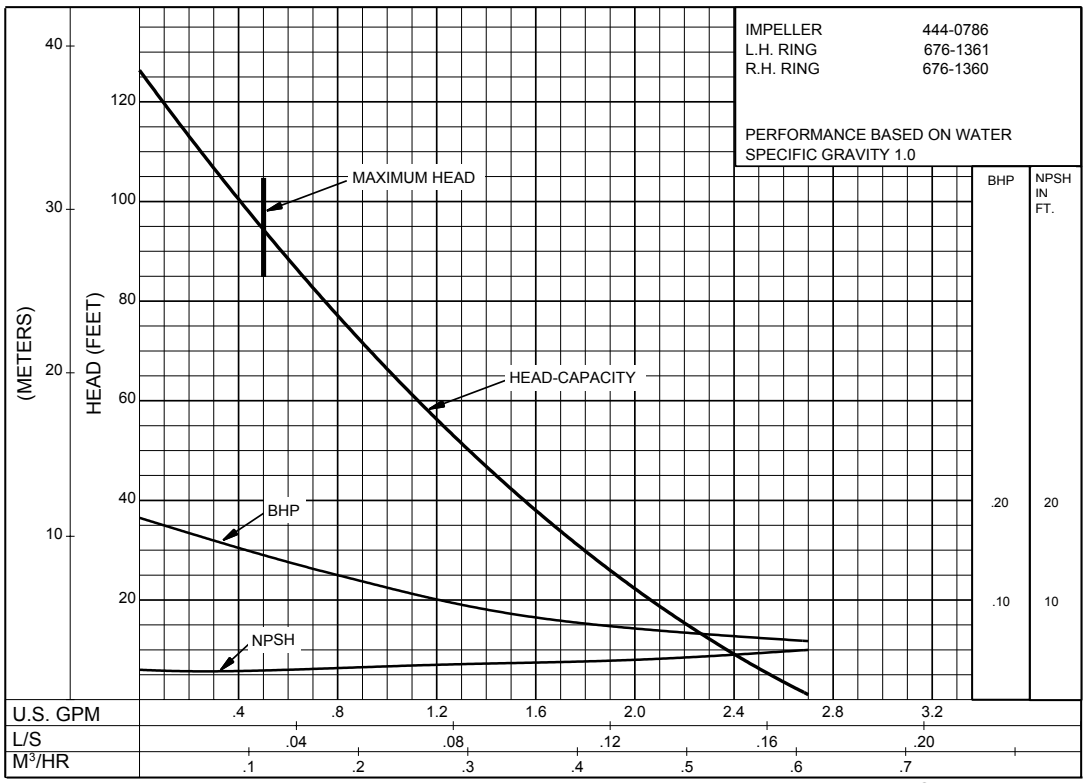
SIZE : B4 **TYPE : 110A** **R. P. M. : 3500**



PC-153391A

3500 R.P.M

SIZE : B4 **TYPE : 110A** **R. P. M. : 1750**



PC-153392A

1750 R.P.M

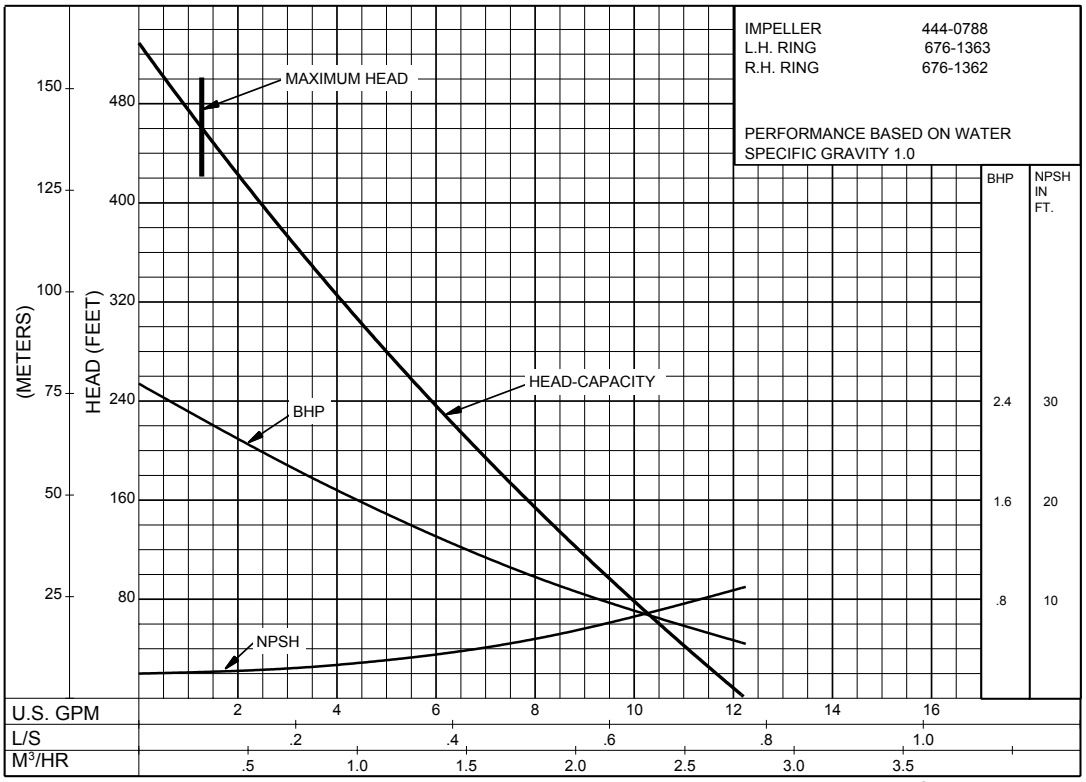
1-1/4 x 1-1/4 x 4 SERIES 110A

SINGLE STAGE

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Dated November 1993

3500
R.P.M

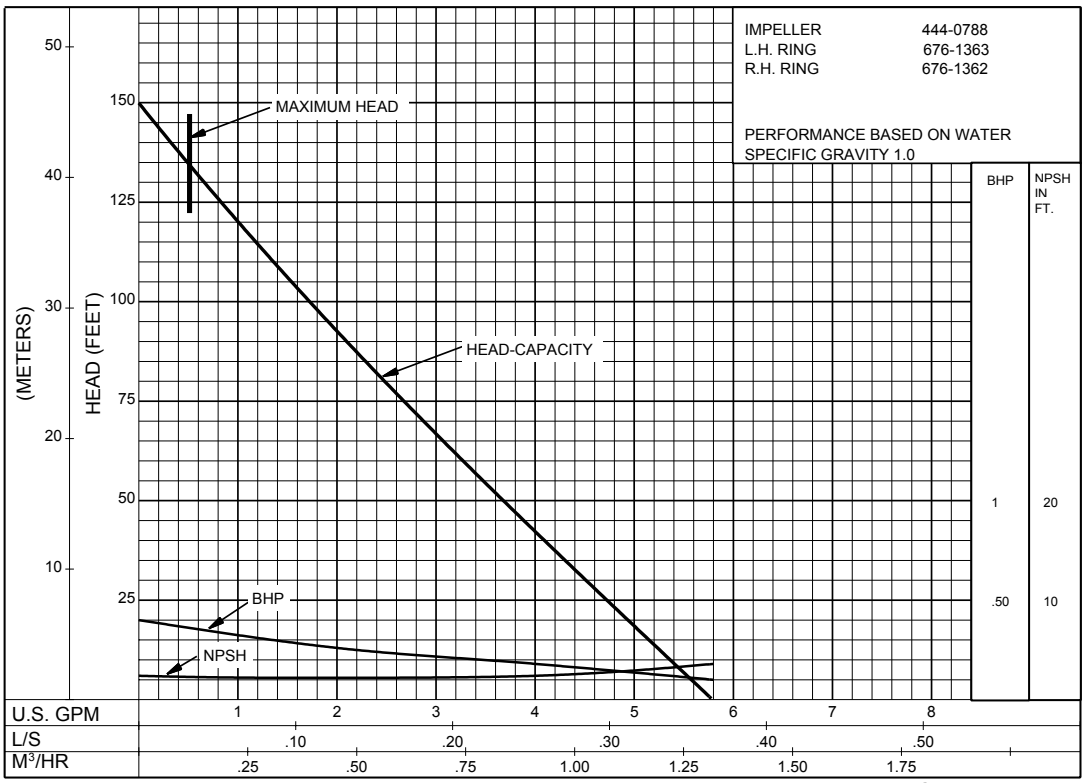
SIZE : C4 **TYPE : 110A** **R. P. M. : 3500**



PC-153393A

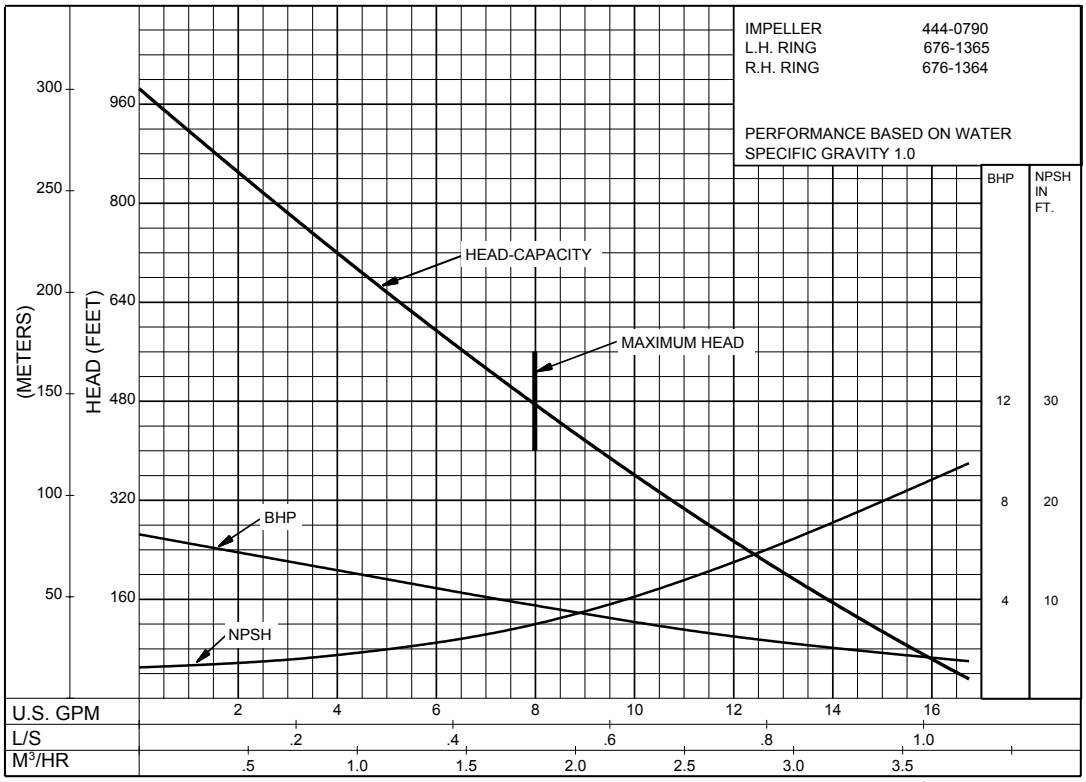
1750
R.P.M

SIZE : C4 **TYPE : 110A** **R. P. M. : 1750**



PC-153394A

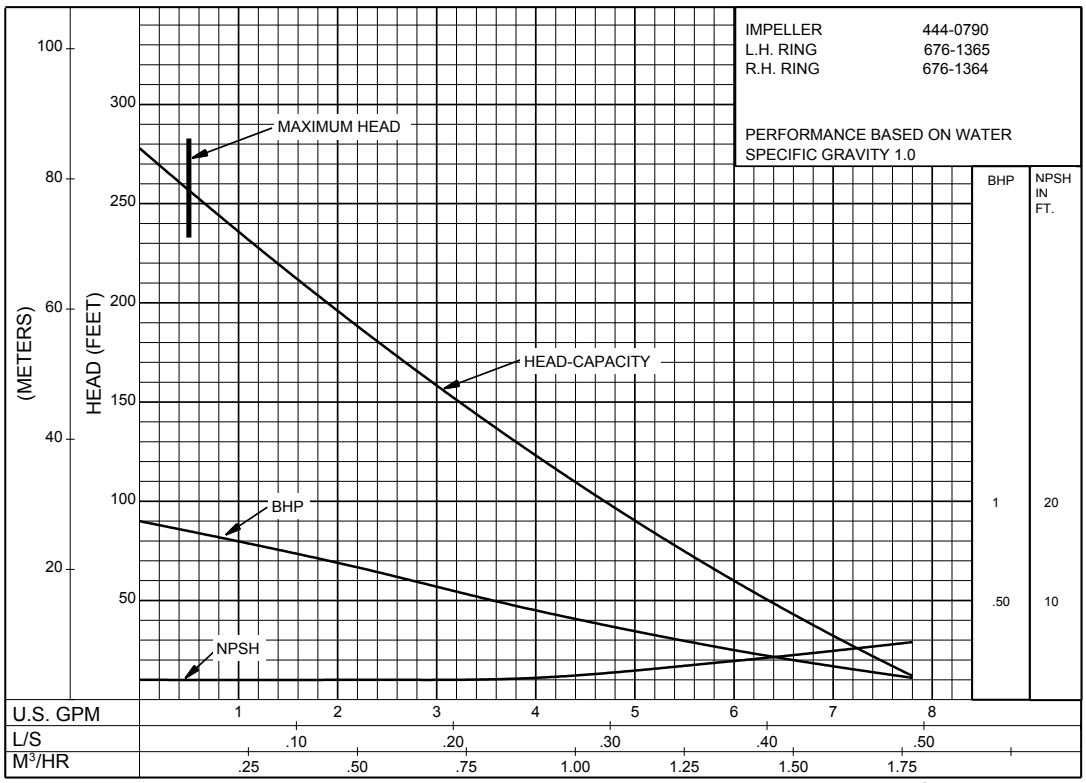
SIZE : D4 **TYPE : 110A** **R. P. M. : 3500**



PC-152353A

3500 R.P.M

SIZE : D4 **TYPE : 110A** **R. P. M. : 1750**



PC-152354A

1750 R.P.M

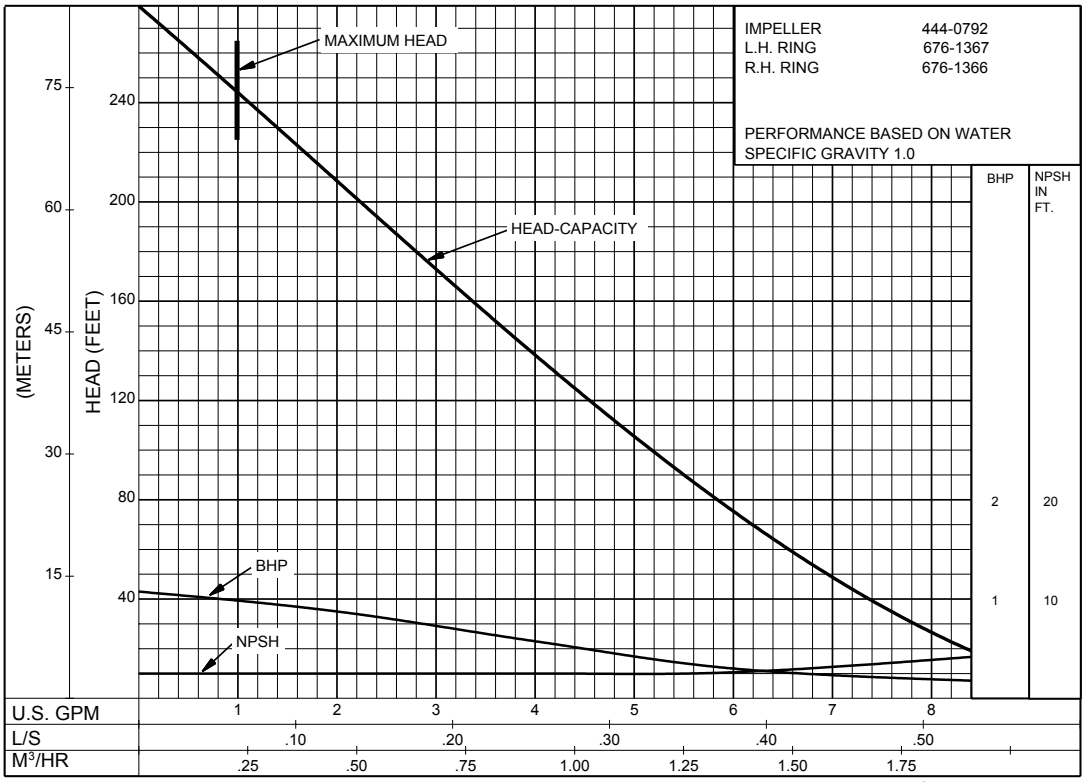
1-1/4 x 1-1/4 x 4 SERIES 110A

SINGLE STAGE

Supersedes Section 110 Page 406
Dated November 1993

1750
R.P.M

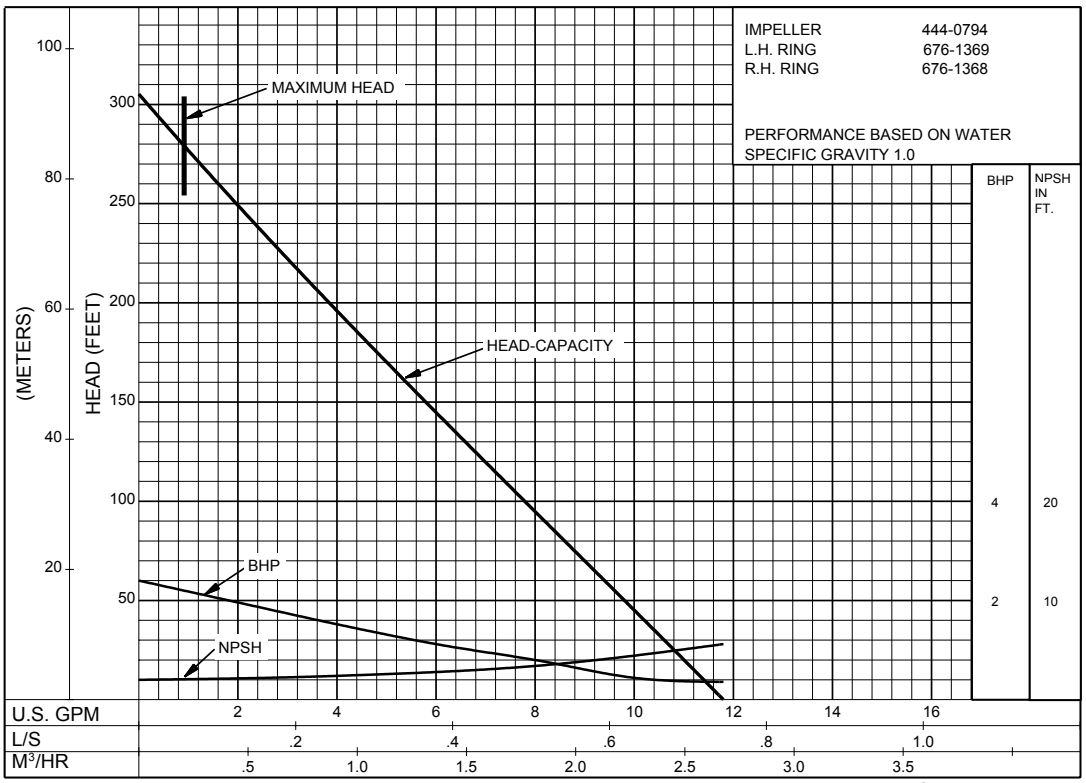
SIZE : E4 **TYPE : 110A** **R. P. M. : 1750**



PC-152357A

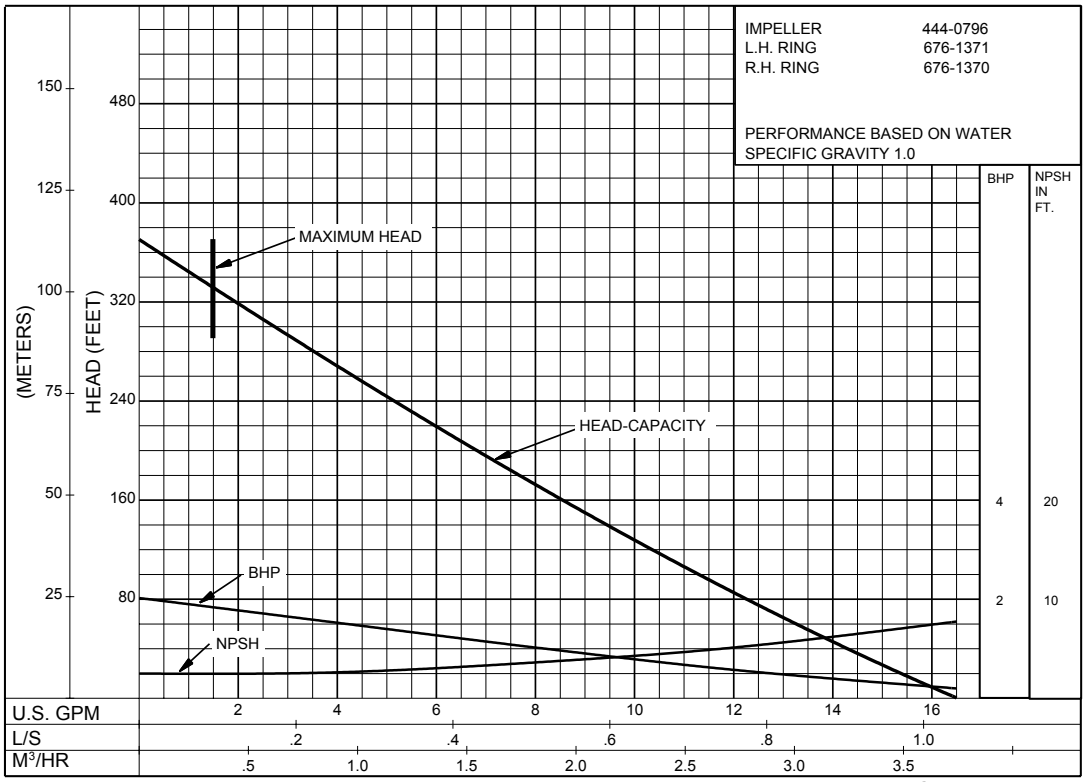
1750
R.P.M

SIZE : F4 **TYPE : 110A** **R. P. M. : 1750**



PC-152355A

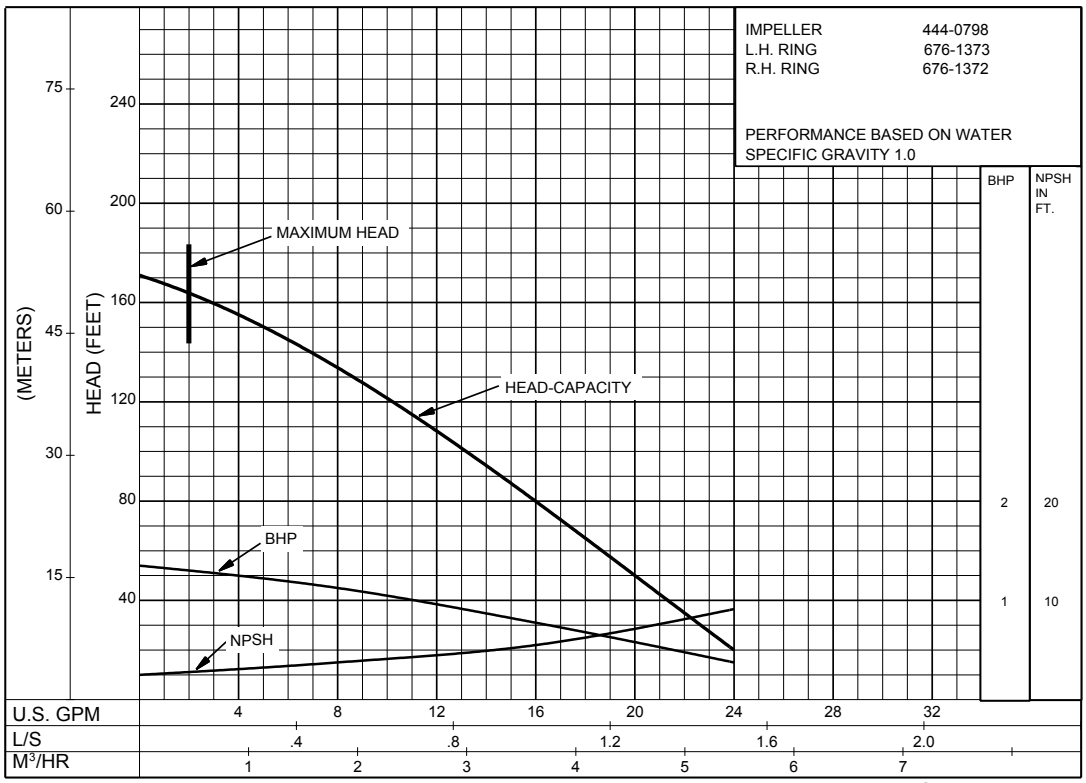
SIZE : G4 **TYPE : 110A** **R. P. M. : 1750**



PC-152365A

1750 R.P.M

SIZE : H4 **TYPE : 110A** **R. P. M. : 1750**



PC-153395A

1750 R.P.M

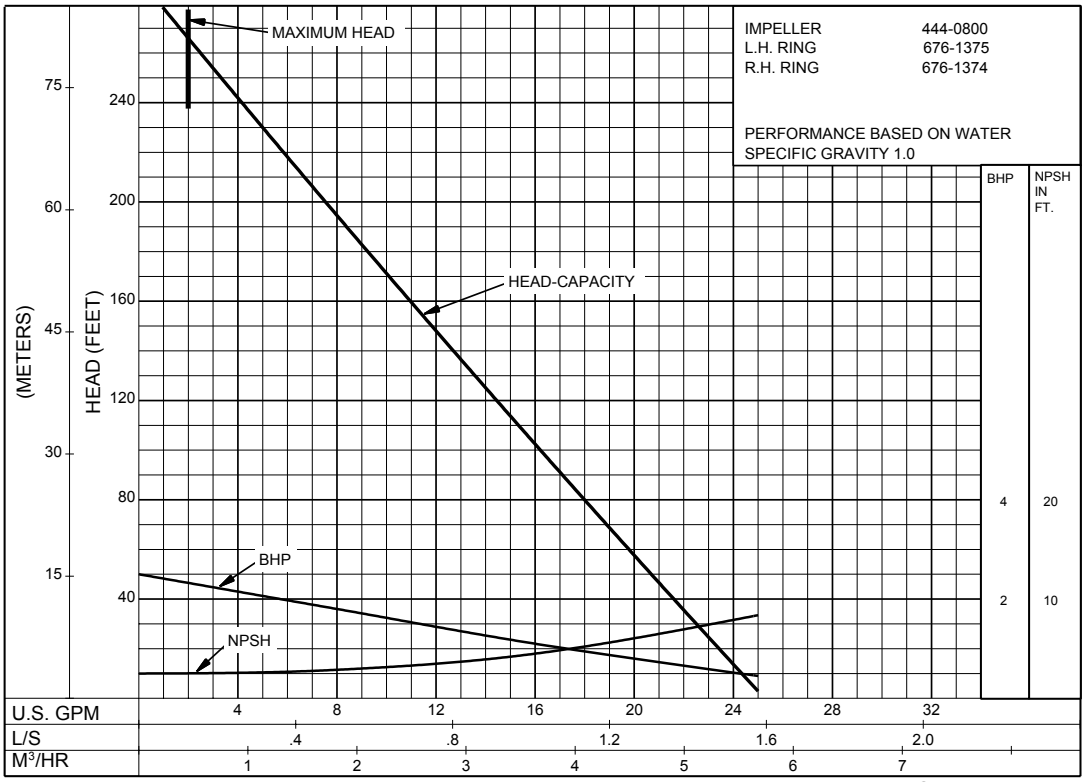
1-1/4 x 1-1/4 x 4 SERIES 110A

SINGLE STAGE

Supersedes Section 110 Page 408
Dated November 1993

1750
R.P.M

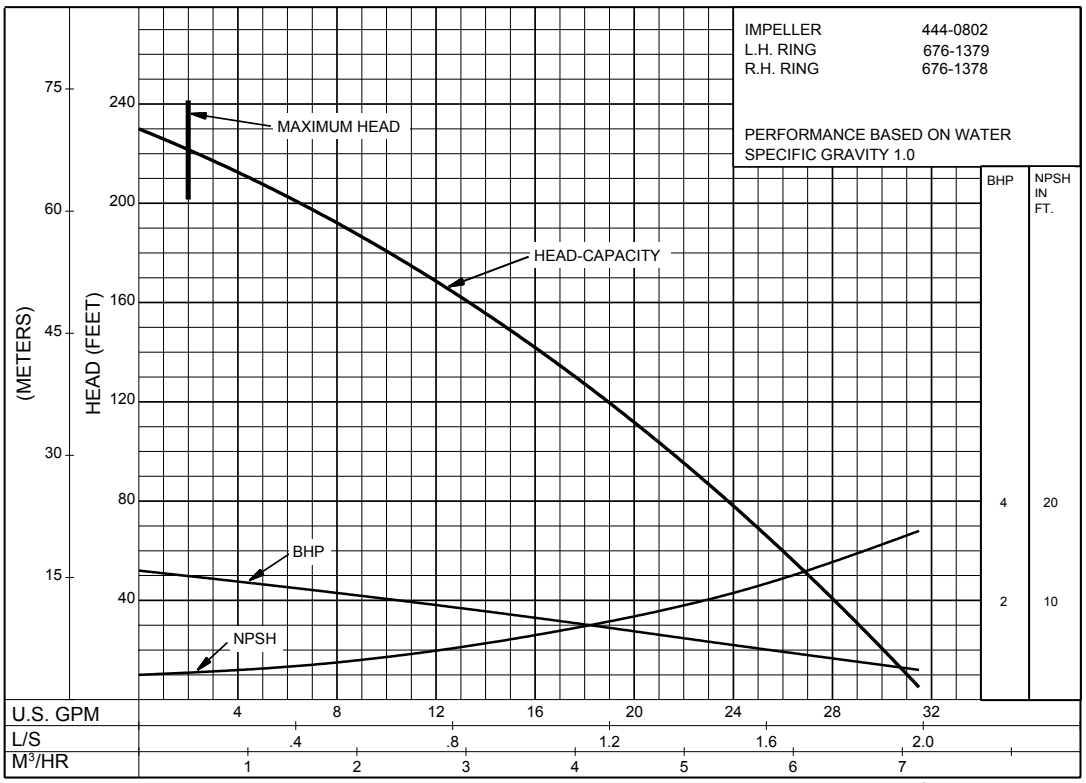
SIZE : I4 **TYPE : 110A** **R. P. M. : 1750**



PC-152358A

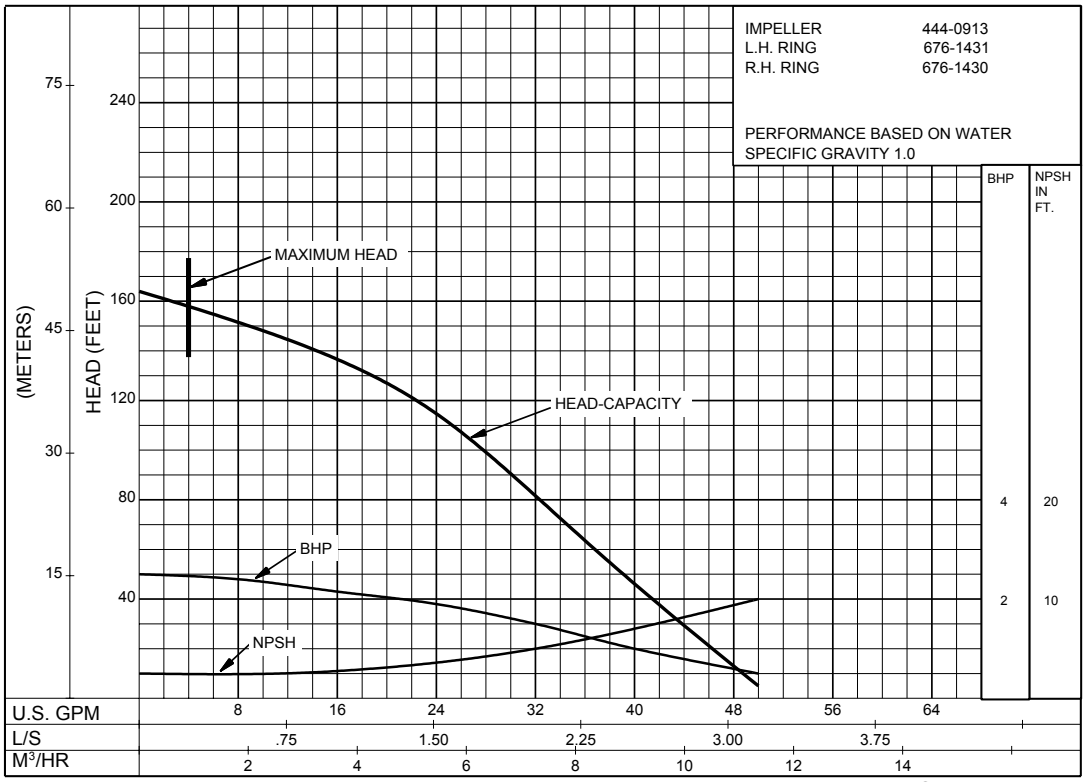
1750
R.P.M

SIZE : I4A **TYPE : 110A** **R. P. M. : 1750**



PC-153396A

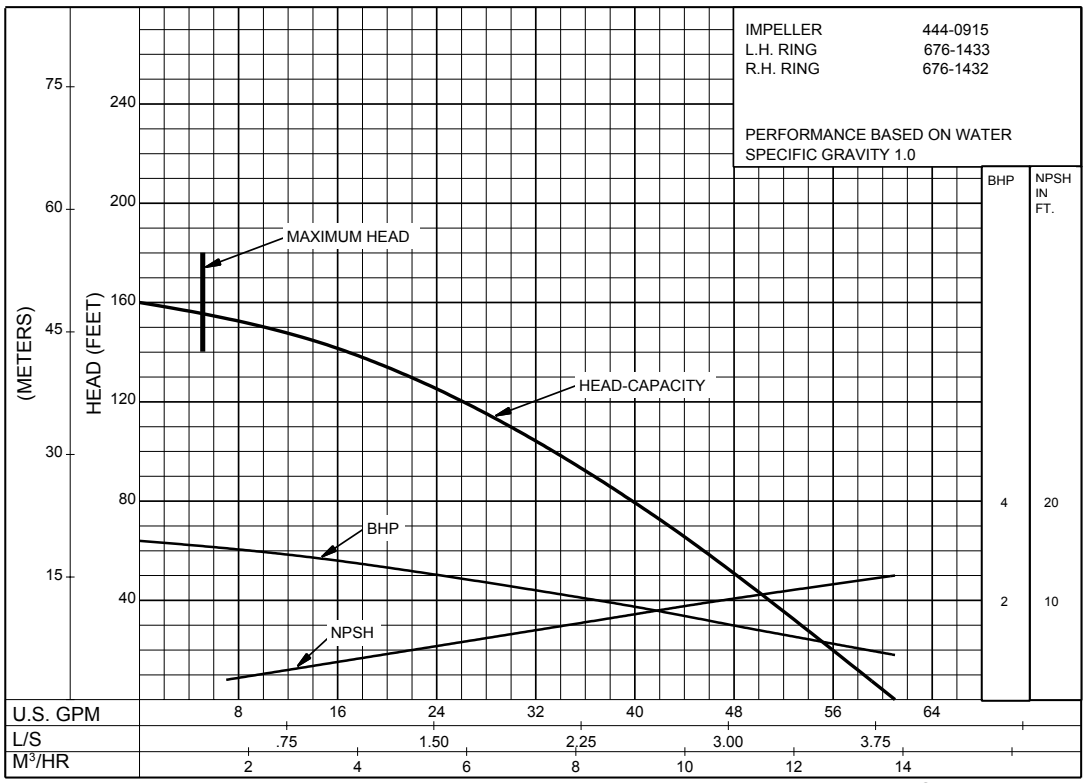
SIZE : M4 **TYPE : 110A** **R. P. M. : 1750**



PC-153397A

1750 R.P.M

SIZE : P4 **TYPE : 110A** **R. P. M. : 1750**



PC-153398B

1750 R.P.M

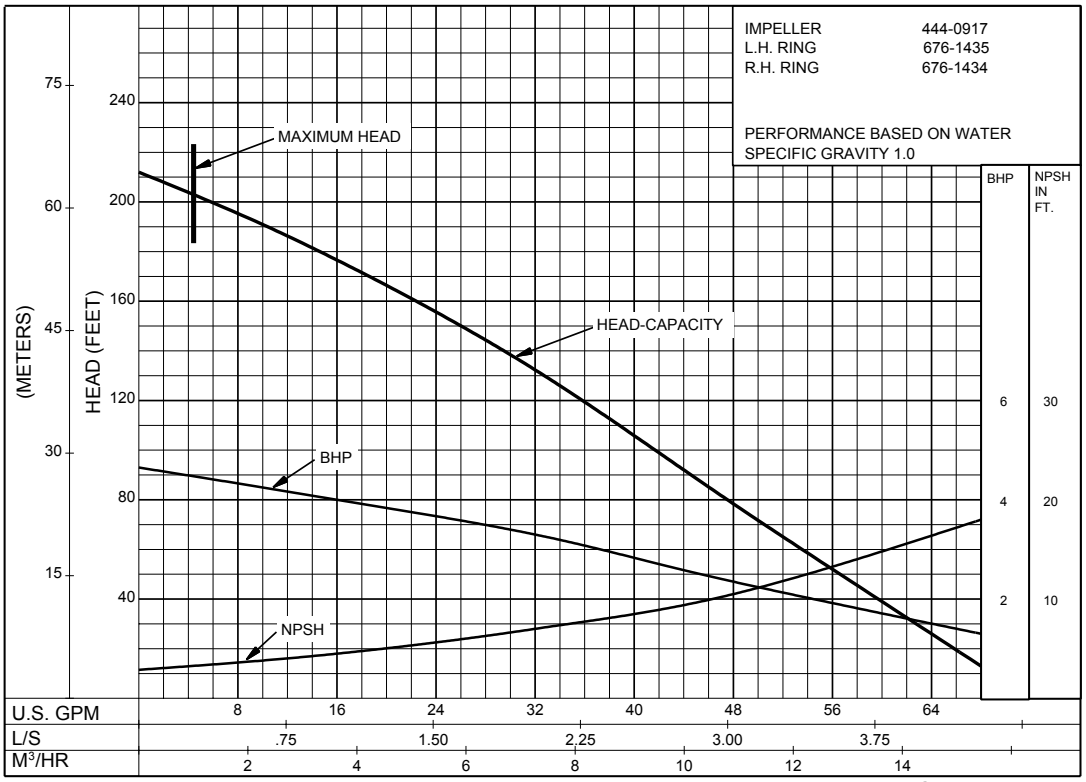
1-1/2 x 1-1/2 x 4 SERIES 110A

SINGLE STAGE

Supersedes Section 110 Page 410
Dated November 1993

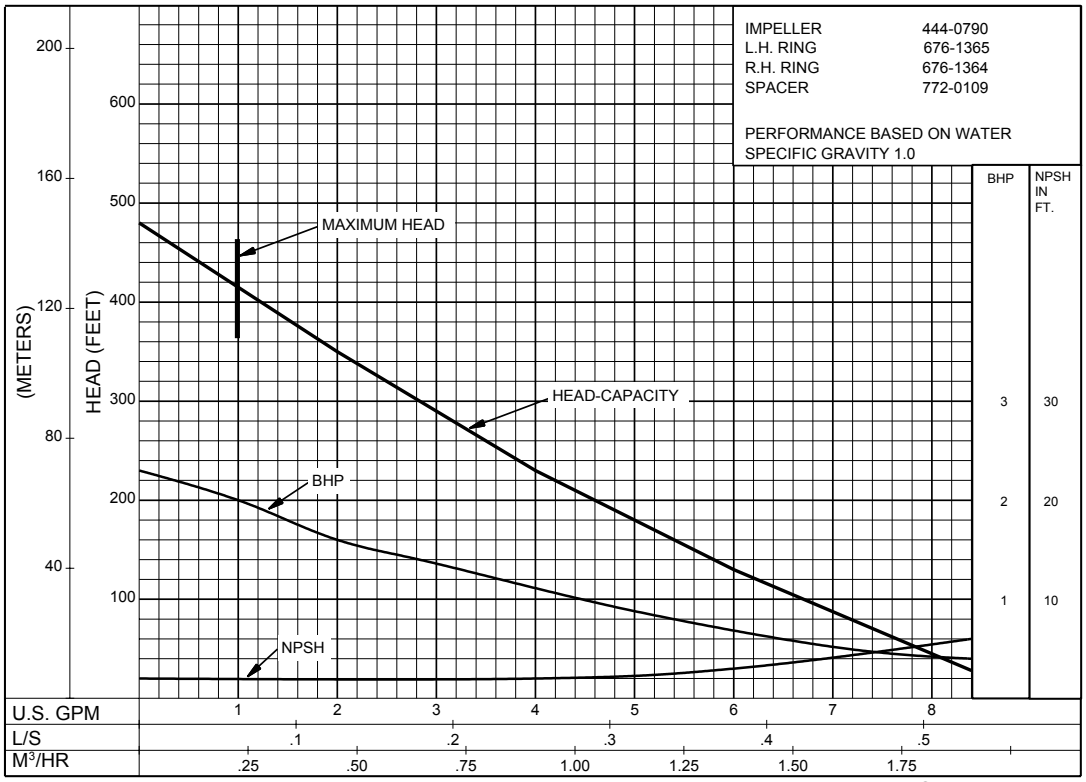
1750
R.P.M

SIZE : R4 **TYPE : 110A** **R. P. M. : 1750**



PC-153399A

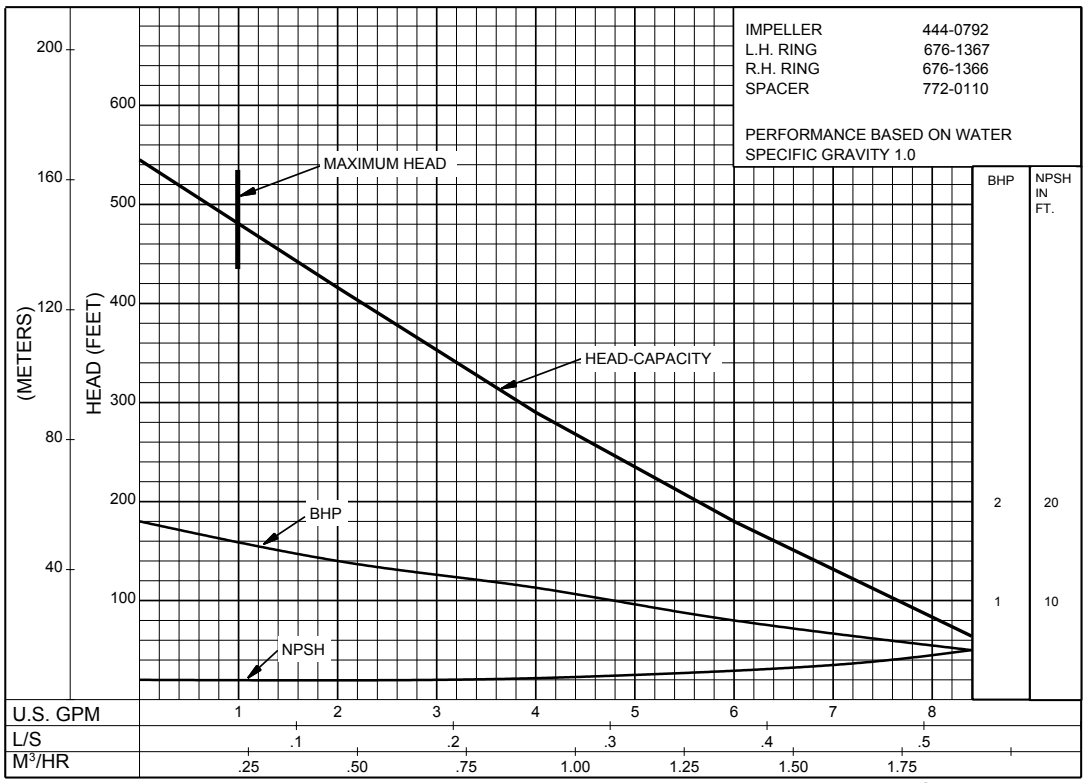
SIZE : D4T **TYPE : 110A** **R. P. M. : 1750**



PC-153400A

1750 R.P.M

SIZE : E4T **TYPE : 110A** **R. P. M. : 1750**



PC-153401A

1750 R.P.M

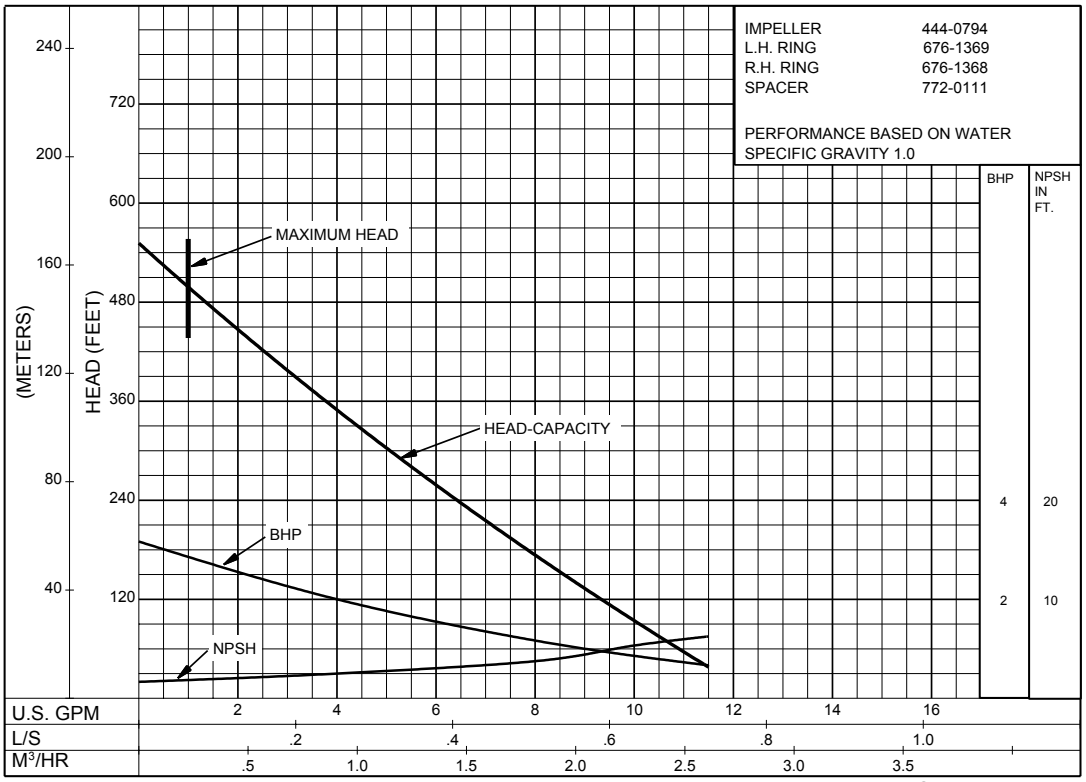
1-1/4 x 1-1/4 x 4 SERIES 110A

TWO STAGE

Supersedes Section 110 Page 412
Dated November 1993

1750 R.P.M

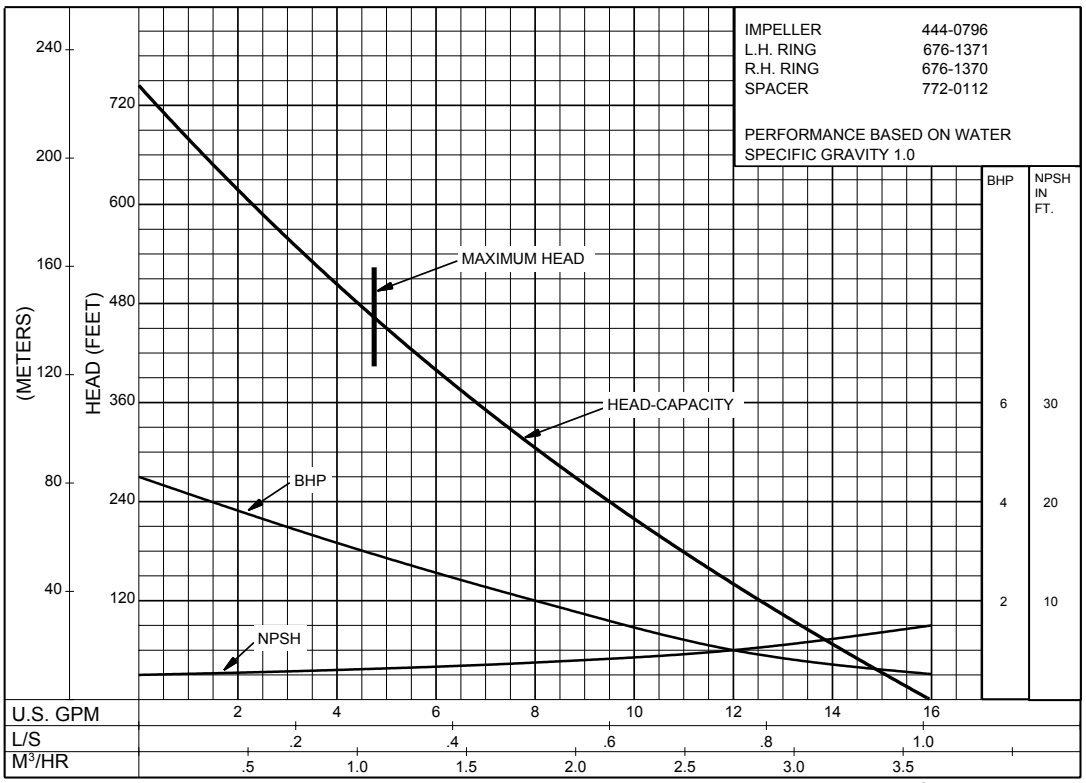
SIZE : F4T **TYPE : 110A** **R. P. M. : 1750**



PC-153402A

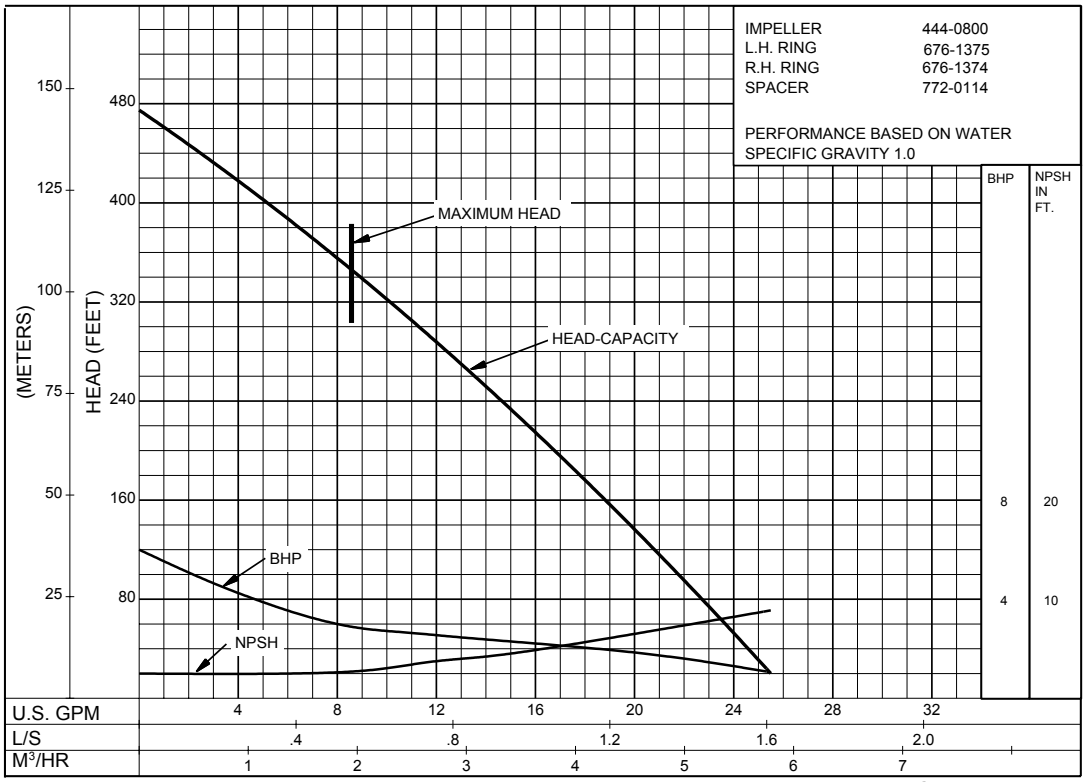
1750 R.P.M

SIZE : G4T **TYPE : 110A** **R. P. M. : 1750**



PC-152356A

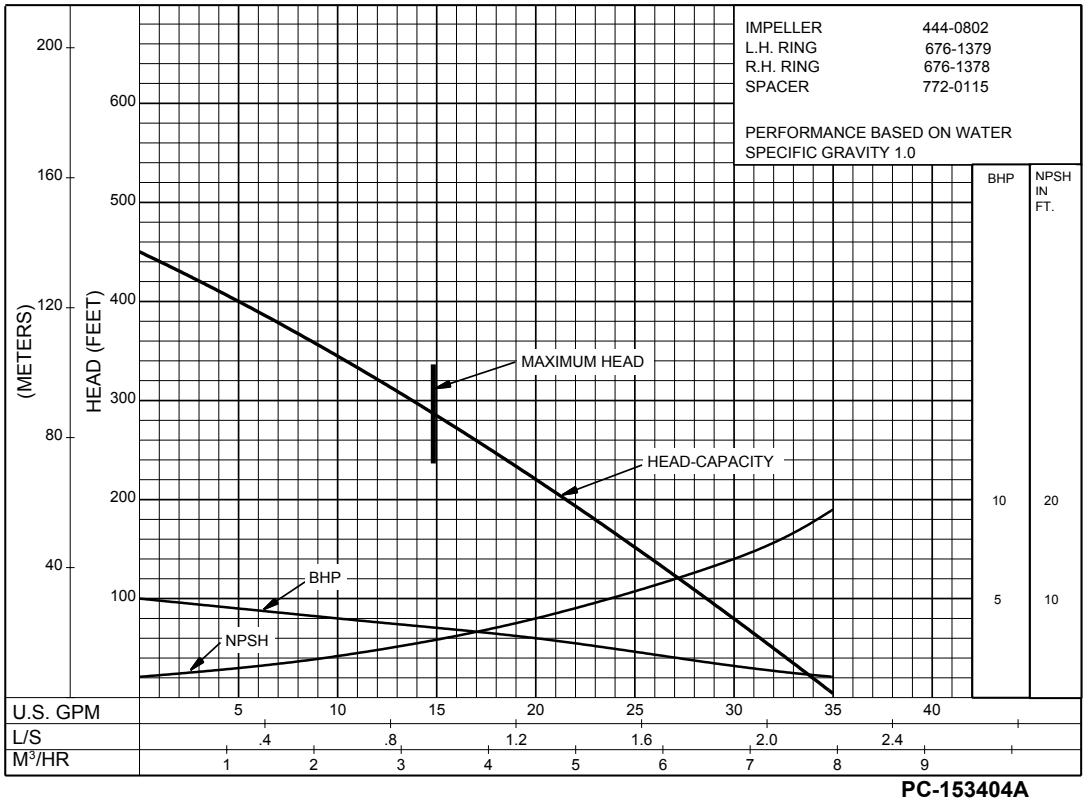
SIZE : I4T **TYPE : 110A** **R. P. M. : 1750**



PC-153403A

1750 R.P.M

SIZE : I4TA **TYPE : 110A** **R. P. M. : 1750**



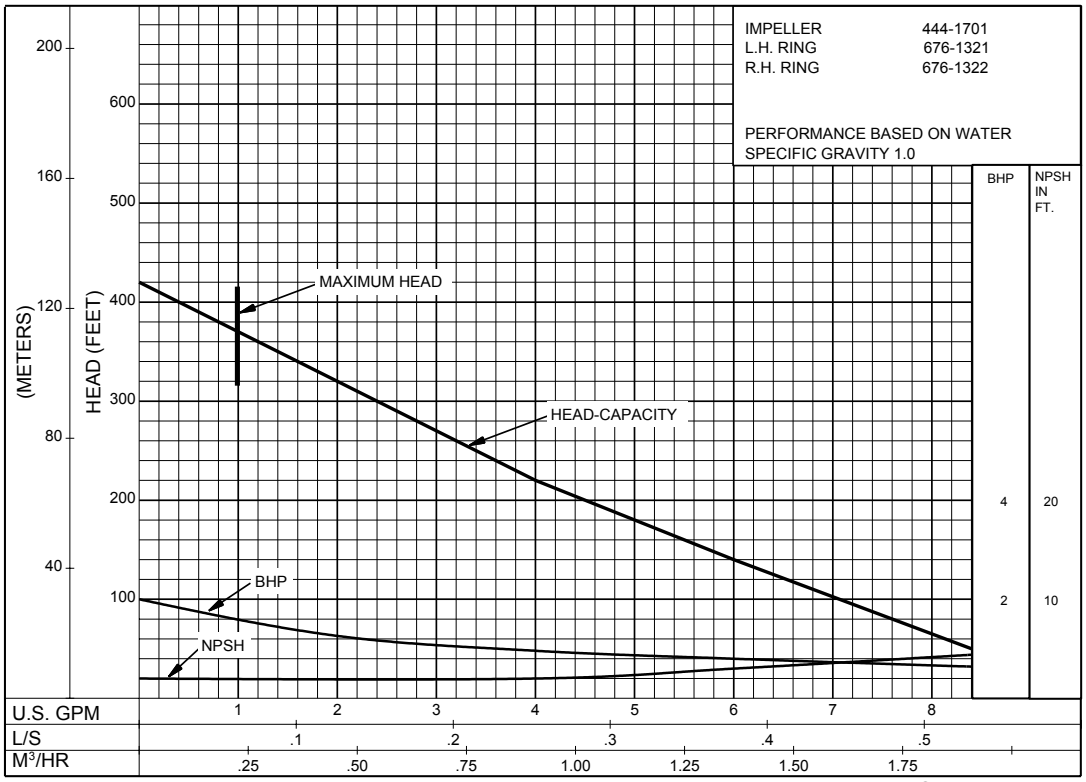
PC-153404A

1750 R.P.M

Supersedes Section 110 Page 414
Dated November 1993

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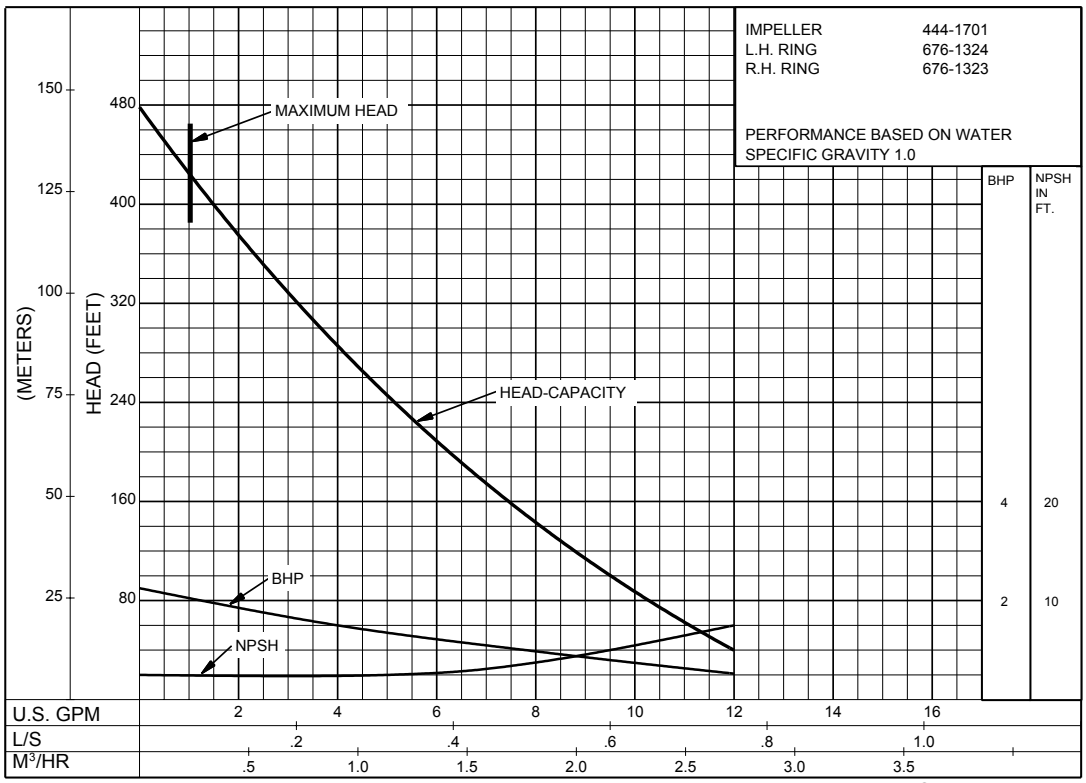
SIZE : D5 **TYPE : 110A** **R. P. M. : 1750**



PC-153405A

1750 R.P.M

SIZE : E5 **TYPE : 110A** **R. P. M. : 1750**



PC-153406A

1750 R.P.M

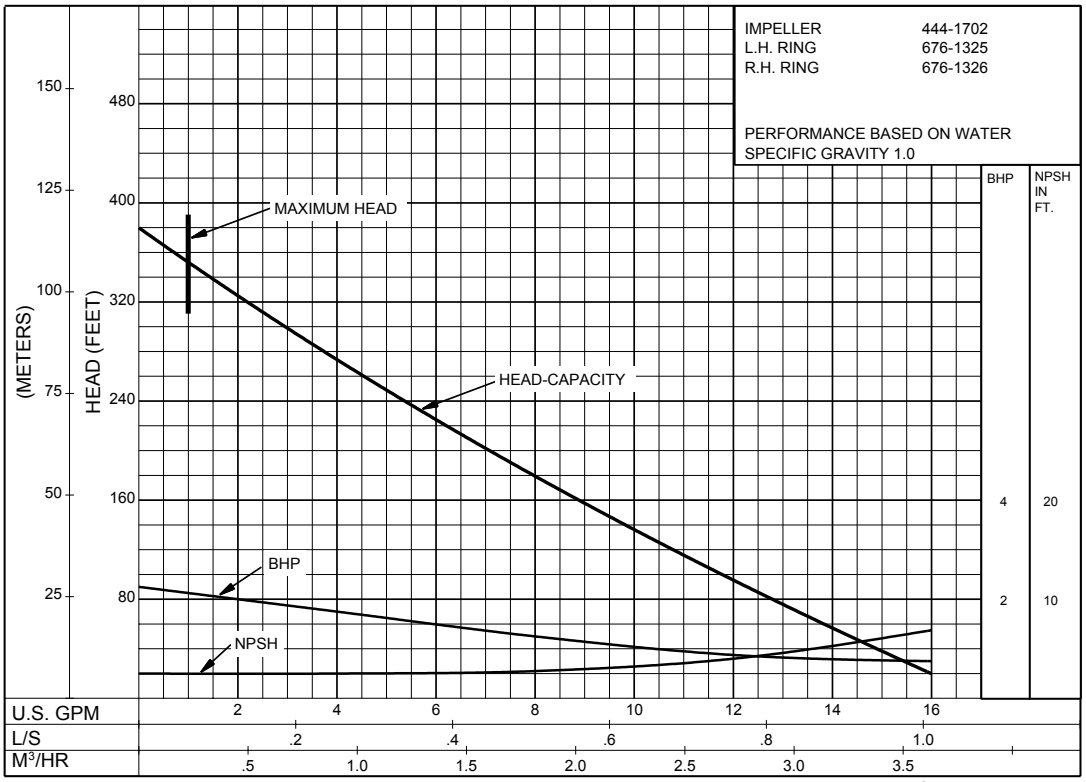
1-1/4 x 1-1/4 x 5 SERIES 110A

SINGLE STAGE

Supersedes Section 110 Page 416
Dated November 1993

1750
R.P.M

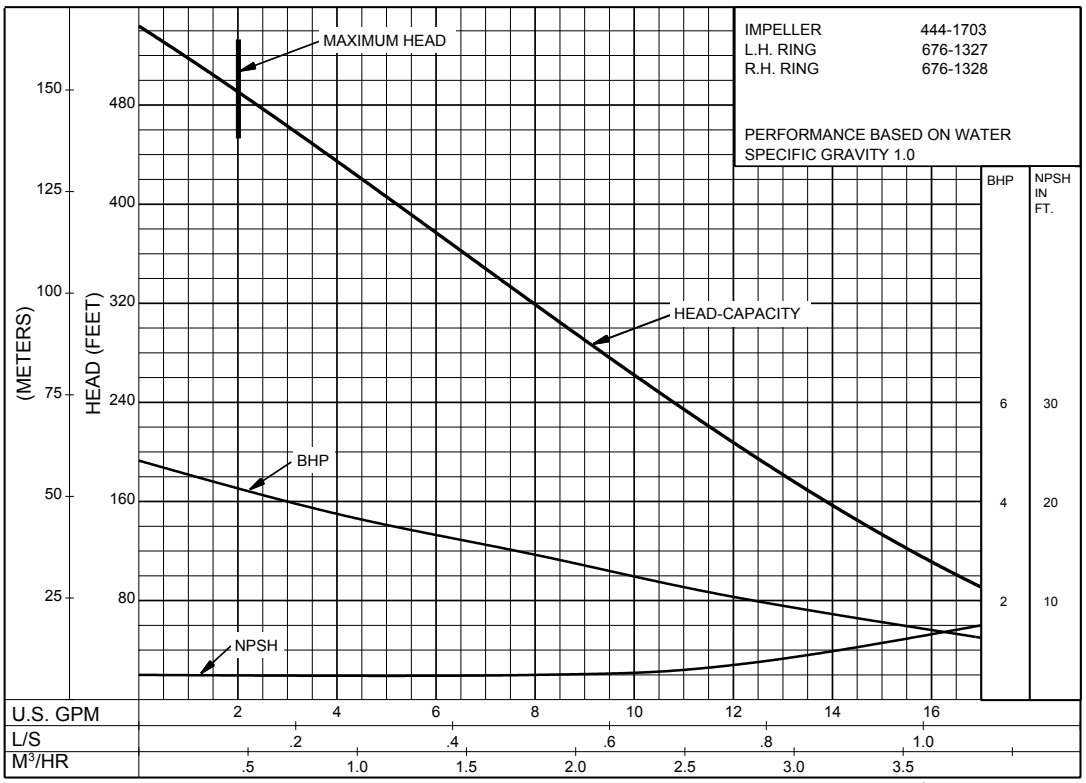
SIZE :F5 **TYPE : 110A** **R. P. M. : 1750**



PC-153407A

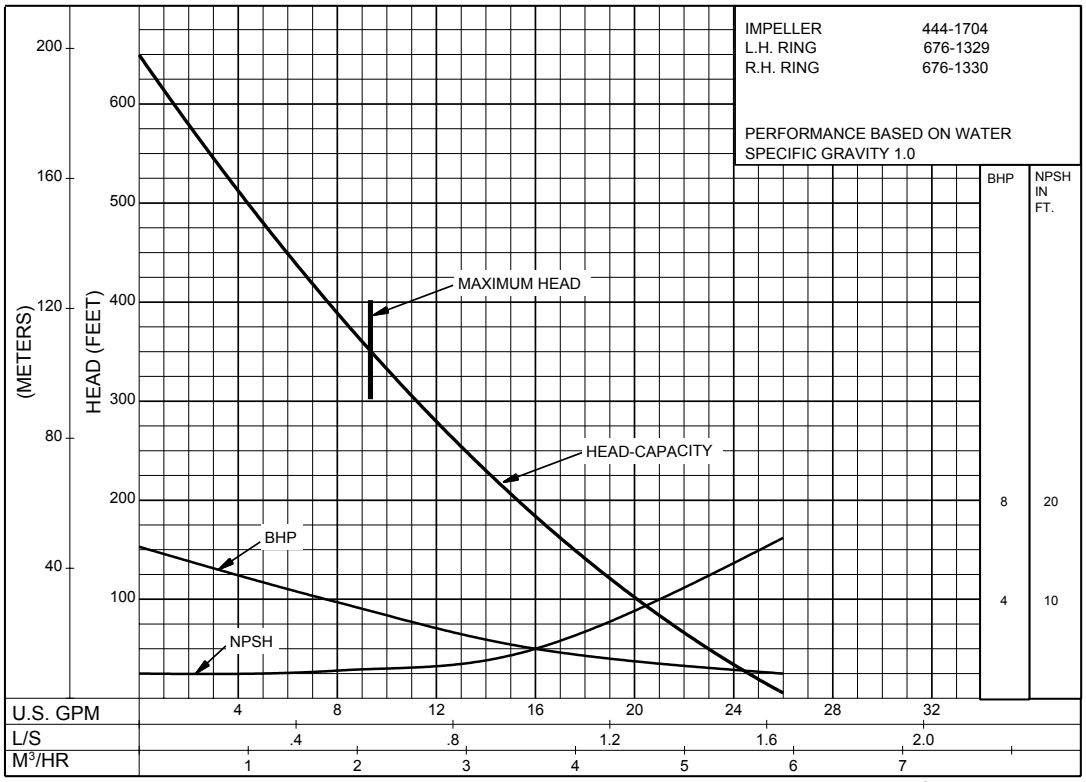
1750
R.P.M

SIZE :G5 **TYPE : 110A** **R. P. M. : 1750**



PC-153408A

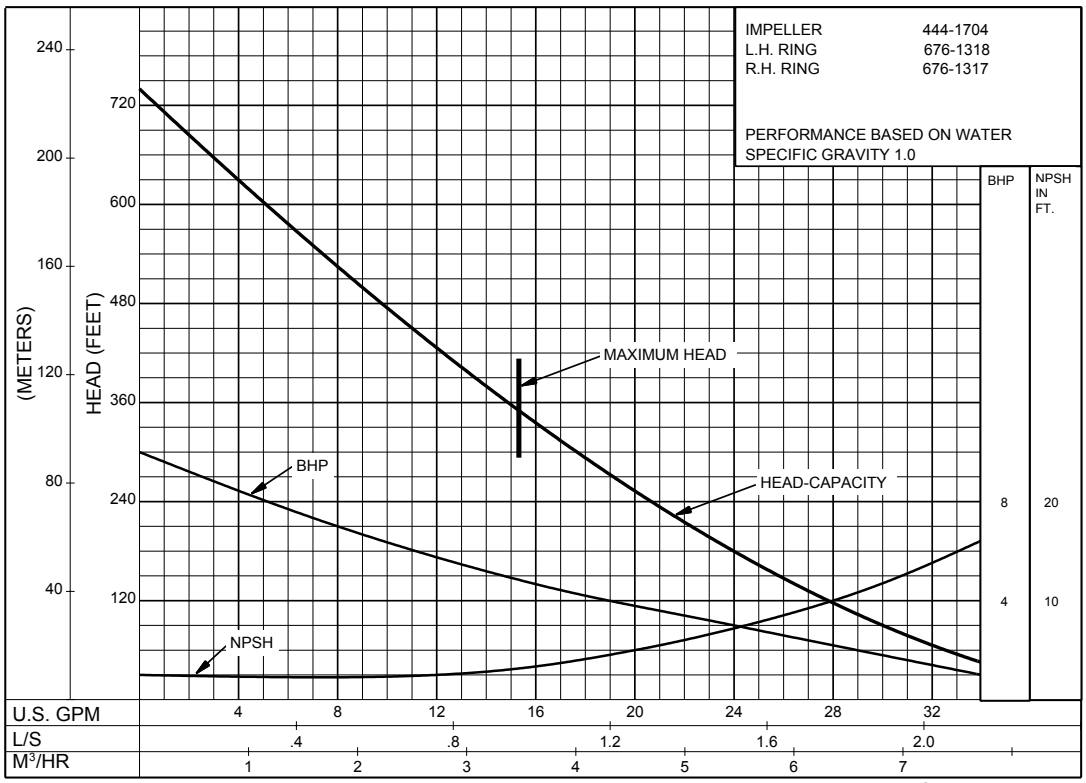
SIZE : H5 **TYPE : 110A** **R. P. M. : 1750**



PC-152359A

1750 R.P.M

SIZE : I5 **TYPE : 110A** **R. P. M. : 1750**



PC-152360A

1750 R.P.M

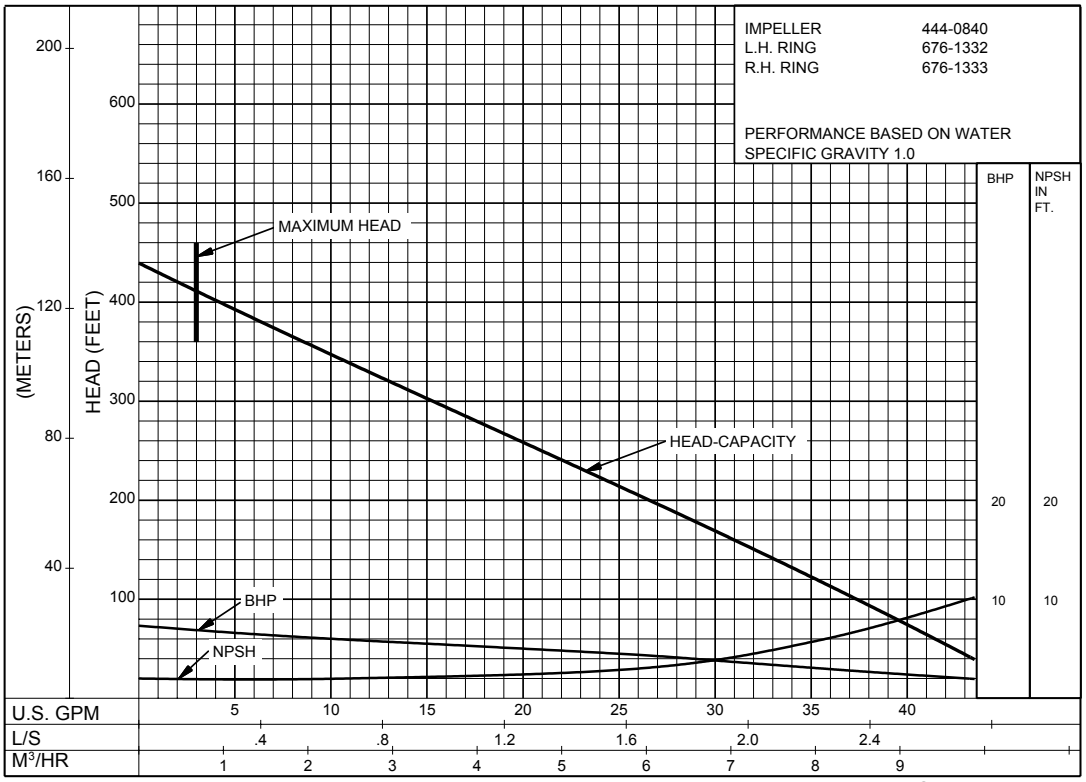
1-1/2 x 2 x 5 SERIES 110A

SINGLE STAGE

Supersedes Section 110 Page 418
Dated November 1993

1750 R.P.M

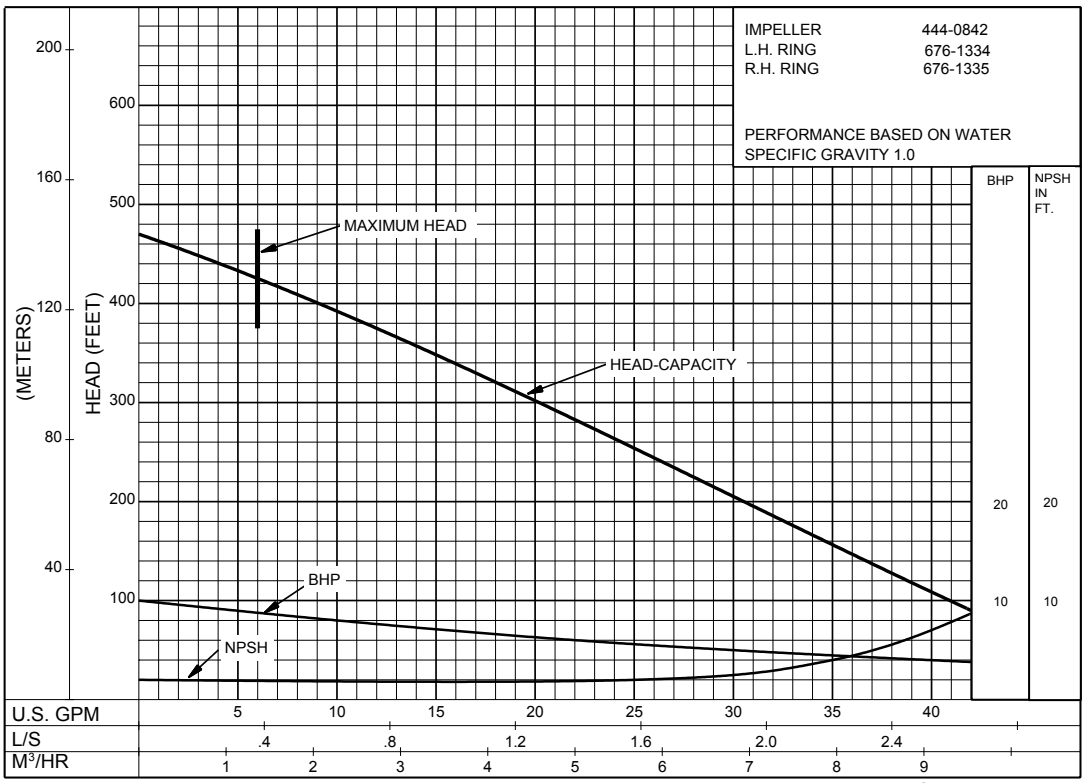
SIZE : J5 **TYPE : 110A** **R. P. M. : 1750**



PC-153409B

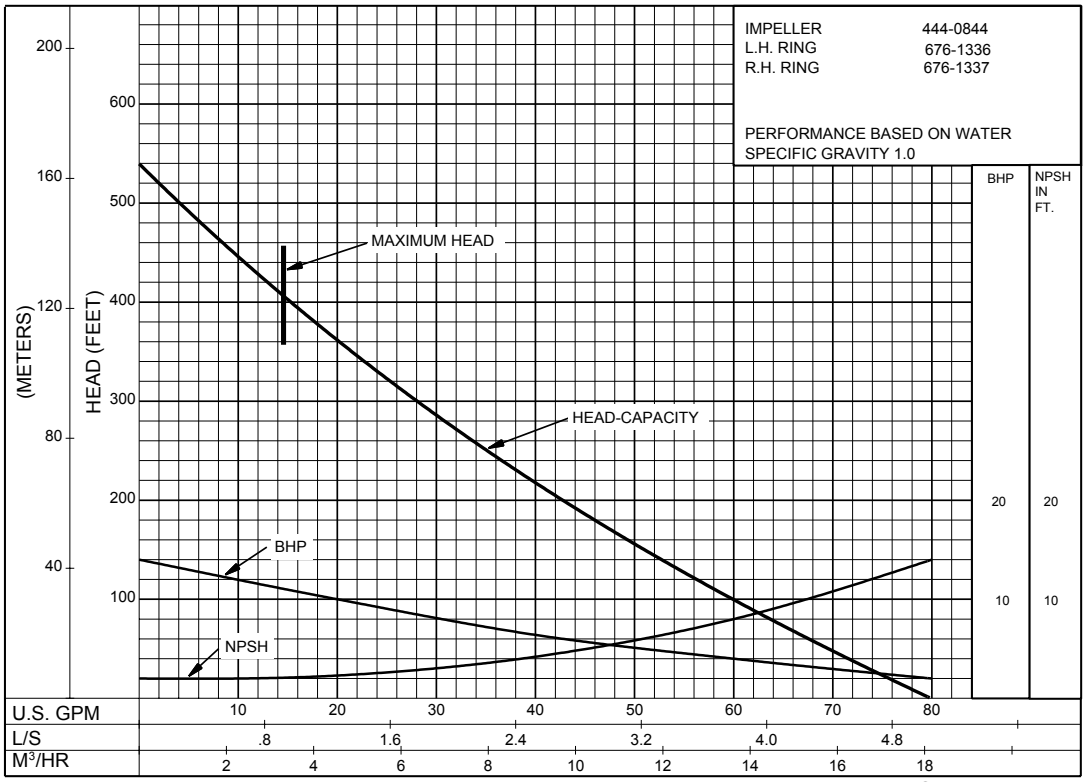
1750 R.P.M

SIZE : K5 **TYPE : 110A** **R. P. M. : 1750**



PC-153410A

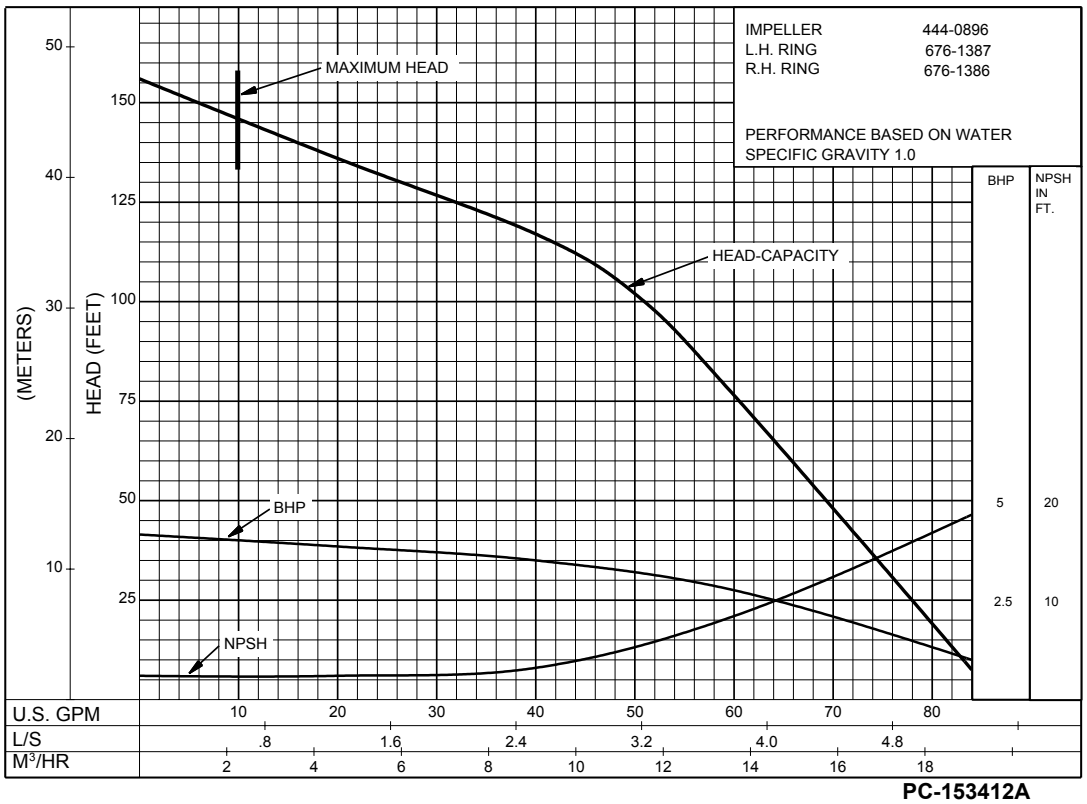
SIZE : L5 **TYPE : 110A** **R. P. M. : 1750**



PC-153411A

1750 R.P.M

SIZE : M5 **TYPE : 110A** **R. P. M. : 1750**



PC-153412A

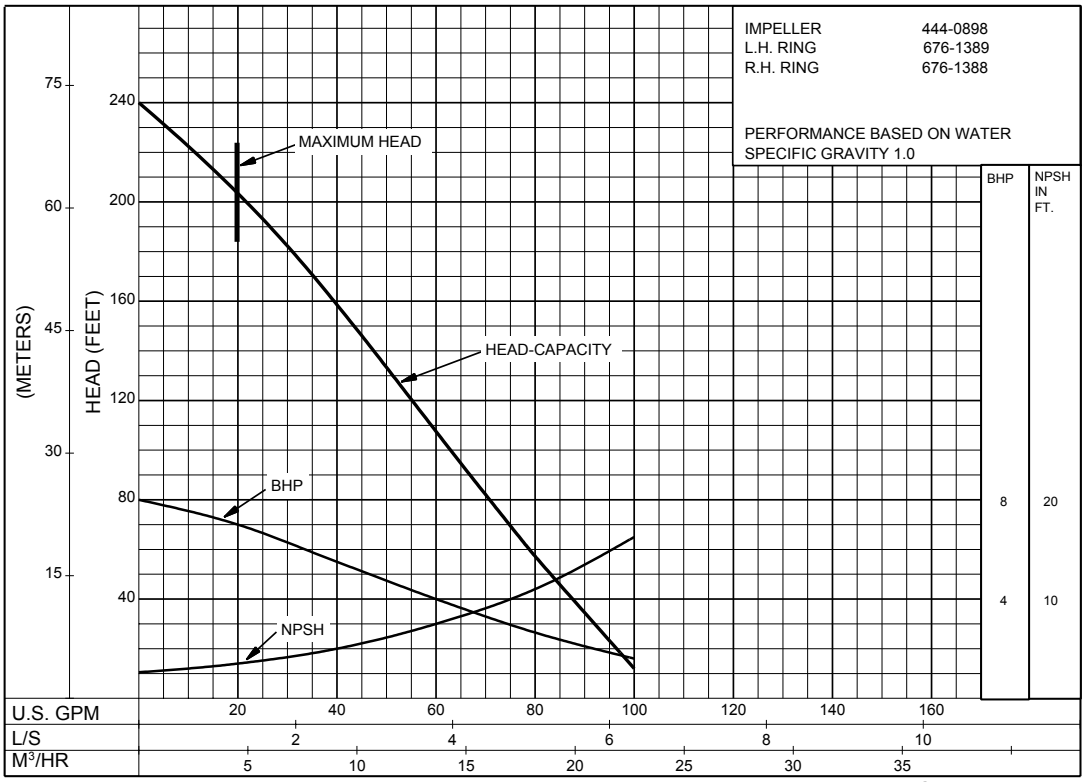
1750 R.P.M

1-1/2 x 2 x 5 SERIES 110A

SINGLE STAGE

1750 R.P.M

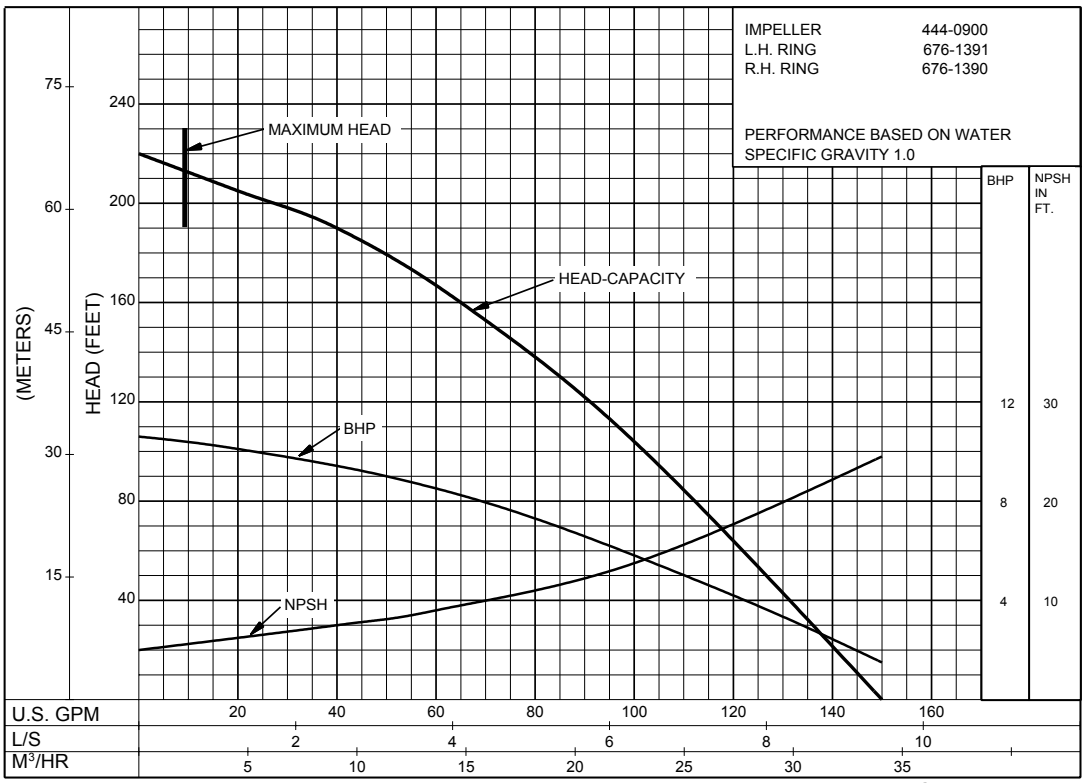
SIZE : N5 **TYPE : 110A** **R. P. M. : 1750**



PC-153413A

1750 R.P.M

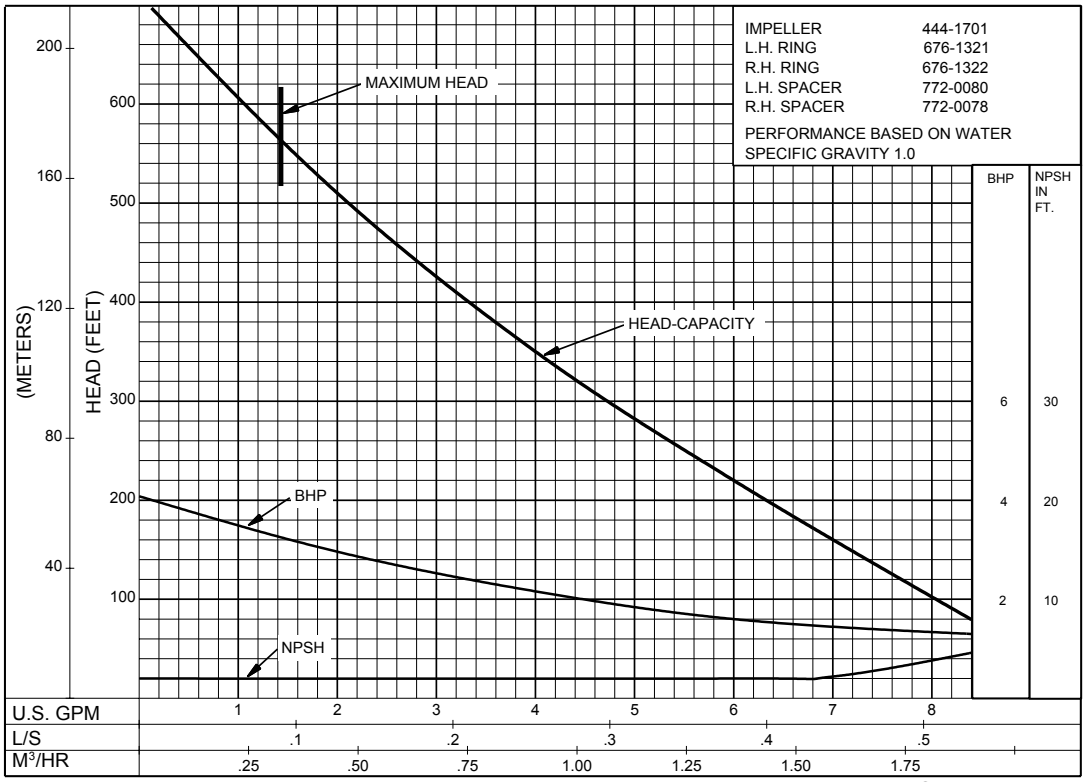
SIZE : P5 **TYPE : 110A** **R. P. M. : 1750**



PC-168040

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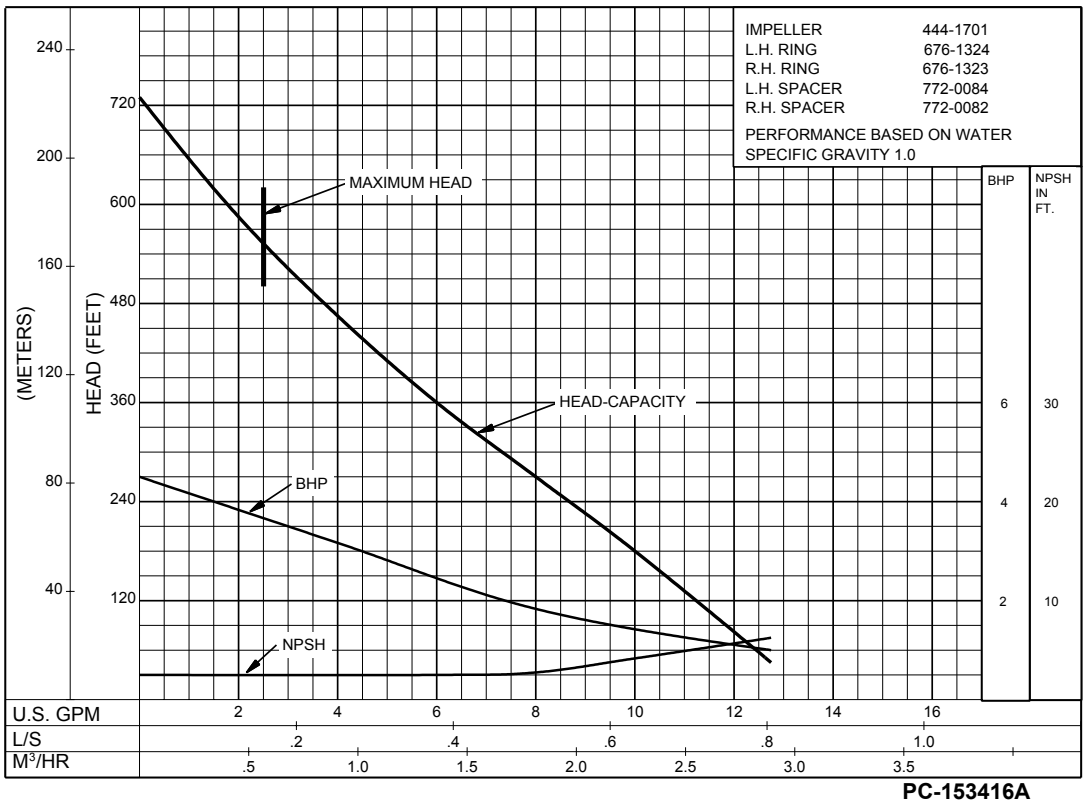
SIZE : D5T **TYPE : 110A** **R. P. M. : 1750**



PC-153415A

1750 R.P.M

SIZE : E5T **TYPE : 110A** **R. P. M. : 1750**



PC-153416A

1750 R.P.M

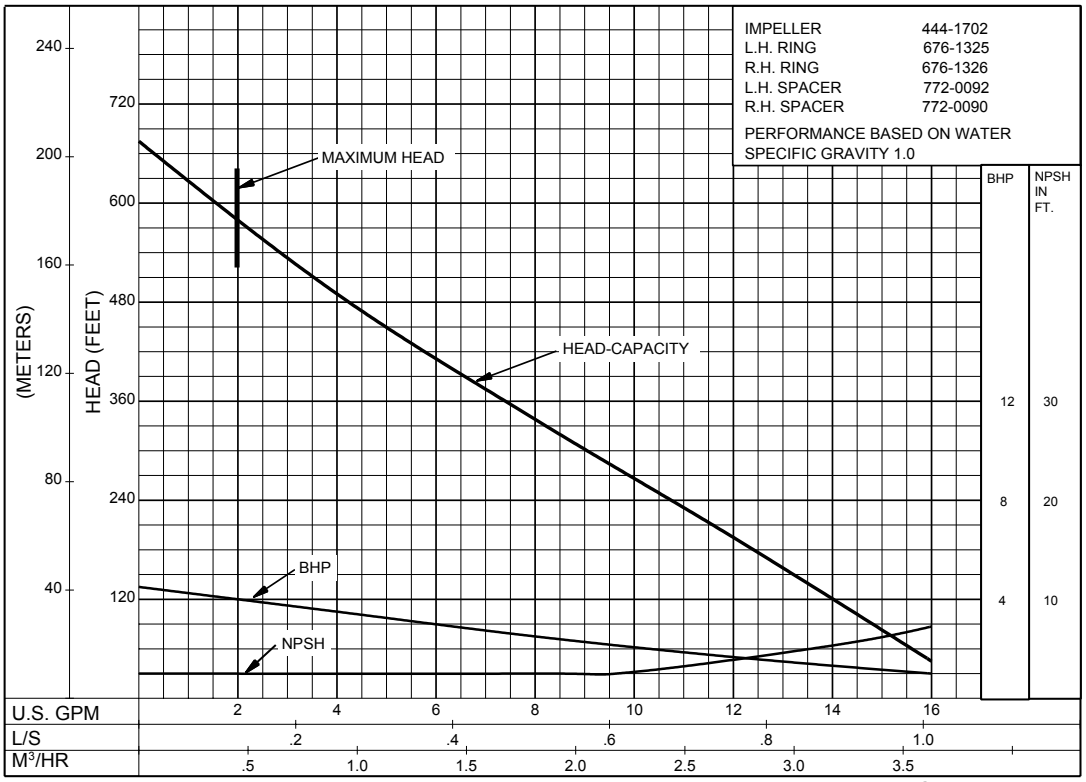
1-1/4 x 1-1/4 x 5 SERIES 110A

TWO STAGE

Supersedes Section 110 Page 422
Dated November 1993

1750
R.P.M

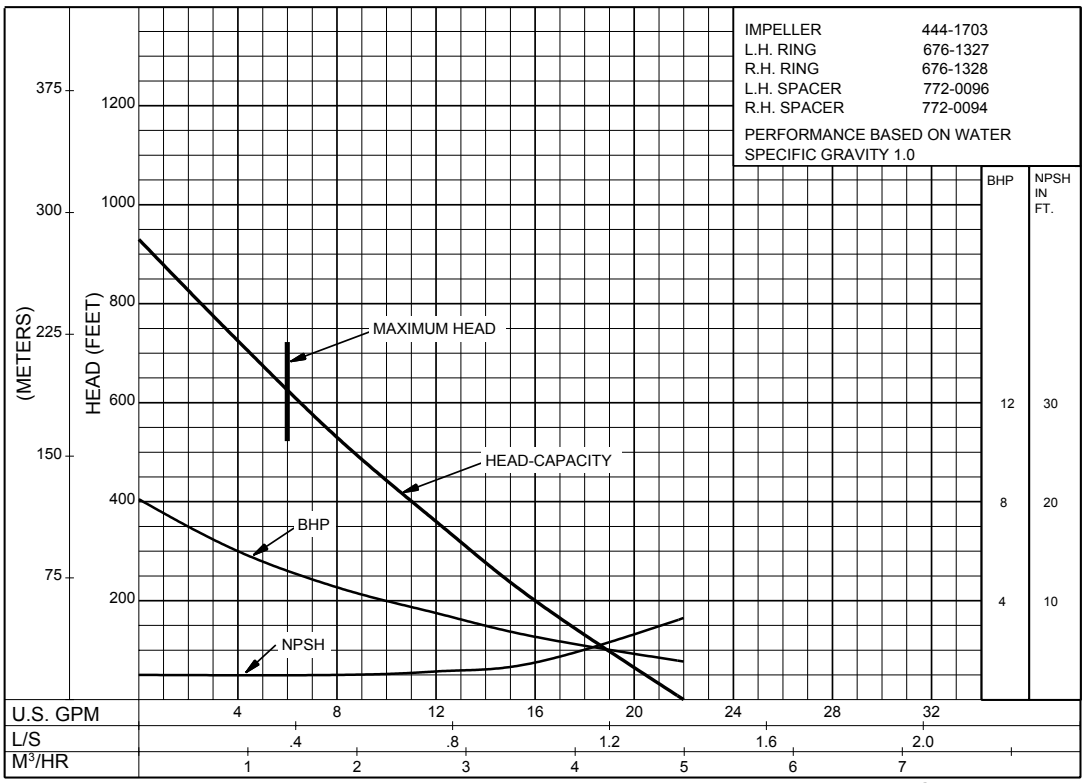
SIZE : F5T **TYPE : 110A** **R. P. M. : 1750**



PC-153417A

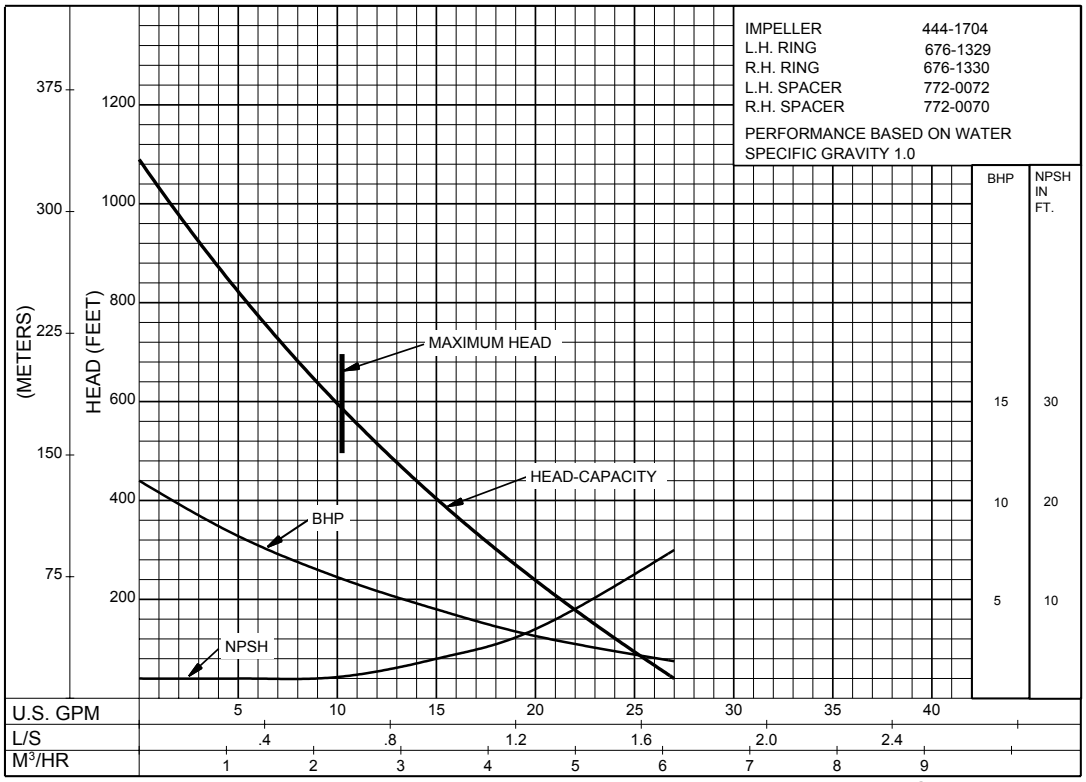
1750
R.P.M

SIZE : G5T **TYPE : 110A** **R. P. M. : 1750**



PC-153418A

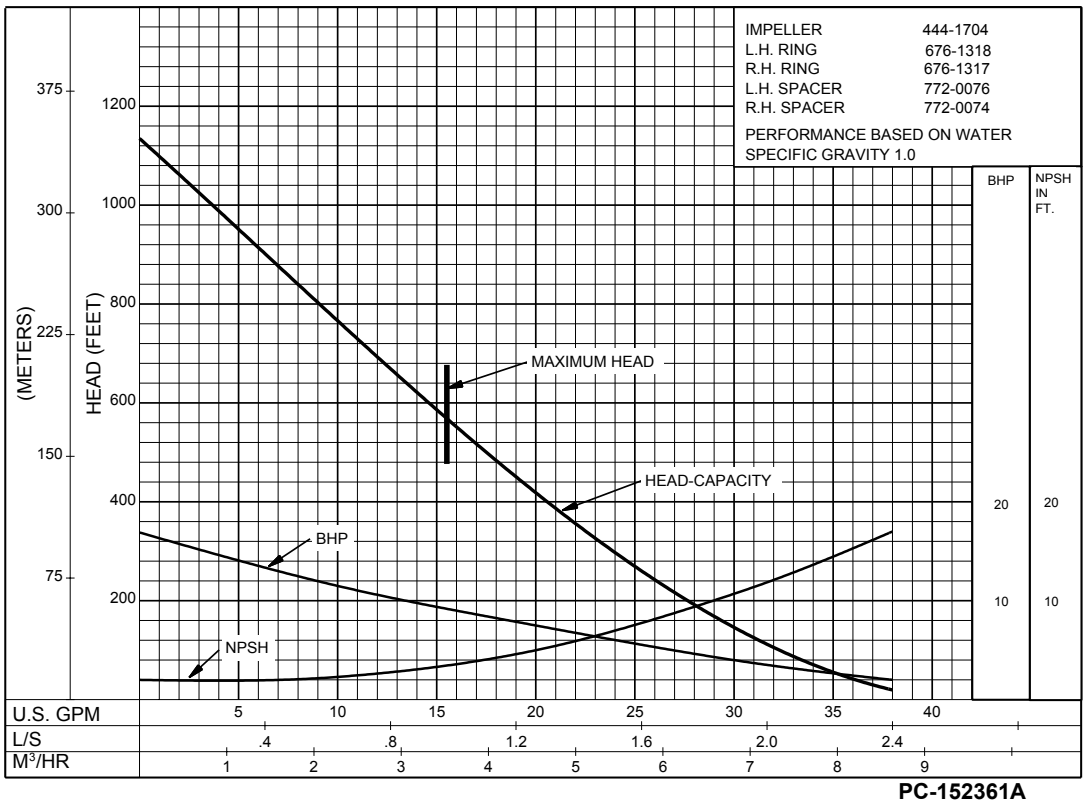
SIZE : H5T **TYPE : 110A** **R. P. M. : 1750**



PC-153419A

1750 R.P.M

SIZE : I5T **TYPE : 110A** **R. P. M. : 1750**



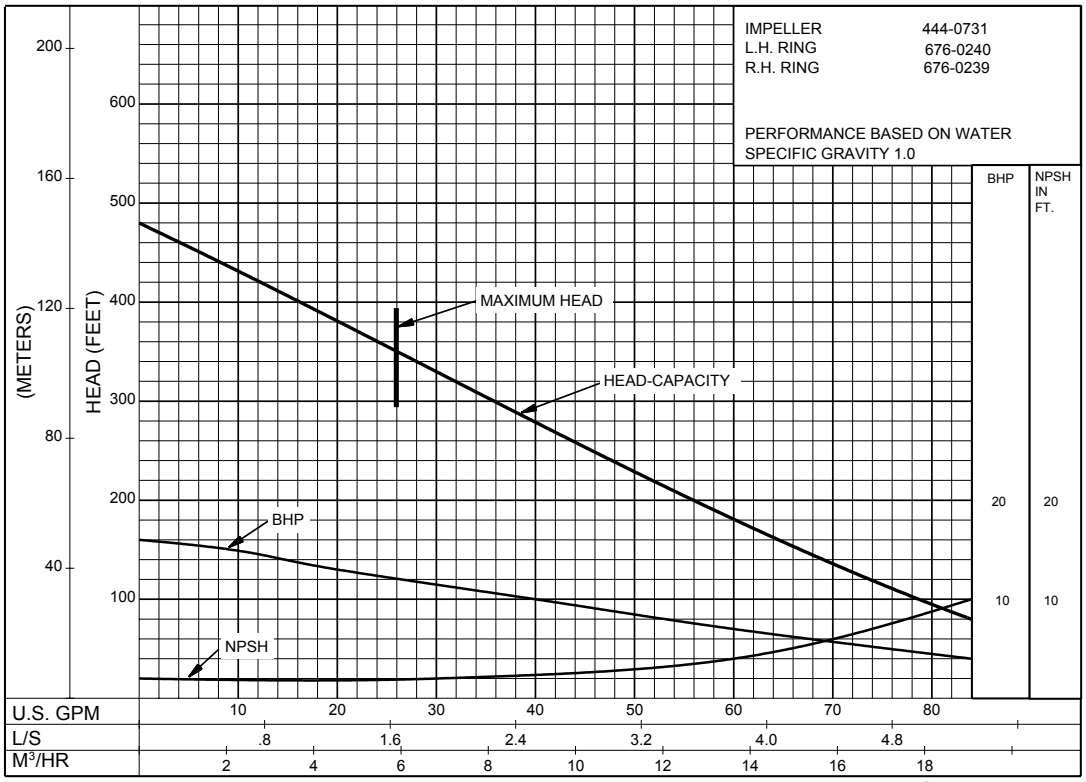
PC-152361A

1750 R.P.M

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Dated November 1993

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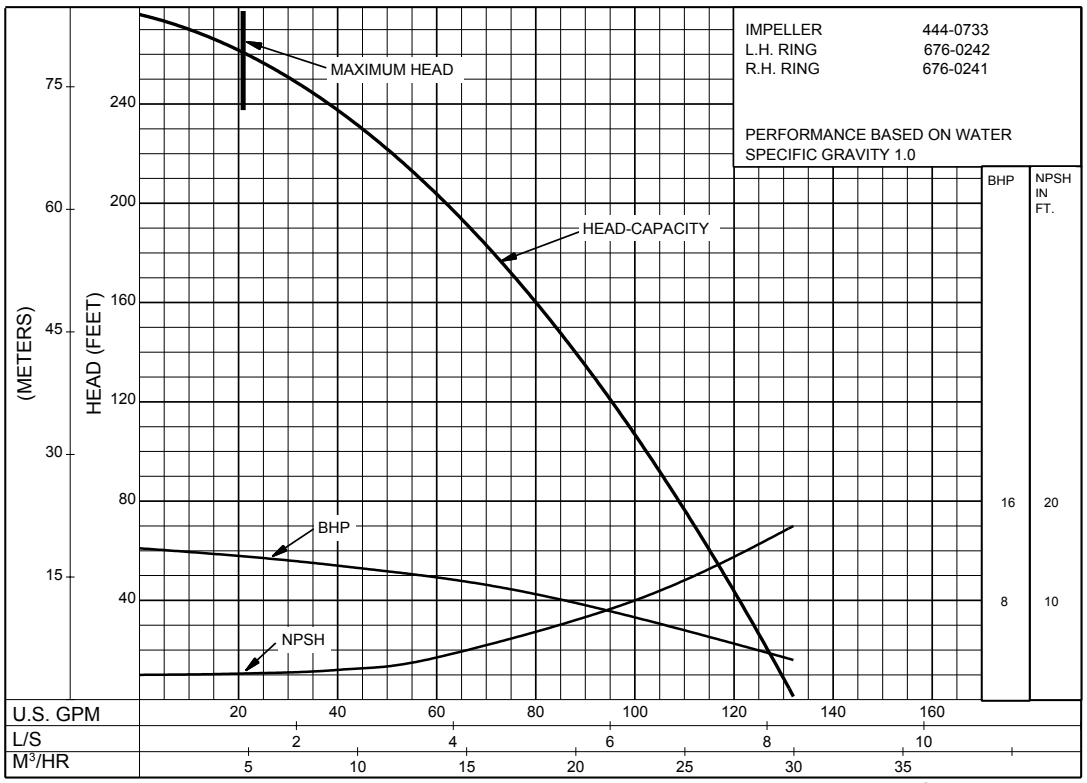
SIZE : G6 **TYPE : 110A** **R. P. M. : 1750**



PC-153420A

1750 R.P.M

SIZE : H6 **TYPE : 110A** **R. P. M. : 1750**



PC-153421A

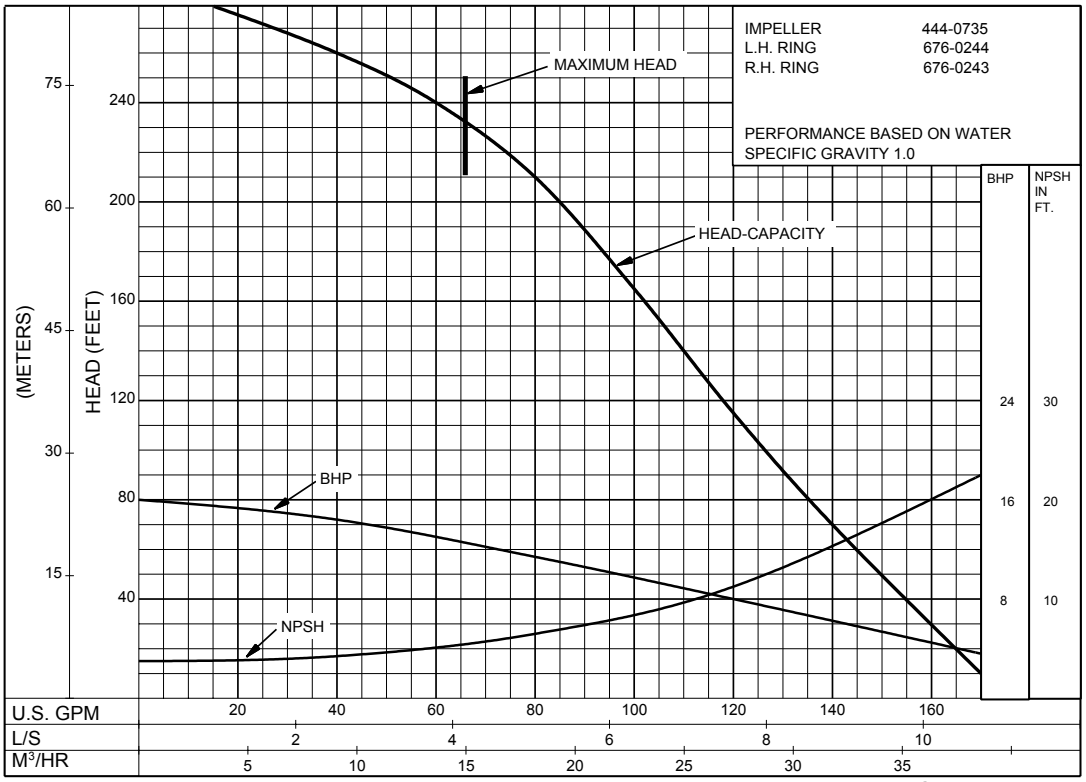
1750 R.P.M

2-1/2 x 3 x 6 SERIES 110A

SINGLE STAGE

1750 R.P.M

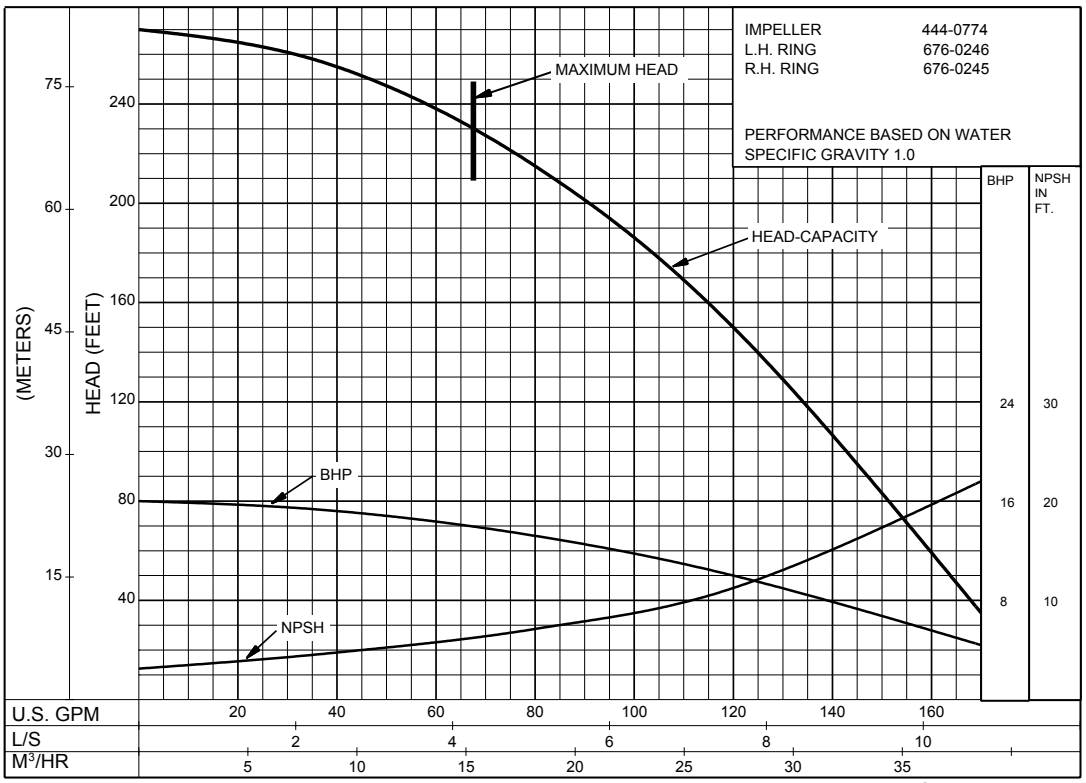
SIZE : J6 **TYPE : 110A** **R. P. M. : 1750**



PC-153422A

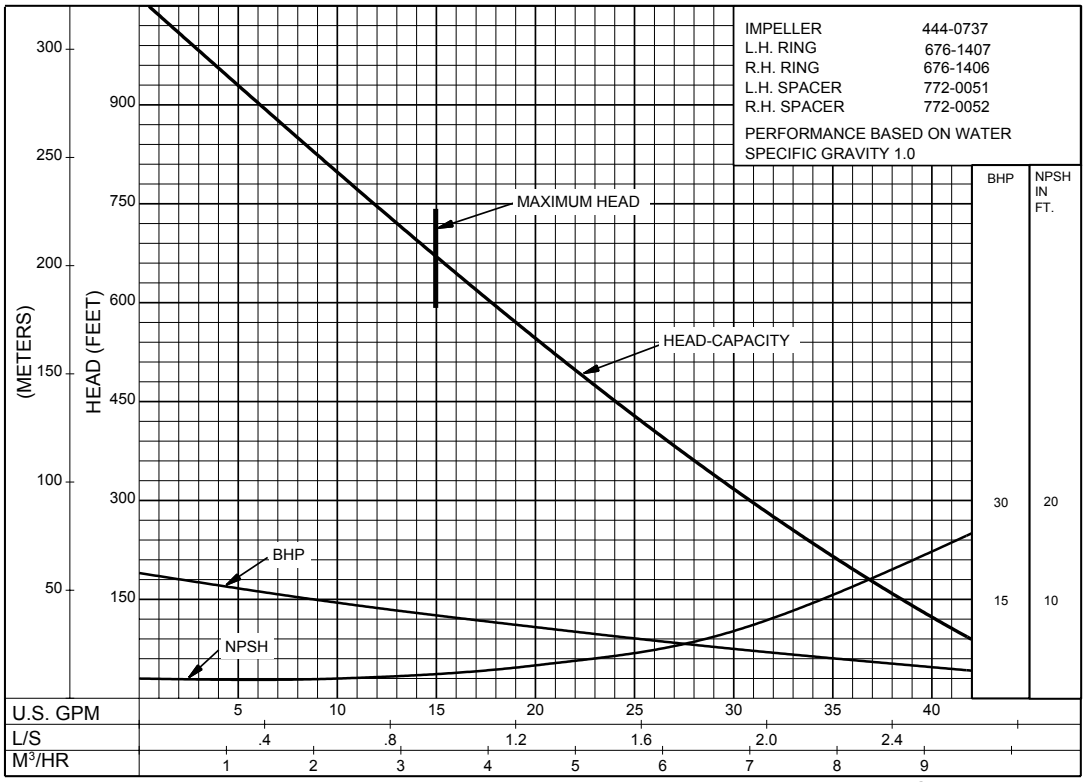
1750 R.P.M

SIZE : K6 **TYPE : 110A** **R. P. M. : 1750**



PC-153423A

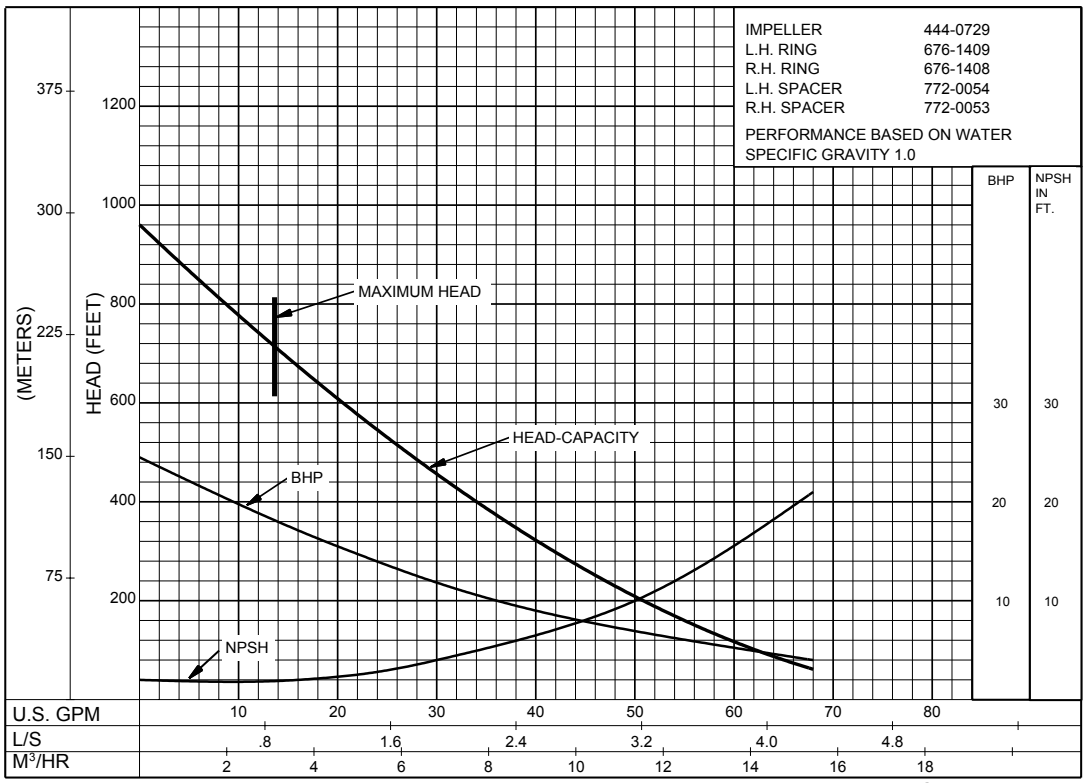
SIZE : D6T **TYPE : 110A** **R. P. M. : 1750**



PC-153424A

1750 R.P.M

SIZE : E6T **TYPE : 110A** **R. P. M. : 1750**



PC-152362A

1750 R.P.M

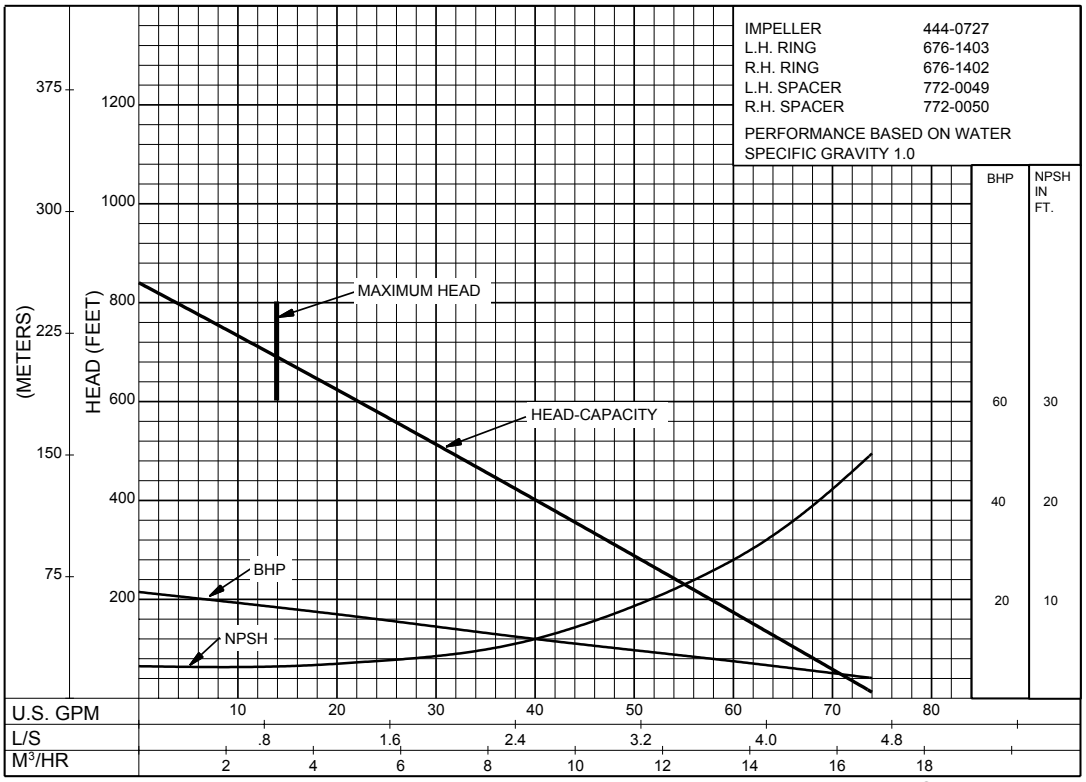
Supersedes Section 110 Page 428
Dated November 1993

2 x 2-1/2 x 6 SERIES 110A

TWO STAGE

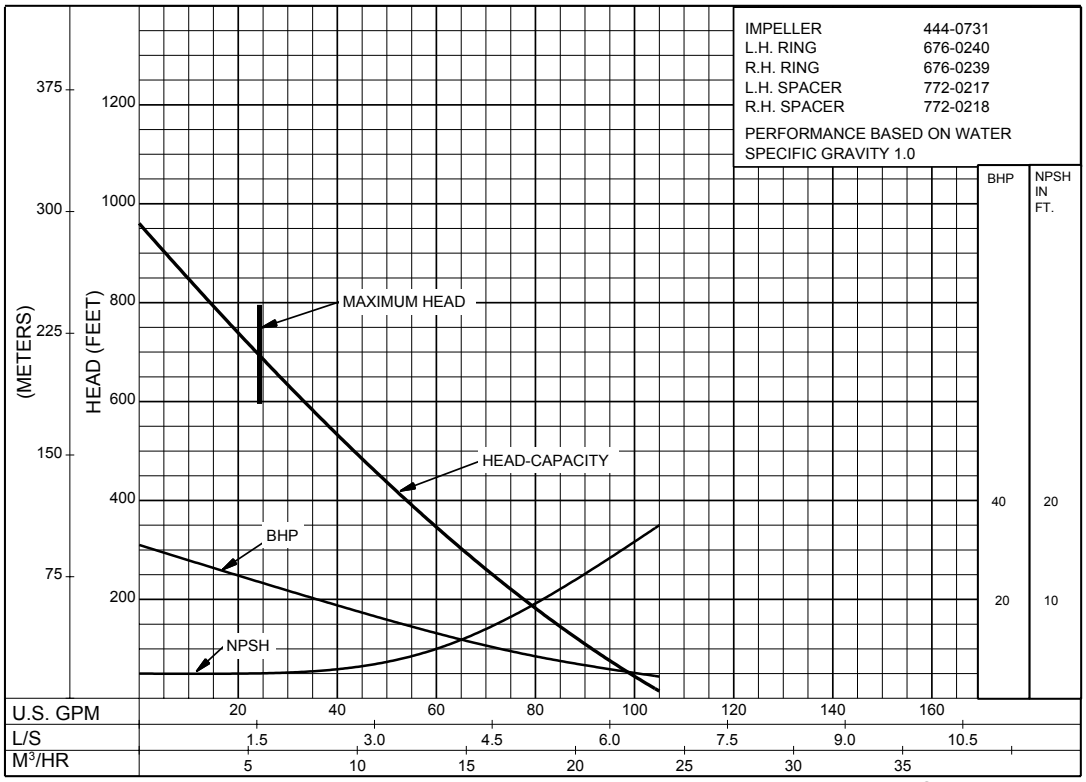
1750
R.P.M

SIZE : F6T **TYPE : 110A** **R. P. M. : 1750**



PC-152363A

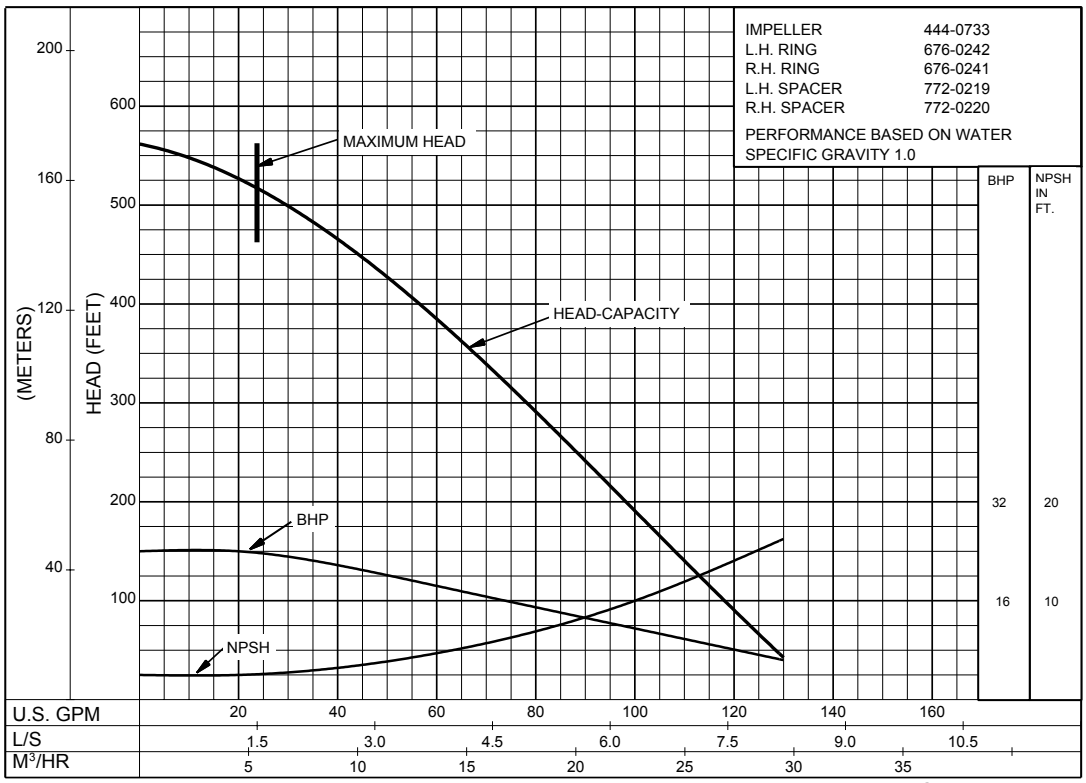
SIZE : G6T **TYPE : 110A** **R. P. M. : 1750**



PC-152364A

1750 R.P.M

SIZE : H6T **TYPE : 110A** **R. P. M. : 1750**



PC-153425A

1750 R.P.M

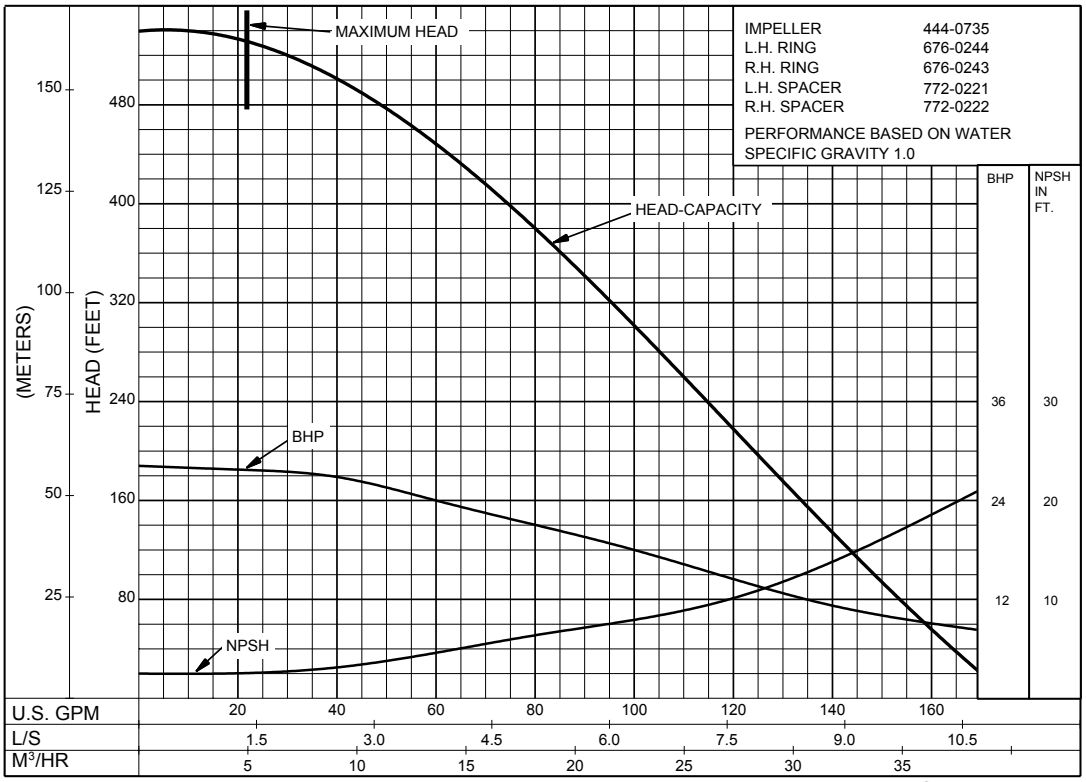
Supersedes Section 110 Page 430
Dated November 1993

2-1/2 x 3 x 6 SERIES 110A

TWO STAGE

SIZE : J6T **TYPE : 110A** **R. P. M. : 1750**

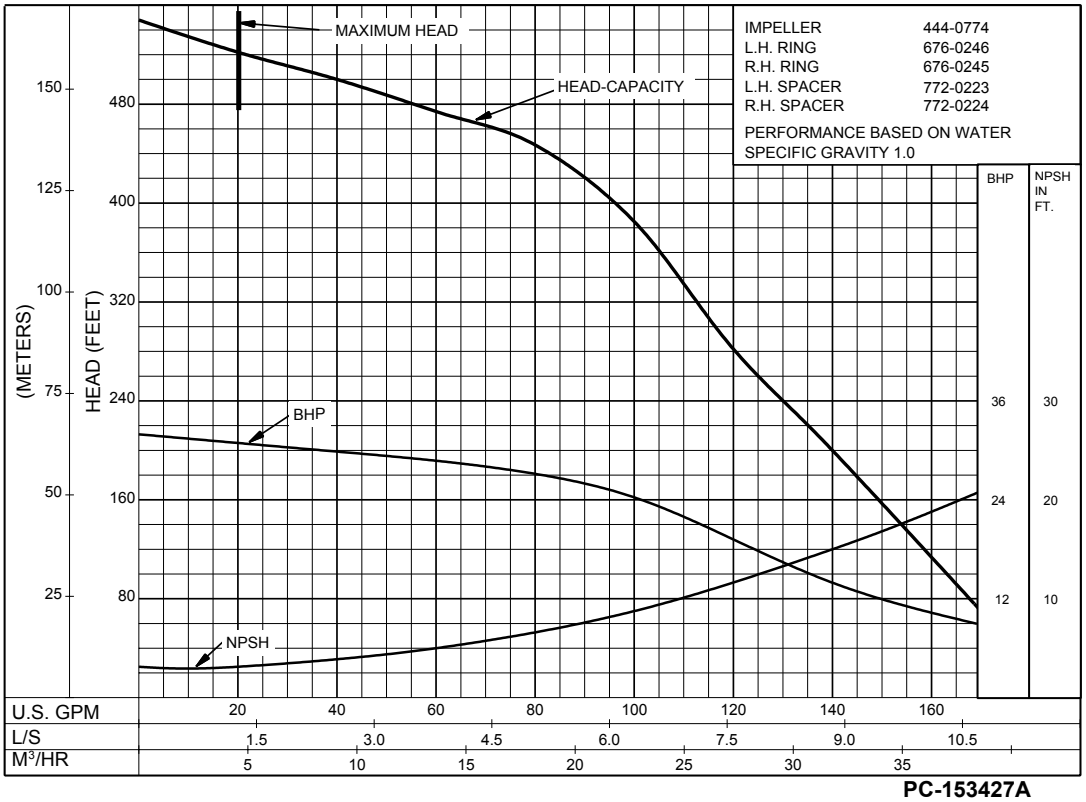
1750 R.P.M



PC-153426A

SIZE : K6T **TYPE : 110A** **R. P. M. : 1750**

1750 R.P.M



PC-153427A

Performance Curves for the 110 Series (50 Hz)

MODEL/SIZE	R.P.M.	PDF PAGE
A35	1440	3
A35	2880	4
A4	2880	5
A4	1440	6
B4	2880	7
B4	1440	8
C4	2880	9
C4	1440	10
D4	2880	11
D4	1440	12
E4	1440	13
F4	1440	14
G4	1440	15
H4	1440	16
I4	1440	17
I4A	1440	18
M4	1440	19
P4	1440	20
R4	1440	21
D4T	1440	22
E4T	1440	23
F4T	1440	24
G4T	1440	25
I4T	1440	26
I4TA	1440	27
D5	1440	28
E5	1440	29
F5	1440	30
G5	1440	31
H5	1440	32
I5	1440	33
J5	1440	34
K5	1440	35
L5	1440	36
M5	1440	37
N5	1440	38
P5	1440	39
D5T	1440	40
E5T	1440	41
F5T	1440	42
G5T	1440	43
H5T	1440	44
I5T	1440	45

Continued next page

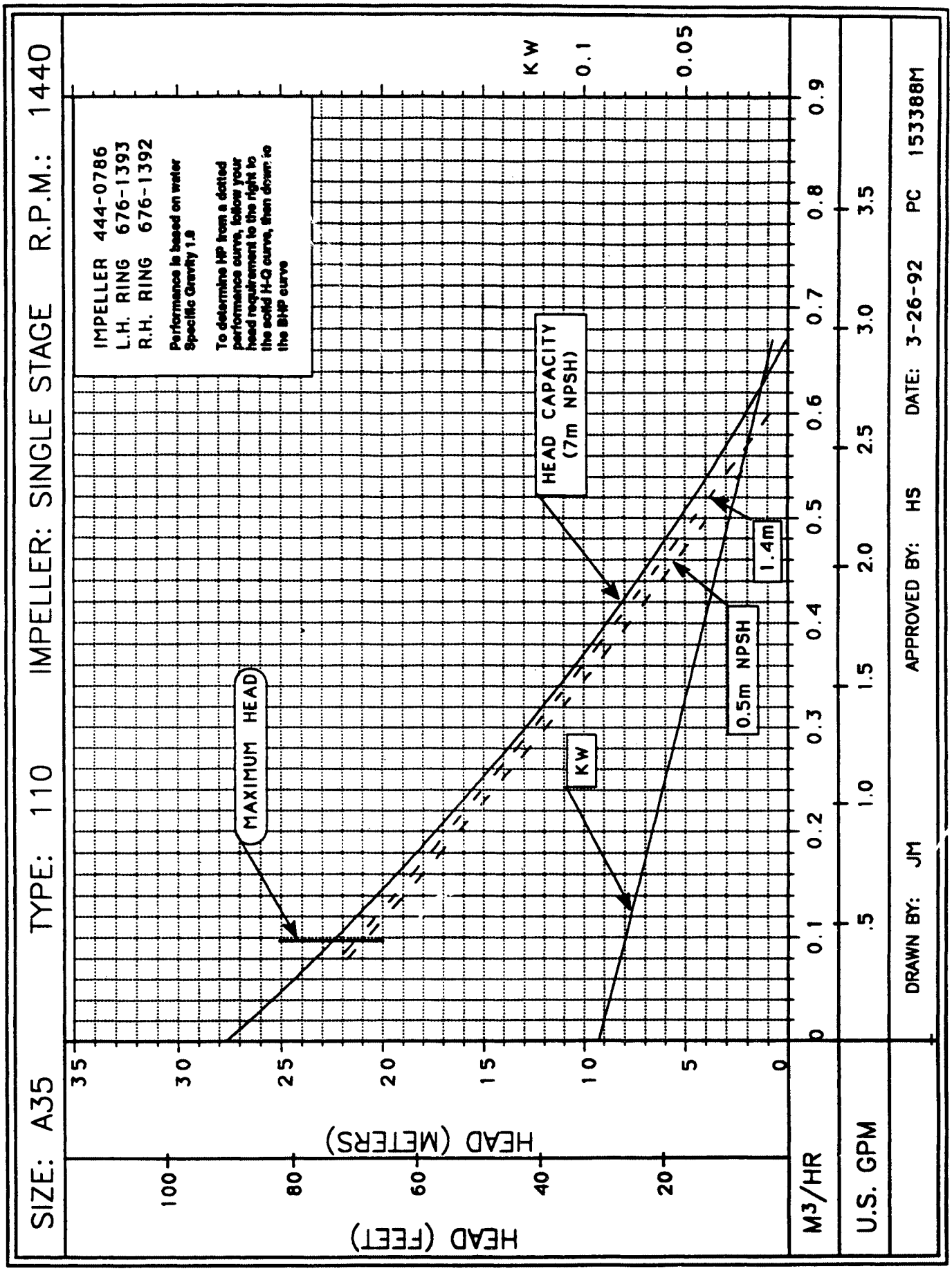
Performance Curves for the 110 Series (50 Hz) (cont.)

MODEL/SIZE	R.P.M.	PDF PAGE
G6	1440	46
H6	1440	47
J6	1440	48
K6	1440	49
D6T	1440	50
E6T	1440	51
F6T	1440	52
G6T	1440	53
H6T	1440	54
J6T	1440	55
K6T	1440	56

SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

A35 - 1440 RPM
SINGLE STAGE IMPELLER

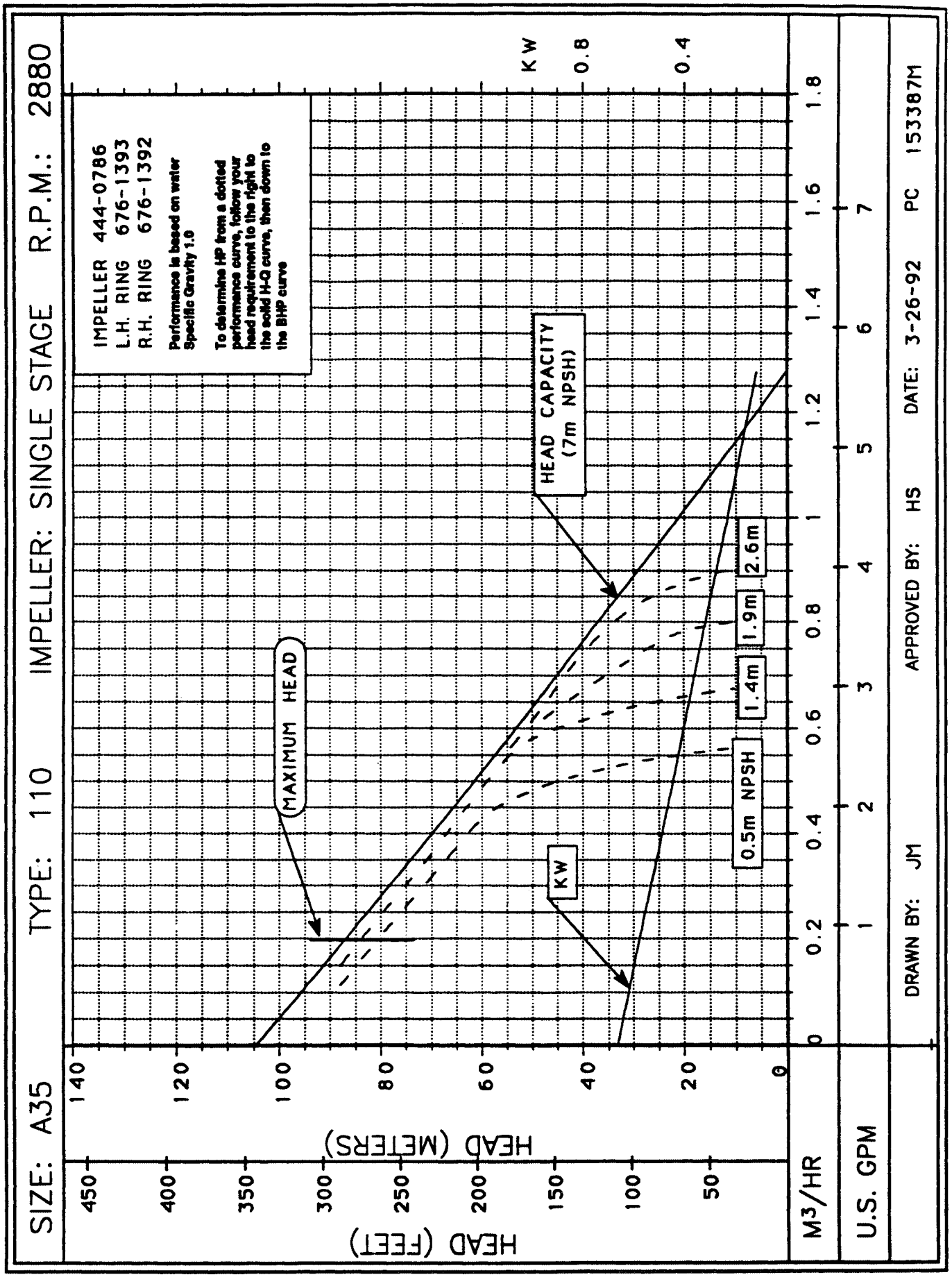
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Pentair Pump Group

A35 - 2880 RPM
SINGLE STAGE IMPELLER

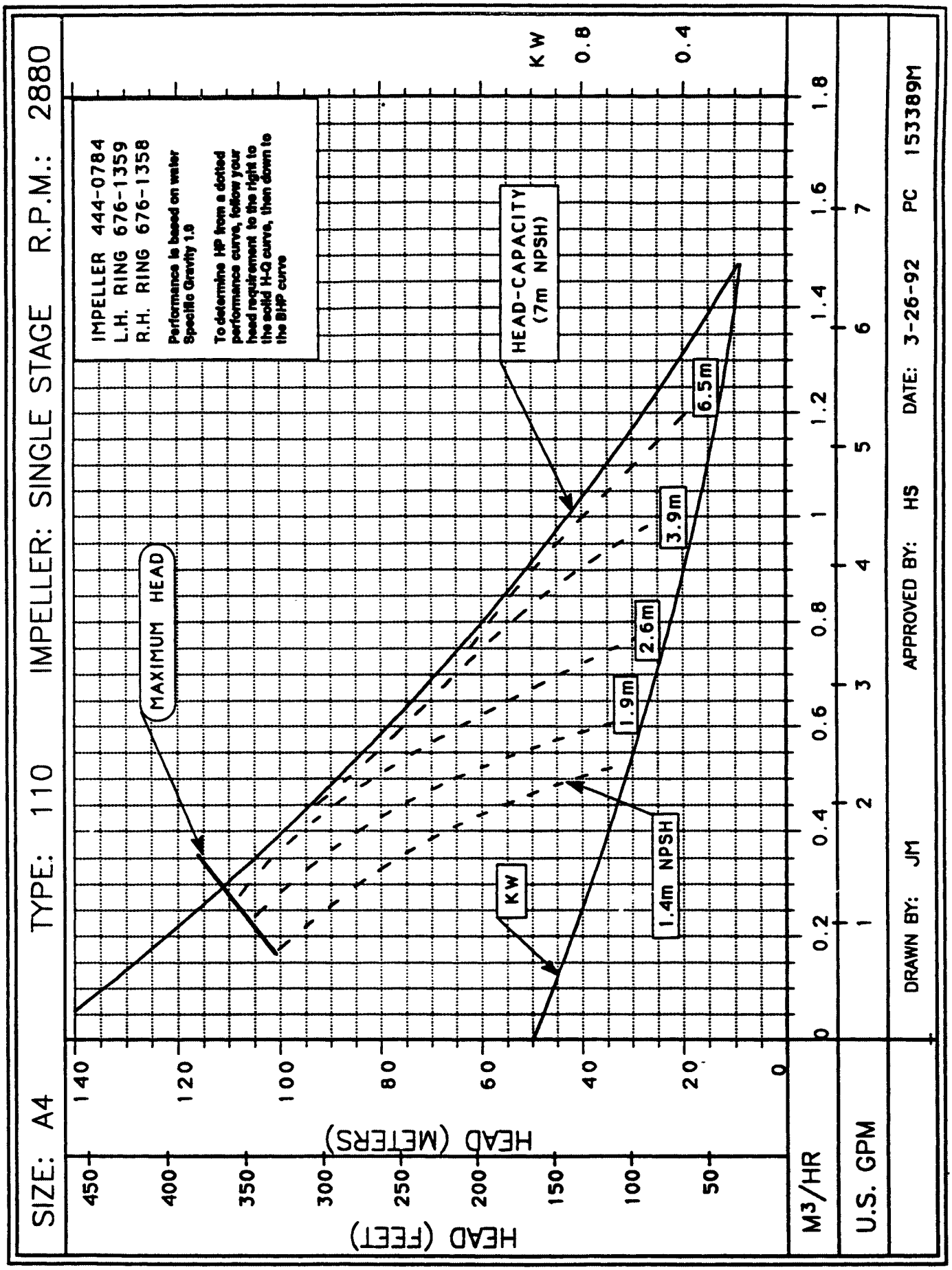
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

A4 - 2880 RPM
SINGLE STAGE IMPELLER

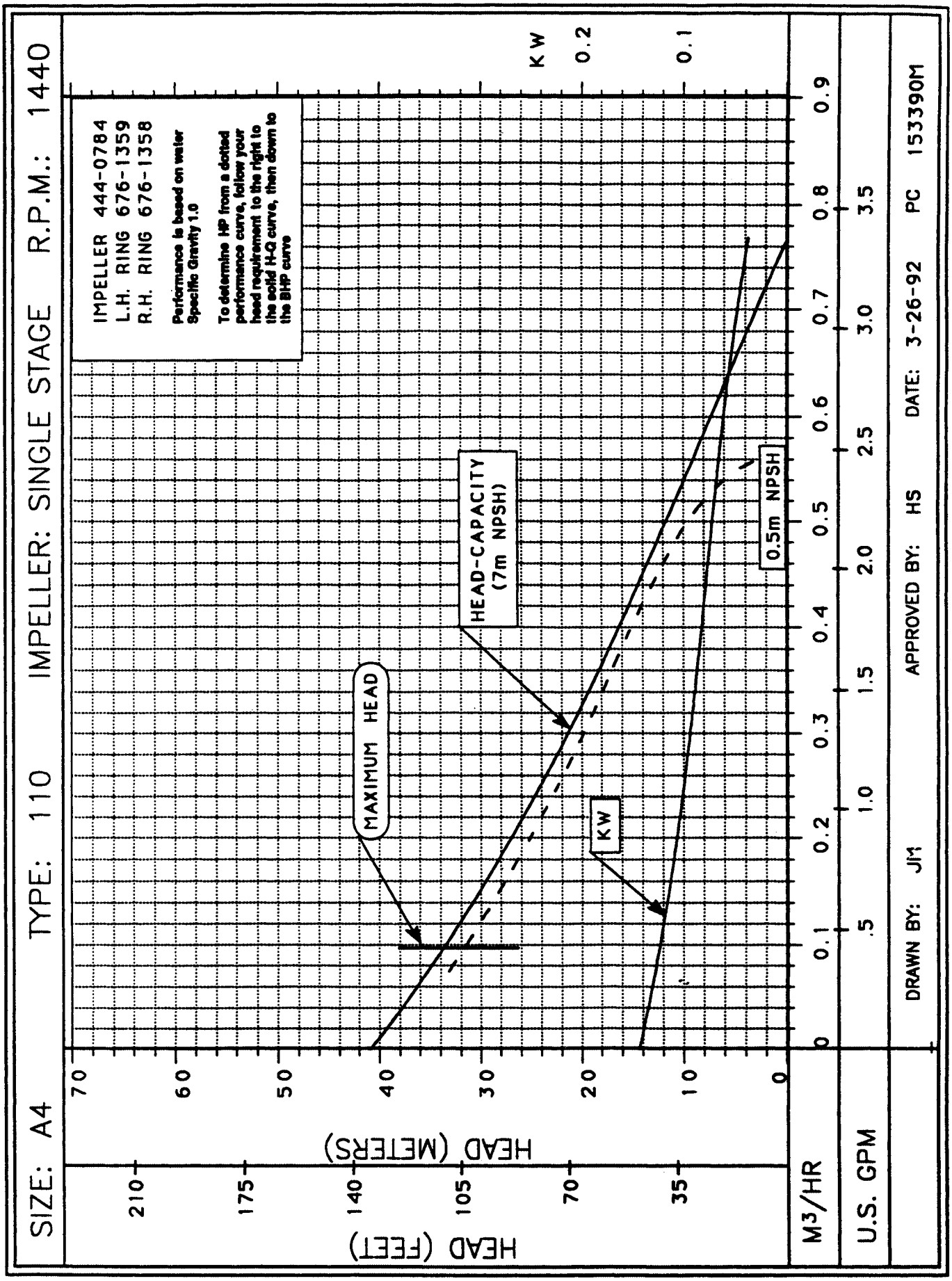
AURORA®
Pentair Pump Group



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A4 - 1440 RPM
SINGLE STAGE IMPELLER

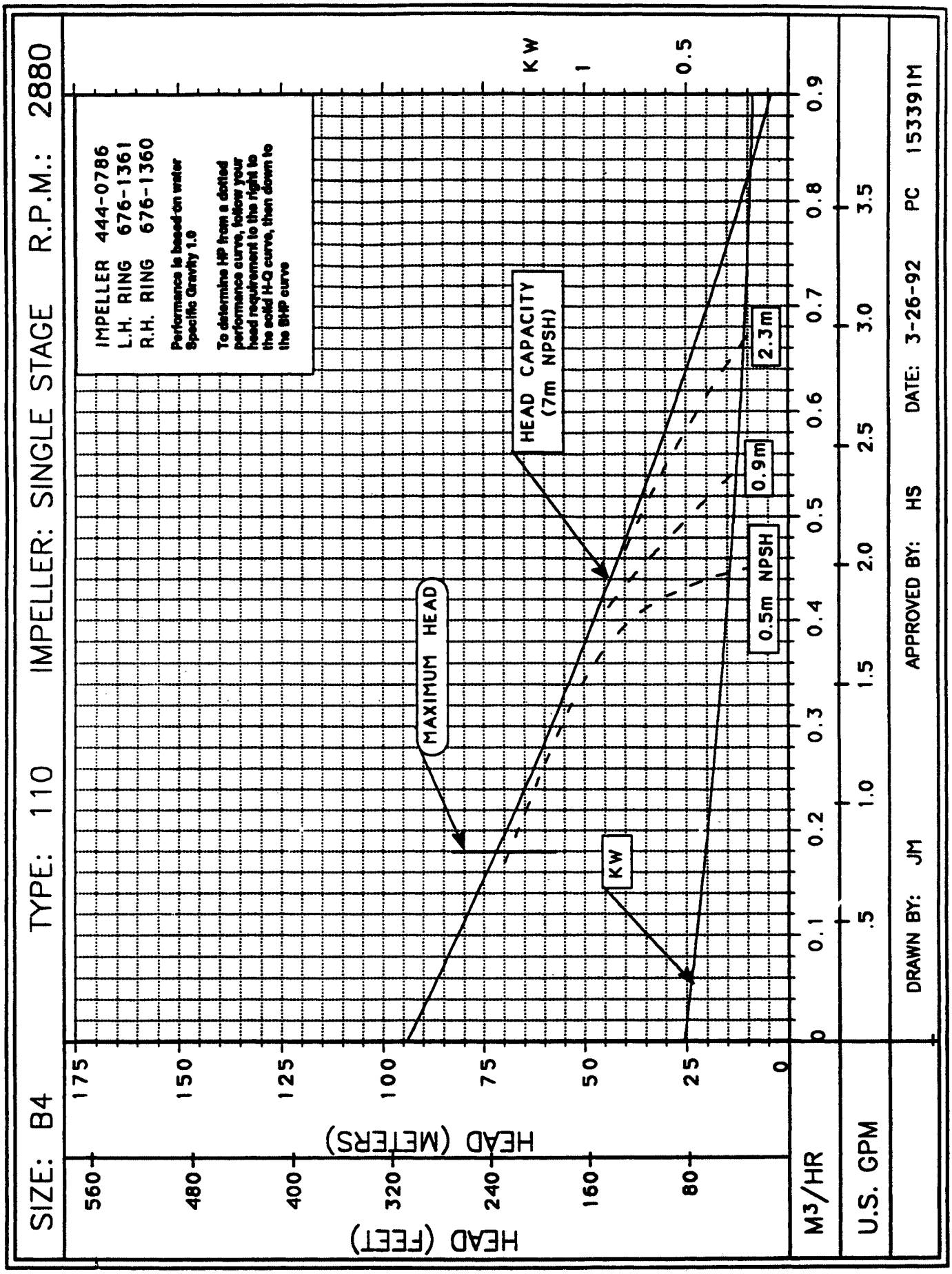
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

B4 - 2880 RPM
SINGLE STAGE IMPELLER

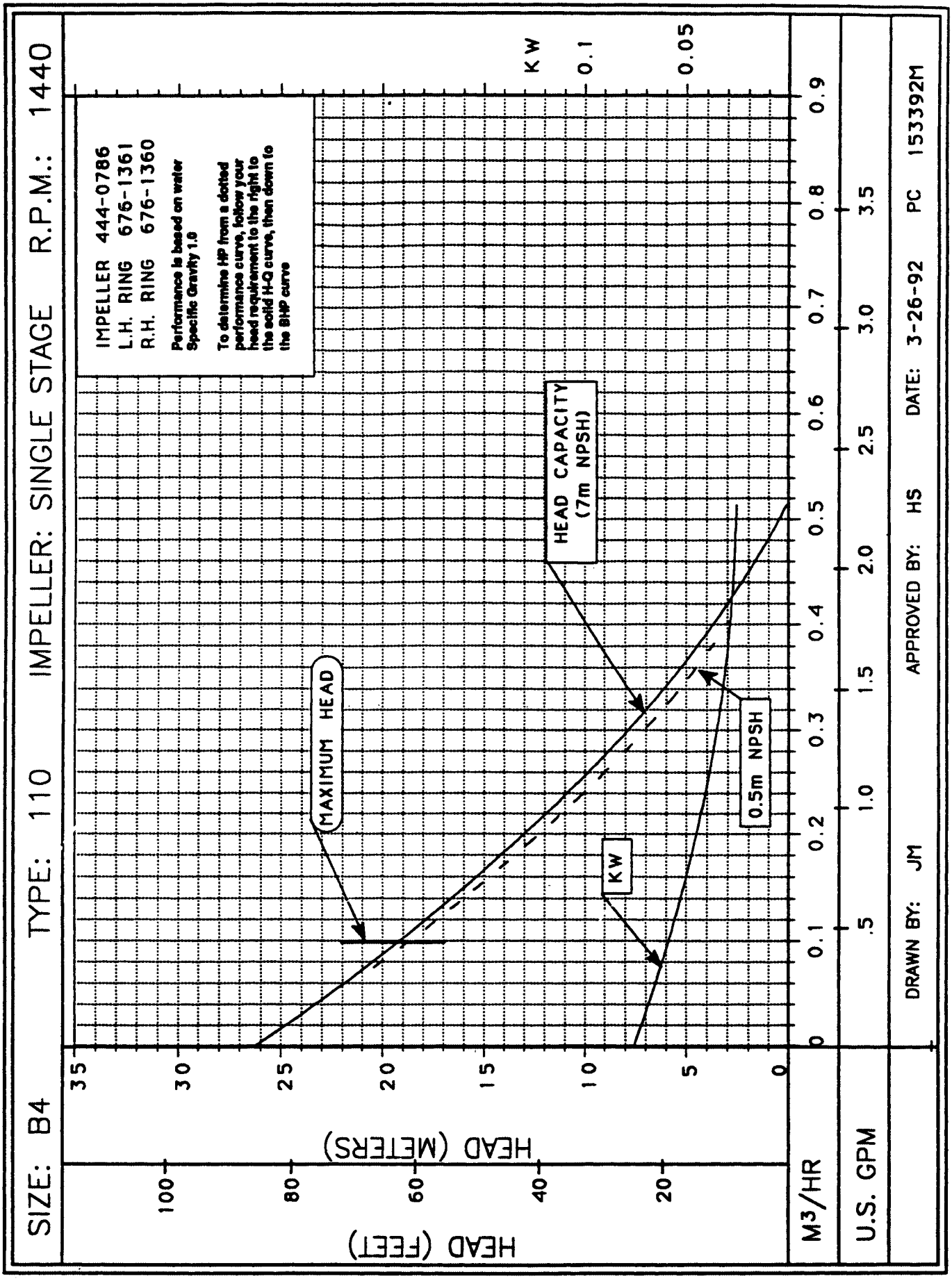
AURORA®
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B4 - 1440 RPM
SINGLE STAGE IMPELLER

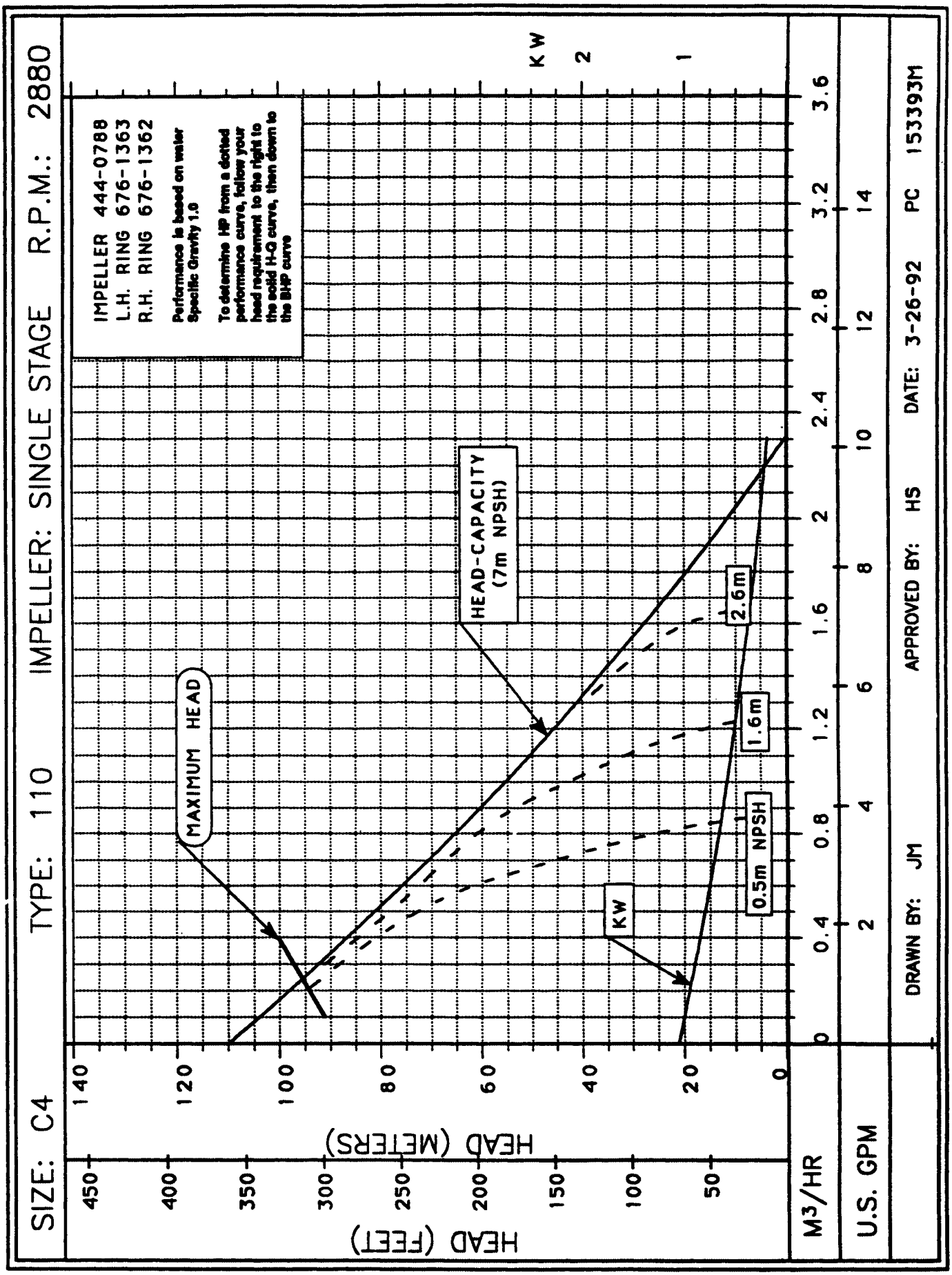
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

C4 - 2880 RPM
SINGLE STAGE IMPELLER

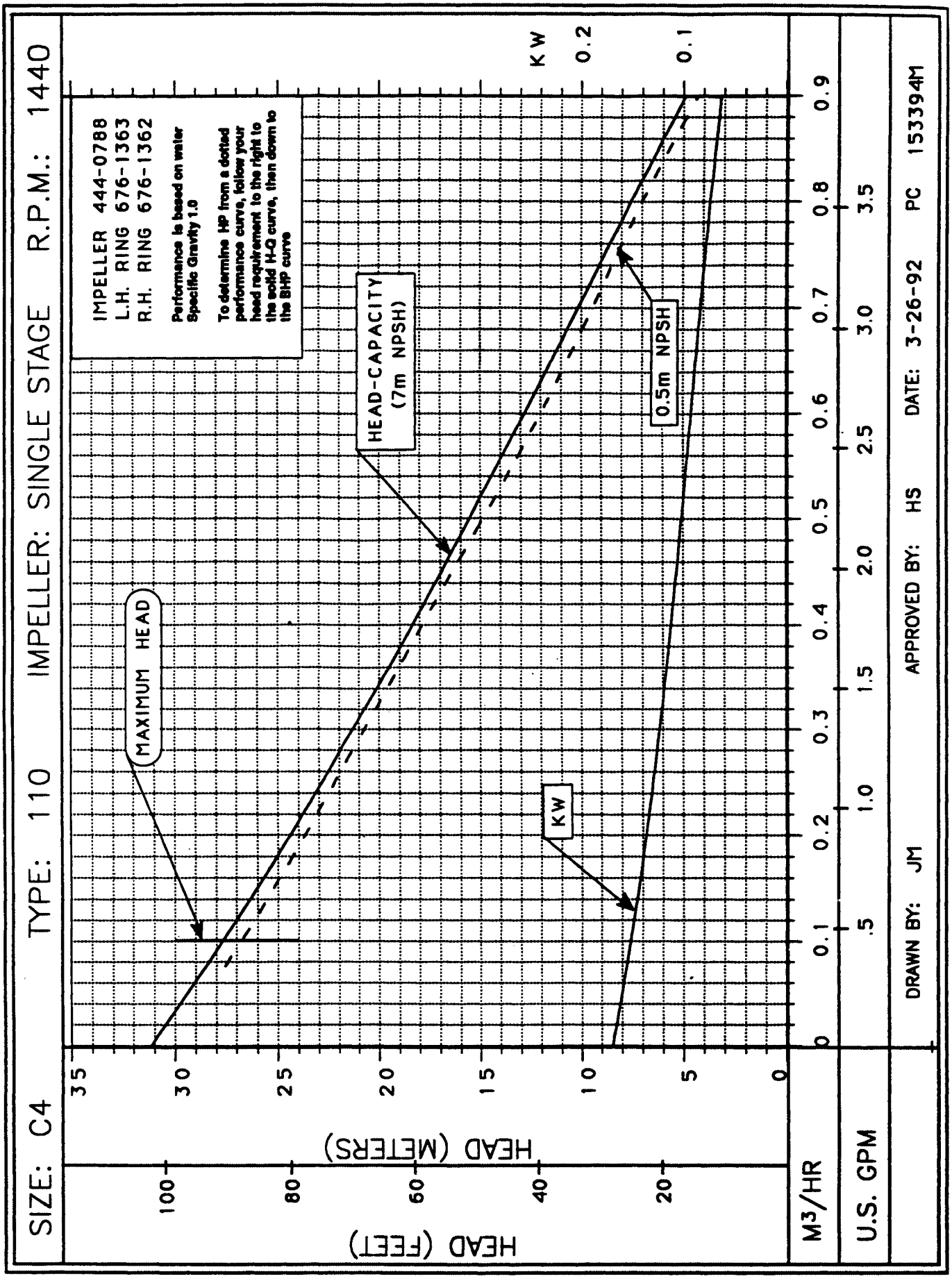
AURORA®
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C4 - 1440 RPM
SINGLE STAGE IMPELLER

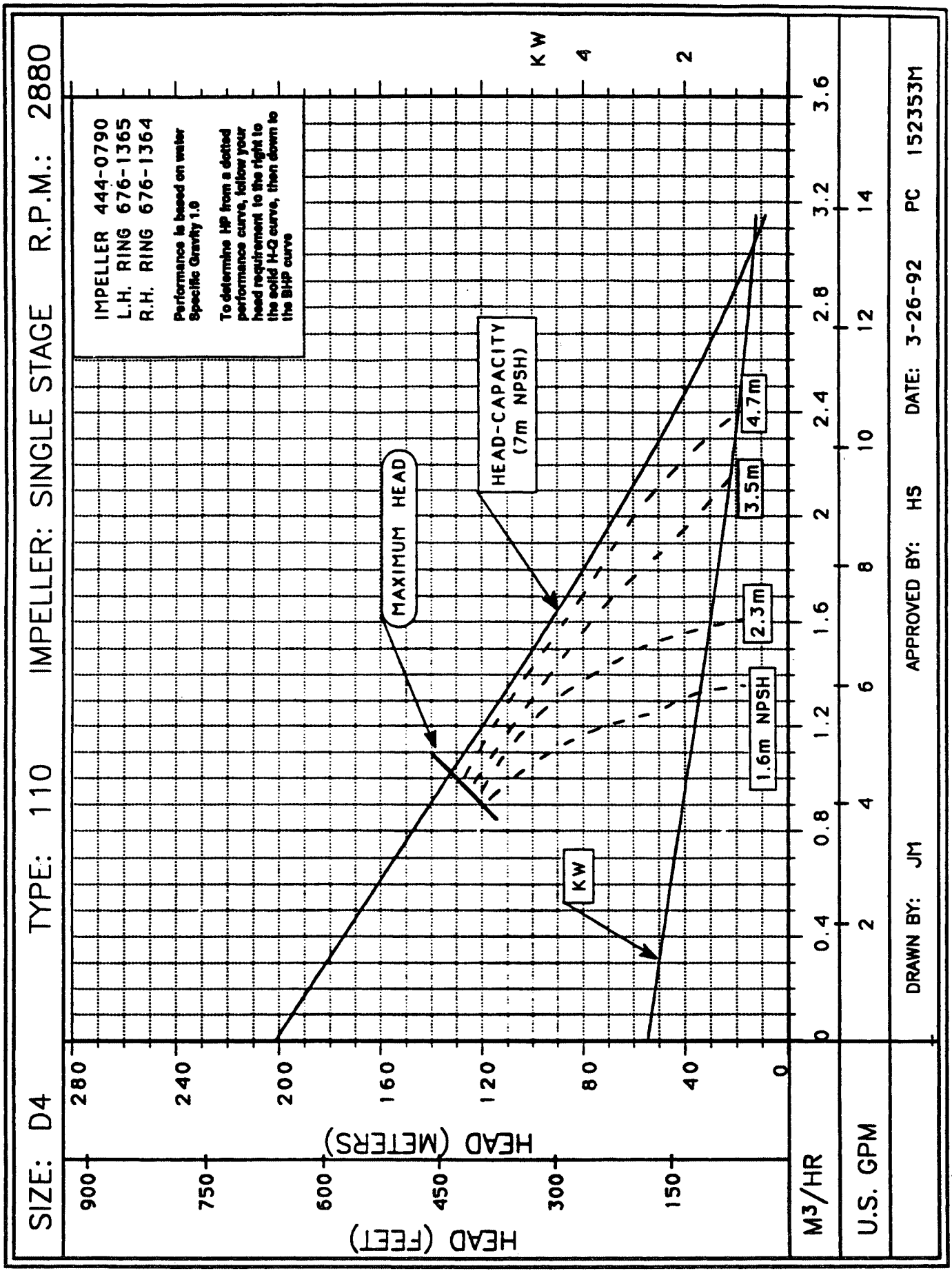
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

D4 - 2880 RPM
SINGLE STAGE IMPELLER

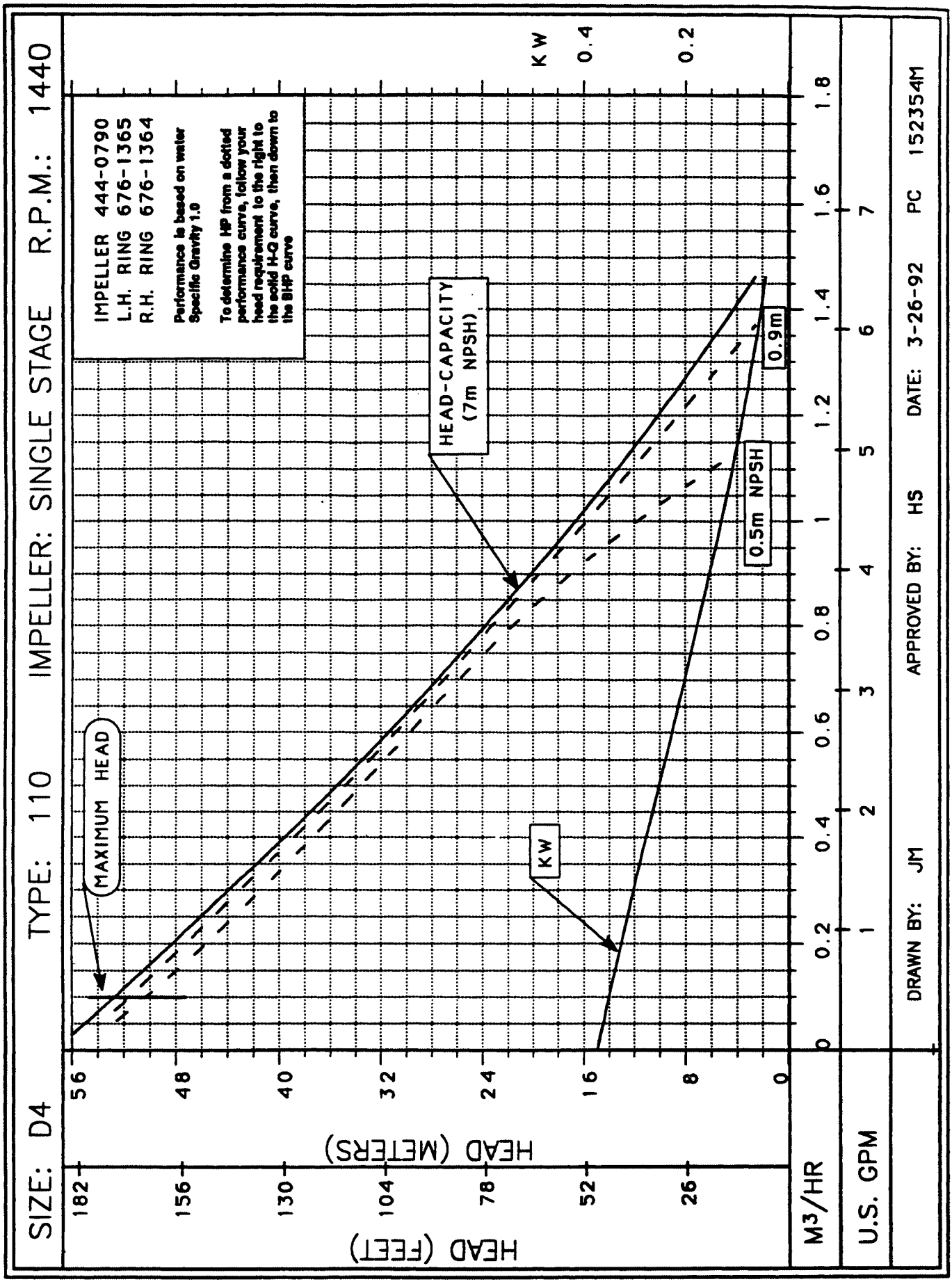
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D4 - 1440 RPM
SINGLE STAGE IMPELLER

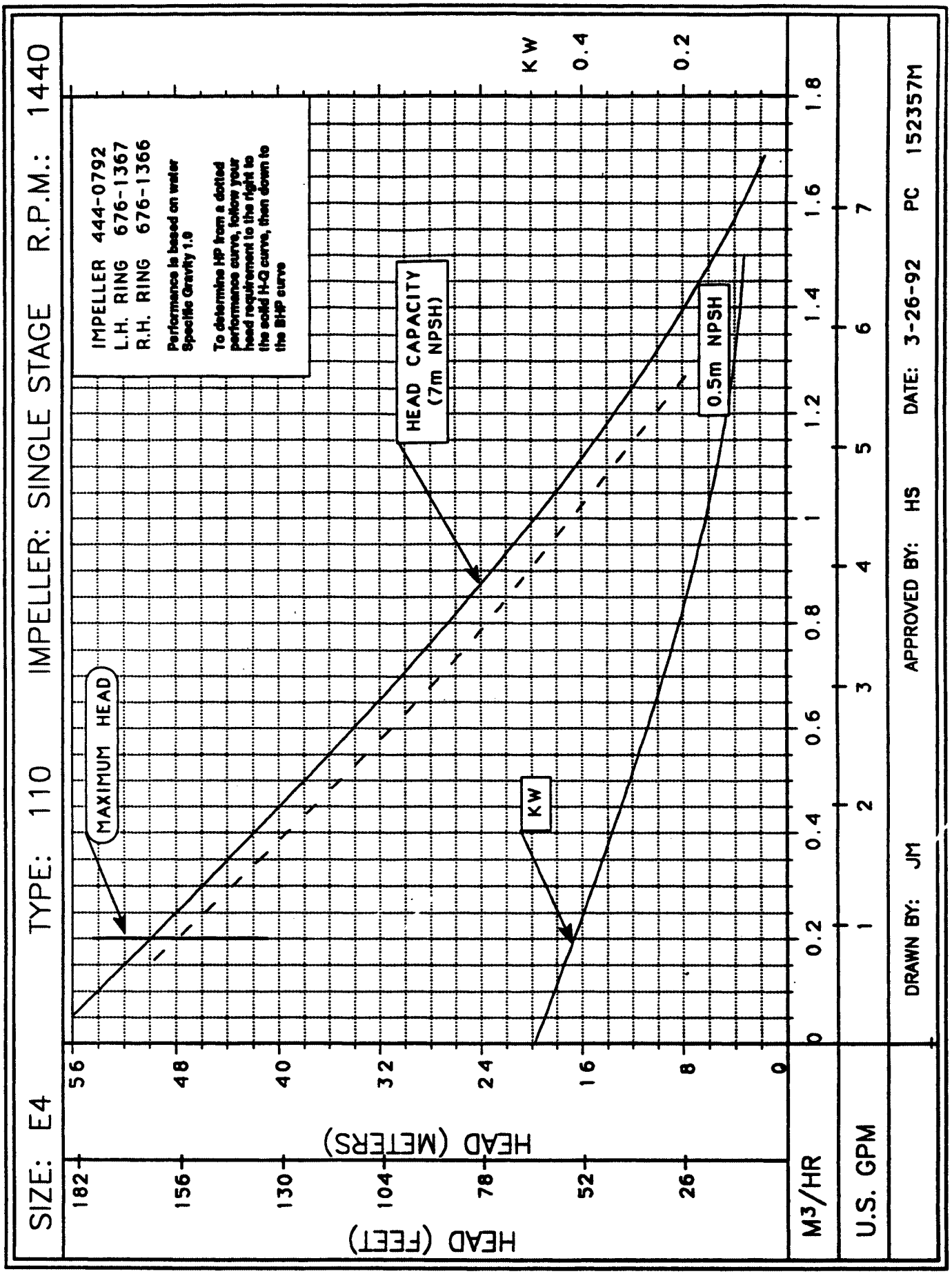
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

E4 - 1440 RPM
SINGLE STAGE IMPELLER

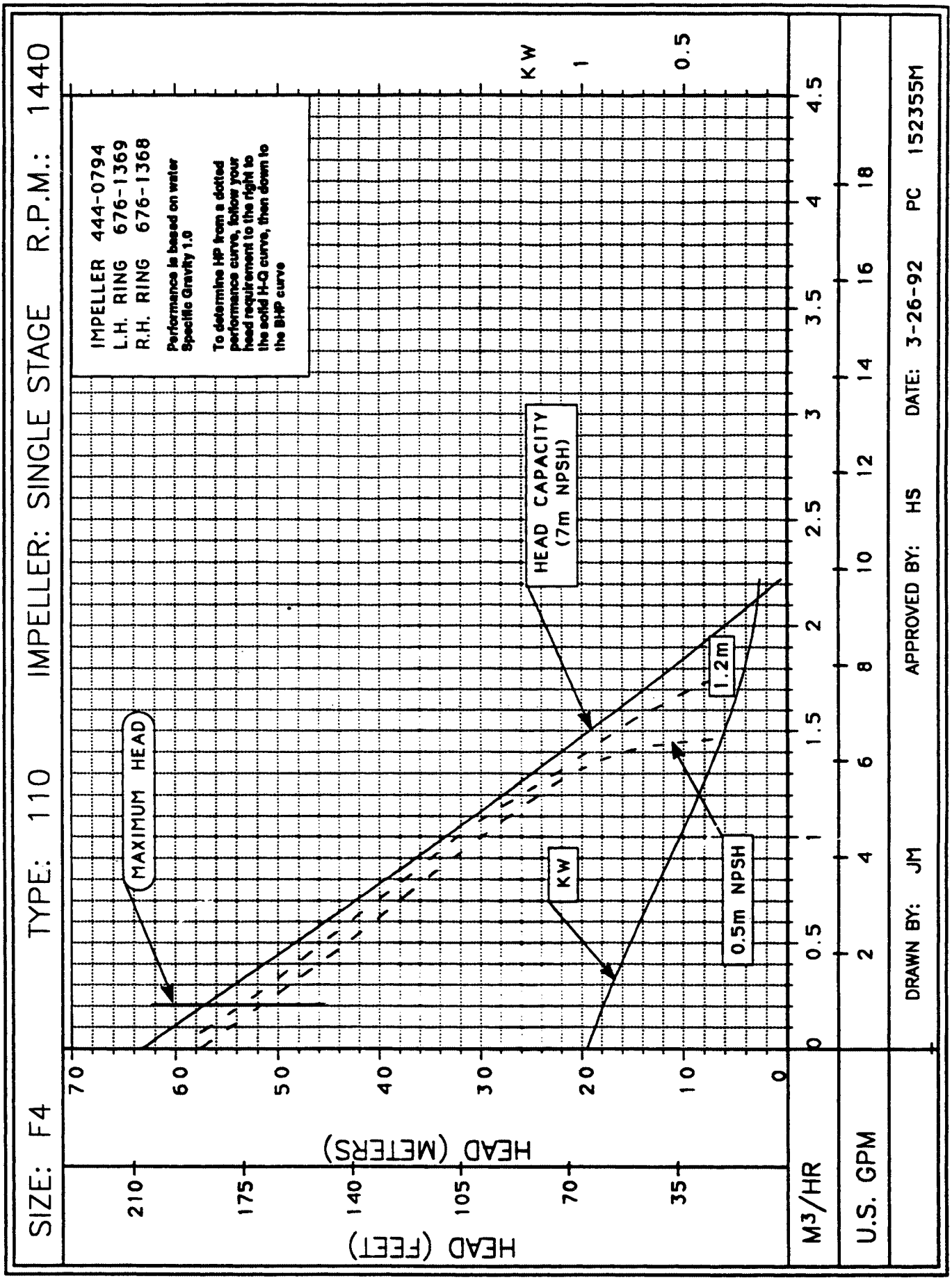
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F4 - 1440 RPM
SINGLE STAGE IMPELLER

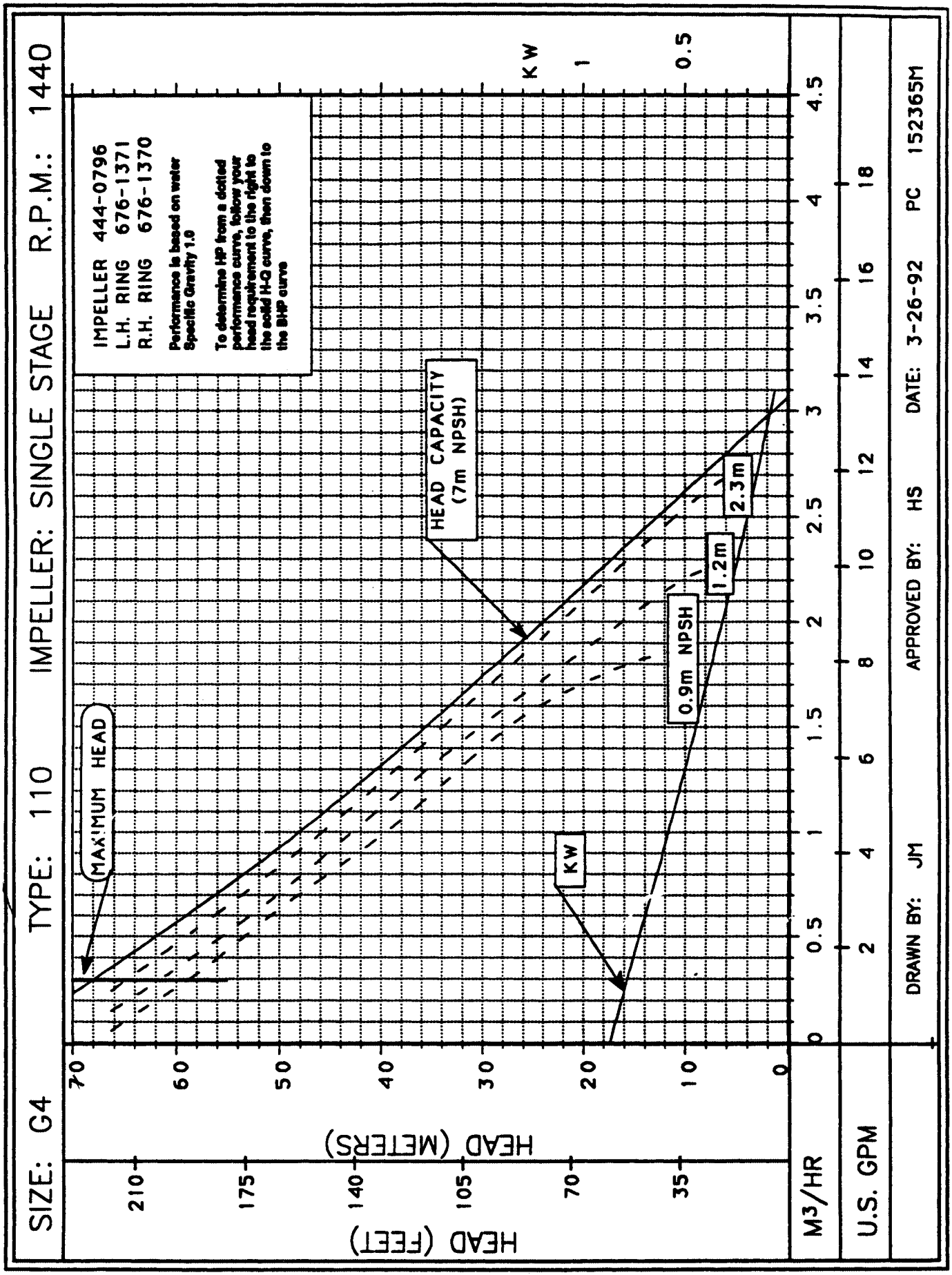
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

G4 - 1440 RPM
SINGLE STAGE IMPELLER

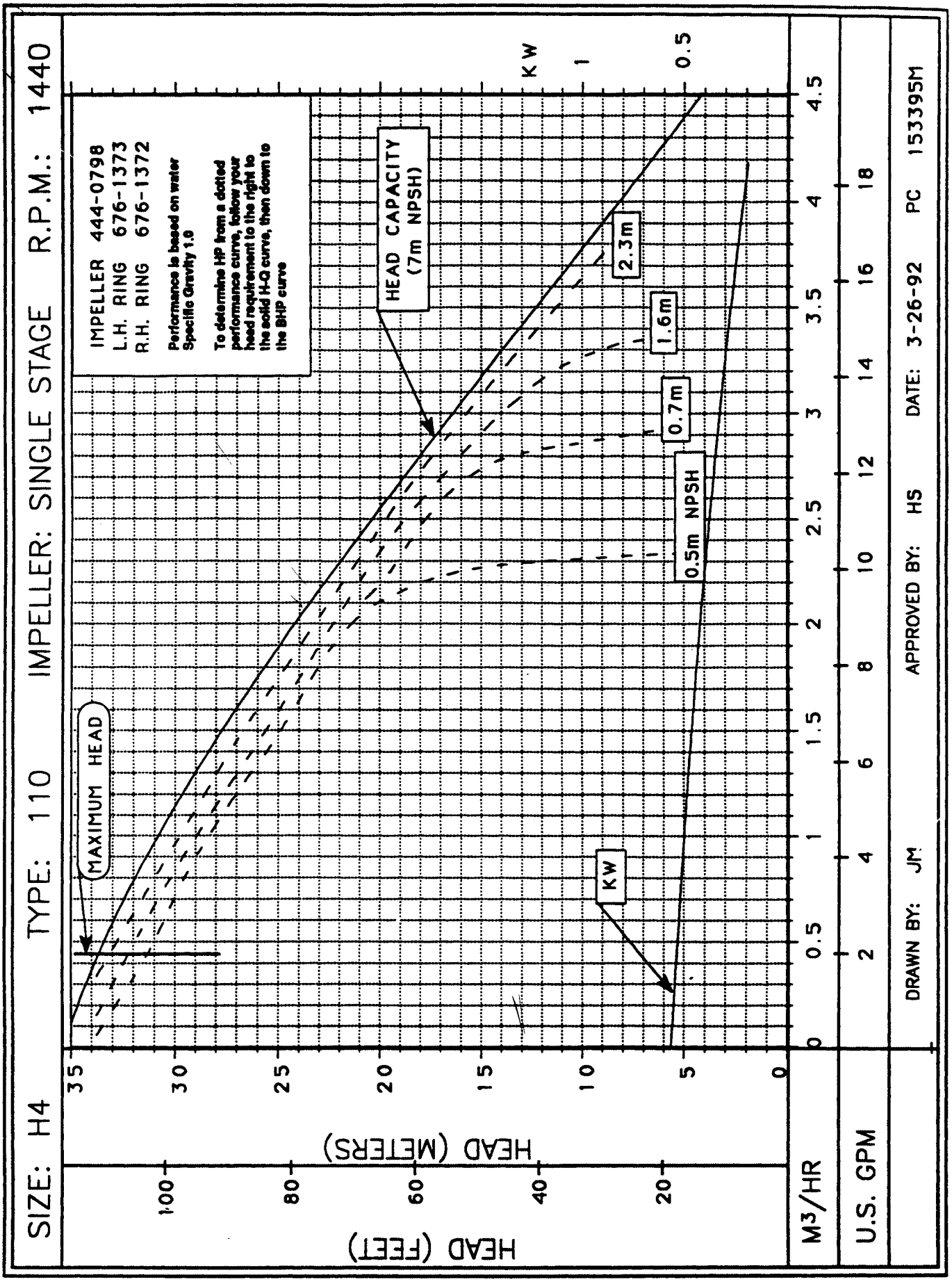
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H4 - 1440 RPM
SINGLE STAGE IMPELLER

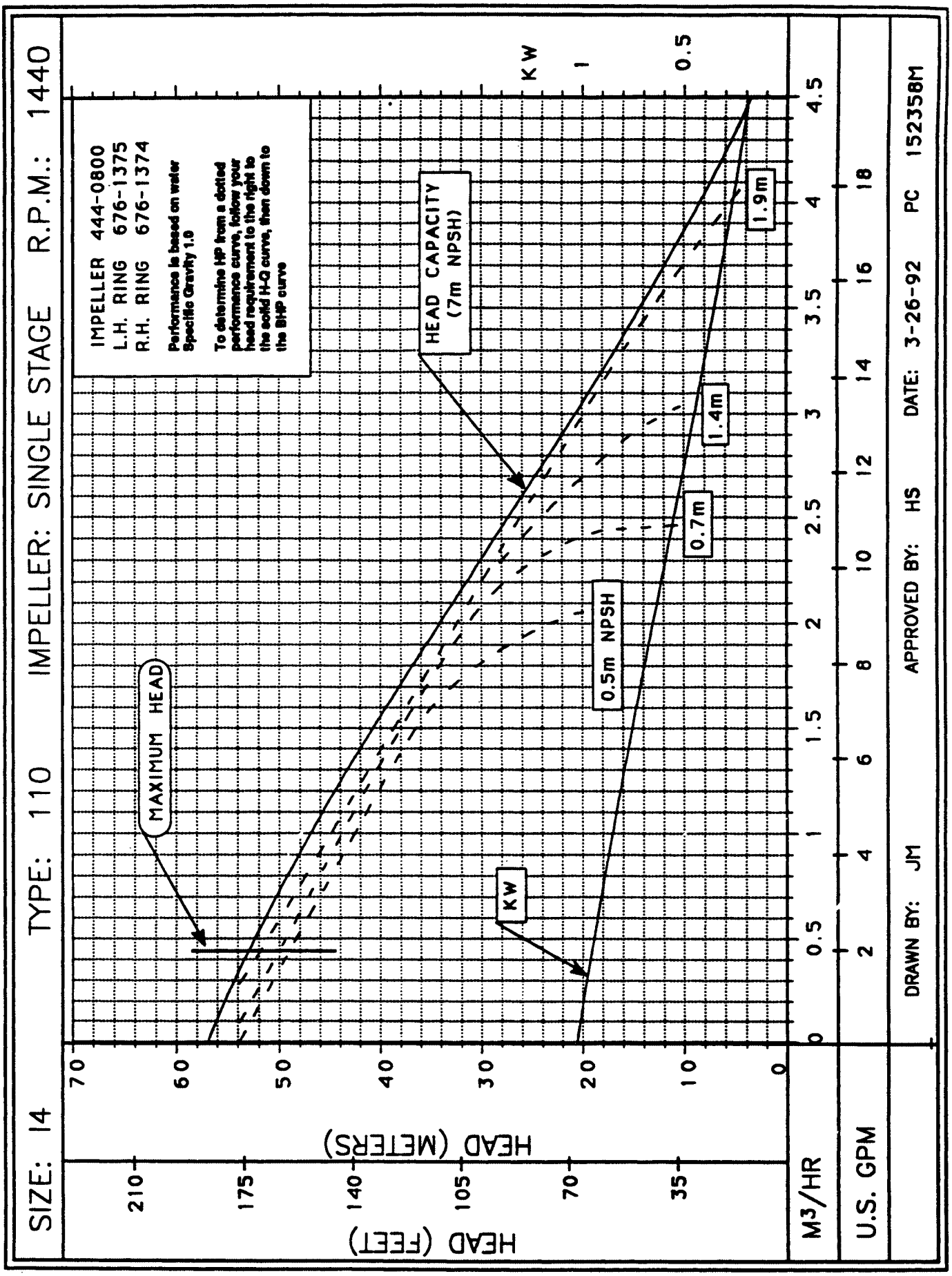
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



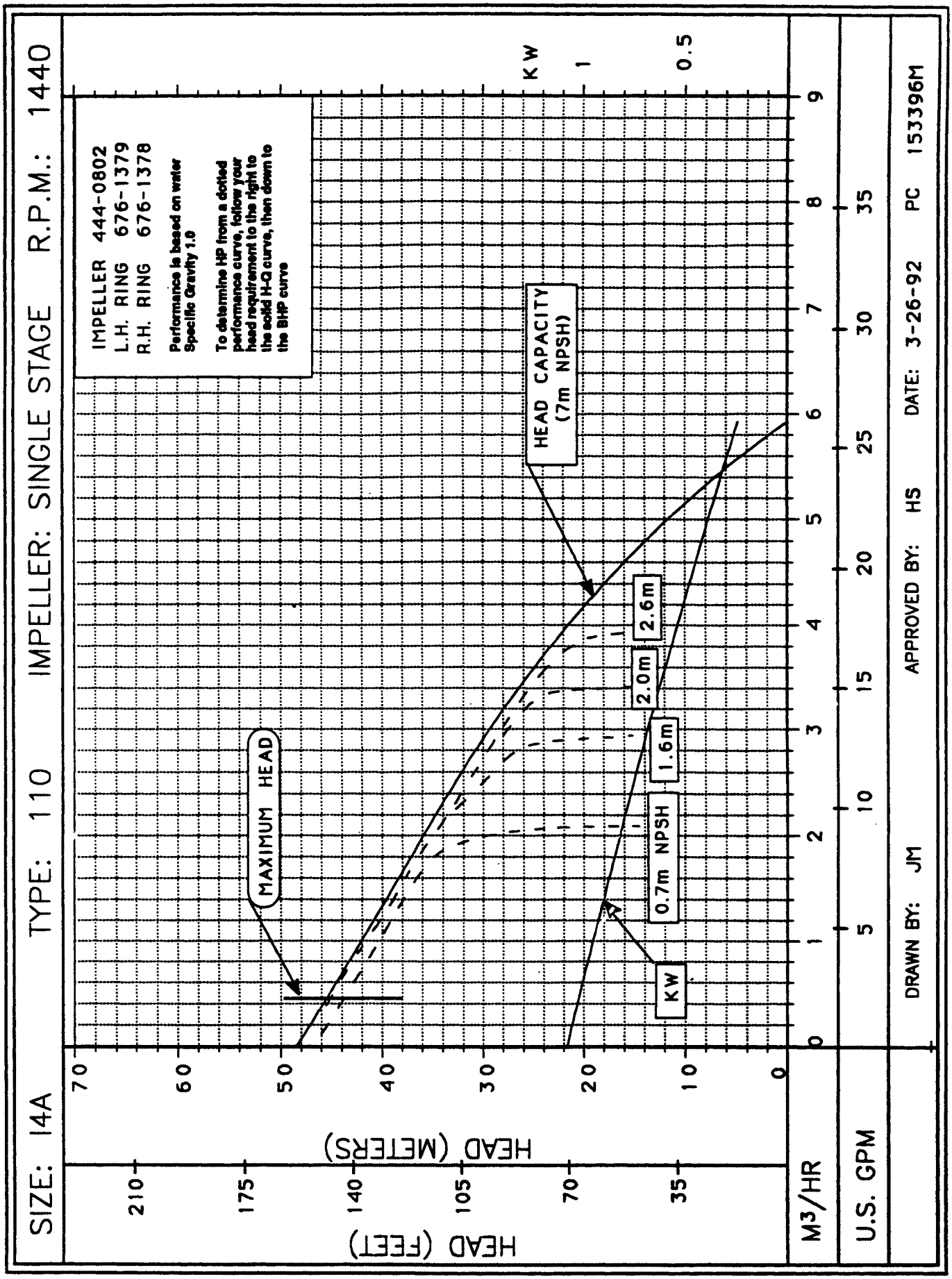
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

14 - 1440 RPM
SINGLE STAGE IMPELLER

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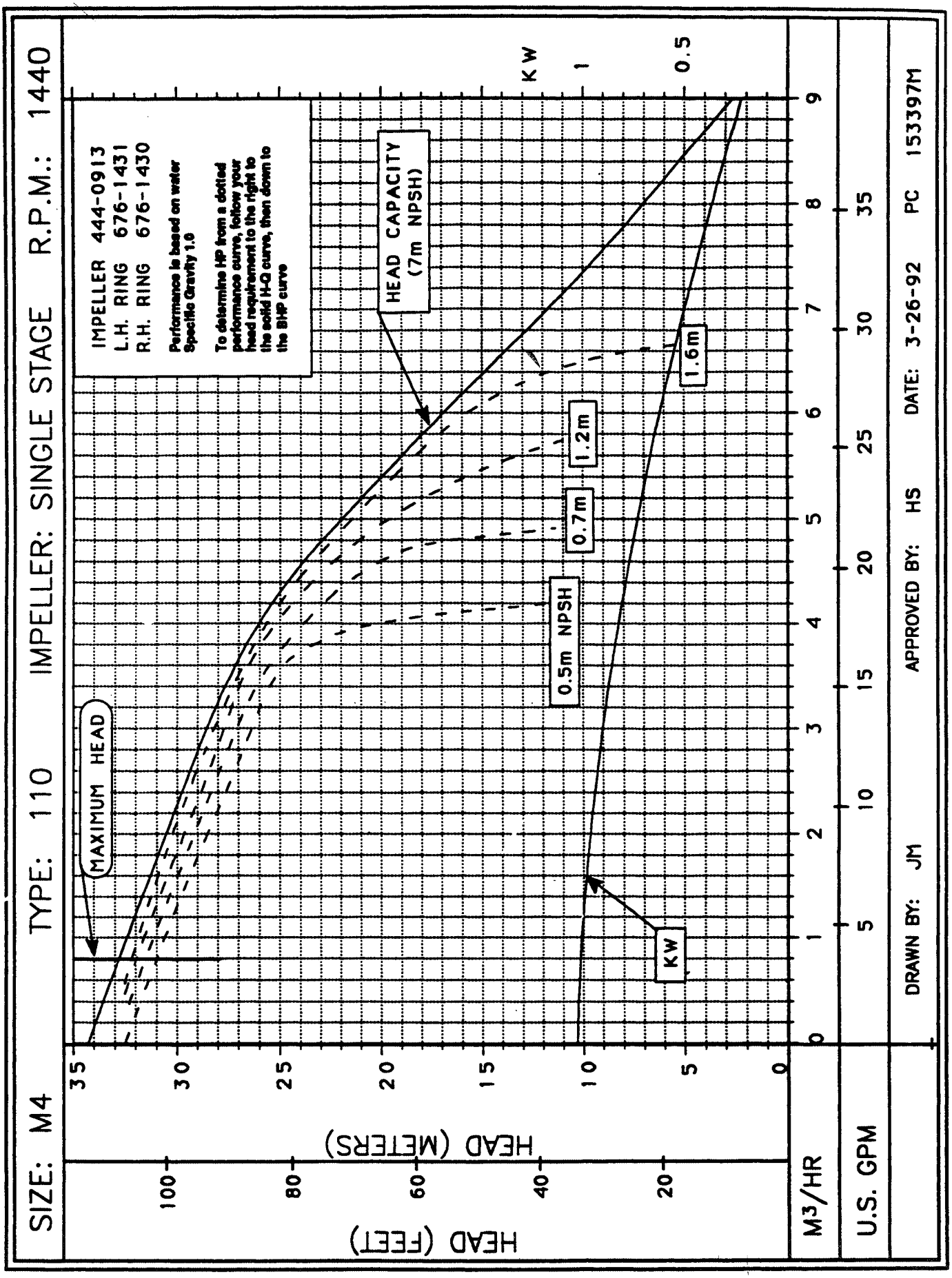
I4A - 1440 RPM
SINGLE STAGE IMPELLER



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

M4 - 1440 RPM
SINGLE STAGE IMPELLER

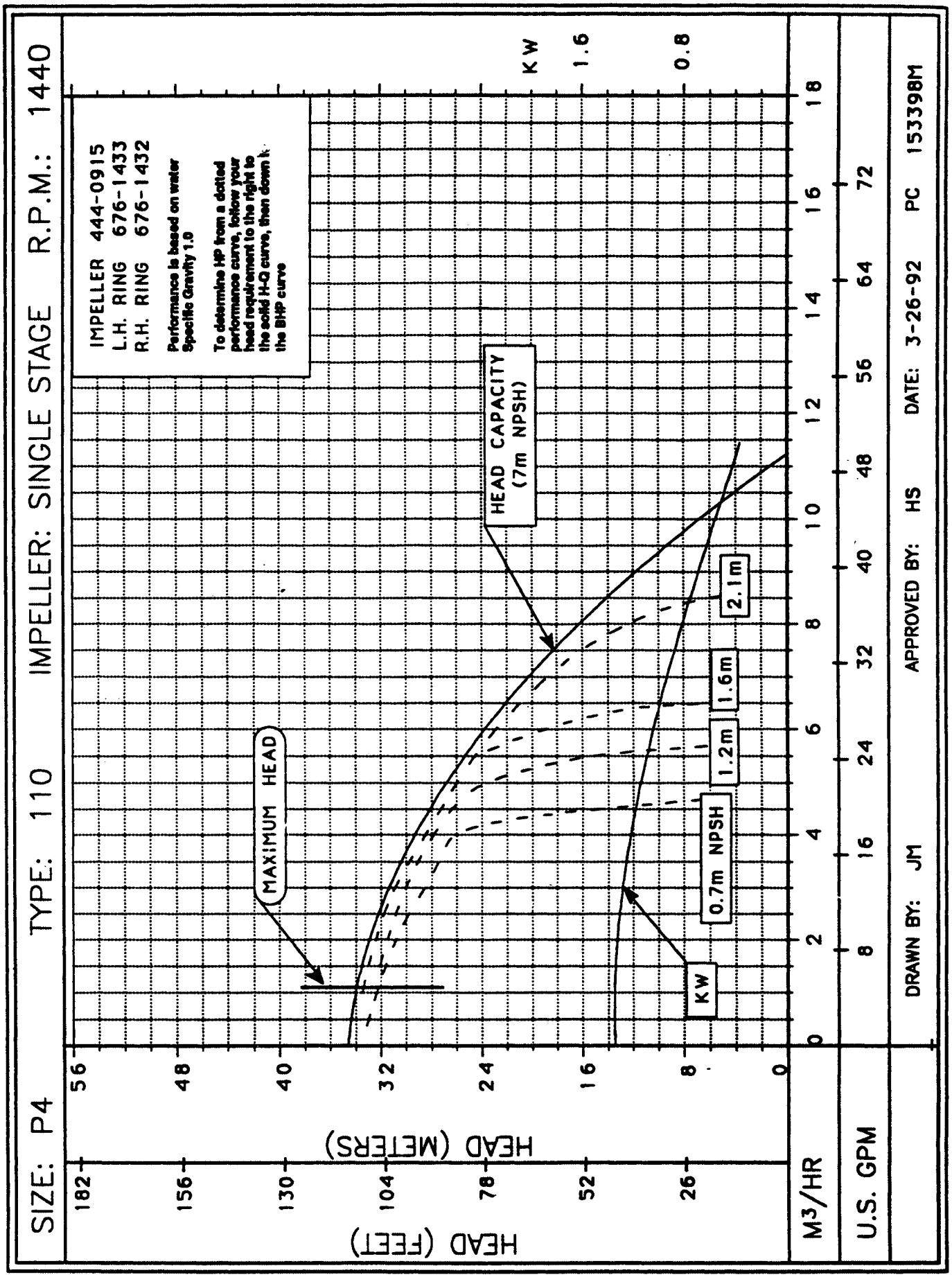
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P4 - 1440 RPM
SINGLE STAGE IMPELLER

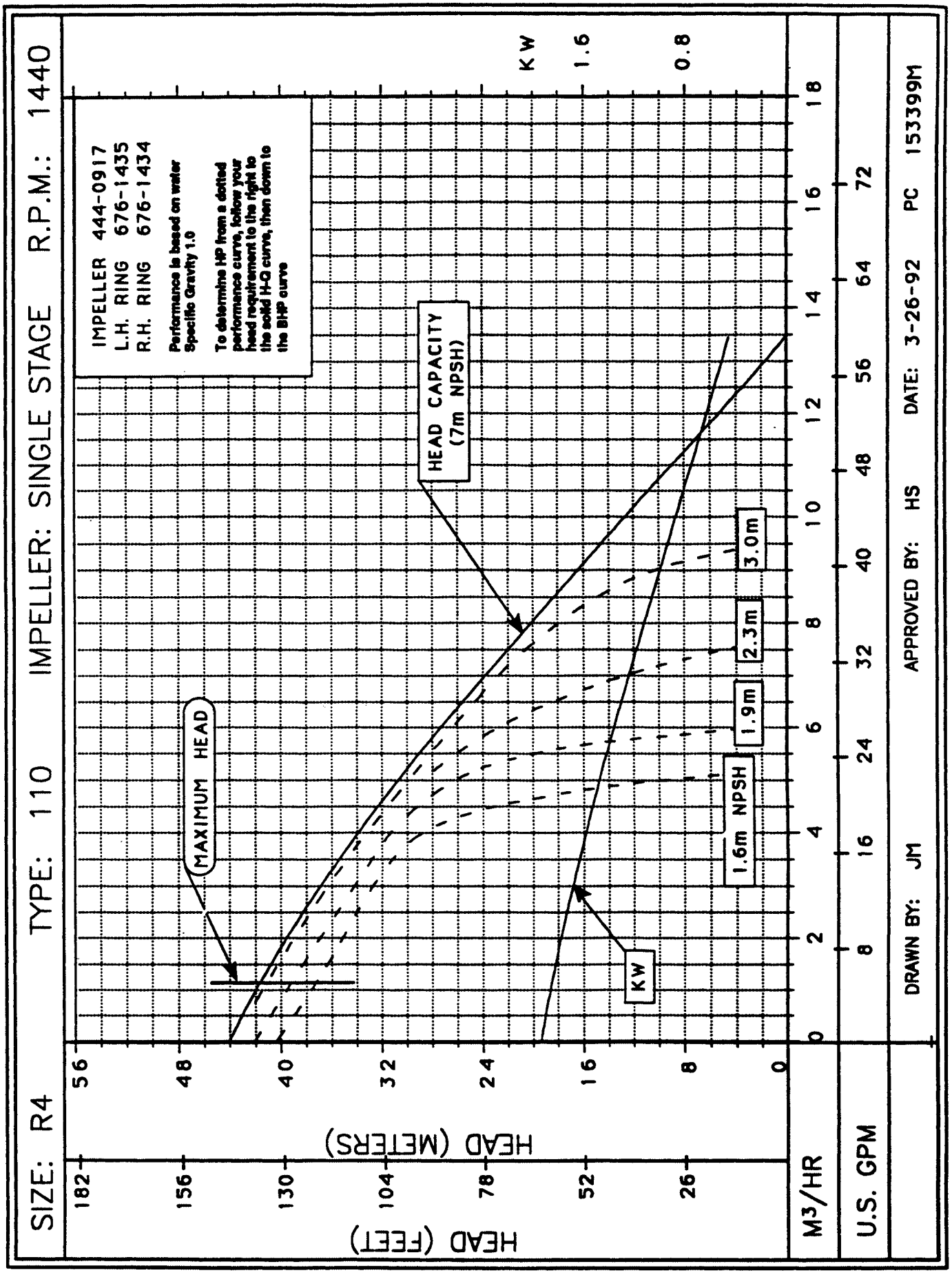
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

R4 - 1440 RPM
SINGLE STAGE IMPELLER

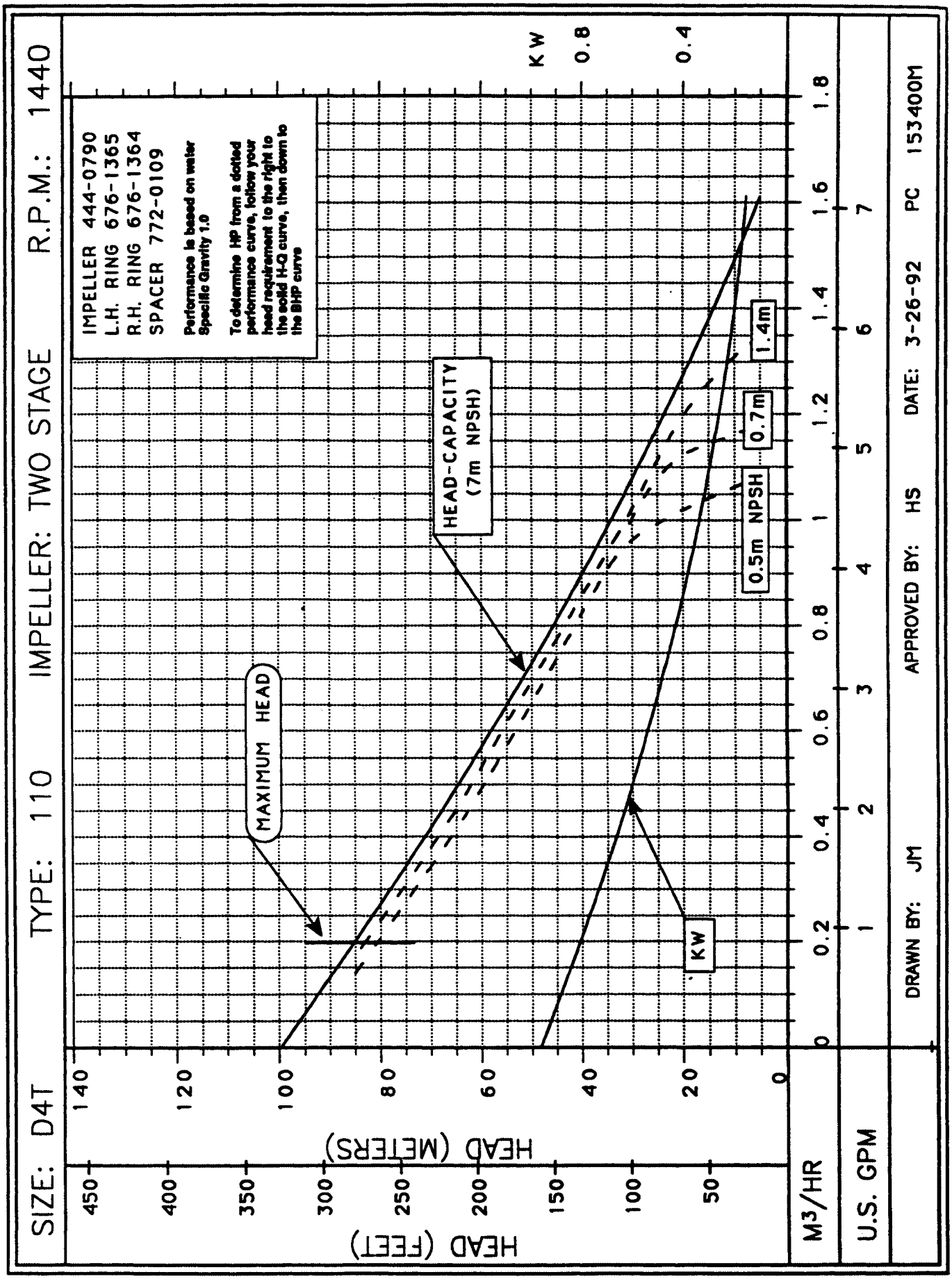
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D4T - 1440 RPM
TWO STAGE IMPELLER

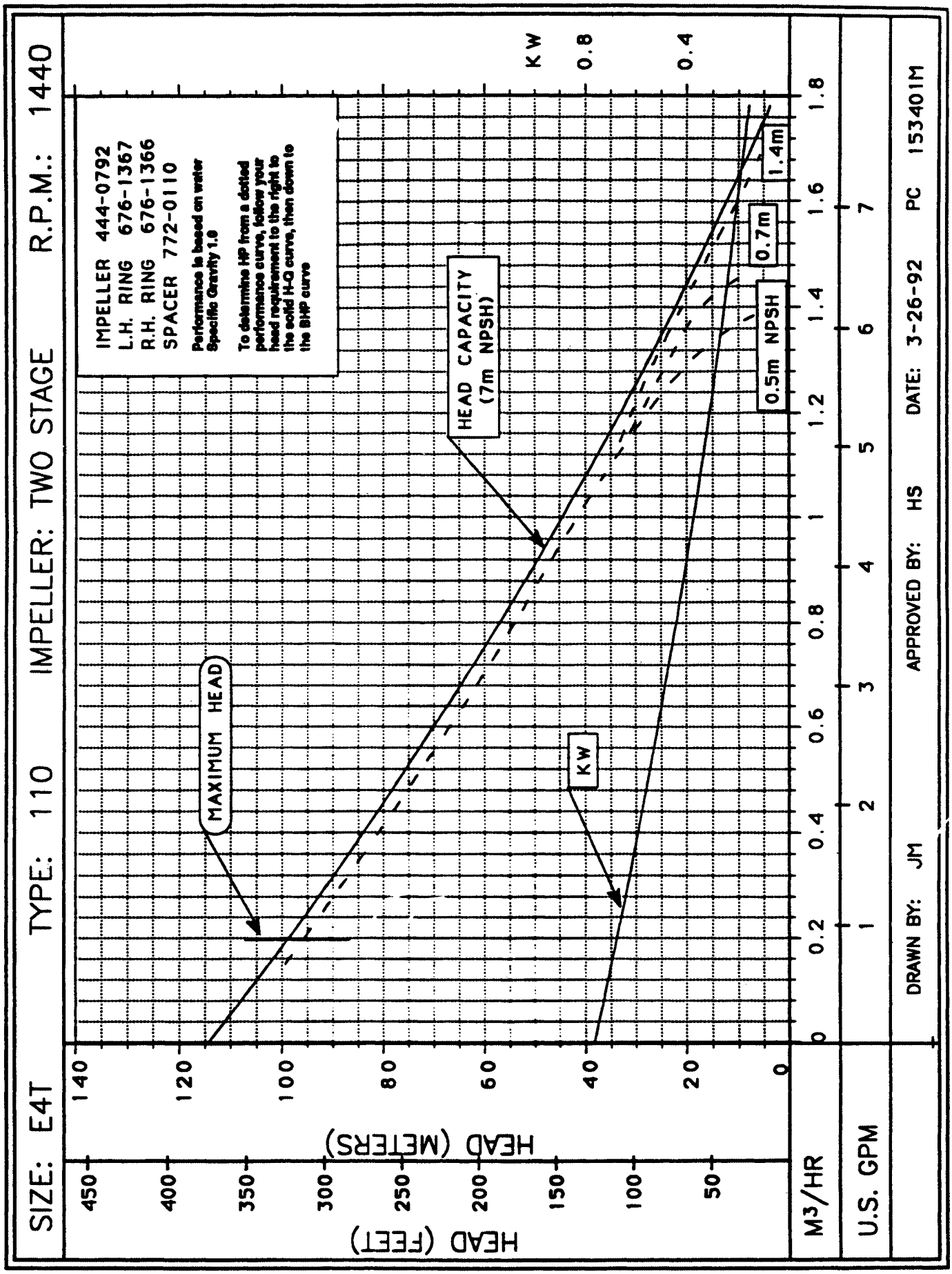
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

E4T - 1440 RPM
TWO STAGE IMPELLER

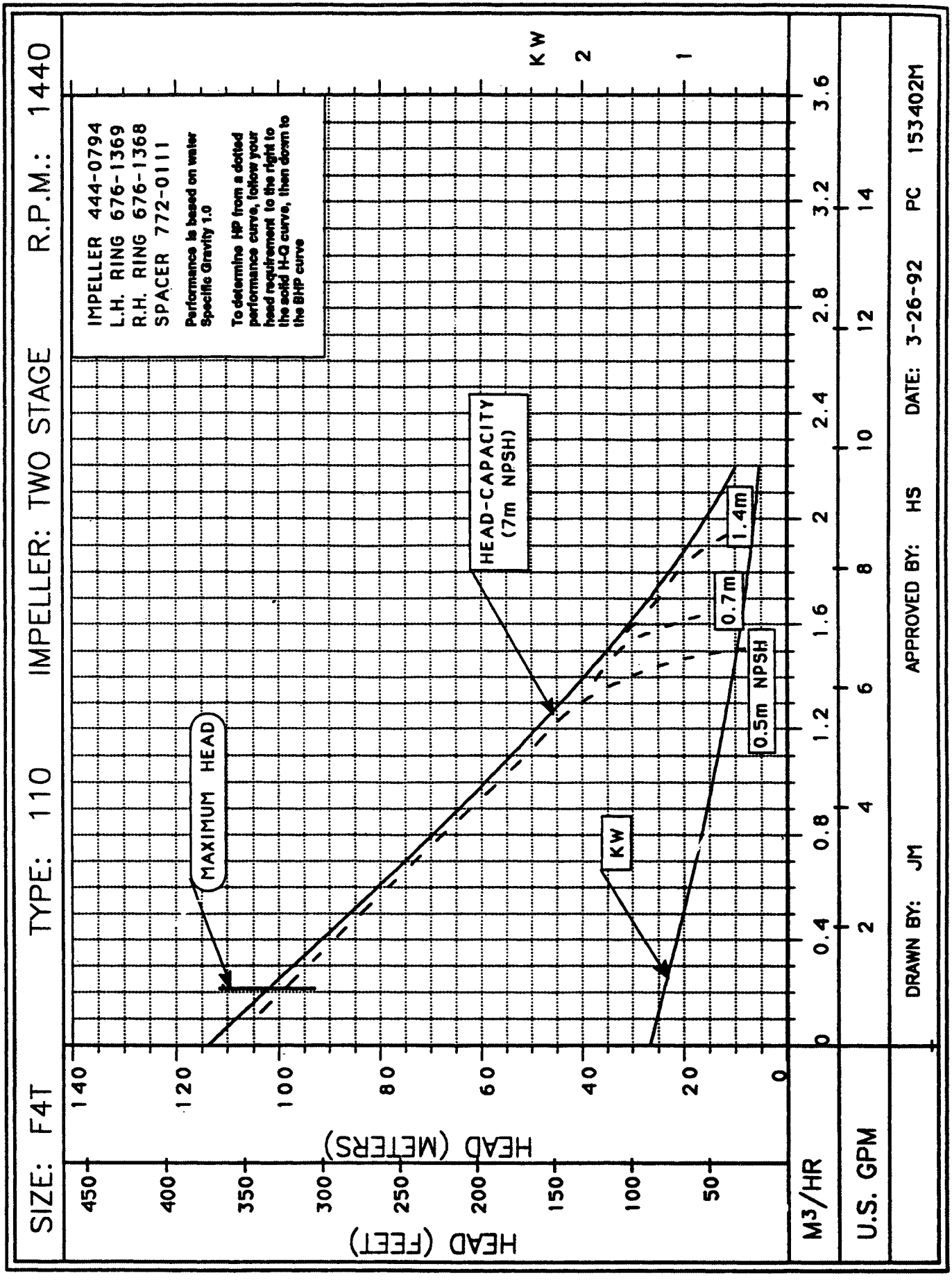
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F4T - 1440 RPM
TWO STAGE IMPELLER

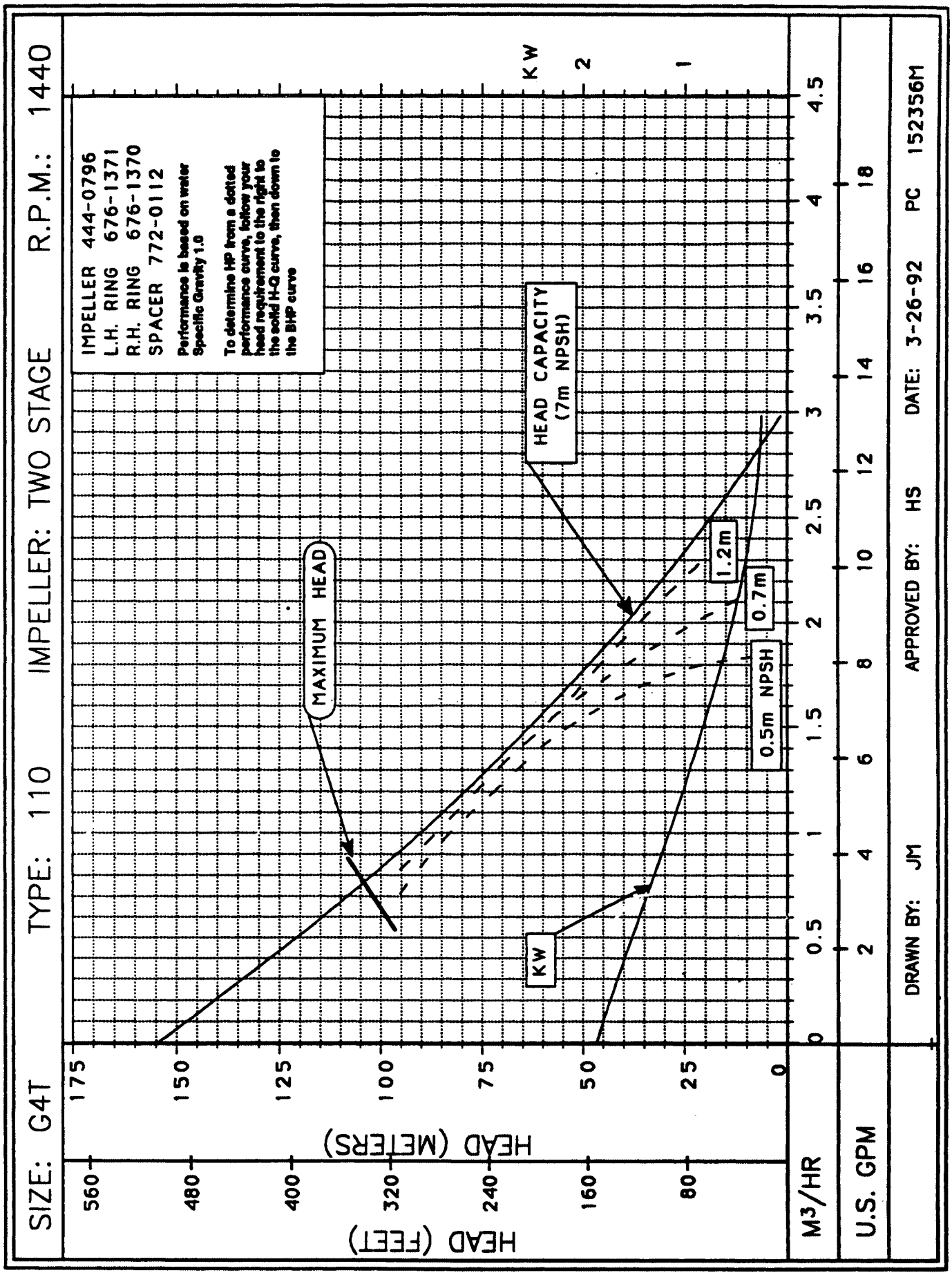
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

G4T - 1440 RPM
TWO STAGE IMPELLER

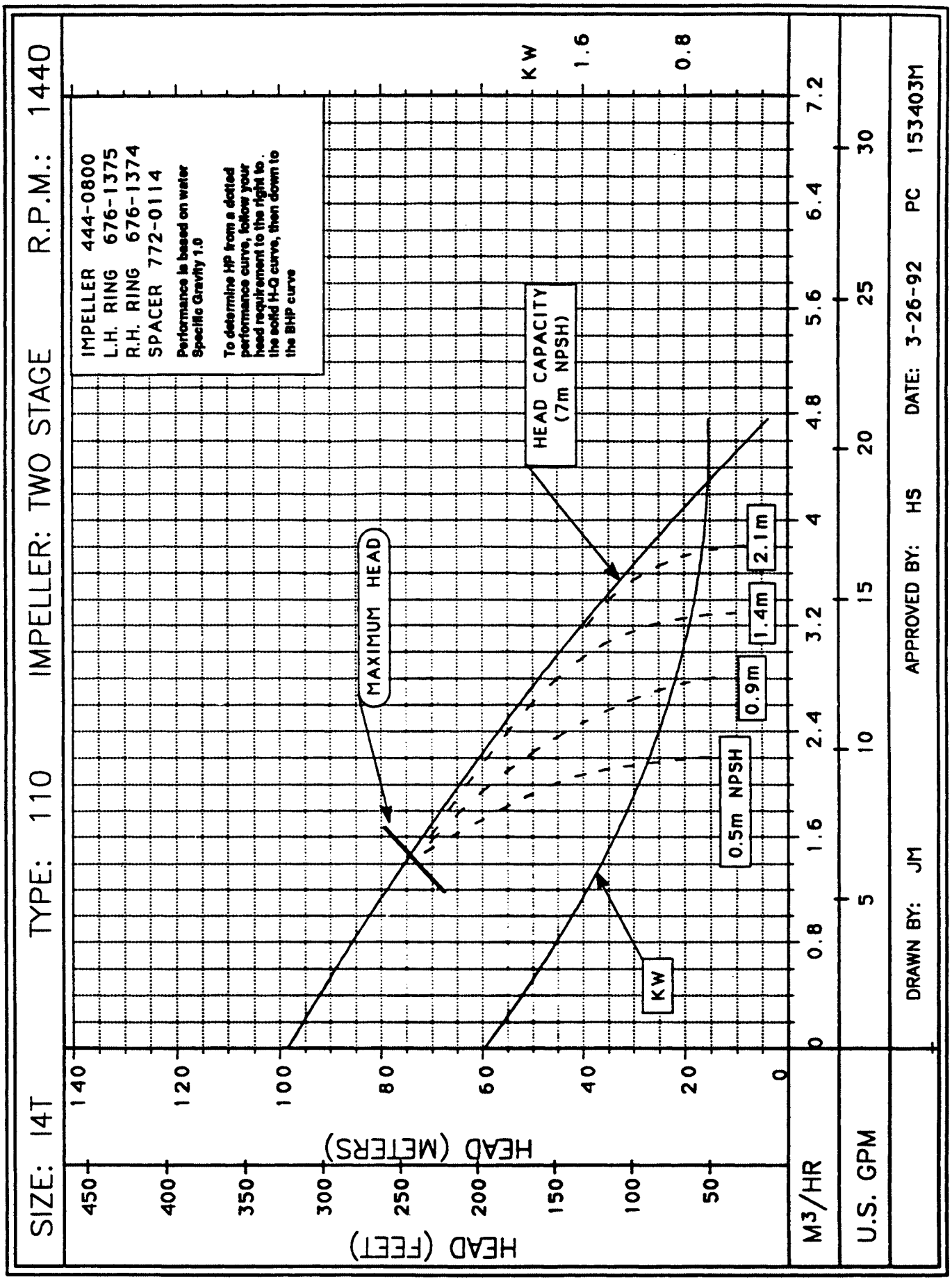
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I4T - 1440 RPM
TWO STAGE IMPELLER

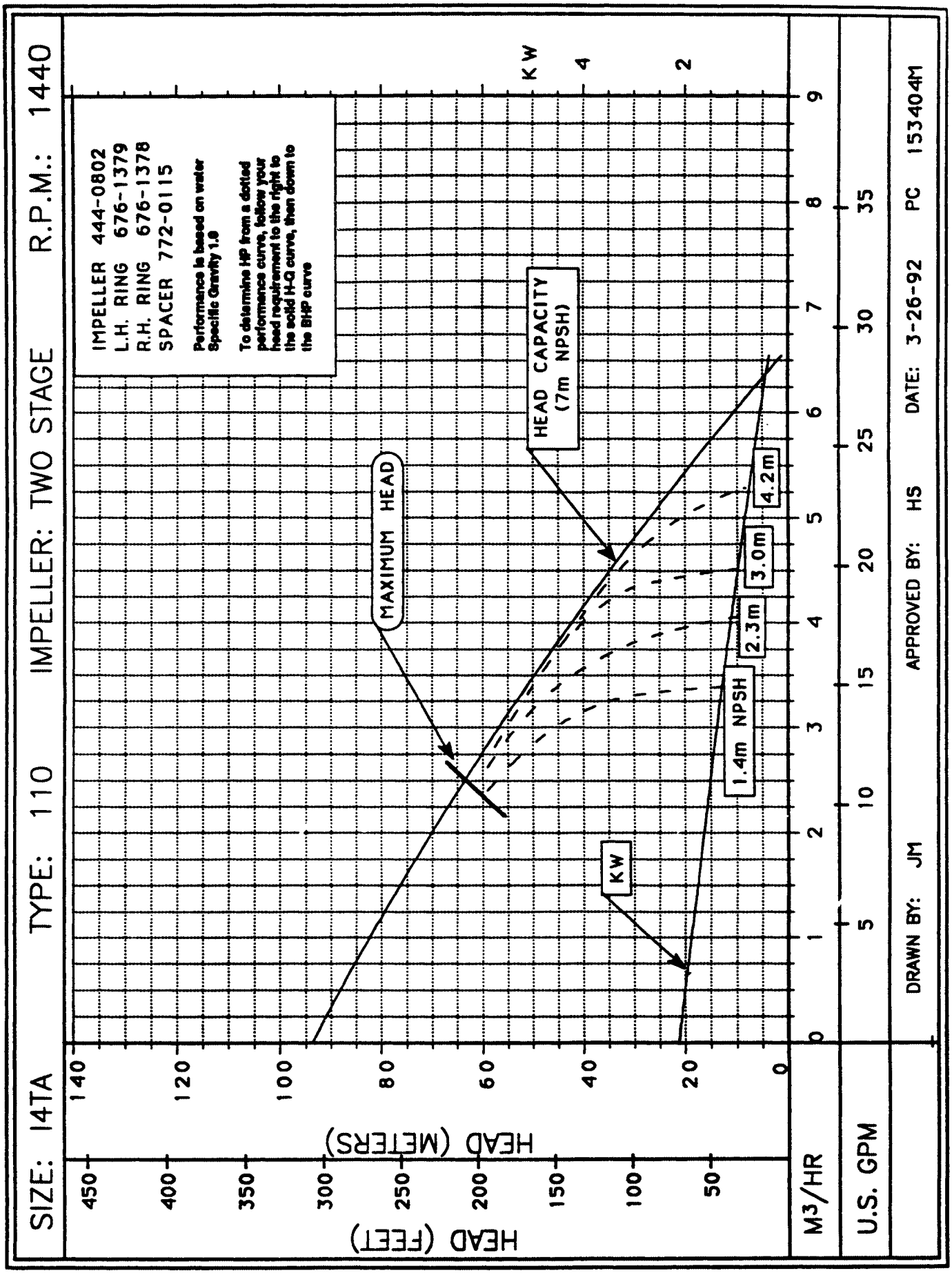
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

I4TA - 1440 RPM
TWO STAGE IMPELLER

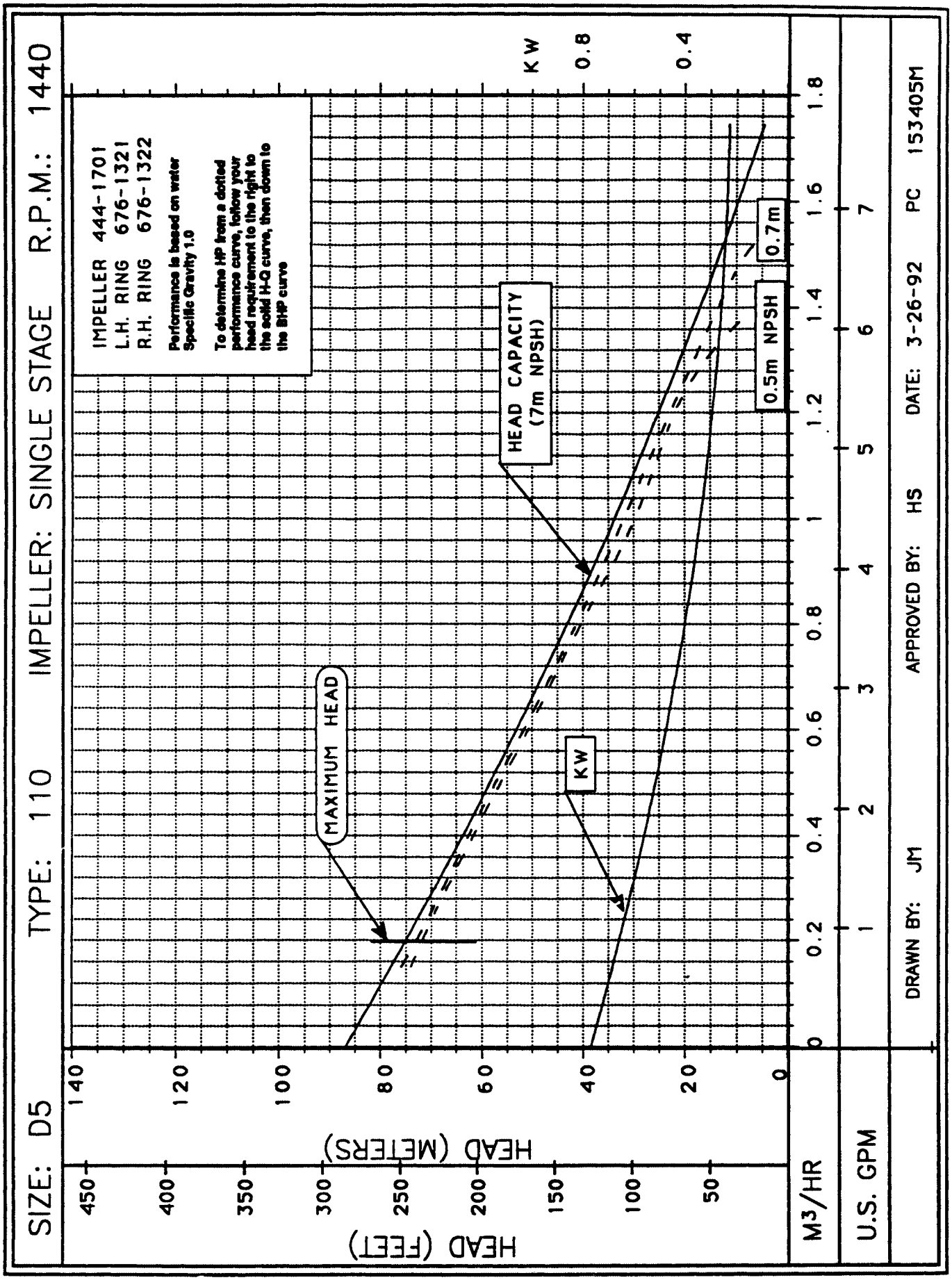
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D5 - 1440 RPM
SINGLE STAGE IMPELLER

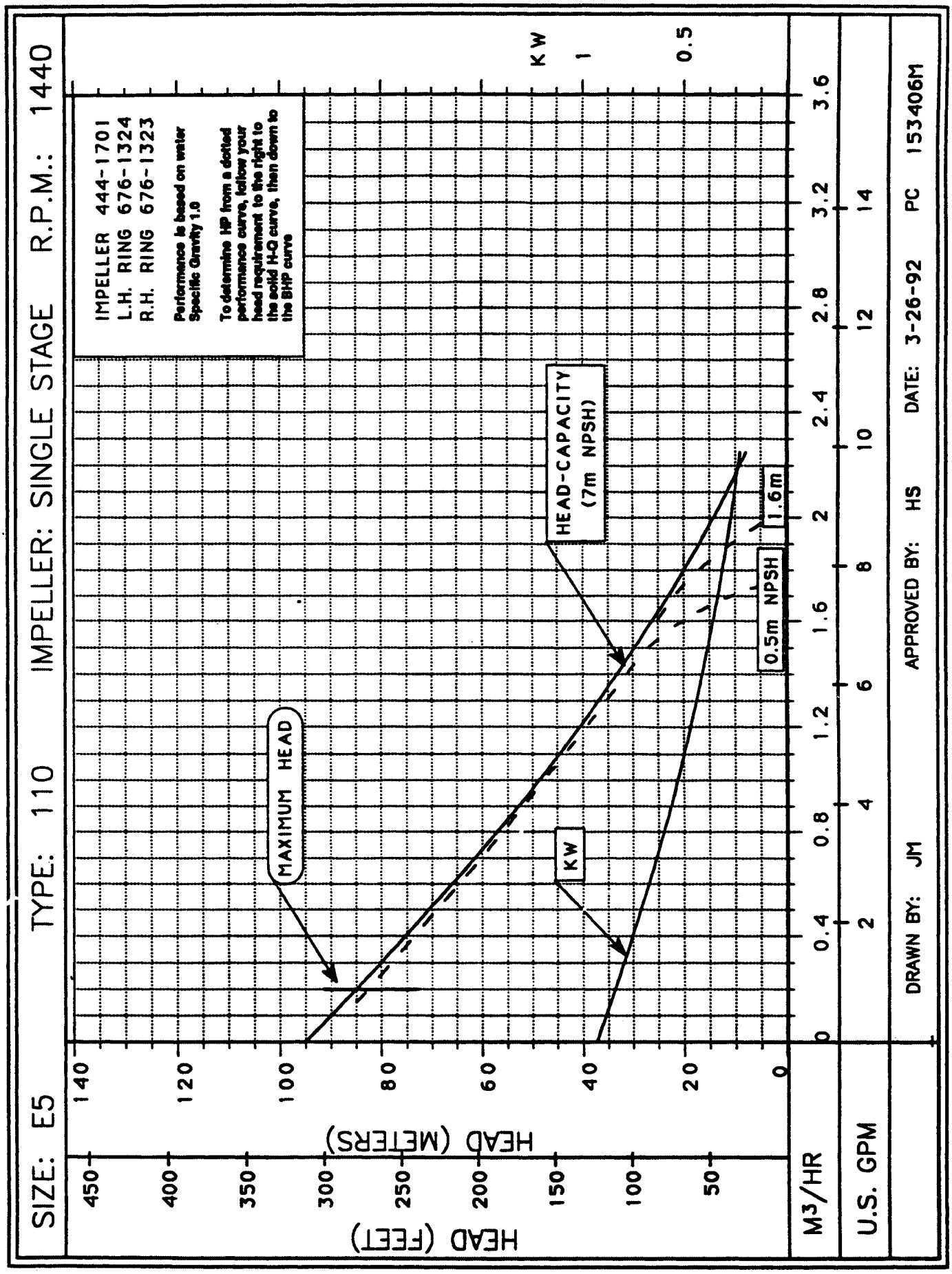
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

E5 - 1440 RPM
SINGLE STAGE IMPELLER

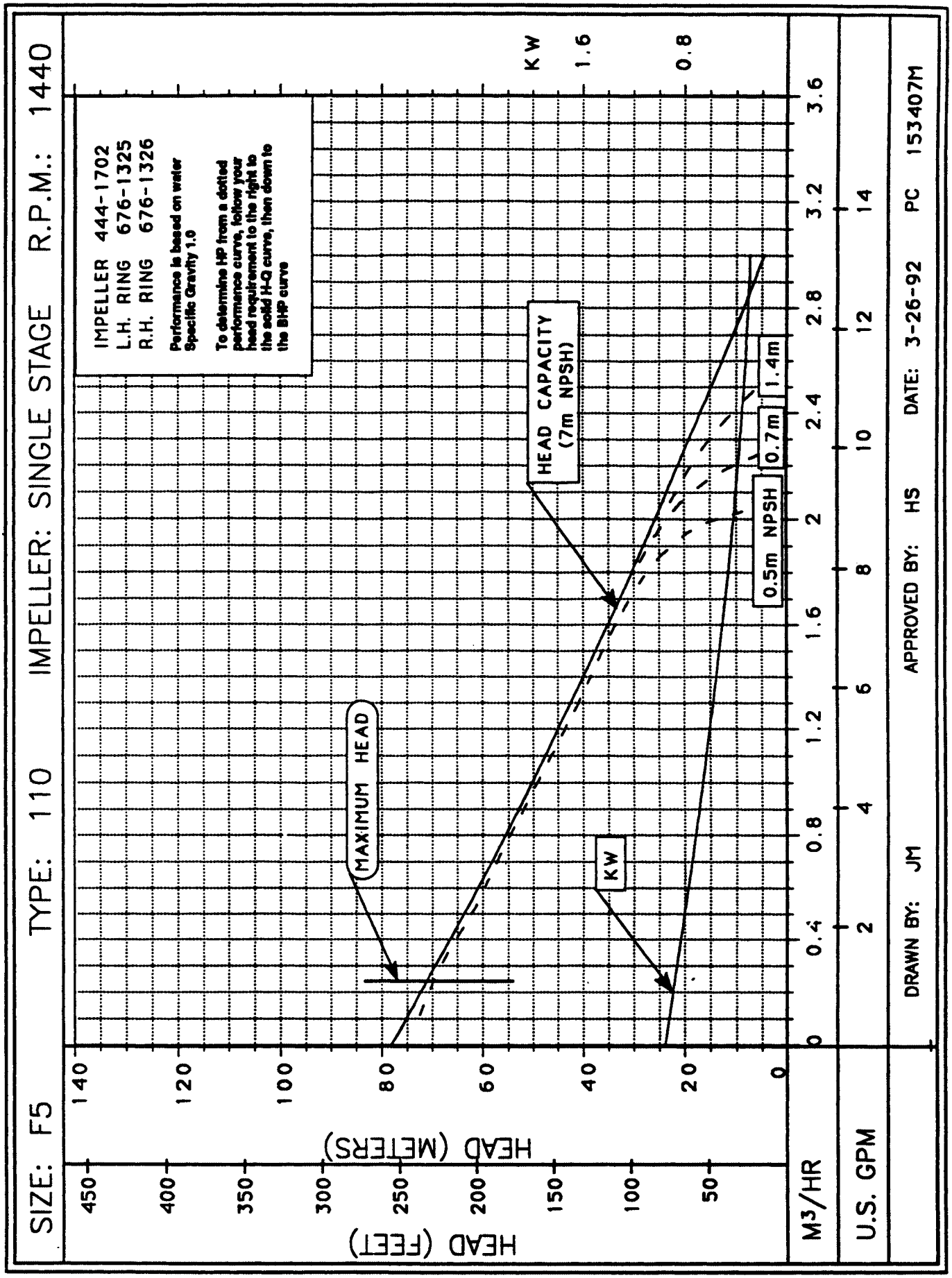
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F5 - 1440 RPM
SINGLE STAGE IMPELLER

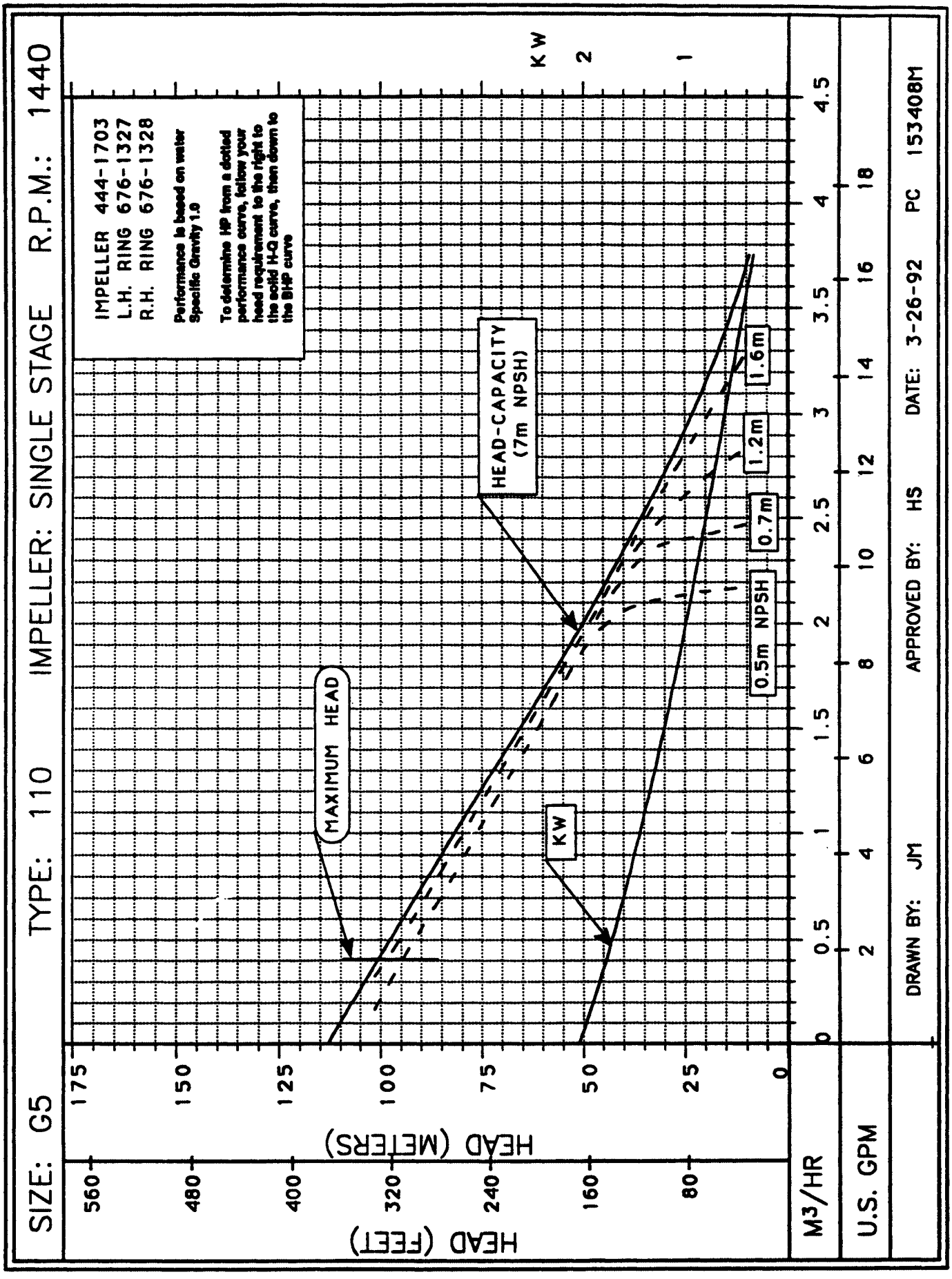
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

G5 - 1440 RPM
SINGLE STAGE IMPELLER

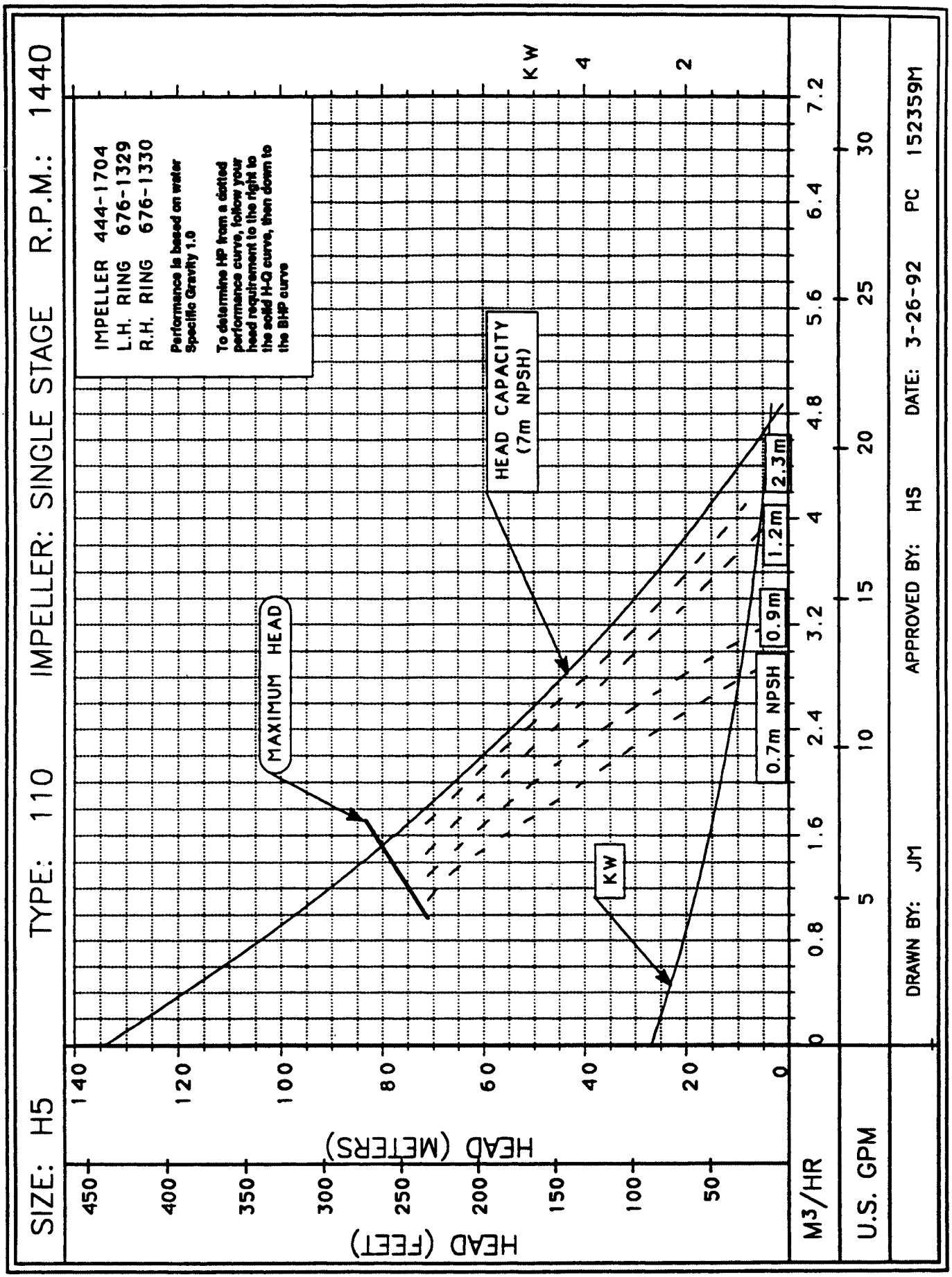
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H5 - 1440 RPM
SINGLE STAGE IMPELLER

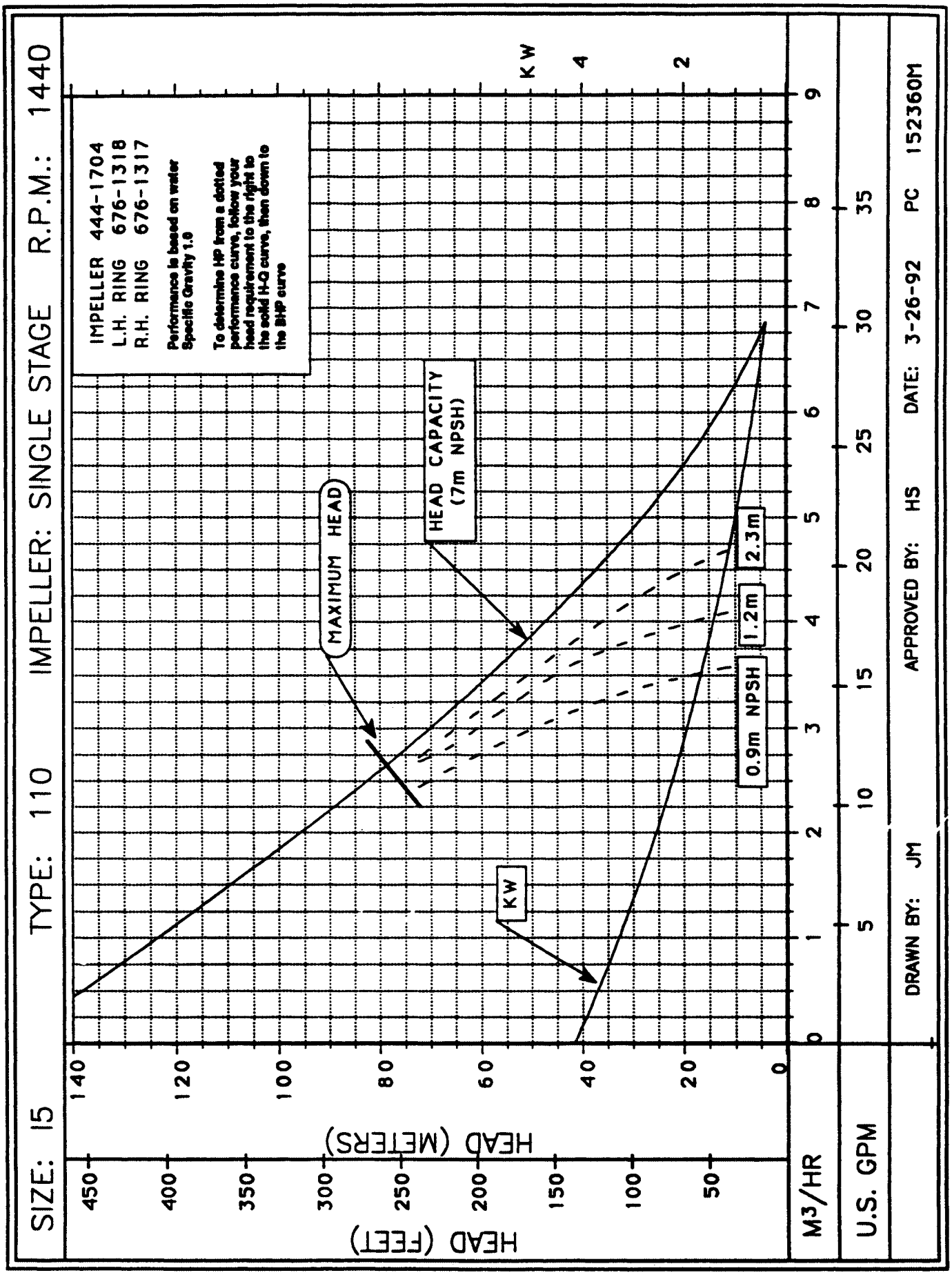
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

I5 - 1440 RPM
SINGLE STAGE IMPELLER

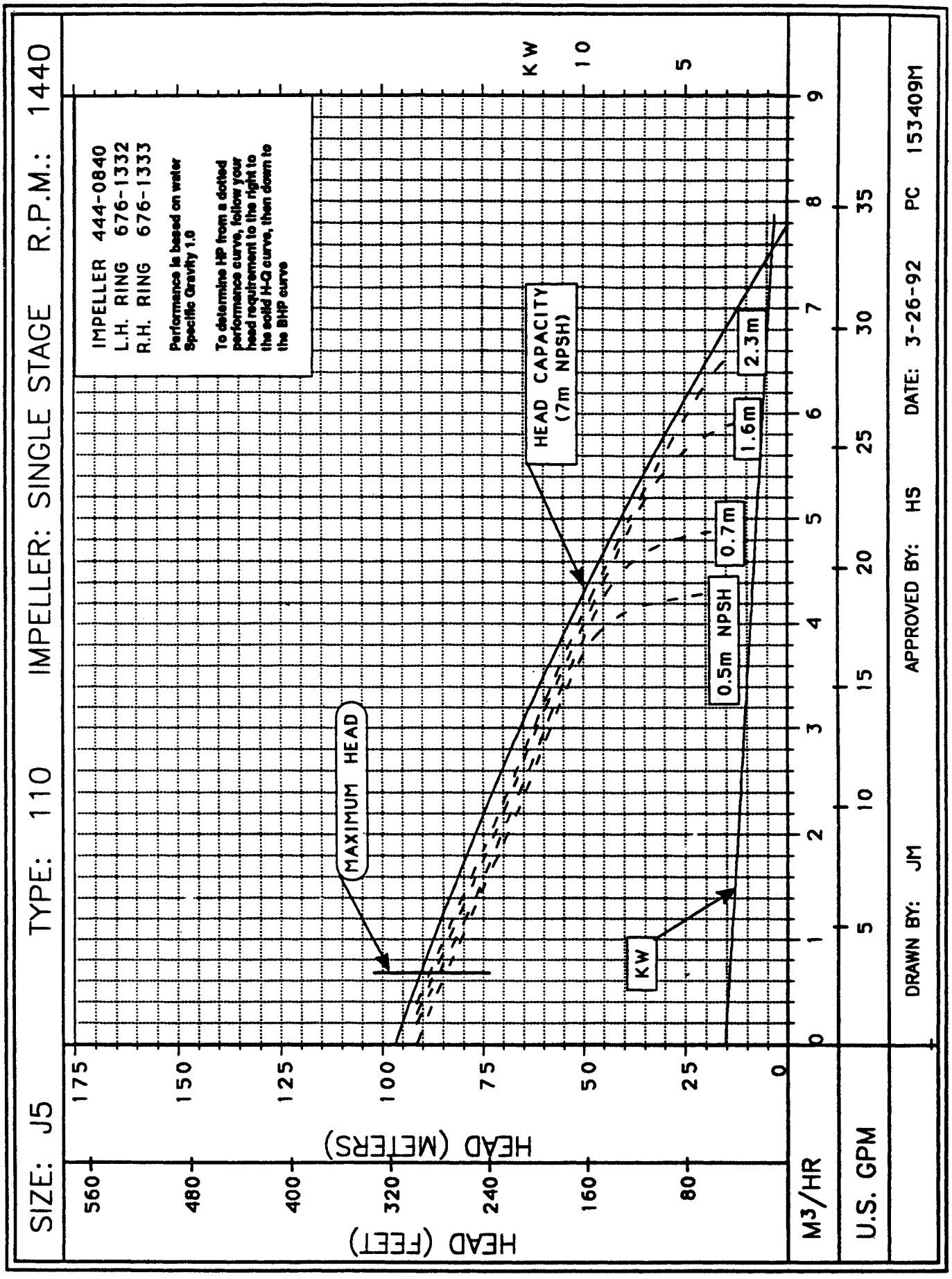
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J5 - 1440 RPM
SINGLE STAGE IMPELLER

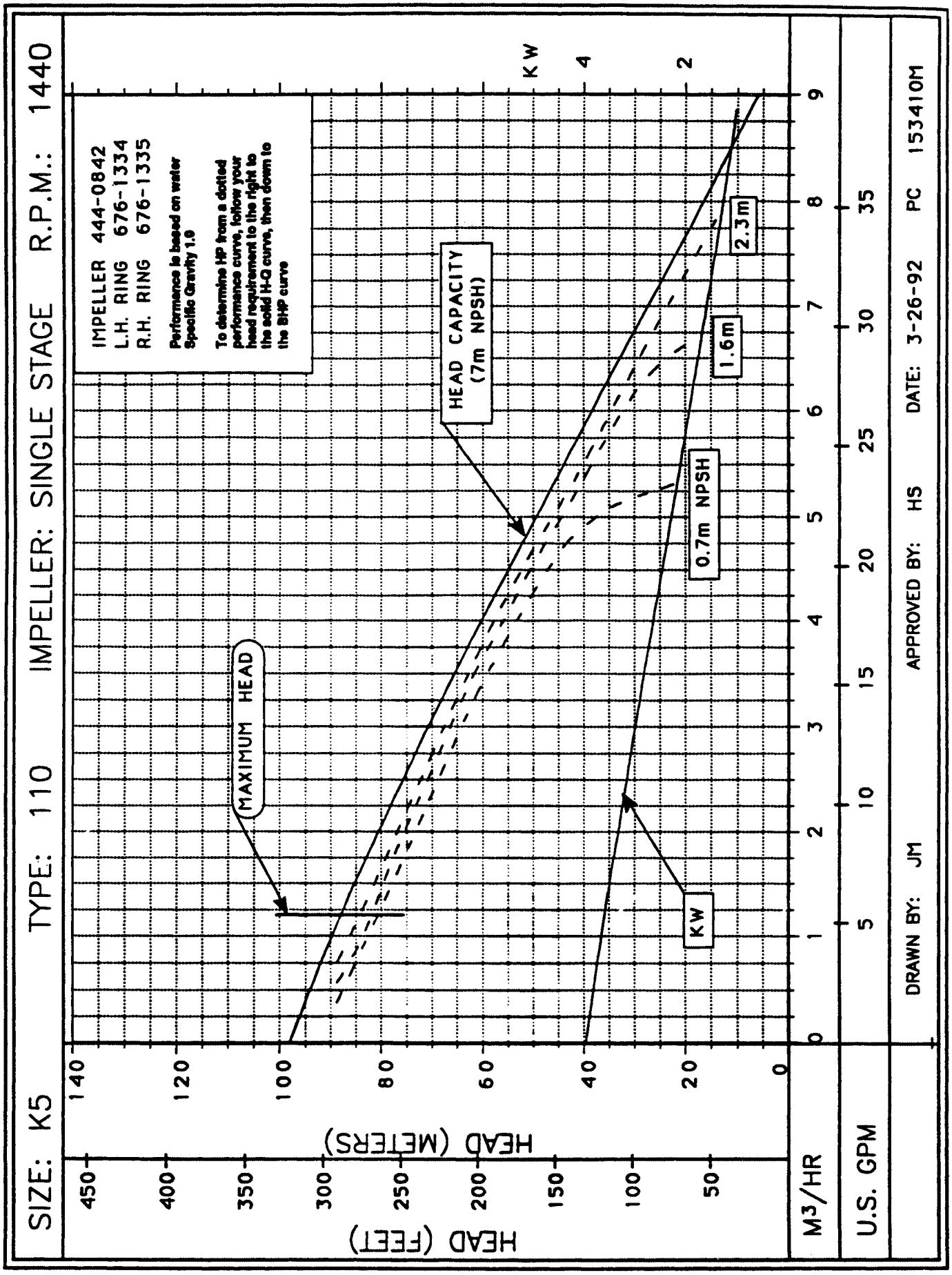
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

K5 - 1440 RPM
SINGLE STAGE IMPELLER

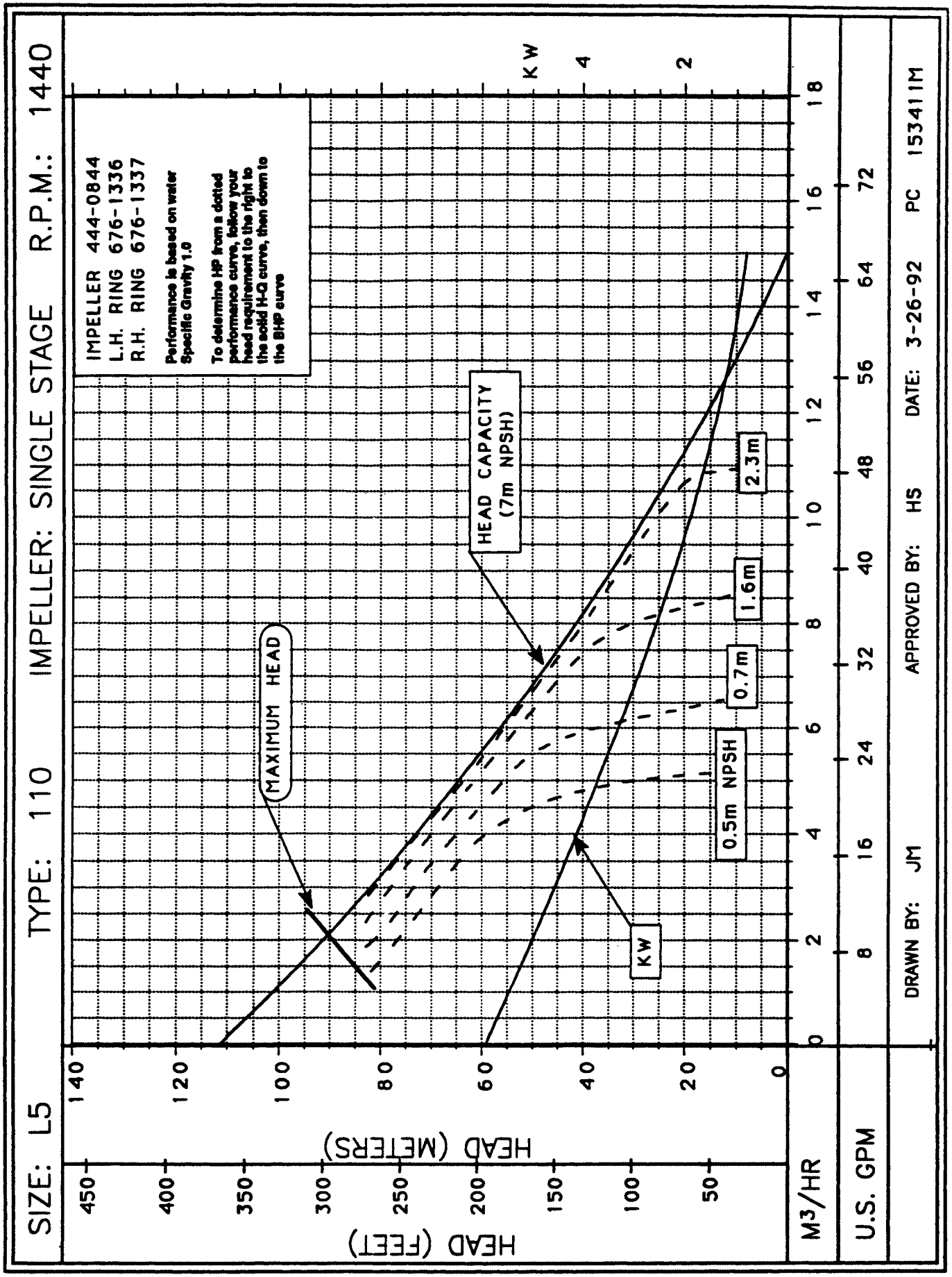
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L5 - 1440 RPM
SINGLE STAGE IMPELLER

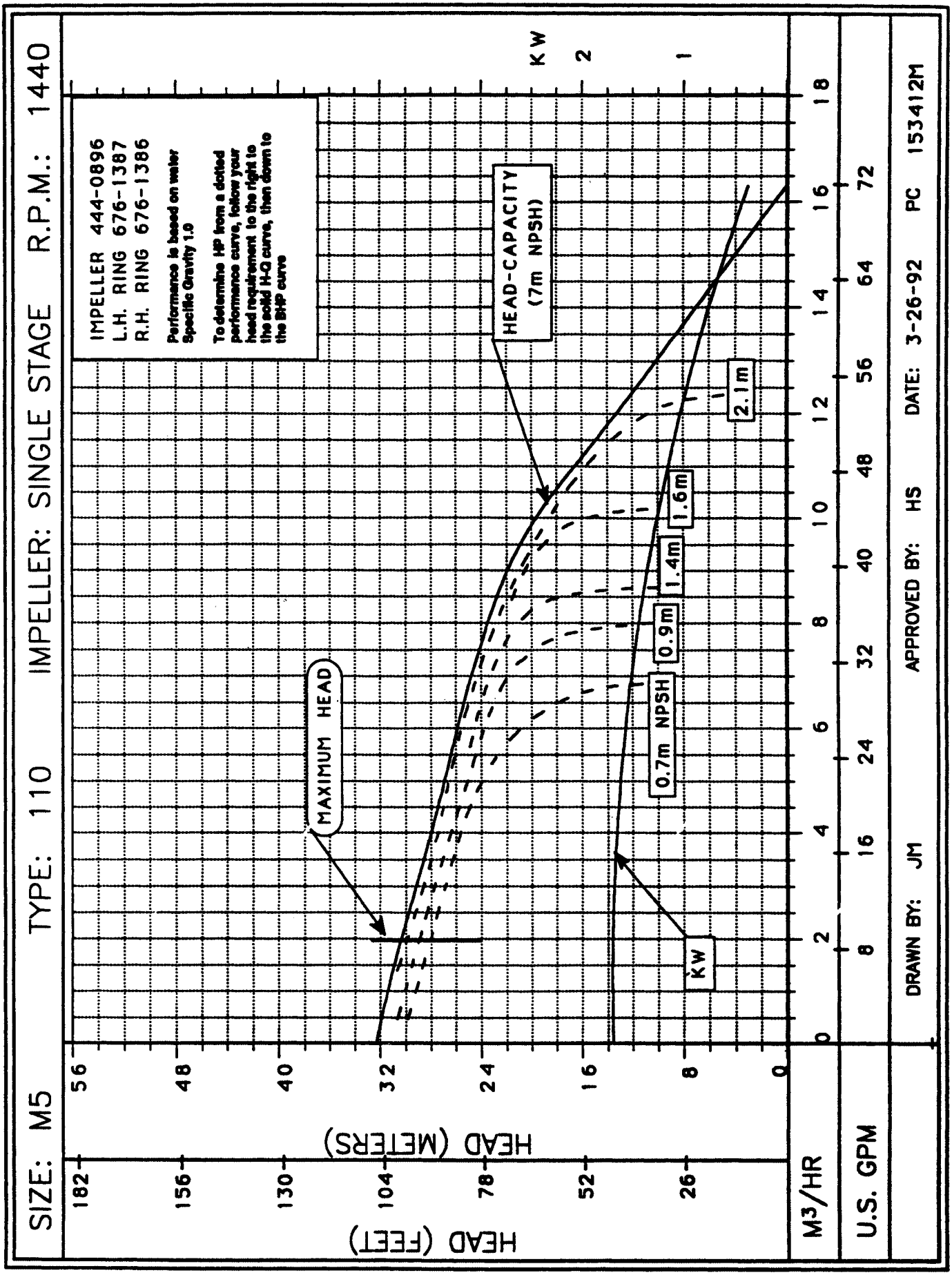
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

M5 - 1440 RPM
SINGLE STAGE IMPELLER

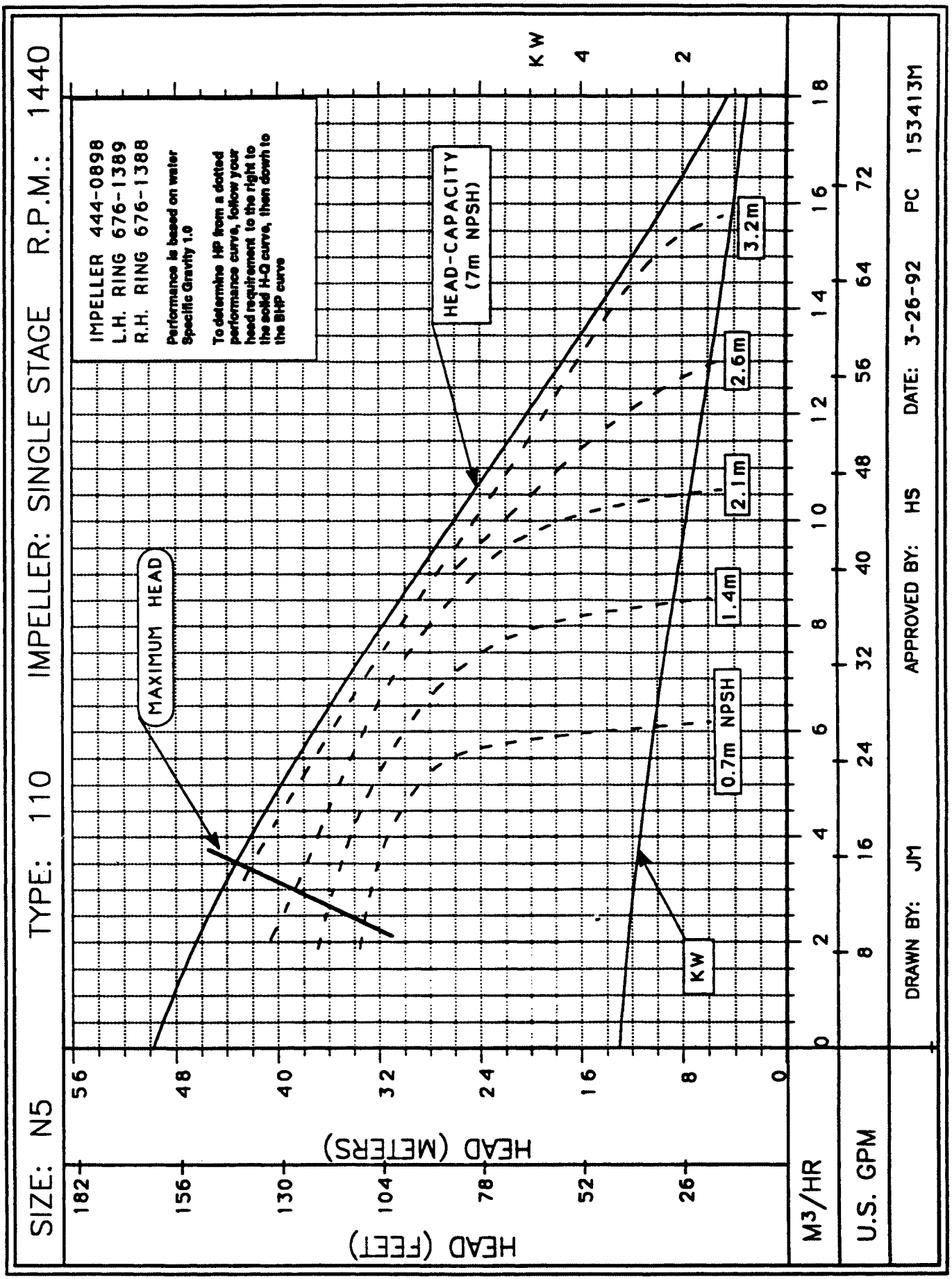
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N5 - 1440 RPM
SINGLE STAGE IMPELLER

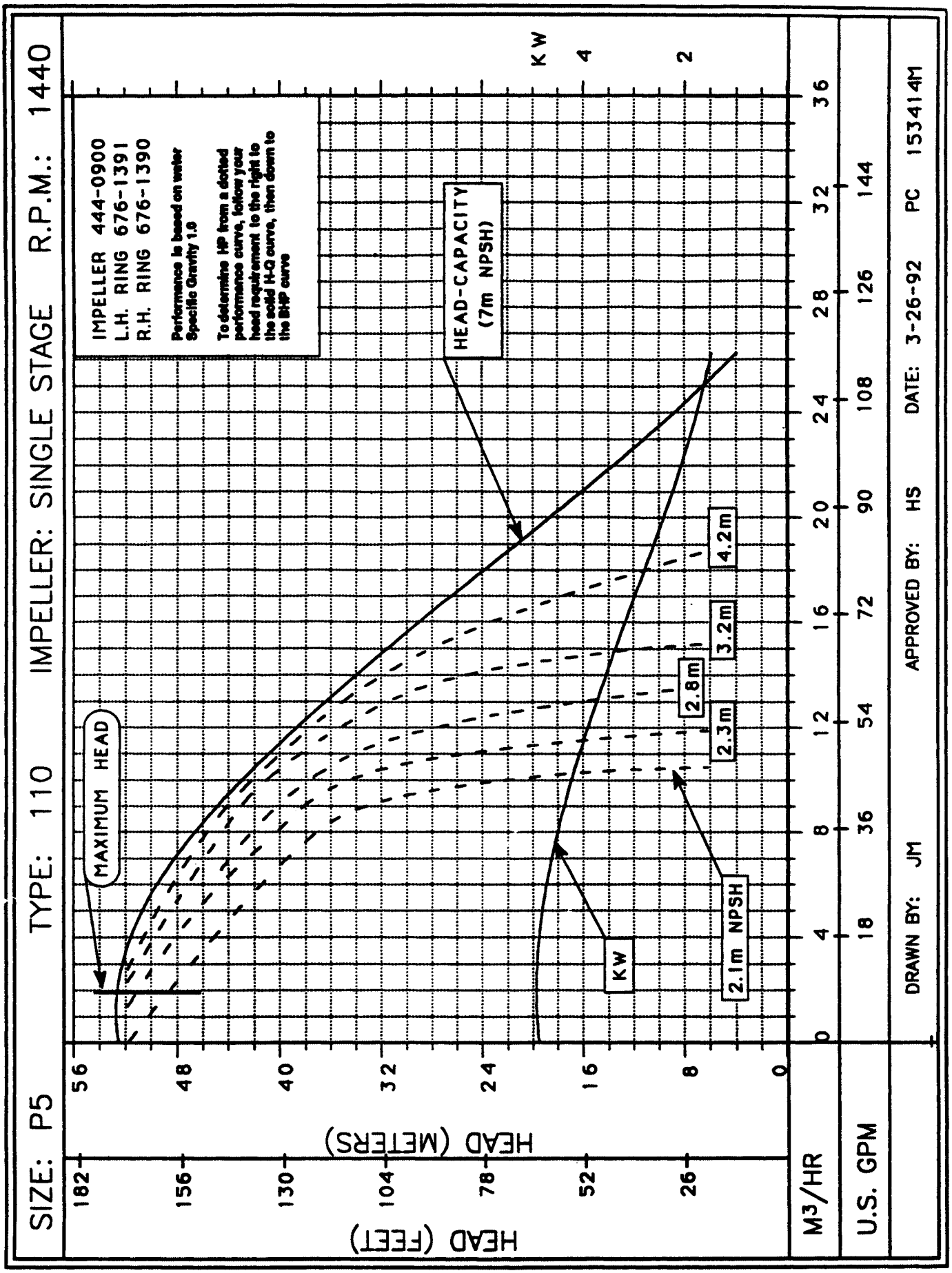
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

P5 - 1440 RPM
SINGLE STAGE IMPELLER

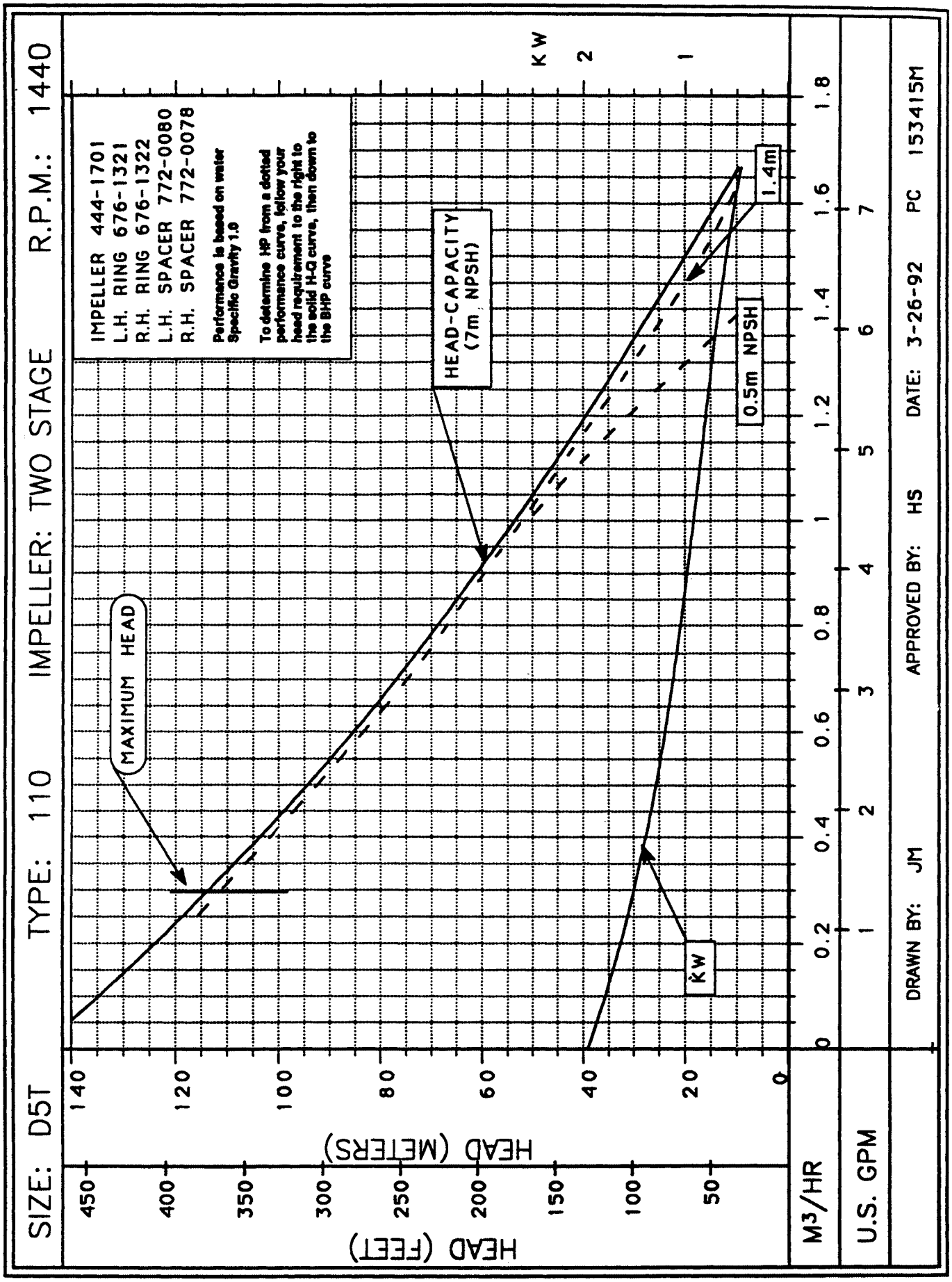
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D5T - 1440 RPM
TWO STAGE IMPELLER

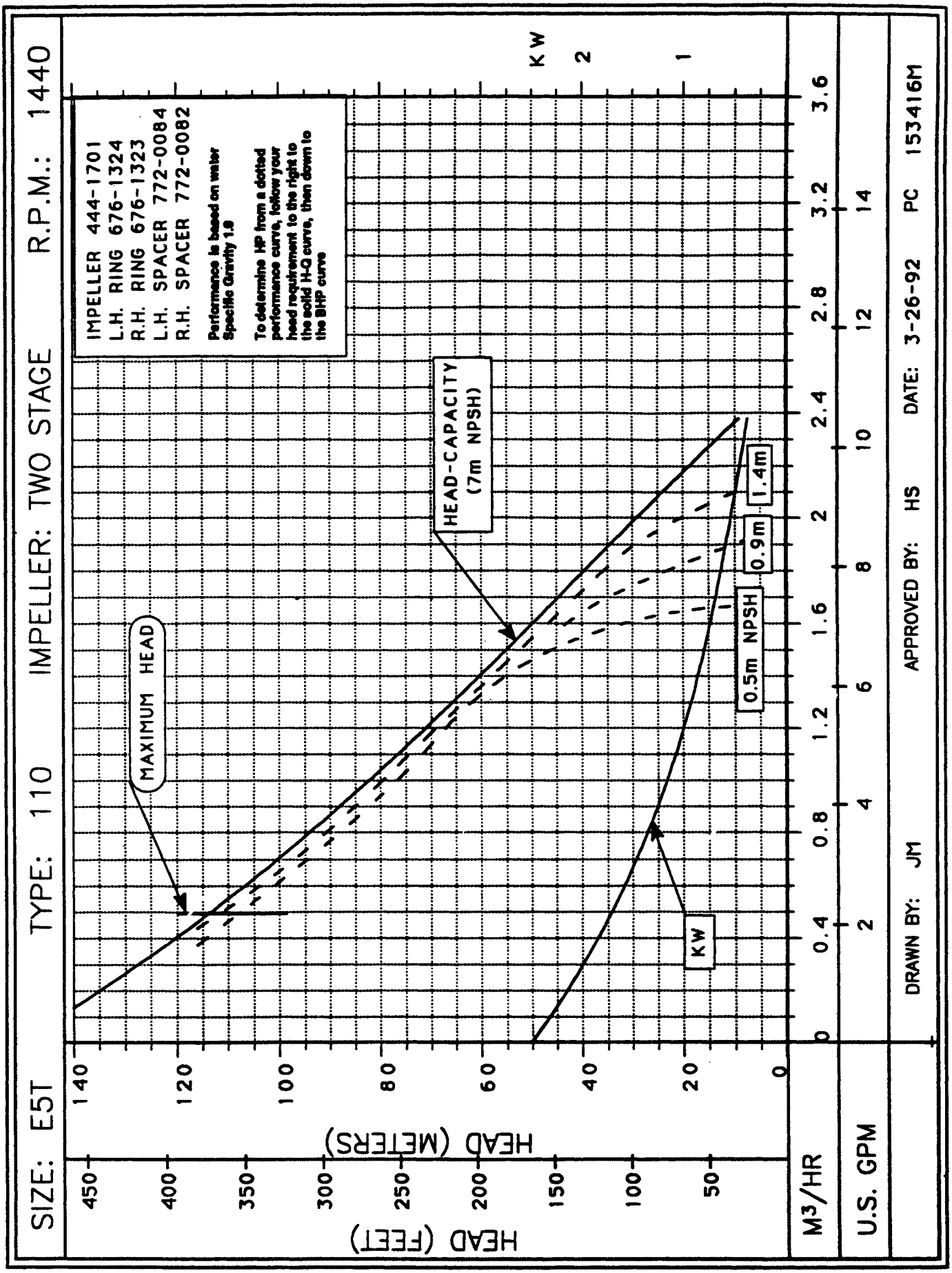
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

E5T - 1440 RPM
TWO STAGE IMPELLER

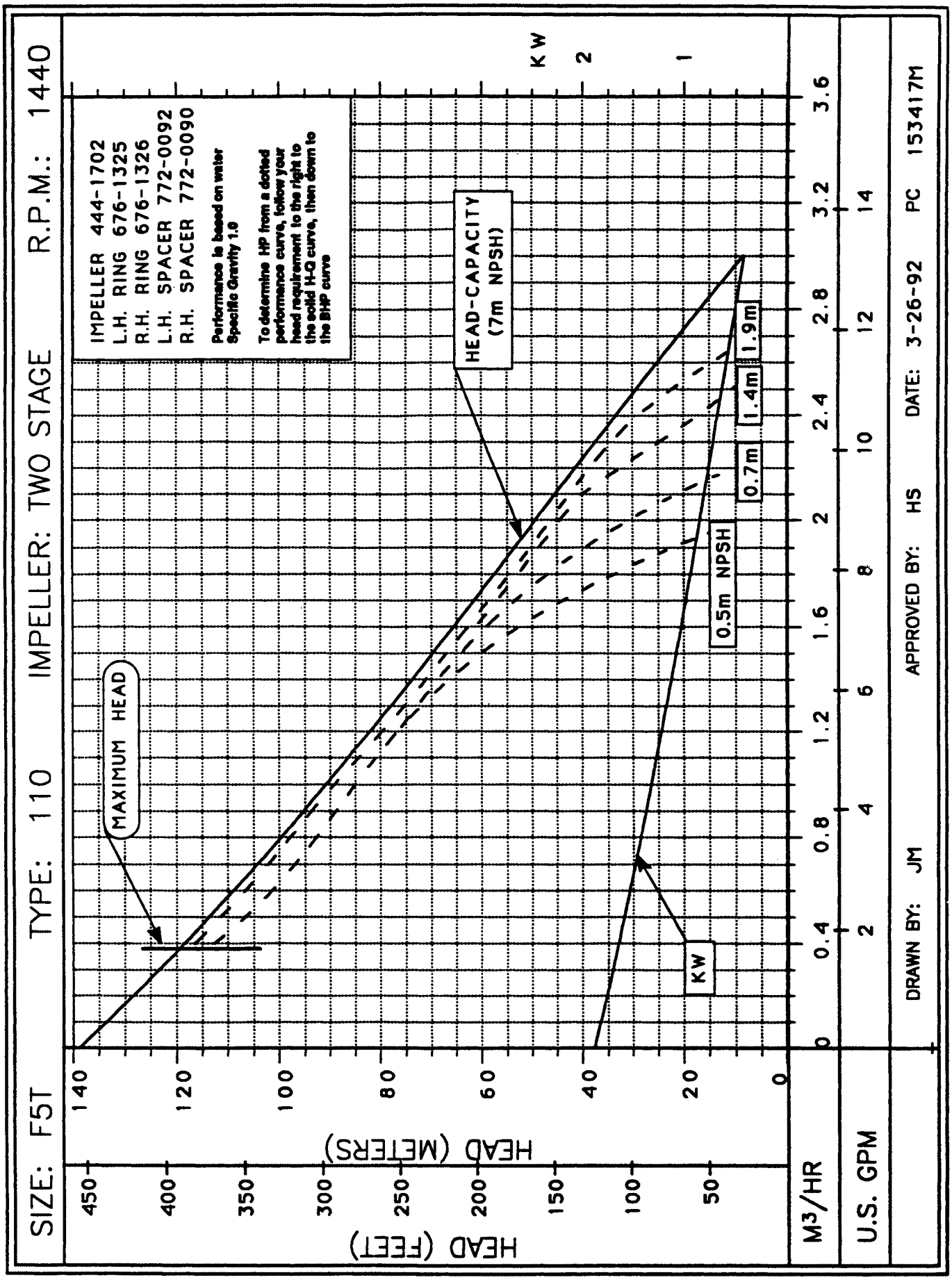
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F5T - 1440 RPM
TWO STAGE IMPELLER

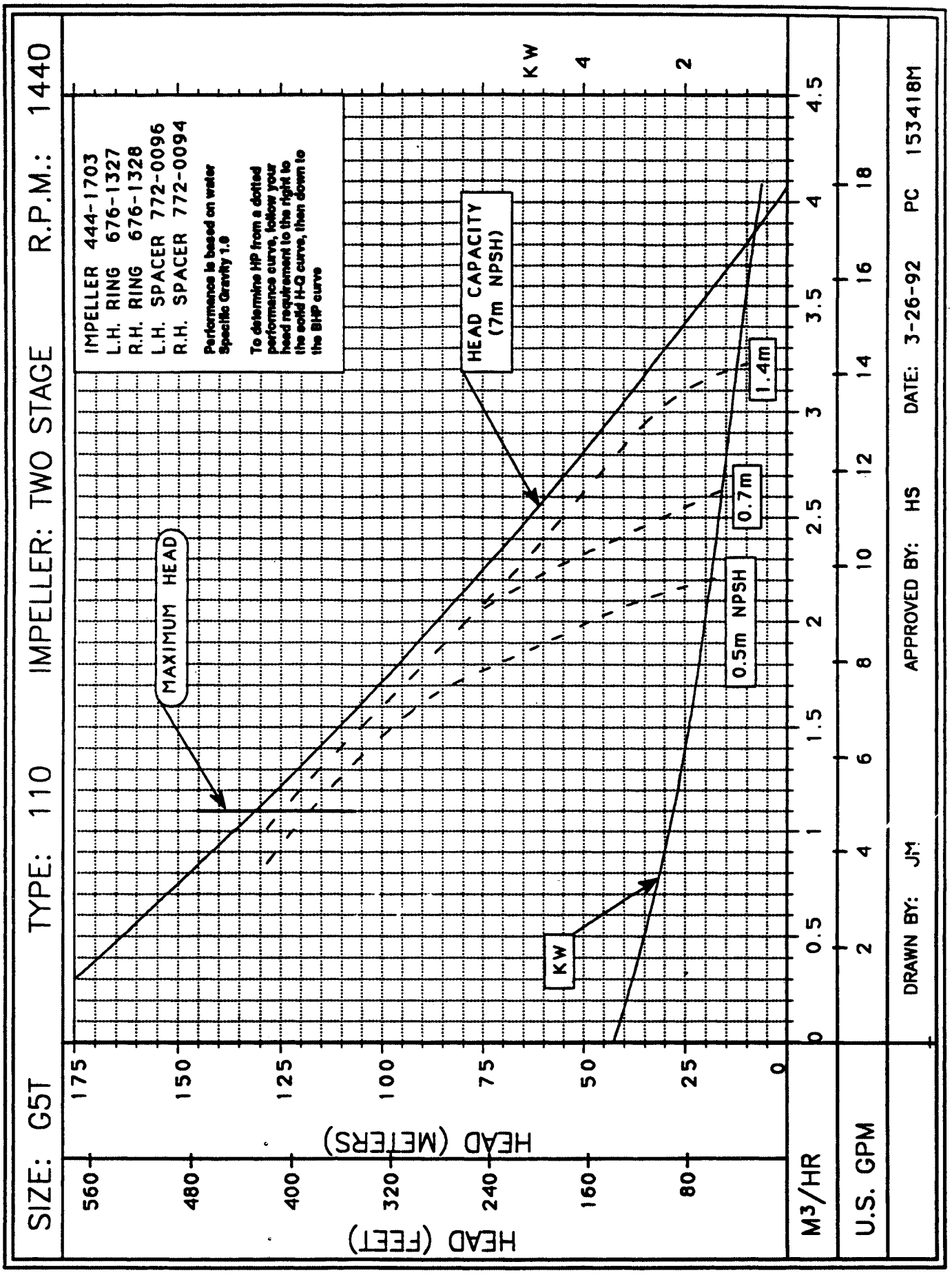
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

G5T - 1440 RPM
TWO STAGE IMPELLER

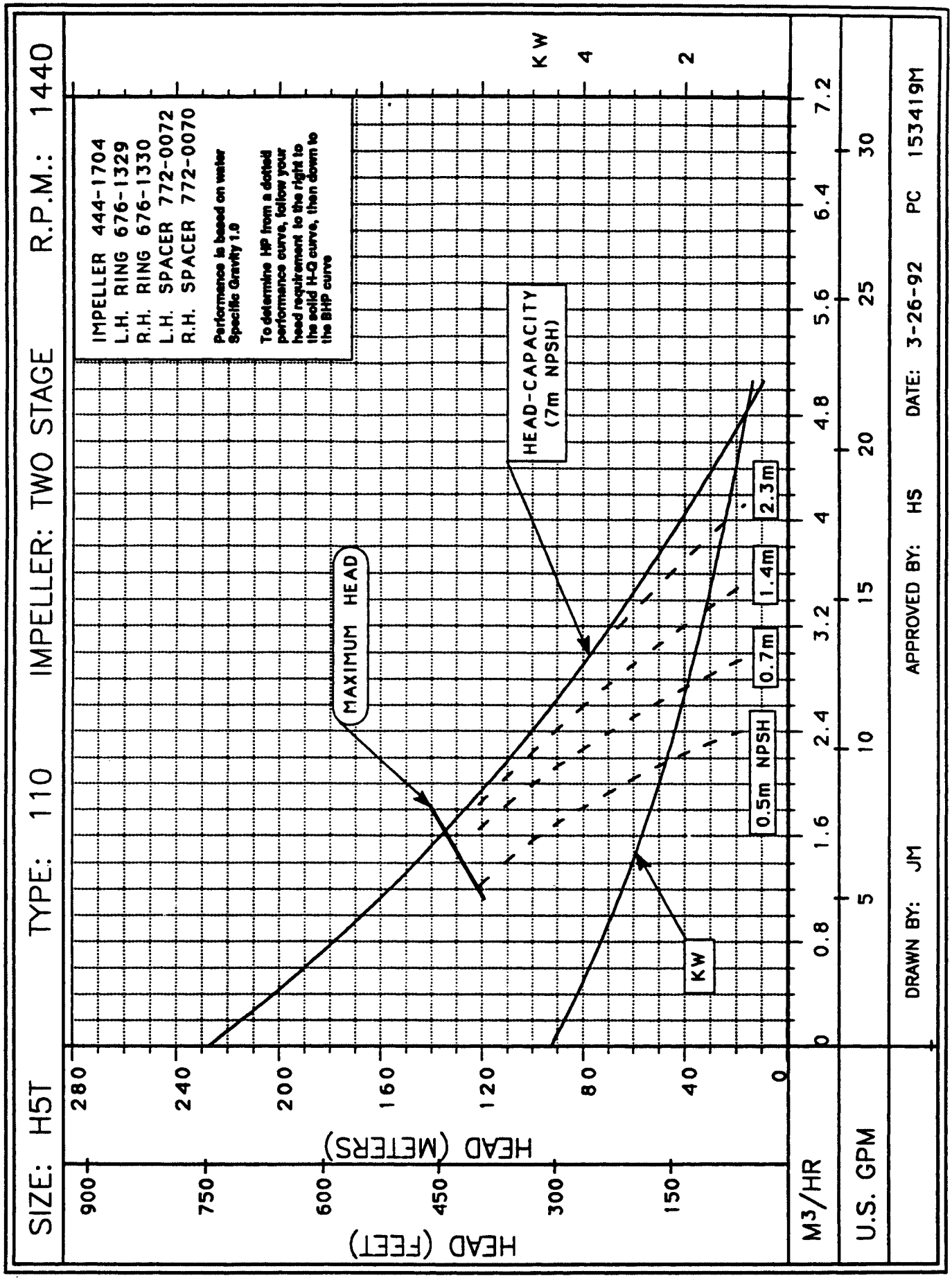
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H5T - 1440 RPM
TWO STAGE IMPELLER

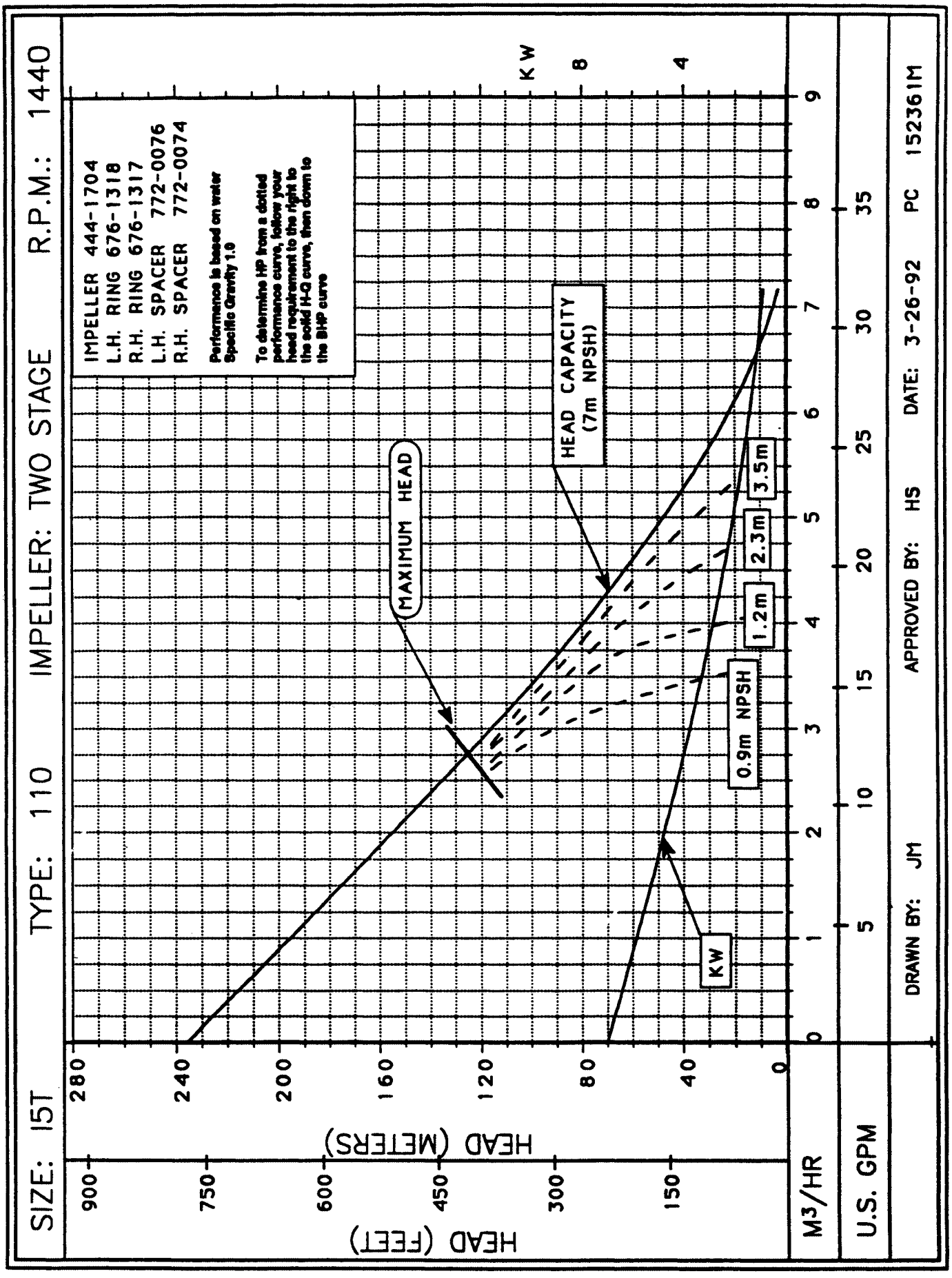
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

I5T - 1440 RPM
TWO STAGE IMPELLER

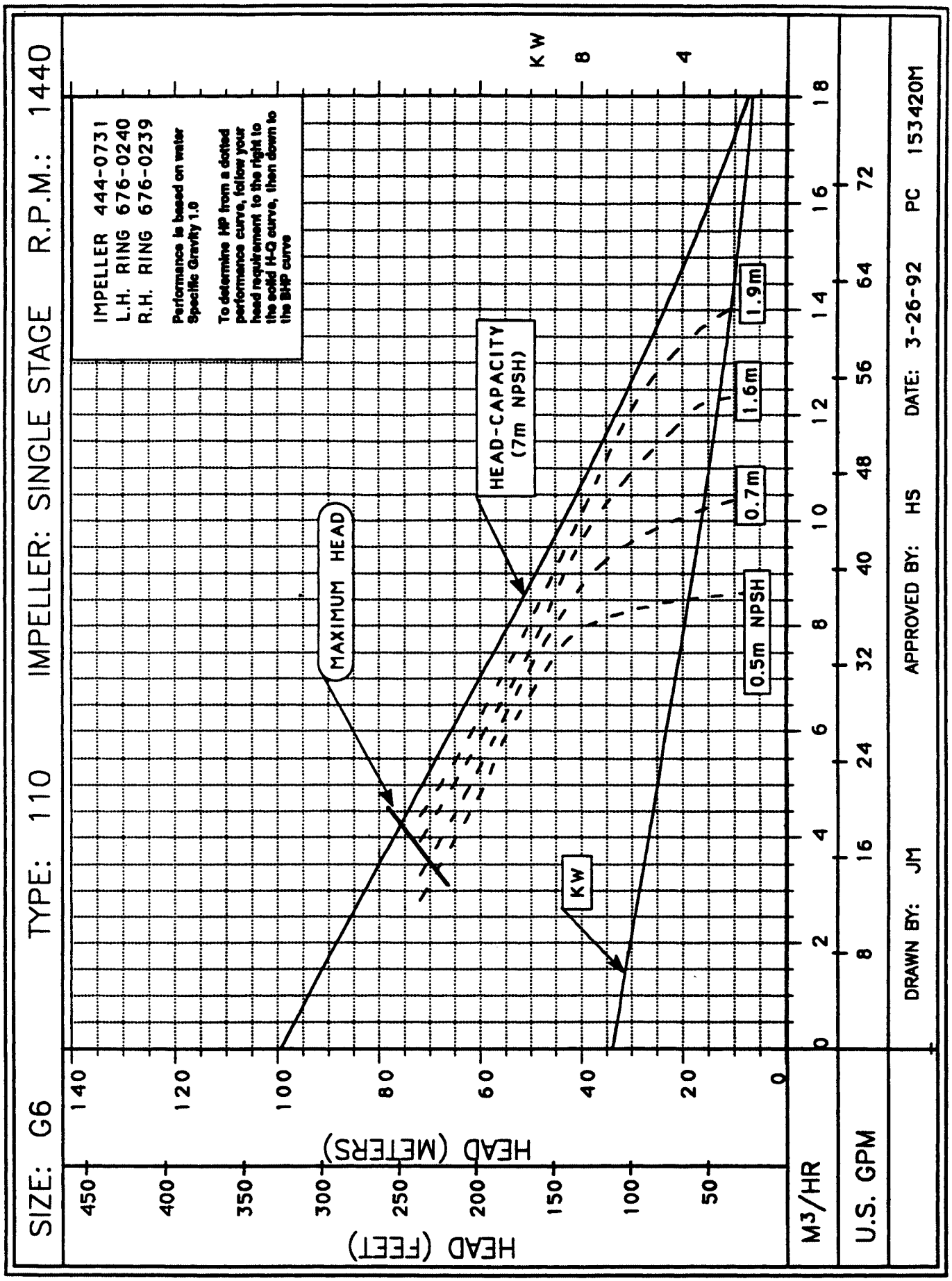
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G6 - 1440 RPM
SINGLE STAGE IMPELLER

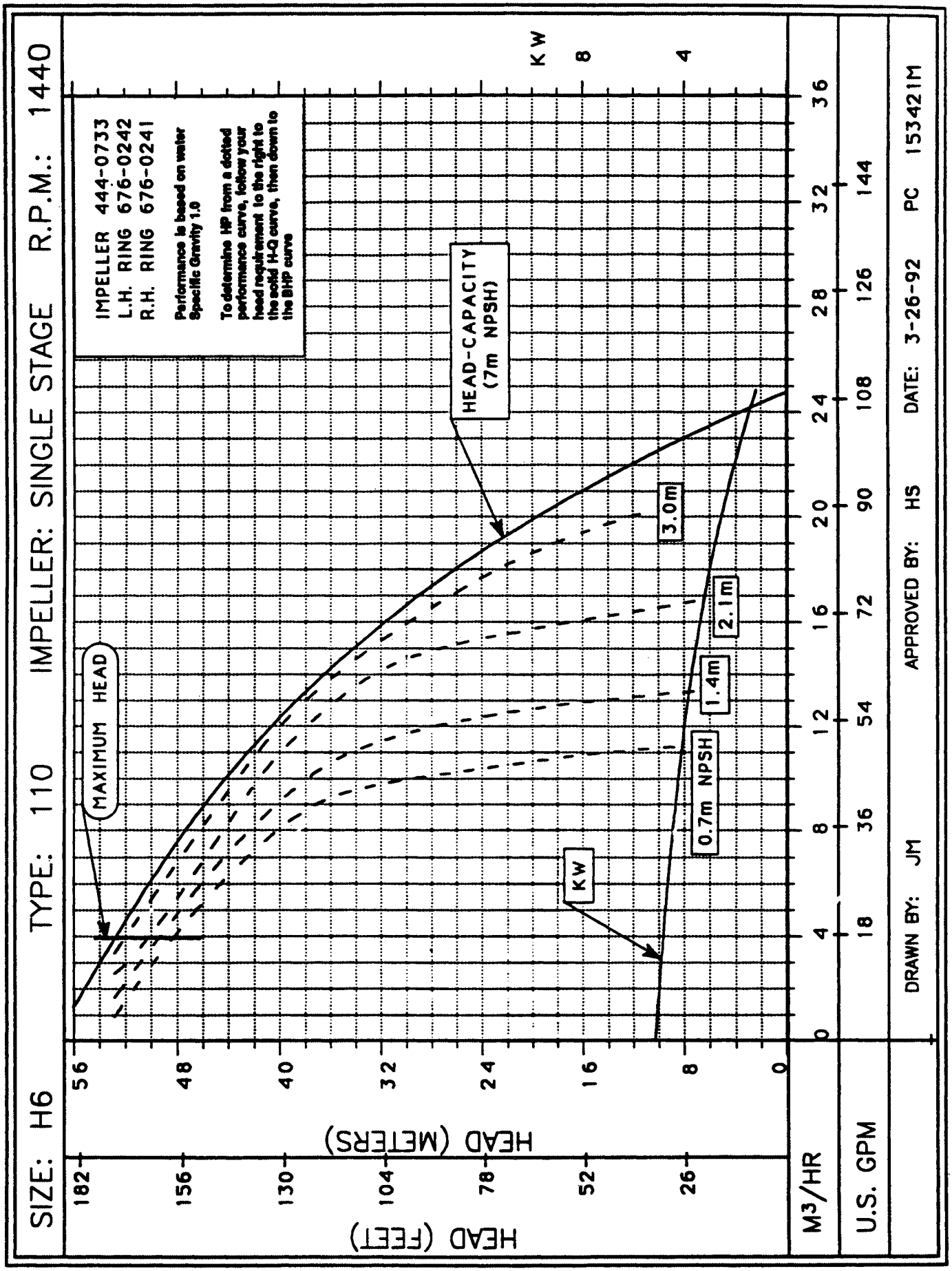
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

H6 - 1440 RPM
SINGLE STAGE IMPELLER

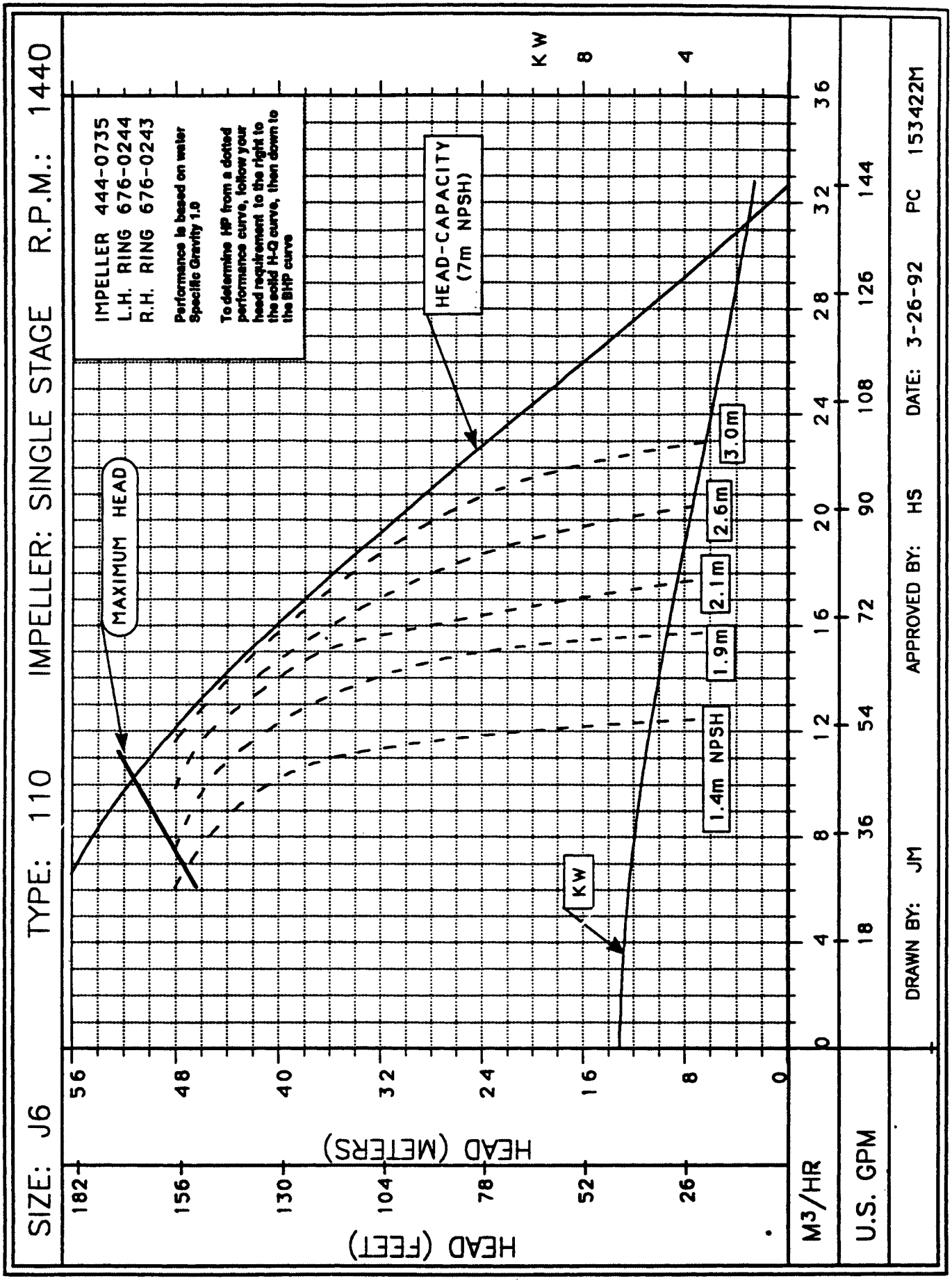
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J6 - 1440 RPM
SINGLE STAGE IMPELLER

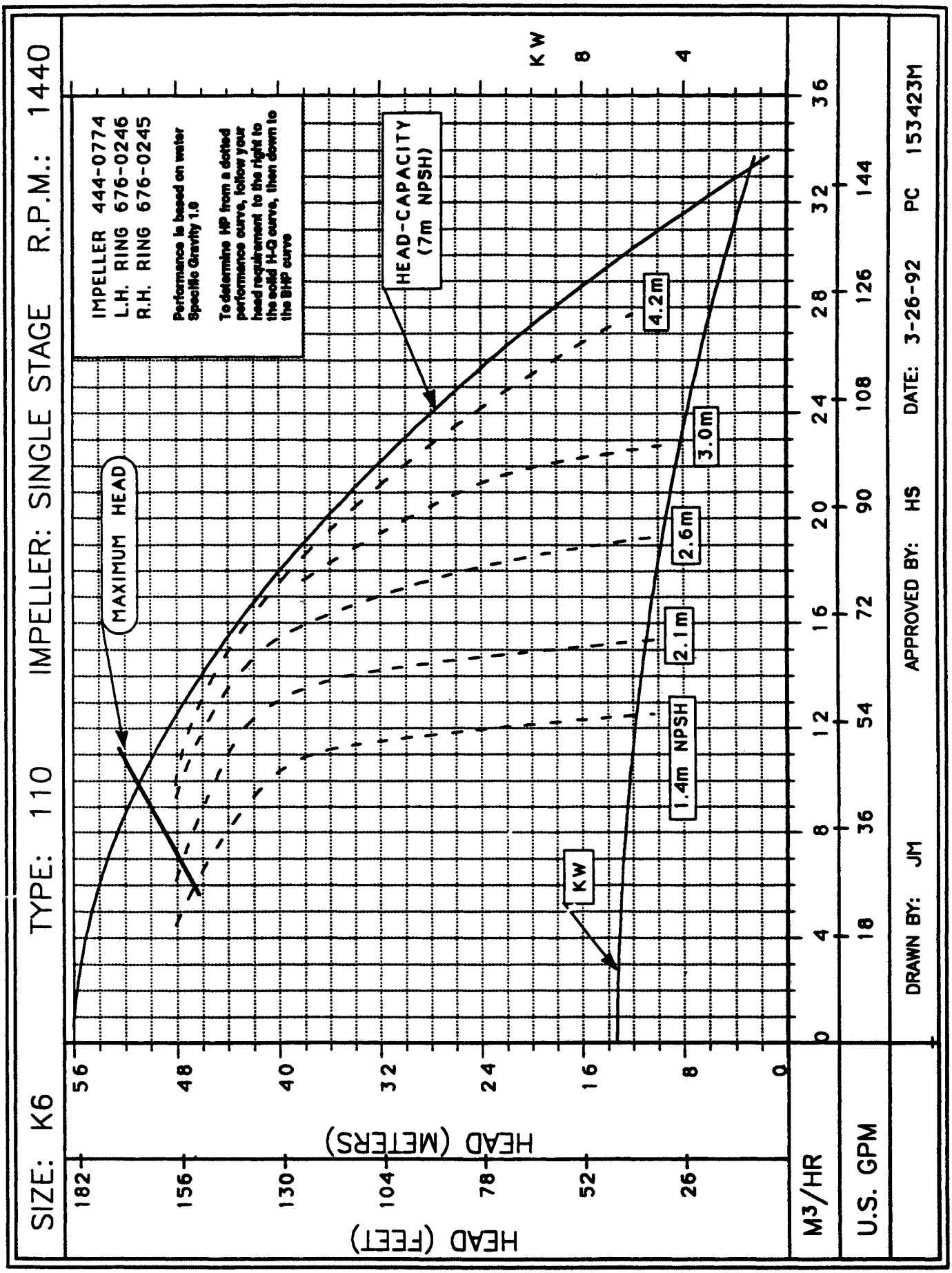
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

K6 - 1440 RPM
SINGLE STAGE IMPELLER

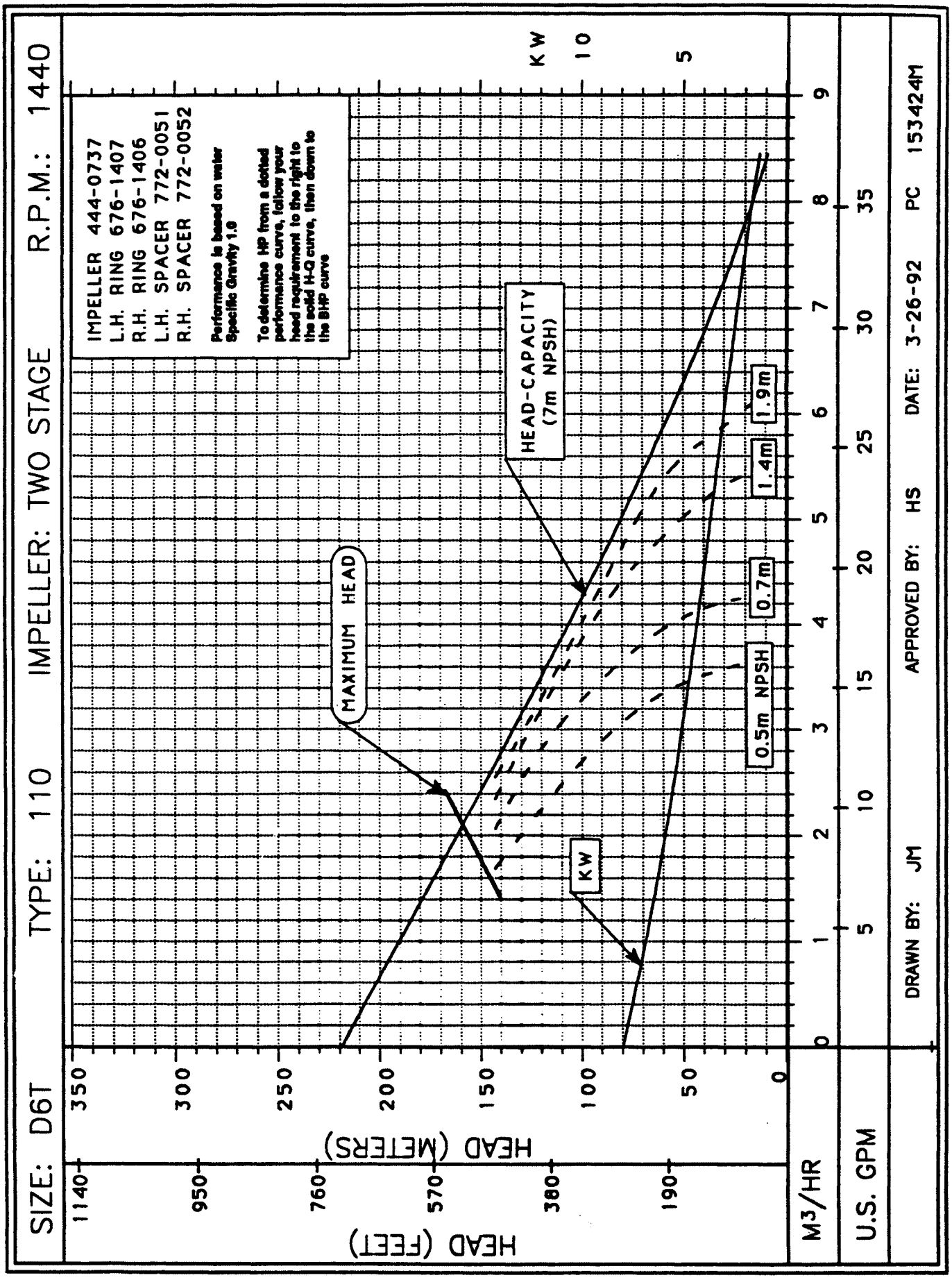
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D6T - 1440 RPM
TWO STAGE IMPELLER

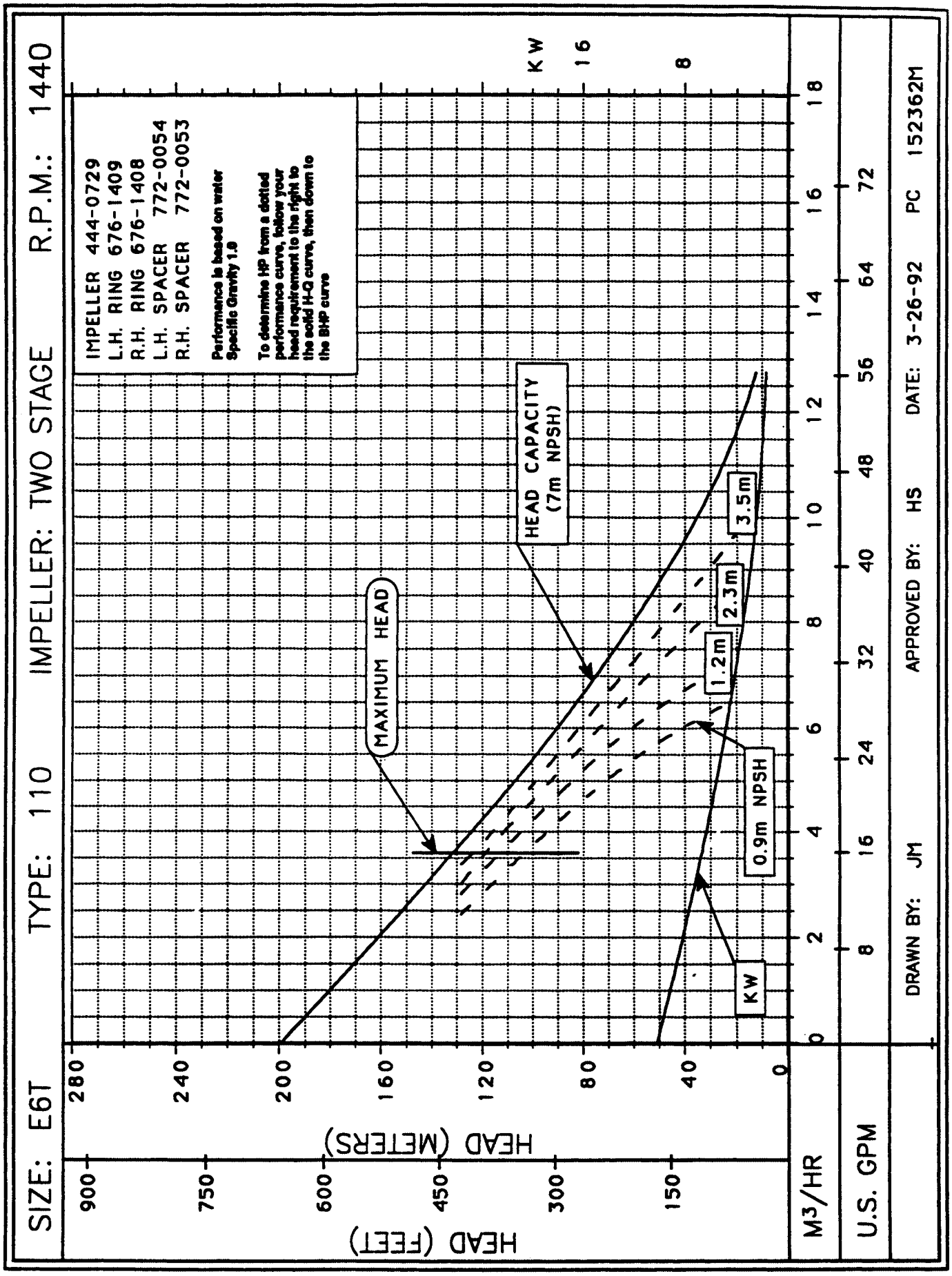
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

E6T - 1440 RPM
TWO STAGE IMPELLER

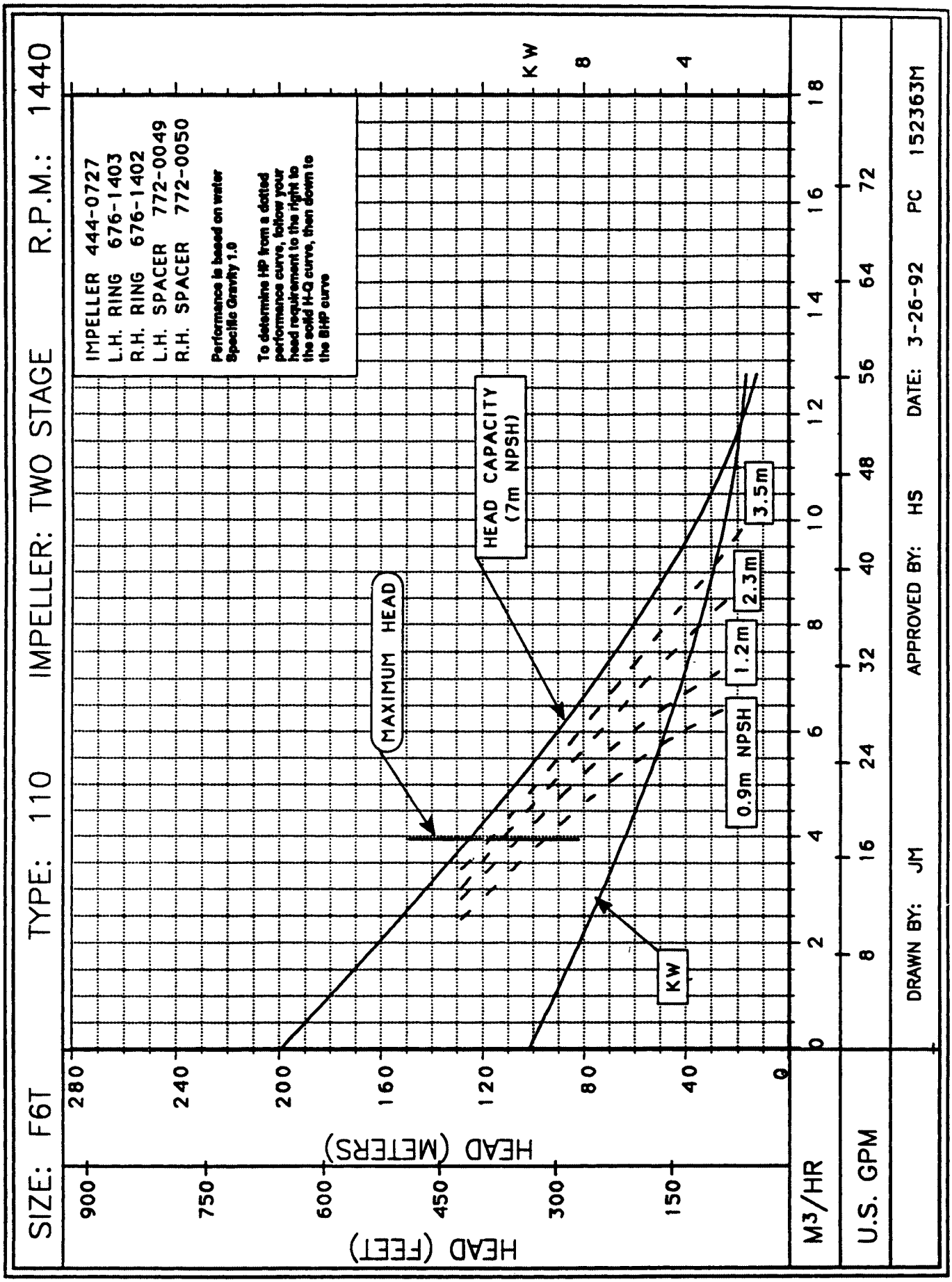
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F6T - 1440 RPM
TWO STAGE IMPELLER

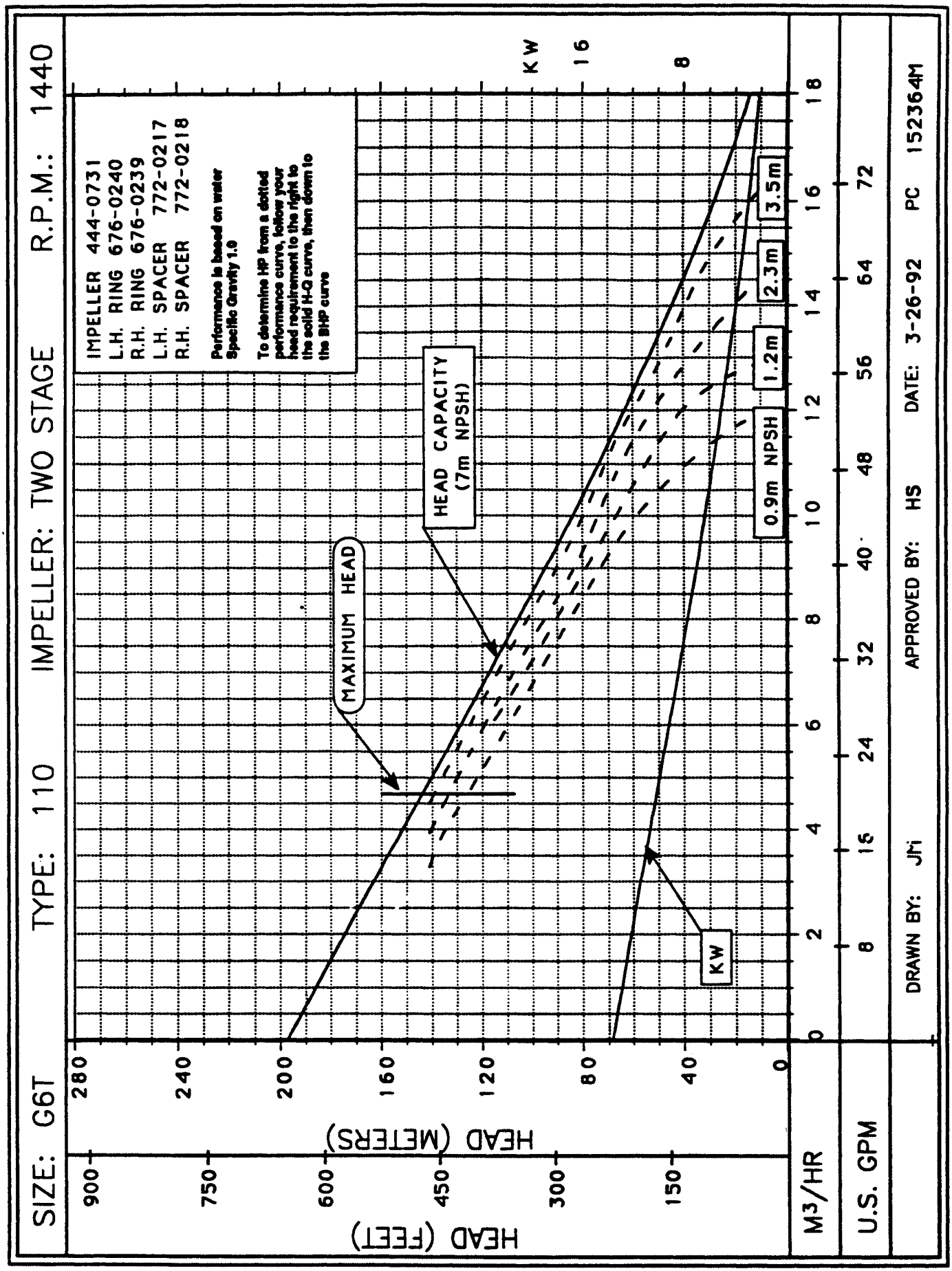
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

G6T - 1440 RPM
TWO STAGE IMPELLER

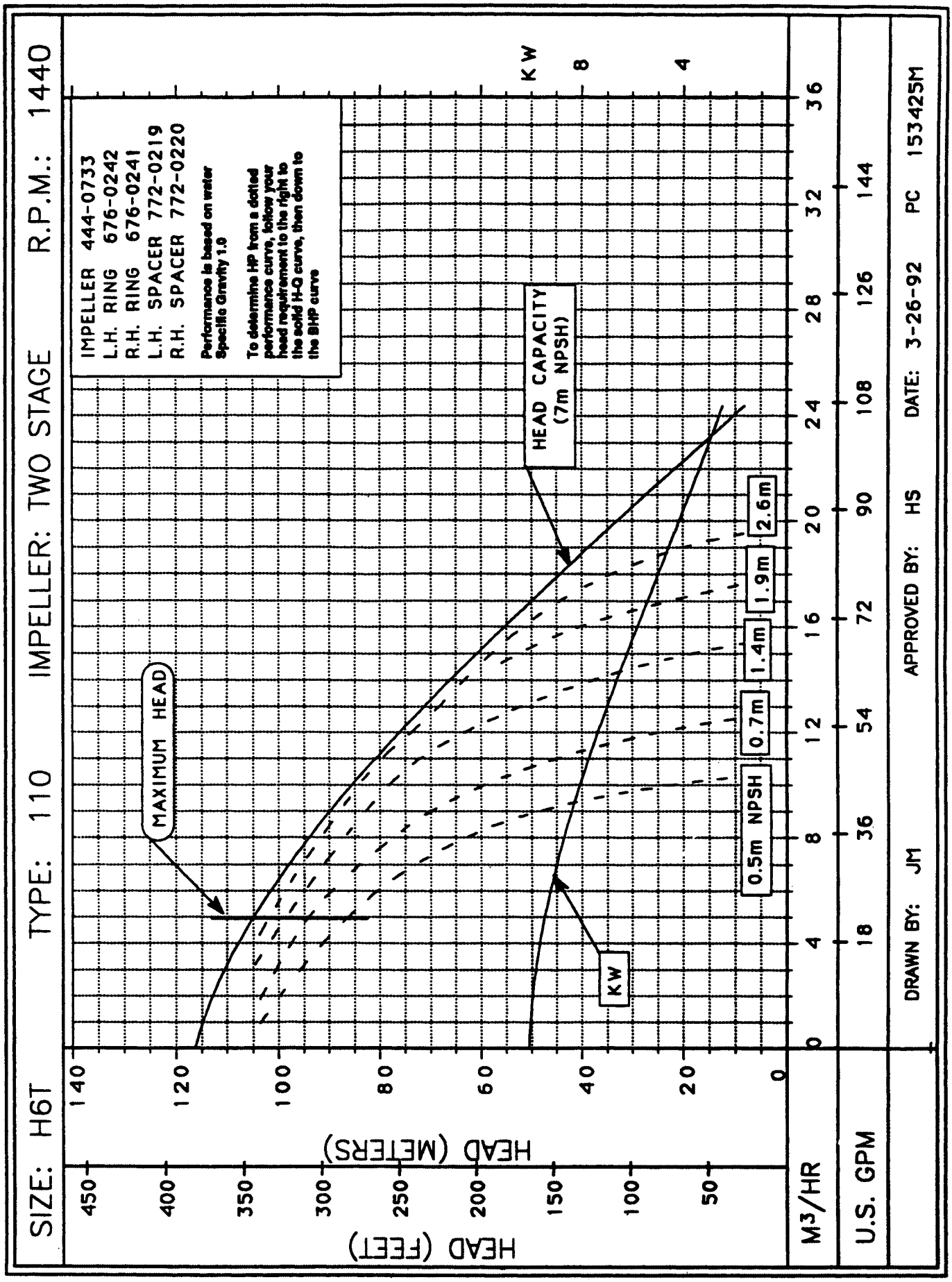
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H6T - 1440 RPM
TWO STAGE IMPELLER

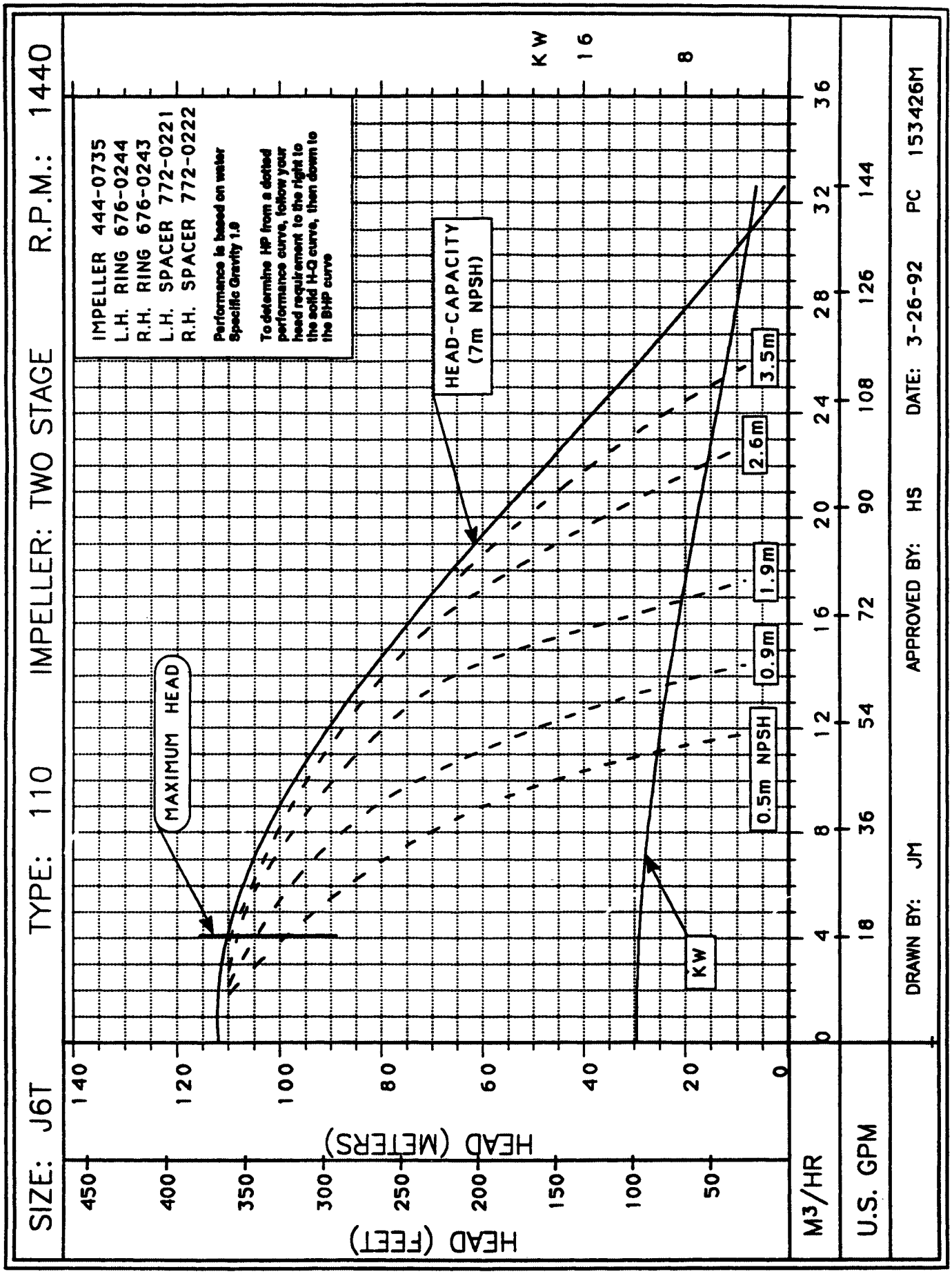
SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

J6T - 1440 RPM
TWO STAGE IMPELLER

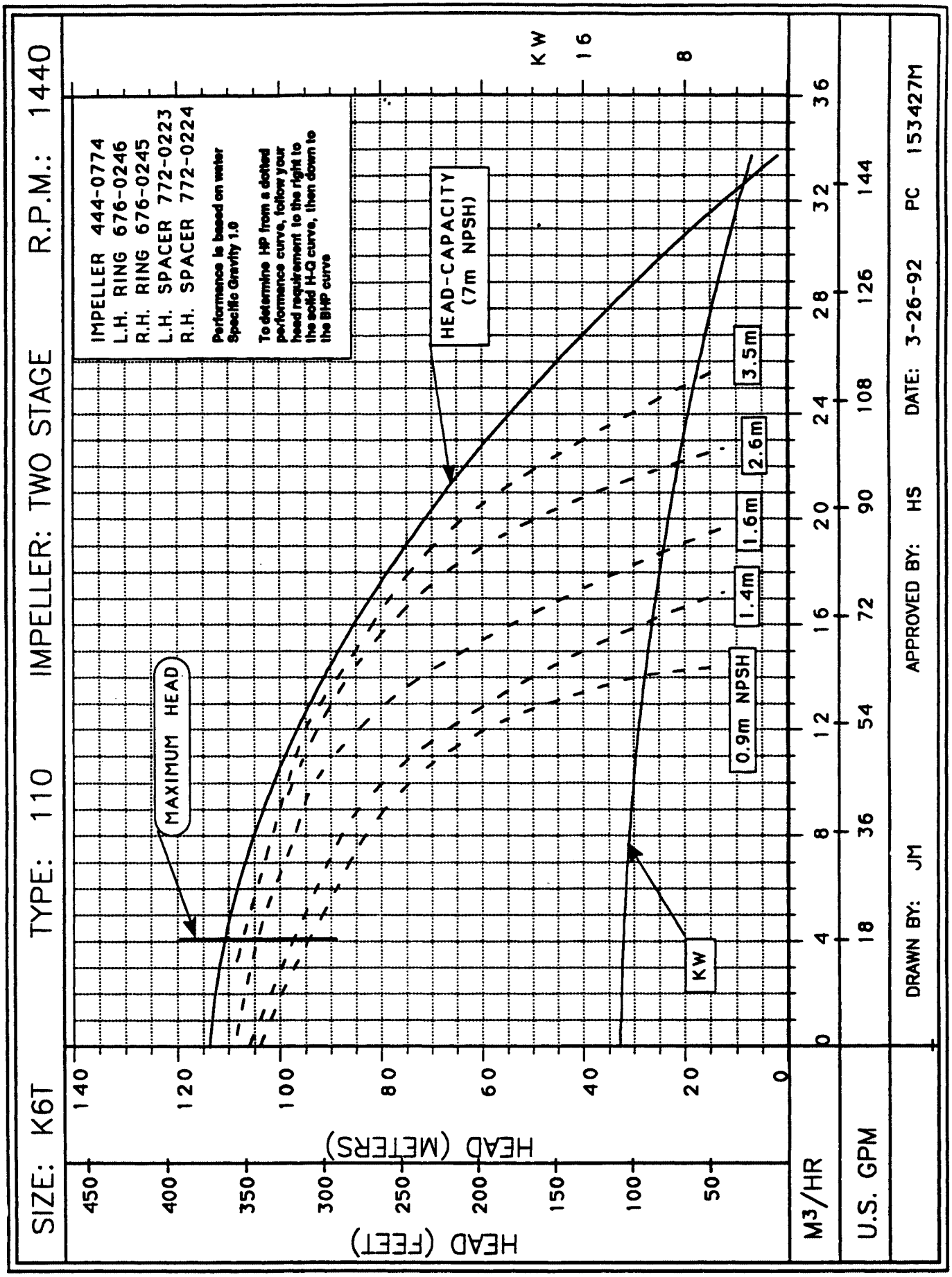
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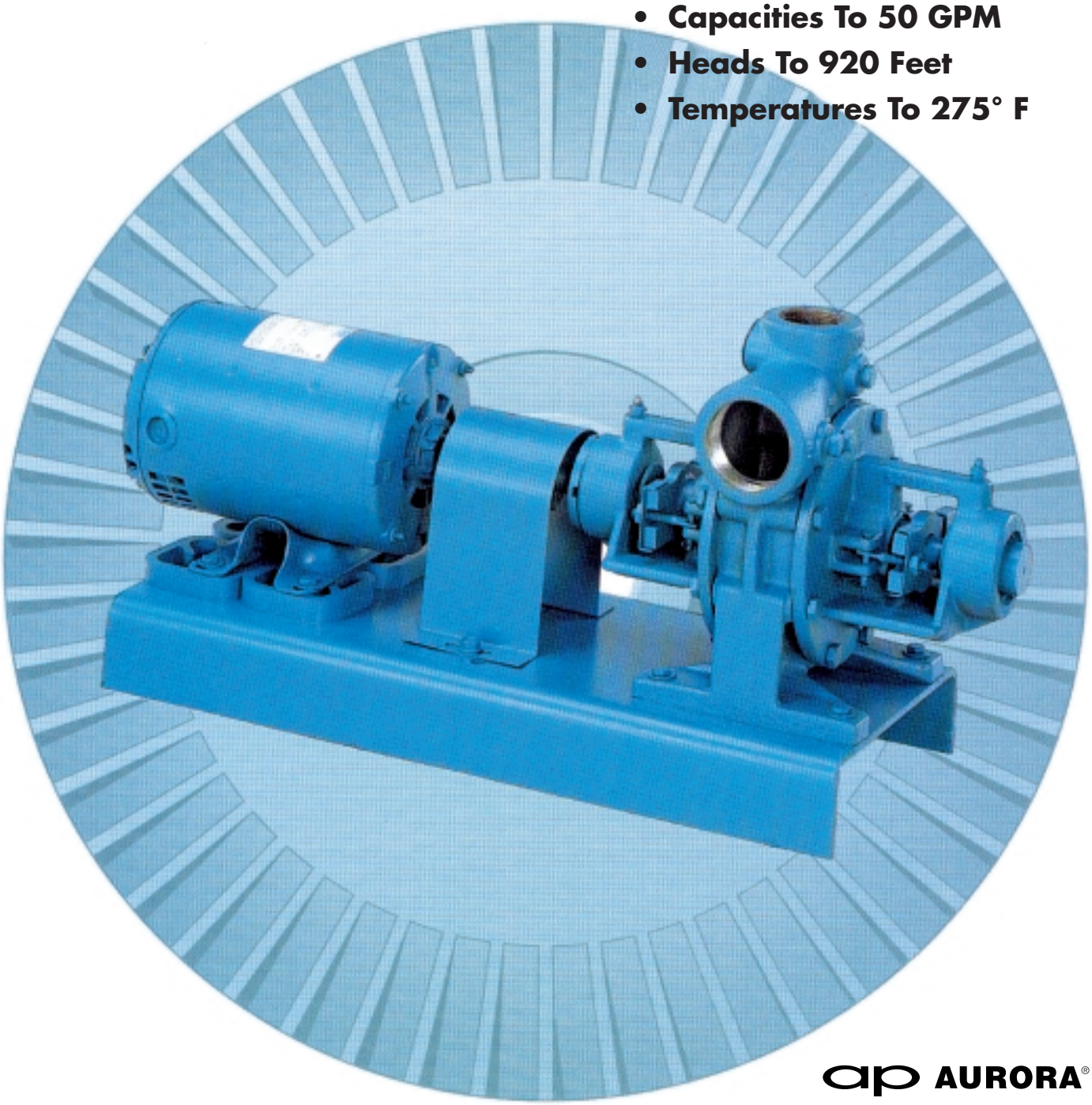
K6T - 1440 RPM
TWO STAGE IMPELLER

SECTION 110 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



120B Series "APCO"
One & Two Stage Turbine Type Pumps

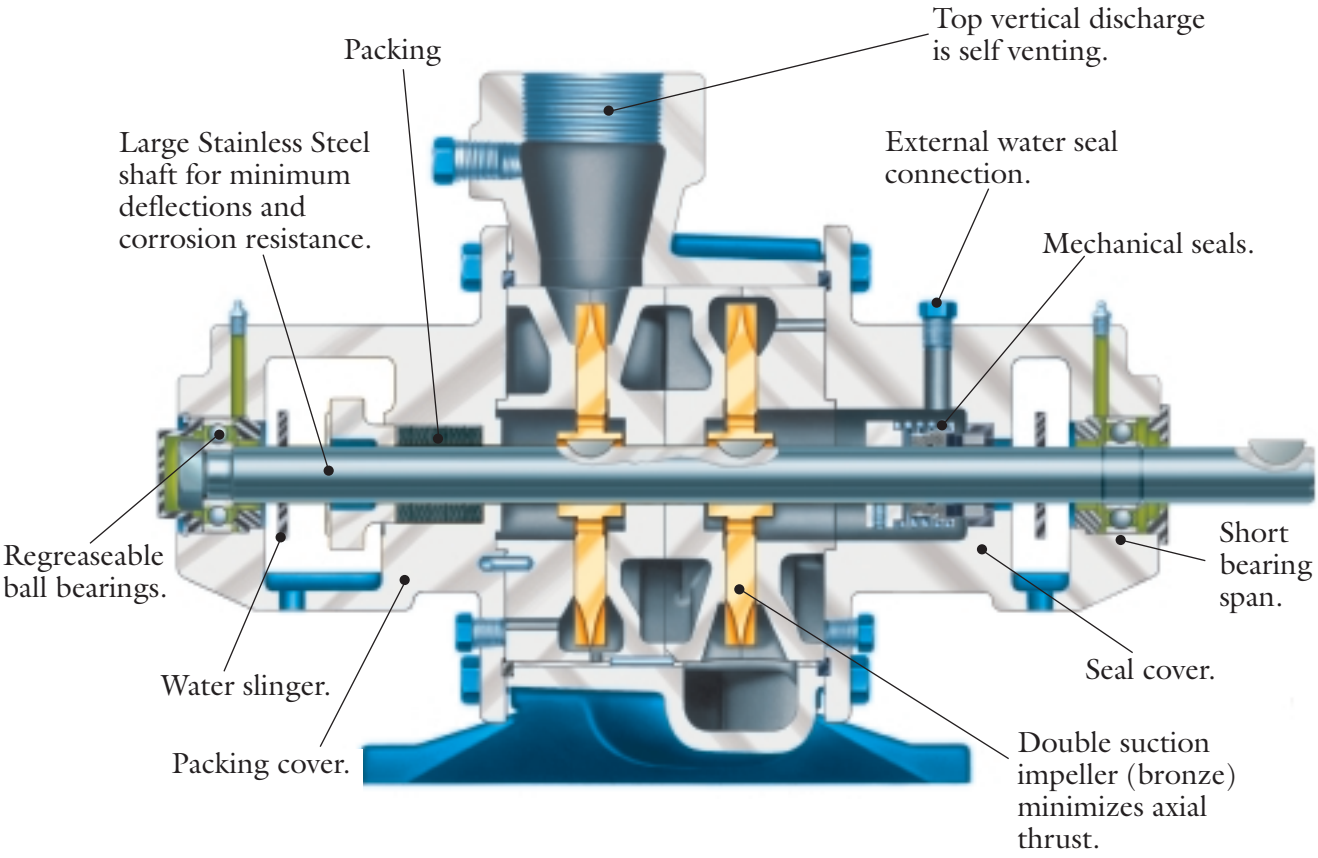
- **Capacities To 50 GPM**
- **Heads To 920 Feet**
- **Temperatures To 275° F**



AURORA®

PENTAIR PUMP GROUP

120B Series Pumps



Typical Two-Stage Unit Shown

Applications

- Boiler Feed
- Condensate Return
- Cooling Systems
- High Pressure Spray
- Booster Systems
- Jockey Pumps
- Chlorine Injection
- Chemical Feed Systems
- Laundry and Dry Cleaning Systems
- Laser Cooling
- Electrostatic Discharge Machines
- TV Tube and CRT Manufacturing
- Car Washes

Benefits

- Reliability
- Years of Field-Proven Service
- Reduce Energy Consumption
- Trouble-free Operation
- High Performance
- Save Space
- Versatility
- Complete Technical Support
- Low Flow/High Head Capabilities

Introduction

Apco regenerative turbine pumps are field-proven throughout the world. Apco pumps are ideal for handling: (1) high head/low flow requirements, (2) liquids entrained with gases and vapors (up to 20%), and (3) constant flows.

You are assured of reliable pumping service because every Apco is tested to insure consistent performance.

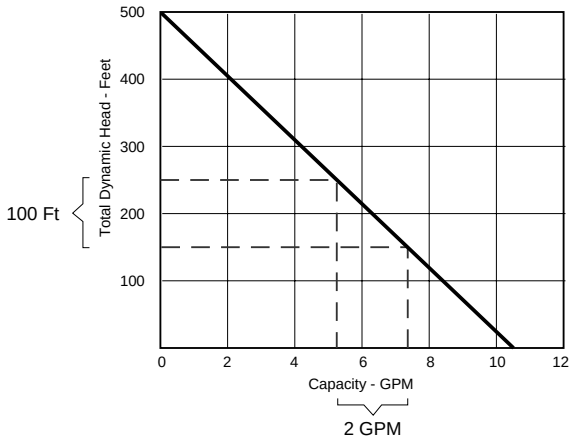
Apco pumps are designed for those special applications where high head and low flow are required by the system. Boiler feed systems, for example, require high pressure to get low flows of water into the pressurized steam boiler.

Conventional centrifugal pumps, in contrast, must operate close to shut off or operate at high speed to meet these high head/low flow requirements. These mis-applications can cause high vibration, mechanical damage, frequent maintenance, and excessive energy use.

Apco pumps thrive in high head/low flow applications so you save on operating costs (less maintenance, downtime and energy costs).

Increase System Reliability with Constant Flow

Apco pumps assure constant flow when you need it. The steep performance curve allows for minimal changes in the capacity even with large pressure variations.



The curve above shows that with a 100 foot change in head, the capacity varies only 2 gallons per minute. You get a virtually constant flow over wide pressure variations to ensure reliable system operation.

The constant flow characteristics make the Apco ideal for cooling systems where it is vital that sufficient flow is maintained to dissipate heat despite changes in pressure.

Pressure variations occur for a number of reasons. The most common designed-in variations are caused by automatic pop-off valves and similar control devices.

With Apco pumps, you can always depend on the same capacity despite variations in head pressure and achieve increased system reliability.

The Apco pump line has the highest performance and broadest hydraulic coverage available.

Apco pumps provide capacities over 50 GPM and can produce up to 920 feet Total Dynamic Head. Apco case working pressure is up to 400 PSI.

With the Apco, you get greater performance to meet more applications in more demanding situations.

You save space with the compact Apco turbine pump. With the Apco, the bearing frame is integral to the pump.

To give you additional versatility, the Apco is available in all-iron construction.

You can match the right material for the media being pumped to ensure long, efficient pump life.

Aurora Pump provides complete technical application and installation support, complete warranty service, and ongoing engineering assistance for the life of the pump.

You can get Aurora Pumps and parts through a worldwide network of experienced distributors and branch offices, all backed by the factory for fast delivery.

Standard

Bronze fitted construction
Hydraulically balanced bronze impeller
Right or left hand rotation
Regreaseable ball bearings
Short bearing span
400# case working pressure
Mechanical seals or graphite impregnated acrylic packing
416 hardened stainless steel shaft
Floating impellers
Removable channel rings
VIP Test – Every pump is given a hydrostatic test at 1-1/2 times rated pressure along with a running test for head/capacity performance check.

Optional

All iron
316 stainless steel or monel shaft
External sealing line to stuffing box
Lantern ring
Formed steel or drip-rim bases
Bypass with manual shut-off valves
Bypass with relief valve
Self-priming features
Certified performance test data can be supplied consisting of head, capacity and horsepower readings taken over the full operating range of the pump.

Selection Charts

1750 R.P.M.

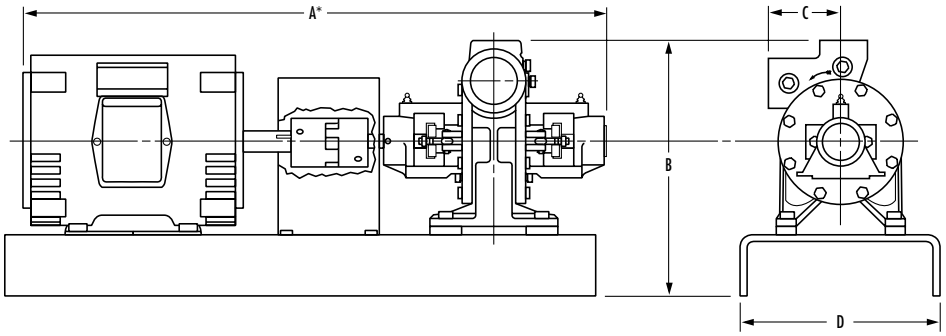
CAPACITY GPM	TOTAL DYNAMIC HEAD IN FEET																							
	10	20	30	40	50	60	70	80	100	115	130	145	160	180	200	220	240	260	280	300	350	400	450	500
2														EX4 3/4	FX4 1 1/2	FX4 1 1/2	FX4 1 1/2	GX4 2	GX4 3	GX4 3	EX4T 1 1/2	FX4T 3	GX4T 5	
4												EX4 3/4	FX4 1	FX4 1 1/2	GX4 2	GX4 2	GX4 2	EX4T 1 1/2	EX4T 1 1/2	FX4T 2	FX4T 3	GX4T 5		
6									EX4 1/2	FX4 1	FX4 1	FX4 1	FX4 1	GX4 1 1/2	GX4 1 1/2	EX4T 1	FX4T 1 1/2	FX4T 2	GX4T 3	GX4T 3	GX4T 3			
8							EX4 1/3	EX4 1/2	FX4 3/4	FX4 3/4	FX4 1	GX4 1	GX4 1 1/2	GX4 1 1/2	FX4T 1 1/2	GX4T 2	GX4T 2	GX4T 3	HX4T 3	HX4T 3	IX4T 5			
10			EX4 1/3	EX4 1/3	FX4 1/2	FX4 1/2	FX4 1/2	FX4 3/4	GX4 1	GX4 1	GX4 1	HX4 1 1/2	IX4 2	GX4T 1 1/2	GX4T 2	GX4T 3	HX4T 3	HX4T 3	HX4T 3	HX4T 3	IX4T 5				
12	EX4 1/3	EX4 1/3	FX4 1/3	FX4 1/3	FX4 1/2	GX4 3/4	GX4 3/4	GX4 3/4	GX4 3/4	HX4 1 1/2	HX4 1 1/2	IX4 1 1/2	IX4 2	GX4T 2	HX4T 3	HX4T 3	HX4T 3	HX4T 3	IX4T 5	IX4T 5				
14	FX4 1/3	FX4 1/3	FX4 1/3	GX4 1/2	GX4 1/2	GX4 1/2	GX4 3/4	GX4 3/4	HX4 1	HX4 1 1/2	IX4 1 1/2	IX4 1 1/2	HX4T 2	HX4T 2	HX4T 3	HX4T 3	HX4T 3	IX4T 3	IX4T 5	IX4T 5				
16	GX4 1/2	GX4 1/2	GX4 1/2	GX4 1/2	GX4 1/2	GX4 3/4	HX4 1	HX4 1	HX4 1	IX4 1	IX4 1 1/2	IX4T 2	HX4T 2	HX4T 2	HX4T 3	IX4T 3	IX4T 3	IX4T 3						
18	GX4 1/2	GX4 1/2	HX4 3/4	HX4 3/4	HX4 3/4	HX4 3/4	HX4 1	HX4 1	IX4 1 1/2	IX4 1 1/2	IX4 1 1/2	HX4T 2	HX4T 2	HX4T 2	IX4T 3	IX4T 3	IX4T 3							
20	HX4 1/2	HX4 1/2	HX4 3/4	HX4 3/4	HX4 3/4	HX4 3/4	HX4 1	IX4 1 1/2	IX4 1 1/2	HX4T 2	HX4T 2	HX4T 2	IX4T 3	IX4T 3	IX4T 3									
22	HX4 1/2	HX4 1/2	HX4 3/4	HX4 3/4	HX4 3/4	HX4 3/4	IX4 1	IX4 1 1/2	HX4T 1 1/2	HX4T 2	IX4T 2	IX4T 3	IX4T 3											
24	HX4 1/2	HX4 3/4	HX4 3/4	HX4 3/4	IX4 1	IX4 1	HX4T 1 1/2	HX4T 1 1/2	IX4T 2	IX4T 2														
26	HX4 1/2	HX4 3/4	HX4 3/4	HX4T 1	HX4T 1	HX4T 1 1/2	IX4T 2																	
28	HX4 1/2	HX4 3/4	HX4T 1	HX4T 1																				
30	HX4T 1																							

3500 R.P.M.

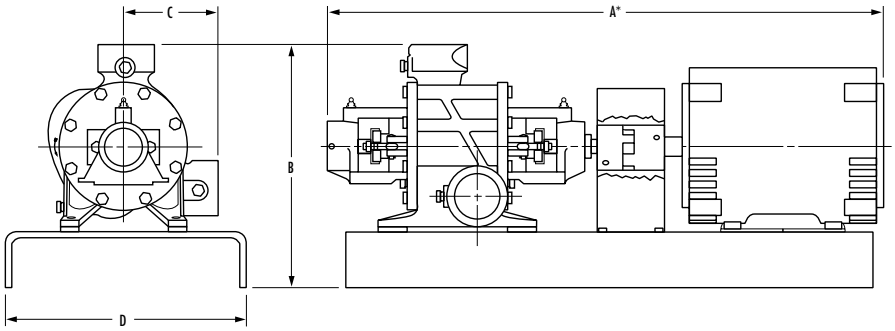
CAPACITY GPM	TOTAL DYNAMIC HEAD IN FEET																	
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	
5										EX4 5	EX4 7 1/2	EX4 7 1/2	EX4 7 1/2	EX4 7 1/2	EX4T 7 1/2	EX4T 7 1/2	EX4T 10	
10						EX4 3	EX4 5	EX4 5	EX4 5	EX4 5	FX4 7 1/2	FX4 7 1/2	FX4 10	EX4T 7 1/2	EX4T 7 1/2	EX4T 7 1/2	EX4T 7 1/2	
15		EX4 2	EX4 2	EX4 3	EX4 3	EX4 3	FX4 5	FX4 5	FX4 7 1/2	FX4 7 1/2	FX4T 10	FX4T 10	FX4T 10	FX4T 10	FX4T 10	FX4T 10		
20		EX4 2	FX4 3	FX4 3	FX4 3	FX4 5	FX4 5	GX4 7 1/2	GX4 7 1/2	GX4 10	GX4 10	GX4 10	GX4T 15	GX4T 15	GX4T 15			
25	FX4 3	FX4 3	FX4 3	GX4 5	GX4 5	GX4 5	GX4 7 1/2	GX4 7 1/2	GX4 7 1/2	HX4 10	GX4T 10	GX4T 15	GX4T 15	GX4T 15				
30	FX4 3	GX4 3	GX4 5	GX4 5	GX4 5	GX4 5	HX4 10	HX4 10	GX4T 10	GX4T 10	GX4T 10	HX4T 15	HX4T 15	HX4T 15				
35	GX4 3	GX4 3	GX4 3	HX4 7 1/2	HX4 7 1/2	HX4 7 1/2	IX4 10	IX4 10	HX4T 10	HX4T 15	HX4T 15	HX4T 15	HX4T 15					
40	HX4 5	HX4 5	HX4 5	HX4 7 1/2	HX4 7 1/2	IX4 10	IX4 10	IX4 10	HX4T 15	HX4T 15	HX4T 15							
45	HX4 5	HX4 5	HX4 5	IX4 10	IX4 10	IX4 10												
50	HX4 5	IX4 7 1/2	IX4 7 1/2	IX4 7 1/2														
55	IX4 7 1/2																	

Dimensions

Single Stage



Two Stage



*May vary with motor manufacturer.

Single Stage Pump

MOTOR FRAME	A	B	C	D
56	26 11/16	12	4	9
143T	24 11/16	12	4	9
145T	25 11/16	12	4	9
182T	26 13/16	12 1/2	4	10
184T	27 13/16	12 1/2	4	10
213T	29 15/16	13 5/8	4	12
215T	31 15/16	13 5/8	4	12
254T	35 3/16	15 5/8	4	13
256T	37 3/16	15 5/8	4	13

Two Stage Pump

MOTOR FRAME	A	B	C	D
143T	26 11/16	12 1/8	5	10
145T	27 11/16	12 1/8	5	10
182T	28 13/16	12 7/8	5	12
184T	29 13/16	12 7/8	5	12
213T	31 15/16	13 5/8	5	12
215T	33 15/16	13 5/8	5	12
254T	37 3/16	15 5/8	5	13
256T	39 3/16	15 5/8	5	13

PUMP SIZE	MAXIMUM DIFFERENTIAL PRES. P.S.I.	MAXIMUM H.P.	
		3500 R.P.M.	1750 R.P.M.
EX4	300	25	7 1/2
EX4T	400		
FX4	300		
FX4T	400		
GX4	300		
GX4T	325		
HX4	225		
HX4T	300		
IX4	175		
IX4T	190		

MOTOR FRAME	HORSEPOWER		MOTOR WEIGHT IN LBS.
	3500 RPM	1750 RPM	
56	—	1/2	50
56	—	3/4	50
143T	1 1/2	1	30
145T	2	1 1/2	35
145T	3	2	35
182T	5	3	45
184T	7 1/2	5	50
213T	10	7 1/2	120
215T	15	—	144
254T	20	—	217
256T	25	—	246

Engineering Specifications

The contractor shall furnish (and install as shown on the plans) an Apco regenerative turbine type pump model……size…… (Bronze Fitted) (All Iron). Each pump shall have a capacity of…… G.P.M. when operating at a total head of……feet at the specified temperature, viscosity, specific gravity, and NPSH. The speed of the pump shall not exceed…… R.P.M. The pump is to be furnished with (packing) (mechanical seals). The pump shall be of vertically split case design with removable bearing housings and the channel rings shall be replaceable without replacing the bearing housings. The suction and discharge connections shall be cast integral with the casing. The discharge shall be in a vertical position and the pump shall be self-venting. The casing and bearing housings shall be cast of 30,000 pound tensile strength cast iron. The impeller(s) shall be located on the stainless steel shaft between grease lubricated ball bearings. The impeller shall be hydraulically self-centering and no external adjustment shall be necessary. Each pump shall be tested prior to shipment. The pump shall be mounted on a (steel) baseplate and flexibly coupled to a……HP…… phase…… Hertz……voltage…… R.P.M., horizontal (drip-proof) (totally enclosed) (explosion proof) motor. The motor shall be sized to prevent overloading at the highest head condition listed in the specifications.

NOTES:
1. Dimensions and weights are approximate.
2. All dimensions are in inches and may vary ±1/8".
3. Frame sizes and motor weight are for open drip-proof motors only.
4. Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
5. Not for construction purposes unless certified.

Design Detail

AREA	DIMENSIONS	120 SERIES PUMP MODEL	
		EX4 THRU IX4	EX4T THRU IX4T
STUFFING BOX	PACKING RINGS PER BOX	7	8
	PACKING SIZE (SQUARE)	1/4"	1/4"
SHAFT	OUTSIDE DIA. OF SHAFT	.787	.787
BALL BEARINGS	INBOARD RADIAL	204K	204K
	OUTBOARD THRUST	303K	303K

Description	Material of Construction
Retainer	Nylon
Bearing Covers	Cast Iron — ASTM A48
Casing	Cast Iron — ASTM A48
Channel Rings	Cast Iron — ASTM A48
Glands	Cast Iron — ASTM A48
Impellers	Bronze — ASTM B62
Packing	Graphited Teflon Fiber
Shaft	Stainless Steel — AISI 416

Limitations

Max. hydrostatic test pressure ..... 600 P.S.I.
Max. case working pressure ..... 400 P.S.I.
Max. suction pressure ..... 175 P.S.I.
Max. recommended packing box pressure ..... 100 P.S.I.
Max. recommended mechanical seal chamber pressure ..... 250 P.S.I.
Box or seal chamber pressure equals – single stage: suction pressure plus 60% differential pressure. Two stage: 1st stage equals – suction pressure plus 30% differential, 2nd stage equals – suction pressure plus 80% differential.
Max. temperatures
*Packing ..... 275° F
Std. mechanical seal ..... 225° F
Hi-temp mechanical seal ..... 275° F
*Packing ..... Suction lift requires lantern ring.

NOTE: 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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EMAIL: aurora_info@pentairpump.com

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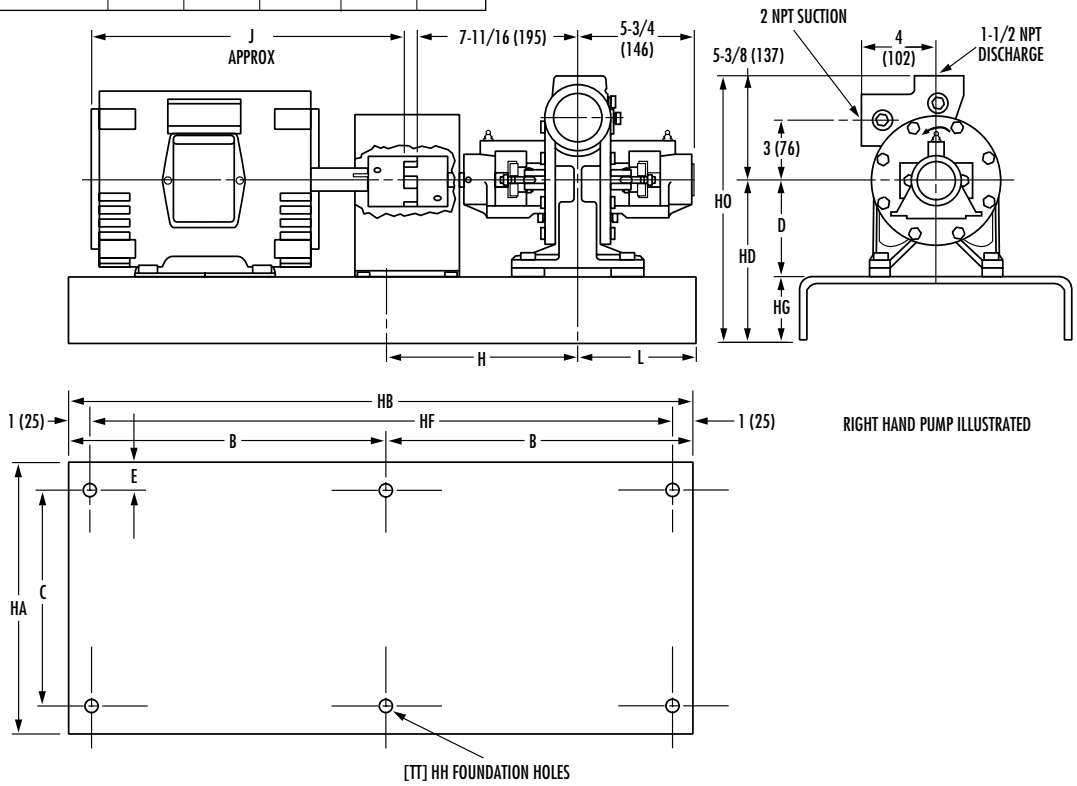
AURORA® Pentair Pump Group

AP-120B/Rev. A 2.93

AURORA MODEL 120 SERIES

MODEL 121B SINGLE STAGE
APCO PUMPS ON STEEL BASE

PUMP MODELS	EX4	FX4	GX4	HX4	IX4



RIGHT HAND PUMP ILLUSTRATED

MOTOR FRAME	B	C	D	E	H	J	L	HA	HB	HD	HF	HG	HH	HO	TT
56	10-1/2 (267)	7 (178)	4-1/8 (105)	1 (25)	6-7/16 (164)	13 (330)	4-1/16 (103)	9 (229)	21 (533)	6-5/8 (168)	-	2-1/2 (64)	1/2 (13)	12 (305)	2
143T	12 (305)	7 (178)	4-1/8 (105)	1 (25)	7-15/16 (202)	11 (279)	4-1/16 (103)	9 (229)	24 (610)	6-5/8 (168)	-	2-1/2 (64)	1/2 (13)	12 (305)	2
145T	12 (305)	7 (178)	4-1/8 (105)	1 (25)	7-15/16 (202)	12 (305)	4-1/16 (103)	9 (229)	24 (610)	6-5/8 (168)	-	2-1/2 (64)	1/2 (13)	12 (305)	2
182T	12 (305)	7 (178)	4-1/2 (114)	1-1/2 (38)	7-15/16 (202)	13 (330)	4-1/16 (103)	10 (254)	24 (610)	7-1/8 (181)	-	2-5/8 (67)	5/8 (16)	12-1/2 (318)	2
184T	13 (330)	7 (178)	4-1/2 (114)	1-1/2 (38)	8-15/16 (227)	14 (356)	4-1/16 (103)	10 (254)	26 (660)	7-1/8 (181)	-	2-5/8 (67)	5/8 (16)	12-1/2 (318)	2
213T	15 (381)	9 (229)	5-1/4 (133)	1-1/2 (38)	10-15/16 (278)	16 (406)	4-1/16 (103)	12 (305)	30 (762)	8-1/4 (210)	-	3 (76)	5/8 (16)	13-5/8 (346)	2
215T	15 (381)	9 (229)	5-1/4 (133)	1-1/2 (38)	10-15/16 (278)	18 (457)	4-1/16 (103)	12 (305)	30 (762)	8-1/4 (210)	-	3 (76)	5/8 (16)	13-5/8 (346)	2
254T	-	10 (254)	6-1/4 (159)	1-1/2 (38)	-	21 (533)	4-1/16 (103)	13 (330)	38 (965)	10-1/4 (260)	36 (914)	4 (102)	3/4 (19)	15-5/8 (397)	4
256T	-	10 (254)	6-1/4 (159)	1-1/2 (38)	-	23 (584)	4-1/16 (103)	13 (330)	38 (965)	10-1/4 (260)	36 (914)	4 (102)	3/4 (19)	15-5/8 (397)	4

NOTES:

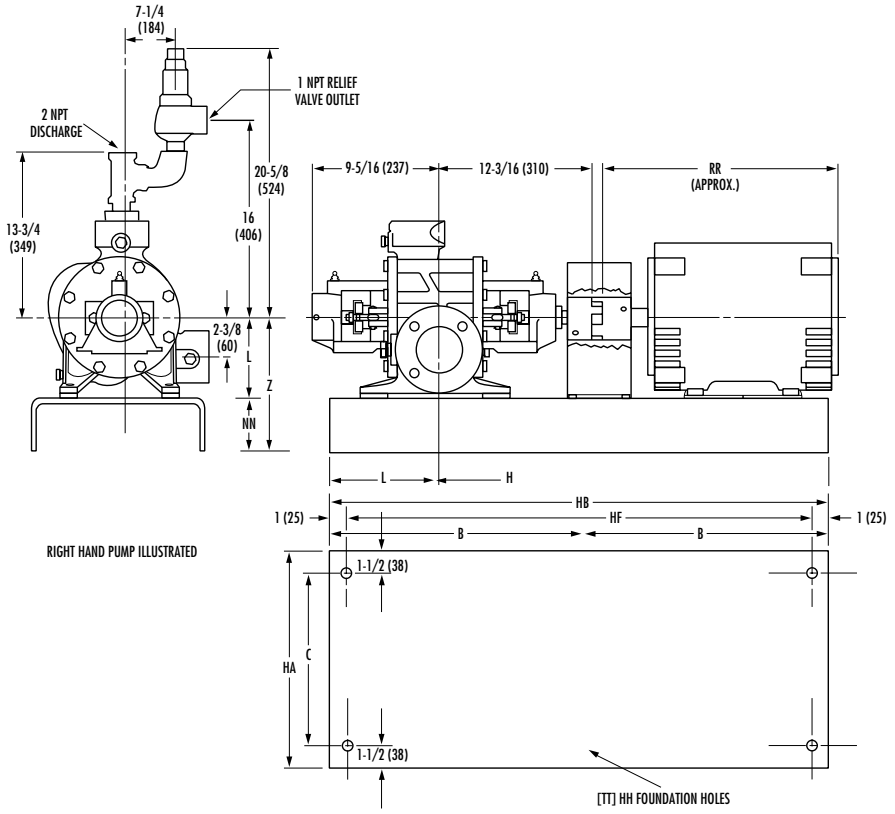
1. All dimensions in inches (mm).
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is shown in approximate location. Capacitor, when furnished, normally appears on top of motor. Dimensions are not specified as they vary with each motor manufacturer.

Supersedes Section 120 Page 252
Dated FEBRUARY 1999

AURORA MODEL 120 SERIES

MODEL 122B TWO STAGE
APCO PUMPS ON STEEL BASE

PUMP MODELS	EX4T	FX4T	GX4T	HX4T	IX4T



MOTOR FRAME	B	C	D	H	J	L	HA	HB	HD	HF	HG	HH	HO	TT
143T	13 (330)	7 (178)	4-1/8 (105)	9 (229)	11 (279)	4-1/16 (103)	10 (254)	26 (660)	6-3/4 (171)	-	2-5/8 (67)	5/8 (16)	12-1/8 (308)	2
145T	13 (330)	7 (178)	4-1/8 (105)	9 (229)	12 (305)	4-1/16 (103)	10 (254)	26 (660)	6-3/4 (171)	-	2-5/8 (67)	5/8 (16)	12-1/8 (308)	2
182T	13-1/2 (343)	9 (229)	4-1/2 (114)	9-7/16 (240)	13 (330)	4-1/16 (103)	12 (305)	27 (686)	7-1/2 (191)	-	3 (76)	5/8 (16)	12-7/8 (327)	2
184T	13-1/2 (343)	9 (229)	4-1/2 (114)	9-7/16 (240)	14 (356)	4-1/16 (103)	12 (305)	27 (686)	7-1/2 (191)	-	3 (76)	5/8 (16)	12-7/8 (327)	2
213T	15 (381)	9 (229)	5-1/4 (133)	10-15/16 (278)	16 (406)	4-1/16 (103)	12 (305)	30 (762)	8-1/4 (210)	-	3 (76)	5/8 (16)	13-5/8 (346)	2
215T	15 (381)	9 (229)	5-1/4 (133)	10-15/16 (278)	18 (457)	4-1/16 (103)	12 (305)	30 (762)	8-1/4 (210)	-	3 (76)	5/8 (16)	13-5/8 (346)	2
254T	-	10 (254)	6-1/4 (159)	-	21 (533)	4-1/16 (103)	13 (330)	38 (965)	10-1/4 (260)	36 (914)	4 (102)	3/4 (19)	15-5/8 (397)	4
256T	-	10 (254)	6-1/4 (159)	-	23 (584)	4-1/16 (103)	13 (330)	38 (965)	10-1/4 (260)	36 (914)	4 (102)	3/4 (19)	15-5/8 (397)	4

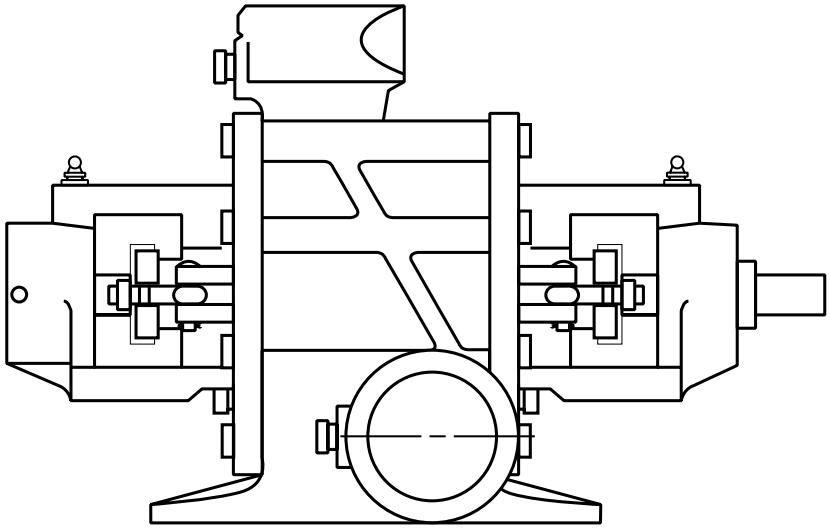
NOTES:

1. All dimensions in inches (mm)
2. Dimensions may vary ± 1/8" (3).
3. Not for construction purposes unless certified.
4. Coupling gap may vary 1/8" (3) to 1" (25).
5. Conduit box is located on the opposite side of the motor shown.
   Capacitor, when furnished, normally appears on top of motor.
   Dimensions are not specified as they vary with each motor manufacturer.

AURORA®
Pentair Pump Group

SUPERSEDES 120P PAGE 1
DATED JULY 1992

120B SERIES
REPAIR PARTS INDEX



MODELS:
121B Single-Stage
122B Two-Stage

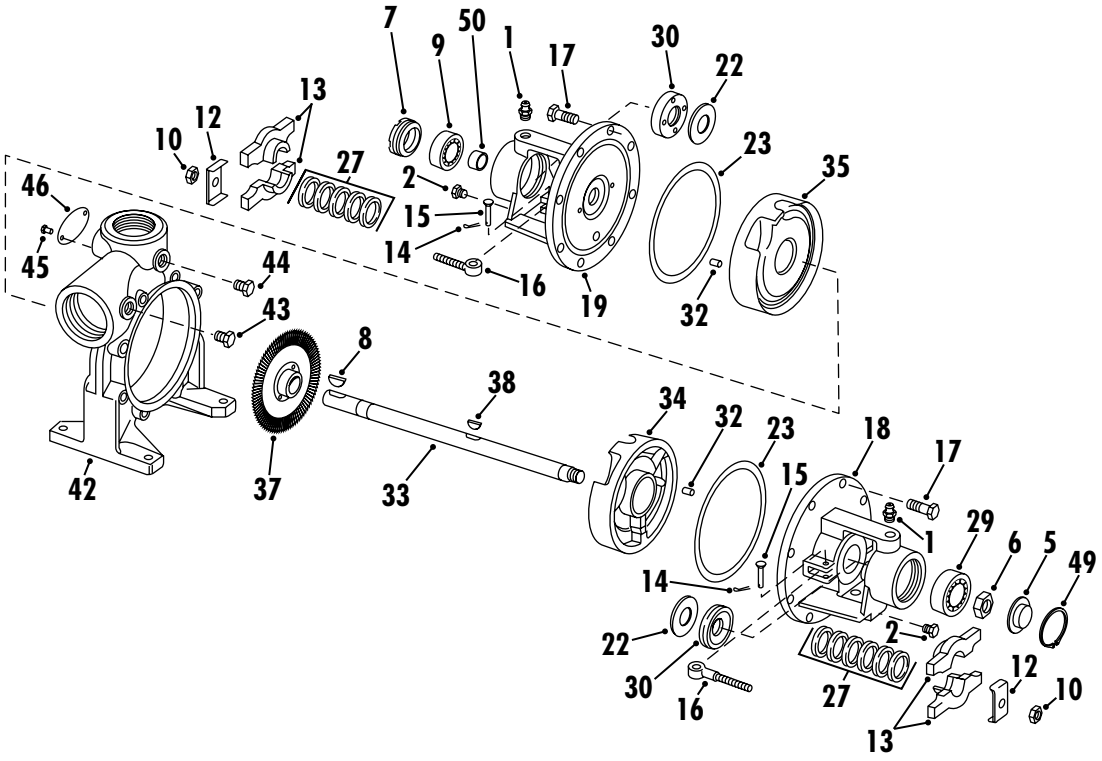
PUMP SIZES:
EX4 thru IX4
EX4T thru IX4T

READ AND UNDERSTAND THE PUMP AND MOTOR INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL, DISASSEMBLE OR REPAIR THE PUMP

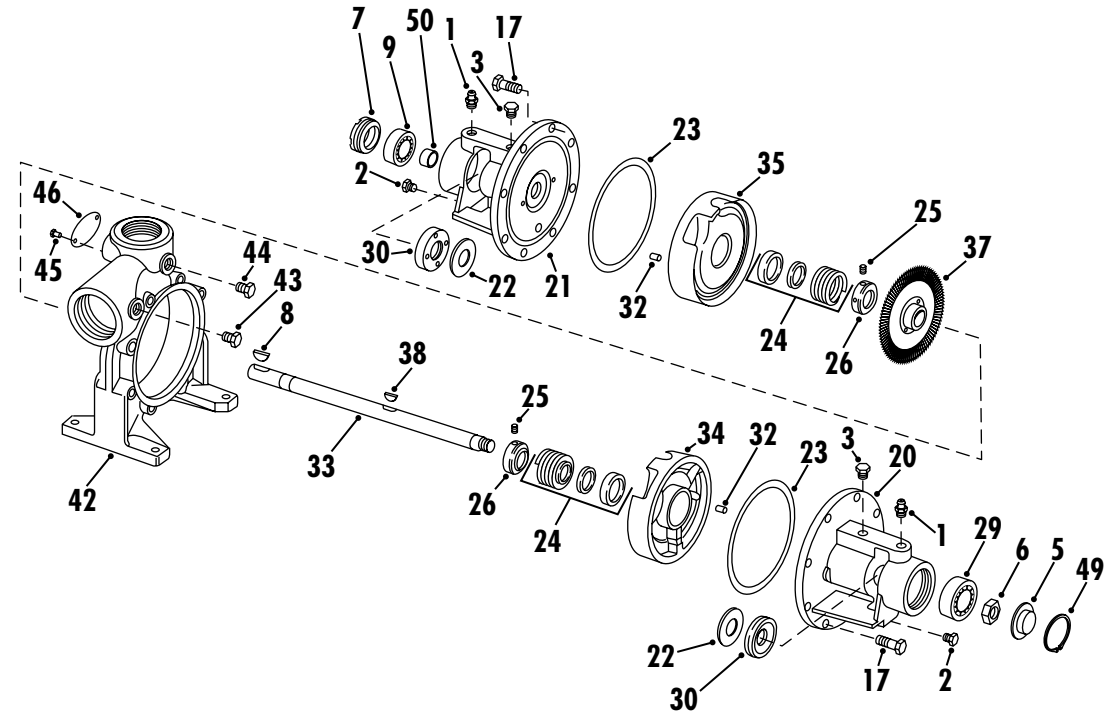
AURORA®
PENTAIR PUMP GROUP

120B SERIES

MODEL 121B
PIECE NUMBERS

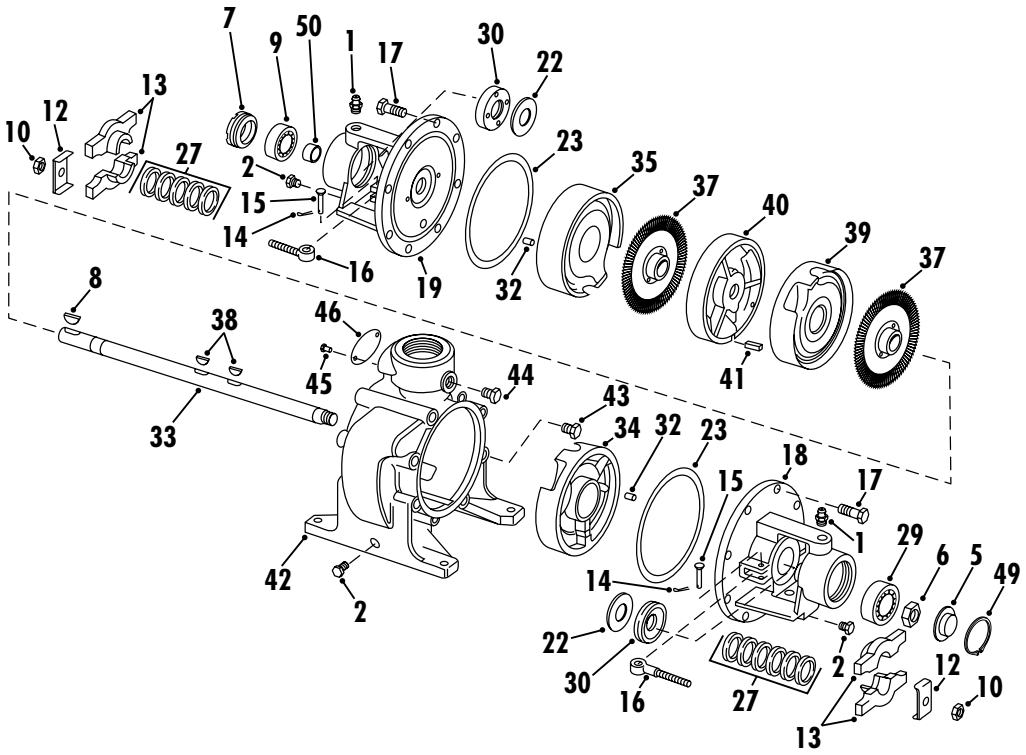


MODEL 121B - SINGLE STAGE WITH PACKING

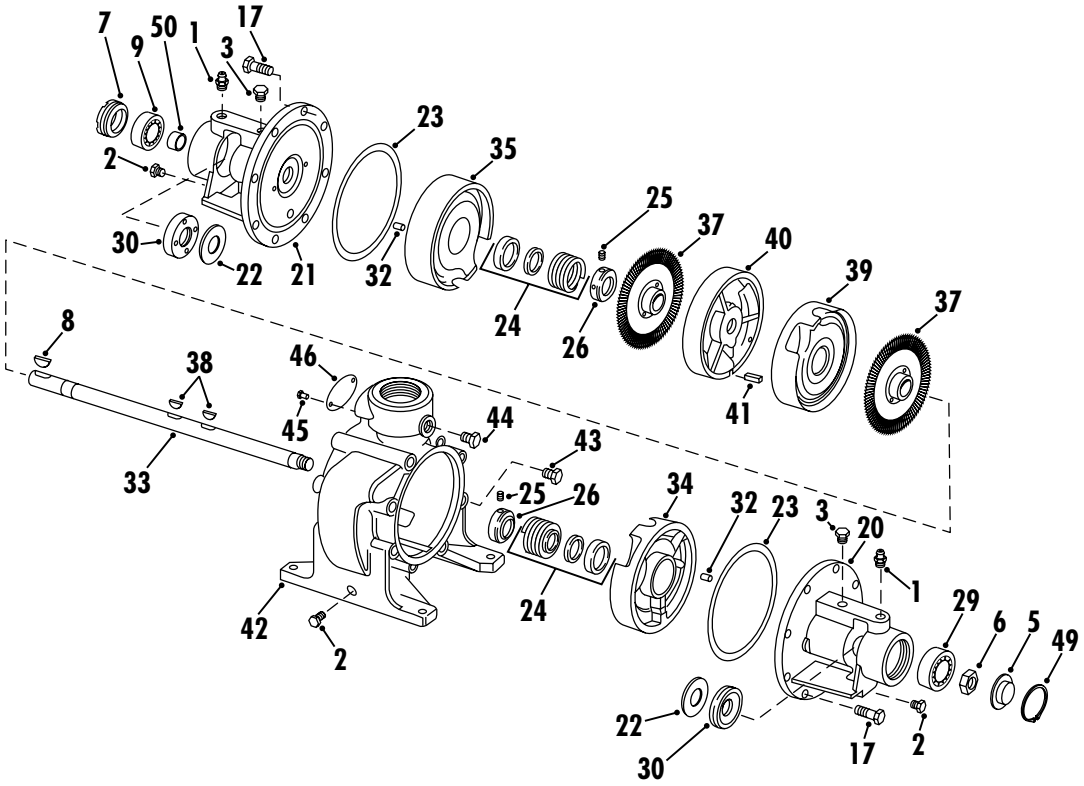


MODEL 121B - SINGLE STAGE WITH SEALS

MODEL 122B
PIECE NUMBERS



MODEL 122B - TWO STAGE WITH PACKING



MODEL 122B - TWO STAGE WITH SEALS

120B SERIES
MODELS 121B - 122B
EX4 thru IX4 & EX4T thru IX4T

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.		MATERIAL A.I.	
1	GREASE FITTING	2	508-0001	651		651	
2	PIPE PLUG						
	EX4 thru IX4	1	600-0001	087		087	
	EX4 thru IX4T	2	600-0001	087		087	
5	OUTBOARD RET.	1	672-0056	500		500	
6	JAM NUT	1	544-0316	080		080	
7	INBOARD RET.	1	672-0049	500		500	
8	KEY	1	972-0006	087		087	
9	BEARING	1	068-1905	647		647	
10	NUT (SEE 16A)	4	544-0107	-		080	
12	GLAND CLAMP						
	(SEE 16A)	4	204-0120	-		360	
13	GLAND	2	372-0194	010		010	
14	COTTER PIN	4	592-0405	087		087	
15	CLEVIS PIN	4	592-0452	360		360	
16	SWING BOLT						
	(SEE 16A)	4	100-2015	-		360	
16A	SWING BOLT ASSY.						
	(SEE 10, 12, 16)	1	099-0004	644		-	
17	CAPSCREW	16	168-0380	082		082	
18	COVER, PACKING	1	260-5127	010		010	
19	COVER, PACKING	1	260-5127	010		010	
20	COVER, SEAL	1	260-5126	010		010	
21	COVER, SEAL	1	260-5126	010		010	
22	SLINGER	2	764-1002	478		478	
23	GASKET	2	364-1198	478		478	
24	SEAL	2	712-0707	755		758	
25	SET SCREW	4	724-0077	104		104	
26	COLLAR	2	224-0082	208		087	
27	PACKING	10	564-0029	802		802	
29	BEARING	1	068-0154	647		647	
30	BORE RETAINER	2	672-0050	500		500	
32	PIN	2	592-0632	104		104	
33	SHAFT						
	EX4 thru IX4	1	728-7273	109		109	
	EX4T thru IX4T	1	728-7274	109		109	
34	CHANNEL RING (RIGHT HAND)						
	EX4 & EX4T	1	676-2016	010		010	
	FX4 & FX4TT	1	676-2018	010		010	
	GX4 & GX4T	1	676-2020	010		010	
	HX4 & HX4T	1	676-2022	010		010	
	IX4 & IX4T	1	676-2024	010		010	

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL B.F.		MATERIAL A.I.	
35	CHANNEL RING (LEFT HAND)						
	EX4 & EX4T	1	676-2015	010		010	
	FX4 & FX4T	1	676-2017	010		010	
	GX4 & GX4T	1	676-2019	010		010	
	HX4 & HX4T	1	676-2021	010		010	
	IX4 & IX4T	1	676-2023	010		010	
36	IMPELLER						
	EX4 & EX4T	*	444-2676	208		053	
	FX4 & FX4T	*	444-2677	208		053	
	GX4 & GX4T	*	444-2678	208		053	
	HX4 & HX4T	*	444-2679	208		053	
	IX4 & IX4T	*	444-2680	208		053	
	* EX4 thru IX4 ONE REQUIRED (SINGLE STAGE)						
	* EX4T thru IX4T TWO REQUIRED (TWO STAGE)						
38	KEY	*	472-0108	100		100	
39	SPACER (LEFT)						
	EX4T	1	772-0240	010		010	
	FX4T	1	772-0242	010		010	
	GX4T	1	772-0244	010		010	
	HX4T	1	772-0246	010		010	
	IX4T	1	772-0248	010		010	
40	SPACER (RIGHT)						
	EX4T	1	772-0241	010		010	
	FX4T	1	772-0243	010		010	
	GX4T	1	772-0245	010		010	
	HX4T	1	772-0247	010		010	
	IX4T	1	772-0249	010		010	
41	SPACER KEY	1	472-1013	104		104	
42	CASING						
	EX4 thru IX4	1	180-2294	010		010	
	EX4T thru IX4T	1	180-2295	010		010	
44	PIPE PLUG	2	600-0002	087		087	
45	DRIVE SCREW	2	708-0013	365		365	
46	NAMEPLATE	1	532-0014	324		324	
49	INT. RET. RING	1	676-2093	088		088	
50	TOLERANCE RING	1	676-2016	114		114	

120B SERIES
MODELS 121B - 122B
EX4 thru IX4 & EX4T thru IX4T

PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL			
				B.F.		A.I.	
	REPAIR PARTS KIT THE FOLLOWING KITS INCLUDE PIECE NUMBERS 6, 8, 9, 22, 23, 29, 32, 33, 34, 35, 37, 38, 39, 40, 41, 47, 48, 49 PACKED PUMP KITS ALSO INCLUDE PIECE NUMBERS 13, 14, 15, 16A, 27 MECHANICAL SEAL KITS ALSO INCLUDE PIECE NUMBERS 24, 25, 26						
	KITS WITH PACKING						
	EX4		476-0662	644			
	FX4		476-0663	644			
	GX4		476-0664	644			
	HX4		476-0665	644			
	IX4		476-0666	644			
	EX4T		476-0667	644			
	FX4T		476-0668	644			
	GX4T		476-0669	644			
	HX4T		476-0670	644			
	IX4T		476-0671	644			
	KITS WITH MECHANICAL SEALS						
	EX4S		476-0672	644			
	FX4S		476-0673	644			
	GX4S		476-0674	644			
	HX4S		476-0675	644			
	IX4S		476-0676	644			
	EX4TS		476-0677	644			
	FX4TS		476-0678	644			
	GX4TS		476-0679	644			
	HX4TS		476-0680	644			
	IX4TS		476-0681	644			

AP-120P-REPAIR

AURORA®

PENTAIR PUMP GROUP

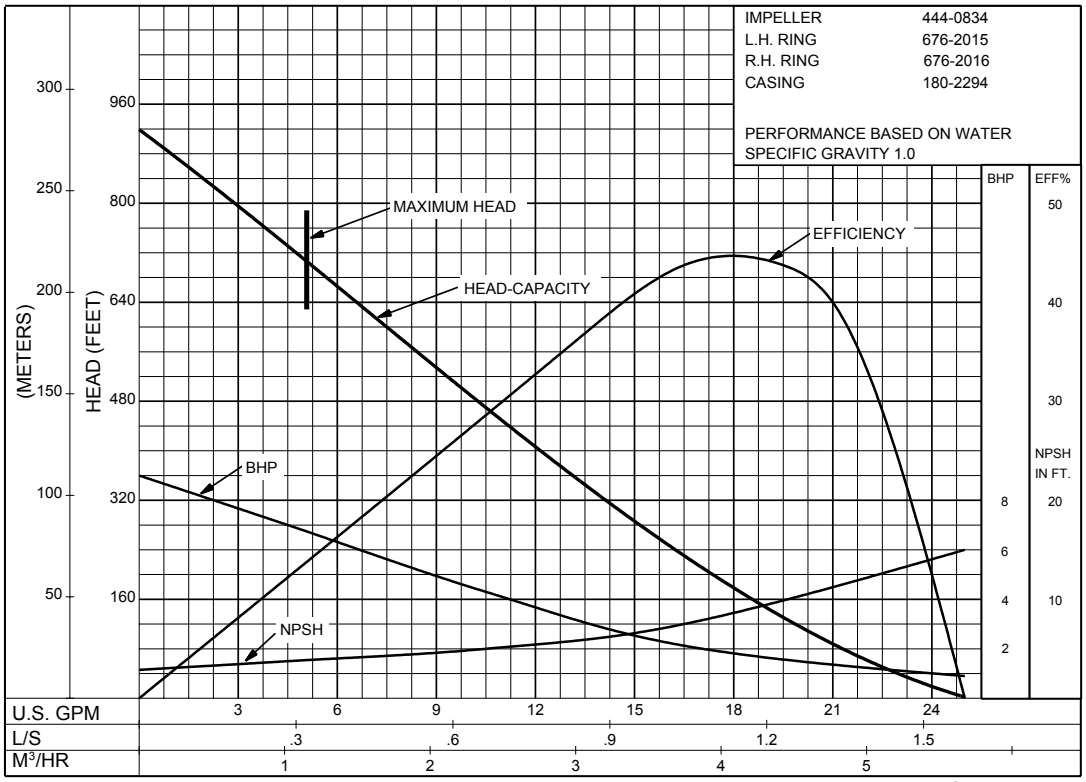
Aurora Pumps
800 Airport Road
North Aurora, IL 60542
phone: 630-859-7000
fax: 630-859-7060

NOTE:
Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information without notice

Performance Curves for the 120 Series

MODEL/SIZE	R.P.M.	CATALOG PAGE	PDF PAGE
EX4 Series	3500/1750	401	2
FX4 Series	3500/1750	402	3
GX4 Series	3500/1750	403	4
HX4 Series	3500/1750	404	5
IX4 Series	3500/1750	405	6
EX4T Series	3500/1750	406	7
FX4T Series	3500/1750	407	8
GX4T Series	3500/1750	408	9
HX4T Series	3500/1750	409	10
IX4T Series	1750	410	11

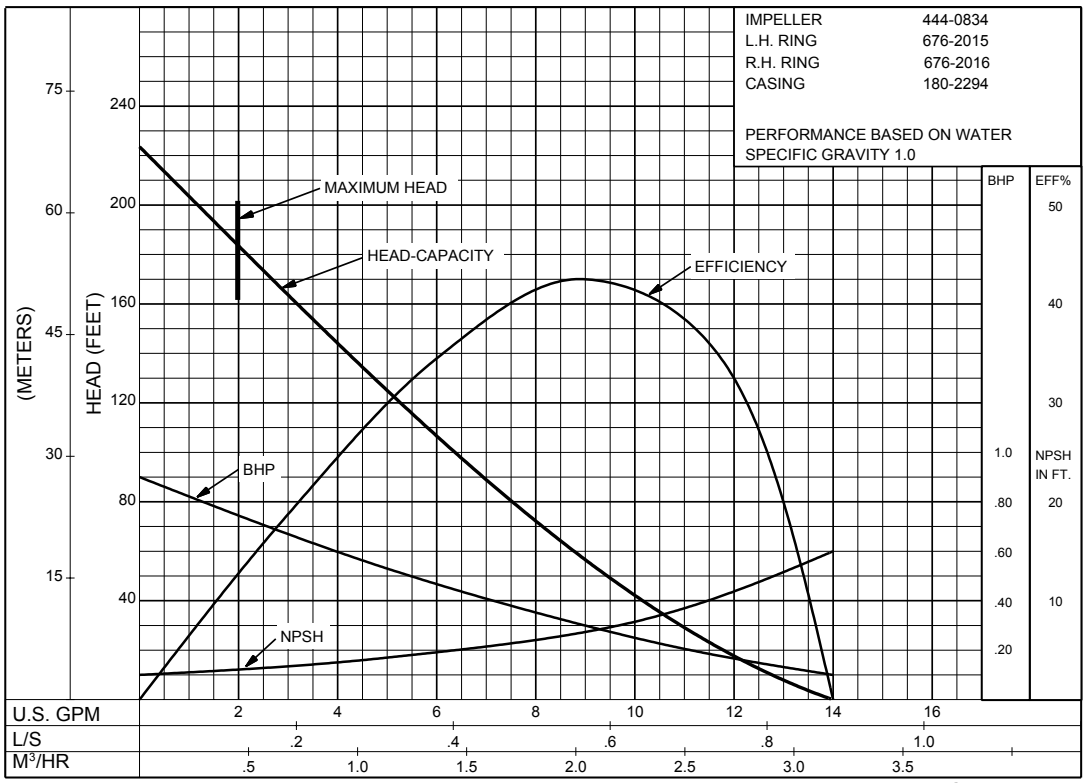
SIZE : EX4 **TYPE : 120B** **R. P. M. : 3500**



11-PC-126806

3500 R.P.M

SIZE : EX4 **TYPE : 120B** **R. P. M. : 1750**



11-PC-126807

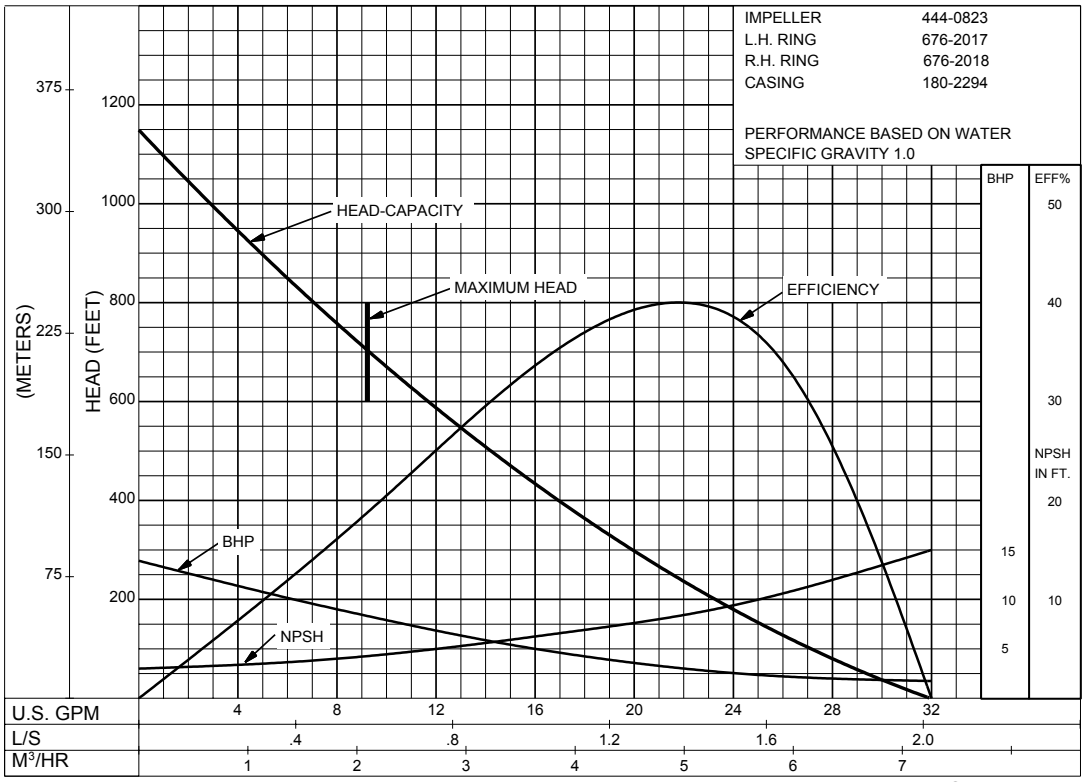
1750 R.P.M

FX4 SERIES 120

SINGLE STAGE

3500
R.P.M

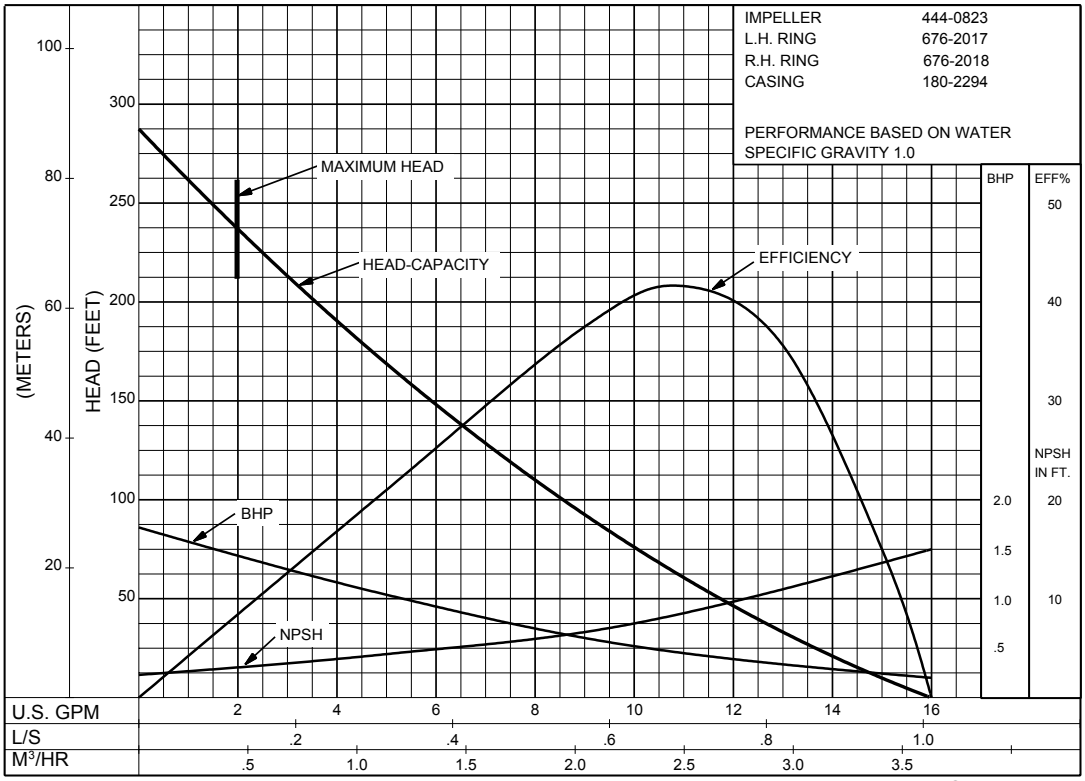
SIZE : FX4 **TYPE : 120B** **R. P. M. : 3500**



11-PC-126808

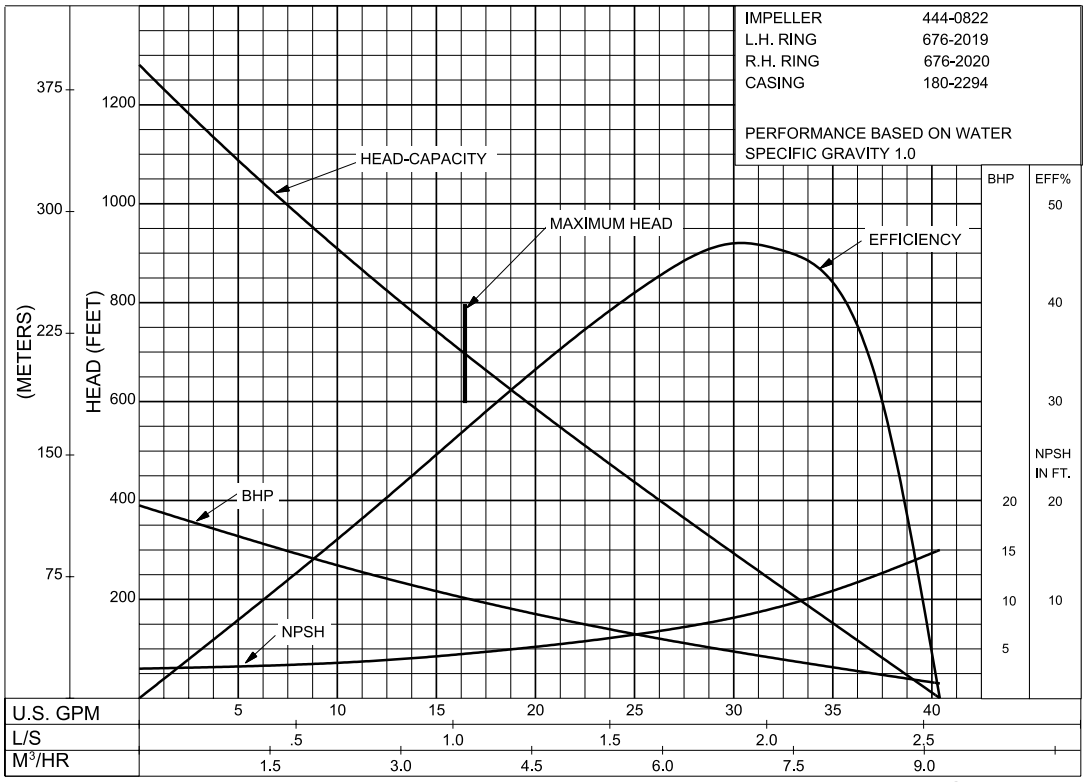
1750
R.P.M

SIZE : FX4 **TYPE : 120B** **R. P. M. : 1750**



11-PC-126809

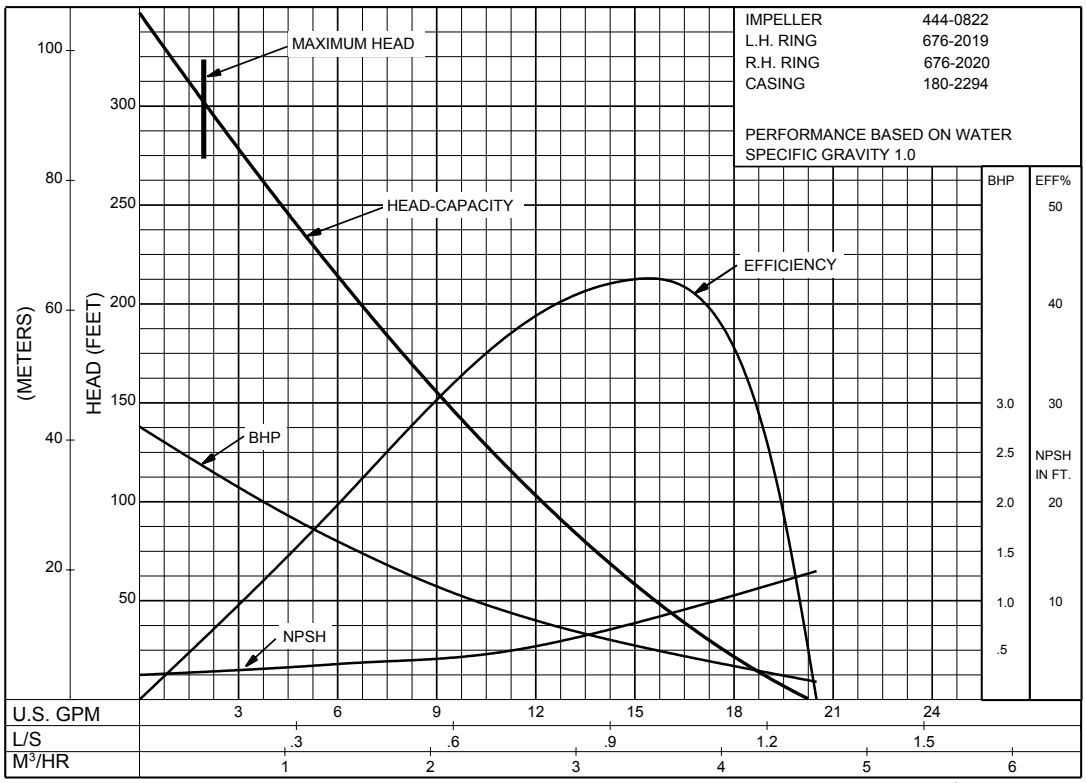
SIZE : GX4 **TYPE : 120B** **R. P. M. : 3500**



11-PC-126810

3500 R.P.M

SIZE : GX4 **TYPE : 120B** **R. P. M. : 1750**



11-PC-126811

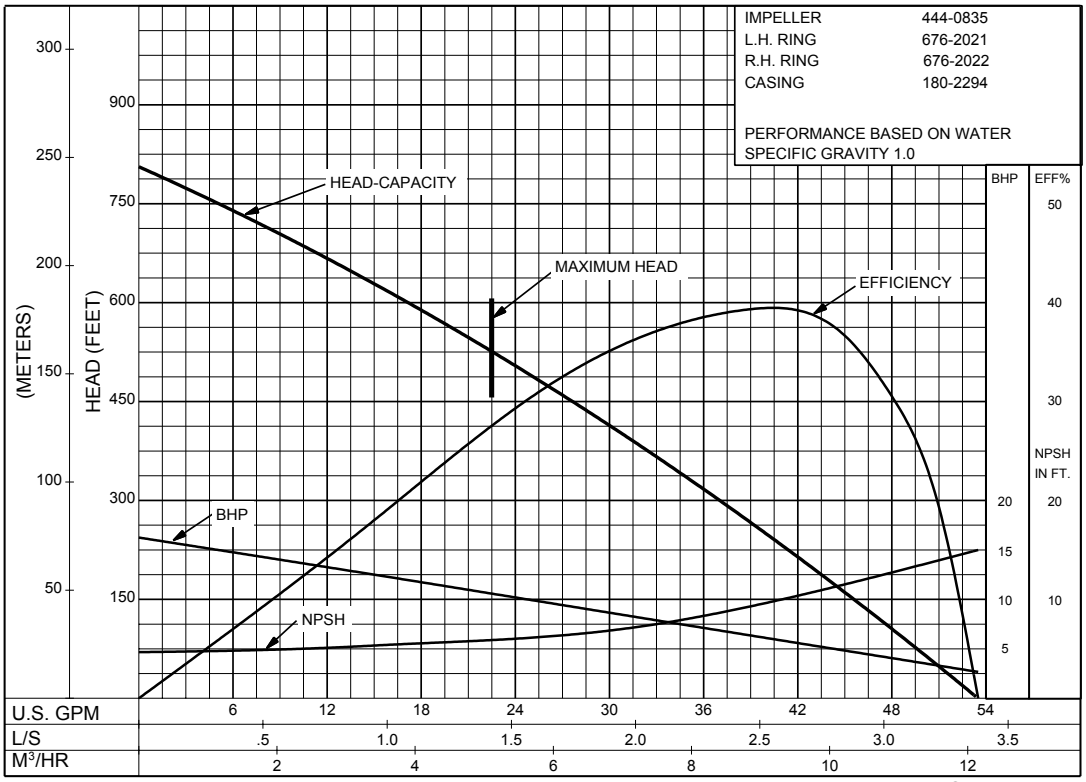
1750 R.P.M

HX4 SERIES 120

SINGLE STAGE

3500
R.P.M

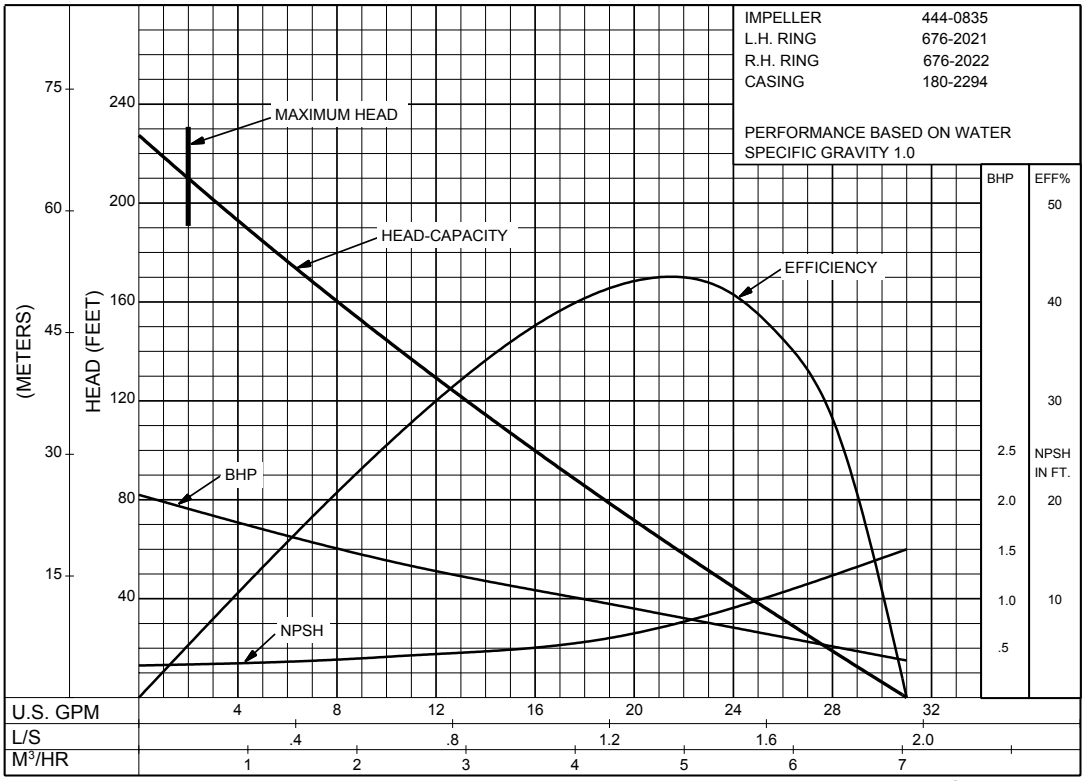
SIZE : HX4 **TYPE : 120B** **R. P. M. : 3500**



11-PC-126812

1750
R.P.M

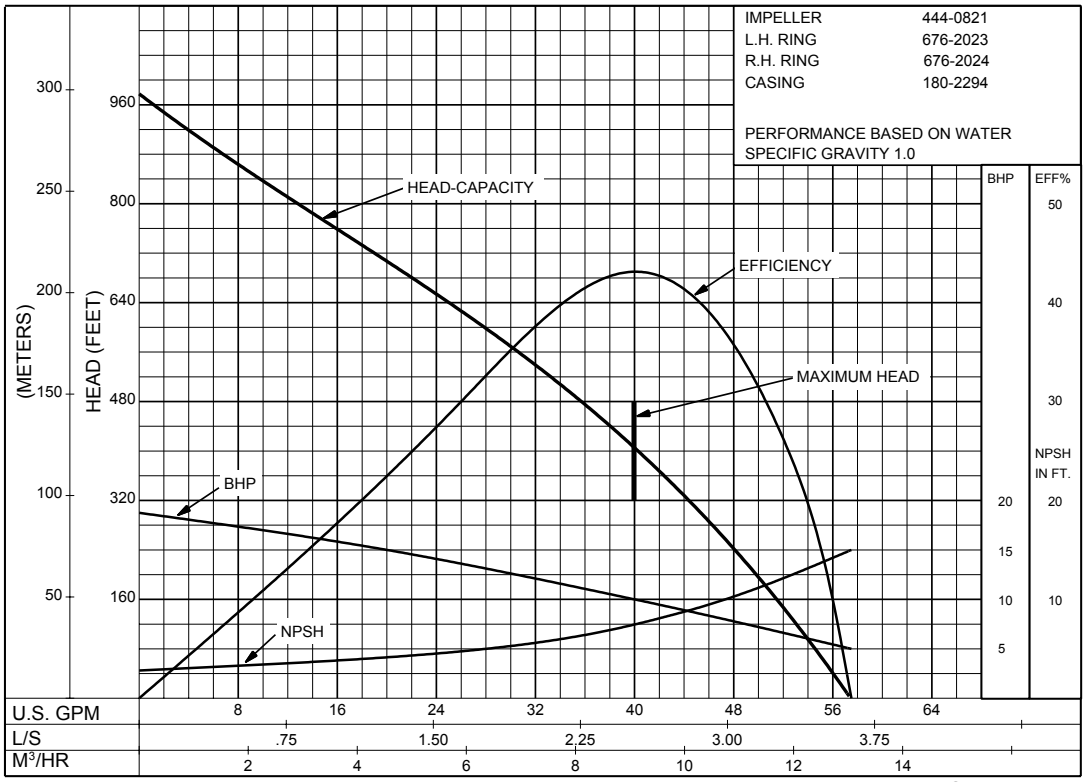
SIZE : HX4 **TYPE : 120B** **R. P. M. : 1750**



11-PC-126813

Supersedes Section 120 Page 405
Dated August 1981

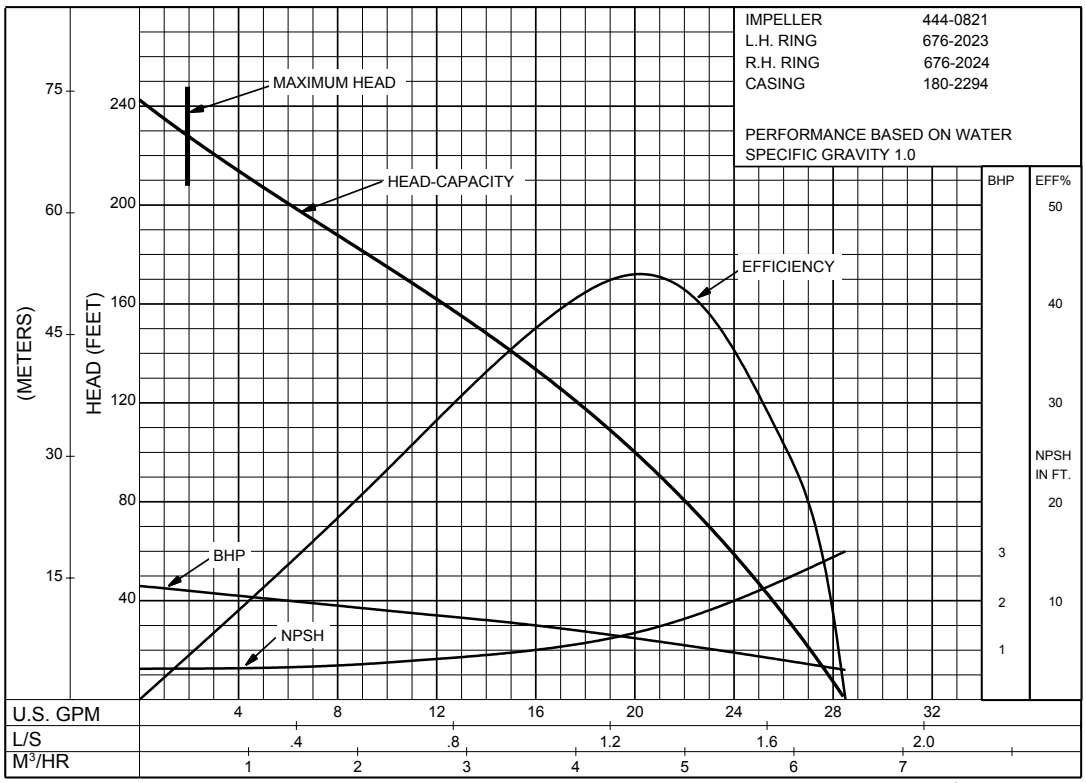
SIZE : IX4 **TYPE : 120B** **R. P. M. : 3500**



11-PC-126814

3500 R.P.M

SIZE : IX4 **TYPE : 120B** **R. P. M. : 1750**



11-PC-126815

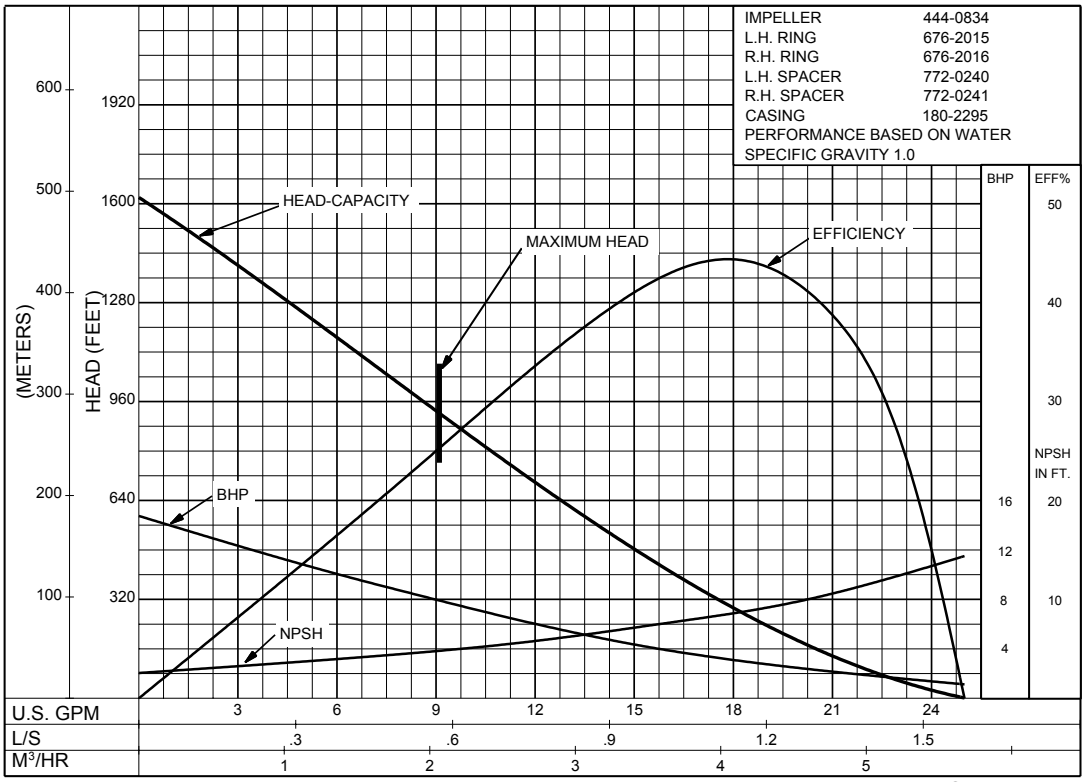
1750 R.P.M

EX4T SERIES 120

TWO STAGE

3500
R.P.M

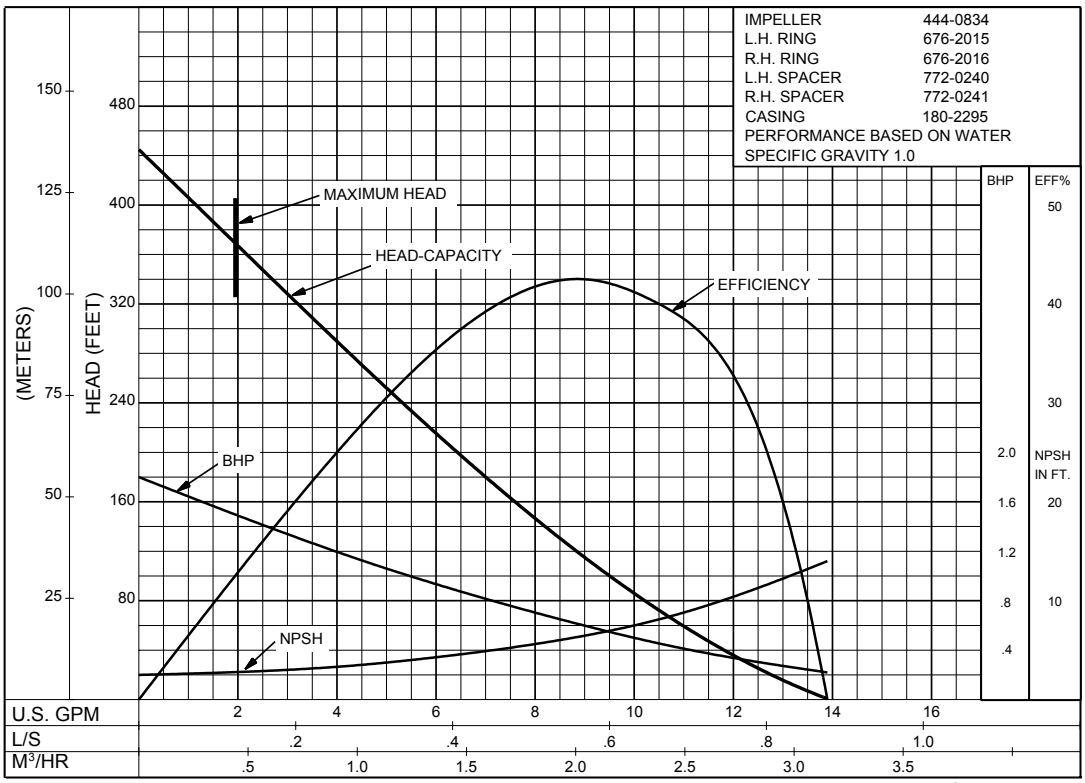
SIZE : EX4T **TYPE : 120B** **R. P. M. : 3500**



11-PC-126816

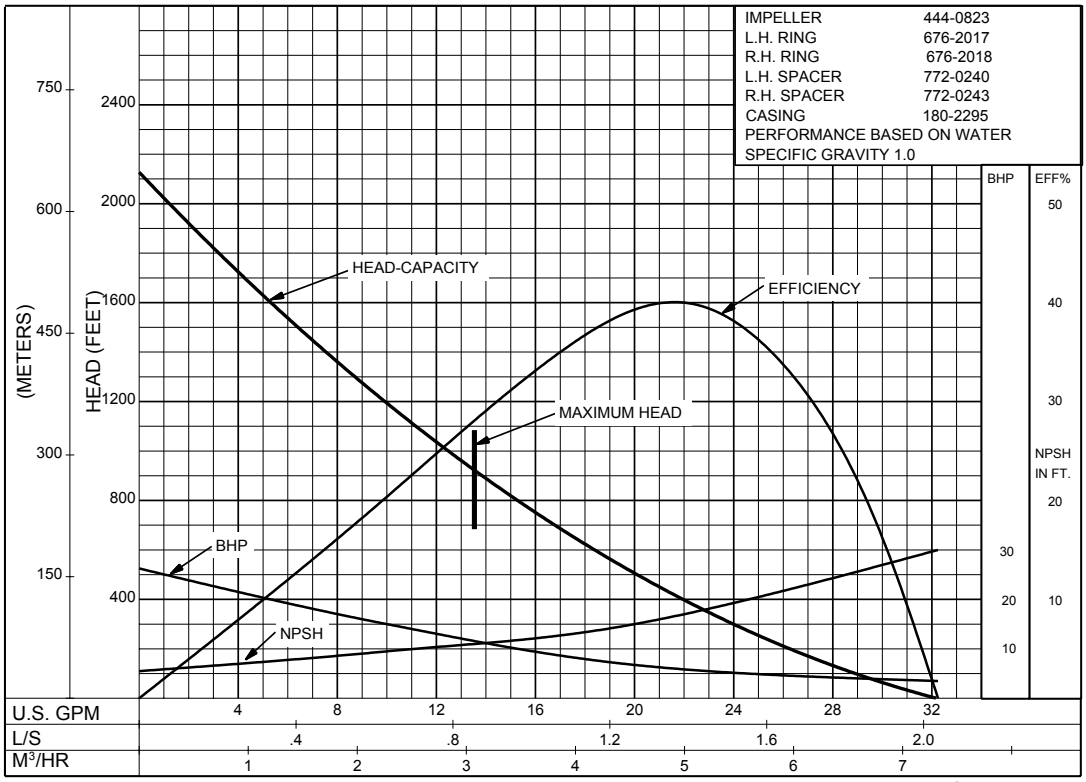
1750
R.P.M

SIZE : EX4T **TYPE : 120B** **R. P. M. : 1750**



11-PC-126817

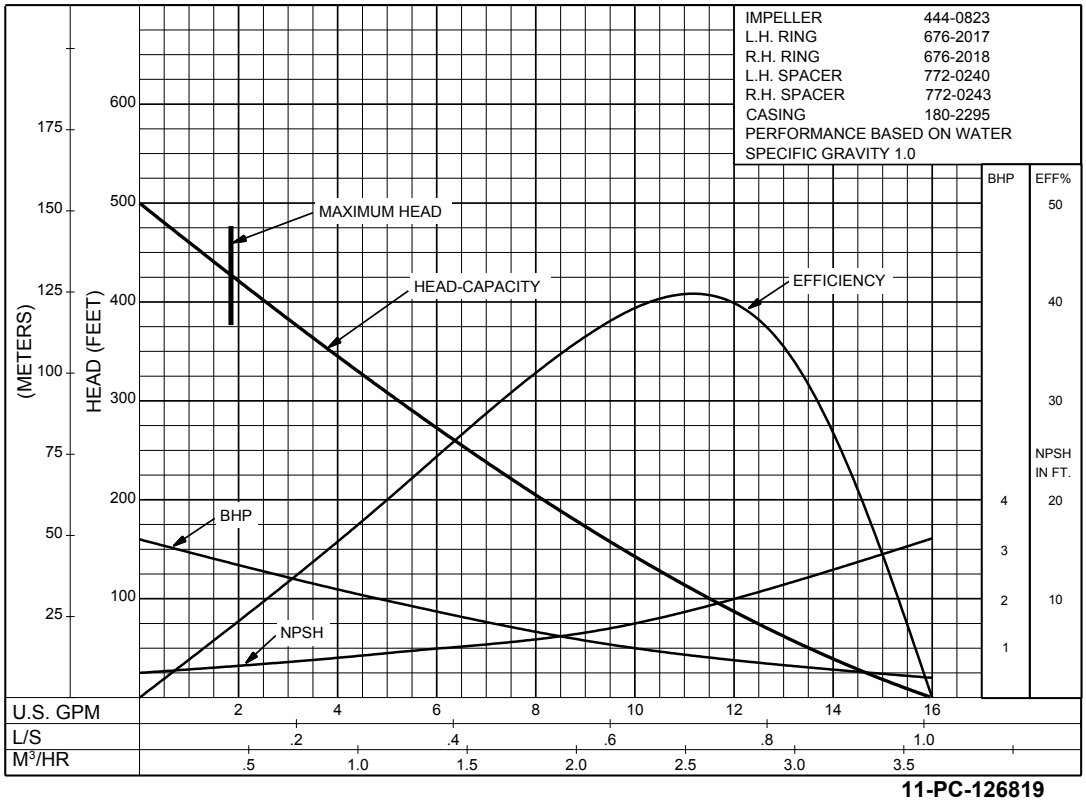
SIZE : FX4T **TYPE : 120B** **R. P. M. : 3500**



11-PC-126818

3500 R.P.M

SIZE : FX4T **TYPE : 120B** **R. P. M. : 1750**



11-PC-126819

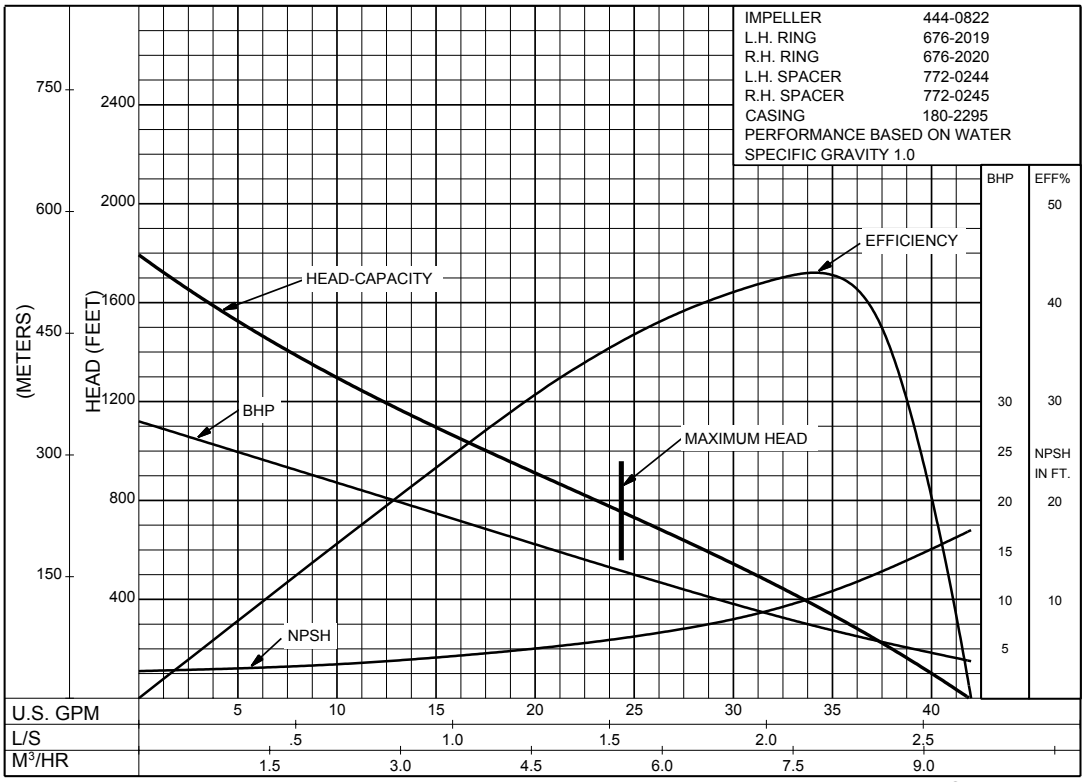
1750 R.P.M

GX4T SERIES 120

TWO STAGE

3500
R.P.M

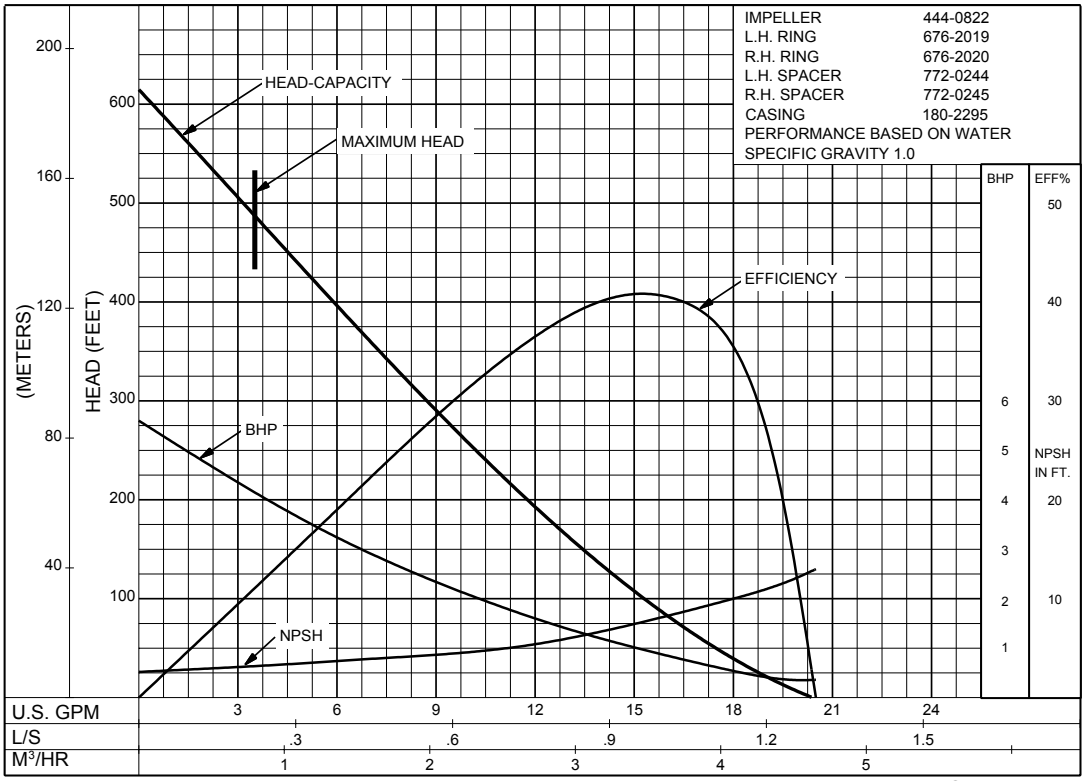
SIZE : GX4T **TYPE : 120B** **R. P. M. : 3500**



11-PC-126820

1750
R.P.M

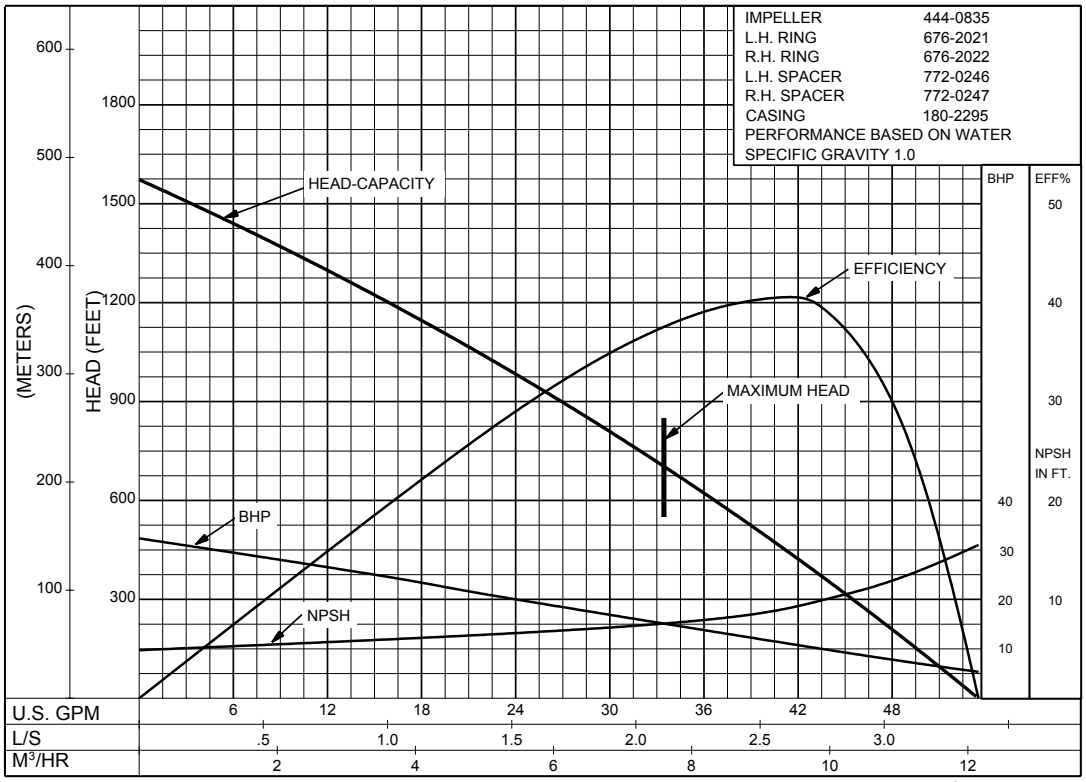
SIZE : GX4T **TYPE : 120B** **R. P. M. : 1750**



11-PC-126821

AURORA®
Pentair Pump Group

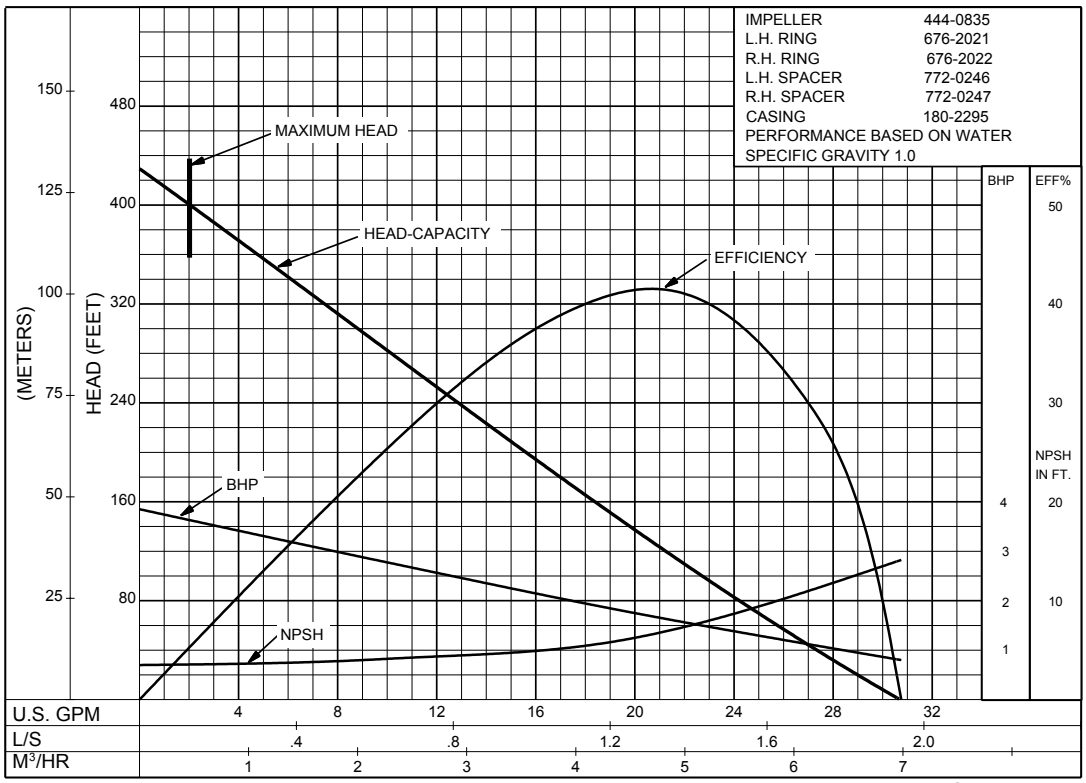
SIZE : HX4T **TYPE : 120B** **R. P. M. : 3500**



11-PC-126822

3500 R.P.M

SIZE : HX4T **TYPE : 120B** **R. P. M. : 1750**



11-PC-126823

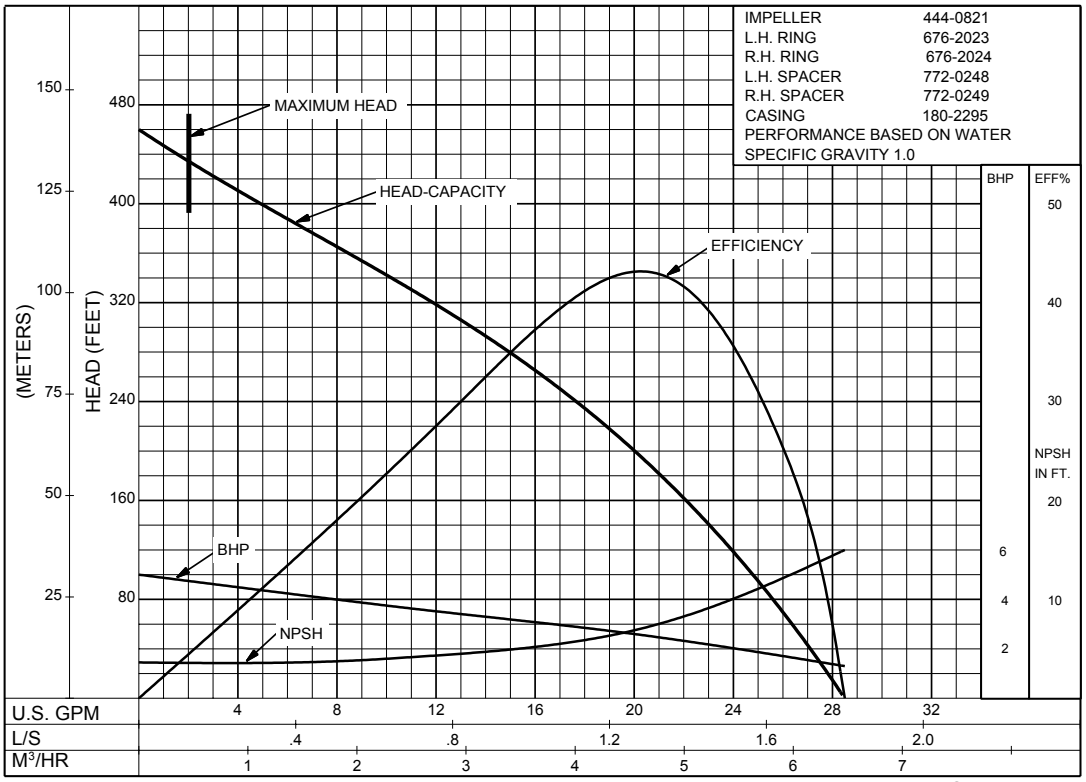
1750 R.P.M

IX4T SERIES 120

TWO STAGE

1750
R.P.M

SIZE : IX4T **TYPE : 120B** **R. P. M. : 1750**



11-PC-126824

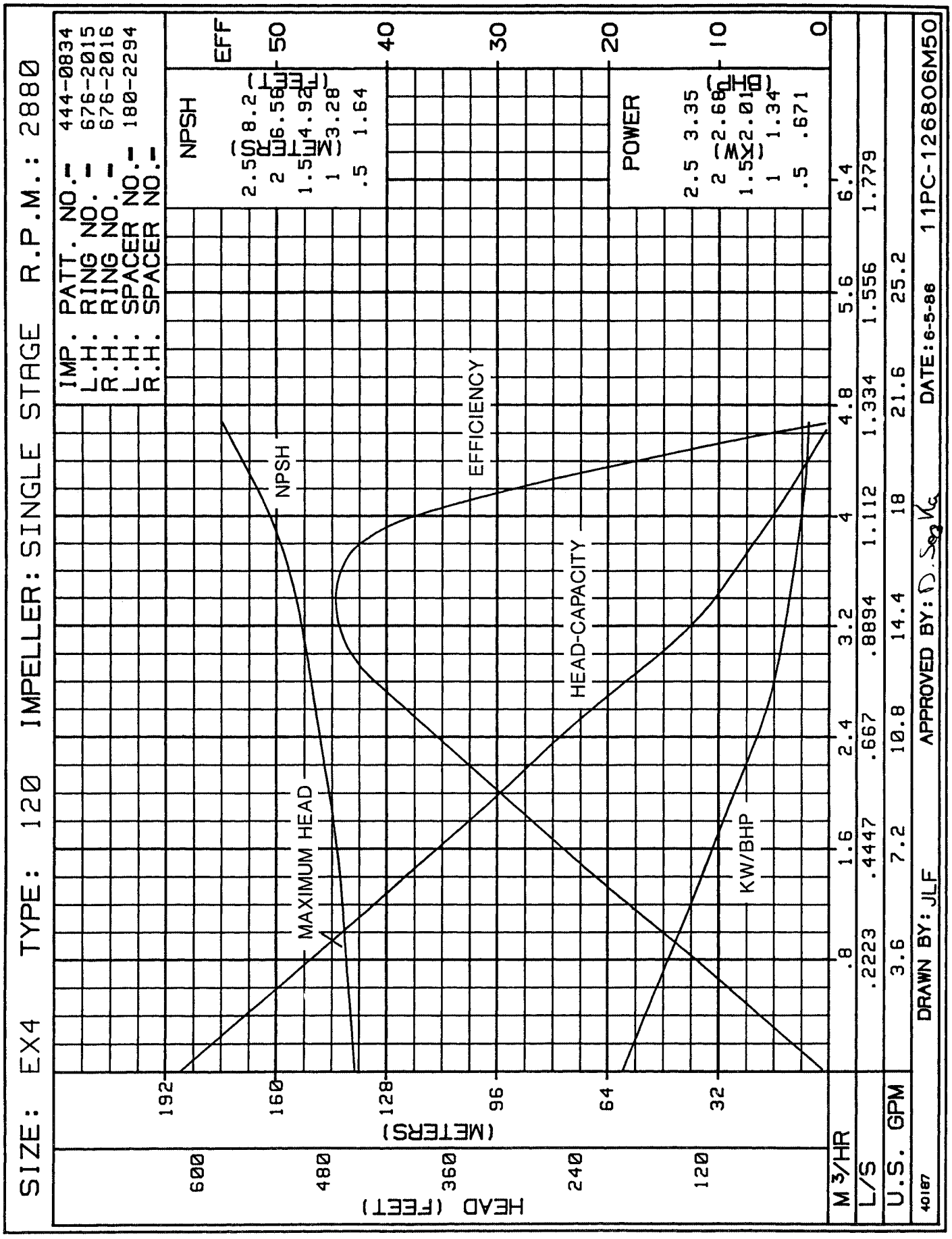
Performance Curves for the 120 Series (50 Hz)

MODEL/SIZE	R.P.M.	PDF PAGE
Ex4	2880	2
Ex4	1440	3
Fx4	2880	4
Fx4	1440	5
Gx4	2880	6
Gx4	1440	7
Hx4	2880	8
Hx4	1440	9
Ix4	2880	10
Ix4	1440	11
Ex4T	2880	12
Ex4T	1440	13
Fx4T	2880	14
Fx4T	1440	15
Gx4T	2880	16
Gx4T	1440	17
Hx4T	2880	18
Hx4T	1440	19
Ix4T	1440	20

AURORA®
Pentair Pump Group

Ex4 - 2880 RPM
SINGLE STAGE IMPELLER

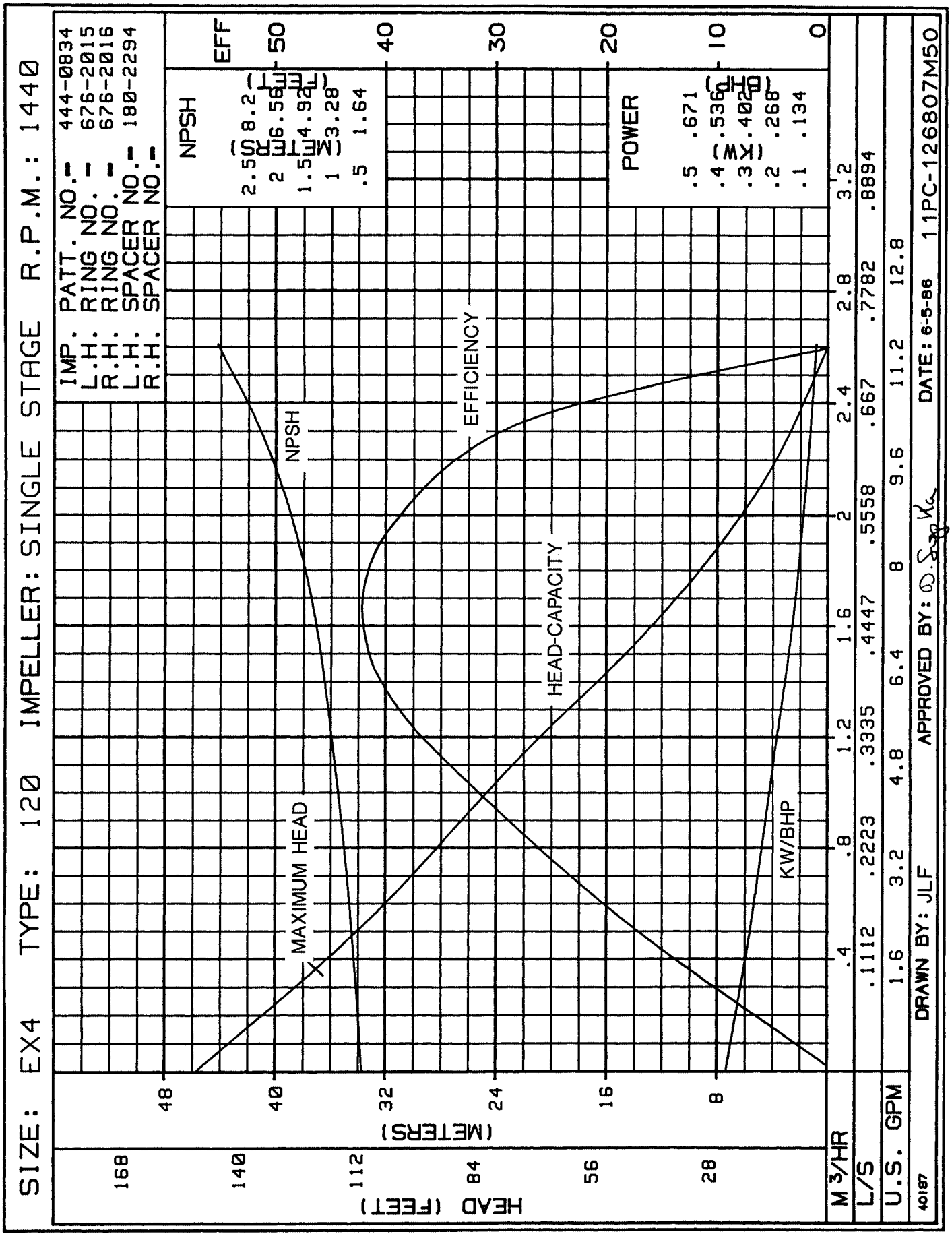
SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

Ex4 - 1440 RPM
SINGLE STAGE IMPELLER

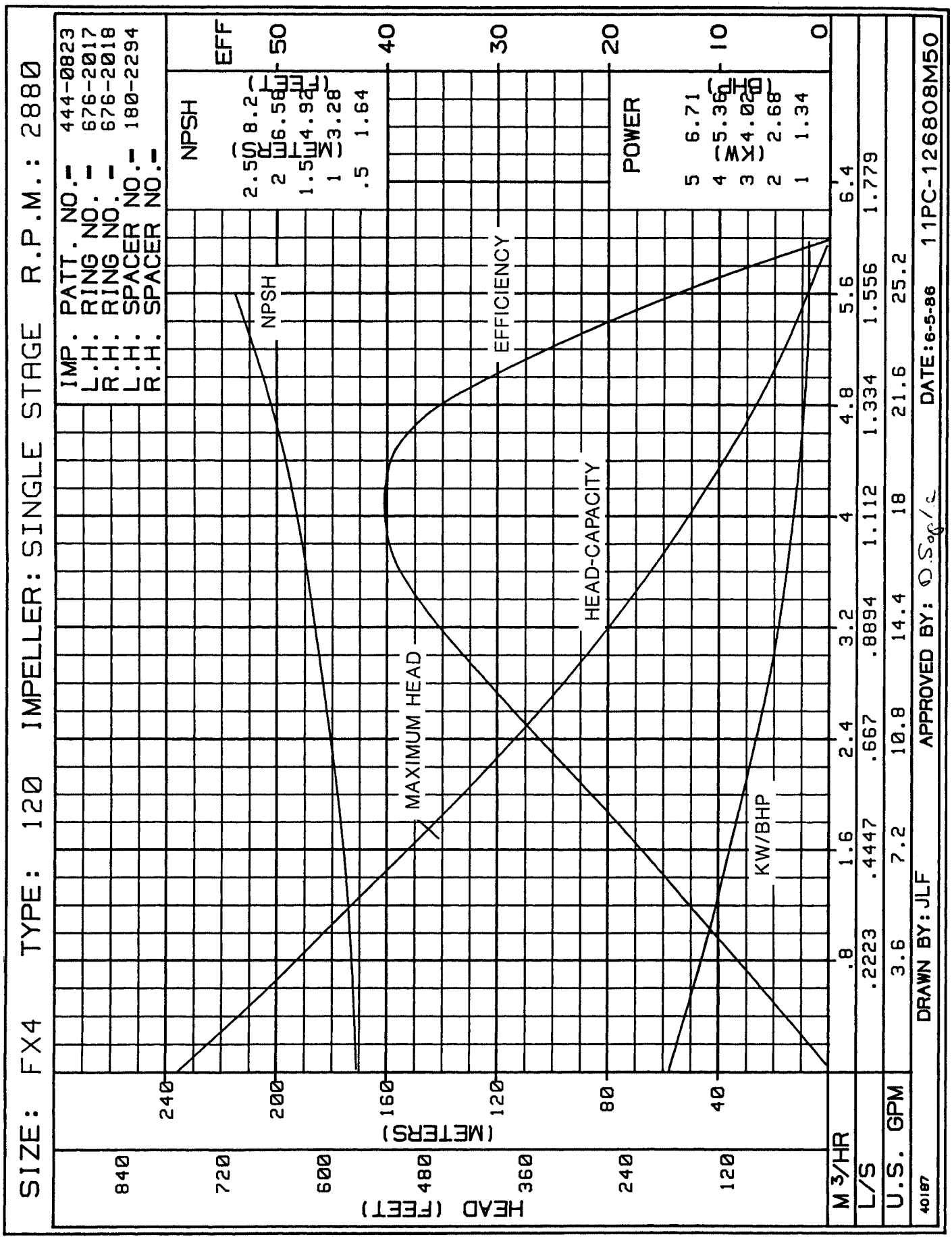
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Fx4 - 2880 RPM
SINGLE STAGE IMPELLER

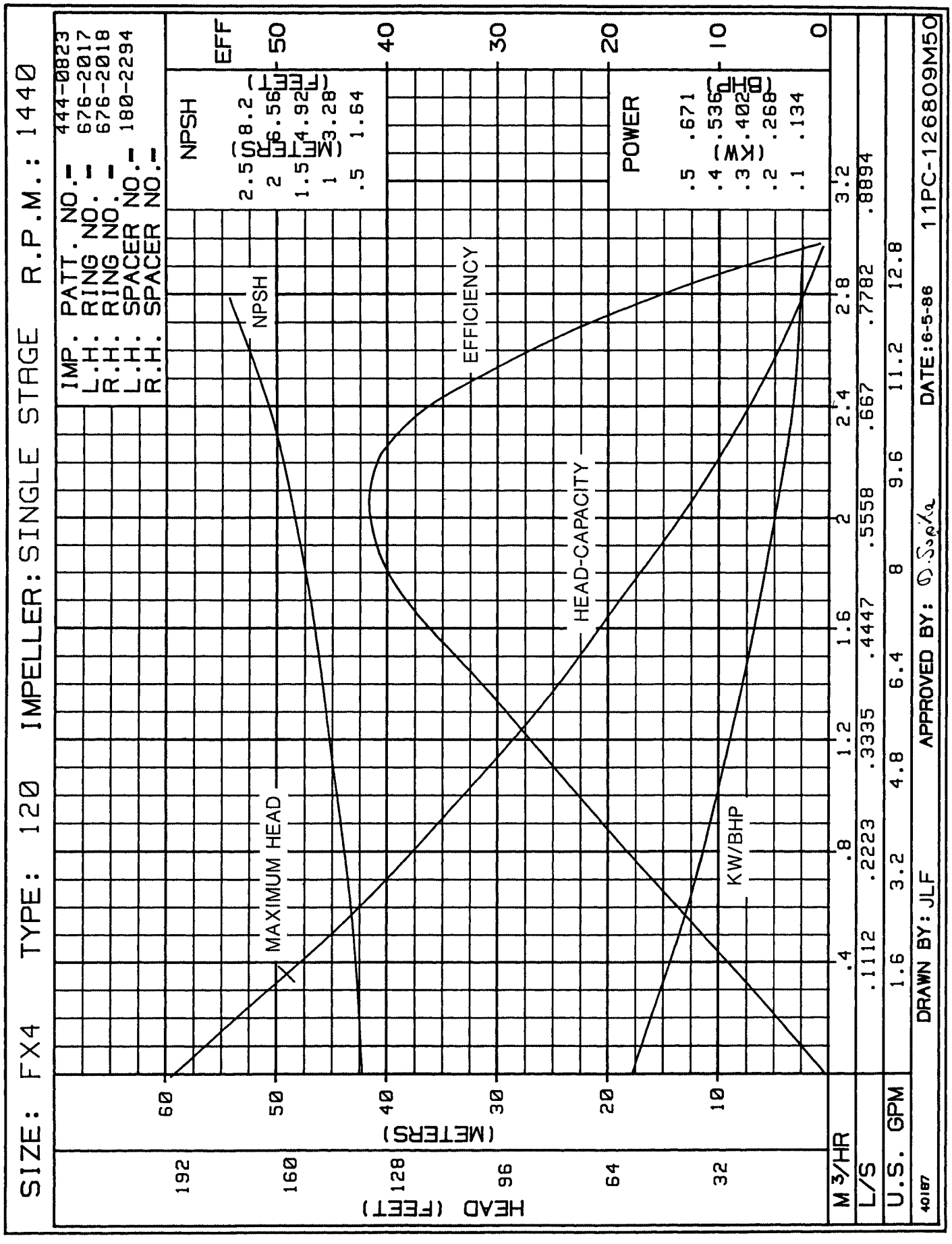
SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

Fx4 - 1440 RPM
SINGLE STAGE IMPELLER

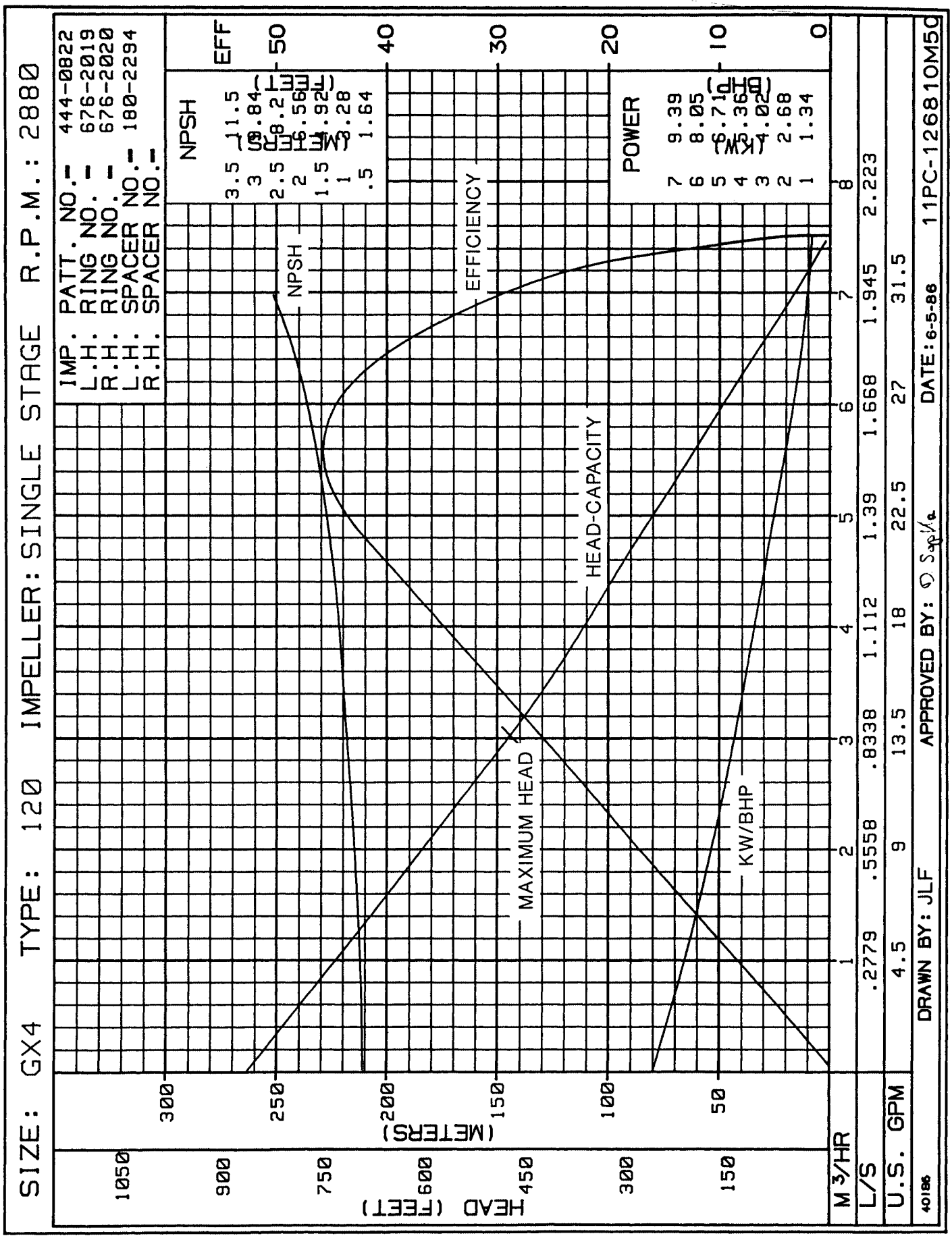
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Gx4 - 2880 RPM
SINGLE STAGE IMPELLER

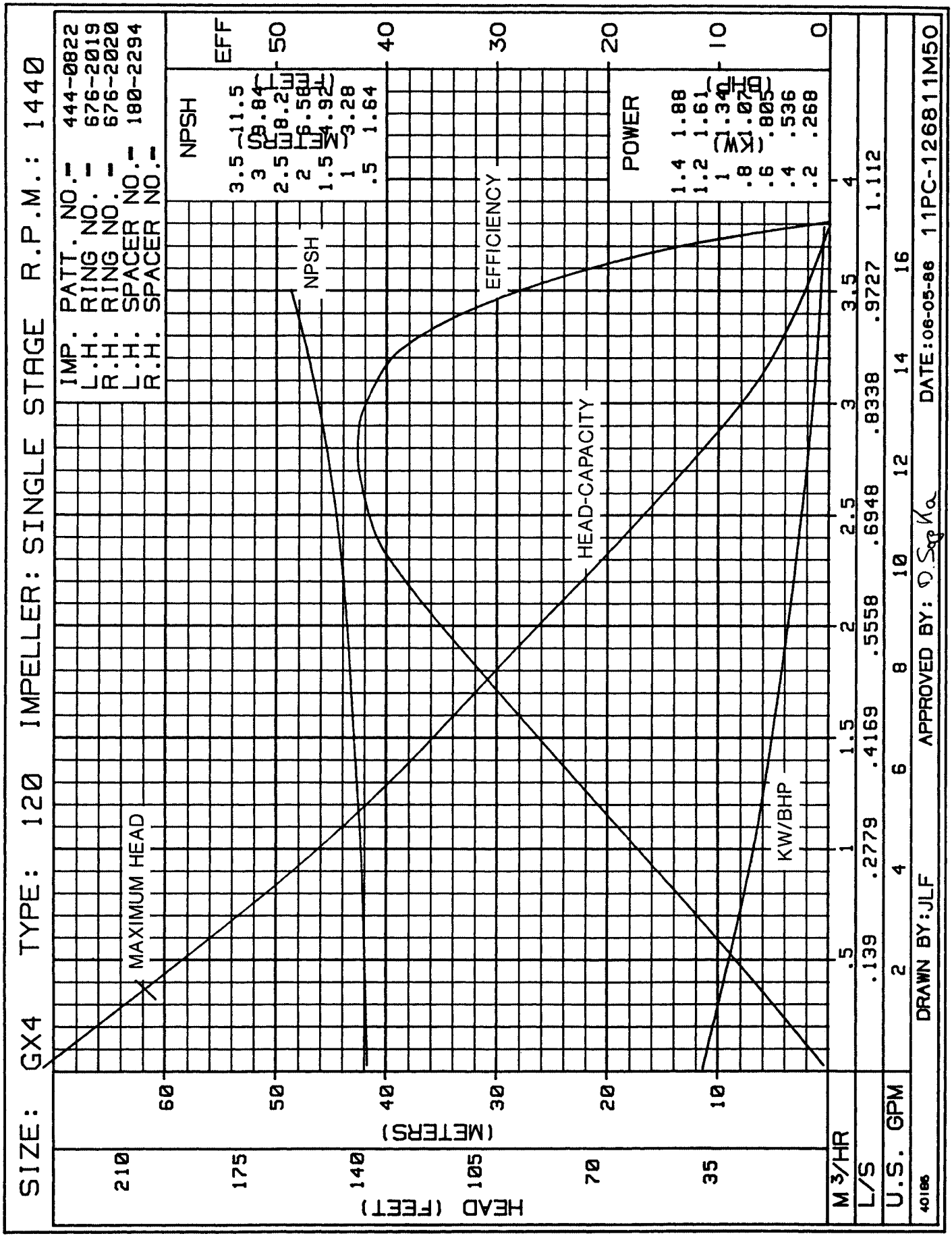
SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

Gx4 - 1440 RPM
SINGLE STAGE IMPELLER

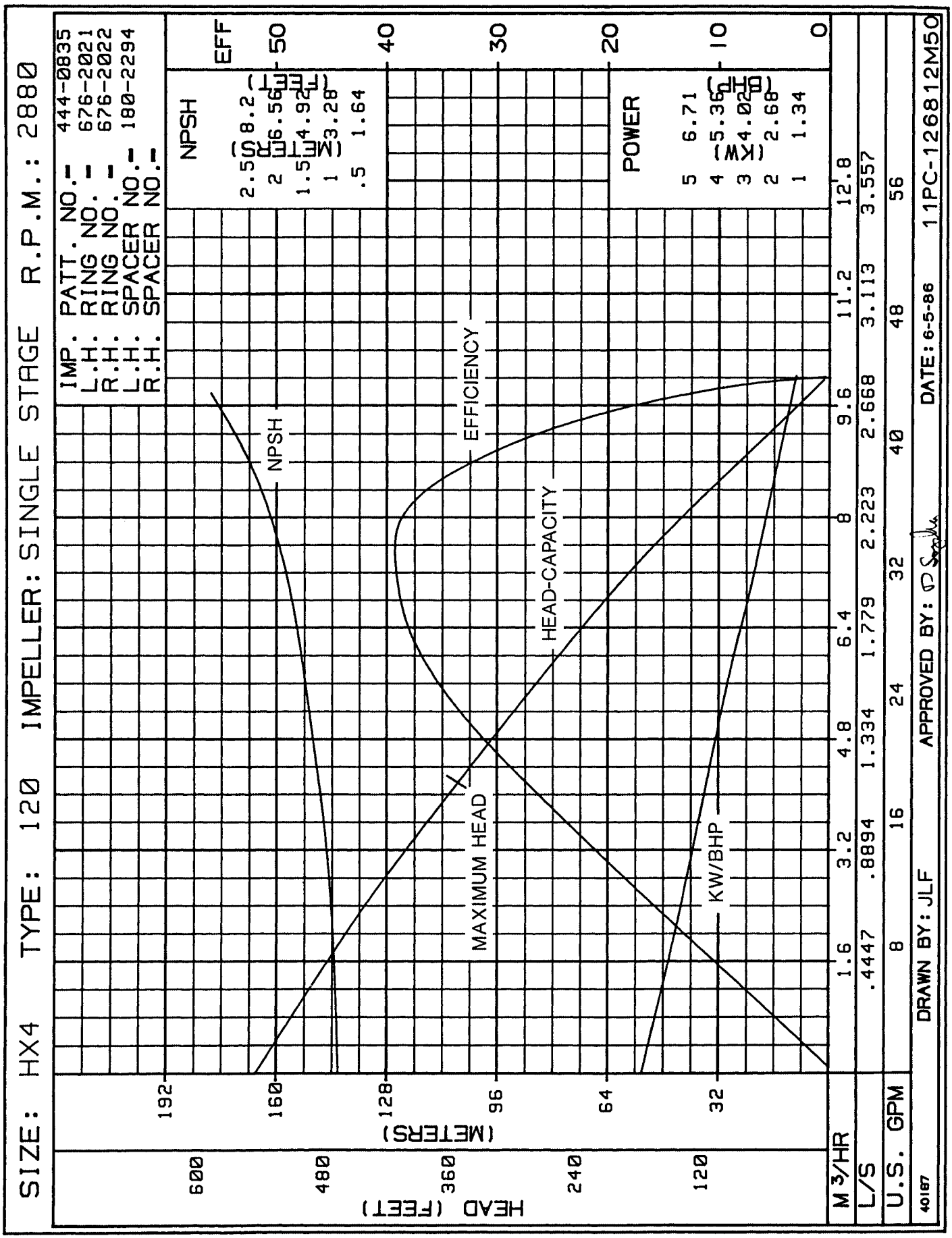
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Hx4 - 2880 RPM
SINGLE STAGE IMPELLER

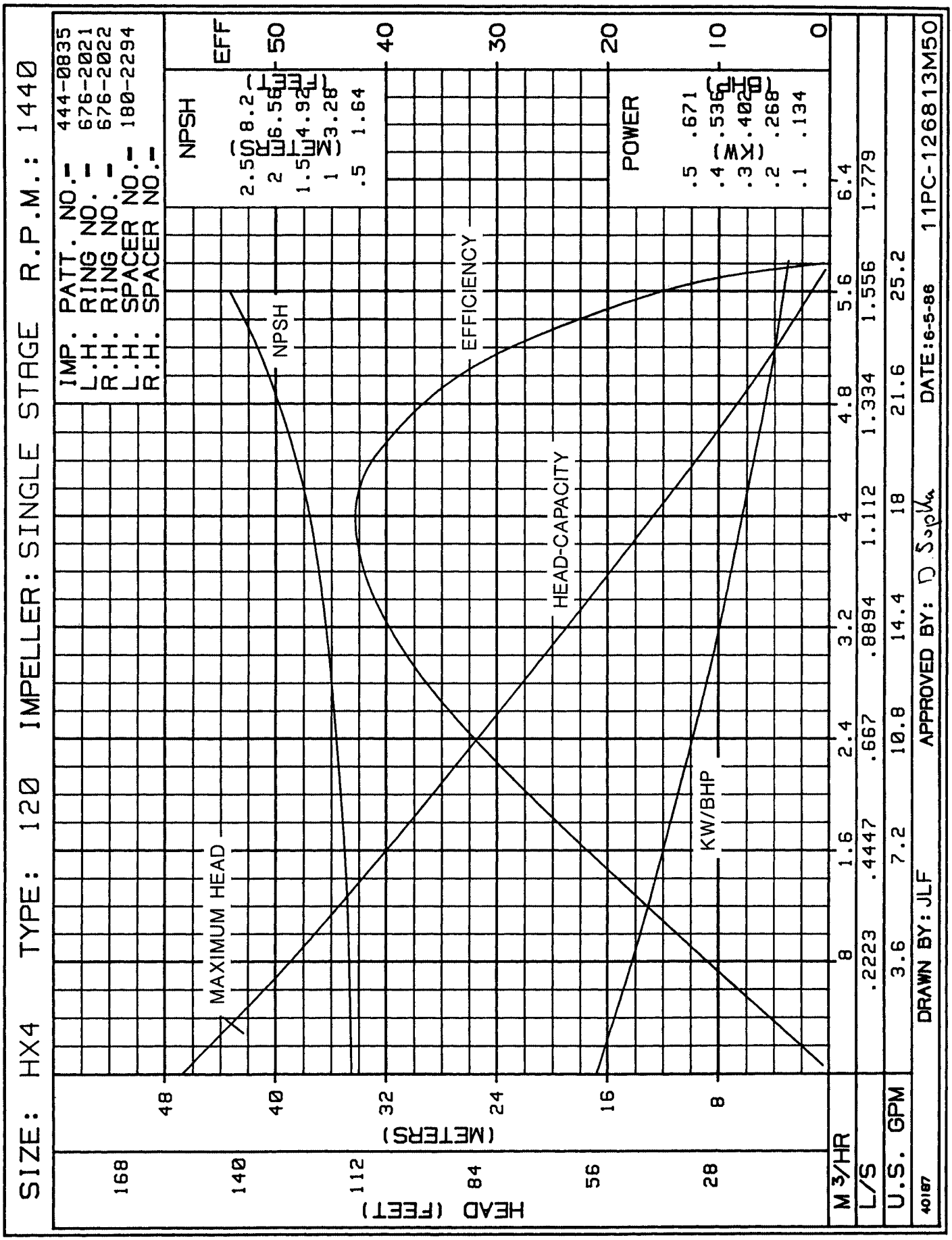
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DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

Hx4 - 1440 RPM
SINGLE STAGE IMPELLER

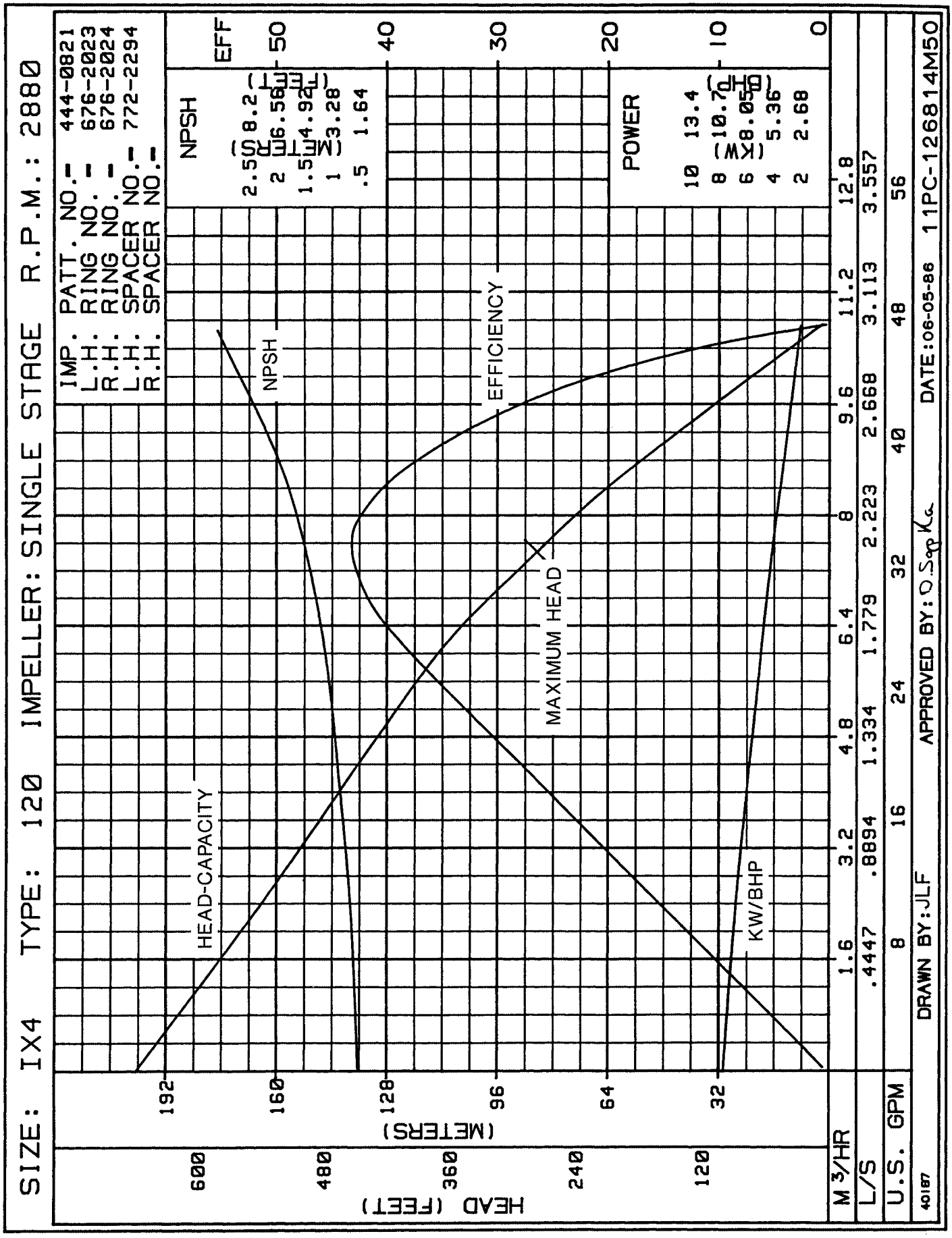
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Ix4 - 2880 RPM
SINGLE STAGE IMPELLER

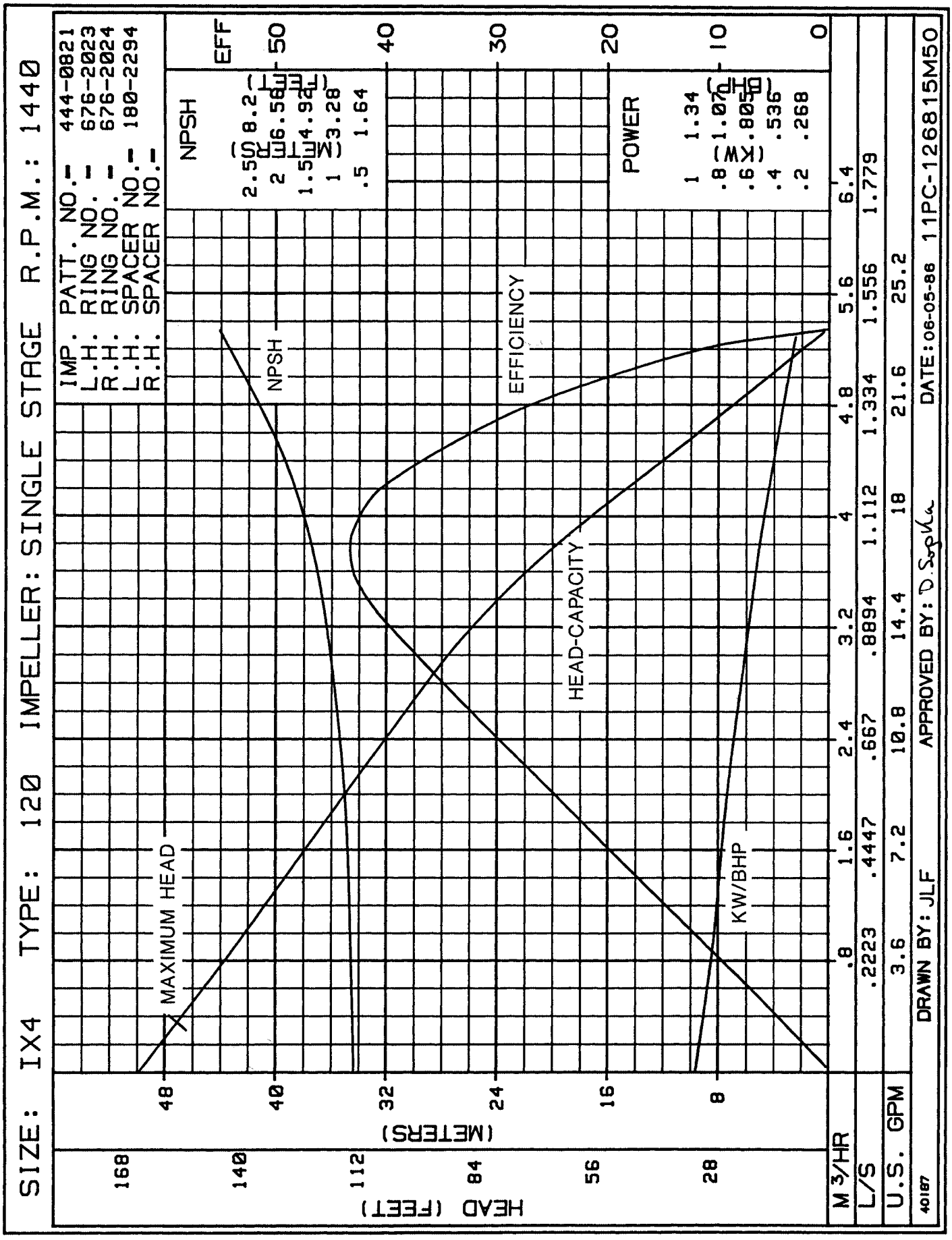
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DATE JULY 1994
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SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

Ix4 - 1440 RPM
SINGLE STAGE IMPELLER

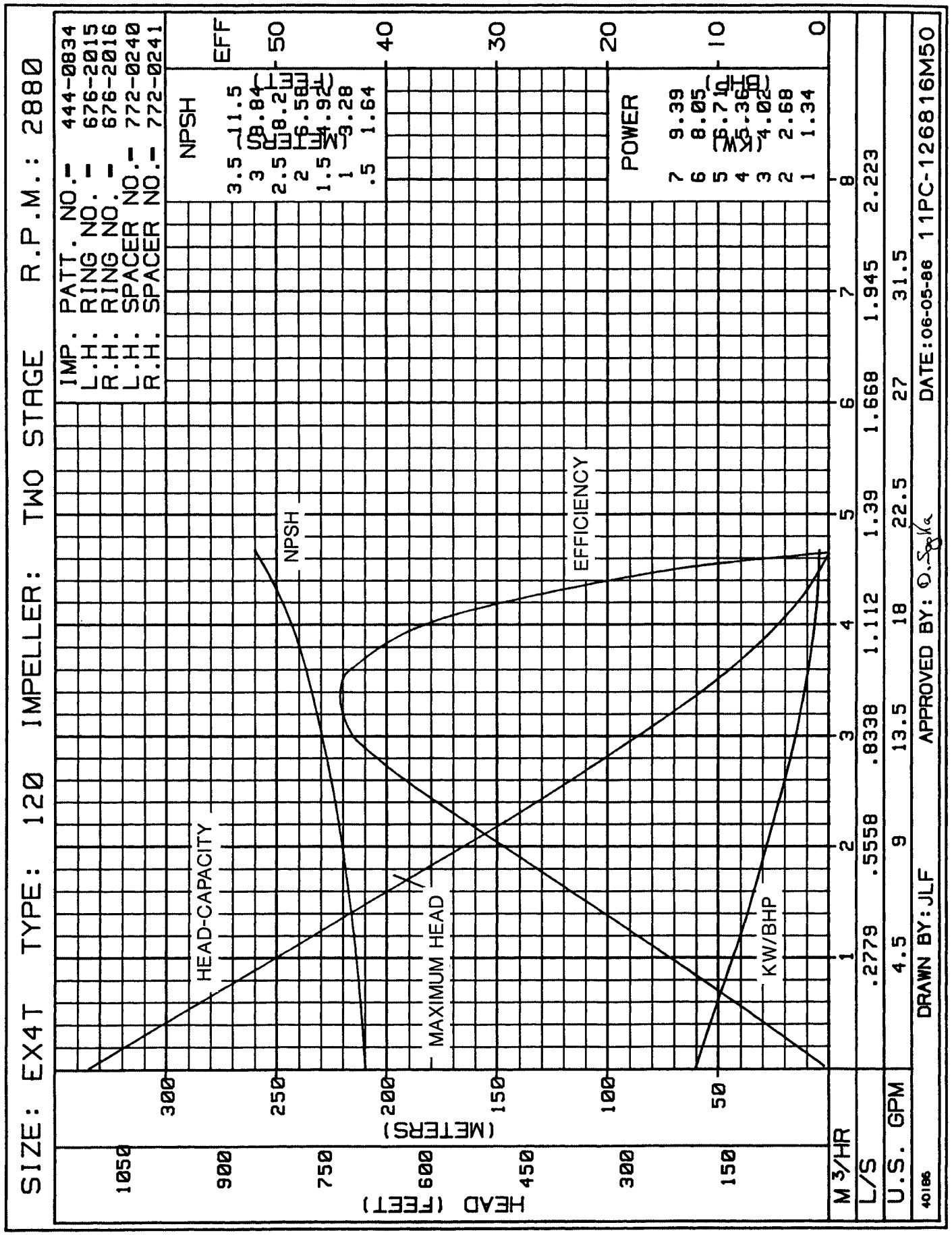
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Ex4T - 2880 RPM
TWO STAGE IMPELLER

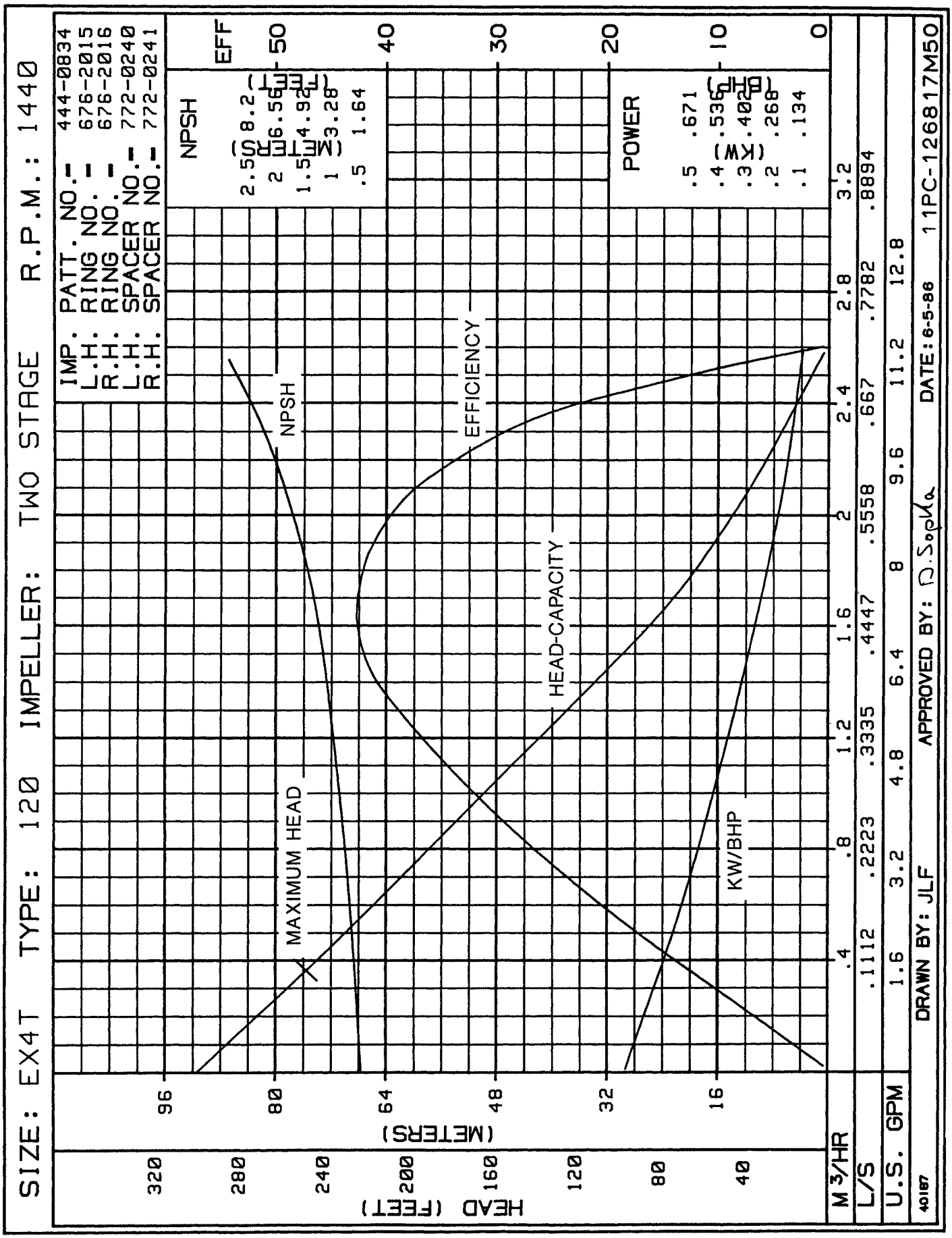
SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

Ex4T - 1440 RPM
TWO STAGE IMPELLER

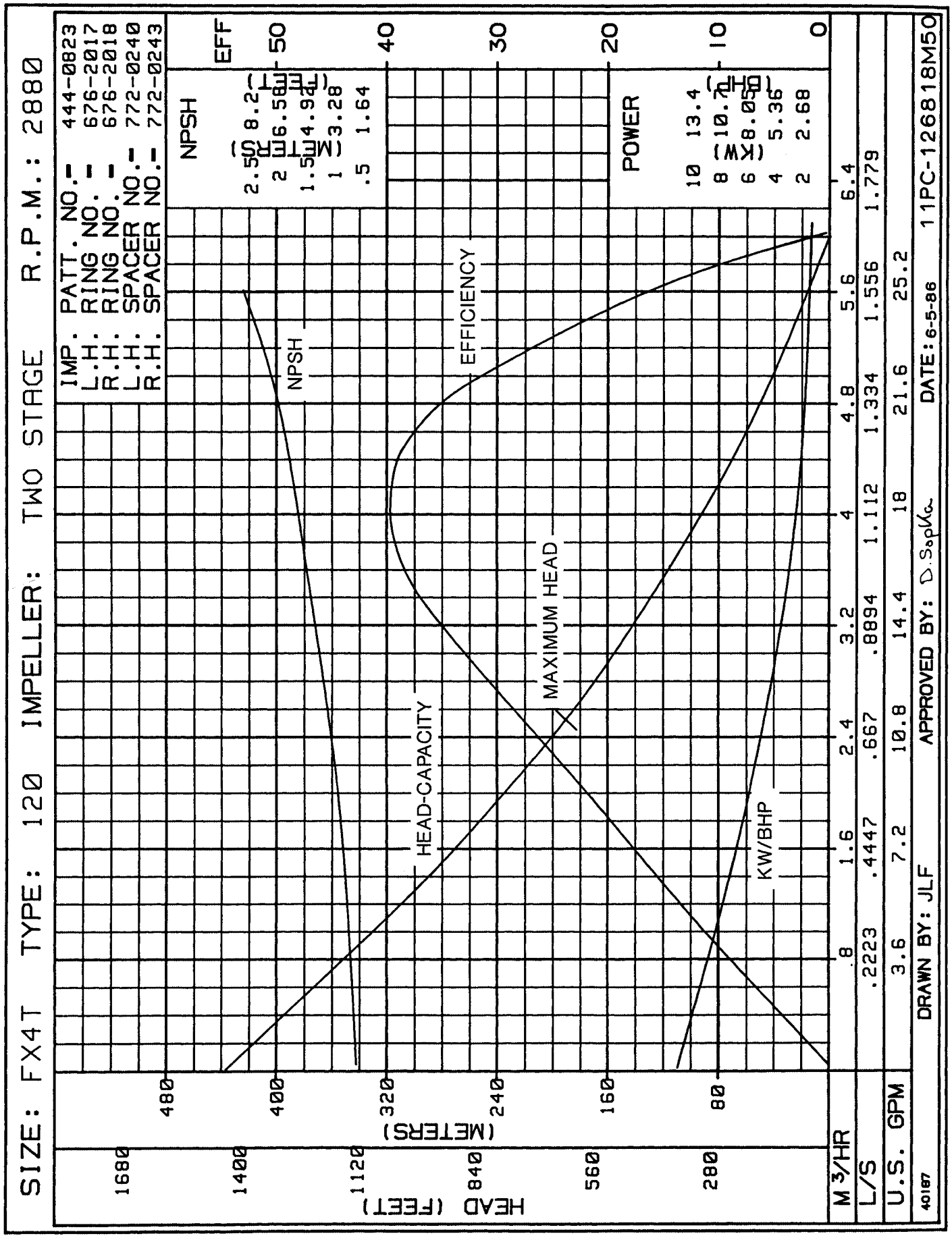
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Fx4T - 2880 RPM
TWO STAGE IMPELLER

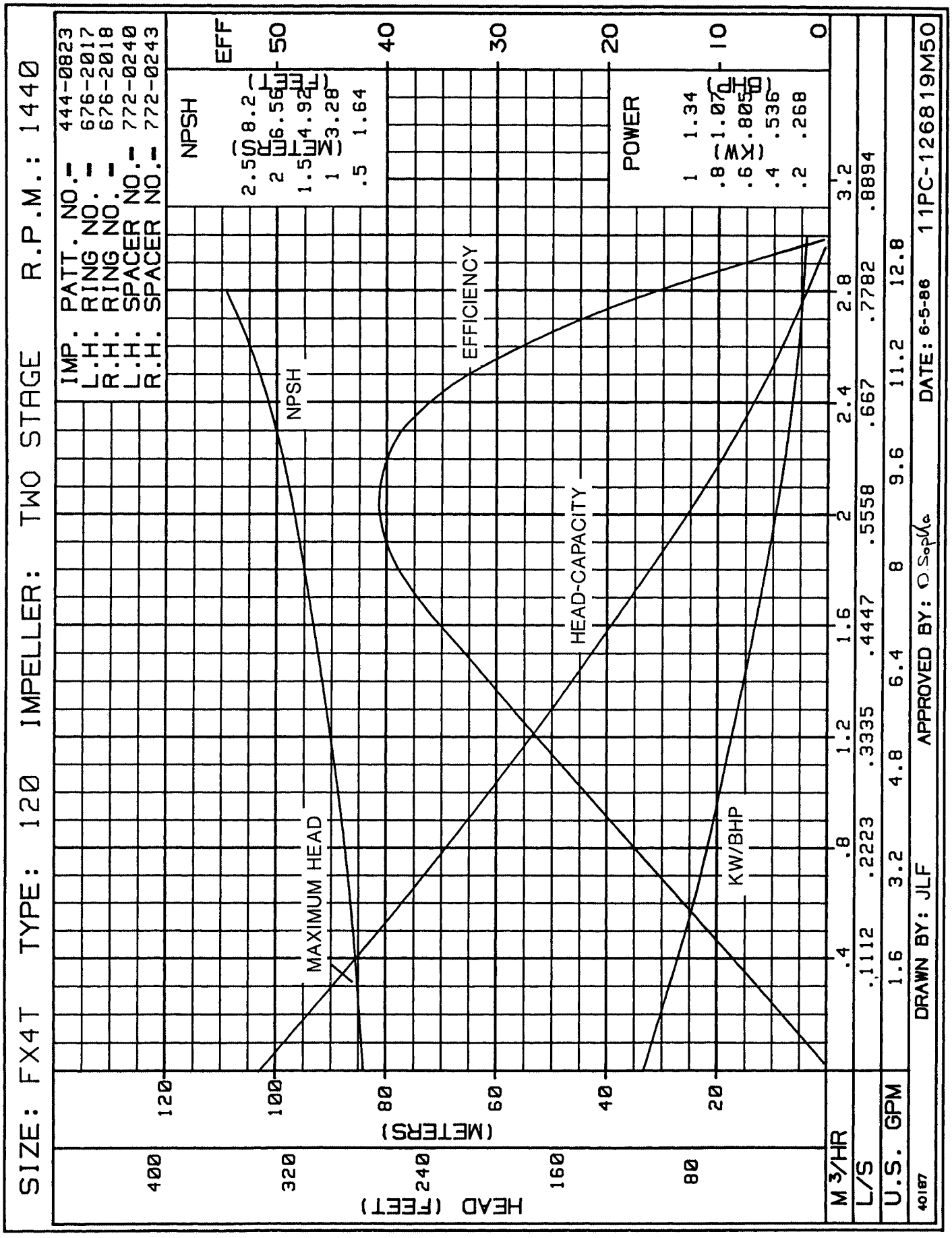
SECTION 120 (Metric 50Hz)
DATE JULY 1994
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SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

Fx4T - 1440 RPM
TWO STAGE IMPELLER

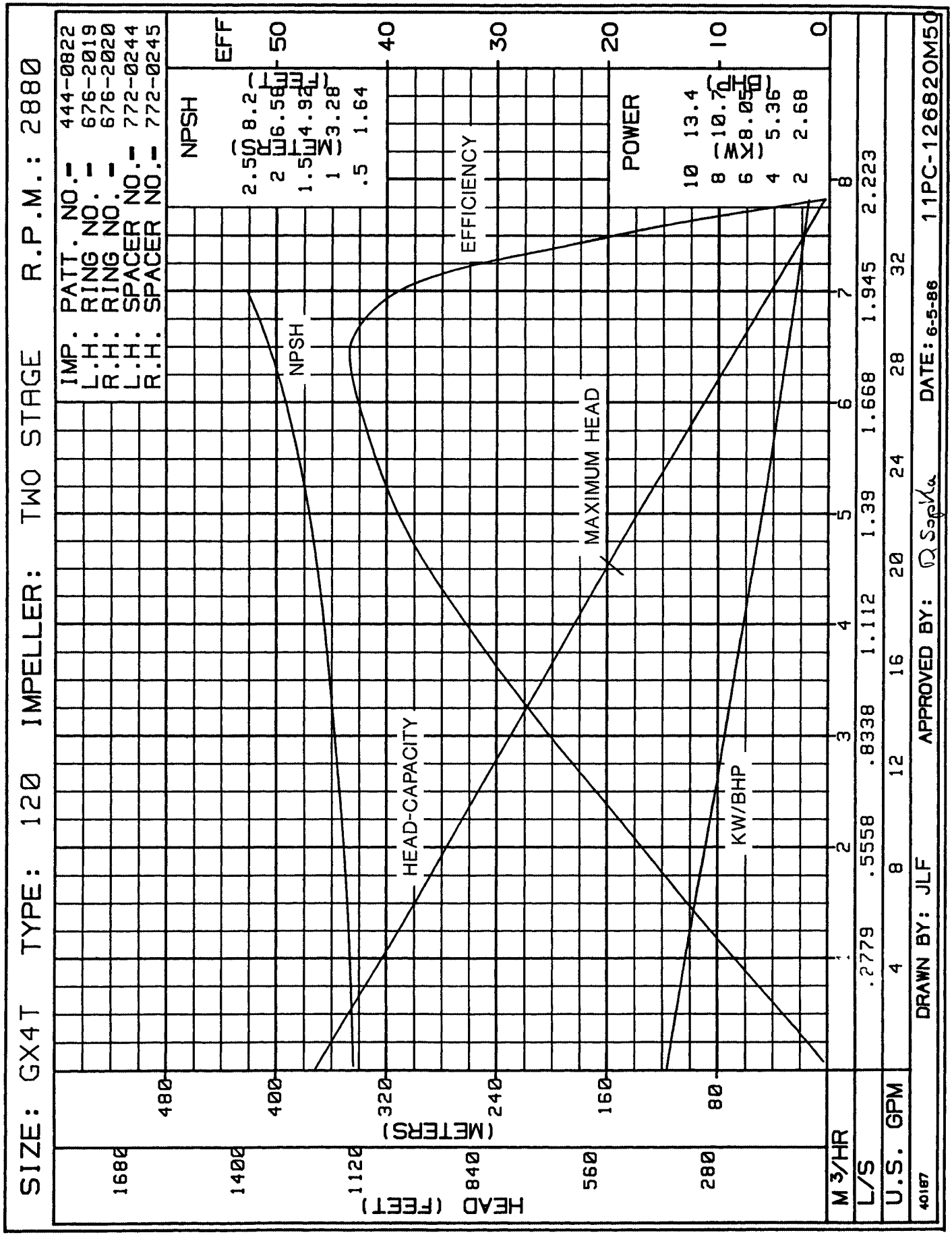
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Gx4T - 2880 RPM
TWO STAGE IMPELLER

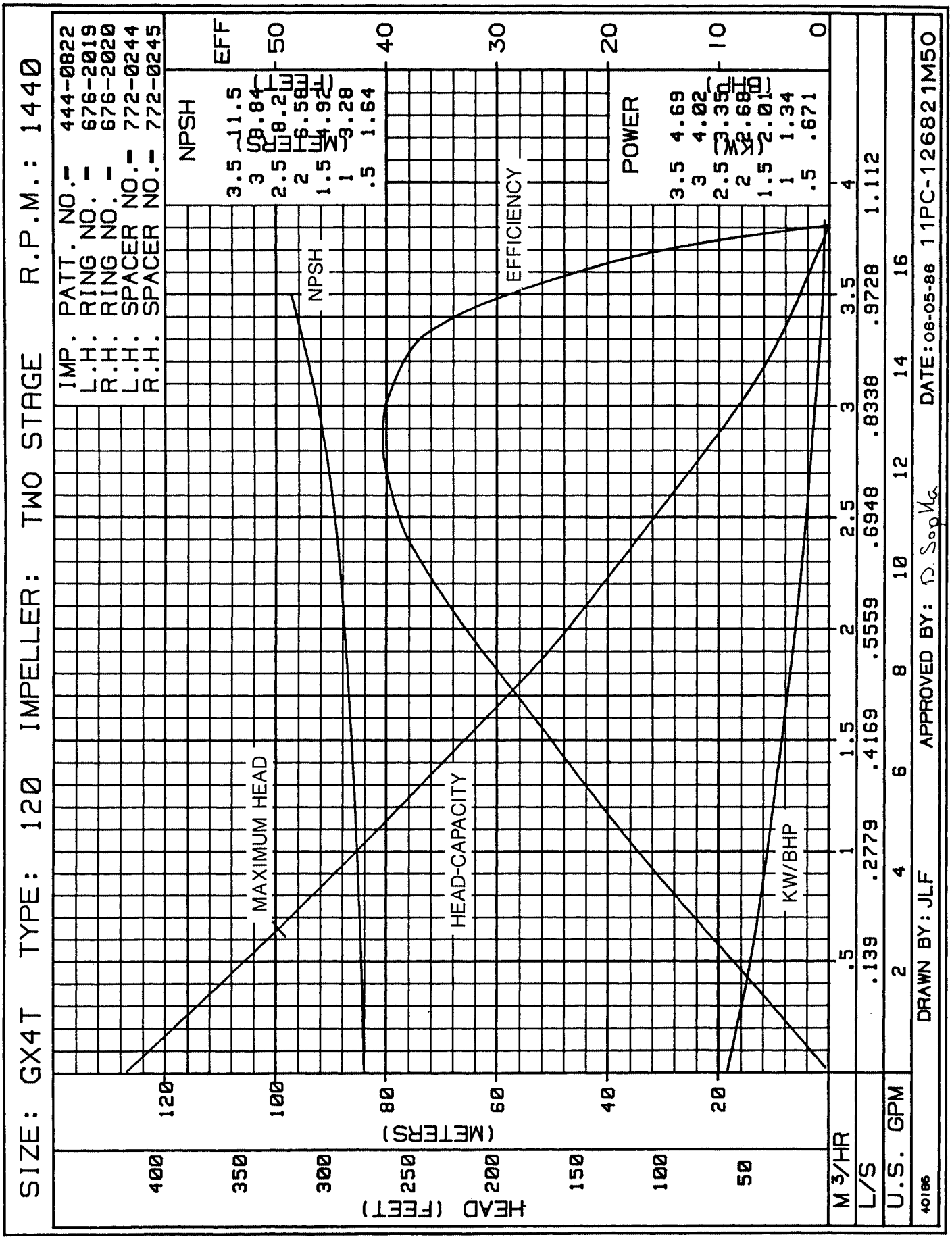
SECTION 120 (Metric 50Hz)
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SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

Gx4T - 1440 RPM
TWO STAGE IMPELLER

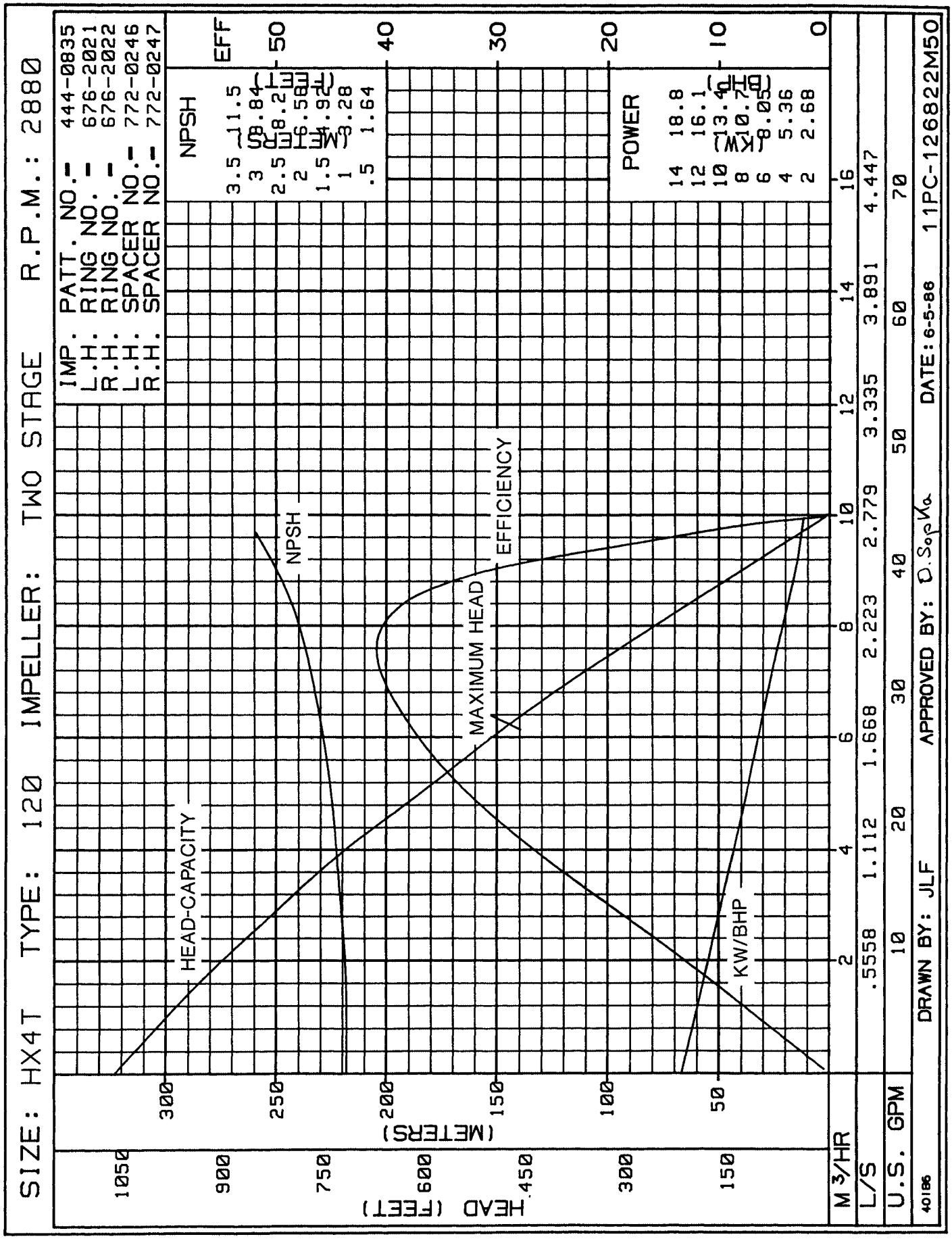
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Hx4T - 2880 RPM
TWO STAGE IMPELLER

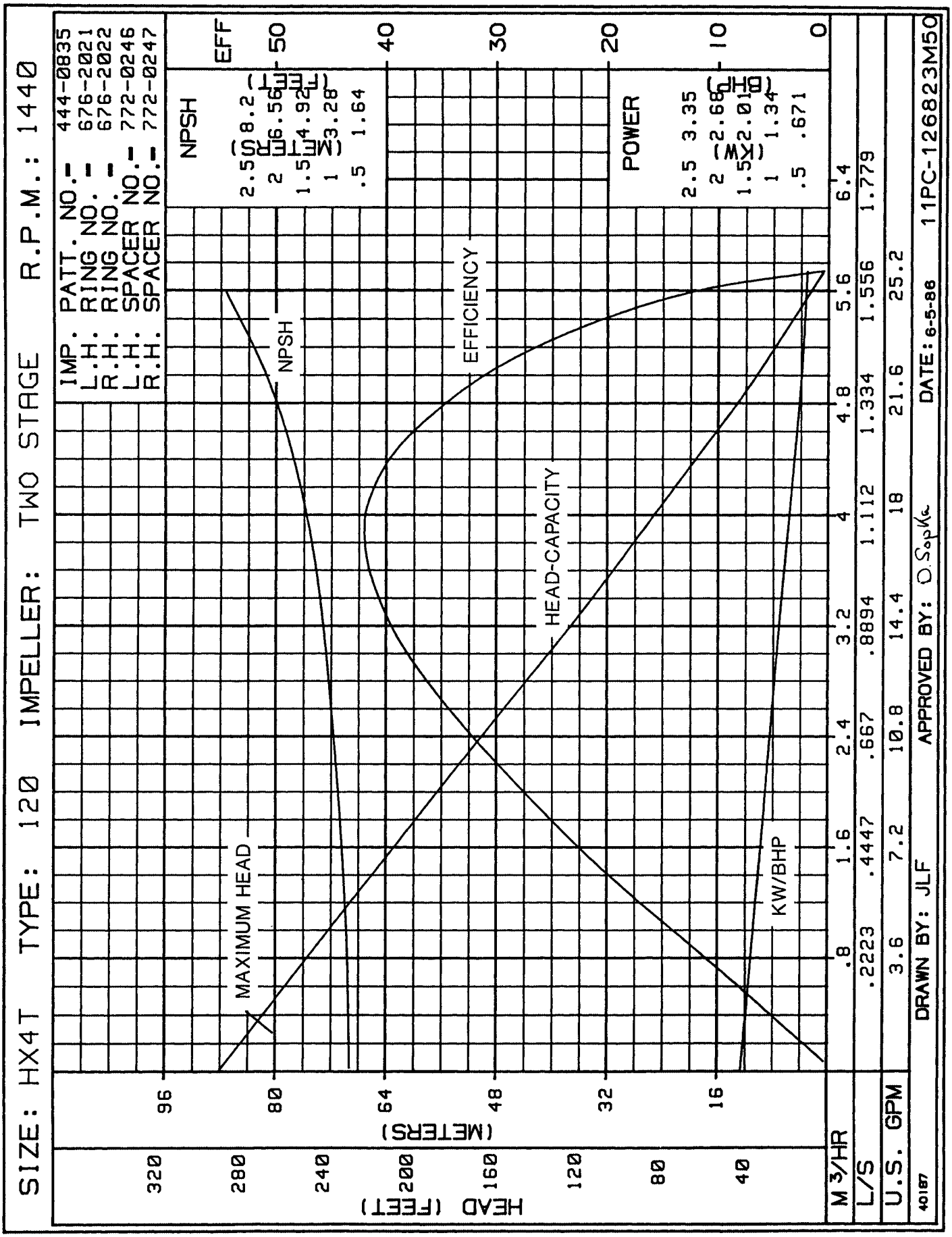
SECTION 120 (Metric 50Hz)
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Hx4T - 1440 RPM
TWO STAGE IMPELLER

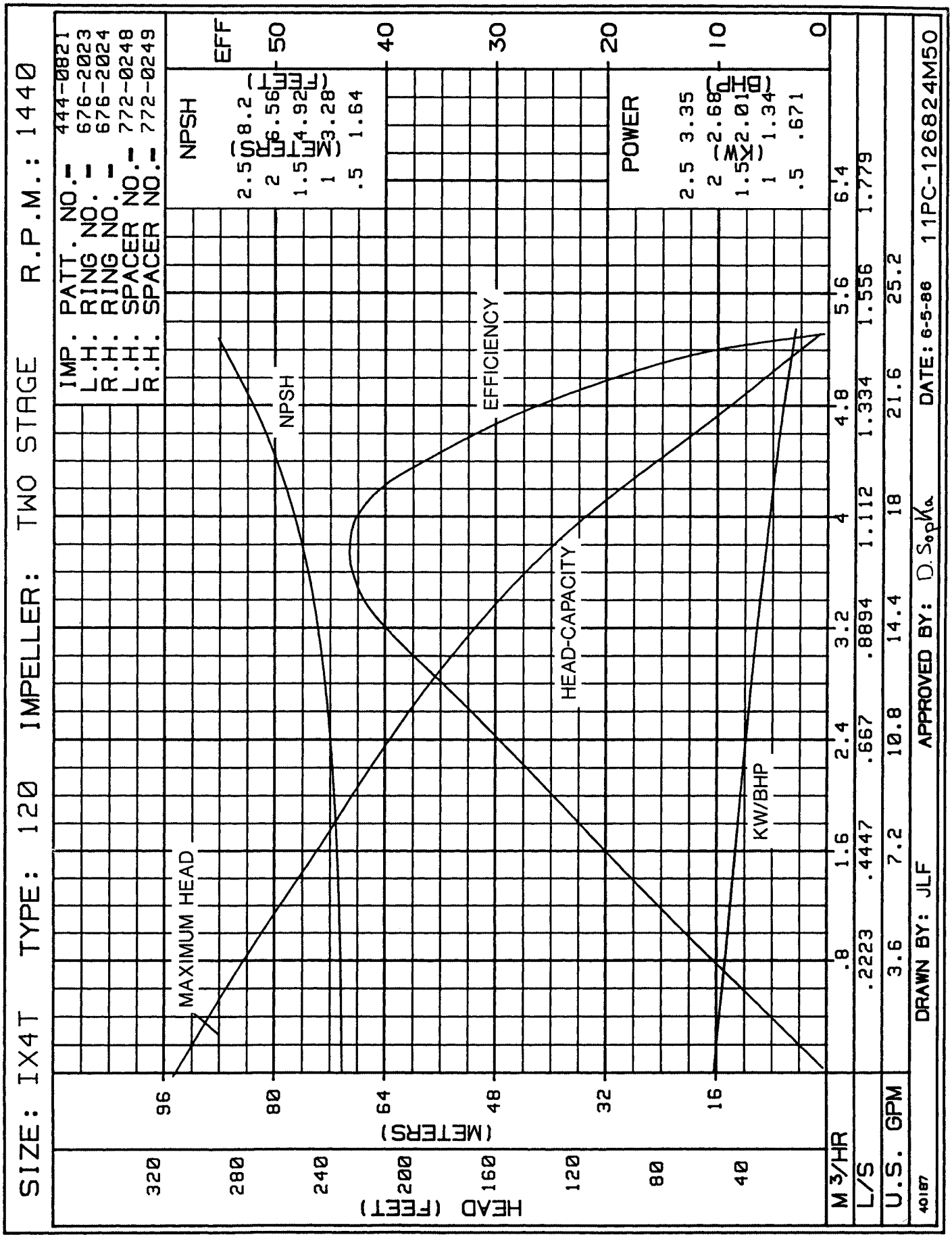
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Ix4T - 1440 RPM
TWO STAGE IMPELLER

SECTION 120 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



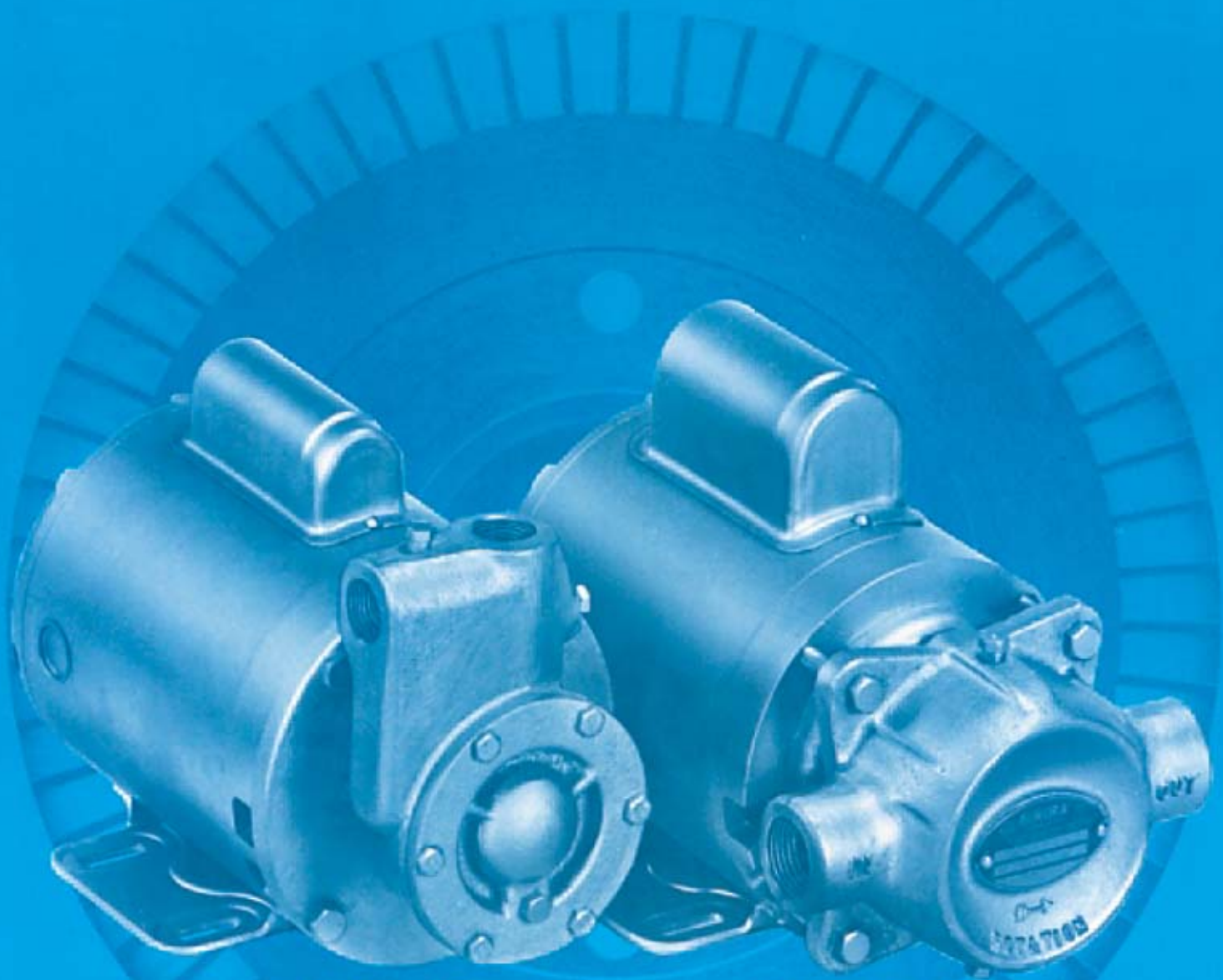
AURORA PUMP A member of PENTAIR PUMP GROUP

AURORA PUMP

BULLETIN 130/REV. H

130 SERIES SINGLE STAGE TURBINE TYPE PUMPS

CAPACITIES TO 50 G.P.M.
HEADS TO 700 FEET
TEMPERATURES TO 212°F



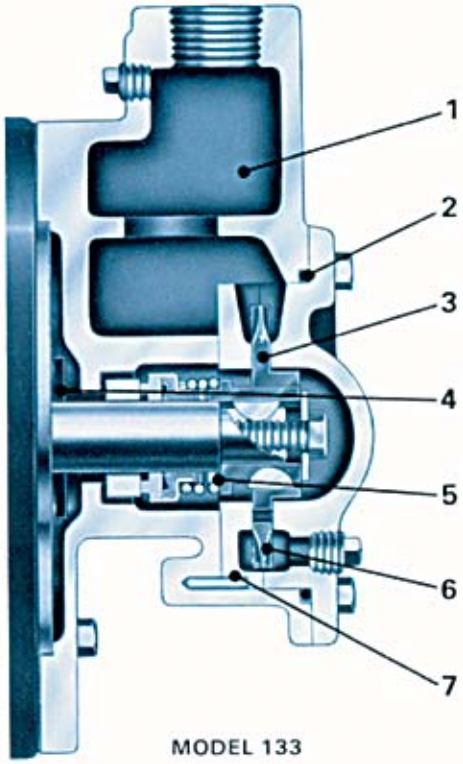
MODEL 133

MODEL 134-135

INTRODUCTION
AURORA TURBINE PUMPS

AURORA PUMP, a pioneer in turbine pump design, has long been the leader in the tubine pump industry. AURORA's leadership consistently offers the ultimate in turbine pump design. The regenerative turbine pump offers many advantages in the area of low flow and moderate to high pressure. A turbine pump is efficient under low flow—high pressure conditions and delivers a steady stream of liquid free from pressure pulsations. There is no metal to metal contact existing within the operating parts of a turbine pump channel. Turbine pumps have solved many liquid handling problems. Because of this versatility, thousands of turbine pump units have been in use for over 50 years. Aurora offers an efficient, economical and proven pump.

PUMP FEATURES



MODEL 133

1 SELF PRIMING feature is provided on Model 133.

2 "O" RING GASKETS prevent leakage.

3 SELF-CENTERING IMPELLER minimizes wear.

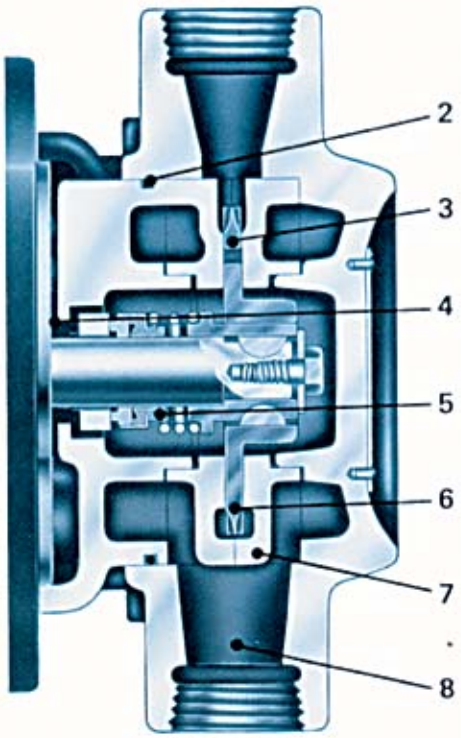
4 WATER SLINGERS protect bearings.

5 MECHANICAL SEAL has carbon against Ni-Resist face for optimum hot water performance. Long life is also assured with 303 stainless steel metal parts and "Buna-N" elastomers.

6 DOUBLE SUCTION IMPELLER minimizes axial thrust.

7 REPLACEABLE CHANNEL RINGS and impellers reduce maintenance costs.

8 STRAIGHT THROUGH IN LINE PIPING is provided on Models 134 and 135 for simple installation.



MODEL 134

THEY'RE ECONOMICAL
End-mounted, close-coupled design with single mechanical seal and choice of 3500 RPM or 1750 RPM operating speeds means you get greater capacity and pressure dollar for dollar. In fact, these close-coupled pumps are so economical, it's practical to have a spare unit ready for immediate replacement when maintenance is required.

THEY CAN'T "VAPOR LOCK"
Turbine impeller handles gases and vapors (up to 20%) along with the liquid . . . eliminating any possibility of vapor lock within the pump.

THEY'RE VERSATILE
Steep head curves with near-constant capacity over wide head variations means you can specify 130 Series Pumps for an extremely wide range of operating conditions. And, if it's necessary, Model 134 and 135 pumps can be easily field converted to right- or left-hand operation by rotating the casing 180° after removing only 4 mounting bolts. Need a self-priming pump? Specify Model 133 with the self-priming feature. This feature has made Model 133 a popular pump selection. Aurora responds to user's needs.

QUICK REFERENCE APCO-TURBINE FEATURE SELECTOR

STANDARD

Bronze fitted construction
Hydraulically balanced bronze impeller
300 # case working pressure
416 stainless steel shaft
Internal sealing water passages
Removable channel rings
VIP-TEST— Every pump is hydrostatically tested and given a running check consisting of head and capacity.

OPTIONAL

All iron, bronze ring, all bronze construction
Ductile iron or stain. stl. impeller
316 stainless steel or monel shaft
Vertical ASA Flanged suction casing (See Bulletin 680, Models 134 and 135 only)
Bypass with manual shut-off valves
Bypass with relief valve
Certified performance test data consisting of head capacity and horsepower readings taken over the full operating range of the pump.

PRINCIPLE OF OPERATION AND SELECTION CHART

Turbine pumps derive their name from the many buckets machined into the periphery of the rotating impeller. They have long since been recognized for their effectiveness in the areas of low flow, high head application. The turbine pump offers higher heads than centrifugal pumps. Because the head capacity curve is steep in a turbine pump, a greater degree of flexibility is available to the engineer. Turbine pumps having top center line discharge are self-venting and have the ability to handle vapors without vapor lock. This characteristic allows handling of boiling liquids and liquified gases at suction heads slightly over the vapor pressure. The turbine pump also has higher efficiencies at low flows than a centrifugal pump. Turbine pumps utilize close running clearances and are normally utilized on clean liquid applications. Viscous materials up to 500 S.S.U. can be pumped. Turbine pumps are unique in operation. The pumped liquid is directed by the liquid passage so that the liquid circulates in and out of the impeller buckets many times on its way from the pump inlet to the pump outlet. Both centrifugal and shearing action combine to impart additional energy to the liquid each time it passes through the buckets. Heads over 700 feet are successfully developed in a single stage pump. The impeller runs at very close axial clearances with the pump channel rings to minimize recirculation losses. The channel rings provide a circular channel around the blade area of the impeller, from the inlet to the outlet. Liquid entering the channel from the inlet is picked up immediately by the buckets on both sides of the impeller and pumped through the channel (Figure 1) by a shearing action. The flow of the liquid within the impeller buckets is illustrated in Figure 2. This process is repeated over and over, each cycle imparting more energy until the liquid is discharged. This flow is smooth and continuous. Turbine pumps are the most economical solution to general lift applications. Aurora Pump knows how to design and build an economical turbine pump without sacrificing quality or performance. For applications of regenerative turbine pumps manufactured by Aurora, refer to Bulletins 110/120, 150, 210, 280 and 680.

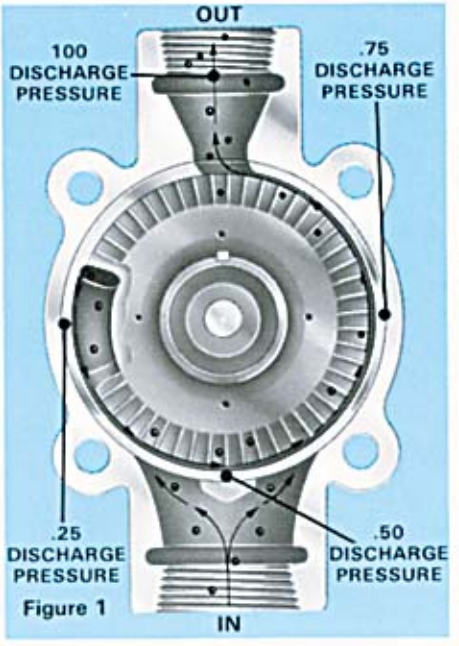


Figure 1

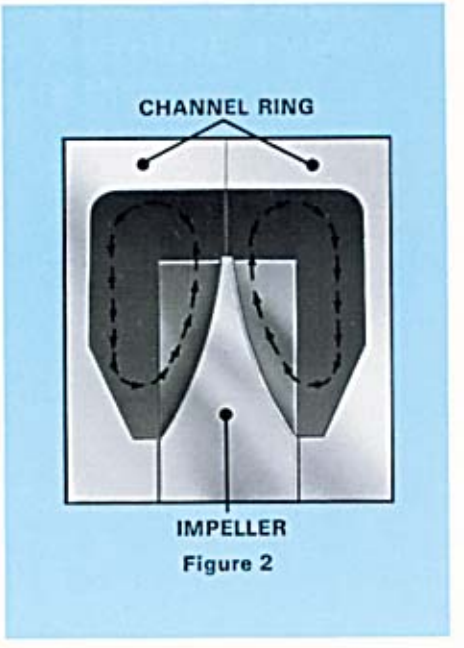


Figure 2

Determine the pump capacity and discharge head. Find the nearest charted head under the Total Dynamic Head listing, select the desired motor speed, and read down to the next larger capacity closest to the calculated requirement. The figures and numbers identify the size of the pump and the motor horsepower.

Horsepowers shown may not be non-overloading. Check performance curve for actual B.H.P.

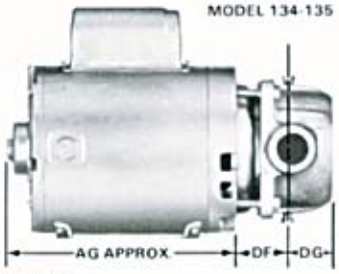
Selections are based on cold water with specific gravity of 1.0 . . . for final selection refer to performance curves.

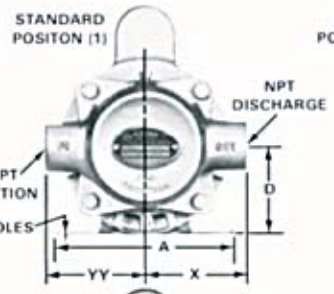
If fluctuation or increase in head is anticipated, the specific pump performance curve should be checked for final selection.

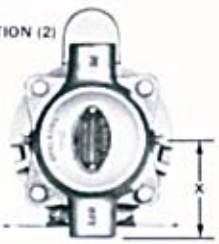
PUMP SIZE	R.P.M.		TOTAL DYNAMIC HEAD IN FEET																				
			10	20	30	40	50	60	70	80	90	100	150	200	250	300	350	400	450	500	550	600	650
D03	3500	GPM	7.2	6.9	6.6	6.3	5.9	5.6	5.2	4.7	4.3	3.9	2.3	1.0									
		HP	1/3	1/3	1/3	1/2	1/3	1/3	1/3	1/3	1/3	1/3	1/2	3/4									
E03	3500	GPM	10.8	10.1	9.7	9.2	8.8	8.4	8.0	7.6	7.2	6.9	5.2	3.7	2.1								
		HP	1/3	1/3	1/3	1/3	1/3	1/2	1/2	1/2	1/2	1/2	3/4	1	1								
F03	3500	GPM	12.0	11.5	11.0	10.4	9.9	9.5	9.1	8.6	8.3	7.9	6.1	4.4	2.7								
		HP	1/3	1/3	1/3	1/3	1/2	1/2	1/2	1/2	3/4	3/4	3/4	1	1 1/2								
G03	3500	GPM	15.8	15.3	14.7	14.2	13.7	13.2	12.7	12.2	11.7	11.3	9.1	6.9	4.5	2.0							
		HP	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	1	1	1 1/2	2	2							
B04	1750	GPM	3.8	3.5	3.2	2.8	2.5	2.2	1.8	1.5	1.1	0.7											
		HP	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3											
	3500	GPM	8.5	8.2	7.8	7.6	7.3	7.0	6.8	6.6	6.3	6.1	5.1	4.2	3.3	2.4	1.4						
		HP	1/3	1/3	1/3	1/3	1/3	1/3	1/2	1/2	1/2	1/2	3/4	3/4	1	1	1 1/2						
C04	1750	GPM	5.0	4.4	3.9	3.6	3.2	2.9	2.6	2.3	2.0	1.7											
		HP	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3											
	3500	GPM	10.6	10.2	9.9	9.6	9.4	9.1	8.8	8.5	8.3	8.1	6.9	5.8	4.8	3.8	2.8	1.9					
		HP	1/3	1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4	1	1	1 1/2	1 1/2					
D04	1750	GPM	6.6	6.2	5.7	5.2	4.7	4.2	3.6	3.0	2.4	1.8											
		HP	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3											
	3500	GPM	12.3	12.2	12.1	12.0	11.9	11.8	11.7	11.6	11.5	11.3	10.4	9.0	7.1	5.5	4.0	2.6					
		HP	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1 1/2	1 1/2	2	2					
F05	1750	GPM	8.2	7.6	7.1	6.6	6.3	6.0	5.6	5.4	5.1	4.8	3.4	2.0									
		HP	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/2	1/2	1/2	3/4									
	3500	GPM	16.5	16.3	16.0	15.7	15.5	15.3	15.0	14.7	14.4	14.2	13.0	11.9	10.8	9.8	9.0	8.0	7.1	6.3	5.5	4.6	3.8
		HP	3/4	3/4	3/4	3/4	3/4	1	1	1	1	1	1 1/2	1 1/2	2	2	3	3	3	3	5	5	5
G05	1750	GPM	12.3	10.7	9.9	9.2	8.4	7.8	7.2	6.6	6.0	5.4	2.6										
		HP	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/2	1/2	1/2	3/4										
	3500	GPM	24.9	24.6	24.1	23.8	23.6	23.0	22.7	22.3	22.0	21.5	20.0	18.2	16.6	15.0	13.5	12.0	10.5	9.0	7.7	6.4	5.1
		HP	2	2	2	2	2	2	2	2	3	3	3	3	5	5	5	5	5	5	7 1/2	10	10
H05	1750	GPM	14.0	13.1	12.4	11.8	11.2	10.7	10.2	9.7	9.2	8.8	6.7	4.7	3.0								
		HP	1/3	1/3	1/3	1/3	1/2	1/2	1/2	3/4	3/4	3/4	1	1	1 1/2								
	3500	GPM	25.0	24.9	24.7	24.5	24.4	24.2	24.1	24.0	23.8	23.7	22.8	21.7	20.5	19.2	17.8	16.0	14.4	12.9	11.3	10.0	8.5
		HP	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	3	3	5	5	5	5	7 1/2	10	10	10
I05	1750	GPM	18.0	17.2	16.5	15.6	15.0	14.2	13.5	12.8	12.2	11.5	8.5	5.7	3.0								
		HP	1/3	1/3	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	1	1 1/2	2								
	3500	GPM	31.3	31.2	31.1	31.1	31.0	30.9	30.8	30.7	30.6	30.5	29.8	28.5	26.8	25.0	23.2	21.5	19.8	18.1	16.5	14.9	13.2
		HP	3	3	3	3	3	3	3	3	3	3	5	5	5	5	5	7 1/2	10	10	10	10	10
J05	1750	GPM	24.4	23.7	22.6	21.5	20.3	19.2	18.1	17.0	15.6	14.5	8.4	2.2									
		HP	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	1	1 1/2	1 1/2									
	3500	GPM	38.4	38.3	38.2	38.1	38.1	38.0	38.0	37.9	37.8	37.8	37.2	36.5	35.0	32.8	30.3	27.5	24.5	21.3	18.0	14.5	11.0
		HP	3	3	3	3	3	3	3	3	5	5	5	5	5	7 1/2	7 1/2	10	10	10	10	10	15
K05	1750	GPM	30.1	29.0	28.0	26.9	25.8	24.6	23.5	22.2	21.0	19.8	12.7	5.0									
		HP	1/3	1/3	1/2	1/2	3/4	3/4	3/4	1	1	1	1 1/2	2									
	3500	GPM	43.7	43.6	43.6	43.5	43.5	43.4	43.4	43.3	43.3	43.2	42.9	42.3	41.7	40.9	39.0	36.0	32.7	29.1	25.7	22.0	18.0
		HP	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	10	10	10	10	15	15	15

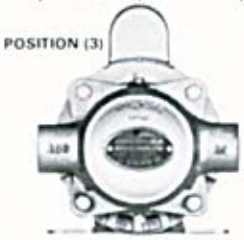
ENGINEERING SPECIFICATIONS & DIMENSIONS

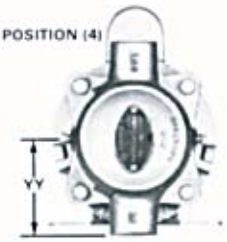
The contractor shall furnish (and install as shown on the plans) an Aurora regenerative turbine type pump model . . . . . size . . . . . (Bronze Fitted) (All Iron) (All Bronze). Each pump shall have a capacity of . . . . . G.P.M. when operating at a total head of . . . . . feet. Pumping temperature is . . . . . °F. Specific gravity is . . . . . The fluid to be pumped is (describe) . . . . . and NPSH of . . . . . Suction pressure will be . . . . . feet. The pump is to be furnished with mechanical seal, replaceable channel rings with in-line suction and discharge openings in casing. The casing shall be of 30,000 pound tensile strength cast iron. The impeller shall be hydraulically self-centering and no external adjustment shall be necessay. Each pump shall be tested prior to shipment. The pump shall be close coupled to a . . . . . HP . . . . . phase . . . . . Hertz . . . . . voltage . . . . . R.P.M., horizontal (dripproof) (totally enclosed) (explosion proof) motor. For (continuous) (intermittent) operation in a . . . . . °F maximum and . . . . . °F minimum atmosphere. The motor shall be sized to prevent overloading at the highest head condition listed in the specifications.







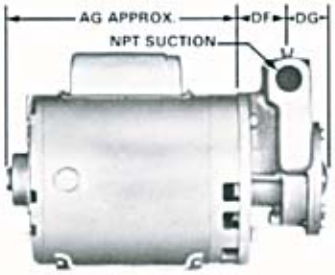




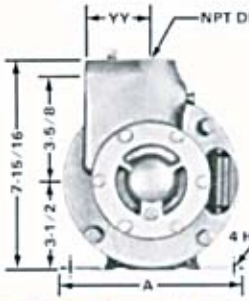
NOTES

1. Dimensions and weights are approximate.
2. All dimensions are in inches and may vary ±1/8".
3. Frame sizes, "AG" dimension and motor weight are for open drip proof motors only.
4. Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
5. Add pump and motor weight for unit weight.
6. Not for construction purposes unless certified.
7. Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information, without notice.

*Single phase only. **Three phase only.



MODEL 133





MODEL 133 MODEL 134-135

Frame	Horsepower 3500 RPM	Horsepower 1750 RPM	Motor Weight (Lbs.)	A	D	AG	Model
56	⅓	⅓	29	6¼	3½	11	133 134 135
	½	½	46				
	¾	¾	56				
	1	1	56				
	1½	1½**	65				
	2	—	80				
145T	—	1½*	42	7	3½	11	134 135
	3**	2**	48				
182T	3*	2*	65	9	4½	11	
	5**	3**	69				
184T	7½**	3*	79	9	4½	12	
	—	5**	83				
213T	10	—	105	10½	5¼	14	135
215T	15	—	125	10½	5¼	15	
254T	20	—	200	12½	6¼	17	

Model	133	134	135
Suction	¾	1	2
Disch.	¾	1	1½
DF	1⅞	2	2¼
DG	1½	1 11/16	2¼
X	NA	3¼	4½
YY	2½	3¼	4½
Pump Wt. (Lbs.)	13	16	30

MATERIALS OF CONSTRUCTION

PUMP PART	BRONZE FITTED	ALL IRON	ALL BRONZE
CASING	CAST IRON ASTM A48	CAST IRON ASTM A48	BRONZE ASTM B62
COVER (133)	CAST IRON ASTM A48	CAST IRON ASTM A48	BRONZE ASTM B62
IMPELLER	BRONZE ASTM B62	DUCTILE IRON ASTM A395	BRONZE ASTM B62
IMPELLER SLEEVE	BRONZE ASTM B62	STAIN. STEEL AISI 316	BRONZE ASTM B62
INNER RING	CAST IRON ASTM A48	CAST IRON ASTM A48	BRONZE ASTM B62
OUTER RING (134-135)	CAST IRON ASTM A48	CAST IRON ASTM A48	BRONZE ASTM B62
MECHANICAL SEAL	316 stainless steel metal parts, "Buna N" elastomer parts, Ni-resist seat and carbon washer		

LIMITATIONS

Pump Model	Pump Size	Max. Suct. Pressure P.S.I.	Max. Diff. Pressure P.S.I.	Max. Casing Pressure P.S.I.	Max. Temp. °F.	Min. Suct Pressure Vac. in Hg	Motor Frame
133	D03 thru G03	100	150	175	225	26	145T 182T 184T
134	B04 C04 D04	100	225 190 180	300	225	26	
135	F05 G05 H05 I05 J05 K05	100	280 250 220 175 150 130	300	225	26	
135	F05 thru K05	100	300	300	225	26	213T 215T 254T

NOTES

1 Maximum differential pressure based on allowable shaft deflection for standard shafts.

2 Maximum casing pressure based on laboratory tests at twice the pressure shown.

3 All pressure limitations on this chart are based on standard pumps constructed of standard materials and handling water at normal temperatures.

4 For temperatures below 32°F., consult factory.

5 Maximum suction pressure based on limitations of mechanical seal furnished as standard.

6 Pumps should not be used when any one of the above limitations is exceeded.

NOTE: 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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WEB: www.aurorapump.com
EMAIL: aurora_info@pentairpump.com

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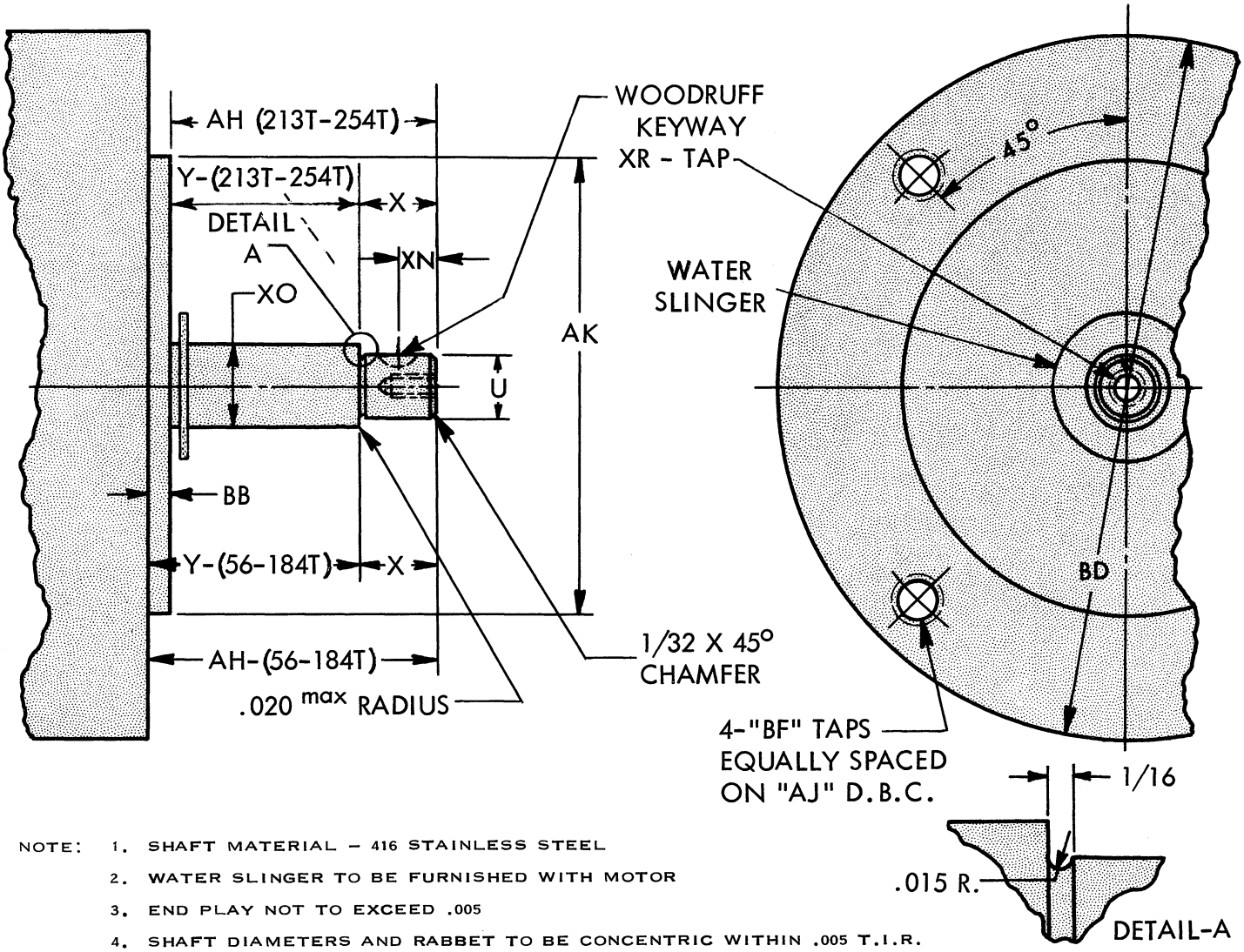
SALES OFFICES IN ALL MAJOR CITIES AND COUNTRIES
Refer to "Pumps" in yellow pages of your phone directory for your local Distributor.

AURORA® Pentair Pump Group

60 HERTZ MOTOR DATA SHEET
1 PHASE: 115-230 VOLTS
3 PHASE: 200 (ONLY) OR 230/460 VOLTS
AURORA MOTOR FRAMES

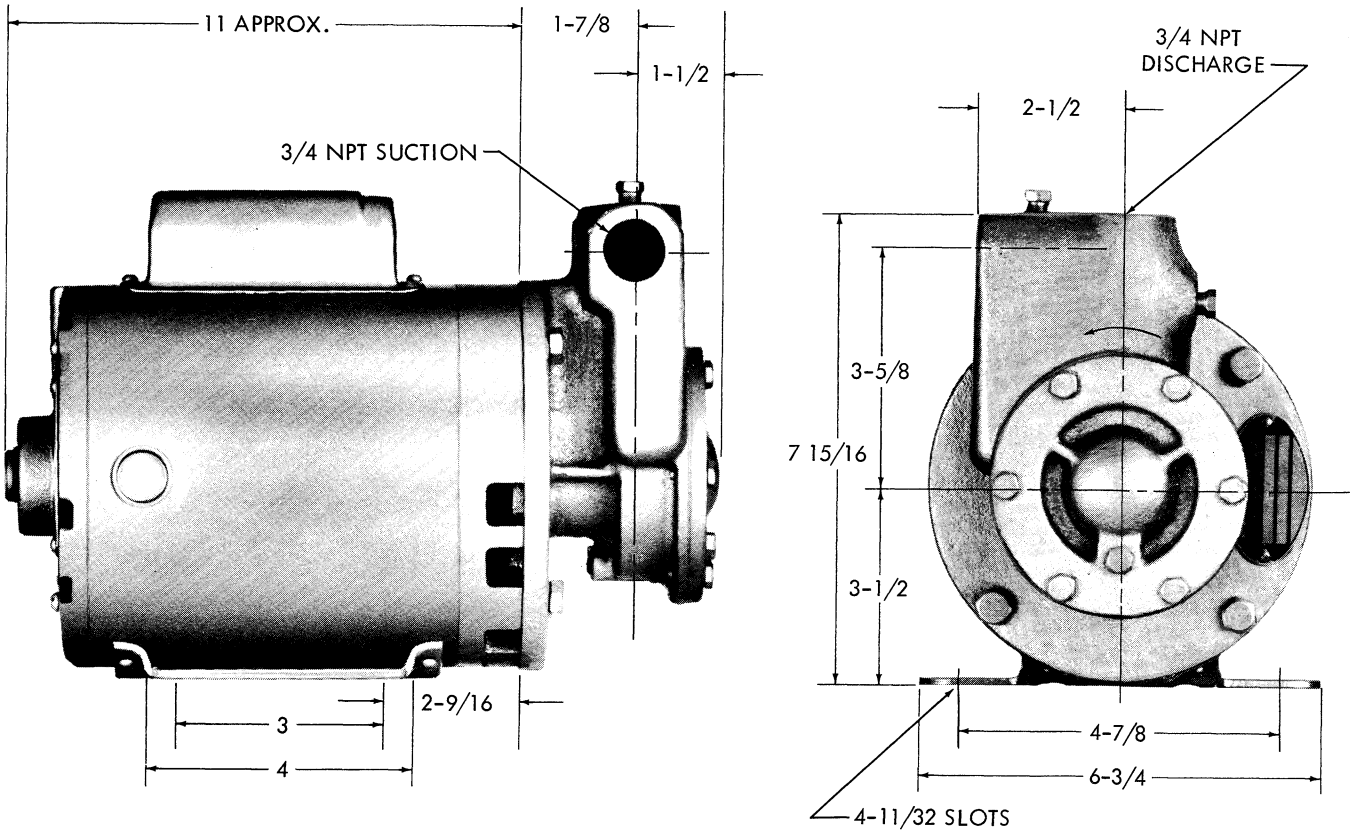
H.P.	ELECTRICAL CHARACTERISTICS 60 CYCLE			HORIZONTAL AND VERTICAL			
	PHASE	VOLT	R.P.M.	OPEN DRIPPROOF FRAME	SERVICE FACTOR O.D.P.	TEFC & EXP PROOF FRAME	SERVICE FACTOR TEFC & EXP PROOF
1/3	1	115-230	1750	56	1.35		
	1	115-230	3500	56	1.60		
	3	200	1750	56	1.35	56	1.0
		230/460	1750				
	3	200	3500	56	1.75	56	1.0
		230/460	3500				
1/2	1	115-230	1750	56	1.25	56	1.0
	1	115-230	3500	56	1.60	56	1.0
	3	200	1750	56	1.25	56	1.0
		230/460	1750				
	3	200	3500	56	1.60	56	1.0
		230/460	3500				
3/4	1	115-230	1750	56	1.25	56	1.0
	1	115-230	3500	56	1.50	56	1.0
	3	200	1750	56	1.25	56	1.0
		230/460	1750				
	3	200	3500	56	1.50	56	1.0
		230/460	3500				
1	1	115-230	1750	56	1.25	56	1.0
	1	115-230	3500	56	1.40	56	1.0
	3	200	1750	56	1.25	56	1.0
		230/460	1750				
	3	200	3500	56	1.40	56	1.0
		230/460	3500				
1-1/2	1	115-230	1750	145T	1.15	145T	1.0
	1	115-230	3500	56	1.40	56	1.0
	3	200	1750	56	1.20	56	1.0
		230/460	1750				
	3	200	3500	56	1.40	56	1.0
		230/460	3500				
2	1	115-230	1750	182T	1.15	182T	1.0
	1	115-230	3500	56	1.20	145T	1.0
	3	200	1750	145T	1.15	145T	1.0
		230/460	1750				
	3	200	3500	56	1.20	145T	1.0
		230/460	3500				
3	1	115-230	1750	184T	1.15	184T	1.0
	1	115-230	3500	182T	1.15	182T	1.0
	3	200	1750	182T	1.15	182T	1.0
		230/460	1750				
	3	200	3500	145T	1.15	182T	1.0
		230/460	3500				
5	3	200	1750	184T	1.15	184T	1.0
		230/460	1750				
	3	200	3500	182T	1.15	184T	1.0
		230/460	3500				
7-1/2	3	200	3500	184T	1.15	213T	1.0
		230/460	3500				
10	3	200	3500	213T	1.15	215T	1.0
		230/460	3500				
15	3	200	3500	215T	1.15	254T	1.0
		230/460	3500				
20	3	200	3500	254T	1.15	256T	1.0
		230/460	3500				

AURORA MODELS 133,134,135
SHAFT EXTENSION



NOTE:
1. SHAFT MATERIAL – 416 STAINLESS STEEL
2. WATER SLINGER TO BE FURNISHED WITH MOTOR
3. END PLAY NOT TO EXCEED .005
4. SHAFT DIAMETERS AND RABBET TO BE CONCENTRIC WITHIN .005 T.I.R.

FRAME SIZE	U	X	Y	AH	AJ	AK	BB	BD	BF SIZE & DEPTH	XN	XO	XR	WOODRUFF KEY
56 145T 182T 184T	.5900 — .5895	11/16	1 7/8	2 9/16	5 7/8	4.500 — 4.497	1/8	6 1/2	3/8-16 N.C. 5/8 DEEP	5/16	.7500 — .7495	1/4-28 N.F. 1/2 DEEP	#3
213T 215T 254T	.8750 — .8745	11/16	1 7/8	2 9/16	7 1/4	8.500 — 8.497	1/4	8 7/8	1/2-13 N.C. 5/8 DEEP	5/16	1.1250 — 1.1245	3/8-24 N.F. 3/4 DEEP	#61



MODEL 133				
PUMP SIZE	D03	E03	F03	G03

NOTES

1. ALL DIMENSIONS IN INCHES.
2. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
3. CONDUIT BOX IS SHOWN IN APPROXIMATE LOCATION. CAPACITOR WHEN FURNISHED NORMALLY APPEARS ON TOP OF MOTOR. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
4. DIMENSIONS MAY VARY ± 1/4".
5. CHECK DISCHARGE POSITION, CASING DIMENSIONS WHICH EXCEED DIMENSION "D" MAY REQUIRE PADS FOR THE MOTOR.
6. MOTOR FRAME 56.

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INSTRUCTION MANUAL
REPAIR
MODEL 133 (03-SERIES)

6

SERVICE

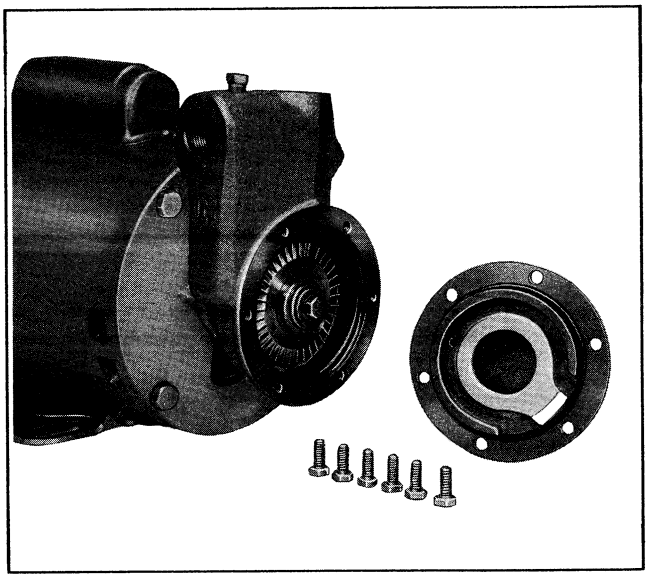
Your Aurora pump requires no maintenance other than periodic inspection and occasional cleaning. The intent of inspection is to prevent breakdown, thus obtaining optimum service life. The pump is lubricated by the liquid being pumped and therefore does not require periodic lubrication. The motor, however may require lubrication, in which case, the motor manufacturer's recommendation should be followed.

REPAIRS

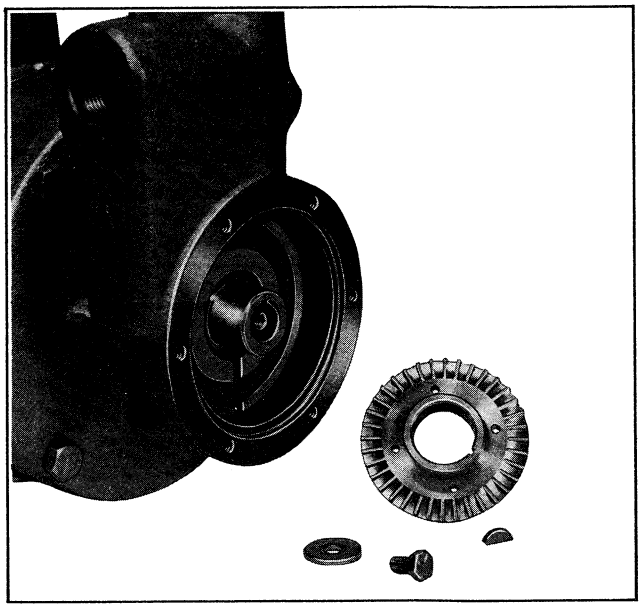
The pump may be disassembled using the illustrations and text provided. Although complete disassembly is covered, it will seldom be necessary to completely disassemble your Aurora pump.

The illustrations accompanying the disassembly instructions show the pump at various stages of disassembly. The illustrations are intended to aid in the correct identification of the parts mentioned in the text.

Inspect removed parts at disassembly to determine their reusability. Cracked castings should never be reused. All packing and gaskets should be replaced with new ones at reassembly simply as a matter of economy; they are much less expensive to replace routinely than to replace as the need occurs. In general it is economical to return to the manufacturer for repair only the motor and motor controller.

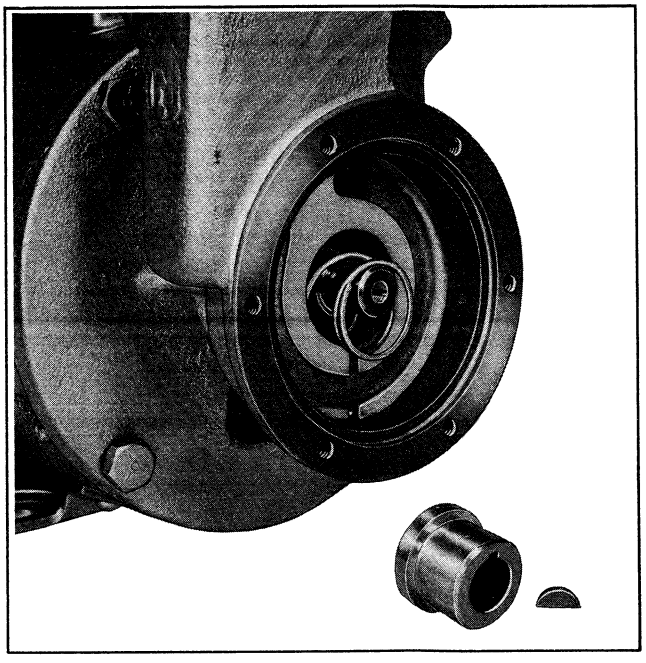


Pump casing cover removed.



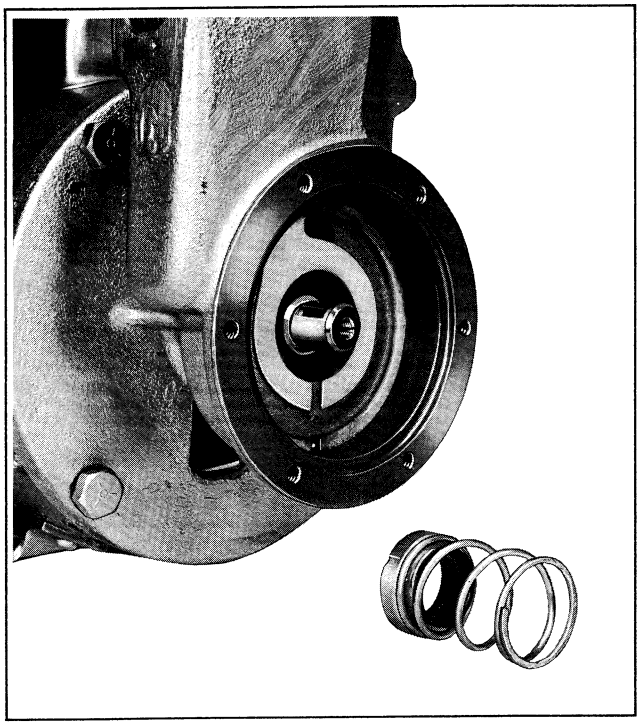
Impeller, screw, washer and key removed.

Disassembly. Disassemble only what is needed to make repairs or accomplish inspection.



Impeller sleeve and key removed.

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Mechanical seal and spring removed.

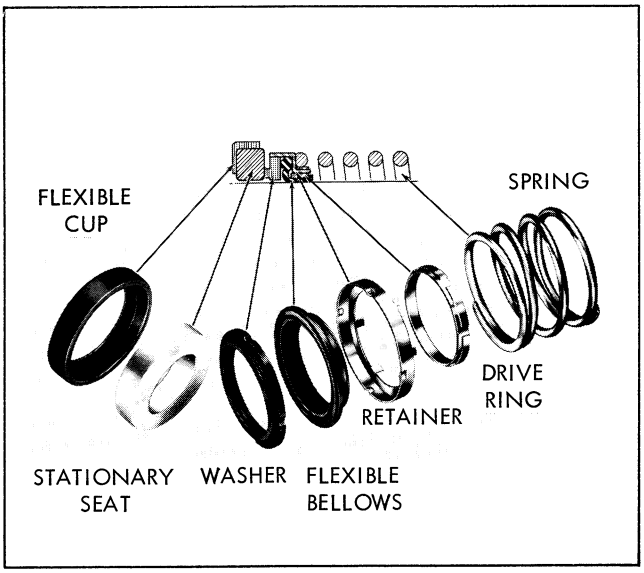


Figure 1. Mechanical Seal

Disassemble Model 133 pump (See Figure 2).

1. Remove the six screws (1) and separate cover (3) and gasket (4) from pump casing (17).

2. If replacement is necessary, remove the two plugs (2), drive screws (15), and nameplate (16) from the pump casing.

3. Remove screw (5) and washer (6) and impeller (7) with key (10) from impeller sleeve.

4. Remove impeller sleeve (9) and key (8) from shaft.

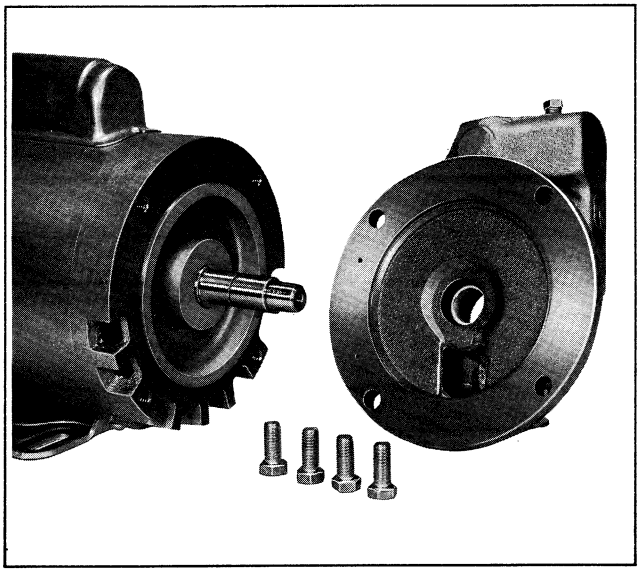
5. Carefully remove the mechanical seal (11). The stationary portion of the seal may be removed in Step 7 below.

CAUTION

The mechanical seal (see Figure 1) is a precision product and must be treated as such. During removal great care must be taken to avoid dropping any part of the seal. Take particular care not to scratch the lapped faces on the washer or the sealing seat. Do not put a seal back into service until the sealing faces of the washer and seat have been relapped or replaced.

6. Remove the inner ring (12) and ring key (13).

7. Remove screws (14) and separate pump casing (17) with stationary portion of seal from motor by applying a steady force between casing and motor.



Pump casing removed.

Reassembly. Clean and inspect all parts thoroughly prior to reassembly. Replace gasket. Check that all mating surfaces are free of nicks and burrs. Inspect the impeller hub carefully for signs of excessive wear. Proceed to reassemble the pump as follows: (See Figure 2).

1. Position the pump casing (17) on the motor and secure with screws (14). Tighten screws evenly.

2. Attach nameplate (16) with screws (15), and replace plugs (2) if these were removed.

NOTE

The mechanical seal (11) cannot be installed as an assembly; the seal seat must be properly in place before the balance of parts can be added.

Reassembly Cont.

2. Thoroughly inspect the seal cavity in the pump casing, checking for burrs or nicks which could damage the seat of the mechanical seal (11). Apply a film of soap paste or light oil (not grease) to the seal seat and install, taking care to seat it evenly and squarely.

NOTE

If it is not possible to insert seat with fingers, place cardboard protecting ring, furnished with seal, over lapped face of seat and press into place with a piece of tubing having end cut square. Tubing should be slightly larger than the diameter of the shaft. Remove cardboard after the seat is firmly seated.

3. Apply a film of soap paste only (not grease) to allow remaining seal parts to be pushed onto shaft. Check the proper sequence of assembly as shown in Figure 1.

4. Install inner ring (12) and ring key (10). Ring is located by key.

5. Replace shaft key (8) and impeller sleeve (9). Be sure spring of mechanical seal is properly positioned on back side of impeller sleeve.

6. Slip on impeller (7). Line up impeller keyway with key (10) so that key is not pushed out of keyway when the impeller is replaced. Secure impeller with washer (6) and screw (5).

7. Place gasket (4) in its seat.

8. Replace cover (3) and attach with screws (1).

9. Attach nameplate (16) with screws (15), and replace plugs (2) if these were removed.

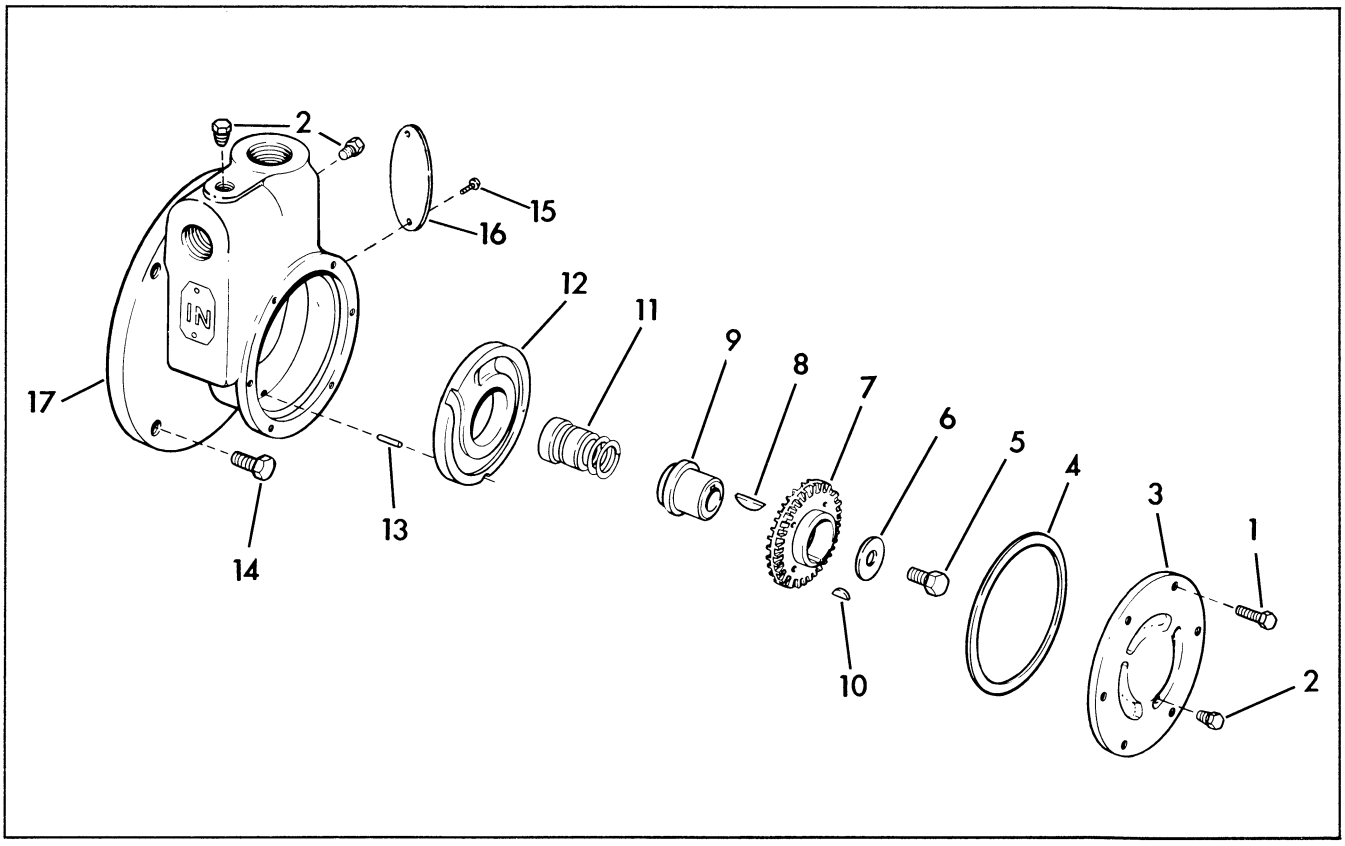


Figure 2. Model 133 Pump Exploded View

List of Parts For Model 133

1. Capscrew
2. Pipe Plug
3. Cover
4. Gasket
5. Capscrew
6. Washer
7. Impeller
8. Key
9. Sleeve
10. Key
11. Seal
12. Inner Ring
13. Pin
14. Capscrew
15. Drive Screw
16. Nameplate
17. Casing

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INSTRUCTION MANUAL
REPAIR
MODEL 134-135 (04-05 SERIES)

6

SERVICE

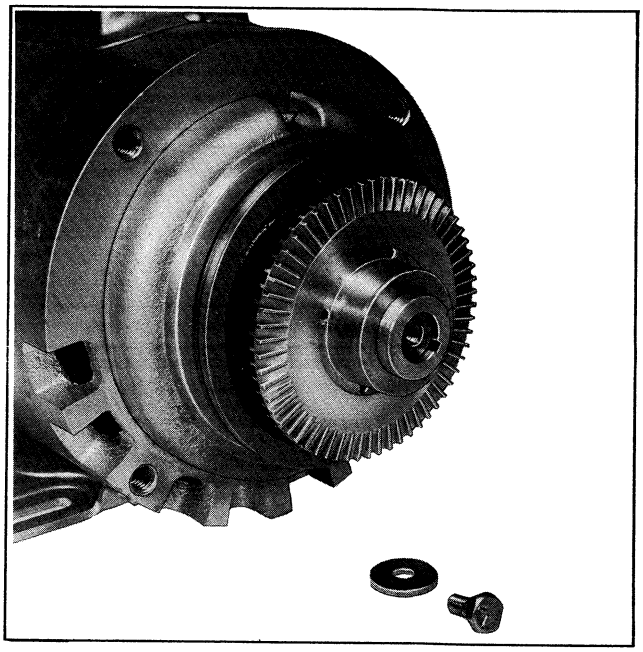
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REPAIRS

The pump may be disassembled using the illustrations and text provided. Although complete disassembly is covered, it will seldom be necessary to completely disassemble your Aurora pump.

The illustrations accompanying the disassembly instructions show the pump at various stages of disassembly. The illustrations are intended to aid in the correct identification of the parts mentioned in the text.

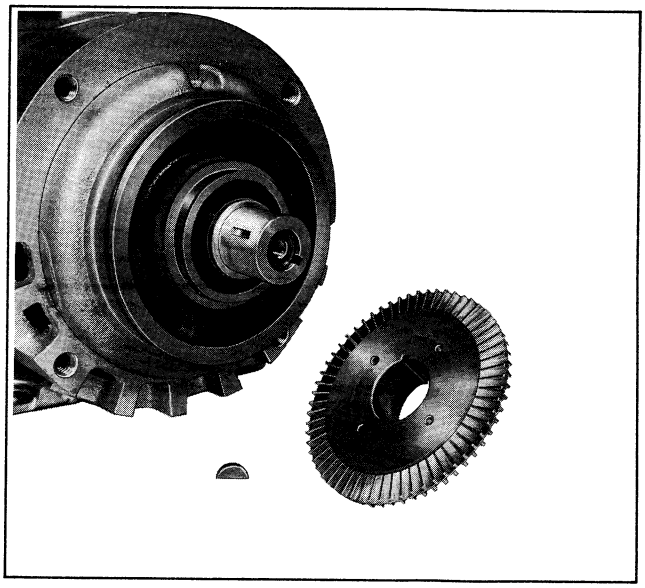
Inspect removed parts at disassembly to determine their reusability. Cracked castings should never be reused. All packing and gaskets should be replaced with new ones at reassembly simply as a matter of economy; they are much less expensive to replace routinely than to replace as the need occurs. In general it is economical to return to the manufacturer for repair only the motor and motor controller.



Impeller screw and washer removed.



Pump casing and outer ring removed.



Impeller and key removed.

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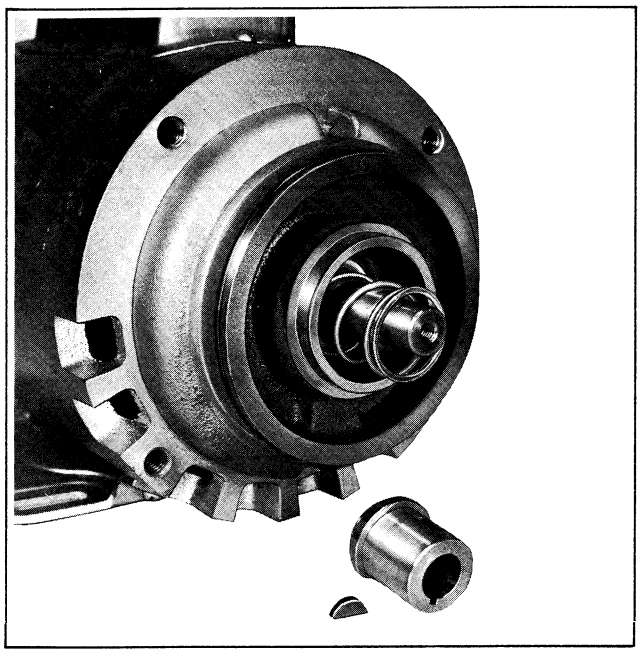
Disassembly. Disassemble only what is needed to make repairs or accomplish inspection.

Disassembling the Model 134 and 135 pumps (See Figure 3).

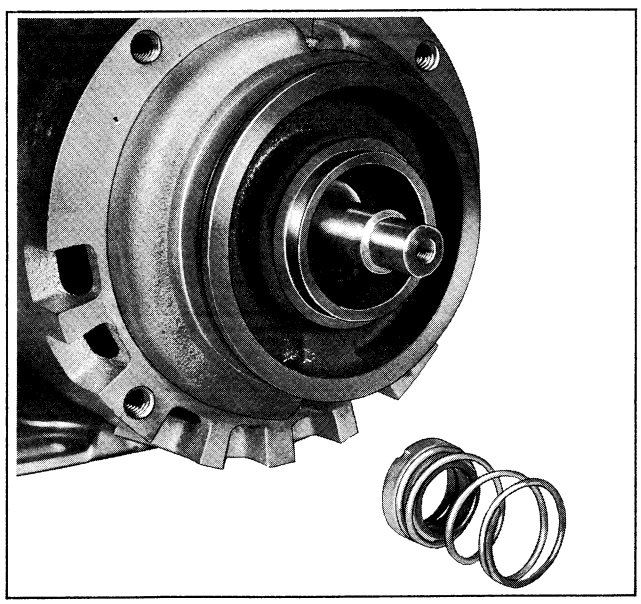
1. Remove the four screws (2) and separate the casing (6) from the motor bracket (19, 20).

2. Remove the two plugs (3), screws (4), and nameplate (5) only if replacement is necessary. Remove pin (15).

3. Remove outer ring (7).



Sleeve and key removed from shaft.



Mechanical seal and spring removed.

4. Remove screw (8) and washer (9) and remove impeller (10) with key (13) from impeller sleeve.

5. Remove impeller sleeve (12) with key (11) from shaft.

6. Carefully remove the mechanical seal (14). The stationary portion of the seal may be removed in Step 9.

CAUTION

The mechanical seal (see Figure 1) is a precision product and must be treated as such. During removal great care must be taken to avoid dropping any part of the seal. Take particular care not to scratch the lapped faces on the washer or the sealing seat. Do not put a seal back into service until the sealing faces of the washer and seat have been relapped or replaced.

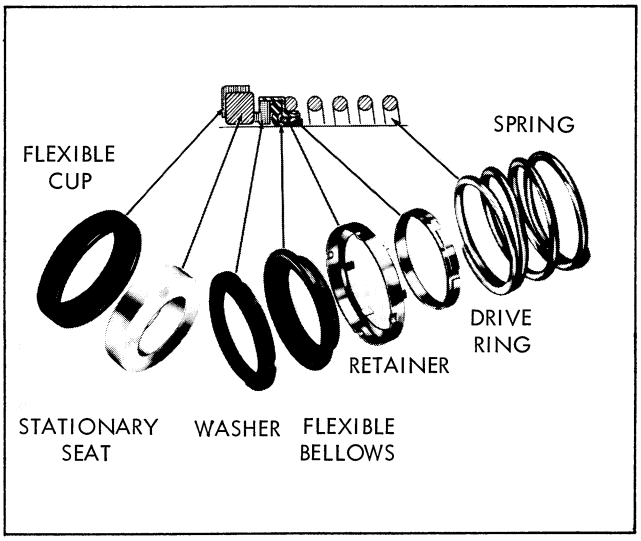


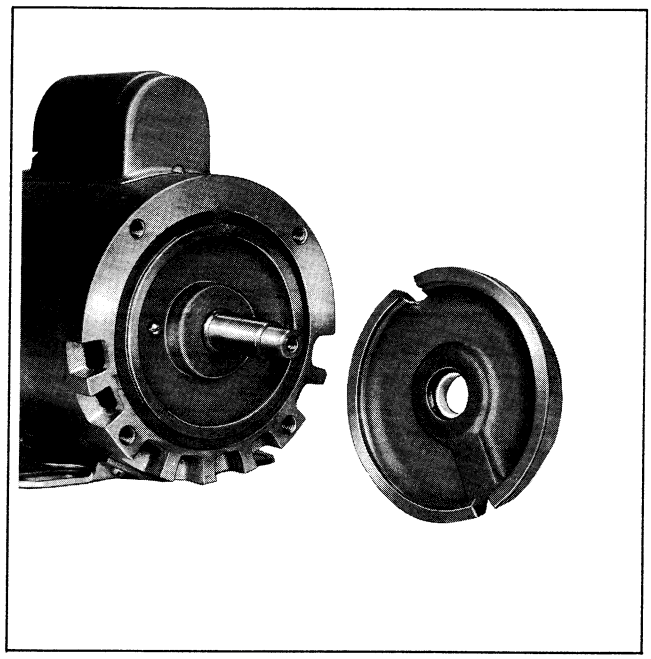
Figure 1. Mechanical Seal

7. Remove inner ring (16).

8. Gasket (17) may be removed from bracket if replacement is necessary.

9. Remove the four screws (18) (Model 135, 1-1/8 inch shaft only). Motor bracket with stationary portion of seal may now be removed by applying a steady force separating bracket and motor.

Reassembly. Clean and inspect all parts thoroughly prior to reassembly. Replace gasket. Check that all mating surfaces are free of nicks and burrs.



Bracket removed.

Inspect the impeller hub carefully for signs of excessive wear. Proceed to reassemble the pump as follows: (See Figure 3)

1. Position the motor bracket (19, 20) on the motor and secure with screws (18). Tighten screws evenly. (Screws used on 135 Series, 1-1/8 inch shaft only).

2. Attach nameplate (5) with screws (4), and replace plugs (3) if these were removed.

NOTE

The mechanical seal (14) cannot be installed as an assembly; the seal seat must be properly in place before the balance of parts can be added.

3. Thoroughly inspect the seal cavity in the motor bracket, checking for burrs or nicks which could damage the seat of the mechanical seal (14). Apply a film of liquid dishwashing detergent to the seal seat and install, taking care to seat it evenly and squarely.

NOTE

If it is not possible to insert seat with fingers, place cardboard protecting ring, furnished with seal, over lapped face of seat and press into place with a piece of tubing having end cut square. Tubing should be slightly larger than the diameter of the shaft. Remove cardboard ring after the seat has been firmly seated.

4. Apply a film of liquid dishwashing detergent to allow remaining seal parts to be pushed onto shaft. Check the proper sequence of assembly as shown in Figure 1.

5. Position gasket (17) on the motor bracket (19, 20) and gradually slip into its groove.

6. Install inner ring (16).

7. Replace shaft key (11) and impeller sleeve (12). Be sure spring of mechanical seal is properly positioned on back side of impeller sleeve.

8. Slip on impeller (10). Line up impeller keyway with key (13) so that key is not pushed out of keyway when the impeller is replaced. Secure impeller with washer (9) and screw (8).

9. Place the pin (15) and outer ring (7) in casing (6); slide casing into position over motor bracket (19, 20) being careful not to damage gasket (17).

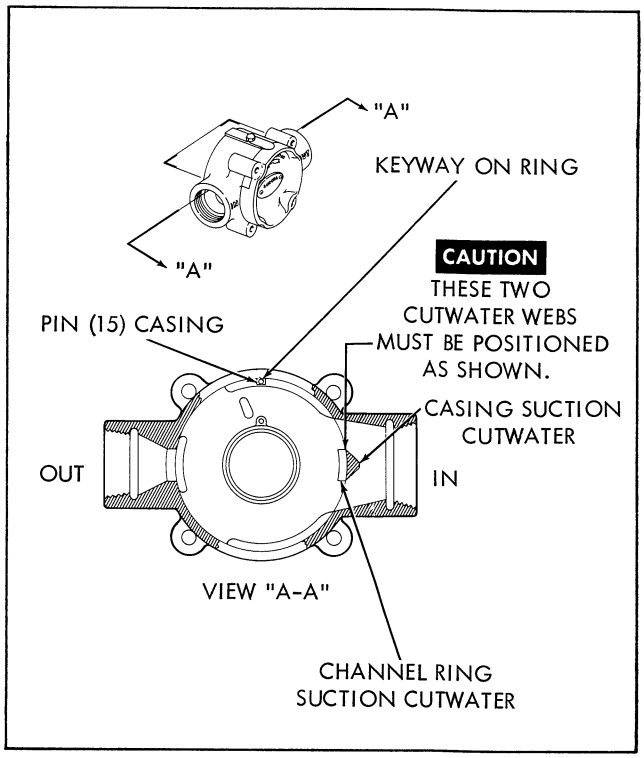


Figure 2. Model 134-135 Installing Inner and Outer Rings in Casing

Attach casing with screws (2). (See Figure 2 for proper positioning of inner and outer rings in casing.)

10. Replace pipe plug (3), and install nameplate (5) and attach with screws (4), if these were removed.

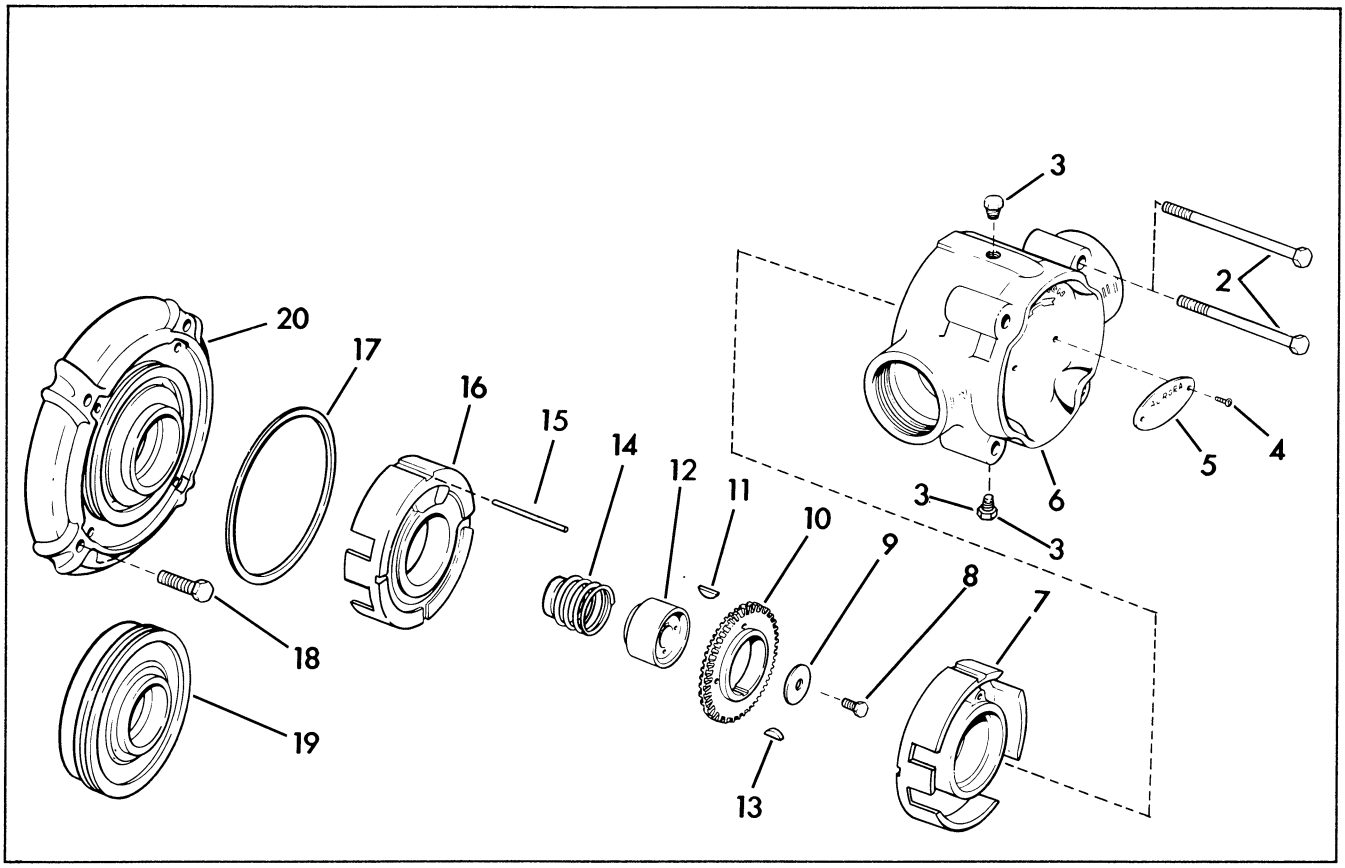
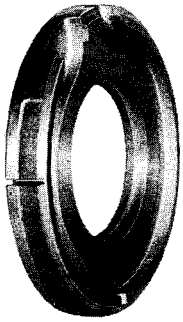


Figure 3. 134 and 135 Series Pump Exploded View

List of Parts For Model 134-135

2. Capscrew
3. Pipe Plug
4. Drive Screw
5. Nameplate
6. Casing
7. Outer Ring
8. Capscrew
9. Washer
10. Impeller
11. Key
12. Sleeve
13. Key
14. Seal
15. Pin
16. Inner Ring
17. Gasket
18. Capscrew
19. Bracket
20. Bracket



IMPELLERS & RINGS

Impellers and rings are accurately machined to close tolerances for close clearance operation.

Impellers are accurately machined and have many buckets on both sides. The impellers are double suction with pressure balancing holes drilled near the mounting hub. This equalizes pressure on both sides of the impeller and balances axial thrust. The impeller(s) are precision bored and are keyed to the shaft sleeve.

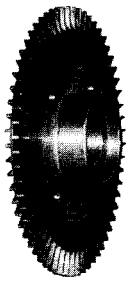
A turbine pump of stainless steel construction tends to gall in the event the impeller comes in contact with the channel rings. One way to overcome this is locking the impeller in place between the channel ring and increasing the clearance between the impeller and channel rings.

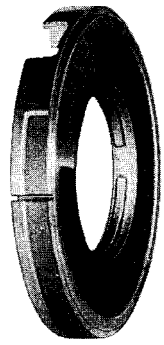
A locked impeller design prevents the impeller from touching the channel rings, but is difficult to adjust. Increased clearances reduce the operating pressures of the pump and require separate performance curves.

APCO-CHEM utilizes a chromium oxide ceramic coating, developed by Union Carbide Corporation which is applied to the sealing surfaces of stainless steel and alloy 20 channel rings. The coating is resistant to acids, caustics and temperatures within the range of the APCO-CHEM pump. A bearing surface is provided by the coating that completely eliminates the possibility of galling. Metal to metal contact is eliminated.

Ceramic coating on stainless steel and alloy constructions allows the impellers to float and center themselves on all APCO-CHEM pumps, and eliminates the need for impeller adjustments. Pumps with the ceramic coating also operate on the same tolerances as the standard ductile iron pump and provide identical performance.

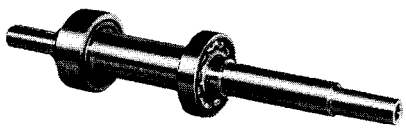
Discharge ports of channel rings on two stage and duplex pumps are OPPOSED 180°, equalizing radial loads and greatly reducing shaft deflection. Impellers and channel rings are interchangeable between single, two stage and duplex pumps.

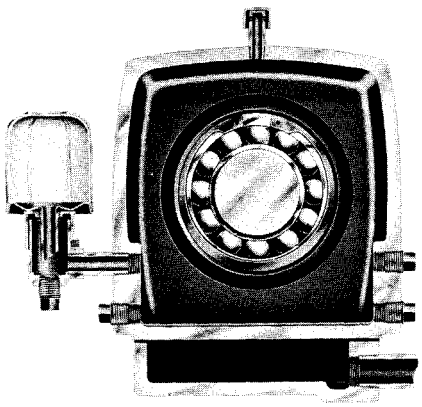




BEARINGS & SHAFTS

Vacuum degassed ball bearings are precision made and give 2 YEAR MINIMUM B_{10} LIFE under worst condition of allowable pump load. Outboard thrust bearings are double row deep groove angular contact to handle radial and thrust loads. End play is less than .001" for longer mechanical seal life to restrict seal leakage. The use of beveled type retaining rings assures that no additional end play is caused by movement axially of the thrust bearing on the shaft. Inboard bearings are single row deep grove and handle radial loads only. The radial bearing outer race is slip fit into the bearing frame and is free to float axially. Precision ground (32 micro-inches) and polished shafts are designed for a MAXIMUM DEFLECTION OF .002" at the mechanical seal faces at maximum recommended load.





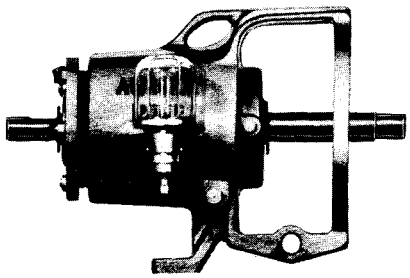
OIL LUBRICATION

Oil lubrication is furnished as standard with grease lubrication optionally available. A constant level oiler with a clear plexiglass oil reservoir indicates the oil reserve. The oiler accurately maintains a fixed oil level at the centerline of the lower ball in both ball bearings. The power frame reservoir for model 151 will hold approximately 3/4 pint and approximately 1-1/2 pints in models 152-3 & 4. The oiler capacity is 4 oz. A breather tube vents the power frame. Drain plugs are provided at the low point of the reservoir. The frame can be field converted to grease by merely replacing the oiler and vent tube with pipe plugs and inserting grease fittings in pipe taps already provided for at both bearings.

ENGINEERING DATA
INTERCHANGEABILITY

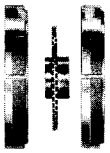
APCO-CHEM offers for standard construction, 2 power frames, 3 shafts, 2 stuffing box covers, 10 impeller and channel ring sets and 4 casings for maximum interchangeability.

MODEL 151
SINGLE STAGE

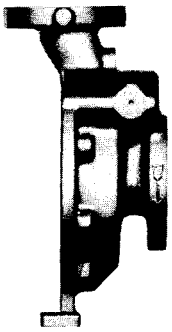




CT111
CT211
CT212



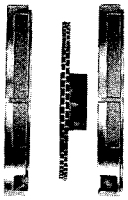
1 FRAME
1 STUFFING BOX
3 L.H. RINGS
3 IMPELLERS
3 R.H. RINGS
1 CASING
1 SHAFT

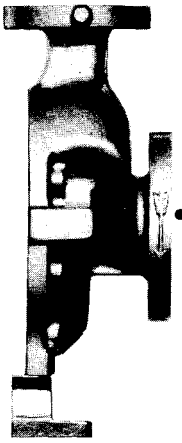


MODEL 152
SINGLE STAGE

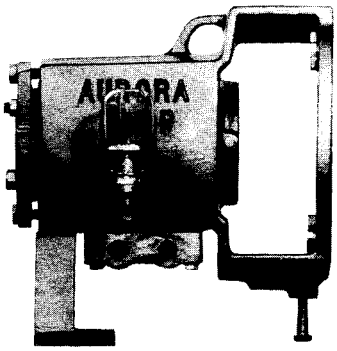


CT713
CT715
CT811
CT911
CT912
CT913
CT914





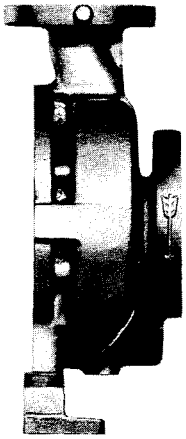
1 FRAME
1 STUFFING BOX
7 L.H. RINGS
7 IMPELLERS
7 R.H. RINGS
3 CASINGS
2 SHAFTS



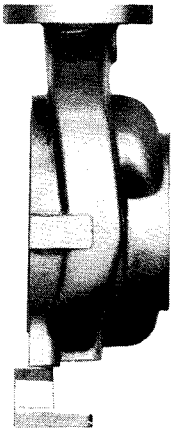


CT723
CT725
CT821
CT921
CT922
CT923
CT924

MODEL 153

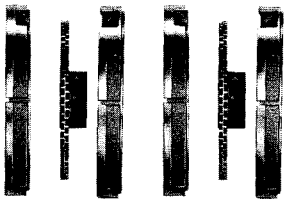


MODEL 154



MODEL 153
TWO STAGE





MODEL 154
DUPLEX

CT991 CT993
CT992 CT994

Two stage utilizes single stage parts with exception of shaft and casing.
Duplex utilizes two stage parts with exception of the casing.

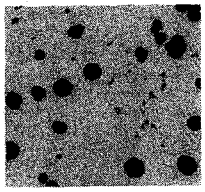
Ductile iron is furnished as a standard material for all cast wetted parts unless otherwise specified.

This standard material was selected over cast iron for its greater tensile strength, ductility and resistance to impact and thermal shock. By comparing the physical properties of ductile iron and steel, it can be shown that the yield strength of 60-40-18 ductile iron exceeds that for low carbon steel at all temperatures up to 1200° F.

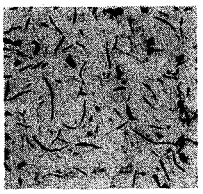
These unusual characteristics are accomplished by the spheroid shape of the graphite particles in the iron matrix. The graphite in conventional cast iron is in the form of flat, sharp-edged flakes resulting in a more brittle material.

The thermal expansion of ductile iron is similar to carbon steel while the corrosion resistance is similar to that of gray cast iron.

The following micro-photographs show the different graphite formations within the metals.



DUCTILE IRON



CAST IRON

A complete listing of pump parts and materials can be found on pgs. 78 & 79 under parts list and materials of construction. The following materials of construction available for APCO-CHEM and their stock status are listed.

MATERIAL	STOCK STATUS
DUCTILE IRON 316 ST. STL.	All sizes stocked.
304 ST. STL. HASTELLOY B HASTELLOY C MONEL NICKEL	Custom ordered to your exacting specifications.

NOTE:

Alloy pumps are furnished in ceramic coated construction to eliminate the galling characteristic of these metals. For material selections not listed, please refer to the factory.

CHEMICAL & PHYSICAL PROPERTIES OF METALS

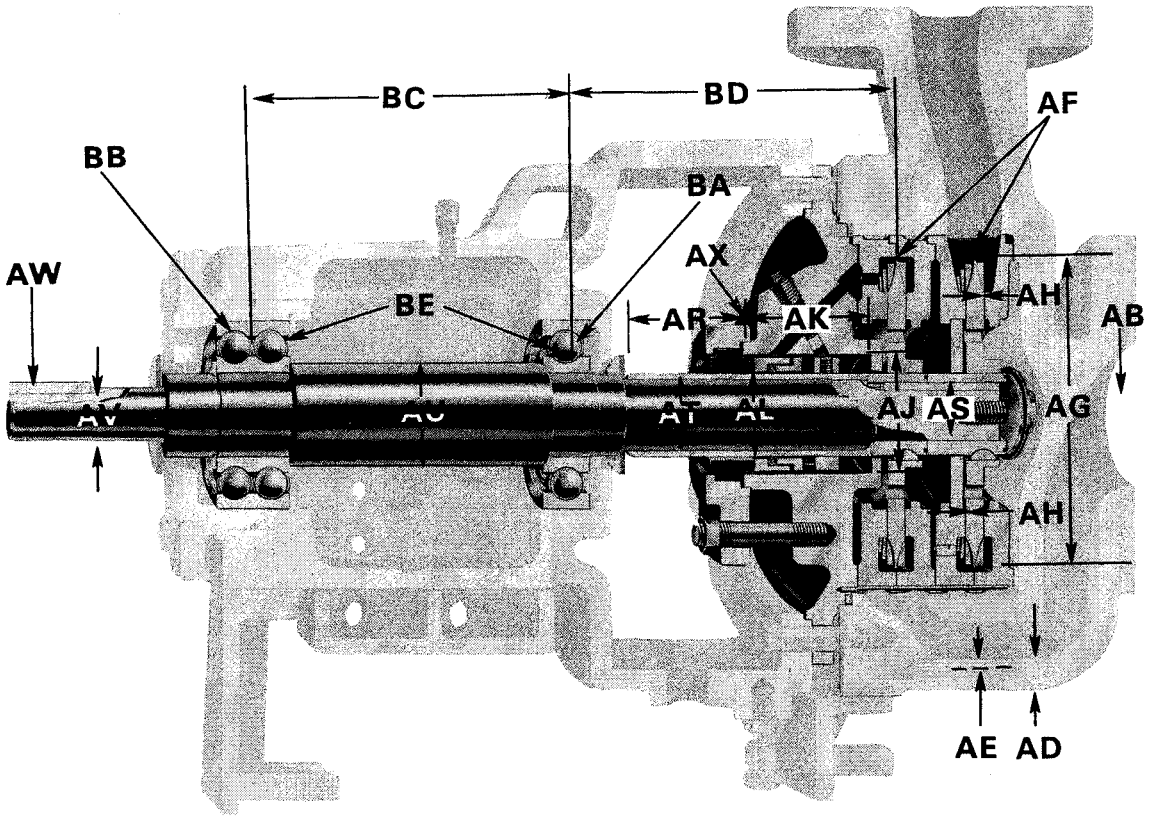
NAME	FORM	SPECIFICATION	TYPICAL CHEMICAL COMPOSITION (%)											MECHANICAL PROPERTIES (MINIMUM)	
			Fe	Cr	Ni	C	Mn	Mo	Cu	Si	S	P	OTHER	TENSILE (PSI)	YIELD (PSI)
CAST IRON	CAST	ASTM A48 (Class 30)	BAL.	—	—	3.0-3.45	.5-1.0	—	—	1.7-2.4	.07-.15	.15-.60	—	30,000	—
DUCTILE IRON	CAST	ASTM A395 (60-40-18)	BAL.	—	1.0	3.4-4.0	.2-.6	—	—	2.0-2.75	—	.08 MAX.	Mg .02-.07	60,000	45,000
CARBON STEEL	CAST	ASTM A216 Grade WCB	BAL.	.40 MAX.	.50 MAX.	.30 MAX.	1.0 MAX.	.25 MAX.	.50 MAX.	.60 MAX.	.06 MAX.	.05 MAX.	—	70,000	36,000
ST. STL. (304)	CAST	ACI CF-8	BAL.	18-21	8-11	.08 MAX.	1.5 MAX.	—	—	2.0 MAX.	.04 MAX.	.04 MAX.	—	77,000	37,000
ST. STL. (304)	WRT.	AISI-304	BAL.	18-20	8-12	.08 MAX.	2.0 MAX.	—	—	1.0 MAX.	.03 MAX.	.045 MAX.	—	85,000	35,000
ST. STL. (316)	CAST	ACI CF-8M	BAL.	18-21	9-12	.08 MAX.	1.5 MAX.	2-3	—	1.5 MAX.	.04 MAX.	.04 MAX.	—	80,000	42,000
ST. STL. (316)	WRT.	AISI-316	BAL.	16-18	10-14	.08 MAX.	2.0 MAX.	2-3	—	1.0 MAX.	.03 MAX.	.045 MAX.	—	85,000	35,000
HASTELLOY B	CAST	ASTM A494	4-6	1.0 MAX.	BAL.	.12 MAX.	1.0 MAX.	26-30	—	1.0 MAX.	.03 MAX.	.04 MAX.	Co 2.5 MAX. V .2-.6	75,000	55,000
HASTELLOY B	WRT.	ASTM B335	4-6	1.0 MAX.	BAL.	.05 MAX.	1.0 MAX.	26-30	—	1.0 MAX.	.02 MAX.	.025 MAX.	Co 2.5 MAX. V .2-.4	130,000	56,000
HASTELLOY C	CAST	ASTM 494	4.5-7	15.5-17.5	BAL.	.12 MAX.	1.0 MAX.	16-18	—	1.0 MAX.	.03 MAX.	.04 MAX.	Co 2.5 MAX., V.2-.4 W 3.75-5.25	83,000	50,000
HASTELLOY C	WRT.	ASTM B336	4-7	14.5-16.5	BAL.	.08 MAX.	1.0 MAX.	15-17	—	1.0 MAX.	.03 MAX.	.04 MAX.	Co 2.5 MAX., V.35 W 3.0-4.5	120,000	55,000
#20 ALLOY	CAST	ACI CN7M	BAL.	18-21	27-30	.08 MAX.	1.5 MAX.	2-3	3-4	2.0 MAX.	.04 MAX.	.04 MAX.	—	70,000	30,000
CARPENTER 20	WRT.	—	BAL.	20	29	.07 MAX.	.75	2.0 MIN.	3.0 MIN.	1.0 MAX.	—	—	—	84,000	38,000
MONEL	CAST	QQ-N-288 Class E	3.5 MAX.	—	60	.3 MAX.	1.5 MAX.	—	26-33	1.0-2.0	—	—	Al .5 MAX. Co & Ta 1.0-3.0	65,000	32,500
MONEL	WRT.	QQ-N-281 Class A	2.5 MAX.	—	63-70	.3 MAX.	2.0 MAX.	—	BAL.	.5 MAX.	.024 MAX.	—	Al .5 MAX.	99,000	52,000
K-MONEL	WRT.	QQ-N-286 Class A	2.0 MAX.	—	63-70	.25 MAX.	1.5 MAX.	—	BAL.	1.0 MAX.	.01 MAX.	—	Al 2.0-4.0 Ti .25-1.0	140,000	80,000
NICKEL	CAST	—	.25 MAX.	—	97	.5 MAX.	.5 MAX.	—	.3 MAX.	1.5 MAX.	.015 MAX.	—	—	45,000	20,000
NICKEL	WRT.	ASTM B160	.4 MAX.	—	99 MIN.	.15 MAX.	.35 MAX.	—	.25 MAX.	.35 MAX.	.01 MAX.	—	—	75,000	50,000

150 SERIES
ENGINEERING DATA
DESIGN DETAILS

AREA		DIMENSION	PUMP MODEL 151	PUMP MODEL 152-153-154
LIQUID END	AA	Discharge—300 P.S.I.—A.S.A. Flat Face	1	1-1/2 | 2
	AB	Suction—150 P.S.I.—A.S.A. Flat Face	1-1/2	3
	AC	Rotation—Facing Suction	CCW	CCW
	AD	Casing Wall Thickness	1/2	5/8 | 3/4 | 3/4
	AE	Casing Corrosion Allowance (Safety)	1/8	1/8
	AF	Number of Stages (Impeller(s))	1	1 | 2 | 2
	AG	Nominal Impeller Diameter	4-1/2	6
	AH	Clearance Between Imp. & Rings—Total both sides		
		1. Ductile Iron 2. Stainless Steel & Alloy 20	.005-.007 .005-.007	.005-.007 .005-.007
STUFFING BOX	AJ	Stuffing Box Bore Diameter	1-3/4	2-1/2
	AK	Stuffing Box Depth	2	2-5/8
	AL	Outside Diameter, Sleeve	1.125	1.750
	AM	Total Packing Rings With Lantern Rings	5	5
	AN	Number of Rings in Front of Lantern Ring	2	2
	AP	Packing Size	5/16	3/8
	AQ	Width of Lantern Ring	3/8	5/8
	AR	Distance from Box to Nearest Obstruction	1-15/16	2-9/16

AREA		DIMENSION	PUMP MODEL 151	PUMP MODEL 152-153-154
SHAFT	AS	Diameter at Impeller	.687	1.125
	AT	Diameter at Shaft Sleeve	.875	1.500
	AU	Diameter Between Bearings (Max. Shaft Dia.)	1.562	2.125
	AV	Diameter at Coupling End	.875	1.125
	AW	Coupling Keyway	3/16 x 3/32	1/4 x 1/8
	AX	Maximum Deflection at Stuffing Box Face	.002	.002
BEARINGS	BA	Bearing No. (Inboard Radial)	306	309
	BB	Bearing No. (Outboard Thrust)	5306	5309
	BC	Bearing Centers	5.37	6.56
	BD	Radial Brg. & 1st. Stg. Impeller Centers	5.75	6.87
	BE	Minimum B_{10} Bearing Life Under Maximum Recommended Load	2 Years	2 Years

NOTES:
1. Pump model can be determined from range charts in 150 Bulletin.
2. Average bearing life is 5 times minimum life.
3. Inboard radial bearings are single row ball. Outboard thrust bearings are double row ball.
4. Packing box is not illustrated.
5. Add 1-5/8" to "BD" dimension on model 153 and 154 pumps to determine the 2nd stage impeller centerline.



AURORA®
PENTAIR PUMP GROUP

ENGINEERING DATA
BEARING LIFE

Is based on the radial and thrust loads imposed on the bearings at the specific operating head and suction pressure. The APCO-CHEM pump is designed for two year minimum B_{10} life at the maximum recommended loads. Bearing life at any other point of greater capacity on the curve will greatly exceed the minimum life shown. Average bearing life is equal to five (5) times the minimum bearing life.

Tables 12, 13 and 14 will enable you to determine the minimum radial and thrust bearing life for any APCO-CHEM pump size.

1. Determine the proper pump size and speed from the range charts illustrated on pages 4 and 9 of the 150 Bulletin.
2. From figure 12, determine radial load at impeller in pounds by reading across from differential pressure per pump stage to pump size and then down (divide differential pressure by 2 for two stage model 153 pumps). This value will be used for determining both inboard and radial bearing life in hours and shaft deflection at impeller.
3. Locate radial load at impeller in pounds on figure 13 and read across to the proper pump size and R.P.M. and then down for inboard radial bearing life.
4. Locate suction pressure (P.S.I.) on figure 14 and read across to the proper pump size and R.P.M. and then down for outboard thrust bearing life.

EXAMPLE:

1. Model 152 (single stage)—a CT914 pump operating at 3500 R.P.M. with a suction pressure of 40 P.S.I. and a differential pressure of 150 P.S.I. would have:

A. Radial load at the impeller of 202 lbs.

B. Continuous inboard radial bearing life of 51,500 hours min.

C. Continuous outboard thrust bearing life of 66,000 hours min.

D. Shaft deflection of .0038" at the impeller (see page 77).

2. Model 153 (two stage)—a CT924 pump operating at 1750 R.P.M. with a suction pressure of 40 P.S.I. and a differential head of 150 P.S.I. (divide the differential head by 2) would have:

A. Radial load at the impeller of 101 lbs.

B. Continuous inboard radial bearing life of 300,000 hours min.

C. Continuous outboard thrust bearing life of 66,000 hours min.

D. Shaft deflection of .001" at the impeller (see page 77).

The above examples illustrate how lower pump operating speeds and two stage pump construction greatly extend the radial bearing life.

NOTE:

1. One (1) year life is based on 8740 HOURS (cont. operation).
2. Additional bearing information can be found on page 74.
3. Specific information on bearing life and shaft deflection can be obtained from the factory.

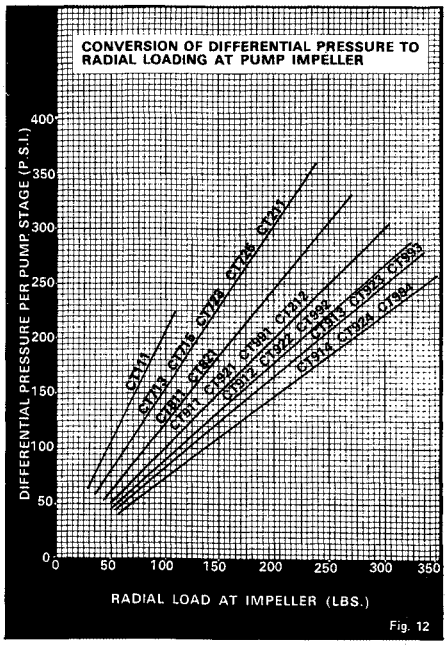


Fig. 12

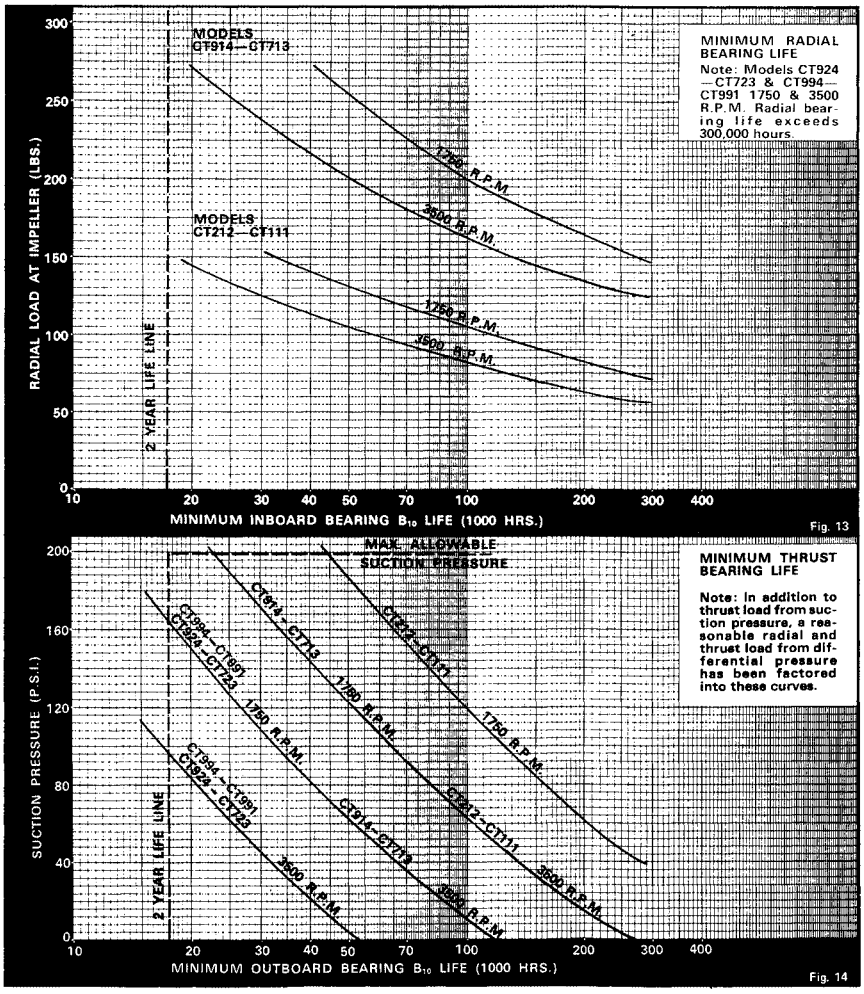


Fig. 13

Fig. 14

Maximum Case Working Pressure The case working pressure is the sum of the differential pressure and the suction pressure. Figures no. 1, 2 and 3 indicate the maximum case working pressure for the APCO-CHEM pump in various materials and at various operating temperatures. These maximum allowable pressures are based on wall thicknesses for the particular series of pumps and take into account the change in the tensile strength of the material at various allowable temps.

Example: A model 152 pump with a 316 stainless steel casing has been selected for operation at a case working pressure of 370 P.S.I.G. at 200° F. Enter chart (figure 2) for model 152 pumps, at 200° F. and read upward to 370 P.S.I.G. It is determined that the selection is within the recommended maximum case working pressure area and is therefore acceptable.

Note that the example exceeds the maximum case working pressure limits if the material selected would have been ductile iron or nickel.

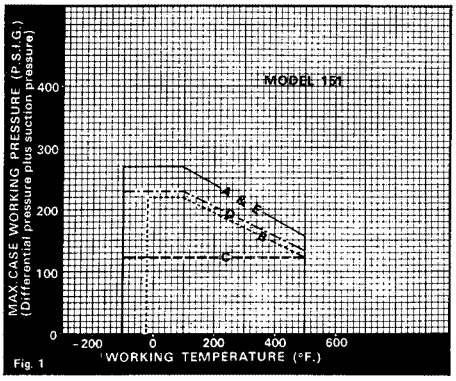


Fig. 1

Maximum Pressure—Temperature Flange Rating This chart illustrates that under certain temperature conditions standard flange pressure can be exceeded.

Note: 1. Ratings are for American Standard specifications (ASA 16.5) Steel or Nodular Iron Flanges.

Note: 2. The curves indicate flange ratings ONLY. Refer to Fig. 1, 2, & 3 for maximum allowable case working pressure.

A. Type 316 Stainless Steel, Hastelloy "B", Hastelloy "C" and no. 20 Ally.
B. Ductile Iron
C. Nickel
D. Monel
E. 304 Stainless Steel

Maximum hydrostatic pressure 1-1/2 times maximum case working pressure at 100° F.

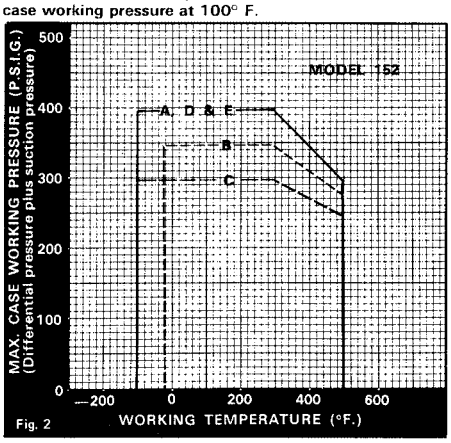


Fig. 2

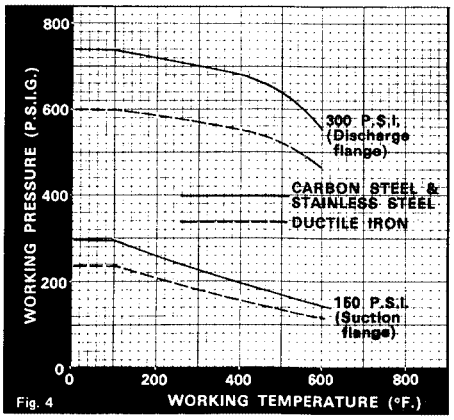


Fig. 4

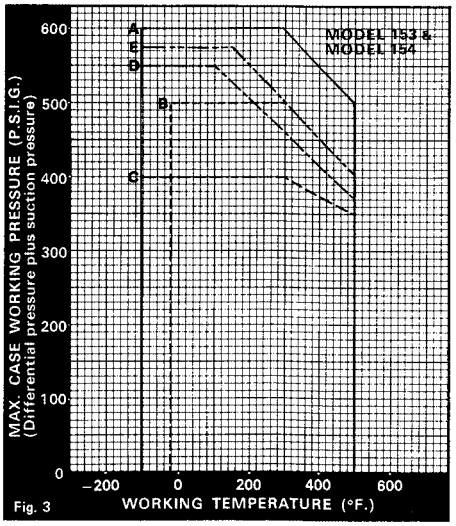


Fig. 3

NOTES:
1. Pumps with standard mechanical seals on continuous duty water applications MUST NOT exceed 180° F. without providing cooling at the stuffing box. Special seal face materials will increase this limit—refer to factory.
2. Pumps with packing on water applications MUST NOT exceed 250° F. without providing cooling at the stuffing box.
3. For temperatures above 300° F. in models 152 and 153, the centerline casing support is recommended.

Maximum Pump Operating Temperatures: Three factors are required to properly determine maximum temperature limitations.

1. Strength of Material High Temperature Limitations:

The high temperature on the casing and other pressure containing parts will cause a reduction in the ultimate strength of the metal. This has already been illustrated under limitations for maximum case working pressure and as was shown, temperatures to 500° F. are allowable with a decrease in case working pressure.

2. Stuffing Box High Temperature Limitations:

A. Mechanical Seal Limitations:

The materials normally used in mechanical seals are suitable for operation at temperatures in the range of 300° F. as long as a lubricating film remains between the seal faces. Many liquids will retain this property at high temperatures. The temperature limitation chart will indicate maximum allowable pump operating temperature at 300° F. without stuffing box cooling.

For Continuous Duty Water Applications, Stuffing Box Temperatures Cannot Exceed 180° F.

Other optional seal face materials will allow higher temperatures. For additional information, refer to the factory.

B. Packing Limitations: The limitations for packing are similar to those for mechanical seals except that temperatures to 250° F. can be tolerated for water applications before a water cooled stuffing box is required.

3. Ball Bearing Lubrication High Temperature Limitations: For longer bearing life, a frame cooling jacket should be provided at any pumping temperature exceeding 300° F.

Note: The following maximum temperature limitations and notes will apply to the majority of applications, however, for specific liquids and temperatures, refer to the factory.

MAXIMUM TEMPERATURE LIMITATIONS FOR PUMPED LIQUID

DESCRIPTION	PUMP SERIES 151	PUMP SERIES 152-3 & 4
Mechanical Seal—without stuffing box cooling (See Note 1).	300° F.	300° F.
Mechanical Seal—with water cooled stuffing box and water jacketed frame.	N/A	500° F.
Packing—without stuffing box cooling (See Note 2).	300° F.	300° F.
Packing—with water cooled stuffing box and jacketed frame.	N/A	500° F.

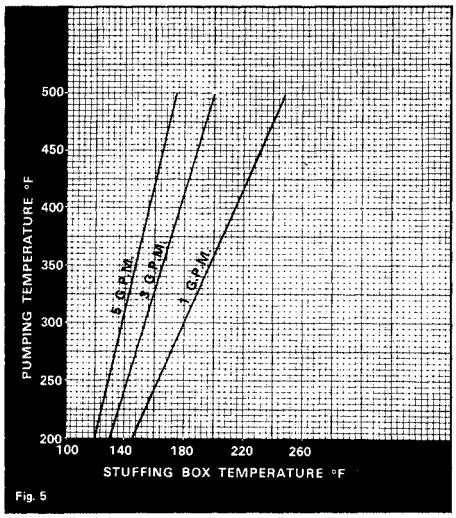


Fig. 5

Water Cooled Stuffing Box Stuffing Box temperature at various pumping temperatures and cooling rates.

Note:
Cooling water
80° F. at inlet.

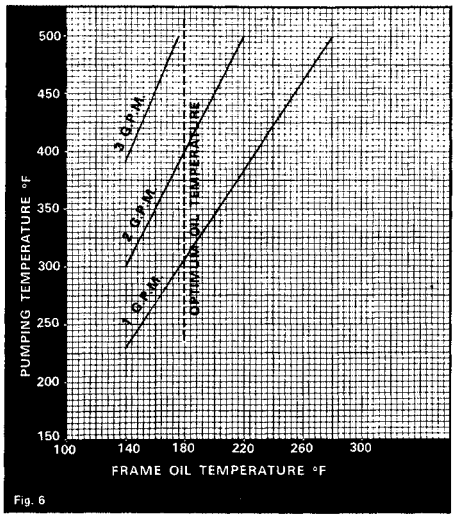


Fig. 6

Water Cooled Bearings Frame oil temperature at various pumping temperatures and cooling rates.

Note: 1. Cooling water 80° F. at inlet. 2. Values shown are typical, final temperature based on Stuffing Box cooling and ambient temperature.

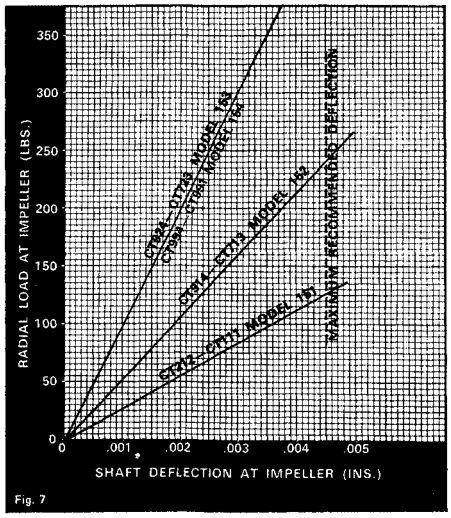


Fig. 7

Maximum Recommended Differential Head The differential head in a pump is the difference between the positive suction head and the discharge head. One effect of differential head is a radial load imposed on the impeller which deflects the shaft from its centerline. The following chart indicates the maximum recommended differential head in feet of liquid (specific gravity 1.0) which will produce a shaft deflection not exceeding .004" at the impeller and .002" at the seal faces. Where differential head does not indicate deflection problems, the maximum pump head is shown. Where specific gravity is less than 1, the allowable head in feet may be increased by the specific gravity correction.

MODEL	SIZE	MAXIMUM DIFFERENTIAL HEAD 3500 R.P.M. FEET*	P.S.I.	1750 R.P.M. FEET*	P.S.I.
151 SINGLE STAGE	CT111	500	215	125	55
	CT211	375	160	150	65
	CT212	250	110	150	65
152 SINGLE STAGE	CT713	800	345	300	130
	CT715	800	345	400	175
	CT811	700	300	400	175
	CT911	600	260	400	175
	CT912	525	225	400	175
	CT913	475	205	400	175
	CT914	425	185	400	175
153 TWO STAGE	CT723	1200	520	550	240
	CT725	1200	520	750	325
	CT821	1200	520	800	345
	CT921	1200	520	800	345
	CT922	1200	520	800	345
	CT923	1200	520	800	345
	CT924	1200	520	800	345
154 DUPLEX	CT991	1200	520	620	260
	CT992	1200	520	660	285
	CT993	1200	520	720	310
	CT994	1200	520	720	310

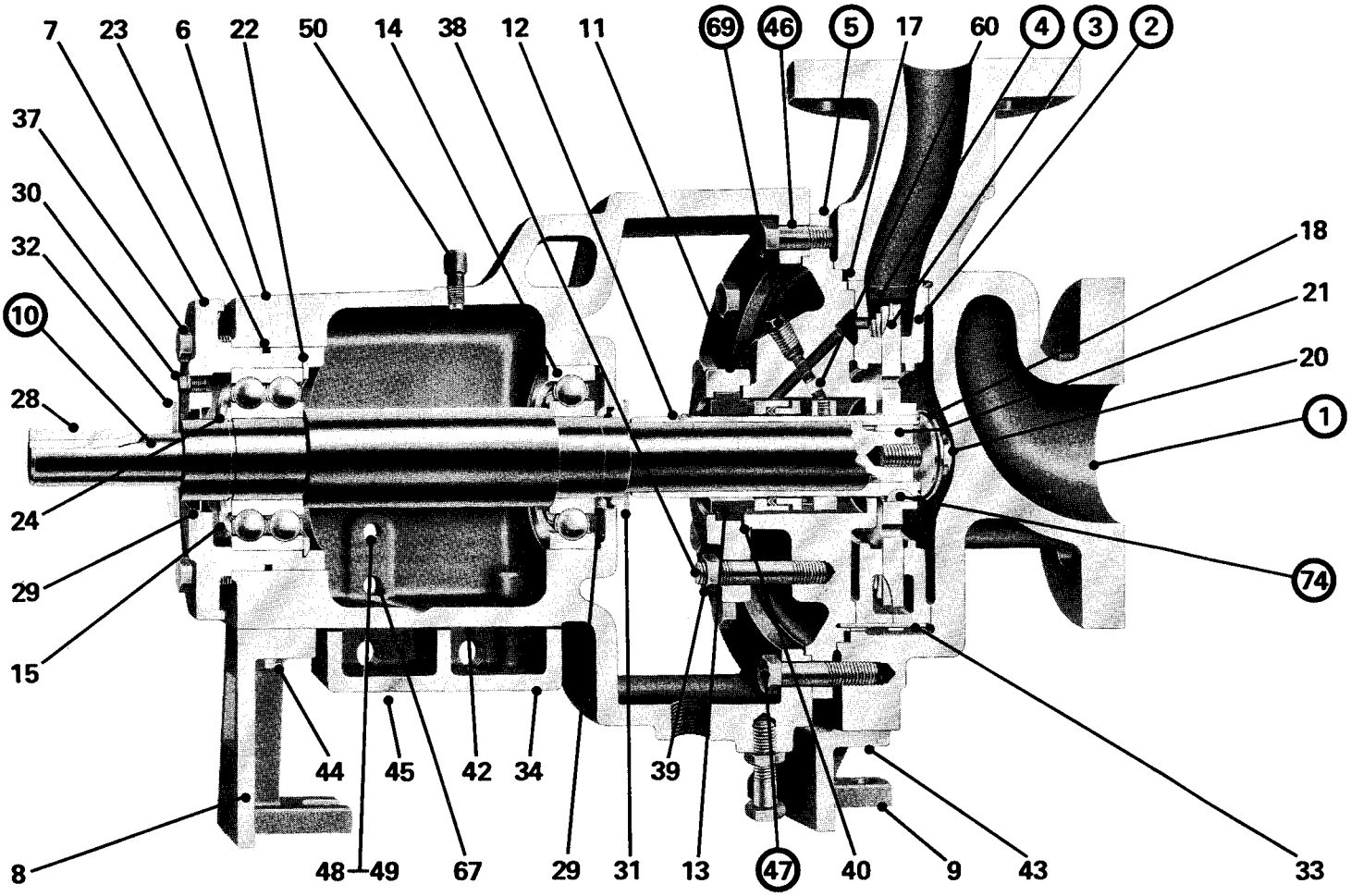
*specific gravity 1.0

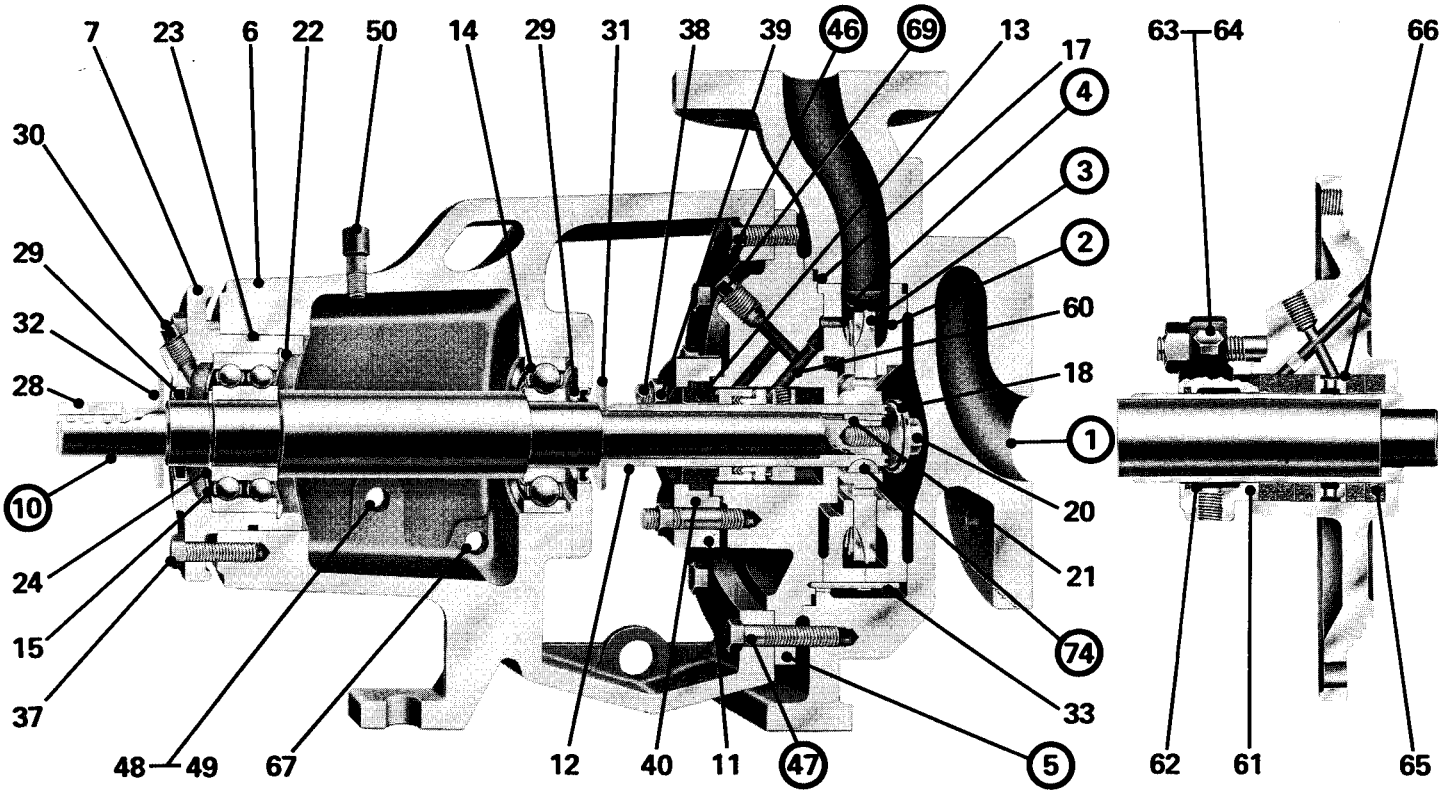
Shaft Deflection Is the consequence of the resultant hydraulic force acting inside the pump and on the impeller and shaft in a radial direction. The bending load tends to move the shaft from its centerline and is directly related to the differential pressure and the cross sectional area of the impeller. The radial load increases as the differential pressure increases and is maximum at shut off (zero capacity).

APCO-CHEM pumps are designed for a maximum deflection of .002" at the mechanical seal faces when operating at the maximum recommended differential pressure. The deflection at the impeller will not exceed .004".

Deflection in models 153 and 154 are minimized by opposing the two pump discharges by 180° and thereby nearly balancing the resultant forces acting on the shaft. Radial load at the impeller in pounds can be obtained from figure 12 on page 75.

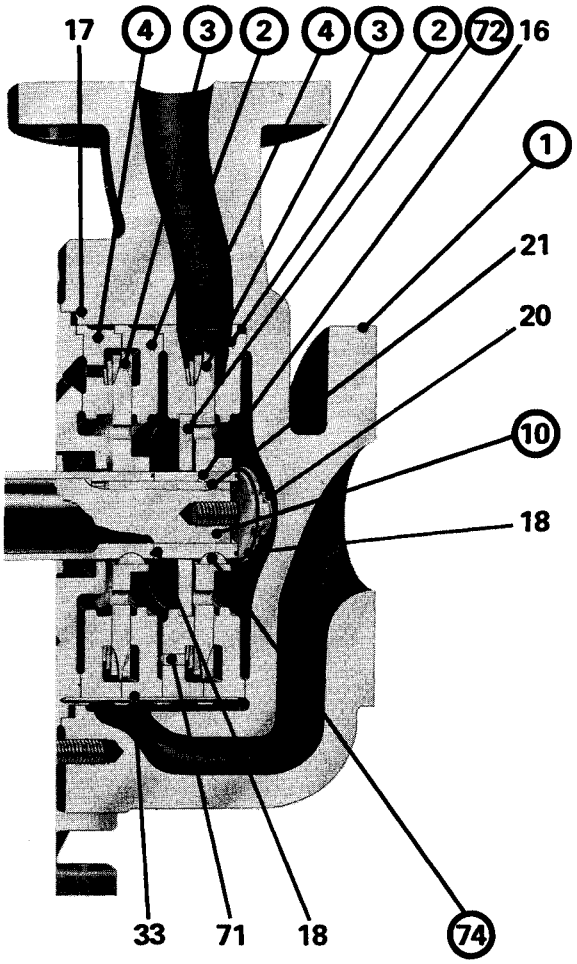
150 SERIES
PARTS LIST

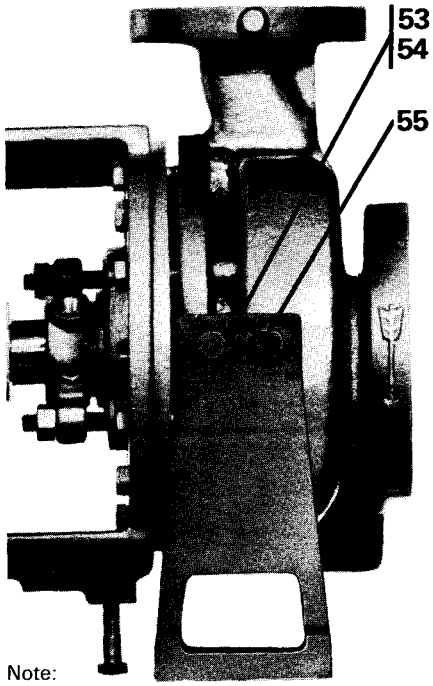




AURORA®
PENTAIR PUMP GROUP

ENGINEERING DATA
MATERIALS OF CONSTRUCTION





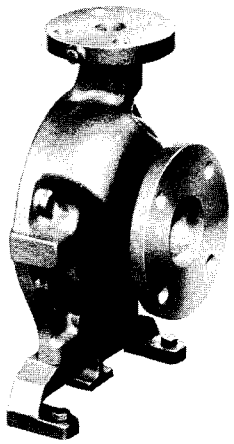
Note:
Complete material details can be found on pages 73 & 76. Piece numbers not shown 25, 26, 27, 41, 51, 52, 56, 57, 58, 59, 68 & 70.

STANDARAD PIECE NO.	NON-WETTED PARTS PART NAME AND DESCRIPTION	MATERIALS MATERIAL OF CONSTRUCTION
6	Frame	C.I.
7	Bearing Cartridge	C.I.
8	Bearing Frame Foot	C.I.
9	Casing Foot	C.I.
11	Seal Gland	316
12	Shaft Sleeve	316
13	Mechanical Seal	316
14	Ball Bearing—Inboard	Steel
15	Ball Bearing—Outboard	Steel
16	Sleeve Extension (2 Std.)	316
17	"O" Ring—Casing to Stuffing Box	Viton
18	"O" Ring—Sleeve to Impeller Screw	Viton
18	"O" Ring—Sleeve Extension to Sleeve	Viton
20	Retainer Screw	316
21	Sleeve Key	316
22	Retaining Ring—O.B. Brg. to Brg. Cart.	Steel
23	"O" Ring—Brg. Cart. to Frame	Buna-N
24	Retaining Ring—O.B. Brg. to Shaft	Steel
25	Alemite Fitting—Brg. Cart. (Grs. Lube)	Steel
26	Alemite Fitting—Frame (Grs. Lube)	Steel
27	Alemite Fitting—Brg. Cart. (Grs. Lube)	Steel
28	Coupling Key	Steel
29	Oil Seal	Buna-N
30	Pipe Plug—Inboard Bearing	Steel
31	Slinger—Inboard	Glass Filled Teflon
32	Slinger—Outboard	Glass Filled Teflon
33	Pin—Channel Ring Locating	316
34	Frame Cooling Jacket	C.I.
37	Capscrew—Brg. Cart. to Frame	Steel
38	Stud—Gland to Box	316
39	Nut—Gland Stud	316
40	Gasket—Seal Gland	Teflon
41	Drip Pan	316
42	Gasket—Frame Cooling Jacket	Fiber
43	Capscrew—Casing Foot	Steel
44	Capscrew—Frame Foot	Steel
45	Capscrew—Frame Cooling Jacket	Steel
48	Constant Level Oiler	Alloy
49	Nipple—Oiler to Frame	Steel
50	Breather	Steel
51	Nameplate	Stainless Steel
52	Screw—Nameplate	Steel
53	Casing Foot—R.H. CL Mount	C.I.
54	Casing Foot—L.H. CL Mount	C.I.
55	Capscrew—CL Foot to Casing	Steel
56	Pipe Plug—Seal Gland (Vent & Drain)	316
57	Throttle Bushing—Seal Gland—(Vent & Drain)	Graphitar
58	Seal Collar (Special Seals)	316
59	Setscrew—Seal Collar (Special Seals)	316
60	Pin—Internal Box Flush	316
61	Packing Gland	316
62	Gland Packing—Quench Throttle	Graphited Fiber
63	Capscrew—Packing Gland Halves	316
64	Nut—Packing Gland Halves	316
65	Packing—Stuffing Box	Graphited Fiber
66	Lantern Ring	Teflon
67	Pipe Plug—Frame Oil Drain	Steel
68	Capscrew—Double Seal Gland	316
70	Gasket—Seal Gland	Teflon
71	Pin—L.H. Chan. Ring (2 Stg.)	316

OPTIONAL	WETTED PARTS (CIRCLED)	MATERIALS
1	Casing	Ductile Iron (Std.)
2	Channel Ring—Right Hand	316
3	Impeller	304
4	Channel Ring—Left Hand	Hastelloy B
5	Stuffing Box—Std. & Water Cooled	Hastelloy C
10	Shaft	Monel
46	Capscrew—Frame	Nickel
47	Capscrew—Casing to Frame	Carpenter #20
69	Pipe Plug—Stuffing Box Lube External	The above listed materials are available for all wetted parts (Piece No's. 1,2,3,4,5,10 46,47,69,72,74).
72	Interstage Bushing (2 Stg.)	
74	Impeller Key	

TOP CENTERLINE DISCHARGE

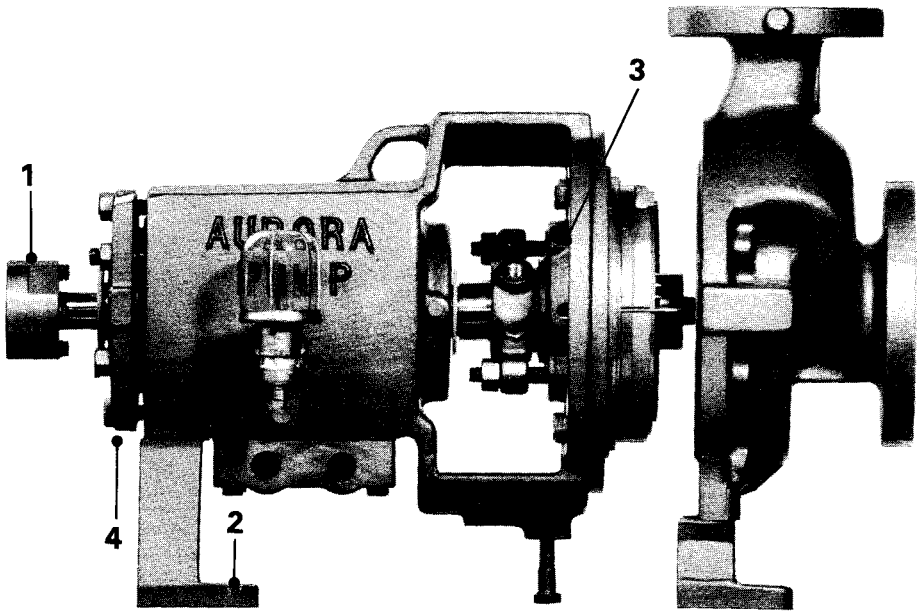
The top vertical discharge, back pull out, casing is self-venting and eliminates the need for opposed impeller rotation. Pipe stress associated with a tangential discharge position is also minimized. Center line mounting is available on model 152-53 & 4 casings. Center line mounting allows expansion on high temperature application. Discharge flanges are rated at 300 P.S.I. flat face and the suction flange at 150 P.S.I. flat face. Other types of flanges are optionally available up to 600 P.S.I. Heavy wall sections are designed for high pressure and long life and include 1/8" thickness for corrosion allowance.



BACK PULL OUT

Back pull out leaves the pump casing in line, allowing piping, insulation, gauges, etc. to remain undisturbed. Back pull out also allows alignment of the pump and driver to be maintained during disassembly. The spacer coupling insert can be dropped out, leaving sufficient space to allow the power frame, stuffing box and impeller assembly to be removed. Jack screw taps are provided to facilitate removal from the casing. The driver and conduit remain in place.

1. Remove capscrews from both coupling hubs and remove spacer insert.
2. Remove capscrews from frame support foot.
3. Remove eight casing capscrews.



STANDARD MECHANICAL SEAL
SINGLE INSIDE-UNBALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated in alternate designs.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

PRESSURES: Below atmospheric pressure up to approximately 200 P.S.I.

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a by-pass arrangement which permits either internal or external flushing to the mechanical seal faces.

TEMPERATURES: From minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

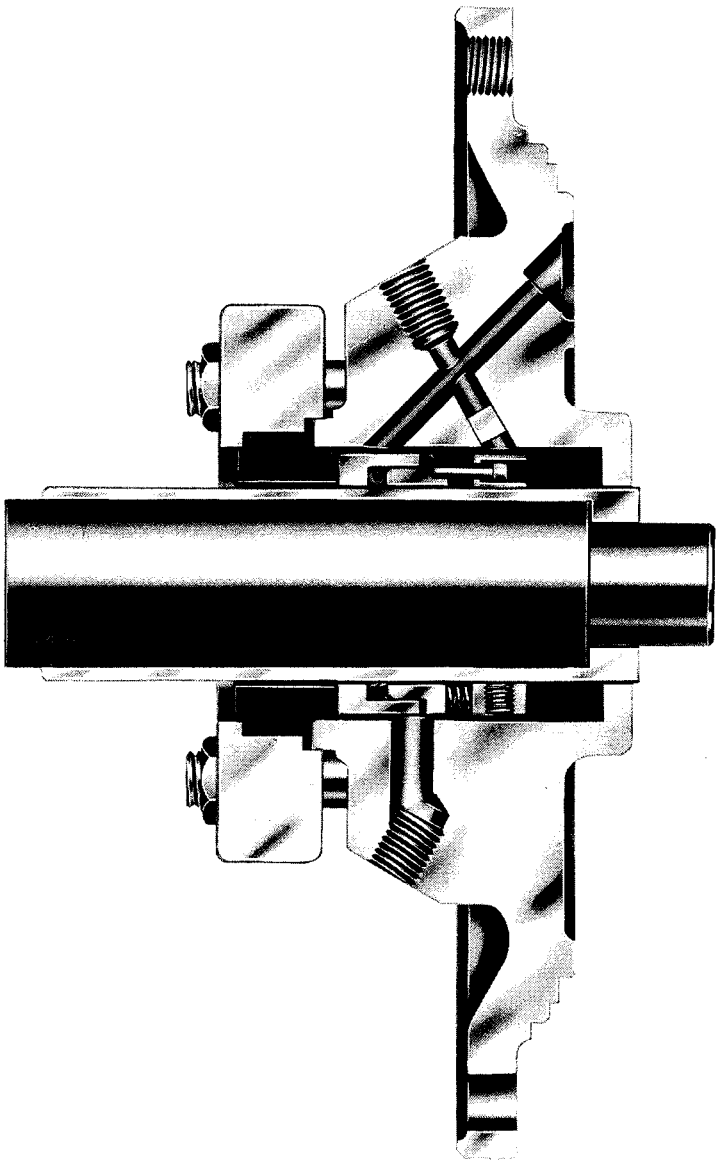
The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

LIQUIDS: With a specific gravity heavier than .6.

Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS:

1. Standard (illustrated)
2. Vent and drain with tapped openings
3. Vent, drain and cooled with tapped openings
4. Cooled with coolant tapped openings.



*DUPONT registered trademark

MECHANICAL SEAL
SINGLE INSIDE-BALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated in alternate designs.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

PRESSURES: Up to 600 P.S.I. (for pressures in excess of 600 P.S.I. please refer to the factory for recommendations).

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a bypass arrangement which permits either internal or external flushing to the mechanical seal faces.

TEMPERATURES: Minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

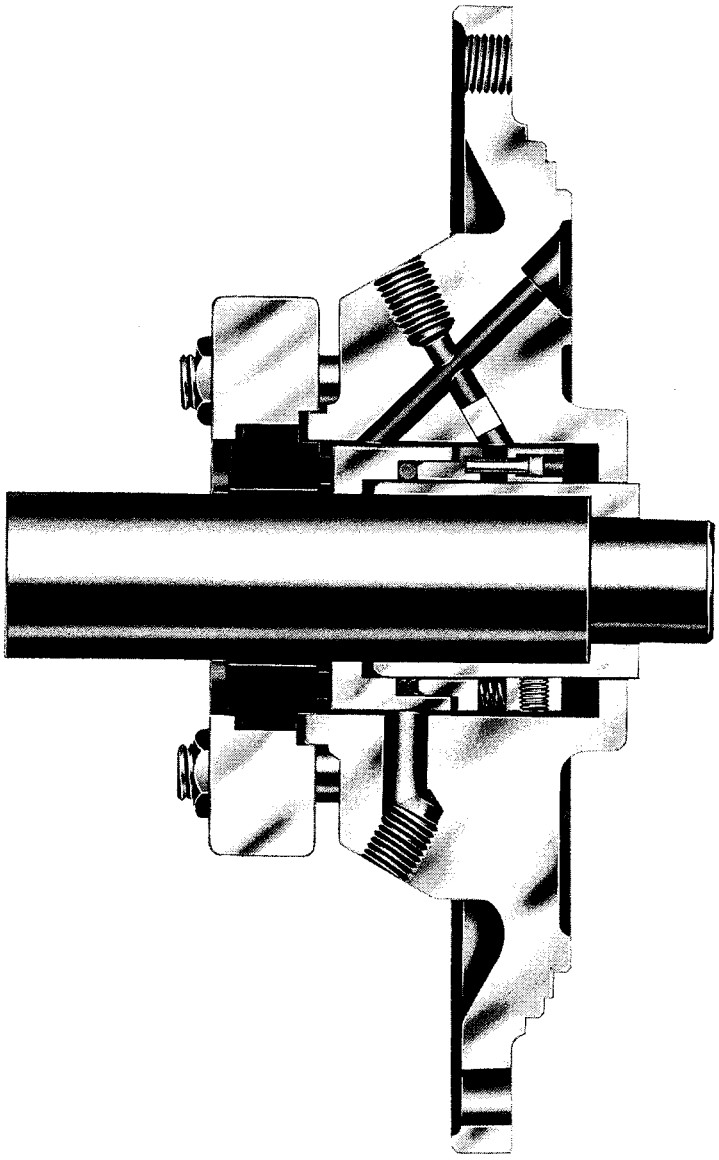
LIQUIDS: With a specific gravity of .6 or lighter.

Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS:
1. Standard (illustrated).
2. Vent and drain with tapped openings.
3. Vent, drain and cooled with tapped openings.
4. Cooled with coolant tapped openings.

NOTE: An alloy shaft will be furnished with this option.

*DUPONT REG. TRADEMARK



MECHANICAL SEAL
DOUBLE INSIDE-UNBALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

NOTE:
1. Double seals are only recommended when operating conditions are such that a single seal is not practical. Double seals provide a greater degree of safety in sealing hazardous and toxic fluids.
2. Double seal operation requires that a sealing fluid be circulated between both sealing faces at a pressure 10-20 P.S.I. greater than that of the pumped liquid at the stuffing box. The secondary liquid furnishes lubrication to the sealing faces and provides cooling.

PRESSURES: Below atmospheric pressure up to approximately 450 P.S.I. depending upon velocity and pressurizing liquid.

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a bypass arrangement which permits either internal or external flushing to the mechanical seal faces.

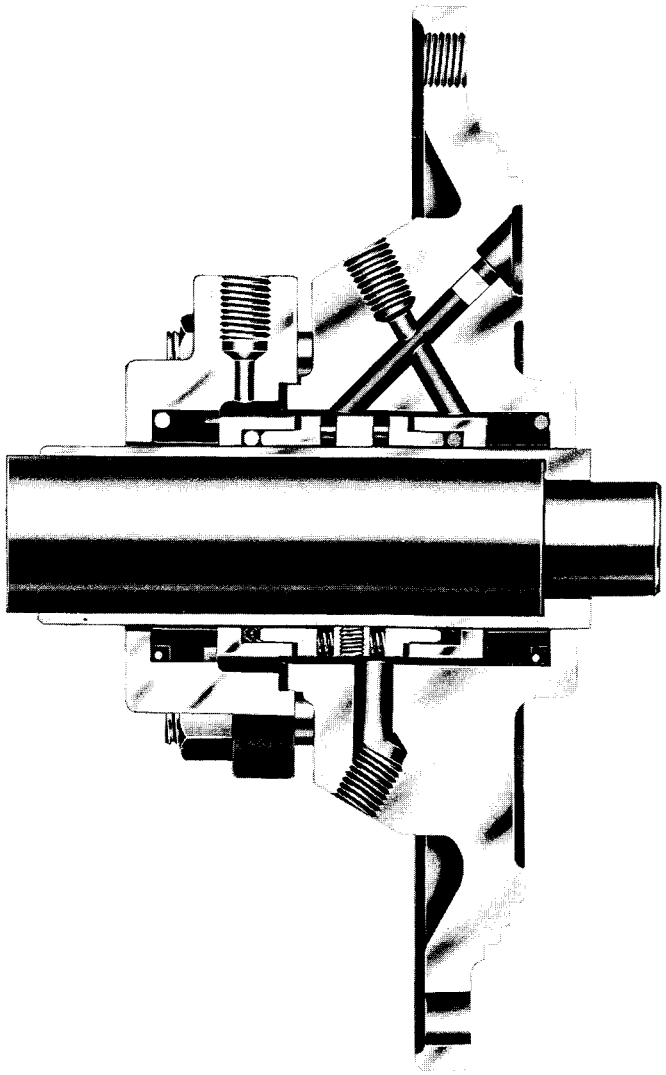
TEMPERATURES: From minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

LIQUIDS: With a specific gravity heavier than .6.

Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS: Standard with sealant tapped opening (illustrated).



*DUPONT REG. TRADEMARK

MECHANICAL SEAL
DOUBLE INSIDE-BALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

NOTE:

1. Double seals are only recommended when operating conditions are such that a single seal is not practical. Double seals provide a greater degree of safety in sealing hazardous and toxic fluids.
2. Double seal operation requires that a sealing fluid be circulated between both sealing faces at a pressure 10-20 P.S.I. greater than that of the pumped liquid at the stuffing box. The secondary liquid furnishes lubrication to the sealing faces and provides cooling.

PRESSURES: Up to 600 P.S.I. (for pressures in excess of 600 P.S.I., please refer to the factory for recommendations).

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a bypass arrangement which permits either internal or external flushing to the mechanical seal faces.

TEMPERATURES: Minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

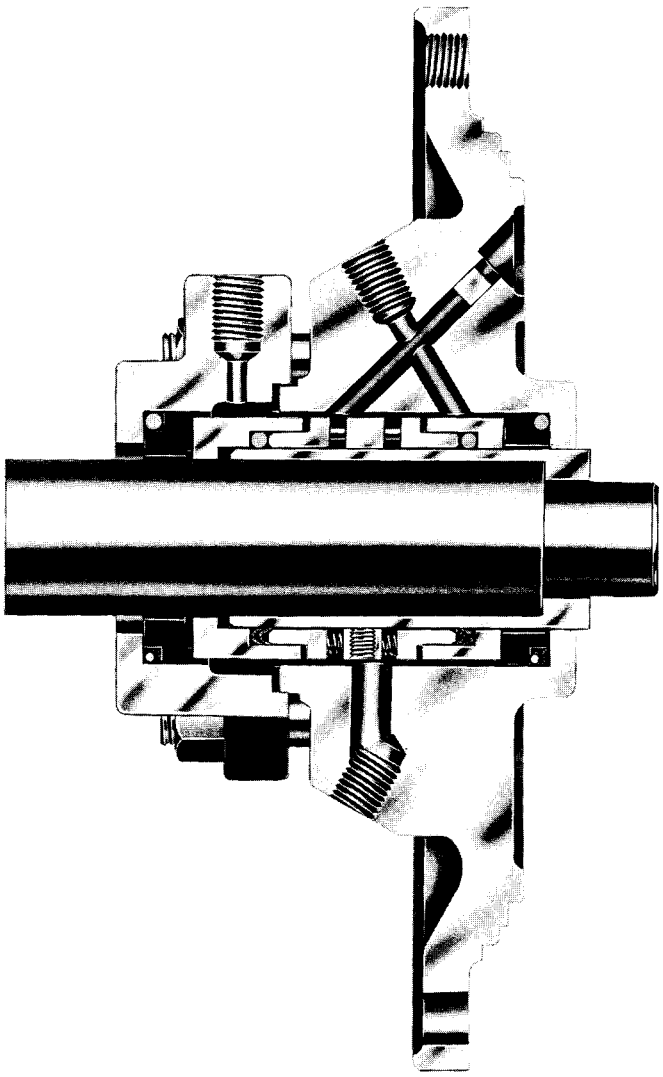
LIQUIDS: With a specific gravity of .6 or lighter. Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS: Standard with sealant tapped opening (illustrated).

NOTE:

1. An alloy shaft will be furnished with this option.
2. This seal option is not available for model 151 pumps.

*DUPONT REG. TRADEMARK



OPTION NO. 5
MECHANICAL SEAL
SINGLE OUTSIDE-BALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated in alternate designs.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

PRESSURES: Below atmospheric pressure up to 400 P.S.I.

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a bypass arrangement which permits either internal or external flushing to the mechanical seal faces.

TEMPERATURES: From minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

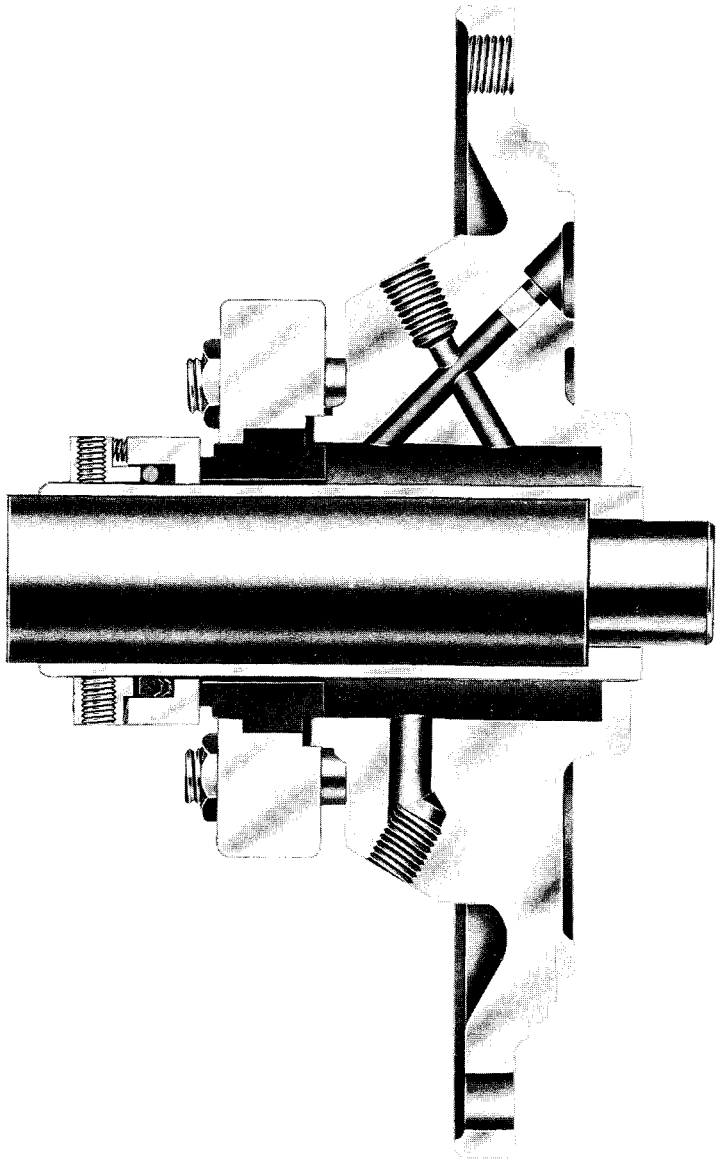
The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

LIQUIDS: With a specific gravity of .6 or lighter.

Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS:

1. Standard (illustrated).
2. Cooled with coolant tapped openings.



*DUPONT REG. TRADEMARK

OPTION NO. 6
PACKING
TYPE APCO-CHEM PUMPS

Factory option die molded, diagonal cut packing rings are of high quality and supplied by leading manufacturers.

Packing rings are impregnated braided acrylic yarn. Various other materials are also available. Lantern rings are TEFLON* and diagonally cut for easy assembly.

Gland plates are stainless steel and can be supplied as indicated.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

PRESSURES: Below atmospheric pressure up to approximately 150 P.S.I.

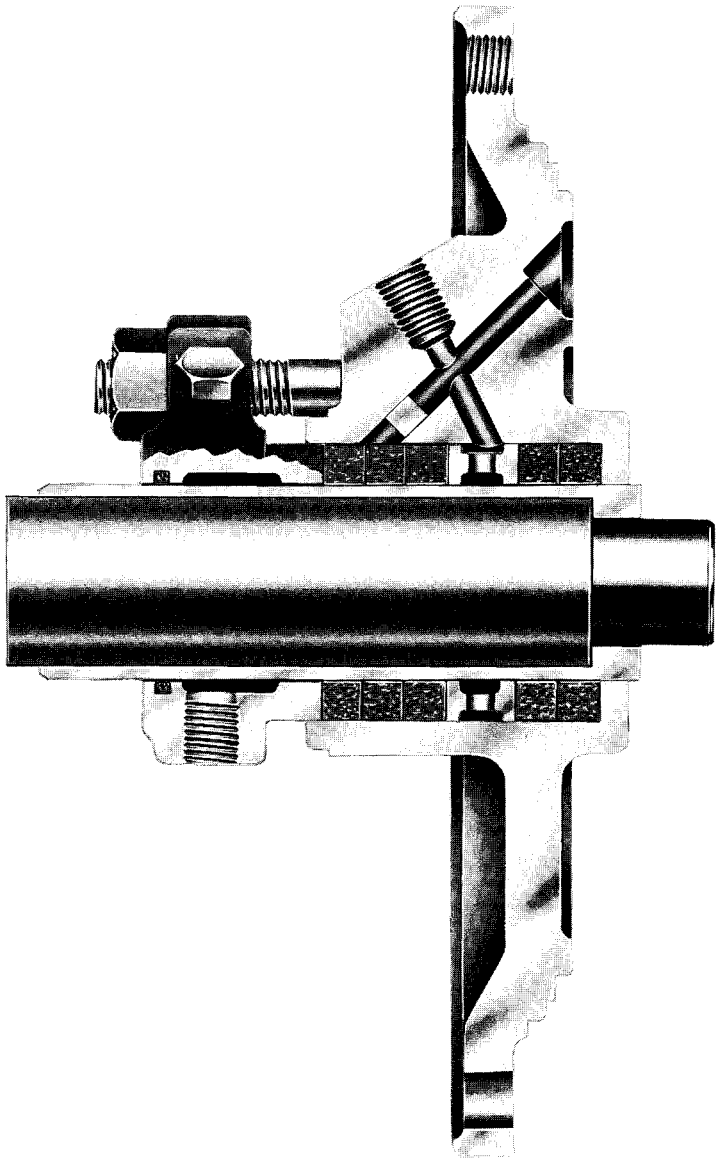
The pressures referred to are those found at the pump discharge. Most packing manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a by-pass arrangement which permits either internal or external flushing to the lantern ring.

TEMPERATURES: From minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

The temperature limitation of packing is frequently determined by the shaft packing material. The various materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 500°F.

LIQUIDS: All liquids that are compatible with white asbestos yarn. Other packings are available for special applications.

PACKING GLAND: Quench with coolant tapped openings (standard illustrated).
NOTE: Hardened stainless steel (450 minimum brinnel) shaft sleeves are furnished with this option.



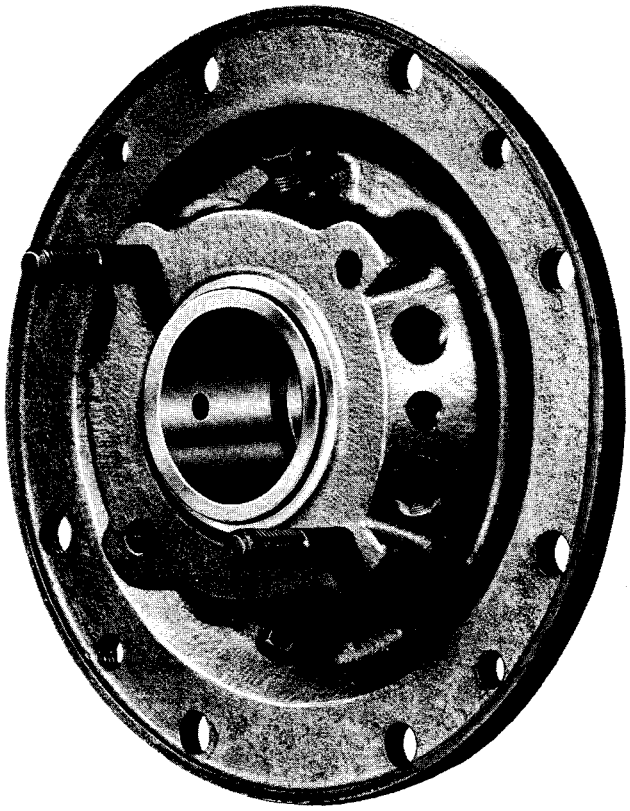
*DUPONT REG. TRADEMARK

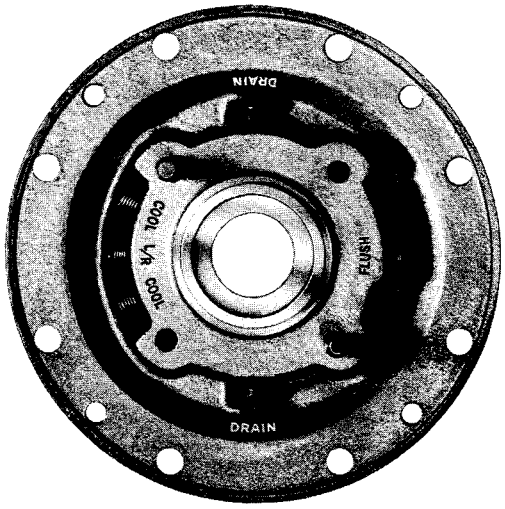
OPTION NO. 7
WATER COOLED STUFFING BOX
TYPE APCO-CHEM PUMPS

The water cooled stuffing box is interchangeable with the standard box and is required for high temperature applications.

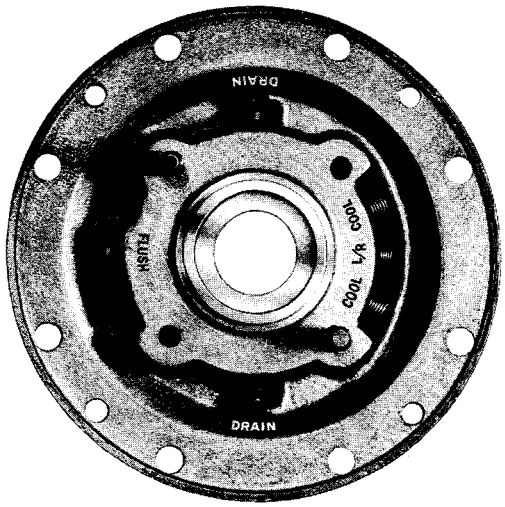
Stuffing box covers offer maximum interchangeability. One cover can be used for either mechanical seals or packing. The cover is a back pull out design and includes an integrally cast stuffing box. The cover is register aligned and securely clamped between the casing and the power frame with eight capscrews. Four additional capscrews lock the stuffing box cover to the power frame which allows the frame and cover assembly to be removed as a unit for maintenance purposes. Two of these capscrews (opposing) may be substituted with extra length capscrews to serve as jack screws to facilitate removal of the cover and frame assembly from the casing.

The covers are fully machined and the stuffing boxes are machine faced for seal or packing and include facilities for internal or external flushing or lubrication of mechanical seals or packing. One quarter (1/4") N.P.S.F. taps are provided for external flushing. Mechanical seal gland gaskets are TEFLON* and are completely confined. Water jacketing includes 1/2" N.P.S.F. inlet and outlet taps in the model 152, 153 and 154; and 3/8" N.P.S.F. taps in the model 151 pumps. The covers are completely interchangeable in the field for seals or packing and require only the necessary glands.





MODEL 151 & 152
SINGLE STAGE



MODEL 153 & 154
TWO STAGE

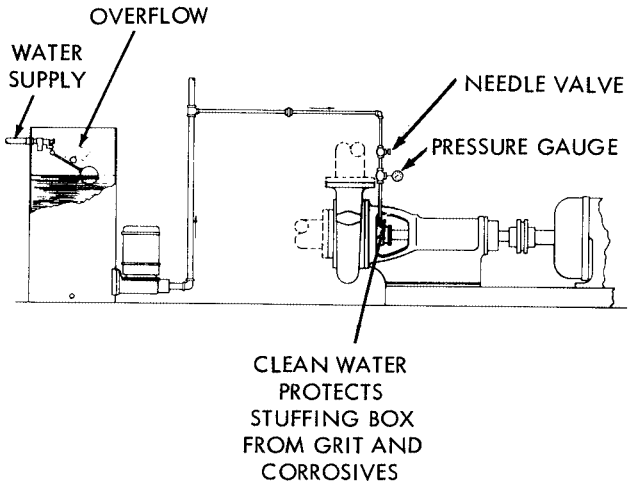
PIPING ORIENTATION ON APCO-CHEM PUMPS

*DUPONT REG. TRADEMARK

OPTION NO. 8
WATER SEAL UNITS
TYPE APCO-CHEM PUMPS

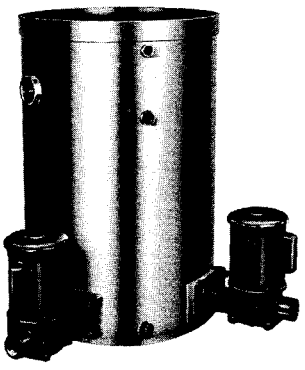
Water seal units are complete pumping systems used with, but independent of, larger industrial pumps. Their purpose is to pump clean water into the stuffing box or for wear ring flushing of pumps handling abrasive or corrosive materials. This provides clear water lubricating and flushing of mechanical seals, packing or wear ring faces. For complete details, see Bulletin 680.

TYPICAL INSTALLATION OF AN AURORA WATER SEAL UNIT

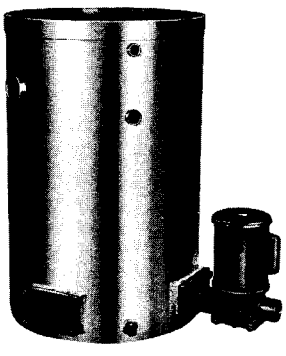


Water Seal Units are available in either a SIMPLEX (one pump) or DUPLEX (two pumps) configuration.

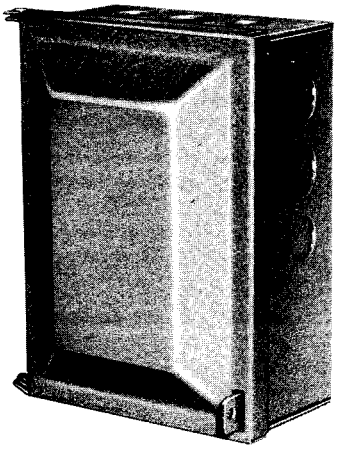
Duplex units extend pump life by alternating pump operation. An electric sequence changer is available to alternate the operation of the two pumps provided in the duplex system.



DUPLEX



SIMPLEX

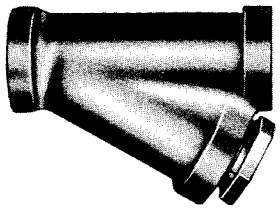


OPTION 8A

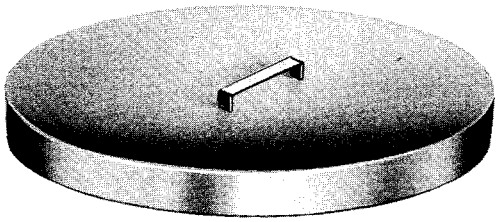
Sequence changer is available in Standard, Weatherproof, or Explosion Proof Enclosures 60/50 Cycle only, 230 volt Maximum.

OPTION 8B

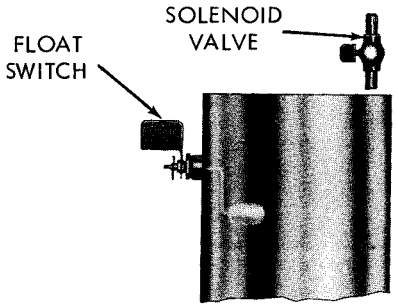
"Y" strainers are available for installation in the inlet pipe line.



OPTION 8C



A 24 gauge galvanized steel cover is available for covering the open top water seal receiver. A handle allows easy removal.



OPTION 8D

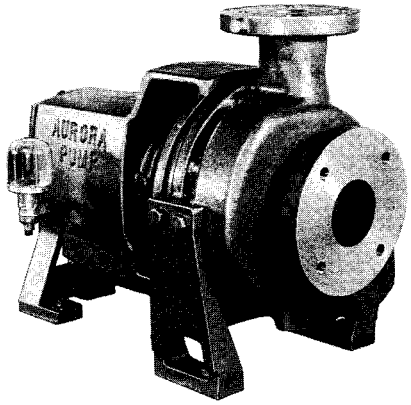
Specify this option when local codes require more than a 7" air gap between the incoming water supply and the tank overflow. As the water level drops in the receiver to a predetermined level the float switch activates the solenoid valve which in turn refills the receiver with fresh water. When the high water level is reached the float switch deactivates the solenoid valve, stopping the incoming water flow.

OPTION NO.'S 13 THRU 15
CENTERLINE MOUNT, DRIP CUP, AND W/J BEARING FRAME

TYPE APCO-CHEM PUMPS

OPTION 13

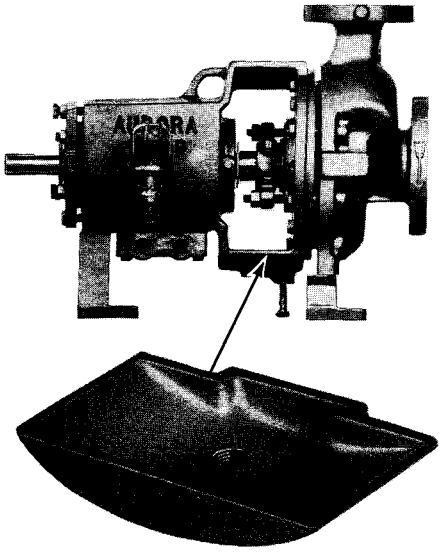
CENTERLINE MOUNTED CASING: Pump models 152, 153 and 154 are recommended for high operating temperatures (generally above 300°F.). This option allows for expansion in all directions from the horizontal ℄ of the shaft. The support does not affect the A.N.S.I. pump mounting dimensions.



OPTION 14

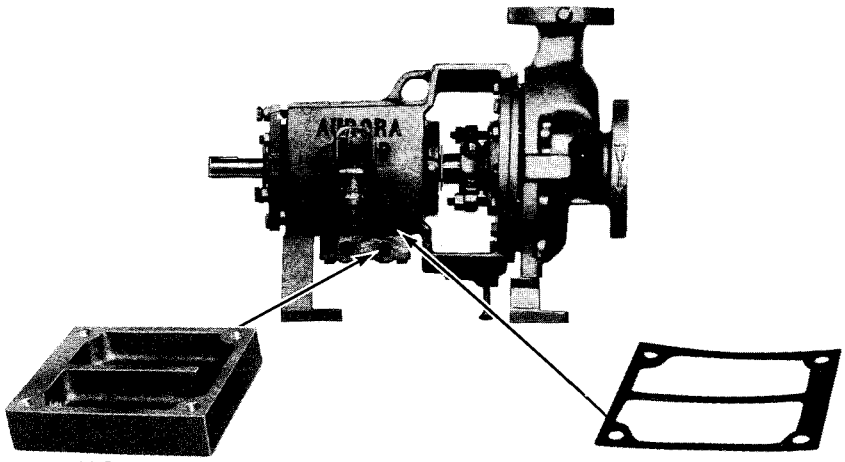
DRIP CUP: Prevents stuffing box leakage from corroding the bearing frame. Models 152, 153 and 154 have a 3/8" N.P.S.F. and model 151 a 1/4" N.P.S.F. pipe tap in the bottom of the cup for drain piping.

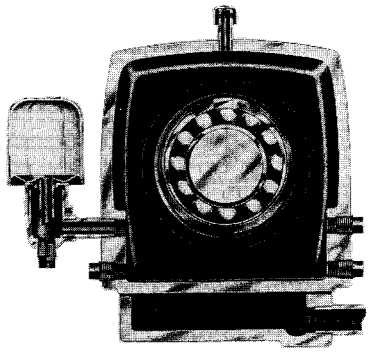
This option is furnished as standard on all model 152, 153 and 154 alloy pumps.



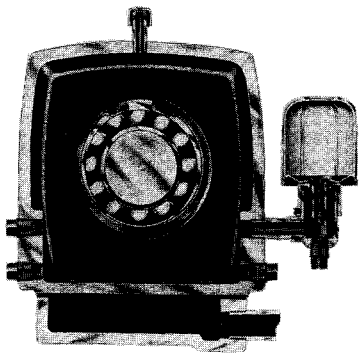
OPTION 15

WATER JACKETED BEARING FRAME: For operation over 300° F., a bolt on water jacket for easy inspection and cleaning, provides oil lubrication cooling for the power frame of models 152, 153 and 154, and should be specified. Actual limitations vary due to other considerations.

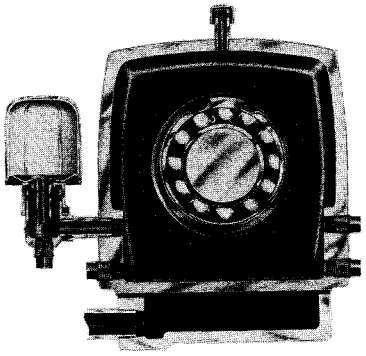




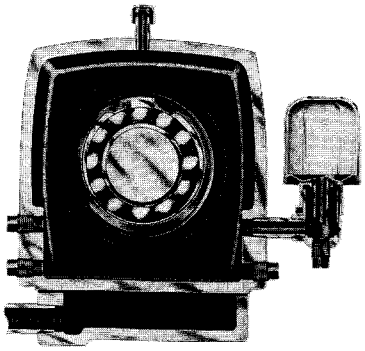
POSITION 1
OPTION 15A



POSITION 2
OPTION 15B



POSITION 3
STANDARD



POSITION 4
OPTION 15C

VARIOUS POWER FRAME PIPING AND LUBRICATION ARRANGEMENTS
(AS VIEWED FROM SUCTION FLANGE)

GAUGE AND DRAIN CONNECTIONS - FLANGES

TYPE APCO-CHEM PUMPS

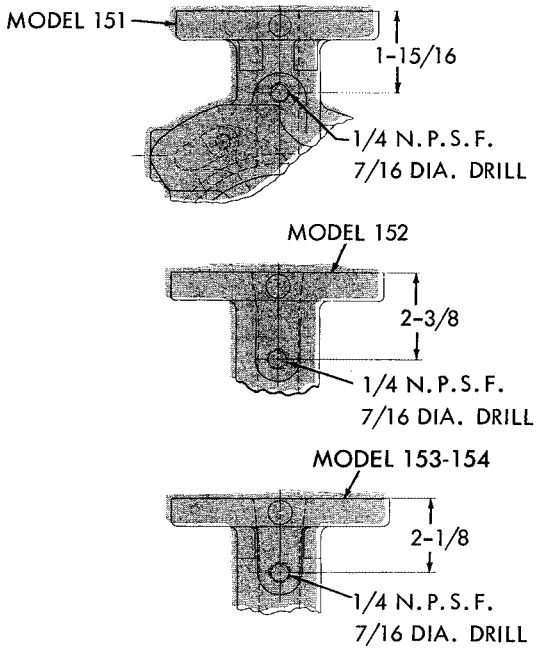
Conveniently located bosses are provided for optional gauge and drain taps.

The casing is not tapped as standard to provide maximum corrosion protection. Casing drain taps are furnished with 1/4 N.P.S.F. threads. Two stage model 153 pumps have provision for two (2) taps, one for each stage.

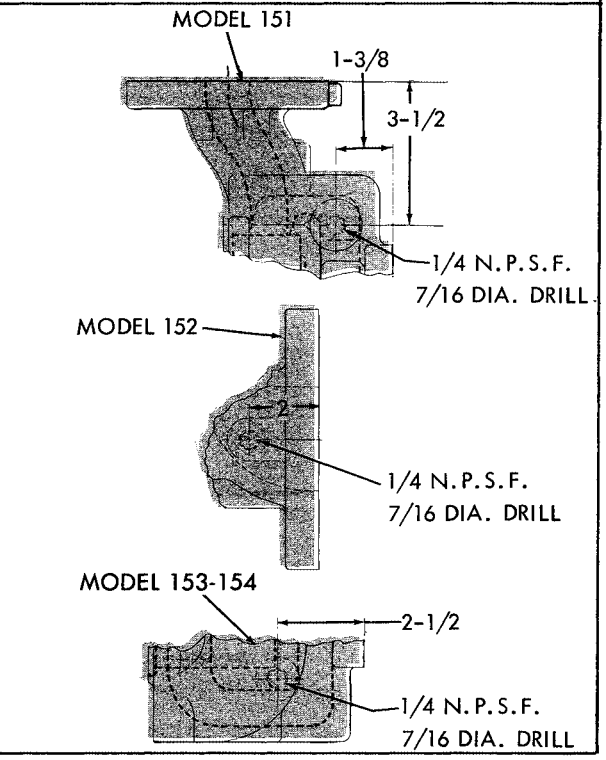
Gauge taps are standard 1/4" N.P.S.F.

OPTION NO. 16
NOZZLE GAUGE CONNECTIONS

DISCHARGE TAP
AS VIEWED FROM SUCTION



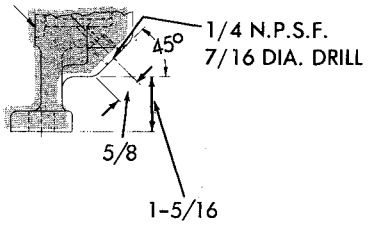
SUCTION TAP
AS VIEWED FROM SIDE



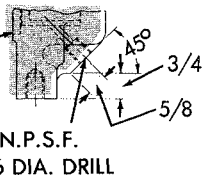
OPTION NO. 17

CASING DRAIN
1/4 N.P.S.F.

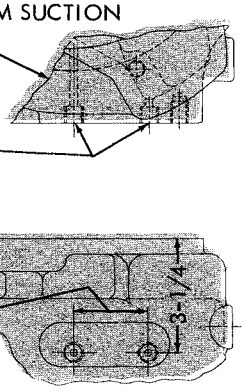
MODEL 151 - AS VIEWED FROM SIDE



MODEL 152
AS VIEWED FROM SIDE

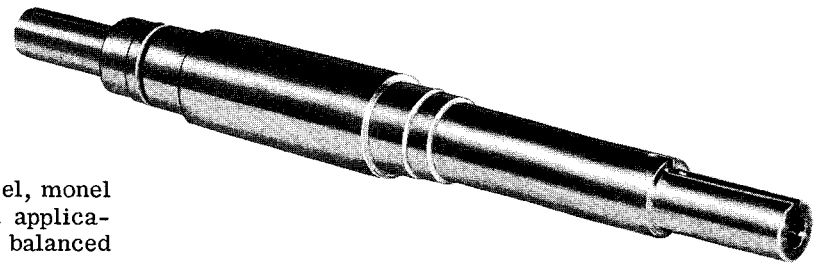


MODEL 153 - AS VIEWED FROM SUCTION



*DUPONT REG. TRADEMARK

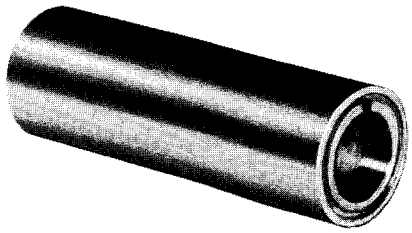
OPTION NO.'S 19 THRU 22
SHAFTS, SLEEVES, GREASE LUBE AND MOTORS
TYPE APCO-CHEM PUMPS



OPTION 19

Precision machined shafts of stainless steel, monel and other alloys are available for difficult application. Alloy shafts are required when inside balanced seals are specified.

OPTION 20



Shaft sleeves, machined to close tolerances are available for mechanical seals in various alloys. Stainless steel sleeves of 450 minimum brinell hardness are standard for packed pumps.

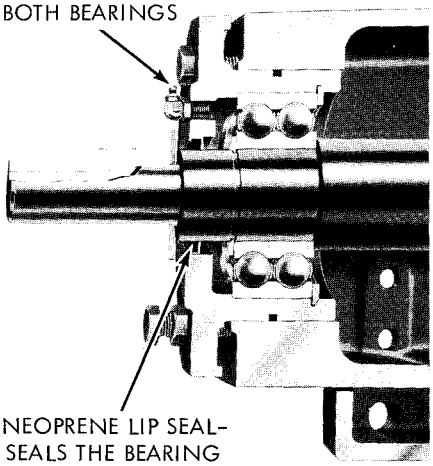
OPTION 22

The Aurora Apco-Chem pump can be provided with any driver. When specified an electric motor, of suitable horsepower, RPM, voltage, phase and enclosure characteristics will be furnished.

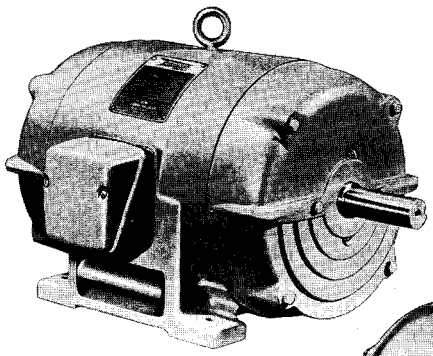
OPTION 21

GREASE LUBRICATION: Can be specified for specific applications.

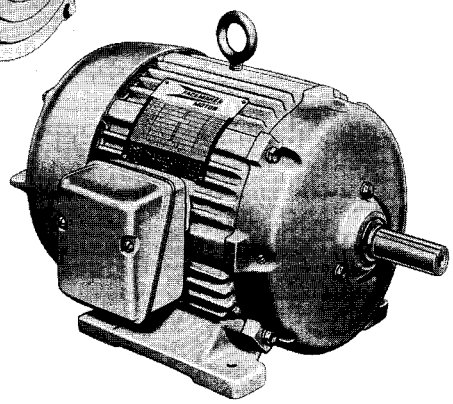
PIPE PLUG IS REPLACED BY A GREASE FITTING AT BOTH BEARINGS



NEOPRENE LIP SEAL-SEALS THE BEARING



OPEN DRIPPROOF ELECTRIC MOTOR

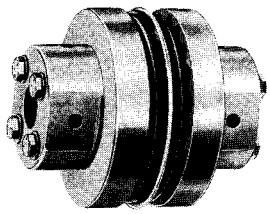


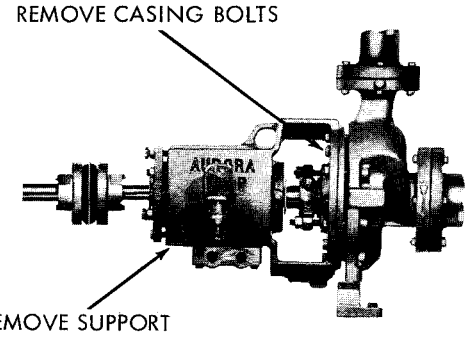
TOTALLY ENCLOSED OR EXPLOSION PROOF ELECTRIC MOTOR

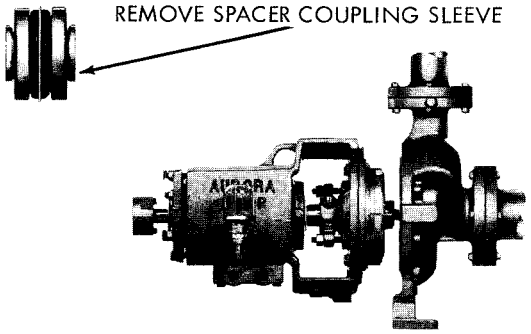
OPTION NO.'S 23 THRU 27
COUPLINGS, COUPLING GUARDS AND BASES
TYPE APCO-CHEM PUMPS

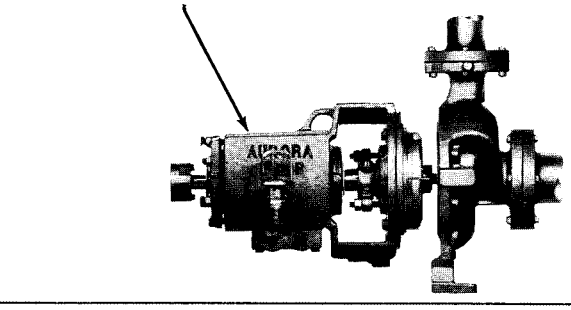
OPTION 23

SPACER COUPLINGS - are recommended for horizontal pump applications where it is desirable to remove the bearing assembly without disturbing the pump or motor. The ANSI Standard for chemical pumps specify spacer couplings. Aurora Pump will provide spacer couplings for complete pump units unless otherwise specified.





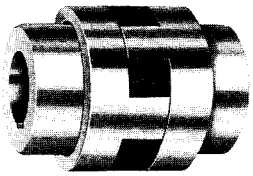


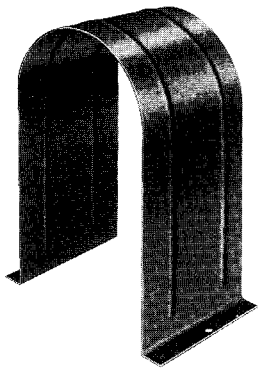


SUPPORT IS INTEGRALLY CAST ON MODEL 151 PUMPS

OPTION 24

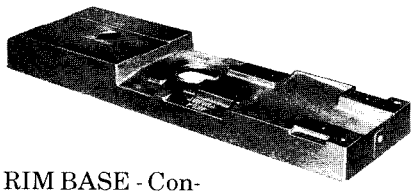
FLEXIBLE COUPLINGS - Factory selected couplings from leading manufacturers are available. Special couplings are also available. The motor must be moved to allow back pull out of the pump bearing assembly.





OPTION 25

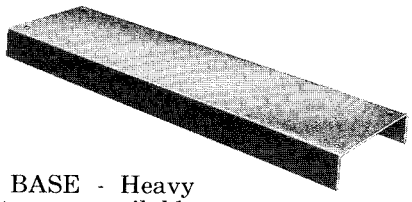
COUPLING GUARD - A formed steel coupling guard for rigid bolting to the base plate is standard. Non-sparking and special enclosed guards are optionally available.



OPTION 26

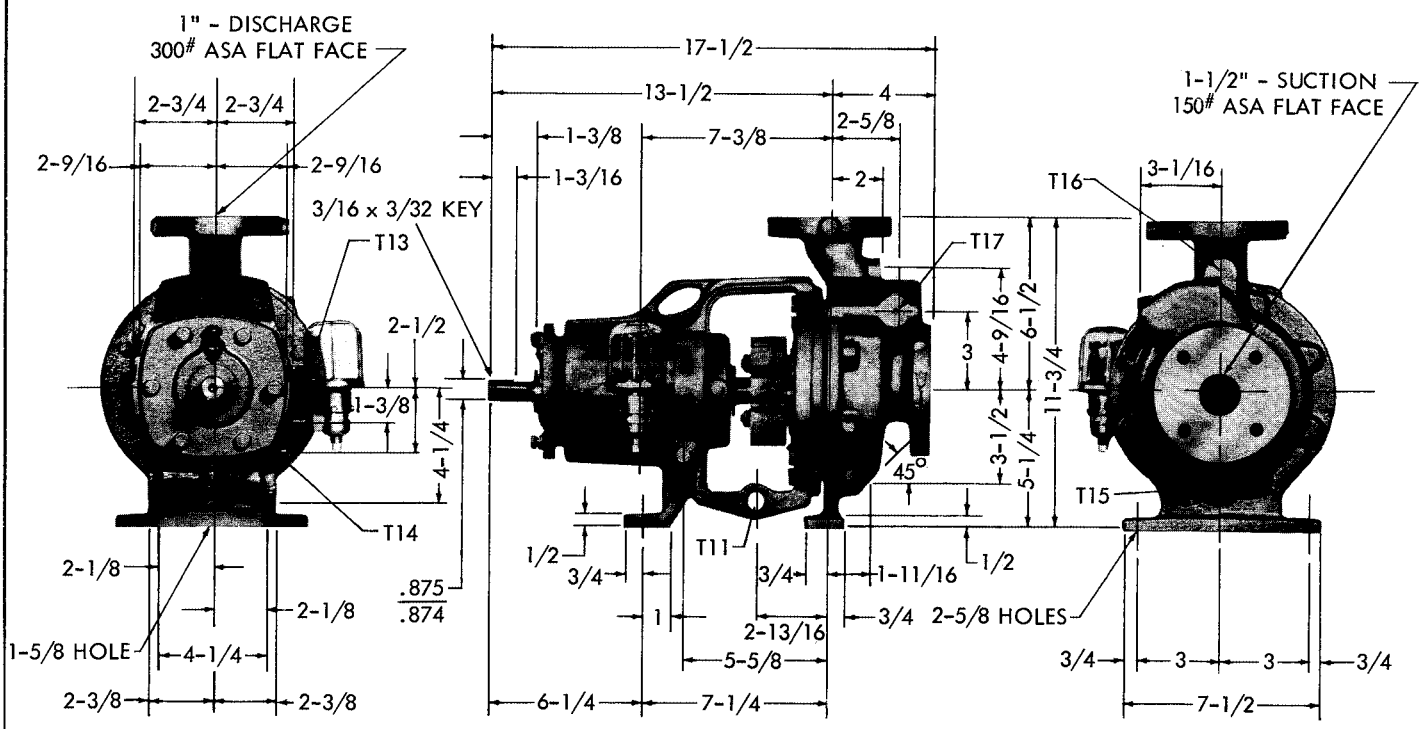
CAST IRON DRIP RIM BASE - Conform to all ANSI dimensions. Cast iron drip rim type base plates are designed to form a rigid mount for pump and motor. It has machined mounting pads for both the pump and motor and an integral tapered drip rim for condensation and stuffing box leakage.

A 1" pipe tap is provided for drain piping. Grouting holes are also provided.



OPTION 27

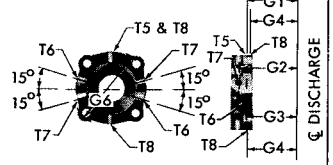
FORMED STEEL BASE - Heavy duty steel base plates are available and conform to all ANSI dimensions.

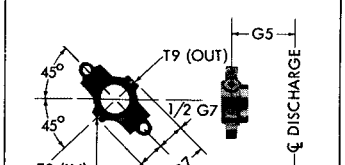


TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	2	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	1/4 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE

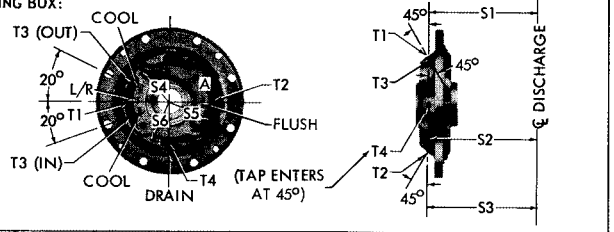
GLANDS:





G1	G2	G3	G4	G5	G6	G7
2-11/16	2-11/16	2-1/8	2-1/8	2-1/2	4	3

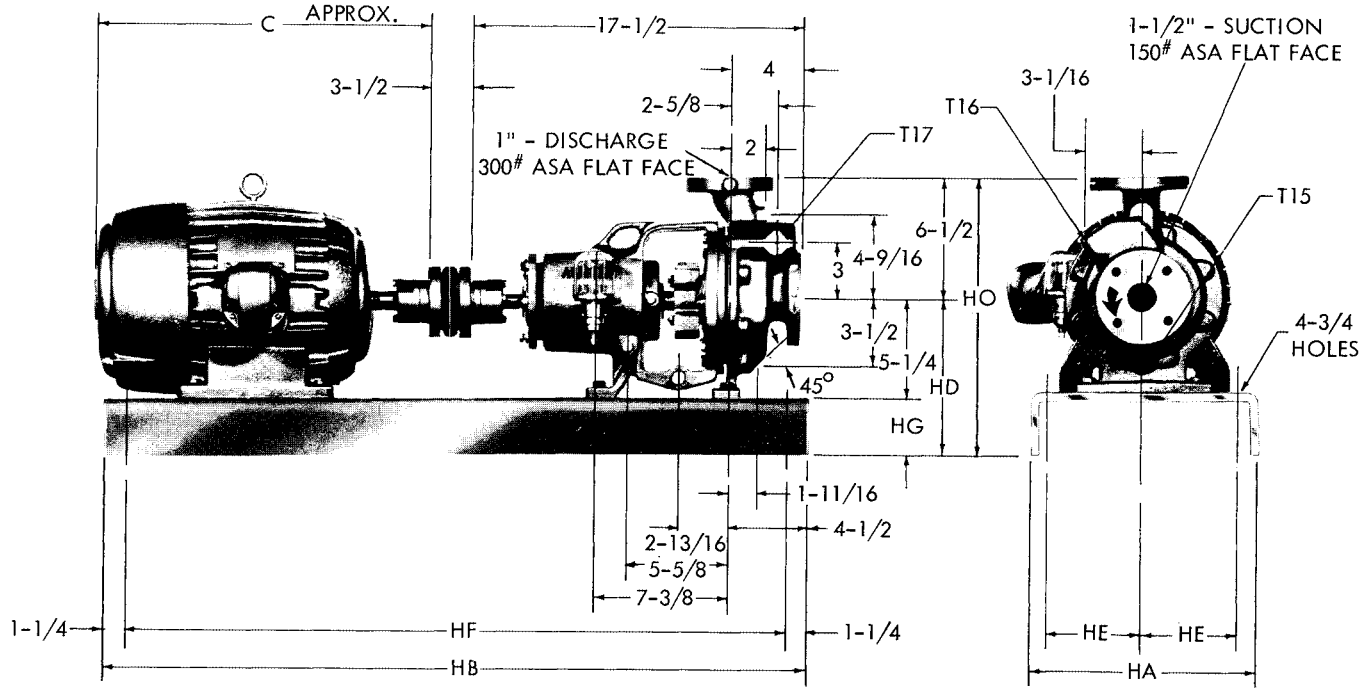
STUFFING BOX:



S1	S2	S3		S4	S5		S6
		STD	W/C		STD	W/C	
1-1/2	1-1/8	1-5/16	1-7/16	2-9/16	2-1/4	2-9/16	2-1/16

NOTES:
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2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 STUFFING BOX
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
5 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 151 PUMPS
ON FORMED STEEL BASE
STANDARD FOOT MOUNTED CASING



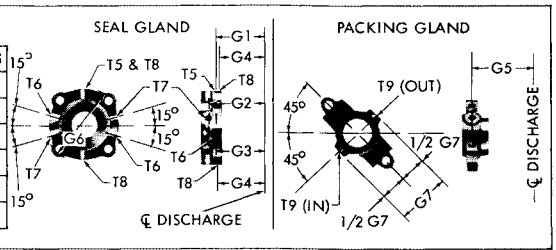
MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HO	AVS BASE PLATE DESIGNATION
143T	12								
145T	13	10	35	8-1/4	4	32-1/2	3	14-3/4	1T
182T	13								
184T	14								
213T	16	12	39	8-1/2	4-1/2	36-1/2	3-1/4	15	2T
215T	18								

TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	2	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	1/4 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE

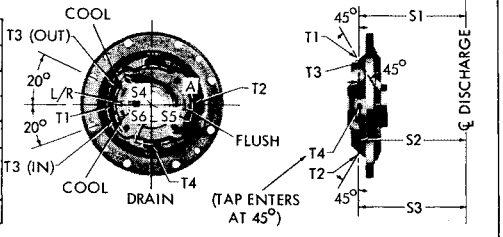
GLANDS:

G1	2-11/16
G2	2-11/16
G3	2-1/8
G4	2-1/8
G5	2-1/2
G6	4
G7	3

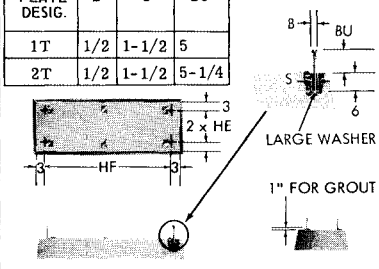


STUFFING BOX:

S1		1-1/2
S2		1-1/8
S3	STD.	1-5/16
	W/C	1-7/16
S4		2-9/16
S5	STD.	2-1/4
	W/C	2-9/16
S6		2-1/16

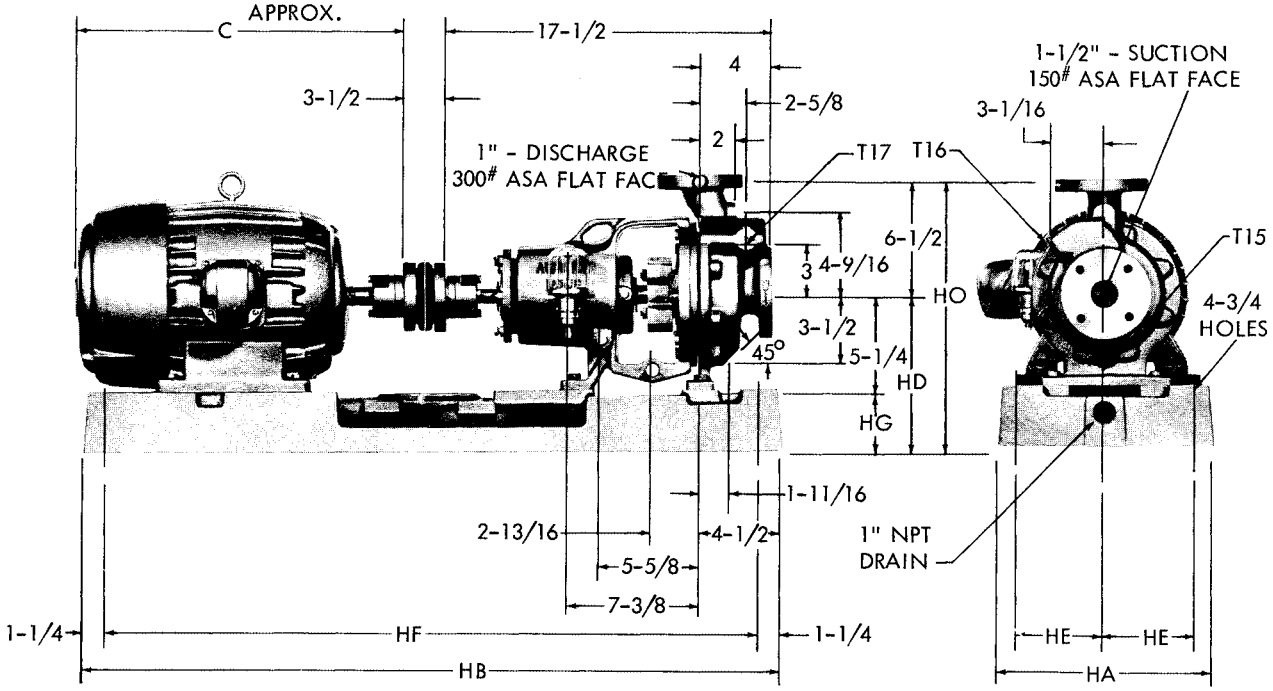


BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5
2T	1/2	1-1/2	5-1/4



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   B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7. SEAL GLAND
   A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 151 PUMPS
ON CAST IRON - DRIP RIM BASE
STANDARD FOOT MOUNTED CASING



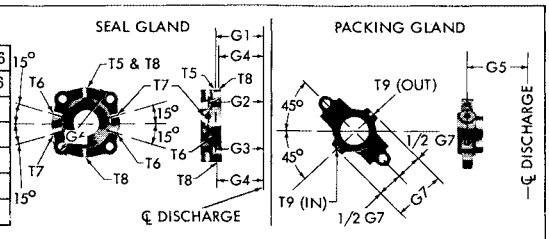
MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HO	AVS BASE PLATE DESIGNATION
143T	12								
145T	13	10	35	8-1/4	4	32-1/2	3	14-3/4	1T
182T	13								
184T	14								
213T	16	12	39	8-1/2	4-1/2	36-1/2	3-1/4	15	2T
215T	18								

TAPPED PIPE CONNECTIONS				
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T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	2	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	1/4 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE

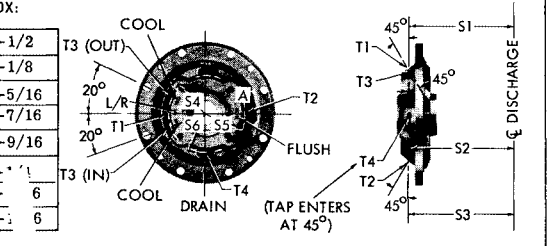
GLANDS:

G1	2-11/16
G2	2-11/16
G3	2-1/8
G4	2-1/8
G5	2-1/2
G6	4
G7	3

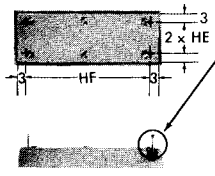


STUFFING BOX:

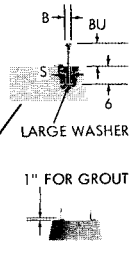
S1		1-1/2
S2		1-1/8
S3	STD.	1-5/16
	W/C	1-7/16
S4		2-9/16
S5	STD.	2-
	W/C	2- 6
S6		2- 6



BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5
2T	1/2	1-1/2	5-1/4

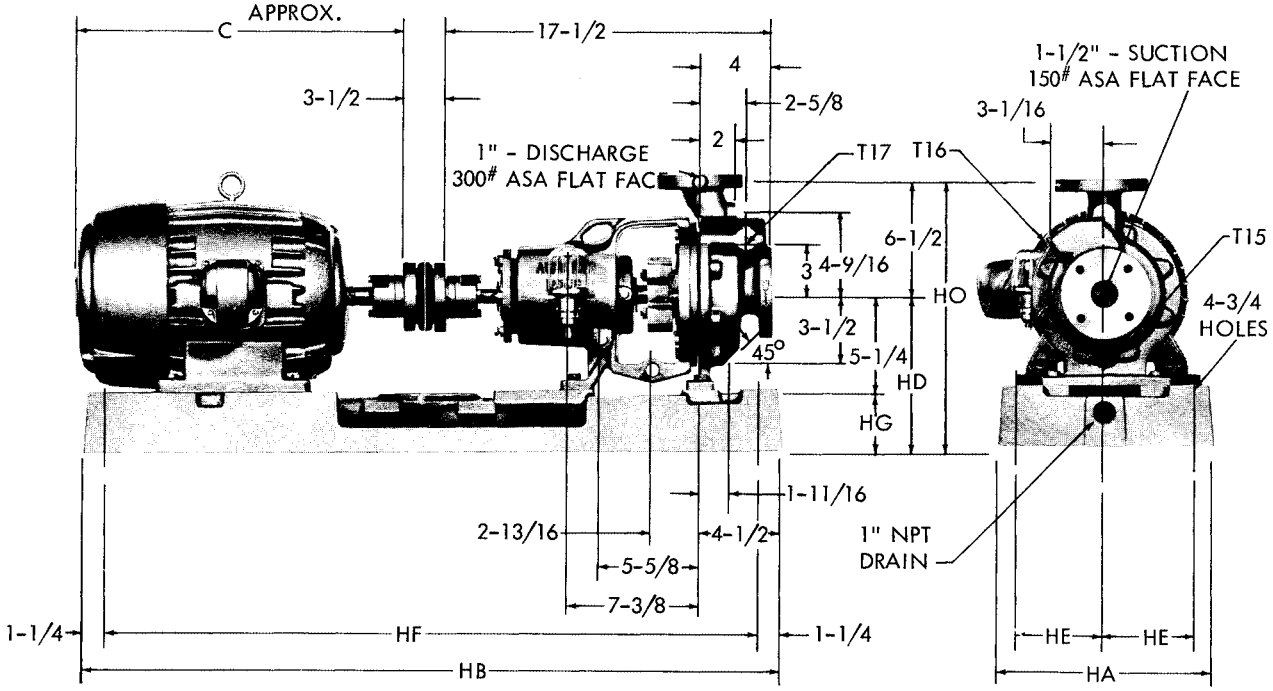


RECOMMENDED FOUNDATION:



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7. SEAL GLAND
   A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 151 PUMPS
ON CAST IRON - DRIP RIM BASE
STANDARD FOOT MOUNTED CASING



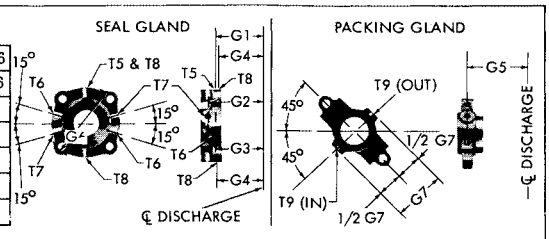
MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HO	AVS BASE PLATE DESIGNATION
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145T	13	10	35	8-1/4	4	32-1/2	3	14-3/4	1T
182T	13								
184T	14								
213T	16	12	39	8-1/2	4-1/2	36-1/2	3-1/4	15	2T
215T	18								

TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
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T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	2	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	1/4 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE

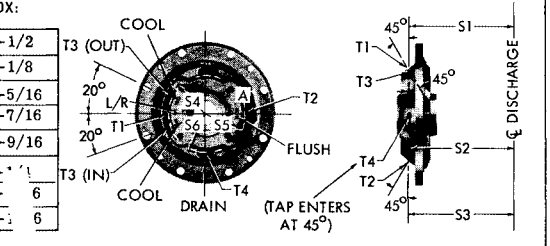
GLANDS:

G1	2-11/16
G2	2-11/16
G3	2-1/8
G4	2-1/8
G5	2-1/2
G6	4
G7	3

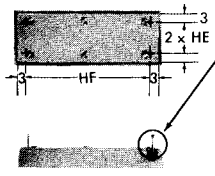


STUFFING BOX:

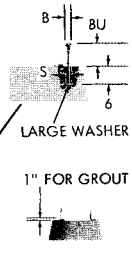
S1		1-1/2
S2		1-1/8
S3	STD.	1-5/16
	W/C	1-7/16
S4		2-9/16
S5	STD.	2-
	W/C	2- 6
S6		2- 6



BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5
2T	1/2	1-1/2	5-1/4



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   B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7. SEAL GLAND
   A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

SECTION 6 ITEM 150
DATED JUNE 1985
SUPERSEDES ITEMS 151, 152, 153, 154
DATED FEBRUARY 1983

AURORA®
Pentair Pump Group

INSTRUCTION MANUAL
(APCO-CHEM)
MODELS 151, 152, 153, 154 REPAIR

6

NOTE

This repair manual is applicable to pump Models 151, 152, 153, 154. All photos illustrate Model 153.

SERVICE

Your Aurora pump requires no maintenance other than periodic inspection, lubrication and occasional cleaning. The intent of inspection is to prevent breakdown, thus obtaining optimum service life.

LUBRICATION OF BEARINGS

The 150 series pumps are available with two options for lubricating the shaft bearings:

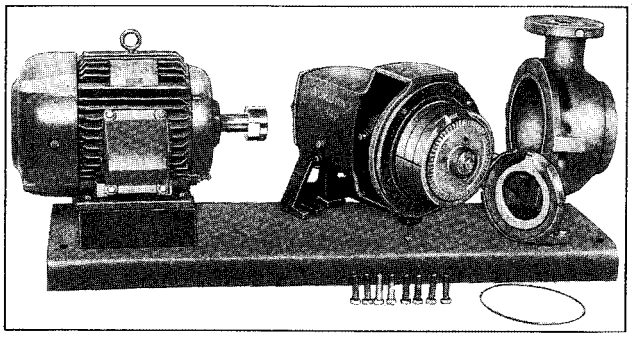
1. Oil Lubrication
2. Regreasable

Oil lubricated bearings are standard on all 150 series pumps. A fixed oil level is maintained within the power frame of an oiler which allows visual indications of reserve oil.

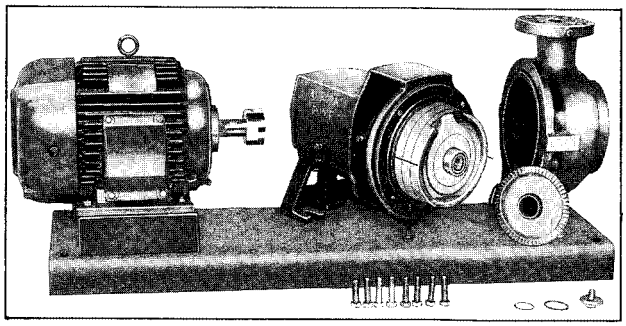
At initial installation and before starting a unit that has been shut down for repairs or for any extended length of time, run enough 10W-30 weight motor oil through the oiler to maintain a constant oil level to insure that the bearing will never be without an oil supply. Oil will have to be added at intervals to maintain a constant level in the oiler. This interval can only be determined by experience.

Under working conditions, oil will breakdown and need to be replaced at regular intervals. The length of these intervals will depend on many factors. Under normal operation, in clean and dry locations, the oil should be changed about once a year. However, when the pump is exposed to dirt contamination, high temperatures (200° F. or above) or a wet location, the oil may have to be changed every 2 or 3 months.

Regreasable bearings will require periodic lubrication and can be accomplished by using the zerk or lubrication fittings



A. Channel ring and casing o-ring removed.



B. Lock nut, o-rings and impeller removed.

in the cartridge cap and power frame. Lubricate the bearings at regular intervals using a grease of high quality. Lithium, lithium soda or calcium base grease is recommended as lubricants for pumps operating in both wet and dry locations. Mixing of different brands of grease should be avoided due to possible chemical reactions between the brands which could damage the bearings. Accordingly, avoid grease of vegetable or animal base which can develop acids, as well as grease containing rosin, graphite, talc and other impurities. Under no circumstances should used grease be reused.

Over lubrication should be avoided as it may result in overheating and possible bearing failure. Under normal application, adequate lubrication is assured if the amount of grease is maintained at 1/3 to 1/2 the capacity of the bearing and adjacent space surrounding it.

In dry locations, each bearing will need lubrication at least every 4,000 hours of running time or every 6 to 12 months, whichever is more frequent. In wet locations the bearings should be lubricated at least after every 2,000 hours of running time or every 4 to 6 months, whichever is more frequent. A unit is considered to be installed in a wet location if the pump and motor are exposed to dripping water, to the weather, or to heavy condensation such as is found in unheated and poorly ventilated underground locations.

At times it may be necessary to clean the bearings due to accumulated dirt or deteriorated lubricants. This can be accomplished by flushing the bearing with a light oil heated to 180 to 200°F. While rotating it on a spindle, wipe the bearing housing with a clean rag soaked in a cleaning solvent and flush all surfaces.

Dry bearing thoroughly before relubricating. Compressed air can be used to speed drying, but care should be taken not to let bearings rotate while being dried.

CAUTION

Use normal fire caution procedures when using any petroleum cleaner.

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NO. AURORA, ILLINOIS

The motor which drives your Aurora pump may or may not require lubrication. Consult the manufacturer's recommendations for proper maintenance instructions.

REPAIRS

The pump may be disassembled using the illustrations and text provided. Although complete disassembly is covered, it will seldom be necessary to completely disassemble your Aurora pump.

The illustrations accompanying the disassembly instructions show the pump at various stages of disassemnbly. The illustrations are intended to aid in the correct identification of the parts mentioned in the text.

Inspect removed parts at disassembly to determine their reusability. Cracked castings should never be reused. All packing and gaskets should be replaced with new ones at reassembly simply as a matter of economy; they are much less expensive to replace routinely than to replace as the need occurs. In general it is economical to return to the manufacturer for repair only the motor and motor controller.

Disassembly of Apco-Chem 150 Series (Figure 1 thru 7).

Repair of Model 152 is discussed and illustrated in this manual. Model 152-153-154 pumps use different casings (1), but otherwise all compenents are interchangeable. Model 151 disassembly is the same as larger models.

1. Break the electrical connections to motor; so pump will not be accidently energized during disassembly.

2. Close all valves or flow devises that regulate flow of liquids to or from pump.

3. Remove any external flushing or cooling lines from pump.

4. Remove four capscrews from each hub of spacer type coupling and remove coupling flange and rubber insert. This leaves a 3-1/2" space between end of motor shaft and pump shaft to facilitate back pull out of pump.

5. If possible drain and/or flush pump to remove any corrosive or toxic liquid before attempting further disassembly. Many units will not have drain taps.

6. Unscrew two capscrews holding frame foot to the base. Remove eight capscrews (47) which hold frame (6) to casing (1). The frame and rotating assembly can be pulled away from the casing and taken to a work bench for further disassembly.

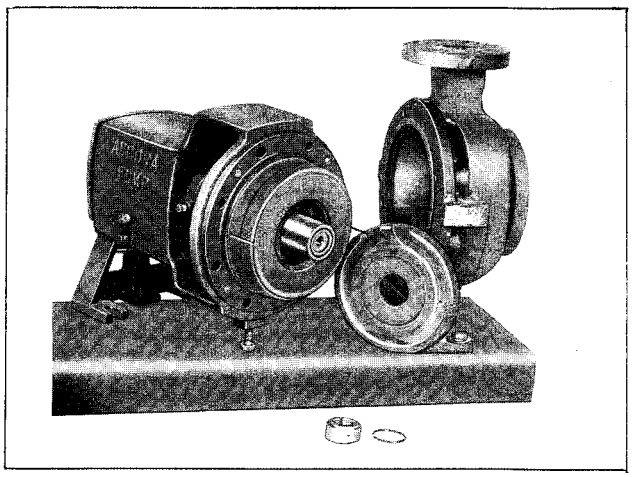
NOTE

If difficulty in withdrawing the frame and rotating element is encountered, remove any two capscrews (46) that are 180 degrees apart. Thread two longer capscrews into their holes. These longer capscrews will act as jackscrews to aid with the disassembly.

7. Right hand channel ring (2) will remain in casing (1). If the ring can not be readily removed by hand, a simple puller can be used incorporating the slots on inside diameter of channel ring.

NOTE

For customer's convenience, a special tool is optionally available from Aurora Pump to remove this ring.



C. Sleeve extension, o-ring and channel ring removed.

8. Impeller screw (20) and "O" ring (18) can be removed. Impeller (3) and impeller key (74) can be removed at this point.

9. Remove left hand channel ring (4), interstage bushing (72), channel ring (2), shaft sleeve extension (16) on Model 153 and 154 pumps.

10. Remove impeller (3), channel ring (4), impeller key (74), and pin (33) for all models.

11. Remove four capscrews (46) and pipe plug (69) which will allow the stuffing box along with the gland, shaft sleeve, sleeve key (21), and packing or mechanical seal (whichever the case may be) to be separated from shaft (10) and bracket (35) or frame (6) depending upon pump model. Remove "O" ring (17).

12. For complete disassembly of the various stuffing boxes, refer to the specific type below.

Single Inside Unbalanced Mechanical Seal (Figure 1, 2 or 3)

a. Remove nuts (39) from studs (38) and slide gland (11) off shaft sleeve (12).

b. The stationary seat, part of the mechanical seal (13), will remain in gland (11). Remove this seat if necessary, using caution not to crack or scratch lapped face. Also remove gaskets (40 and 70) from the gland.

NOTE

Gasket (70) is not used with all types of single inside unbalanced seals, refer to the drawing of your particular seal.

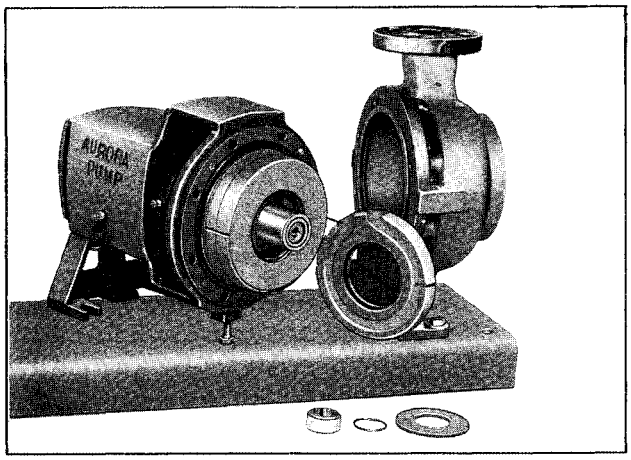
c. The balance of mechanical seal parts can be slid out of stuffing box (5) along with shaft sleeve (12). The seal's washer, retainer ring, flexible bellows, and spring are loose and may be removed from the shaft sleeve.

d. After scribing the sleeve to locate the position of the seal on reassembly, the seal collar (58) can be removed by loosening setscrews (59).

Standard Packing (Figure 4)

a. Remove nuts (39) from studs (38) and slide gland (61) off shaft sleeve (12).

b. Withdraw shaft sleeve (12) from stuffing box (5). Remove packing (65) and lantern ring (66) from the stuffing box.



D. Channel ring, sleeve extension, o-ring and bushing removed.

c. Gland (61) can be separated into two halves by removing capscrews (63) and nuts (64). This exposes gland packing (62) which can be removed.

Single Inside Balanced Mechanical Seal (Figure 5)

a. Remove nuts (39) from studs (38) and slide gland (11) from stuffing box (5).

b. The mechanical seal's stationary seat and gaskets (40 and 70) can be removed from the gland.

NOTE

Gasket (70) is not used with all types of single inside balanced seals, refer to the drawing of your particular seal.

c. Shaft sleeve (12) and mechanical seal (13) can be removed from the stuffing box (5). The loose seal parts can then be removed. After scribing the sleeve to locate the position of the seal on reassembly, the seal lock collar (58) is removed from shaft sleeve by loosening setscrews (59) and sliding it off.

Double Inside Unbalanced Mechanical Seal (Figure 6)

a. Remove nuts (39) from studs (38) and slide gland (11) off shaft sleeve (12).

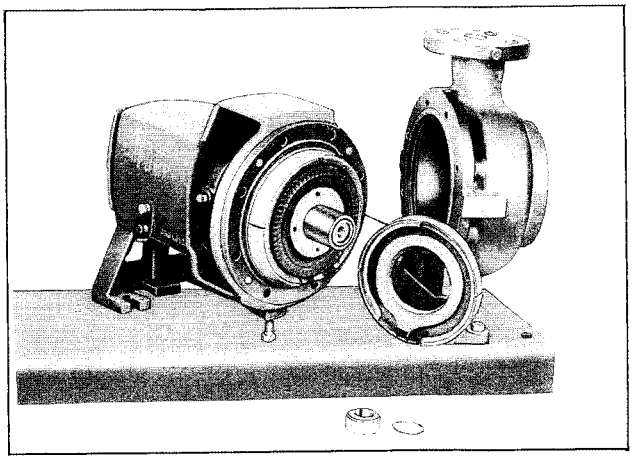
b. One mechanical seal (13) stationary seat will remain in the gland cavity and the other will stay in the stuffing box (5).

c. Withdraw shaft sleeve (12) from stuffing box (5). The loose parts of mechanical seal (13) can be removed and the lock collar taken off the shaft sleeve. (Scribe the shaft sleeve before removal to facilitate reassembly of seal.)

d. The stationary seats can be removed if necessary.

Double Inside Balanced Mechanical Seal

Disassembly of a double inside balanced seal is basically the same as for a double inside unbalanced seal.



E. Right hand channel ring removed.

Single Outside Balanced Mechanical Seal (Figure 7)

a. Scribe the shaft sleeve to locate position of seal on reassembly. Then remove mechanical seal (13), except for the stationary seat which held in the gland, by loosening the setscrews in its lock collar.

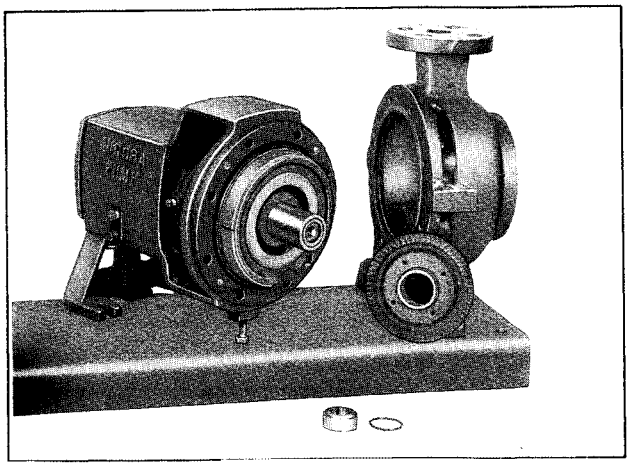
c. Withdraw shaft sleeve (12) from stuffing box (5).

d. Remove nuts (39) from studs (38) which allows gland (11) to be removed. Remove the seal's stationary seat and gaskets (40 and 70) from the gland (11).

CAUTION

The parts of any mechanical seal are easily damaged if they are not properly handled. The ceramic and carbon parts can be chipped or cracked by being allowed to slide loose on the shaft. Care should also be taken not to scratch lapped faces of a seal.

13. For Model 152, 153 and 154 pumps, foot (8) may be removed by unscrewing capscrews (44). Bracket (35) may be removed by unscrewing capscrews (19).



F. Impeller removed. Note position of left hand channel ring opening.

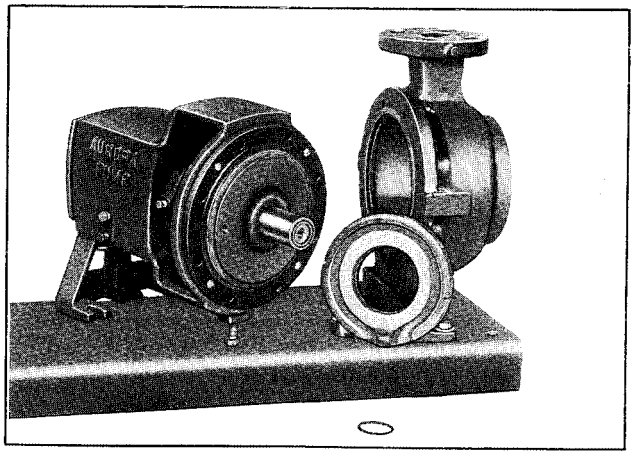
14. Also on Model 152, 153 and 154 pumps frame cooling cover (34) and gasket (42) may be removed by unscrewing capscrews (45).

15. Remove slinger (31) from inboard end of shaft (10). Key (28) and slinger (32) are then removed from outboard end of shaft.

16. Remove capscrews (37). When this is done the shaft and bearing assembly can be withdrawn from frame (6).

17. Use a pair of truarc pliers to remove retainer ring (22) from bearing cartridge (7). Slide bearing cartridge and oil seal (29) off shaft. The oil seal can be tapped from its cavity if necessary. Remove "O" ring (23) from bearing cartridge (7).

18. If pump is oil lubricated, plug (30) can be removed or if it is grease lubricated, zerk fittings can be removed from bearing cartridge (7). On the oil lubricated frame remove constant level oiler (48), nipple (49), plug (67), and breather (50).



G. Left hand channel ring removed.

On the grease lubricated frame, zerk fittings can be removed from the inboard end of the frame. On either frame option, oil seal (29) can be tapped from its cavity on the inboard end of frame (6).

19. Remove retaining ring (24) with a pair of truarc pliers.

20. Bearings (14 and 15) are pressed on the shaft and must be pulled or pressed off shaft (10).

Reassembly of Apco-Chem 150 Series

1. Position gasket (42) and frame cooling cover (34) to frame (6) with capscrews (45) on Model 152, 153 and 154 pumps.

2. Fasten foot (8) to frame (6) with capscrews (44). Position bracket (35) on frame (6) and secure with capscrews (19) on Model 152, 153 and 154 pumps.

3. Press bearing (14) onto inboard end of shaft (10). Press bearing (15) onto outboard end of shaft. Snap retaining ring (24) into its groove by bearing (15) with a pair of truarc pliers.

CAUTION

This ring is beveled on its inside diameter. This beveled side must always be away from the bearing.

4. Press grease seals (29) into their cavities in bearing cap (7) and frame (6).

5. Place "O" Ring (23) in its groove on bearing cap (7). Slide the bearing cap over outboard bearing (15). The bearing is held in place in the bearing cap by retaining ring (22). Use a pair of truarc pliers to set this ring.

CAUTION

This ring is beveled on its outside diameter. This beveled side must always be away from the bearing.

6. The assembly from steps 3, 4, 5 is placed through the outboard opening of power frame (6) and is held is place by turning capscrews (37) into frame (6) until tight. Impeller adjustment is not required due to a floating impeller design.

7. Place slinger (32) on outboard end of shaft (10) and slinger (31) on the inboard end. Set key (28) in the keyway on the shaft's outboard end. Place plug (30) in bearing cap (7). Put breather tube (50) and constant oiler parts (48 and 49) on frame (6). Also put drain plug (67) back in the power frame.

If pump has grease lubrication option, place grease zerk fitting in bearing cap (7), grease zerk fitting in the inboard end of frame (6).

8. Reassemble the various types of stuffing boxes as follows:

NOTE

Thoroughly clean all metal parts of any residue that may be on them. Pay particular attention to the seal faces so that they are not scratched or damaged by improper handling.

Do not return any mechanical seal to service unless the stationary seat and washer have been replaced or their faces lapped. If shaft sleeve (12) is corroded or badly worn, it should be replaced.

NOTE

Be sure to check the proper position of stuffing box (5). On Model 151 and 152 pumps the internal bypass opening in the face should be on the horizontal center line to the RIGHT of the shaft extension when facing the pump end. On Model 153 and 154 pumps the internal bypass opening in the face should be on the horizontal center line to the LEFT of the shaft extension when facing the pump end.

Standard Packing (Figure 4)

a. Insert sleeve (12) in stuffing box (5). Carefully place two pieces of packing (65) around the sleeve, then insert lantern ring (66) and three more pieces of packing.

b. Place gland packing (62) in the groove of the two split gland halves (61) and join these halves together with capscrews (63) and nuts (64).

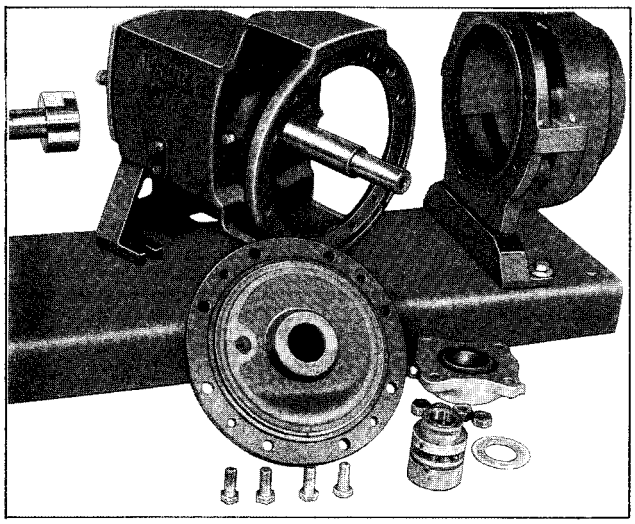
c. Place assembled gland over studs (38) and lightly tighten nuts (39).

NOTE

Do not over tighten packing, final adjustment must be made after pump is operating.

When adjusting packing, turn both nuts down evenly a flat or two at a time. Let packing work in, then tighten the gland nut another flat or two. This process should be continued until drip rate is approximately 20 to 30 drops per minute. Over tightening a gland will cause the stuffing box to heat up and will also cause excessive wear on the shaft sleeve.

d. Take the above assembly and slide it onto shaft (10). Capscrews (46) are used to fasten stuffing box (5) to bracket (35). Be sure the by-pass is properly oriented. See NOTE on page 4.



H. Stuffing box and mechanical seal removed from power frame.

Single Inside Unbalanced Mechanical Seal (Figure 1, 2 or 3)

a. Set seal collar (58) on shaft sleeve (12) with setscrews (59). Refer to drawing of your specific seal for the location of seal collar or at location scribed on the sleeve during disassemby.

b. Place gasket (70) in the gland if used with your seal arrangment. Insert the stationary seat in gland (11). Place gasket (40) in the groove formed by the stationary seat and gland.

c. Carefully place gland (11) and stationary seat on the shaft. With the balance of mechanical seal (13) parts in place on shaft sleeve (12), slide the sleeve onto the shaft.

d. Carefully position stuffing box (5) over shaft sleeve (12). Be sure the by-pass is properly oriented. See NOTE on page 4. Secure the stuffing box to bracket (35) or frame (6) on Model 151 with capscrews (46).

e. Slide gland (11) over shaft sleeve (12) and studs (38). Tighten nuts (39) onto the studs until the gaskets are compressed.

CAUTION

Do not over over tighten gland as this will distort the mechanical seal's stationary face and cause excessive leakage.

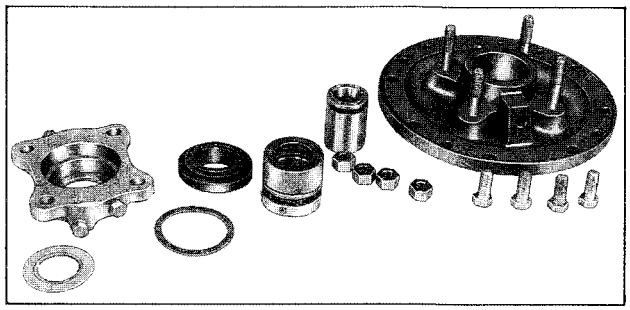
Single Inside Balanced Mechanical Seal (Figure 5)

The same instructions apply to single balanced mechanical seals as to single unbalanced mechanical seals.

Double Inside Unbalanced Mechanical Seal (Figure 6)

a. Place the mechanical seal's collar on shaft sleeve (12). Refer to the drawing of your specific seal for the location of seal collar or at location scribed on the sleeve during disassembly.

b. Insert one stationary seat in gland (11) and the other in stuffing box (5).



I. Disassembly of stuffing box and mechanical seal.

c. Place gland (11) on shaft (10). After the balance of the mechanical seal's parts have been properly placed on the shaft sleeve, slide it onto the shaft.

d. Carefully position stuffing box (5) over shaft sleeve (12). Be sure the by-pass is properly oriented. See NOTE on page 4. Secure stuffing box to bracket (35) or frame (6) on Model 151 with capscrews (46).

e. Set gland (11) over studs (38) and tighten nuts (39) only enough to compress gasket (40), which was placed in the gland earlier. Over tightening will cause the seal to leak.

Double Inside Balanced Mechanical Seal

The same instructions apply to the double inside balanced mechanical seal as to the double inside unbalanced seal.

Single Outside Balanced Mechanical Seal (Figure 7)

a. Place gasket (70) in gland (11). Insert the stationary seat, part of mechanical seal (13), in the gland and set gasket (40) on it. Position gland on stuffing box (5) and tighten nuts (39) on stud (38) finger tight.

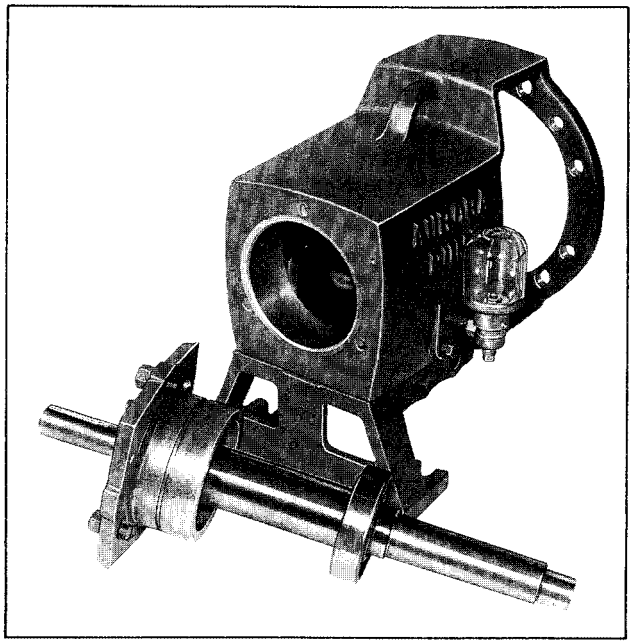
b. Secure the mechanical seal's lock collar on shaft sleeve (12) with the setscrews furnished with it at location scribed on the sleeve during disassembly.

c. Place the shaft sleeve on shaft (10) and slide the remaining seal parts onto it as shown on drawing of your seal.

d. Place gland (11), stationary seat, and the stuffing box assembly from step a, on shaft sleeve (12).

e. Position stuffing box (5) on shaft sleeve (12) and secure it to bracket (35) or frame (6) on Model 151 with capscrews (46). Be sure the by-pass is properly oriented. See NOTE on page 4.

f. Tighten nuts (39) only enough to compress gaskets (70 and 40). Over tightening of the gland will cause seal to leak.

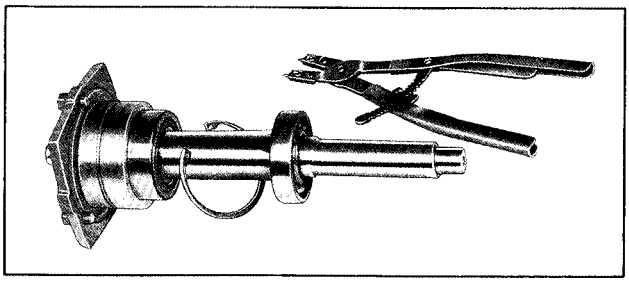


J. Power frame with rotating element removed.

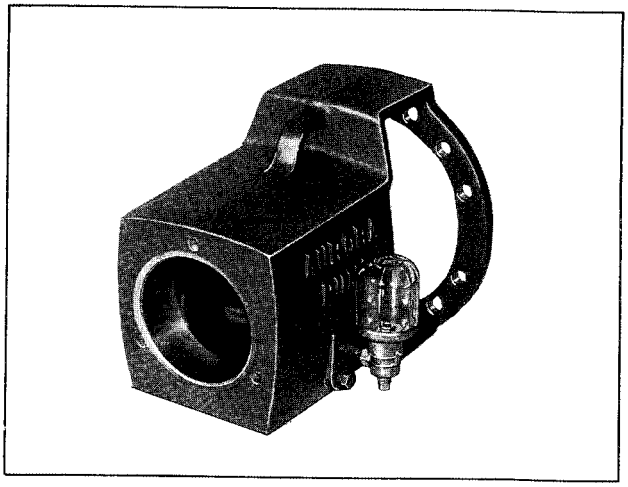
9. For Model 153 and 154, place pin (33) in position on right hand side of stuffing box (5). For Model 151 and 152 place pin (33) in position on LEFT hand side of stuffing box (5). Place channel ring (4) in its rabbeted groove on stuffing box (5). The discharge opening must be at the bottom with the pin in place.

10. Set "O" ring (18) in the groove in shaft sleeve (12).

11. Slide key (21) into the keyway on shaft (10) and the shaft sleeve (12).



K. Remove retainer ring from bearing cap with truarc pliers.



L. Constant oiler connection to power frame.

12. Place impeller key (74) in sleeve (12) and slide impeller (3) on sleeve.

13. Slide sleeve extension (16) onto shaft (10) and against the shaft sleeve (12) on Model 153 and 154.

14. Place a channel ring (2), channel ring (4) and interstage bushing (72) on shaft (10). The discharge opening of channel ring (4) should face up. Also note that pin (71) is in place in ring (4) on Model 153 and 154.

15. Place impeller key (74) in sleeve (16) and slide impeller (3) on sleeve. Insert "O" ring (18) in the groove provided in the sleeve extension and secure with impeller screw (20).

16. "O" Ring (17) can be set in its groove in casing by applying a light coat of oil and sticking it in place.

17. Channel ring (2) is placed over the rabbet face of channel ring (4).

18. Slide the pump into casing (1). Secure with capscrews (47).

19. Place the spacer coupling back on pump and motor. Tighten capscrews holding frame foot (8) to base.

20. Connect all flushing and cooling lines that were removed from pump.

21. Open all valves or flow devises that control flow of liquids to or from the pump.

22. Check pump to make sure alignment between pump and motor has not been disturbed.

23. Read the starting instructions before attempting to put your Apco-Chem pump back in operation.

24. Before starting, double check for free rotation of impeller with no bind. If a rub is noted, recheck all assembly steps.

Model 151 List of Parts (See Figures 1 and 4 thru 7)

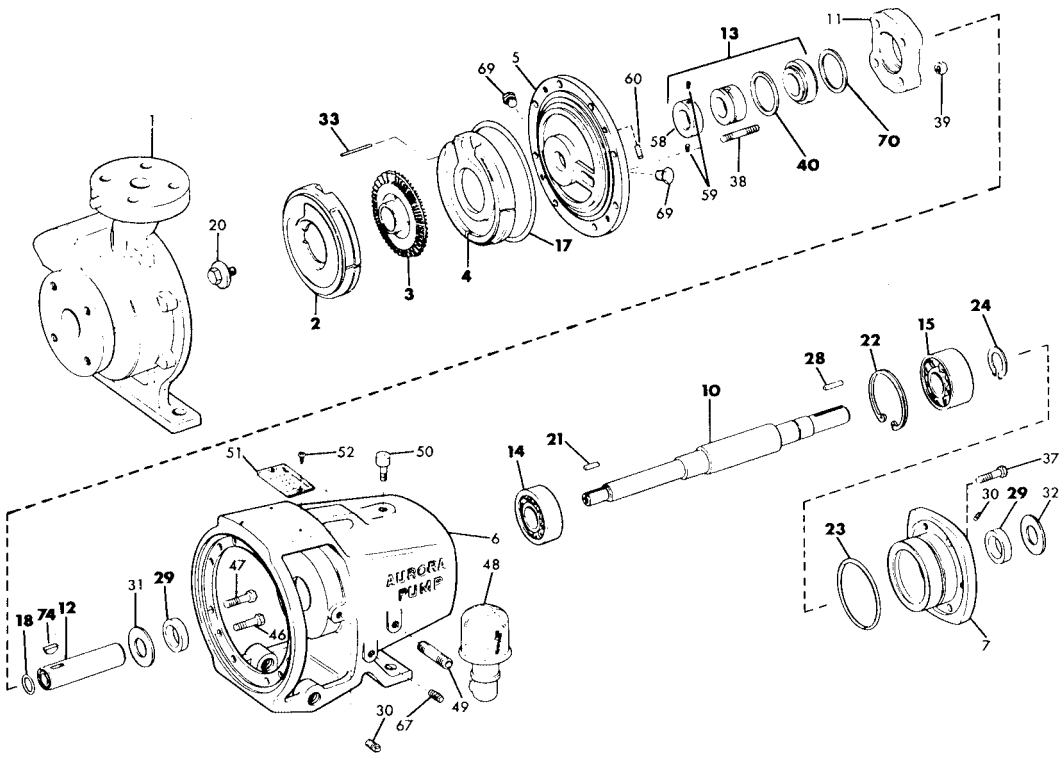
1. Casing
2. Channel Ring RH
3. Impeller
4. Channel Ring LH
5. Stuffing Box
6. Frame
7. Cartridge
10. Shaft
11. Gland
12. Sleeve
13. Seal
14. Bearing
15. Bearing
17. "O" Ring
18. "O" Ring
20. Screw
21. Key - Sleeve
22. Ring
23. "O" Ring
24. Ring
28. Key
29. Seal
30. Plug
31. Slinger
32. Slinger
33. Pin
37. Capscrew
38. Stud
39. Nut
40. Gasket
41. Drip Cup
46. Capscrew
47. Capscrew
48. Oiler
49. Nipple
50. Breather
51. Nameplate
52. Screw
58. Seal Collar
59. Setscrew
60. Pin
61. Packing Gland
62. Gland Packing
63. Capscrew
64. Nut
65. Packing
66. Lantern Ring
67. Plug
69. Plug
70. Gasket
74. Key - Impeller

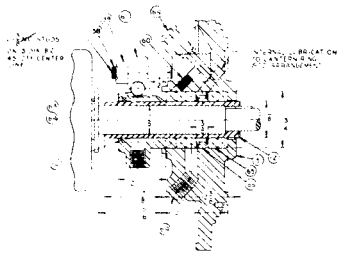
Model 152 List of Parts (See Figures 2 and 4 thru 7)

1. Casing
1A. Casing (C/L MTD)
2. Channel Ring RH
3. Impeller
4. Channel Ring LH
5. Stuffing Box
5A. Stuffing Box (Water JKTD)
6. Frame
7. Cartridge
8. Frame Foot
9. Casing Foot
10. Shaft
11. Gland
12. Sleeve
13. Seal
14. Bearing
15. Bearing
17. "O" Ring
18. "O" Ring
19. Capscrew
20. Screw
21. Key - Sleeve
22. Ring
23. "O" Ring
24. Ring
25. Capscrew
26. Nut
27. Nut
28. Key
29. Seal
30. Plug
31. Slinger
32. Slinger
33. Pin
34. Cover
35. Bracket
37. Capscrew
38. Stud
39. Nut
40. Gasket
41. Drip Cup
42. Gasket
43. Capscrew
44. Capscrew
45. Capscrew
46. Capscrew
47. Capscrew
48. Oiler
49. Nipple
50. Breather
51. Nameplate
52. Screw
53. Casing Foot RH
54. Casing Foot LH
55. Capscrew
56. Eye Bolt
58. Seal Collar
59. Setscrew
60. Pin
61. Packing Gland
62. Gland Packing
63. Capscrew
64. Nut
65. Packing
66. Lantern Ring
67. Plug
68. Plug
69. Plug
70. Gasket
74. Key - Impeller

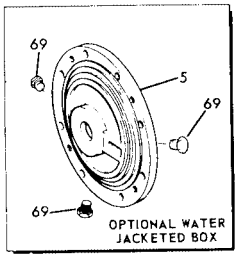
Model 153-154 List of Parts (See Figures 3 and 4 thru 7)

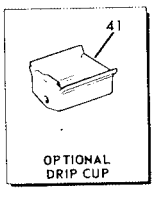
1. Casing
1A. Casing (C/L MTD)
2. Channel Ring RH
3. Impeller
4. Channel Ring LH
5. Stuffing Box
5A. Stuffing Box (Water JKTD)
6. Frame
7. Cartridge
8. Frame Foot
9. Casing Foot
10. Shaft
11. Gland
12. Sleeve
13. Seal
14. Bearing
15. Bearing
16. Sleeve Extension
17. "O" Ring
18. "O" Ring
19. Capscrew
20. Screw
21. Key - Sleve
22. Ring
23. "O" Ring
24. Ring
25. Capscrew
26. Nut
27. Nut
28. Key
29. Seal
30. Plug
31. Slinger
32. Slinger
33. Pin
34. Cover
35. Bracket
37. Capscrew
38. Stud
39. Nut
40. Gasket
41. Drip Cup
42. Gasket
43. Capscrew
44. Capscrew
45. Capscrew
46. Capscrew
47. Capscrew
48. Oiler
49. Nipple
50. Breather
51. Nameplate
52. Screw
53. Casing Foot RH
54. Casing Foot LH
55. Capscrew
56. Eye Bolt
58. Seal Collar
59. Setscrew
60. Pin
61. Packing Gland
62. Gland Packing
63. Capscrew
64. Nut
65. Packing
66. Lantern Ring
67. Plug
69. Plug
70. Gasket
71. Pin
72. Bushing
74. Key - Impeller

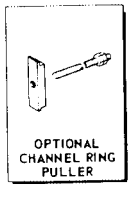




PACKING BOX
(STANDARD)





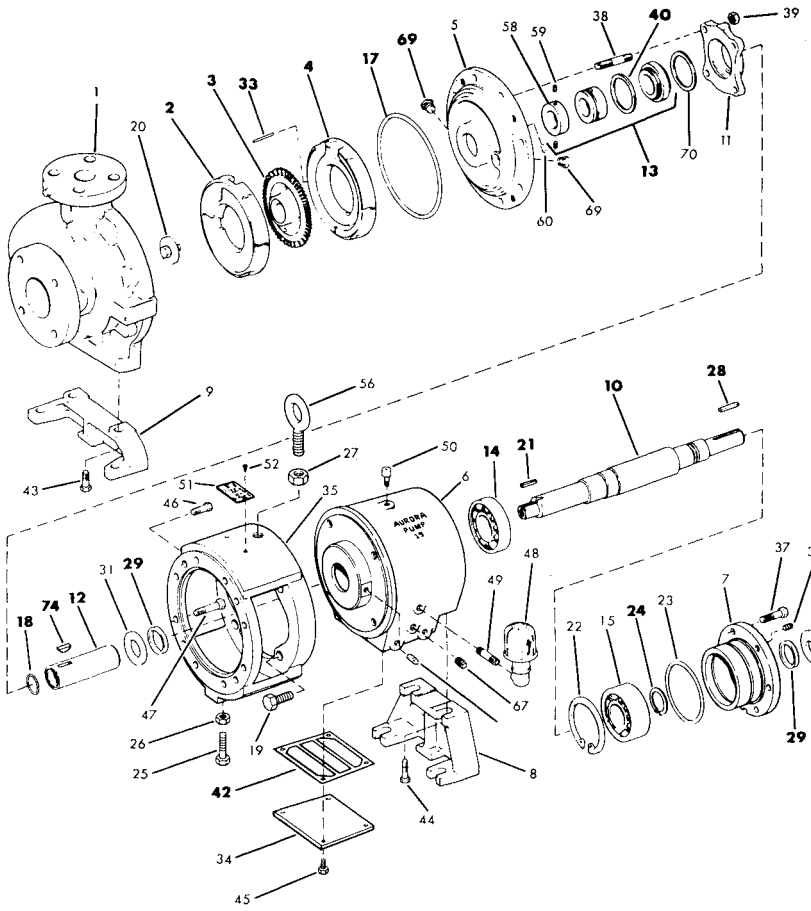


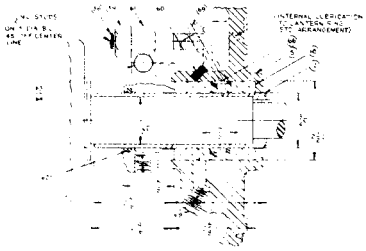
NOTE

WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL.

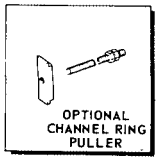
ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR, FACTORY BRANCH SALES OFFICE OR THE FACTORY AT NORTH AURORA, ILLINOIS.

Figure 1. Apco-Chem Model 151 Exploded View

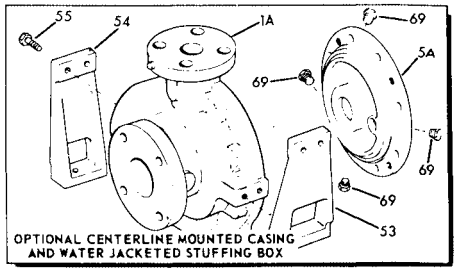




PACKING BOX
(STANDARD)





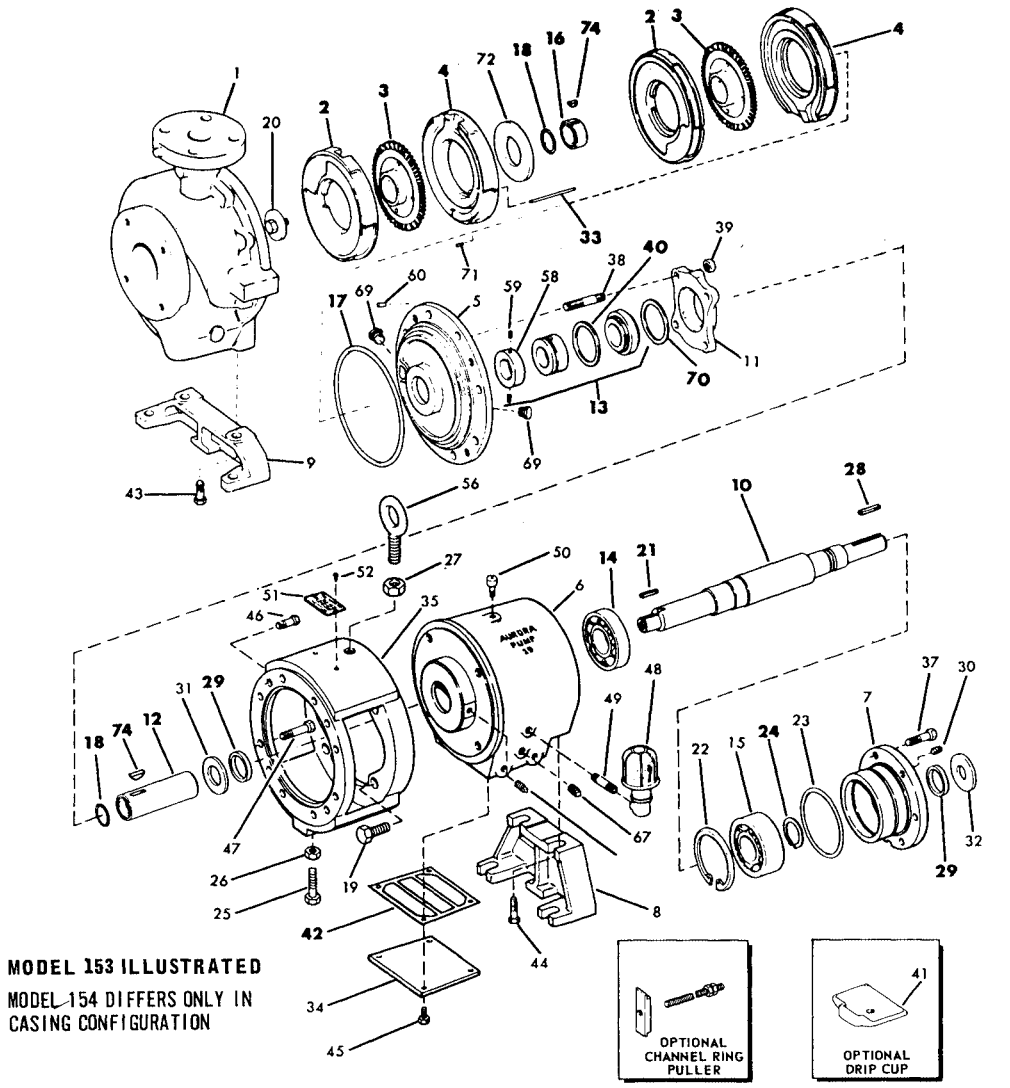


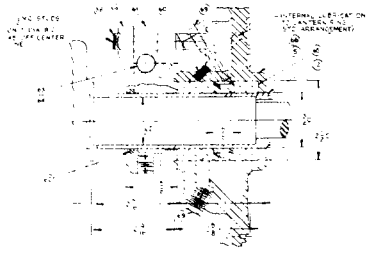
NOTE

WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL.

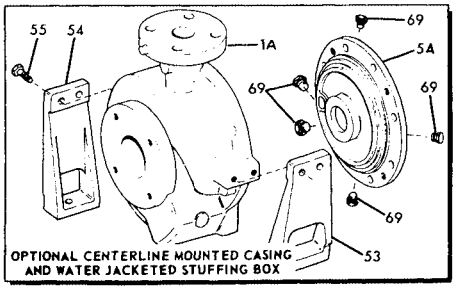
ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR, FACTORY BRANCH SALES OFFICE OR THE FACTORY AT NORTH AURORA, ILLINOIS.

Figure 2. Apco-Chem Model 152 Exploded View





PACKING BOX
(STANDARD)



NOTE

WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL.

ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR, FACTORY BRANCH SALES OFFICE OR THE FACTORY AT NORTH AURORA, ILLINOIS.

Figure 3. Apco-Chem Model 153-154 Exploded View

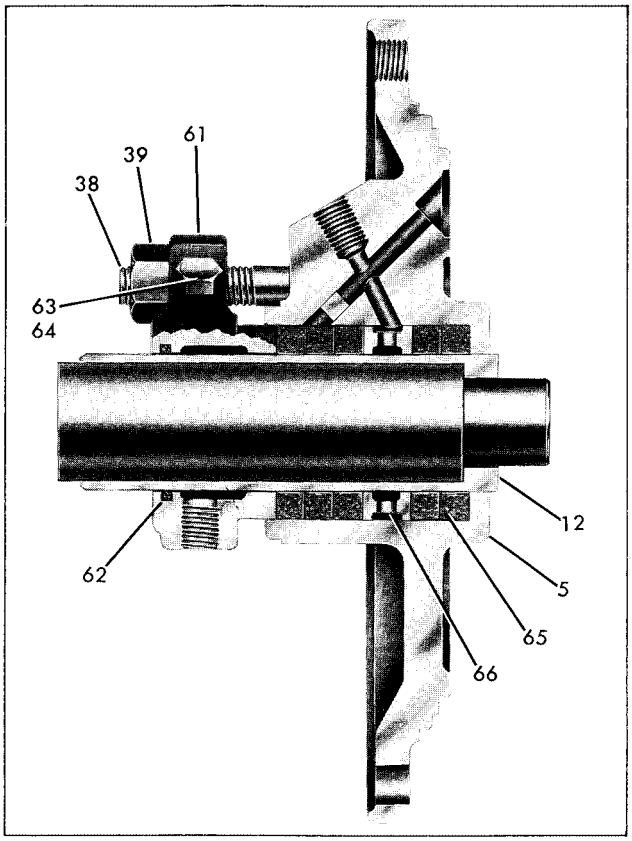


Figure 4. Standard Packing With Lantern Ring

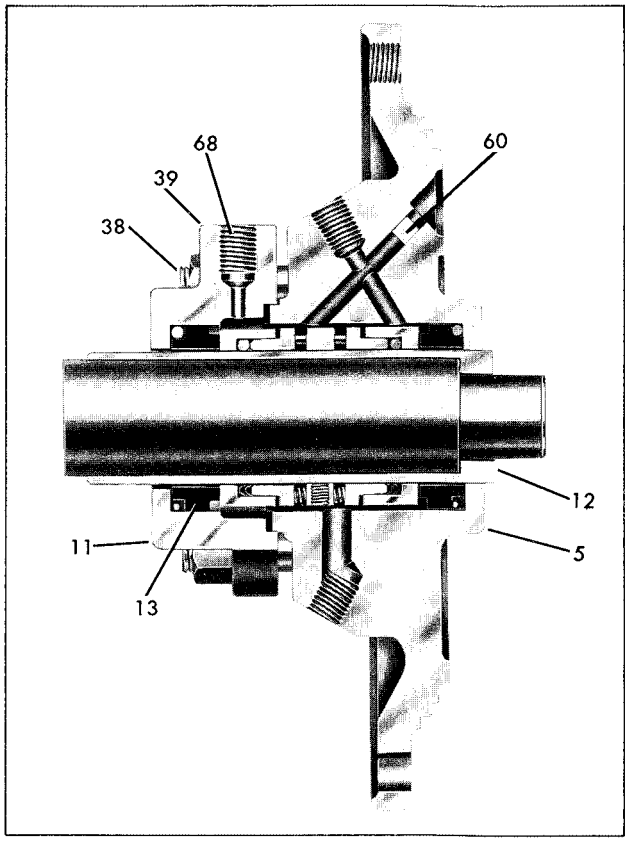


Figure 6. Double Inside-Unbalanced Mechanical Seal

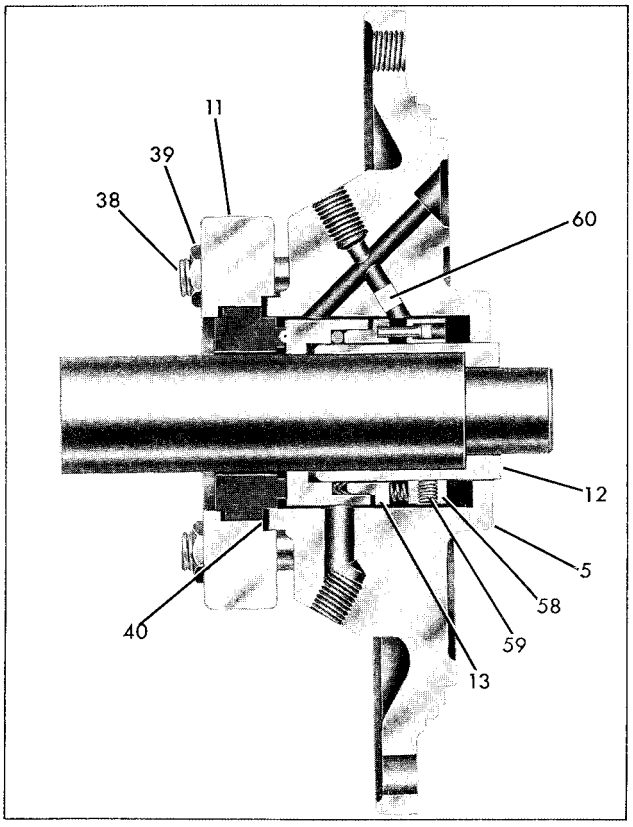


Figure 5. Single Inside-Balanced Mechanical Seal

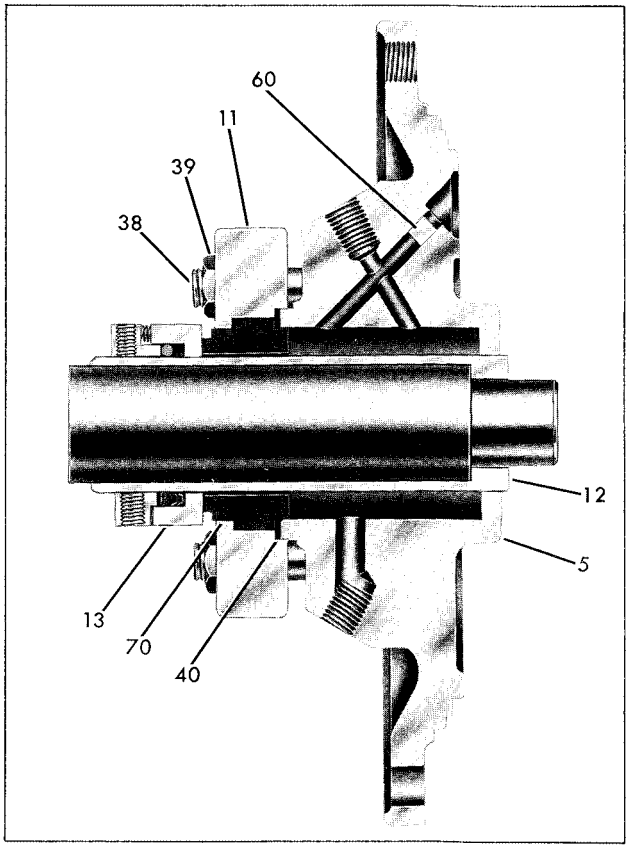
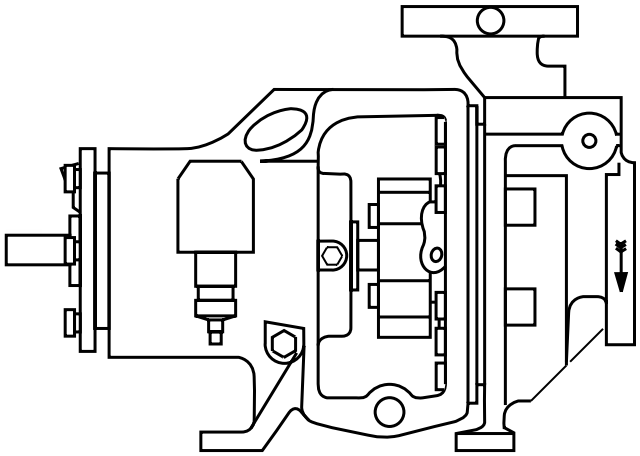


Figure 7. Single Outside-Balanced Mechanical Seal

SUPERSEDES 150P PAGE 1
DATED NOVEMBER 1988

150 SERIES
REPAIR PARTS INDEX



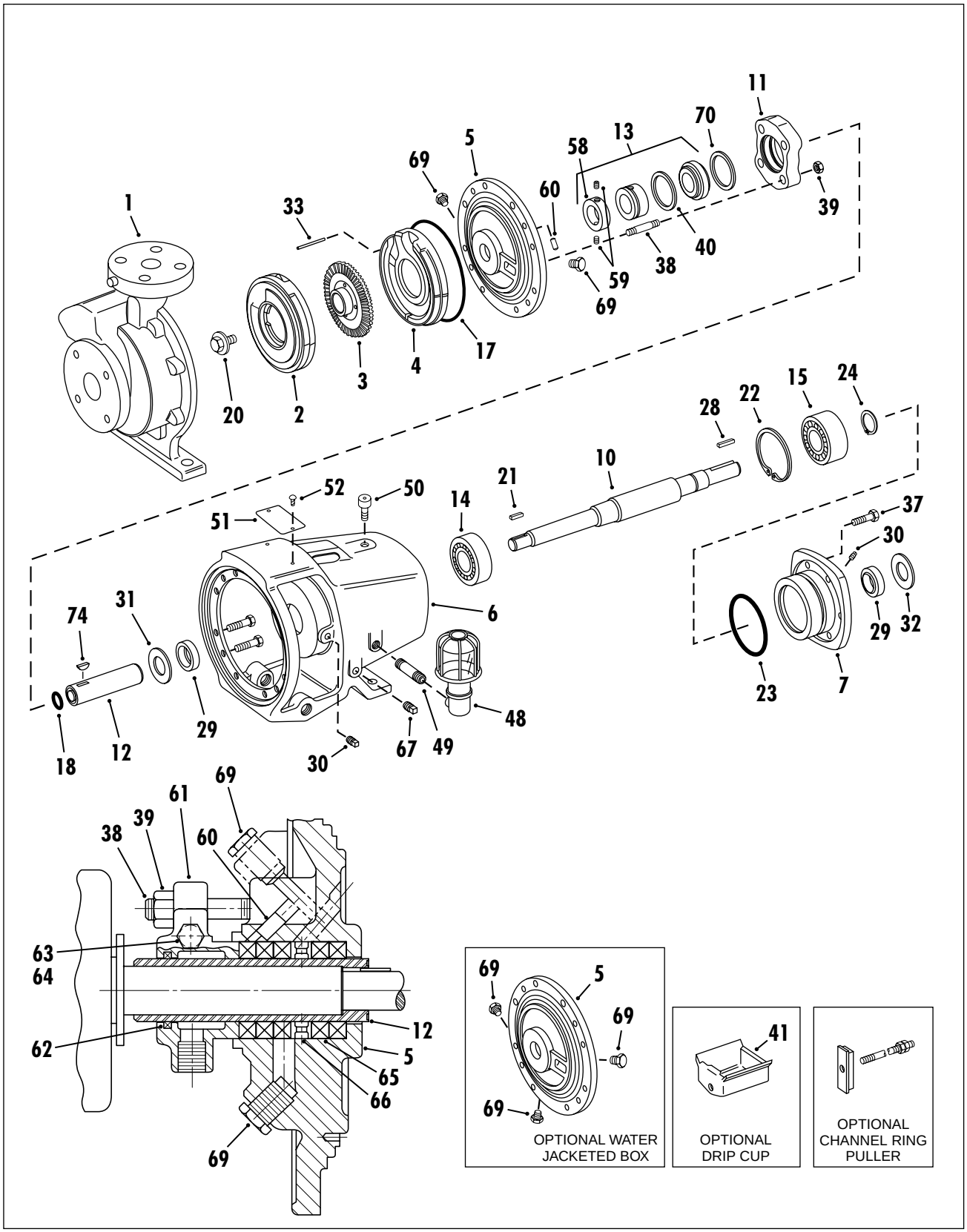
READ AND UNDERSTAND THE PUMP AND MOTOR INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL, DISASSEMBLE OR REPAIR THE PUMP

AURORA®
Pentair Pump Group

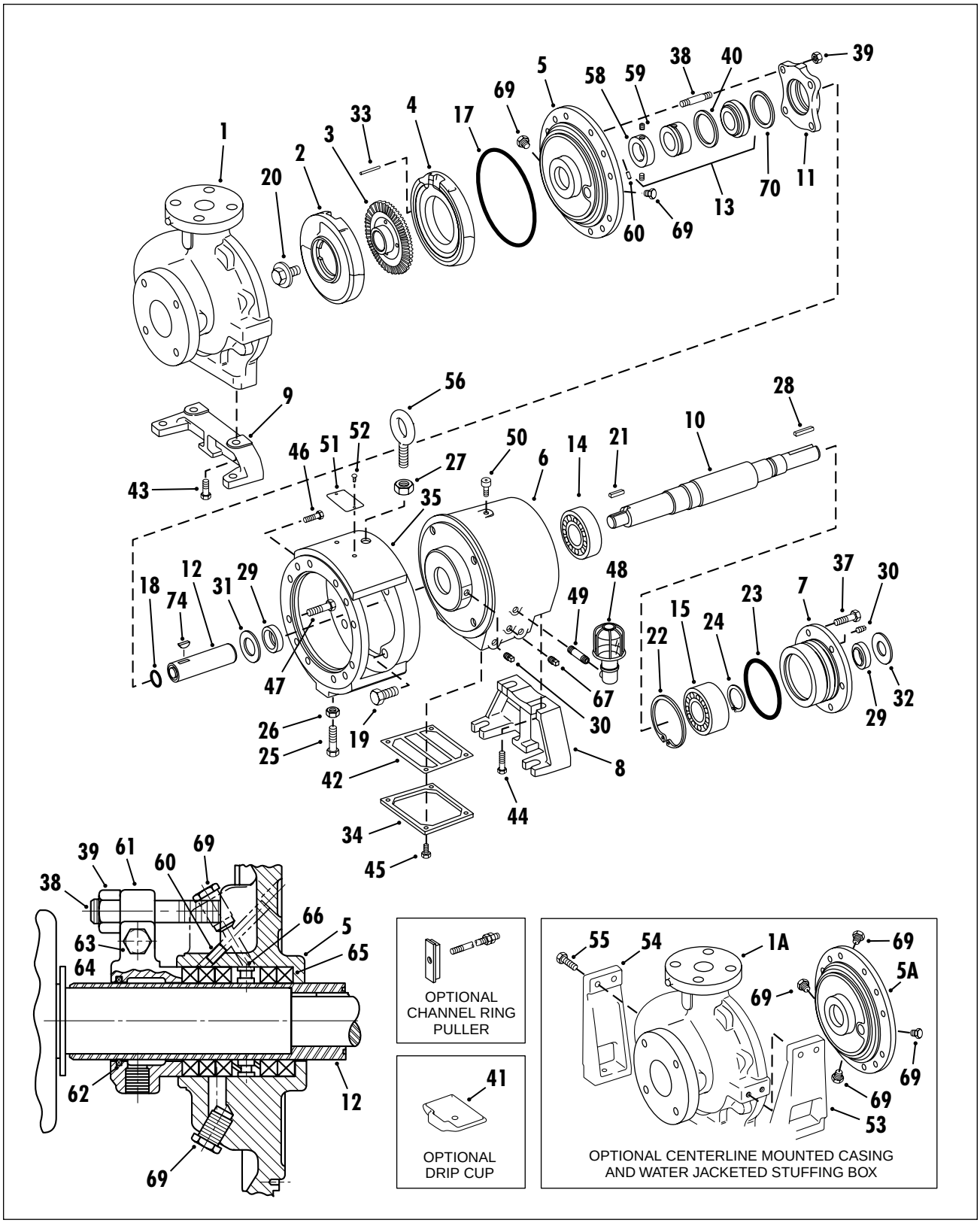
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152	19-20-21-14	715	7-8
152	19-20-21-14	811	7-8
152	19-20-21-14	911	7-8
152	19-20-21-14	912	7-8
152	19-20-21-14	913	7-8
152	19-20-21-14	914	7-8
153-154	19-20-21-14	723	9-10
153-154	19-20-21-14	725	9-10
153-154	19-20-21-14	821	9-10
153-154	19-20-21-14	921	9-10
153-154	19-20-21-14	922	9-10
153-154	19-20-21-14	923	9-10
153-154	19-20-21-14	924	9-10
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153-154	22	924	11-12
153-154	22	991	11-12
153-154	22	992	11-12
153-154	22	993	11-12
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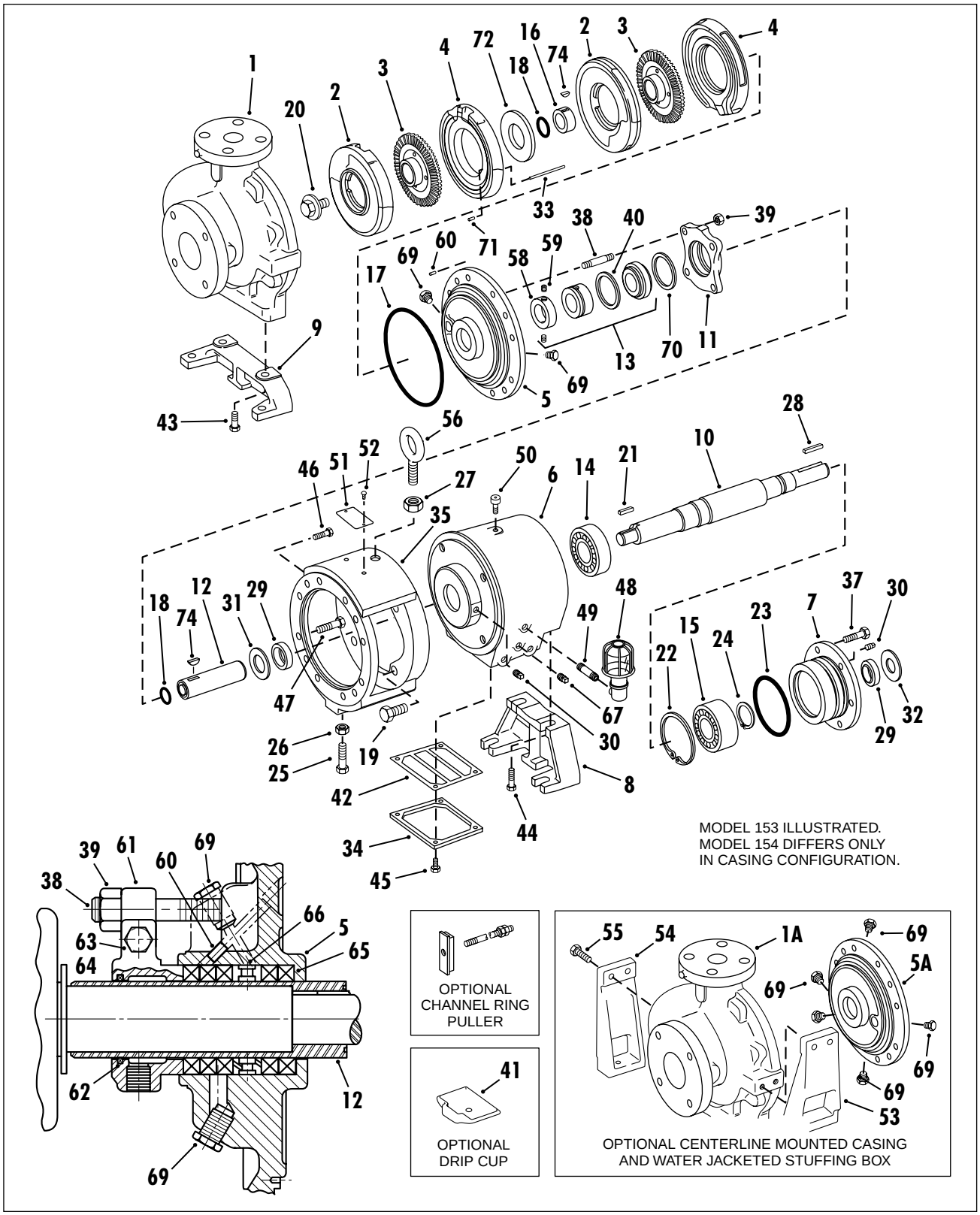
150 SERIES
MODEL 151
PIECE NUMBERS



150 SERIES
MODEL 152
PIECE NUMBERS



150 SERIES
MODEL 153-154
PIECE NUMBERS



150 SERIES
MODEL 151
111 THRU 212
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
1	CASING	1	180-0622	053	104	053	104
2	CHANNEL RING						
	(RIGHT HAND) 111	1	676-1939	010	010		
	111	1	676-0154			548	548
	211	1	676-1940	010	010		
	211	1	676-0156			548	548
	212	1	676-1941	010	010		
	212	1	676-0158			548	548
3	IMPELLER 111	1	444-2253	053	053	104	104
	211	1	444-2254	053	053	104	104
	212	1	444-2255	053	053	104	104
4	CHANNEL RING						
	(LEFT HAND) 111	1	676-1936	010	010		
	111	1	676-0153			548	548
	211	1	676-1937	010	010		
	211	1	676-0155			548	548
	212	1	676-1938	010	010		
	212	1	676-0157			548	548
5	STUFFING BOX	1	812-0317	053	104	053	104
5A	STUFFING BOX	1	812-0318	053	104	053	104
	(OPTIONAL WATER						
	JACKETED)						
6	FRAME	1	356-0176	010	010	010	010
7	BRG. CARTRIDGE	1	164-0453	010	010	010	010
10	SHAFT	1	728-0427	063	063	063	104
11	SEAL GLAND	1	372-0337	053	104	053	104
12	SLEEVE PACKING	1	756-0507	108	108	108	104
	SLEEVE, ROTT & 9T	1	756-0507	104	104	104	104
	PT & 9BT	1	756-0508	104	104	104	104
13	SEAL ROTT	1	712-6175	776	776	776	776
	PT	1	712-6165	776	776	776	776
	9BT	1	712-6155	762	762	762	762
	9T	1	712-6145	762	762	762	762
14	BEARING	1	068-0157	647	647	647	647
15	BEARING	1	068-0455	647	647	647	647
17	O-RING	1	364-0447	494	494	494	494
18	O-RING	1	364-0321	494	494	494	494
20	IMPELLER SCREW	1	544-2158	104	104	104	104
21	KEY	1	472-0180	104	104	104	104
22	RETAINING RING	1	676-0445	088	088	088	088

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
23	O-RING	1	364-0427	457	457	457	457
24	RETAINING RING	1	676-0929	088	088	088	088
28	KEY	1	472-0201	087	087	087	087
29	SEAL	2	712-0250	653	653	653	653
30	PLUG	3	600-0001	087	087	087	087
31	SLINGER	1	764-0057	522	522	522	522
32	SLINGER	1	764-0057	522	522	522	522
33	PIN	1	592-0806	104	104	104	104
37	CAPSCREW	3	168-0386	082	082	082	082
38	STUD	2	808-0111	104	104	104	104
39	NUT	2	544-0109	104	104	104	104
40	GASKET	1	364-1315	509	509	509	509
41	DRIP CUP (OPT.)	1	268-0156	104	104	104	104
46	CAPSCREW	4	168-0382	082	082	082	104
47	CAPSCREW	8	168-0390	082	082	082	104
48	OILER	1	552-0027	652	652	652	652
49	NIPPLE	1	600-1204	387	387	387	387
50	BREATHER	1	864-0053	656	656	656	656
51	NAMEPLATE	1	532-0056	114	114	114	114
52	DRIVE SCREW	2	708-0013	365	365	365	365
57	THROTTLE BUSHING	(NOT SHOWN)					
	ROTT & 9T	1	136-1362	540	540	540	540
	PT & 9BT	1	136-1363	540	540	540	540
58	SEAL COLLAR	(NOT REQUIRED)					
59	SETSCREW	(NOT REQUIRED)					
60	PIN	1	592-0028	104	104	104	104
61	PACKING GLAND	1	372-0330	053	104	053	104
62	GLAND PACKING	2	564-0303	802	802	802	802
63	CAPSCREW	2	168-0280	104	104	104	104
64	NUT	2	544-0105	104	104	104	104
65	PACKING	6	564-0069	802	802	802	802
66	LATERN RING	1	676-0960	512	512	512	512
67	PLUG	3	600-0020	087	087	087	087
69	PLUG	3	600-0002	087	104	087	104
70	GASKET	1	364-1317	509	509	509	509
74	KEY	1	472-0109	104	104	104	104
	OPT. RING PULLER						
	PULLER	1	628-0009	058			
	SCREW	1	708-0815	058			
	NUT	2	544-0109	080			

150 SERIES
MODEL 152
713 THRU 914
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
1	CASING	1	180-0620	053	104	053	104
1A	CASING - CENTERLINE MOUNT	1	180-0623	053	104	053	104
2	CHANNEL RING (RIGHT HAND) 713	1	676-1928	010	010		
	713	1	676-0160			548	548
	715	1	676-1929	010	010		
	715	1	676-0162			548	548
	811	1	676-1930	010	010		
	811	1	676-0164			548	548
	911	1	676-1931	010	010		
	911	1	676-0166			548	548
	912	1	676-1932	010	010		
	912	1	676-0168			548	548
	913	1	676-1933	010	010		
	913	1	676-0170			548	548
	914	1	676-1934	010	010		
	914	1	676-0172			548	548
3	IMPELLER 713	1	444-2256	053	053	104	104
	715	1	444-2256	053	053	104	104
	811	1	444-2257	053	053	104	104
	911	1	444-2258	053	053	104	104
	912	1	444-2259	053	053	104	104
	913	1	444-2260	053	053	104	104
	914	1	444-2261	053	053	104	104
4	CHANNEL RING (LEFT HAND) 713	1	676-1921	010	010		
	713	1	676-0159			548	548
	715	1	676-1922	010	010		
	715	1	676-0161			548	548
	811	1	676-1923	010	010		
	811	1	676-0163			548	548
	911	1	676-1924	010	010		
	911	1	676-0165			548	548
	912	1	676-1925	010	010		
	912	1	676-0167			548	548
	913	1	676-1926	010	010		
	913	1	676-0169			548	548
	914	1	676-1927	010	010		
	914	1	676-0171			548	548

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
5	STUFFING BOX	1	812-0315	053	104	053	104
5A	STUFFING BOX - JACKETED	1	812-0316	053	104	053	104
6	FRAME (STD)	1	356-0004	010	010	010	010
	(JACKETED)	1	356-0007	010	010	010	010
7	BRG. CARTRIDGE	1	164-0108	010	010	010	010
8	FRAME FOOT	1	820-0125	010	010	010	010
9	CASING FOOT	1	820-0127	010	010	010	010
10	SHAFT	1	728-0425	063	063	063	104
11	GLAND		REFER TO FACTORY				
12	SLEEVE PACKING	1	756-0504	108	108	108	104
	ROTT & 9T	1	756-0504	104	104	104	104
	PT & 9BT	1	756-0505	104	104	104	104
13	SEAL ROTT	1	712-6176	776	776	776	776
	9T	1	712-6146	762	762	762	762
	PT	1	712-6166	776	776	776	776
	9BT	1	712-6156	762	762	762	762
14	BEARING	1	068-0160	647	647	647	647
15	BEARING	1	068-0458	647	647	647	647
17	O-RING	1	364-0456	494	494	494	494
18	O-RING	2	364-0329	494	494	494	494
19	CAPSCREW	4	168-0562	082	082	082	082
20	IMPELLER SCREW	1	544-2159	104	104	104	104
21	KEY	1	472-0201	104	104	104	104
22	RETAINING RING	1	676-0446	088	088	088	088
23	O-RING	1	364-0436	457	457	457	457
24	RETAINING RING	1	676-0943	088	088	088	088
25	CAPSCREW	1	168-0496	082	082	082	082
26	NUT	1	544-0113	082	082	082	082
27	NUT	1	544-0117	082	082	082	082
28	KEY	1	472-0245	087	087	087	087
29	SEAL	2	712-0256	653	653	653	653
30	PLUG	3	600-0001	087	087	087	087
31	SLINGER	1	764-0055	522	522	522	522
32	SLINGER	1	764-0056	522	522	522	522
33	PIN	1	592-0806	104	104	104	104
34	POWER FRAME COVER	1	260-0682	087	087	087	087
35	BRACKET	1	116-0461	010	010	010	010
37	CAPSCREW	3	168-0492	082	082	082	082

150 SERIES
MODEL 152
713 THRU 914
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
38	STUD (STD PUMP)	2	808-0315	104	104	104	104
	(JACKETED PUMP)	2	808-0313	104	104	104	104
39	NUT	2	544-0113	104	104	104	104
40	GASKET	1	364-1314	509	509	509	509
41	DRIP CUP (OPT.)	1	268-0155	104	104	104	104
42	POWER FR. GASKET	1	364-0811	614	614	614	614
43	CAPSCREW	2	168-0488	082	082	082	082
44	CAPSCREW	3	168-0492	082	082	082	082
45	CAPSCREW	4	168-0252	082	082	082	082
46	CAPSCREW	4	168-0488	082	082	082	104
47	CAPSCREW	8	168-0496	082	082	082	104
48	OILER	1	552-0027	652	652	652	652
49	NIPPLE	1	600-1204	387	387	387	387
50	BREATHER	1	864-0053	656	656	656	656
51	NAMEPLATE	1	532-0056	114	114	114	114
52	DRIVE SCREW	2	708-0013	365	365	365	365
53	CASING FT. RH	1	820-0126	010	010	010	010
54	CASING FT. RH	1	820-0128	010	010	010	010
55	CAPSCREW	4	168-0492	082	082	082	082
56	EYEBOLT	1	100-0110	082	082	082	082
57	THROTTLE BUSHING						
	(NOT SHOWN)						
	ROTT & 9T	1	136-1359	540	540	540	540
	PT & 9BT	1	136-1360	540	540	540	540
58	SEAL COLLAR		REFER TO FACTORY				
59	SETSCREW	2	724-0077	104	104	104	104
60	PIN	1	592-0028	104	104	104	104
61	PACKING GLAND	1	372-0323	053	104	053	104
62	GLAND PACKING	2	564-0302	802	802	802	802
63	CAPSCREW	2	168-0394	104	104	104	104
64	NUT	2	544-0109	104	104	104	104
65	PACKING	7	564-0105	802	802	802	802
66	LANTERN RING	1	676-0953	512	512	512	512
67	PLUG	3	600-0002	087	087	087	087
69	PLUG	4	600-0002	087	104	087	104
70	GASKET	1	364-1316	509	509	509	509

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
74	KEY	1	472-0109	104	104	104	104
	OPTIONAL RING PULLER						
	PULLER	1	628-0010	058			
	SCREW	1	708-0815	058			
	NUT	2	544-0109	080			
	REPAIR KIT INCLUDES PIECE NOS. 2, 3, 4, 17, 18, 20, 23						
	151 CT-111		476-0319	642			623
	CT-211		476-0320	642			623
	CT-212		476-0321	642			623
	152 CT-713		476-0322	642			623
	CT-715		476-0323	642			623
	CT-811		476-0324	642			623
	CT-911		476-0325	642			623
	CT-912		476-0326	642			623
	CT-913		476-0327	642			623
	CT-914		476-0328	642			623

150 SERIES
MODEL 153-154
723 THRU 994
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
1	CASING - 153	1	180-0621	053	104	053	104
	CASING - 154	1	180-0616	053	104	053	104
1A	CASING - CENTERLINE	1	180-0624	053	104	053	104
	MOUNT - 153						
	CASING - CENTERLINE	1	180-0617	053	104	053	104
	MOUNT - 154						
2	CHANNEL RING						
	(RIGHT HAND) 723	2	676-1928	010	010		
	723	2	676-0160			548	548
	725	2	676-1929	010	010		
	725	2	676-0162			548	548
	821	2	676-1930	010	010		
	821	2	676-0164			548	548
	921 & 991	2	676-1931	010	010		
	921 & 991	2	676-0166			548	548
	922 & 992	2	676-1932	010	010		
	922 & 992	2	676-0168			548	548
	923 & 993	2	676-1933	010	010		
	923 & 993	2	676-0170			548	548
	924 & 994	2	676-1934	010	010		
	924 & 994	2	676-0172			548	548
3	IMPELLER 723	2	444-2256	053	053	104	104
	725	2	444-2256	053	053	104	104
	821	2	444-2257	053	053	104	104
	921 & 991	2	444-2258	053	053	104	104
	922 & 992	2	444-2259	053	053	104	104
	923 & 993	2	444-2260	053	053	104	104
	924 & 994	2	444-2261	053	053	104	104
4	CHANNEL RING						
	(LEFT HAND) 723	2	676-1921	010	010		
	723	2	676-0159			548	548
	725	2	676-1922	010	010		
	725	2	676-0161			548	548
	821	2	676-1923	010	010		
	821	2	676-0163			548	548
	921 & 991	2	676-1924	010	010		
	921 & 991	2	676-0165			548	548
	922 & 992	2	676-1925	010	010		
	922 & 992	2	676-0167			548	548

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
4	CHANNEL RING LH						
	923 & 993	2	676-1926	010	010		
	923 & 993	2	676-0169			548	548
	924 & 994	2	676-1927	010	010		
	924 & 994	2	676-0171			548	548
5	STUFFING BOX	1	812-0315	053	104	053	104
5A	STUFFING BOX -	1	812-0316	053	104	053	104
	JACKETED						
6	FRAME (STD.)	1	356-0004	010	010	010	010
	(JACKETED)	1	356-0007	010	010	010	010
7	BRG. CARTRIDGE	1	164-0108	010	010	010	010
8	FRAME FOOT	1	820-0125	010	010	010	010
9	CASING FOOT	1	820-0127	010	010	010	010
10	SHAFT	1	728-0426	063	063	063	104
11	GLAND		REFER TO FACTORY				
12	SLEEVE PACKING	1	756-0504	108	108	108	104
	ROTT & 9T	1	756-0504	104	104	104	104
	PT & 9BT	1	756-0505	104	104	104	104
13	SEAL						
	ROTT	1	712-6176	776	776	776	776
	9T	1	712-6146	762	762	762	762
	PT	1	712-6166	776	776	776	776
	9BT	1	712-6156	762	762	762	762
14	BEARING	1	068-0160	647	647	647	647
15	BEARING	1	068-0458	647	647	647	647
16	SLEEVE EXTENSION	1	756-0503	104	104	104	104
17	O-RING	1	364-0456	494	494	494	494
18	O-RING	2	364-0329	494	494	494	494
19	CAPSCREW	4	168-0562	082	082	082	082
20	IMPELLER SCREW	1	544-2159	104	104	104	104
21	KEY - SLEEVE	1	472-0211	104	104	104	104
22	RETAINING RING	1	676-0446	088	088	088	088
23	O-RING	1	364-0436	457	457	457	457
24	RETAINING RING	1	676-0943	088	088	088	088
25	CAPSCREW	1	168-0496	082	082	082	082
26	NUT	1	544-0113	082	082	082	082
27	NUT	1	544-0117	082	082	082	082
28	KEY	1	472-0245	087	087	087	087

150 SERIES
MODEL 153-154
723 THRU 994
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
29	SEAL	2	712-6327	653	653	653	653
30	PLUG	3	600-0001	087	087	087	087
31	SLINGER	1	764-0055	522	522	522	522
32	SLINGER	1	764-0056	522	522	522	522
33	PIN	1	592-0817	104	104	104	104
34	POWER FRAME	1	260-0682	087	087	087	087
	COVER						
35	BRACKET	1	116-0461	010	010	010	010
37	CAPSCREW	3	168-0492	082	082	082	082
38	STUD		REFER TO FACTORY				
39	NUT	2	544-0113	104	104	104	104
40	GASKET	1	364-1314	509	509	509	509
41	DRIP CUP	1	268-0155	104	104	104	104
42	POWER FR. GASKET	1	364-0811	614	614	614	614
43	CAPSCREW	2	168-0488	082	082	082	082
44	CAPSCREW	2	168-0492	082	082	082	082
45	CAPSCREW	4	168-0252	082	082	082	082
46	CAPSCREW	4	168-0488	082	082	082	104
47	CAPSCREW	8	168-0496	082	082	082	104
48	OILER	1	552-0027	652	652	652	652
49	NIPPLE	1	600-1204	387	387	387	387
50	BREATHER	1	864-0053	656	656	656	656
51	NAMEPLATE	1	532-0056	114	114	114	114
52	DRIVE SCREW	2	708-0013	365	365	365	365
53	CASING FT. RH	1	820-0126	010	010	010	010
54	CASING FT. LH	1	820-0128	010	010	010	010
55	CAPSCREW	4	168-0492	082	082	082	082
56	EYEBOLT	1	100-0110	082	082	082	082
57	THROTTLE BUSHING						
	(NOT SHOWN)						
	ROTT & 9T	1	136-1359	540	540	540	540
	PT & 9BT	1	136-1360	540	540	540	540
58	SEAL COLLAR		REFER TO FACTORY				
59	SETSCREW	2	724-0077	104	104	104	104
60	PIN	1	592-0028	104	104	104	104
61	PACKING GLAND	1	372-0323	053	104	053	104
62	GLAND PACKING	2	564-0302	802	802	802	802
63	CAPSCREW	2	168-0394	104	104	104	104
64	NUT	2	544-0109	104	104	104	104
65	PACKING	7	564-0105	802	802	802	802

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
66	LANTERN RING	1	676-0953	512	512	512	512
67	PLUG	3	600-0002	087	087	087	087
69	PLUG	5	600-0002	087	104	087	104
70	GASKET	1	364-1316	509	509	509	509
71	PIN	1	592-0238	104	104	104	104
72	BUSHING	1	136-0117	104	104	104	104
74	KEY	2	472-0109	104	104	104	104
	OPTIONAL RING PULLER						
	PULLER	1	628-0010	058			
	SCREW	1	708-0815	058			
	NUT	2	544-0109	080			
	REPAIR KIT INCLUDES PIECE NOS. 2, 3, 4, 16, 17, 18, 20, 33, 71, 72, 74						
	CT-723		476-0329	642			623
	CT-725		476-0330	642			623
	CT-821		476-0331	642			623
	CT-921		476-0332	642			623
	CT-922		476-0333	642			623
	CT-923		476-0334	642			623
	CT-924		476-0335	642			623
	CT-991		476-0332	642			623
	CT-992		476-0333	642			623
	CT-993		476-0334	642			623
	CT-994		476-0335	642			623

150 SERIES
MODEL 152-153-154
713 THRU 914, 723 THRU 994
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 22	–	–	–
1	CASING 152	1	180-0620	111			
	153	1	180-0621	111			
	154	1	180-0616	111			
1A	CASING						
	CENTERLINE MOUNT						
	152	1	180-0623	111			
	153	1	180-0624	111			
	154	1	180-0617	111			
2	CHANNEL RING						
	(RIGHT HAND)						
	152 713	1	676-0160	549			
	715	1	676-0162	549			
	811	1	676-0164	549			
	911	1	676-0166	549			
	912	1	676-0168	549			
	913	1	676-0170	549			
	914	1	676-0172	549			
	153-154 723	2	676-0160	549			
	725	2	676-0162	549			
	821	2	676-0164	549			
	921 & 991	2	676-0166	549			
	922 & 992	2	676-0168	549			
	923 & 993	2	676-0170	549			
	924 & 994	2	676-0172	549			
3	IMPELLER						
	152 713	1	444-2256	111			
	715	1	444-2256	111			
	811	1	444-2257	111			
	911	1	444-2258	111			
	912	1	444-2259	111			
	913	1	444-2260	111			
	914	1	444-2261	111			
	153-154 723	2	444-2256	111			
	725	2	444-2256	111			
	821	2	444-2257	111			
	921 & 991	2	444-2258	111			
	922 & 992	2	444-2259	111			
	923 & 993	2	444-2260	111			
	924 & 994	2	444-2261	111			

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 22	–	–	–
4	CHANNEL RING						
	(LEFT HAND)						
	152 713	1	676-0159	549			
	715	1	676-0161	549			
	811	1	676-0163	549			
	911	1	676-0165	549			
	912	1	676-0167	549			
	913	1	676-0169	549			
	914	1	676-0171	549			
	153-154 723	2	676-0159	549			
	725	2	676-0161	549			
	821	2	676-0163	549			
	921 & 991	2	676-0165	549			
	922 & 992	2	676-0167	549			
	923 & 993	2	676-0169	549			
	924 & 994	2	676-0171	549			
5	STUFFING BOX	1	812-0315	111			
5A	STUFFING BOX -	1	812-0316	111			
	JACKETED						
6	FRAME	1	356-0004	010			
	JACKETED	1	356-0007	010			
7	BRG. CARTRIDGE	1	164-0108	010			
8	FRAME FOOT	1	820-0125	010			
9	CASING FOOT	1	820-0127	010			
10	SHAFT 152	1	728-0425	111			
	153-154	1	728-0426	111			
11	GLAND		REFER TO FACTORY				
12	SLEEVE PACKING	1	756-0504	111			
	ROTT & 9T	1	756-0504	111			
	PT & 9BT	1	756-0505	111			
13	SEAL						
	ROTT	1	712-6176	775			
	9T	1	712-6146	768			
	PT	1	712-6166	775			
	9BT	1	712-6156	768			
14	BEARING	1	068-0160	647			
15	BEARING	1	068-0458	647			
16	SLEEVE EXTENSION						
	153-154	1	756-0503	111			
17	O-RING	1	364-0456	509			
18	O-RING	1	364-0329	509			

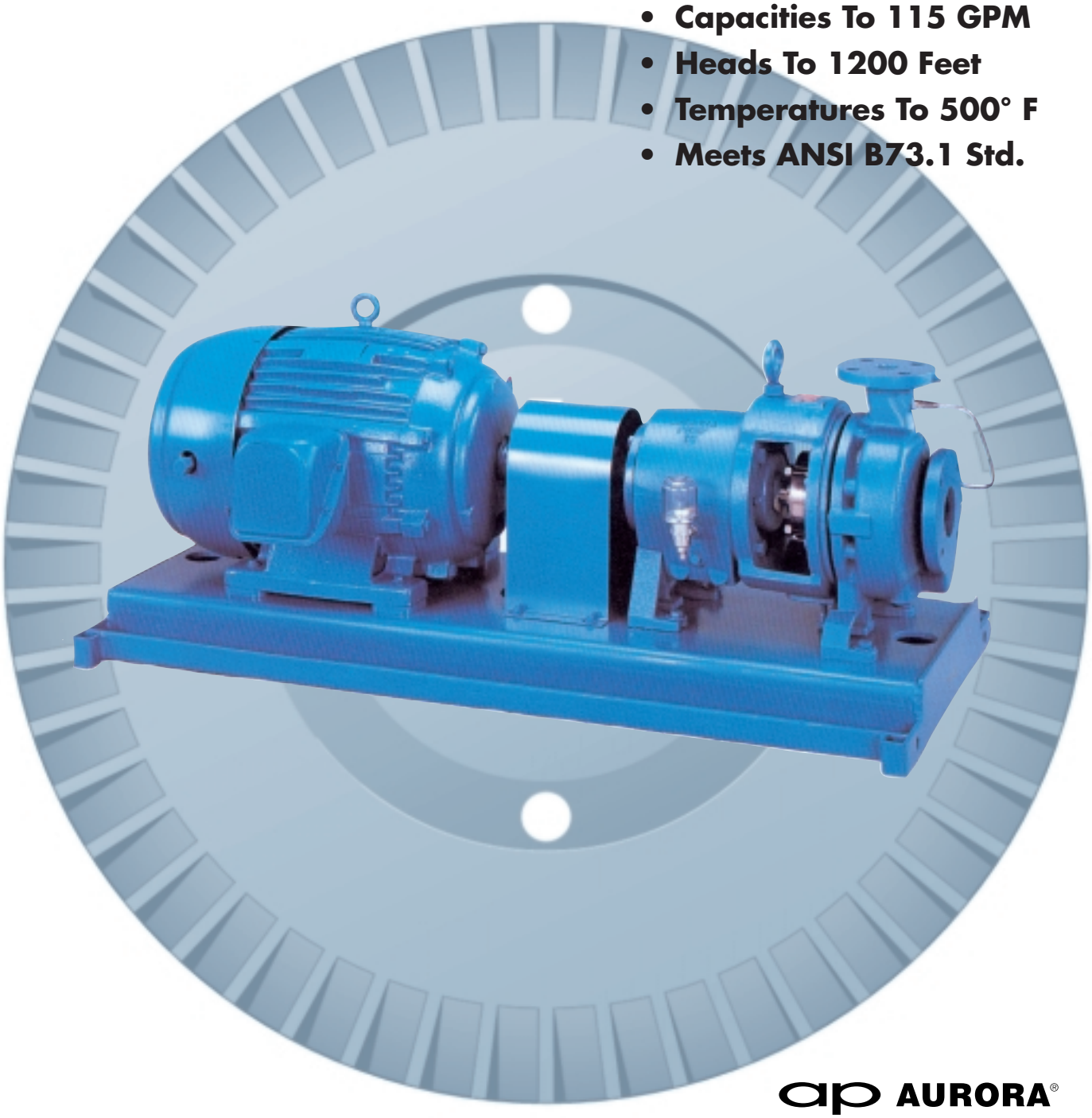
150 SERIES
MODEL 152-153-154
713 THRU 914, 723 THRU 994
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL			
				22	–	–	–
19	CAPSCREW	4	168-0562	082			
20	IMPELLER SCREW	1	544-2159	111			
21	KEY 152	1	472-0201	111			
	153-154	1	472-0211	111			
22	RETAINING RING	1	676-0446	088			
23	O-RING	1	364-0436	457			
24	RETAINING RING	1	676-0943	088			
25	CAPSCREW	1	168-0496	082			
26	NUT	1	544-0113	080			
27	NUT	1	544-0117	080			
28	KEY	1	472-0245	087			
29	SEAL	2	712-6327	653			
30	PLUG	2	600-0001	087			
31	SLINGER	1	764-0055	522			
32	SLINGER	1	764-0056	522			
33	PIN 152	1	592-0806	111			
	153-154	1	592-0817	111			
34	POWER FRAME						
	COVER	1	260-0682	087			
35	BRACKET	1	116-0461	010			
37	CAPSCREW	3	168-0492	082			
38	STUD		REFER TO FACTORY				
39	NUT 152	2	544-0113	111			
	153-154	2	544-0013	111			
40	GASKET	1	364-1314	509			
41	DRIP CUP	1	268-0155	104			
42	GASKET	1	364-0811	614			
43	CAPSCREW	2	168-0488	082			
44	CAPSCREW	3	168-0492	082			
45	CAPSCREW	4	168-0252	082			
46	CAPSCREW	2	168-0488	104			
47	CAPSCREW	8	168-0496	104			
48	OILER	1	552-0027	652			
49	NIPPLE	1	600-1204	387			
50	BREATHER	1	864-0053	656			
51	NAMEPLATE	1	532-0056	114			
52	DRIVE SCREW	2	708-0013	365			
53	CASING FOOT RH	1	820-0126	010			
54	CASING FOOT LH	1	820-0128	010			
56	EYEBOLT	1	100-0110	082			

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL			
				22	–	–	–
57	THROTTLE BUSHING						
	(NOT SHOWN)						
	ROTT & 9T	1	136-1359	540			
	PT & 9BT	1	136-1360	540			
58	SEAL COLLAR		REFER TO FACTORY				
59	SETSCREW	2	724-0077	111			
60	PIN	1	592-0028	111			
61	PACKING GLAND	1	372-0323	111			
62	GLAND PACKING	2	564-0302	802			
63	CAPSCREW	2	168-0394	111			
64	NUT	2	544-0109	111			
65	PACKING	7	564-0105	802			
66	LANTERN RING	1	676-0953	512			
67	PLUG	3	600-0002	087			
69	PLUG	5	600-0002	087			
70	GASKET	1	364-1316	509			
71	PIN 153-154	1	592-0238	111			
72	BUSHING 153-154	1	136-0117	111			
74	KEY	1	472-0109	111			
	OPTIONAL RING						
	PULLER						
	SCREW	1	708-0815	058			
	NUT	2	544-0109	080			
	PULLER	1	628-0010	058			
75	PLUG						
	152		N/R*				
	153		N/R				
	154	1	600-0005	087	104	087	104

150 Series "APCO-CHEM" Regenerative Turbine Process Pumps for Low Flow High Pressure Applications

- Capacities To 115 GPM
- Heads To 1200 Feet
- Temperatures To 500° F
- Meets ANSI B73.1 Std.



AURORA®

PENTAIR PUMP GROUP

150 Series "APCO-CHEM" Process Turbine Pump

Low Flow, High Pressure Regenerative Turbine Process Pump

Process Industry Field Proven For:

- Chemicals
- Petrochemicals
- Refinery
- Pulp and Paper
- General Industry

Services:

- Boiler Feed
- Condensate
- Chemical Transfer
- Injection

Design Features:

- Steep head capacity curves for applications that require minimal flow change.
- Ability to handle vapors up to 20% by volume.
- Steady flow—eliminates pulsation problems associated with other pump designs.
- Back pull-out design for low cost, one craft maintenance.
- Top vertical centerline discharge.
- Pump has known shut-off pressure as opposed to positive displacement designs.
- Reduced down-time for bearing and seal maintenance.
- Pump built to ANSI B73.1 dimensional standards for maximum interchangeability.
- Lower operating costs than standard centrifugal pumps at low flow conditions.
- Balanced double suction impeller design reduces axial thrust.

Sealing Flexibility

Shaft Arrangement – With shaft sleeve.
Seal Types – Single or double, inside, balanced or unbalanced.
Glands – Plain, flush, quench, vent and drain.
Seat Mounting – Flexibly mounted "O"-ring or clamped stationary seat.
Flush Plans – ANSI and API configurations available.

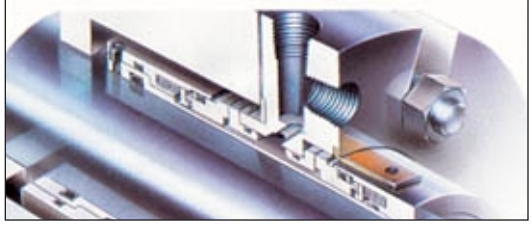
Type 1100
Single inside seal – cartridge seal



Type 1B
Single inside



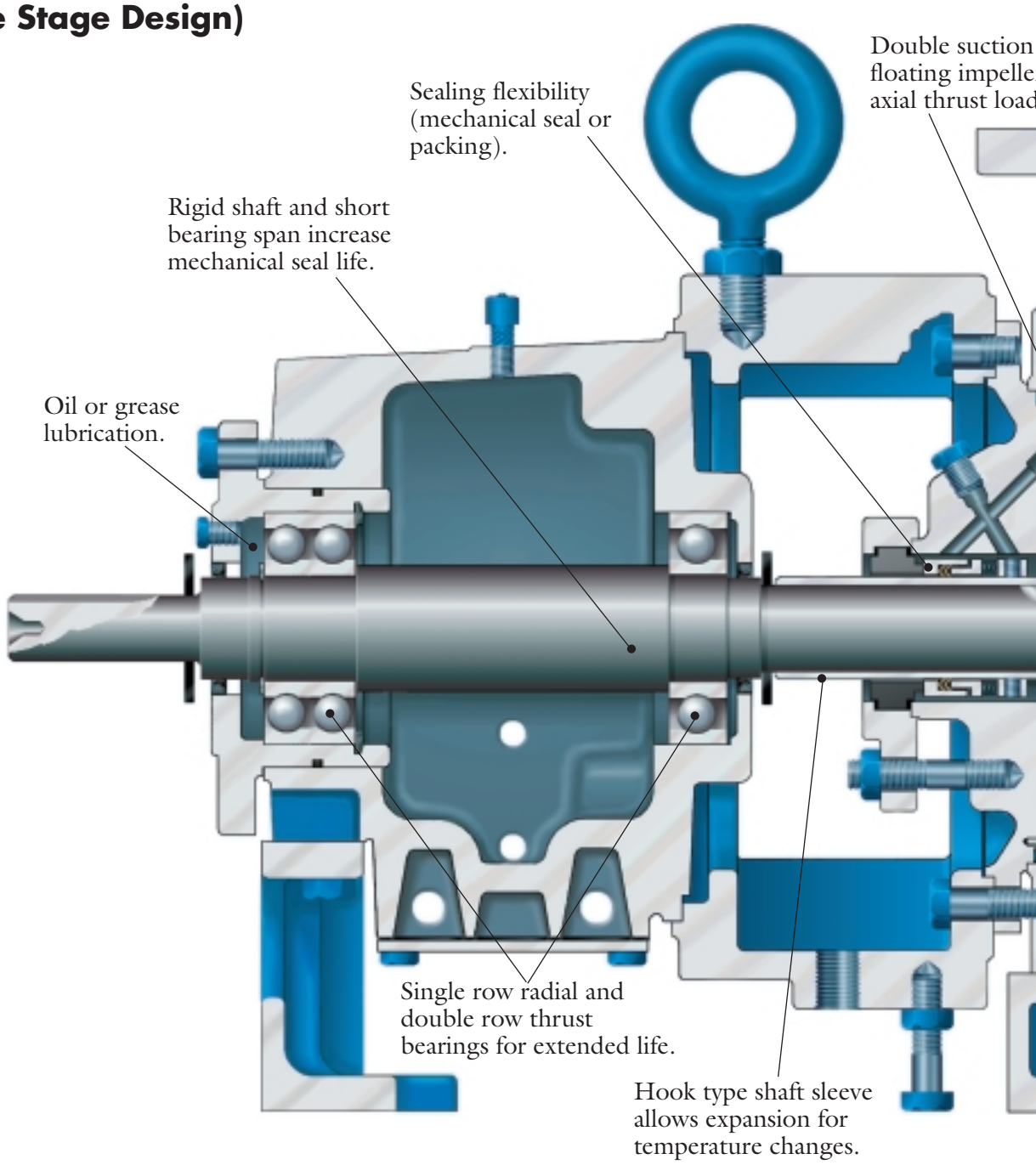
Type 88
Double seal or tandem cartridge



© John Crane Inc., Seal Pictures

"APCO-CHEM" Design Features of the One and Two Stage Turbine Typ

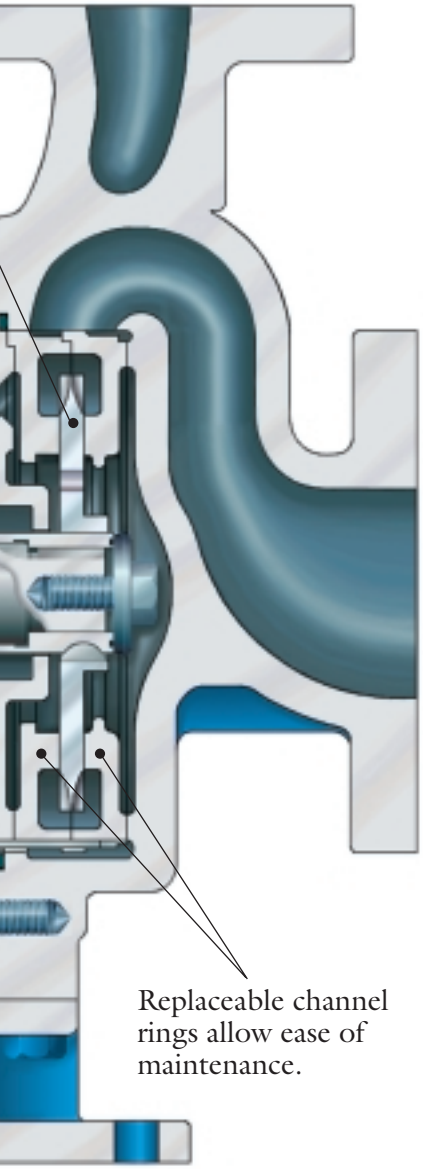
Model 151 and 152 (Single Stage Design)



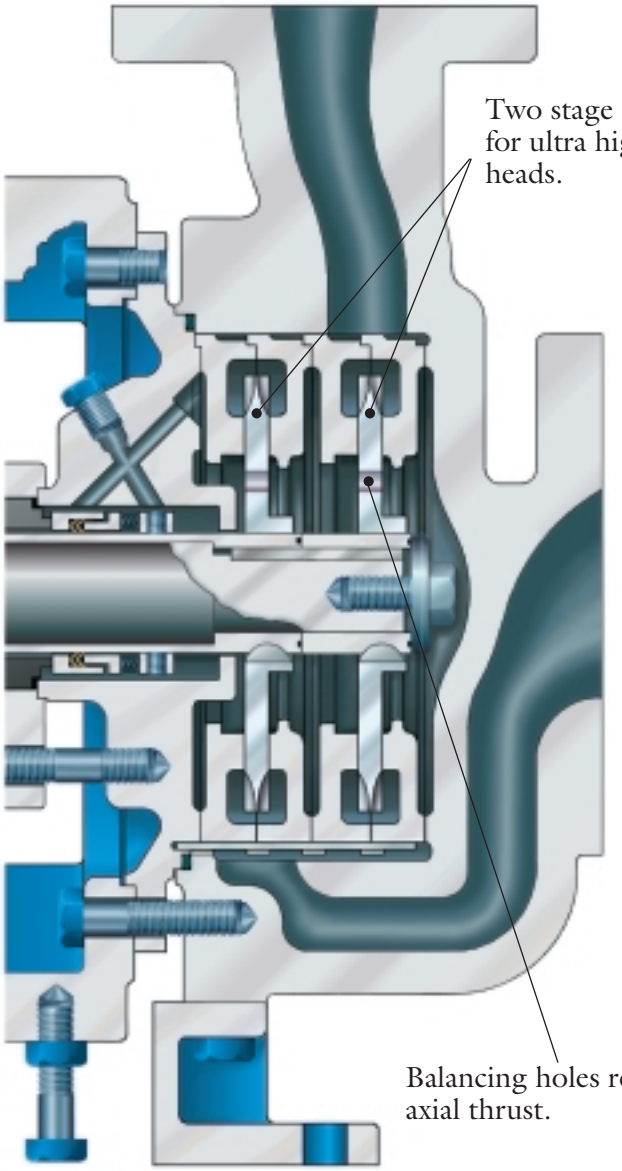
Optional Design Features

- Jacketed stuffing box for cooling or heating mechanical seal cavity.
- Jacketed bearing frame provides bearing cooling for high temperature services.
- Case centerline mounting for high temperature services (not available on Model 151).

nd
balances
.



Model 153 and 154
Liquid End



Optimal Hydraulic Coverage

"APCO-CHEM" Turbine Pumps

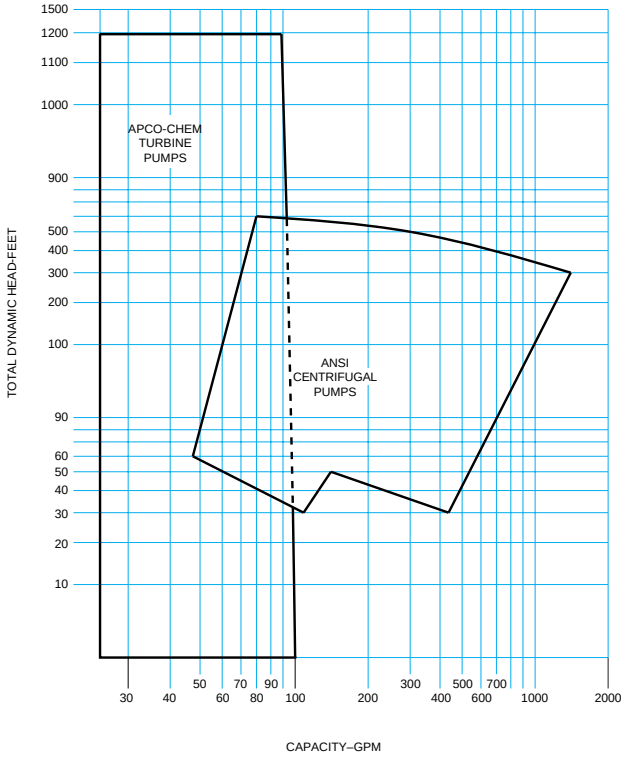
Specific speed (N_S)[1] can be thought of as a hydraulic index number indicating a specific type of pump best suited for a particular application. The Hydraulic Institute lists a range of N_S from 500 through 20,000 for centrifugal pumps starting at a straight radial impeller and progressing through an axial-flow design.[2]

But, what about N_S's below 500? This is where the unique Apco-Chem regenerative turbine can best serve those special pumping applications. Consider the following pumping requirements at 3500 RPM.

Head (FT)	600	600	600	600
Flow (GPM)	10	30	60	90
N_S	91	158	224	274

Now try to find a good centrifugal pump that would meet those pumping requirements at a reasonable efficiency, NPSH requirement, and operating life. Rather difficult!

However, look at the quality performance a regenerative turbine can give to those requirements. Specific speed, then, is an index that indicates the type of pump best suited for the myriad pumping applications in the marketplace. N_S below 500 can best be handled by regenerative turbines that have the inherent hydraulic capabilities of pumping low flows and high head requirements.

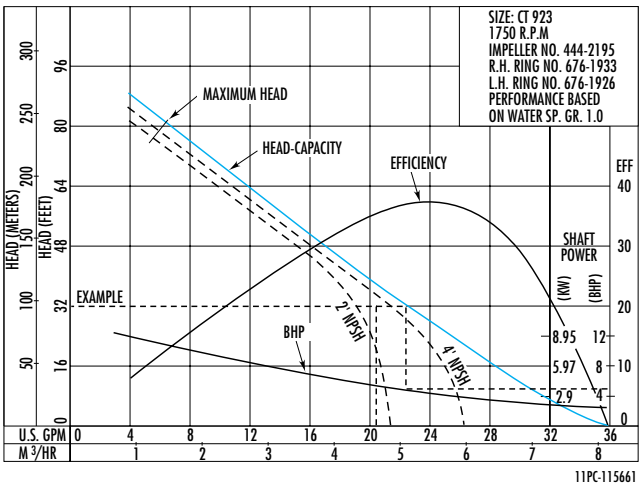


[1]Specific Speeds $N_S = \frac{(RPM)\ (GPM)^{1/2}}{(FT.\ of\ Head)^{3/4}}$

[2]See ANSI/HI 1.1-1.5-1994 standards page 3.

EXAMPLE: Select a pump for 20 G.P.M., 320 feet Total Dynamic Head, with 3 foot N.P.S.H. available. Enter curve at 320 ft. and move to right to 3' N.P.S.H. line. Read down to 20.5 G.P.M. To determine the B.H.P., go back to 320 foot line and continue to right to solid Head-Capacity curve, then down to B.H.P. curve, then to right and read 4.7 B.H.P. For application where N.P.S.H. available exceeds that as shown by dotted lines, select pump capacity and B.H.P. on solid lines.

150 SERIES TURBINE TYPE PUMPS



Process Turbine Pump Principles of Operation

Turbine pumps derive their name from the many buckets machined into the periphery of the rotating impeller. They have long since been recognized for their effectiveness in the areas of low flow, high head application. The turbine pump offers higher heads than centrifugal pumps.

Because the head capacity curve is steep in a turbine pump, a greater degree of flexibility is available to the process engineer. Turbine pumps having top center line discharge are self-venting and have the ability to handle vapors without vapor lock.

This characteristic allows handling of boiling liquids and liquefied gases at suction heads slightly over the vapor pressure.

The turbine pump also has higher efficiencies at low flows than a centrifugal pump.

Turbine pumps utilize close running clearances and are normally utilized on clean liquid applications. Viscous materials up to 500 S.S.U. can be pumped.

Turbine pumps are unique in operation. The pumped liquid is directed by the liquid passage so that the liquid circulates in and out of the impeller buckets many times on its way from the pump inlet to the pump outlet. Both centrifugal and shearing action combine to impart additional energy to the liquid each time it passes through the buckets.

Heads over 900 feet are successfully developed in a single stage. The impeller runs at very close axial clearances with the pump channel rings to minimize recirculation losses. The channel rings provide a circular channel around the blade area of the impeller, from the inlet to the outlet. Liquid entering the channel from the inlet is picked up immediately by the buckets on both sides of the impeller and pumped through the channel (Figure 1) by a shearing action.

The flow of the liquid within the impeller buckets is illustrated in Figure 2. This process is repeated over and over, each cycle imparting more energy until the liquid is discharged. This flow is smooth and continuous.

In two stage pumps, the liquid is directed to a second stage impeller where the process is repeated, doubling the discharge head. By offsetting the discharges by 180°, the radial loads on the bearing are nearly balanced and shaft deflection is minimized.

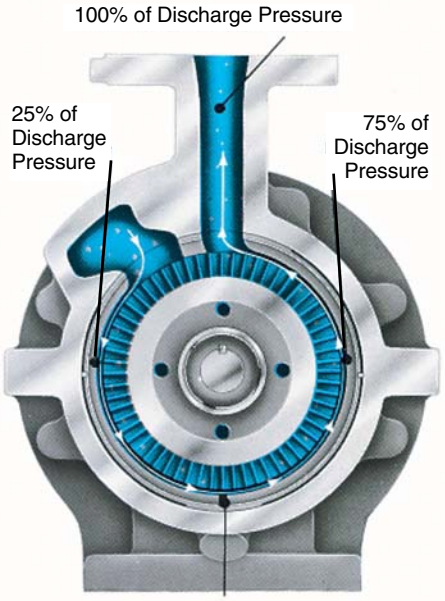
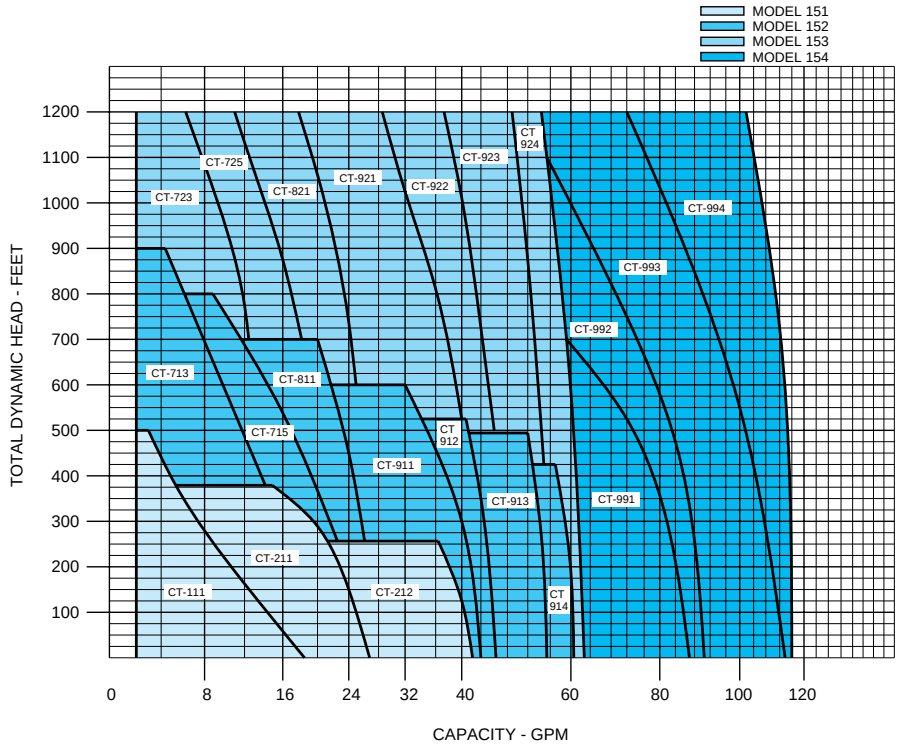


Fig. 1

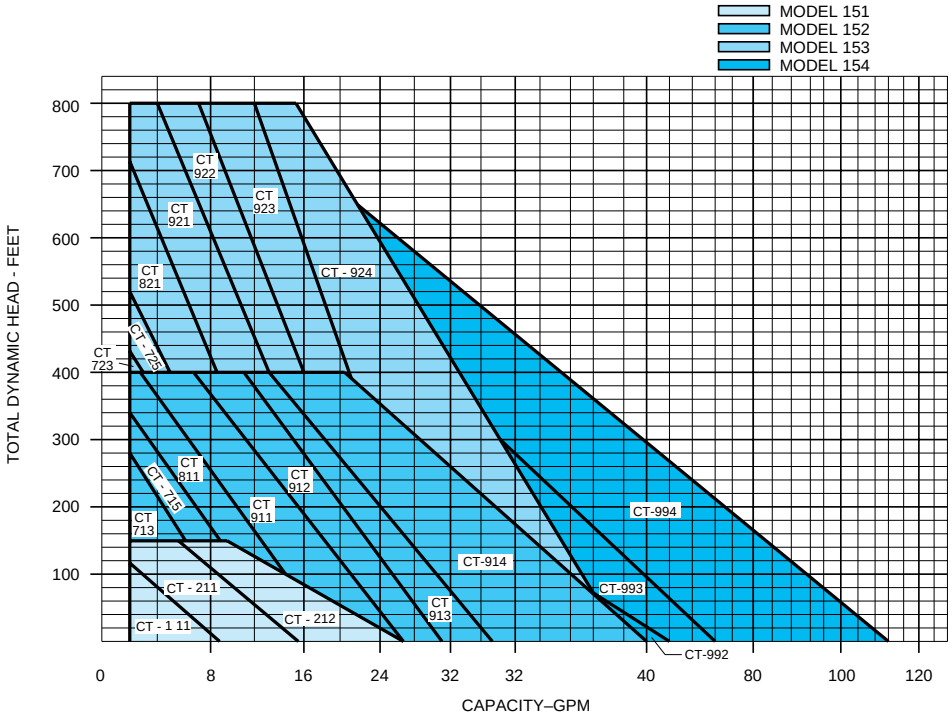

Fig. 2

Hydraulic Performance Range Charts

3500 RPM



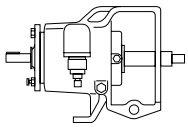
1750 RPM



Modular Design

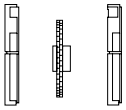
APCO-CHEM offers for standard construction, 2 power frames, 3 shafts, 2 stuffing box covers, 10 impeller and channel ring sets and 4 casings for maximum interchangeability.

Model 151
Single Stage

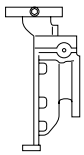




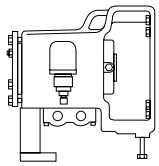
CT111
CT211
CT212



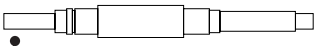
1 Frame
1 Stuffing Box
3 L.H. Rings
3 Impellers
3 R.H. Rings
1 Casing
1 Shaft



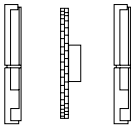
Model 152
Single Stage

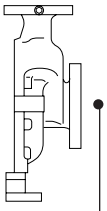






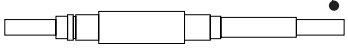
CT713 CT723
CT715 CT725
CT811 CT821
CT911 CT921
CT912 CT922
CT913 CT923
CT914 CT924

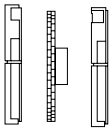


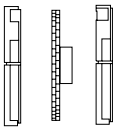


1 Frame
1 Stuffing Box
7 L.H. Rings
7 Impellers
7 R.H. Rings
3 Casings

Model 153
Two Stage







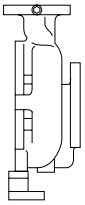
CT991
CT992

CT993
CT994

Model 154
Duplex

Two stage utilizes single stage parts with exception of shaft and casing. Duplex utilizes two stage parts with exception of the casing.

Model 153



Model 154



Materials of Construction

PUMP PART	MATERIAL CODE*		
	14	19	22
CASING	316 STAIN. STL. ASTM A743	DUCTILE IRON ASTM A395	ALLOY 20 ASTM A743 CN7M
IMPELLER	316 STAIN. STL. ASTM A743	DUCTILE IRON ASTM A395	ALLOY 20 ASTM A743 CN7M
SHAFT	316 STAIN. STL. AISI 316	STEEL AISI C1045	CARPENTER 20
CHANNEL RINGS	316 STAIN.** STL. ASTM A743	CAST IRON ASTM A48	ALLOY 20** ASTM A743 CN7M
SLEEVE	316 STAIN. STL. AISI 316	HDN. STAIN. STL. ASTM A276	CARPENTER 20
GLAND	316 STAIN. STL. AISI 316	DUCTILE IRON ASTM A395	ALLOY 20 ASTM A743 CN7M
STUFFING BOX	316 STAIN. STL. ASTM A743	DUCTILE IRON ASTM A395	ALLOY 20 ASTM A743 CN7M

Pumps come standard with packing.
– Braided acrylic with graphite/TFE
(Teflon lantern ring furnished upon request.)

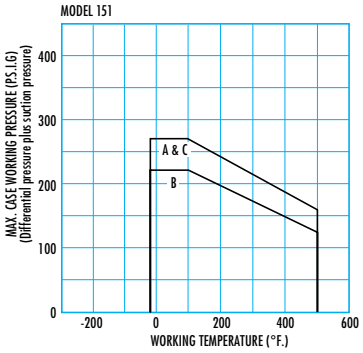
*Other material combinations available.
**Chromium oxide ceramic coated sealing surfaces.

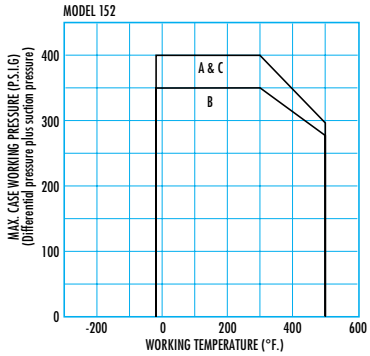
Pressure & Temperature Capability

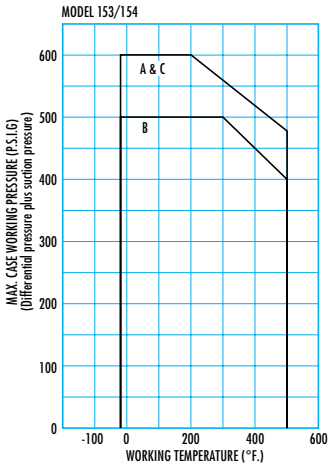
Maximum Temperature Limitations for Pumped Liquid

DESCRIPTION	PUMP MODELS	
	151	152-3-4
Mechanical Seal – without stuffing box cooling (See Note 1).	300° F	300° F
Mechanical Seal – with water cooled stuffing box and water jacketed frame.	N/A	500° F
Packing – without stuffing box cooling (See Note 2).	300° F	300° F
Packing – with water cooled stuffing box and jacketed frame.	N/A	500° F

NOTES:
1. Pumps with standard mechanical seals on continuous duty water applications MUST NOT exceed 180° F without providing cooling at the stuffing box. Special seal face materials will increase this limit – refer to factory.
2. Pumps with packing on water applications MUST NOT exceed 250° F without providing cooling at the stuffing box.
3. For temperatures above 300° F in models 152, 153 and 154, the centerline casing support is recommended.







Code For Pressure – Temperature Chart		
A	B	C
316 SS	Ductile Iron	Alloy 20

Construction Details

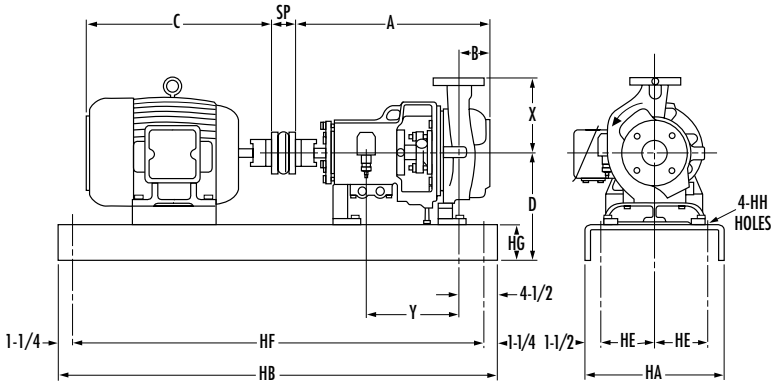
	SERIES 150	PUMP MODEL			
		151	152	153	154
General	Discharge Flanges (300)	1	1 1/2	1 1/2	2
	Suction Flange	1 1/2	3	3	3
	Number of Stages	1	1	2	2
	Casing Wall Thickness	1/2	5/8	3/4	3/4
	Nominal Impeller Dia.	4 1/2	–	6	–
	Corrosion Allowance	1/8			
	Impeller Clearance	0.005' to 0.007'			
	Rotation From CPLG	CW			
Stuffing Box	Bore	1 3/4"	2 1/2"		
	Depth	2"	2 5/8"		
	O.D. Sleeve	1 1/8"	1 3/4"		
	Packing Size	3/8 Sq.	5/8 Sq.		
	Distance To First Obstruction	1 15/16	2 9/16		
	Total Rings	5	5		

	SERIES 150	PUMP MODEL			
		151	152	153	154
Shaft	Dia. at Impeller	11/16"	1 1/8"		
	Dia. at Sleeve	7/8"	1 1/2"		
	Dia. Between Bearings	1 9/16"	2 1/8"		
	Dia. at Coupling End	7/8"	1 1/8"		
	Keyway	3/16 Sq.	1/4 Sq.		
	Maximum Deflection	0.002"			
Bearings	Radial Bearing	306	309		
	Thrust Bearing	5306	5309		
	Bearing Centers	5.37"	6.87"		
	Radial Brg. and 1st Stg. Center	5.37"	6.56"		
	Radial Brg. and 2nd Stg. Center	5.75"	6.87"		
	Min. B10 Bearing LIfe	2 years			

TAPPED OPENINGS			
PURPOSE	NO. OF TAPS	TAP SIZE	
		151	152-3-4
Lantern Ring Connection	1	1/4 NPSF	1/4 NPSF
Frame Adapter Drain	1*	1/2 NPSF	1/2 NPSF
Discharge Gauge Connection**	1	1/4 NPT	1/4 NPT
Suction Gauge Connection**	1	1/4 NPT	1/4 NPT

*Model 151 has 2 taps.
**Optional

General Dimensions and Engineering Specifications



MODEL	PUMP SIZE	DISCHARGE SIZE	SUCTION SIZE	A	D	X	Y	B	SP
151	1x1½x6	1	1½	17½	5¼	6½	7¼	4	3½
152	1½x3x6	1½	3	23½	8¼	8½	12½	4	3½
153	1½x3x6	1½	3	*23½	8¼	8½	12½	4*	3½
154	2x3x6	2	3	*23½	8¼	9½	12½	4*	3½

When optional 300# flange is used, add 3/16" to Model 153 and 15/16" to Model 154.

DIMENSIONS DETERMINED BY MOTOR									
MODEL	MOTOR			BEDPLATE					
		MOTOR FRAME SIZE	C MAX	HA	HB	HG	HF	HH	HE
151	1T	56 - 145T		10	35	3	32½	¾	4
151	2T	182 - 215T		12	39	3¼	36½	¾	4½
152	1	143T - 215T		12	45	3¾	42½	¾	4½
153	2	245T - 286TS		15	52	4⅛	49½	¾	6
154	3	324T - 365TS		18	58	4¾	55½	1	7

The contractor shall furnish (and install as shown on plans) Aurora Model (151 - 17-1/2" A.N.S.I. horizontal flexible coupled) (152 - 23-1/2" A.N.S.I. horizontal flexible coupled) (153 - 23-1/2", 154-23-1/2" A.N.S.I. horizontal flexible coupled) back pull out regenerative turbine pump(s) size…… x …… x…… The pump shall be constructed with (ductile iron) (316 stainless steel) pressure containing parts having a minimum tensile strength of (60,000 PSI ductile iron) (80,000 PSI 316 stainless steel) and shall be of sufficient thickness to withstand stresses and strains at full operating pressures. Casings shall be subject to a hydrostatic pressure test at 150% of the specified duty point. The pump shall be capable of delivering at design conditions a capacity of…… G.P.M. when operating against a Total Dynamic Head of…… feet, with a temperature of……;°F, …… Liquid specific gravity ……Pump shall operate at a maximum synchronous speed of . . . R.P.M. 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. Each pump is to be furnished with a (standard) (water cooled) stuffing box with (……mechanical seal) (packing). The unit must be equipped with (316 stainless steel) (440C hardened stainless steel, pack pumps) pin locked shaft sleeve that extends the length of the stuffing box. The pump shaft extension shall be "O" ring sealed from the pumped liquid. The discharge shall be in a vertical position and the pump shall be self-venting. The impeller shall be hydraulically self-centering and no external adjustment shall be necessary. Pump and motor are to be mounted on a common (A.N.S.I. cast iron) (steel) baseplate. The pump shaft shall be made of high grade…… steel or equal. The minimum diameter acceptable will be……". The shaft shall be installed in a cast iron power frame. Pumps shall have a shaft designed for .002" deflection at the face of the stuffing box with the pump running under maximum load condition. (Oil) (Grease) lubricated ball bearings, having a 2-year minimum life (AFBMA B-10) under the maximum condition of load protected by separate oil seals and slingers, shall be used. The pump shall be flexible coupled to standard horizontal NEMA ……HP……phase……. Hertz……volts…… RPM (drip-proof) (totally enclosed) (explosion-proof) motor. 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.

NOTE: Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information without notice.

— Your Authorized Local Distributor —

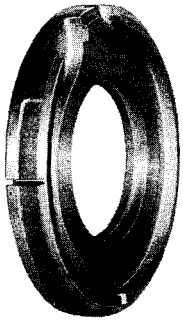
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PHONE: (630) 859-7000 U.S.A./CANADA FAX: (630) 859-7060
WORLDWIDE FAX: (630) 859-1226

AURORA MFG. PLANT:
800 AIRPORT ROAD • NORTH AURORA, ILLINOIS U.S.A. • 60542

SALES OFFICES IN ALL MAJOR CITIES AND COUNTRIES
Refer to "Pumps" in yellow pages of your phone directory for your local Distributor

AURORA
PENTAIR PUMP GROUP

AP-150 (KCC PRINTED IN U.S.A.)



IMPELLERS & RINGS

Impellers and rings are accurately machined to close tolerances for close clearance operation.

Impellers are accurately machined and have many buckets on both sides. The impellers are double suction with pressure balancing holes drilled near the mounting hub. This equalizes pressure on both sides of the impeller and balances axial thrust. The impeller(s) are precision bored and are keyed to the shaft sleeve.

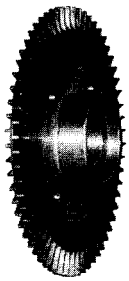
A turbine pump of stainless steel construction tends to gall in the event the impeller comes in contact with the channel rings. One way to overcome this is locking the impeller in place between the channel ring and increasing the clearance between the impeller and channel rings.

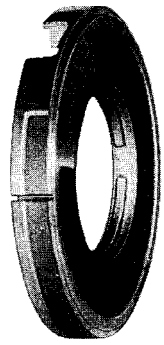
A locked impeller design prevents the impeller from touching the channel rings, but is difficult to adjust. Increased clearances reduce the operating pressures of the pump and require separate performance curves.

APCO-CHEM utilizes a chromium oxide ceramic coating, developed by Union Carbide Corporation which is applied to the sealing surfaces of stainless steel and alloy 20 channel rings. The coating is resistant to acids, caustics and temperatures within the range of the APCO-CHEM pump. A bearing surface is provided by the coating that completely eliminates the possibility of galling. Metal to metal contact is eliminated.

Ceramic coating on stainless steel and alloy constructions allows the impellers to float and center themselves on all APCO-CHEM pumps, and eliminates the need for impeller adjustments. Pumps with the ceramic coating also operate on the same tolerances as the standard ductile iron pump and provide identical performance.

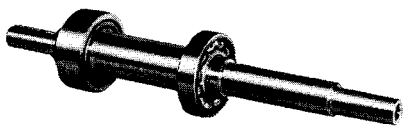
Discharge ports of channel rings on two stage and duplex pumps are OPPOSED 180°, equalizing radial loads and greatly reducing shaft deflection. Impellers and channel rings are interchangeable between single, two stage and duplex pumps.

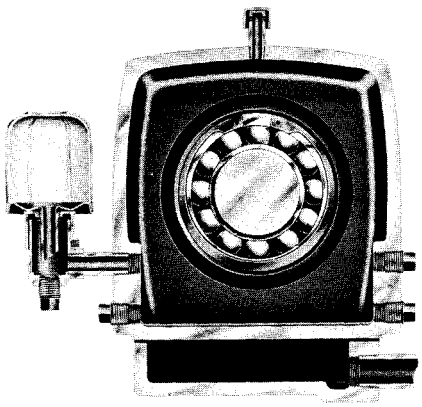




BEARINGS & SHAFTS

Vacuum degassed ball bearings are precision made and give 2 YEAR MINIMUM B_{10} LIFE under worst condition of allowable pump load. Outboard thrust bearings are double row deep groove angular contact to handle radial and thrust loads. End play is less than .001" for longer mechanical seal life to restrict seal leakage. The use of beveled type retaining rings assures that no additional end play is caused by movement axially of the thrust bearing on the shaft. Inboard bearings are single row deep grove and handle radial loads only. The radial bearing outer race is slip fit into the bearing frame and is free to float axially. Precision ground (32 micro-inches) and polished shafts are designed for a MAXIMUM DEFLECTION OF .002" at the mechanical seal faces at maximum recommended load.





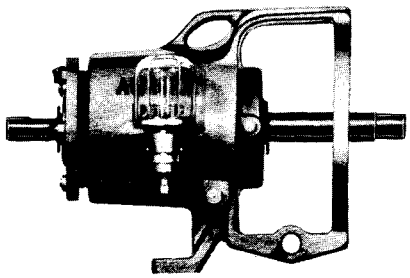
OIL LUBRICATION

Oil lubrication is furnished as standard with grease lubrication optionally available. A constant level oiler with a clear plexiglass oil reservoir indicates the oil reserve. The oiler accurately maintains a fixed oil level at the centerline of the lower ball in both ball bearings. The power frame reservoir for model 151 will hold approximately 3/4 pint and approximately 1-1/2 pints in models 152-3 & 4. The oiler capacity is 4 oz. A breather tube vents the power frame. Drain plugs are provided at the low point of the reservoir. The frame can be field converted to grease by merely replacing the oiler and vent tube with pipe plugs and inserting grease fittings in pipe taps already provided for at both bearings.

ENGINEERING DATA
INTERCHANGEABILITY

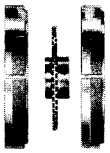
APCO-CHEM offers for standard construction, 2 power frames, 3 shafts, 2 stuffing box covers, 10 impeller and channel ring sets and 4 casings for maximum interchangeability.

MODEL 151
SINGLE STAGE

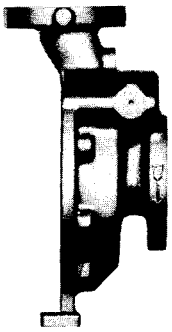




CT111
CT211
CT212



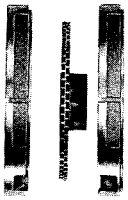
1 FRAME
1 STUFFING BOX
3 L.H. RINGS
3 IMPELLERS
3 R.H. RINGS
1 CASING
1 SHAFT

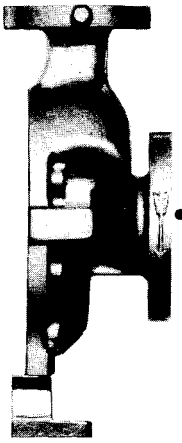


MODEL 152
SINGLE STAGE

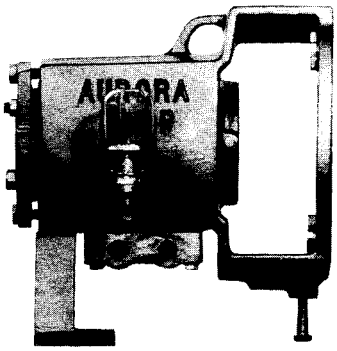


CT713
CT715
CT811
CT911
CT912
CT913
CT914





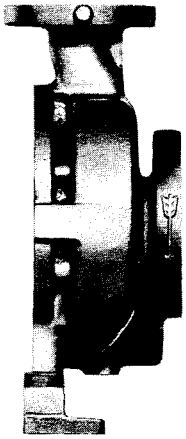
1 FRAME
1 STUFFING BOX
7 L.H. RINGS
7 IMPELLERS
7 R.H. RINGS
3 CASINGS
2 SHAFTS



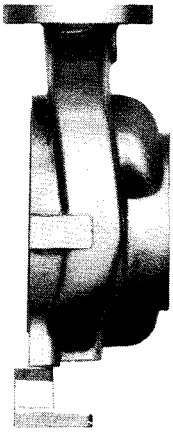


CT723
CT725
CT821
CT921
CT922
CT923
CT924

MODEL 153

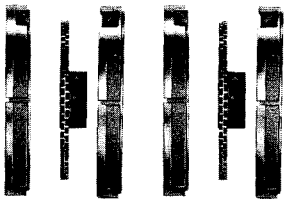


MODEL 154



MODEL 153
TWO STAGE





MODEL 154
DUPLEX

CT991 CT993
CT992 CT994

Two stage utilizes single stage parts with exception of shaft and casing.
Duplex utilizes two stage parts with exception of the casing.

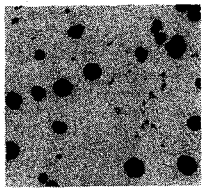
Ductile iron is furnished as a standard material for all cast wetted parts unless otherwise specified.

This standard material was selected over cast iron for its greater tensile strength, ductility and resistance to impact and thermal shock. By comparing the physical properties of ductile iron and steel, it can be shown that the yield strength of 60-40-18 ductile iron exceeds that for low carbon steel at all temperatures up to 1200° F.

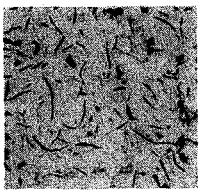
These unusual characteristics are accomplished by the spheroid shape of the graphite particles in the iron matrix. The graphite in conventional cast iron is in the form of flat, sharp-edged flakes resulting in a more brittle material.

The thermal expansion of ductile iron is similar to carbon steel while the corrosion resistance is similar to that of gray cast iron.

The following micro-photographs show the different graphite formations within the metals.



DUCTILE IRON



CAST IRON

A complete listing of pump parts and materials can be found on pgs. 78 & 79 under parts list and materials of construction. The following materials of construction available for APCO-CHEM and their stock status are listed.

MATERIAL	STOCK STATUS
DUCTILE IRON 316 ST. STL.	All sizes stocked.
304 ST. STL. HASTELLOY B HASTELLOY C MONEL NICKEL	Custom ordered to your exacting specifications.

NOTE:

Alloy pumps are furnished in ceramic coated construction to eliminate the galling characteristic of these metals. For material selections not listed, please refer to the factory.

CHEMICAL & PHYSICAL PROPERTIES OF METALS

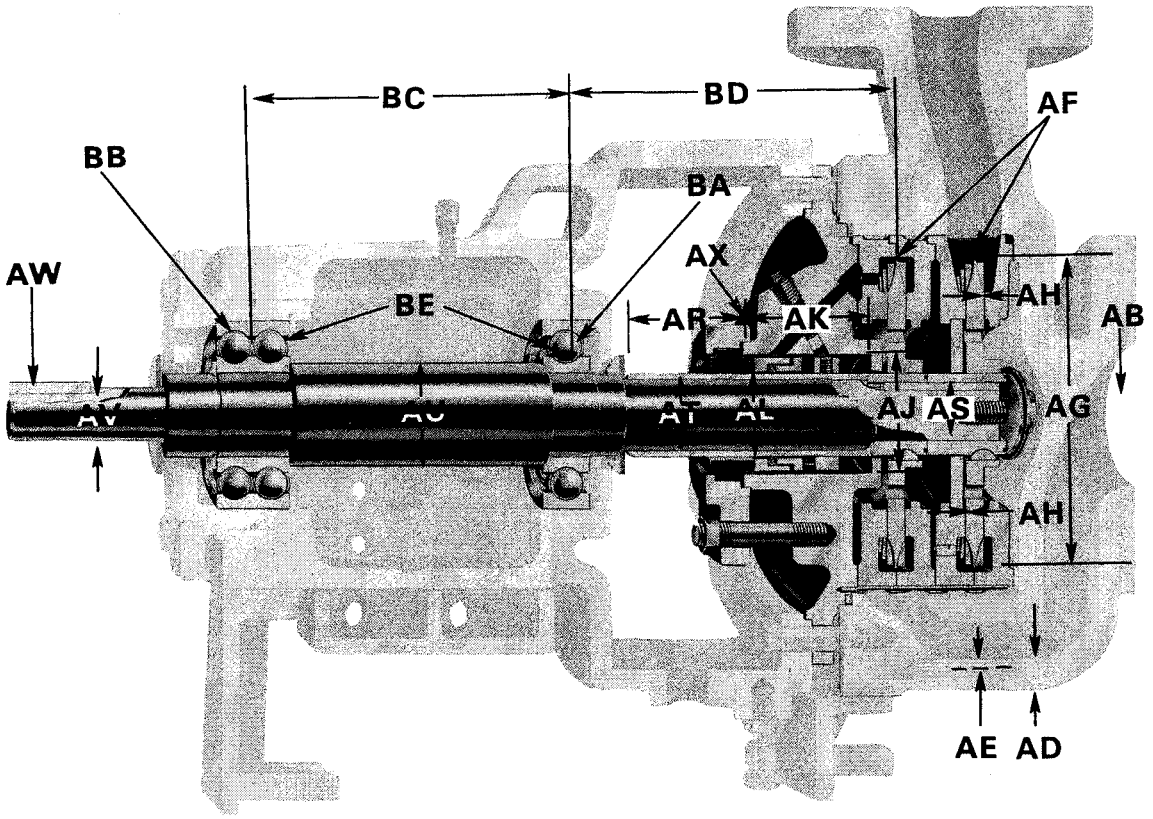
NAME	FORM	SPECIFICATION	TYPICAL CHEMICAL COMPOSITION (%)											MECHANICAL PROPERTIES (MINIMUM)	
			Fe	Cr	Ni	C	Mn	Mo	Cu	Si	S	P	OTHER	TENSILE (PSI)	YIELD (PSI)
CAST IRON	CAST	ASTM A48 (Class 30)	BAL.	—	—	3.0-3.45	.5-1.0	—	—	1.7-2.4	.07-.15	.15-.60	—	30,000	—
DUCTILE IRON	CAST	ASTM A395 (60-40-18)	BAL.	—	1.0	3.4-4.0	.2-.6	—	—	2.0-2.75	—	.08 MAX.	Mg .02-.07	60,000	45,000
CARBON STEEL	CAST	ASTM A216 Grade WCB	BAL.	.40 MAX.	.50 MAX.	.30 MAX.	1.0 MAX.	.25 MAX.	.50 MAX.	.60 MAX.	.06 MAX.	.05 MAX.	—	70,000	36,000
ST. STL. (304)	CAST	ACI CF-8	BAL.	18-21	8-11	.08 MAX.	1.5 MAX.	—	—	2.0 MAX.	.04 MAX.	.04 MAX.	—	77,000	37,000
ST. STL. (304)	WRT.	AISI-304	BAL.	18-20	8-12	.08 MAX.	2.0 MAX.	—	—	1.0 MAX.	.03 MAX.	.045 MAX.	—	85,000	35,000
ST. STL. (316)	CAST	ACI CF-8M	BAL.	18-21	9-12	.08 MAX.	1.5 MAX.	2-3	—	1.5 MAX.	.04 MAX.	.04 MAX.	—	80,000	42,000
ST. STL. (316)	WRT.	AISI-316	BAL.	16-18	10-14	.08 MAX.	2.0 MAX.	2-3	—	1.0 MAX.	.03 MAX.	.045 MAX.	—	85,000	35,000
HASTELLOY B	CAST	ASTM A494	4-6	1.0 MAX.	BAL.	.12 MAX.	1.0 MAX.	26-30	—	1.0 MAX.	.03 MAX.	.04 MAX.	Co 2.5 MAX. V .2-.6	75,000	55,000
HASTELLOY B	WRT.	ASTM B335	4-6	1.0 MAX.	BAL.	.05 MAX.	1.0 MAX.	26-30	—	1.0 MAX.	.02 MAX.	.025 MAX.	Co 2.5 MAX. V .2-.4	130,000	56,000
HASTELLOY C	CAST	ASTM 494	4.5-7	15.5-17.5	BAL.	.12 MAX.	1.0 MAX.	16-18	—	1.0 MAX.	.03 MAX.	.04 MAX.	Co 2.5 MAX., V.2-.4 W 3.75-5.25	83,000	50,000
HASTELLOY C	WRT.	ASTM B336	4-7	14.5-16.5	BAL.	.08 MAX.	1.0 MAX.	15-17	—	1.0 MAX.	.03 MAX.	.04 MAX.	Co 2.5 MAX., V.35 W 3.0-4.5	120,000	55,000
#20 ALLOY	CAST	ACI CN7M	BAL.	18-21	27-30	.08 MAX.	1.5 MAX.	2-3	3-4	2.0 MAX.	.04 MAX.	.04 MAX.	—	70,000	30,000
CARPENTER 20	WRT.	—	BAL.	20	29	.07 MAX.	.75	2.0 MIN.	3.0 MIN.	1.0 MAX.	—	—	—	84,000	38,000
MONEL	CAST	QQ-N-288 Class E	3.5 MAX.	—	60	.3 MAX.	1.5 MAX.	—	26-33	1.0-2.0	—	—	Al .5 MAX. Co & Ta 1.0-3.0	65,000	32,500
MONEL	WRT.	QQ-N-281 Class A	2.5 MAX.	—	63-70	.3 MAX.	2.0 MAX.	—	BAL.	.5 MAX.	.024 MAX.	—	Al .5 MAX.	99,000	52,000
K-MONEL	WRT.	QQ-N-286 Class A	2.0 MAX.	—	63-70	.25 MAX.	1.5 MAX.	—	BAL.	1.0 MAX.	.01 MAX.	—	Al 2.0-4.0 Ti .25-1.0	140,000	80,000
NICKEL	CAST	—	.25 MAX.	—	97	.5 MAX.	.5 MAX.	—	.3 MAX.	1.5 MAX.	.015 MAX.	—	—	45,000	20,000
NICKEL	WRT.	ASTM B160	.4 MAX.	—	99 MIN.	.15 MAX.	.35 MAX.	—	.25 MAX.	.35 MAX.	.01 MAX.	—	—	75,000	50,000

150 SERIES
ENGINEERING DATA
DESIGN DETAILS

AREA		DIMENSION	PUMP MODEL 151	PUMP MODEL 152-153-154
LIQUID END	AA	Discharge—300 P.S.I.—A.S.A. Flat Face	1	1-1/2 | 2
	AB	Suction—150 P.S.I.—A.S.A. Flat Face	1-1/2	3
	AC	Rotation—Facing Suction	CCW	CCW
	AD	Casing Wall Thickness	1/2	5/8 | 3/4 | 3/4
	AE	Casing Corrosion Allowance (Safety)	1/8	1/8
	AF	Number of Stages (Impeller(s))	1	1 | 2 | 2
	AG	Nominal Impeller Diameter	4-1/2	6
	AH	Clearance Between Imp. & Rings—Total both sides		
		1. Ductile Iron 2. Stainless Steel & Alloy 20	.005-.007 .005-.007	.005-.007 .005-.007
STUFFING BOX	AJ	Stuffing Box Bore Diameter	1-3/4	2-1/2
	AK	Stuffing Box Depth	2	2-5/8
	AL	Outside Diameter, Sleeve	1.125	1.750
	AM	Total Packing Rings With Lantern Rings	5	5
	AN	Number of Rings in Front of Lantern Ring	2	2
	AP	Packing Size	5/16	3/8
	AQ	Width of Lantern Ring	3/8	5/8
	AR	Distance from Box to Nearest Obstruction	1-15/16	2-9/16

AREA		DIMENSION	PUMP MODEL 151	PUMP MODEL 152-153-154
SHAFT	AS	Diameter at Impeller	.687	1.125
	AT	Diameter at Shaft Sleeve	.875	1.500
	AU	Diameter Between Bearings (Max. Shaft Dia.)	1.562	2.125
	AV	Diameter at Coupling End	.875	1.125
	AW	Coupling Keyway	3/16 x 3/32	1/4 x 1/8
	AX	Maximum Deflection at Stuffing Box Face	.002	.002
BEARINGS	BA	Bearing No. (Inboard Radial)	306	309
	BB	Bearing No. (Outboard Thrust)	5306	5309
	BC	Bearing Centers	5.37	6.56
	BD	Radial Brg. & 1st. Stg. Impeller Centers	5.75	6.87
	BE	Minimum B_{10} Bearing Life Under Maximum Recommended Load	2 Years	2 Years

NOTES:
1. Pump model can be determined from range charts in 150 Bulletin.
2. Average bearing life is 5 times minimum life.
3. Inboard radial bearings are single row ball. Outboard thrust bearings are double row ball.
4. Packing box is not illustrated.
5. Add 1-5/8" to "BD" dimension on model 153 and 154 pumps to determine the 2nd stage impeller centerline.



AURORA®
PENTAIR PUMP GROUP

ENGINEERING DATA
BEARING LIFE

Is based on the radial and thrust loads imposed on the bearings at the specific operating head and suction pressure. The APCO-CHEM pump is designed for two year minimum B_{10} life at the maximum recommended loads. Bearing life at any other point of greater capacity on the curve will greatly exceed the minimum life shown. Average bearing life is equal to five (5) times the minimum bearing life.

Tables 12, 13 and 14 will enable you to determine the minimum radial and thrust bearing life for any APCO-CHEM pump size.

1. Determine the proper pump size and speed from the range charts illustrated on pages 4 and 9 of the 150 Bulletin.
2. From figure 12, determine radial load at impeller in pounds by reading across from differential pressure per pump stage to pump size and then down (divide differential pressure by 2 for two stage model 153 pumps). This value will be used for determining both inboard and radial bearing life in hours and shaft deflection at impeller.
3. Locate radial load at impeller in pounds on figure 13 and read across to the proper pump size and R.P.M. and then down for inboard radial bearing life.
4. Locate suction pressure (P.S.I.) on figure 14 and read across to the proper pump size and R.P.M. and then down for outboard thrust bearing life.

EXAMPLE:

1. Model 152 (single stage)—a CT914 pump operating at 3500 R.P.M. with a suction pressure of 40 P.S.I. and a differential pressure of 150 P.S.I. would have:

A. Radial load at the impeller of 202 lbs.

B. Continuous inboard radial bearing life of 51,500 hours min.

C. Continuous outboard thrust bearing life of 66,000 hours min.

D. Shaft deflection of .0038" at the impeller (see page 77).

2. Model 153 (two stage)—a CT924 pump operating at 1750 R.P.M. with a suction pressure of 40 P.S.I. and a differential head of 150 P.S.I. (divide the differential head by 2) would have:

A. Radial load at the impeller of 101 lbs.

B. Continuous inboard radial bearing life of 300,000 hours min.

C. Continuous outboard thrust bearing life of 66,000 hours min.

D. Shaft deflection of .001" at the impeller (see page 77).

The above examples illustrate how lower pump operating speeds and two stage pump construction greatly extend the radial bearing life.

NOTE:

1. One (1) year life is based on 8740 HOURS (cont. operation).
2. Additional bearing information can be found on page 74.
3. Specific information on bearing life and shaft deflection can be obtained from the factory.

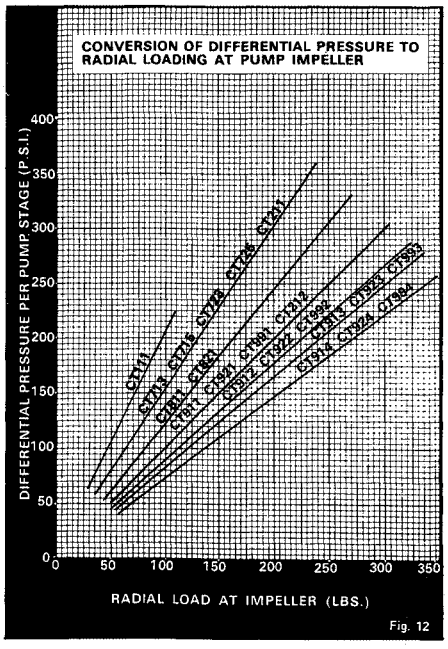


Fig. 12

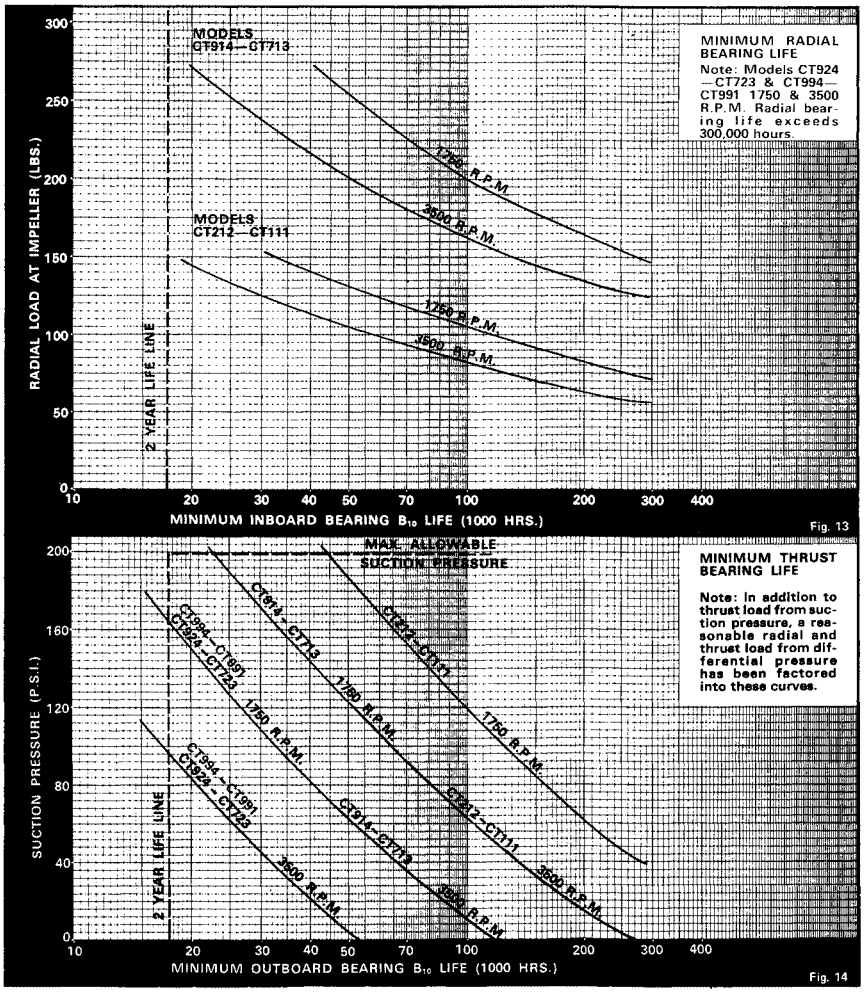


Fig. 13

Fig. 14

Maximum Case Working Pressure The case working pressure is the sum of the differential pressure and the suction pressure. Figures no. 1, 2 and 3 indicate the maximum case working pressure for the APCO-CHEM pump in various materials and at various operating temperatures. These maximum allowable pressures are based on wall thicknesses for the particular series of pumps and take into account the change in the tensile strength of the material at various allowable temps.

Example: A model 152 pump with a 316 stainless steel casing has been selected for operation at a case working pressure of 370 P.S.I.G. at 200° F. Enter chart (figure 2) for model 152 pumps, at 200° F. and read upward to 370 P.S.I.G. It is determined that the selection is within the recommended maximum case working pressure area and is therefore acceptable.

Note that the example exceeds the maximum case working pressure limits if the material selected would have been ductile iron or nickel.

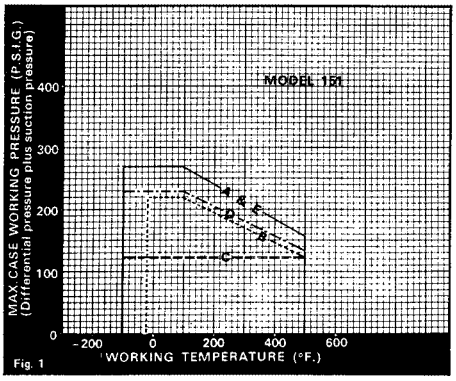


Fig. 1

Maximum Pressure—Temperature Flange Rating This chart illustrates that under certain temperature conditions standard flange pressure can be exceeded.

Note: 1. Ratings are for American Standard specifications (ASA 16.5) Steel or Nodular Iron Flanges.

Note: 2. The curves indicate flange ratings ONLY. Refer to Fig. 1, 2, & 3 for maximum allowable case working pressure.

A. Type 316 Stainless Steel, Hastelloy "B", Hastelloy "C" and no. 20 Ally.
B. Ductile Iron
C. Nickel
D. Monel
E. 304 Stainless Steel

Maximum hydrostatic pressure 1-1/2 times maximum case working pressure at 100° F.

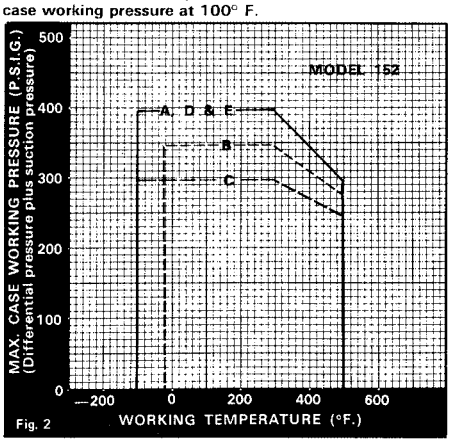


Fig. 2

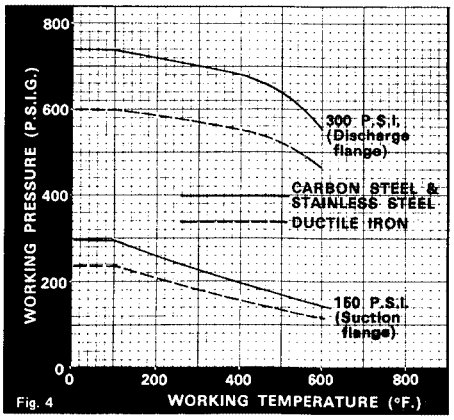


Fig. 4

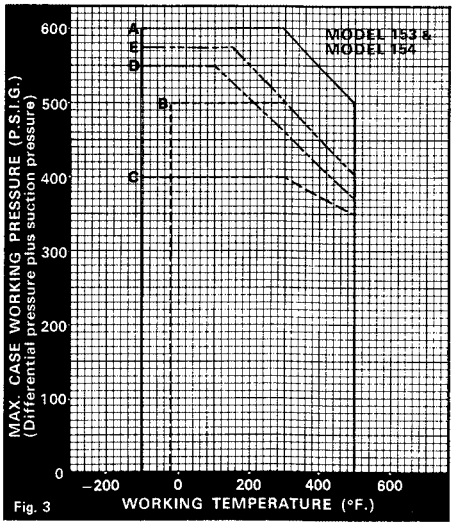


Fig. 3

NOTES:
1. Pumps with standard mechanical seals on continuous duty water applications MUST NOT exceed 180° F. without providing cooling at the stuffing box. Special seal face materials will increase this limit—refer to factory.
2. Pumps with packing on water applications MUST NOT exceed 250° F. without providing cooling at the stuffing box.
3. For temperatures above 300° F. in models 152 and 153, the centerline casing support is recommended.

Maximum Pump Operating Temperatures: Three factors are required to properly determine maximum temperature limitations.

1. Strength of Material High Temperature Limitations:

The high temperature on the casing and other pressure containing parts will cause a reduction in the ultimate strength of the metal. This has already been illustrated under limitations for maximum case working pressure and as was shown, temperatures to 500° F. are allowable with a decrease in case working pressure.

2. Stuffing Box High Temperature Limitations:

A. Mechanical Seal Limitations:

The materials normally used in mechanical seals are suitable for operation at temperatures in the range of 300° F. as long as a lubricating film remains between the seal faces. Many liquids will retain this property at high temperatures. The temperature limitation chart will indicate maximum allowable pump operating temperature at 300° F. without stuffing box cooling.

For Continuous Duty Water Applications, Stuffing Box Temperatures Cannot Exceed 180° F.

Other optional seal face materials will allow higher temperatures. For additional information, refer to the factory.

B. Packing Limitations: The limitations for packing are similar to those for mechanical seals except that temperatures to 250° F. can be tolerated for water applications before a water cooled stuffing box is required.

3. Ball Bearing Lubrication High Temperature Limitations: For longer bearing life, a frame cooling jacket should be provided at any pumping temperature exceeding 300° F.

Note: The following maximum temperature limitations and notes will apply to the majority of applications, however, for specific liquids and temperatures, refer to the factory.

MAXIMUM TEMPERATURE LIMITATIONS FOR PUMPED LIQUID

DESCRIPTION	PUMP SERIES 151	PUMP SERIES 152-3 & 4
Mechanical Seal—without stuffing box cooling (See Note 1).	300° F.	300° F.
Mechanical Seal—with water cooled stuffing box and water jacketed frame.	N/A	500° F.
Packing—without stuffing box cooling (See Note 2).	300° F.	300° F.
Packing—with water cooled stuffing box and jacketed frame.	N/A	500° F.

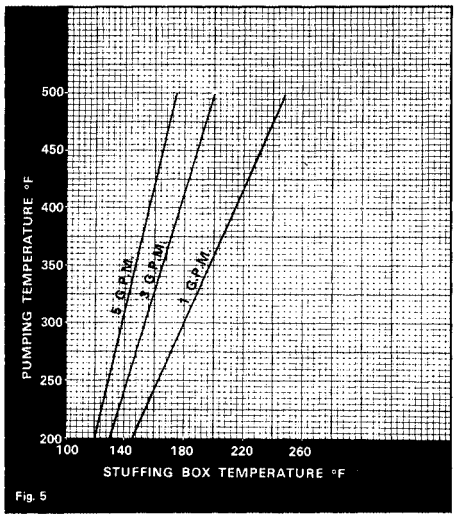


Fig. 5

Water Cooled Stuffing Box Stuffing Box temperature at various pumping temperatures and cooling rates.

Note:
Cooling water
80° F. at inlet.

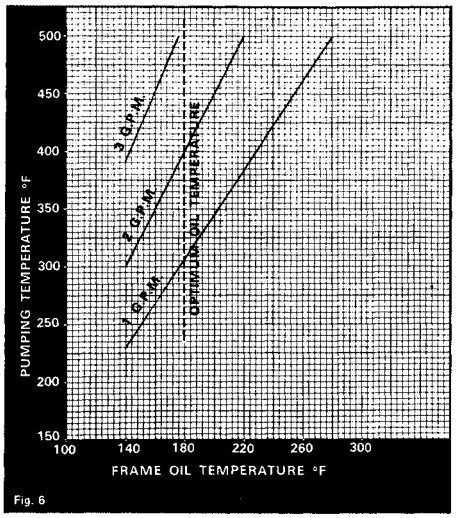


Fig. 6

Water Cooled Bearings Frame oil temperature at various pumping temperatures and cooling rates.

Note: 1. Cooling water 80° F. at inlet. 2. Values shown are typical, final temperature based on Stuffing Box cooling and ambient temperature.

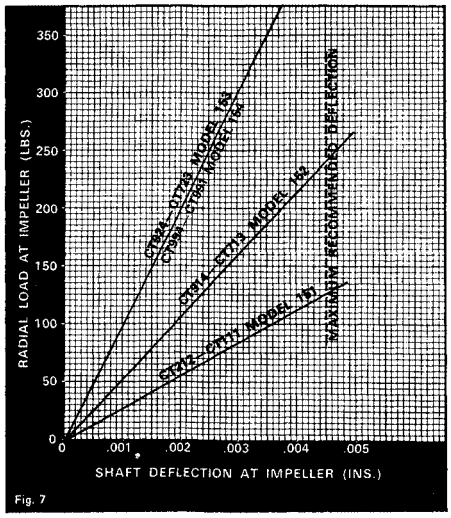


Fig. 7

Maximum Recommended Differential Head The differential head in a pump is the difference between the positive suction head and the discharge head. One effect of differential head is a radial load imposed on the impeller which deflects the shaft from its centerline. The following chart indicates the maximum recommended differential head in feet of liquid (specific gravity 1.0) which will produce a shaft deflection not exceeding .004" at the impeller and .002" at the seal faces. Where differential head does not indicate deflection problems, the maximum pump head is shown. Where specific gravity is less than 1, the allowable head in feet may be increased by the specific gravity correction.

MODEL	SIZE	MAXIMUM DIFFERENTIAL HEAD 3500 R.P.M. FEET*	P.S.I.	1750 R.P.M. FEET*	P.S.I.
151 SINGLE STAGE	CT111	500	215	125	55
	CT211	375	160	150	65
	CT212	250	110	150	65
152 SINGLE STAGE	CT713	800	345	300	130
	CT715	800	345	400	175
	CT811	700	300	400	175
	CT911	600	260	400	175
	CT912	525	225	400	175
	CT913	475	205	400	175
	CT914	425	185	400	175
153 TWO STAGE	CT723	1200	520	550	240
	CT725	1200	520	750	325
	CT821	1200	520	800	345
	CT921	1200	520	800	345
	CT922	1200	520	800	345
	CT923	1200	520	800	345
	CT924	1200	520	800	345
154 DUPLEX	CT991	1200	520	620	260
	CT992	1200	520	660	285
	CT993	1200	520	720	310
	CT994	1200	520	720	310

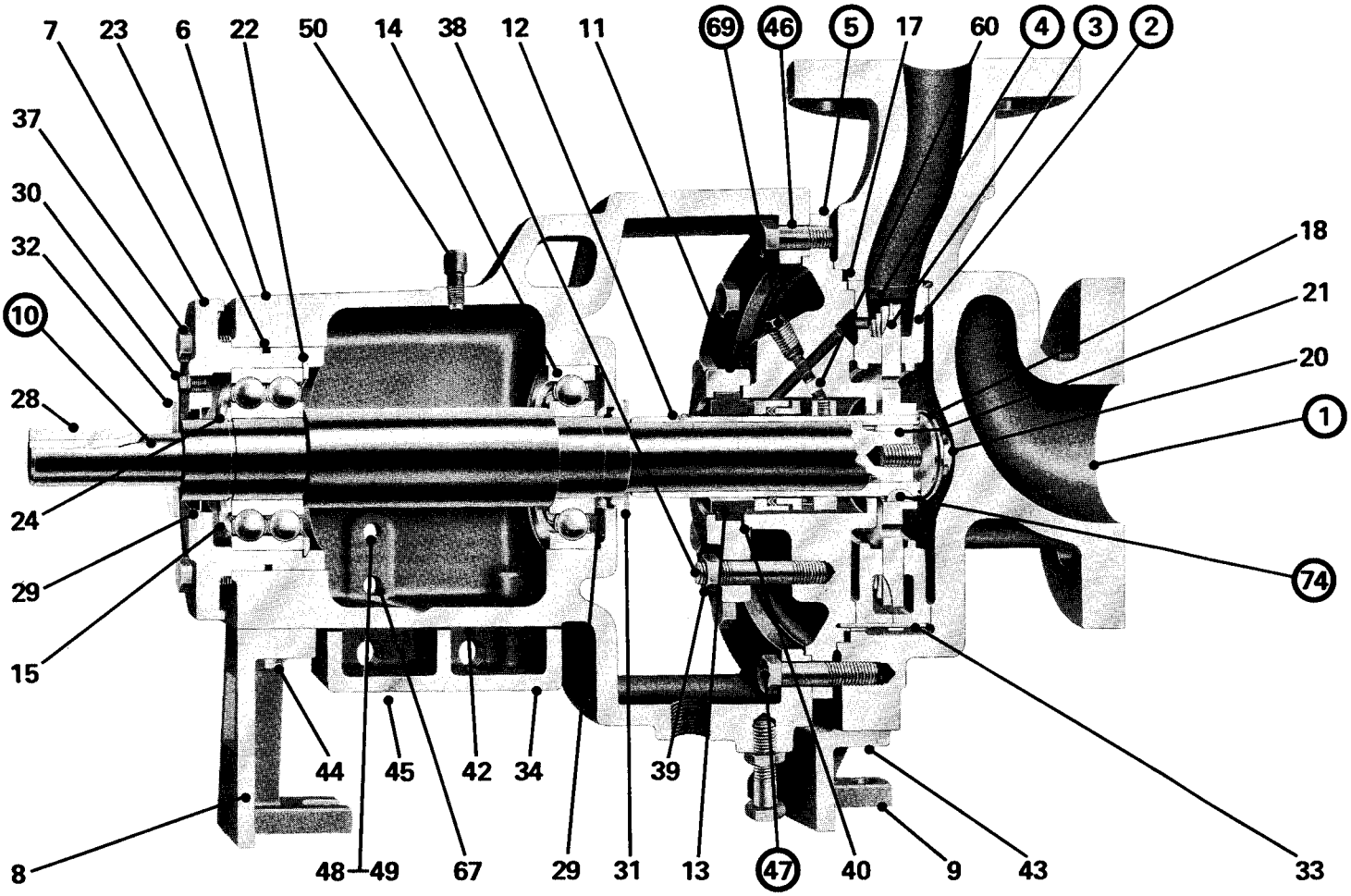
*specific gravity 1.0

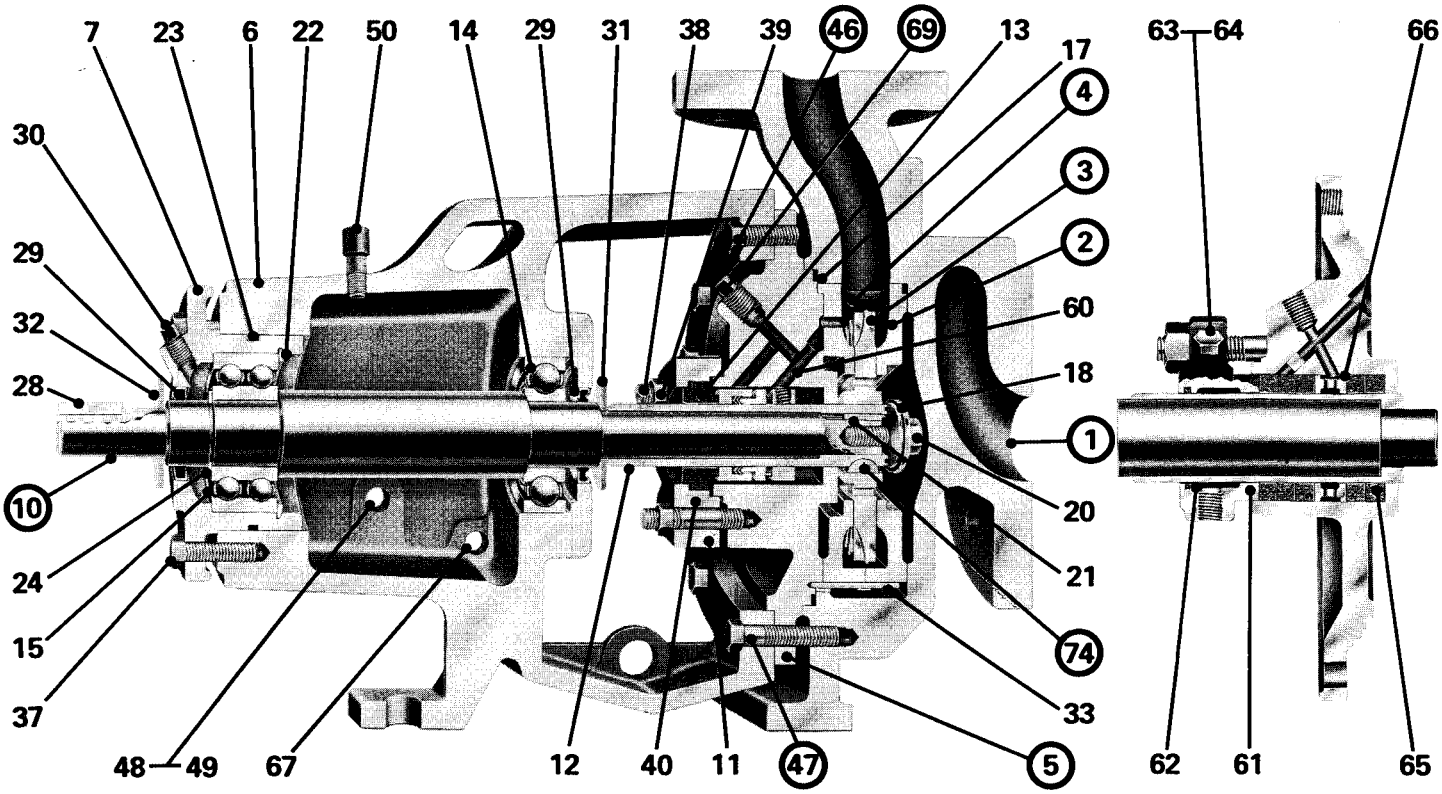
Shaft Deflection Is the consequence of the resultant hydraulic force acting inside the pump and on the impeller and shaft in a radial direction. The bending load tends to move the shaft from its centerline and is directly related to the differential pressure and the cross sectional area of the impeller. The radial load increases as the differential pressure increases and is maximum at shut off (zero capacity).

APCO-CHEM pumps are designed for a maximum deflection of .002" at the mechanical seal faces when operating at the maximum recommended differential pressure. The deflection at the impeller will not exceed .004".

Deflection in models 153 and 154 are minimized by opposing the two pump discharges by 180° and thereby nearly balancing the resultant forces acting on the shaft. Radial load at the impeller in pounds can be obtained from figure 12 on page 75.

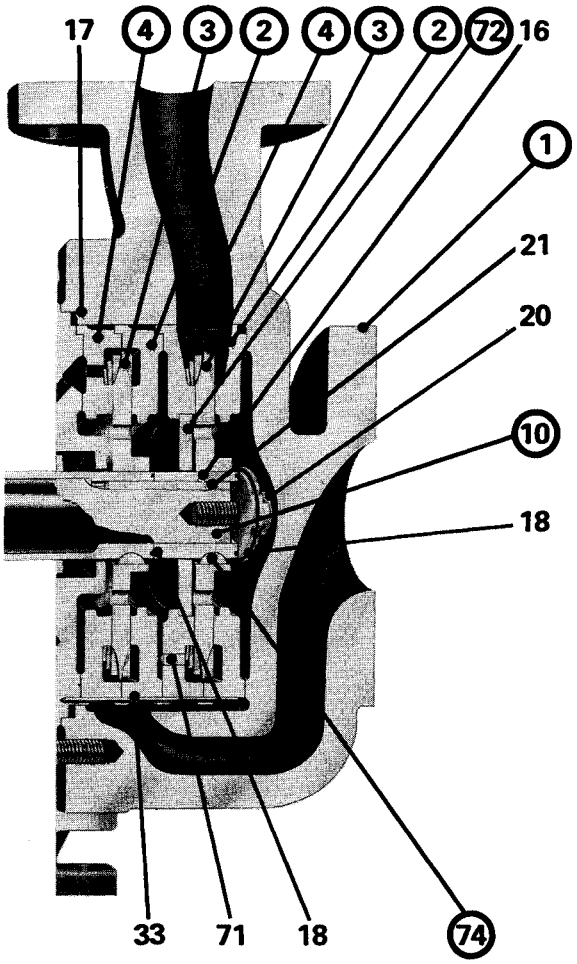
150 SERIES
PARTS LIST

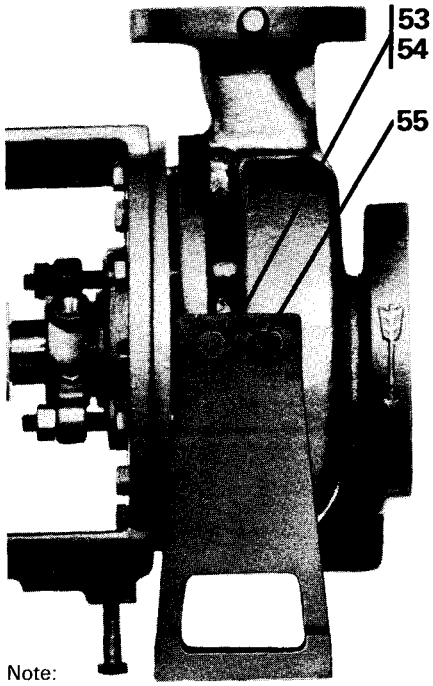




AURORA®
PENTAIR PUMP GROUP

ENGINEERING DATA
MATERIALS OF CONSTRUCTION





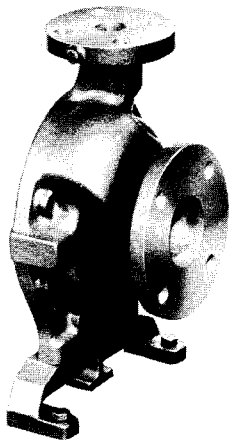
Note:
Complete material details can be found on pages 73 & 76. Piece numbers not shown 25, 26, 27, 41, 51, 52, 56, 57, 58, 59, 68 & 70.

STANDARAD PIECE NO.	NON-WETTED PARTS PART NAME AND DESCRIPTION	MATERIALS MATERIAL OF CONSTRUCTION
6	Frame	C.I.
7	Bearing Cartridge	C.I.
8	Bearing Frame Foot	C.I.
9	Casing Foot	C.I.
11	Seal Gland	316
12	Shaft Sleeve	316
13	Mechanical Seal	316
14	Ball Bearing—Inboard	Steel
15	Ball Bearing—Outboard	Steel
16	Sleeve Extension (2 Std.)	316
17	"O" Ring—Casing to Stuffing Box	Viton
18	"O" Ring—Sleeve to Impeller Screw	Viton
18	"O" Ring—Sleeve Extension to Sleeve	Viton
20	Retainer Screw	316
21	Sleeve Key	316
22	Retaining Ring—O.B. Brg. to Brg. Cart.	Steel
23	"O" Ring—Brg. Cart. to Frame	Buna-N
24	Retaining Ring—O.B. Brg. to Shaft	Steel
25	Alemite Fitting—Brg. Cart. (Grs. Lube)	Steel
26	Alemite Fitting—Frame (Grs. Lube)	Steel
27	Alemite Fitting—Brg. Cart. (Grs. Lube)	Steel
28	Coupling Key	Steel
29	Oil Seal	Buna-N
30	Pipe Plug—Inboard Bearing	Steel
31	Slinger—Inboard	Glass Filled Teflon
32	Slinger—Outboard	Glass Filled Teflon
33	Pin—Channel Ring Locating	316
34	Frame Cooling Jacket	C.I.
37	Capscrew—Brg. Cart. to Frame	Steel
38	Stud—Gland to Box	316
39	Nut—Gland Stud	316
40	Gasket—Seal Gland	Teflon
41	Drip Pan	316
42	Gasket—Frame Cooling Jacket	Fiber
43	Capscrew—Casing Foot	Steel
44	Capscrew—Frame Foot	Steel
45	Capscrew—Frame Cooling Jacket	Steel
48	Constant Level Oiler	Alloy
49	Nipple—Oiler to Frame	Steel
50	Breather	Steel
51	Nameplate	Stainless Steel
52	Screw—Nameplate	Steel
53	Casing Foot—R.H. CL Mount	C.I.
54	Casing Foot—L.H. CL Mount	C.I.
55	Capscrew—CL Foot to Casing	Steel
56	Pipe Plug—Seal Gland (Vent & Drain)	316
57	Throttle Bushing—Seal Gland—(Vent & Drain)	Graphitar
58	Seal Collar (Special Seals)	316
59	Setscrew—Seal Collar (Special Seals)	316
60	Pin—Internal Box Flush	316
61	Packing Gland	316
62	Gland Packing—Quench Throttle	Graphited Fiber
63	Capscrew—Packing Gland Halves	316
64	Nut—Packing Gland Halves	316
65	Packing—Stuffing Box	Graphited Fiber
66	Lantern Ring	Teflon
67	Pipe Plug—Frame Oil Drain	Steel
68	Capscrew—Double Seal Gland	316
70	Gasket—Seal Gland	Teflon
71	Pin—L.H. Chan. Ring (2 Stg.)	316

OPTIONAL	WETTED PARTS (CIRCLED)	MATERIALS
1	Casing	Ductile Iron (Std.)
2	Channel Ring—Right Hand	316
3	Impeller	304
4	Channel Ring—Left Hand	Hastelloy B
5	Stuffing Box—Std. & Water Cooled	Hastelloy C
10	Shaft	Monel
46	Capscrew—Frame	Nickel
47	Capscrew—Casing to Frame	Carpenter #20
69	Pipe Plug—Stuffing Box Lube External	The above listed materials are available for all wetted parts (Piece No's. 1,2,3,4,5,10 46,47,69,72,74).
72	Interstage Bushing (2 Stg.)	
74	Impeller Key	

TOP CENTERLINE DISCHARGE

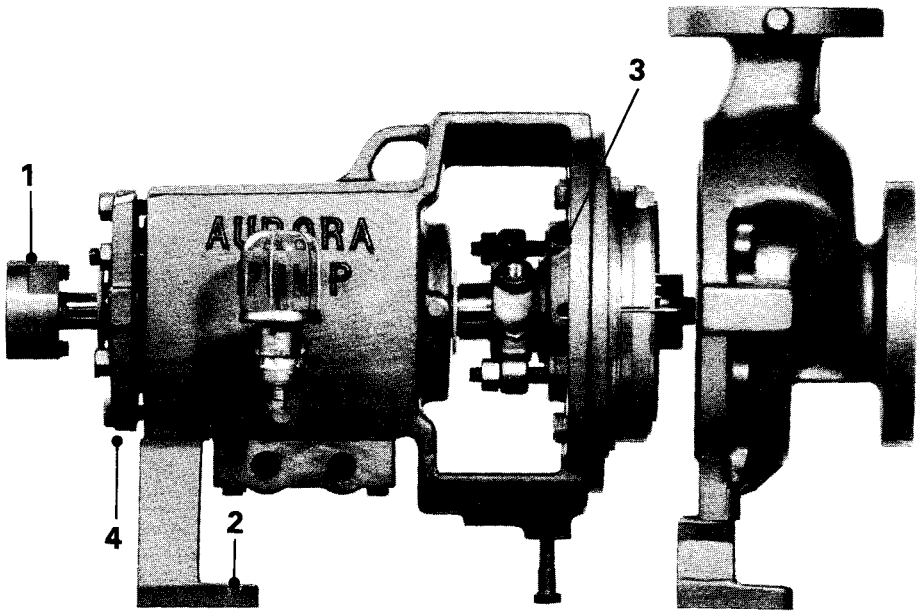
The top vertical discharge, back pull out, casing is self-venting and eliminates the need for opposed impeller rotation. Pipe stress associated with a tangential discharge position is also minimized. Center line mounting is available on model 152-53 & 4 casings. Center line mounting allows expansion on high temperature application. Discharge flanges are rated at 300 P.S.I. flat face and the suction flange at 150 P.S.I. flat face. Other types of flanges are optionally available up to 600 P.S.I. Heavy wall sections are designed for high pressure and long life and include 1/8" thickness for corrosion allowance.



BACK PULL OUT

Back pull out leaves the pump casing in line, allowing piping, insulation, gauges, etc. to remain undisturbed. Back pull out also allows alignment of the pump and driver to be maintained during disassembly. The spacer coupling insert can be dropped out, leaving sufficient space to allow the power frame, stuffing box and impeller assembly to be removed. Jack screw taps are provided to facilitate removal from the casing. The driver and conduit remain in place.

1. Remove capscrews from both coupling hubs and remove spacer insert.
2. Remove capscrews from frame support foot.
3. Remove eight casing capscrews.



STANDARD MECHANICAL SEAL
SINGLE INSIDE-UNBALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated in alternate designs.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

PRESSURES: Below atmospheric pressure up to approximately 200 P.S.I.

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a by-pass arrangement which permits either internal or external flushing to the mechanical seal faces.

TEMPERATURES: From minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

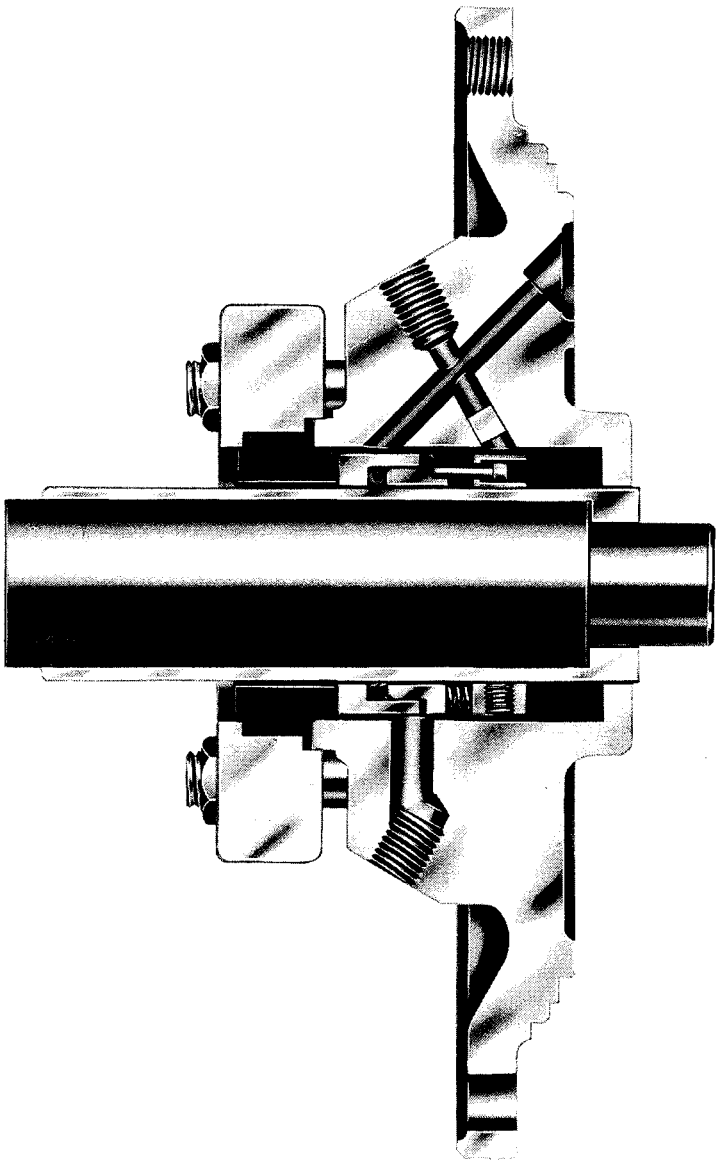
The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

LIQUIDS: With a specific gravity heavier than .6.

Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS:

1. Standard (illustrated)
2. Vent and drain with tapped openings
3. Vent, drain and cooled with tapped openings
4. Cooled with coolant tapped openings.



*DUPONT registered trademark

MECHANICAL SEAL
SINGLE INSIDE-BALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated in alternate designs.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

PRESSURES: Up to 600 P.S.I. (for pressures in excess of 600 P.S.I. please refer to the factory for recommendations).

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a bypass arrangement which permits either internal or external flushing to the mechanical seal faces.

TEMPERATURES: Minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

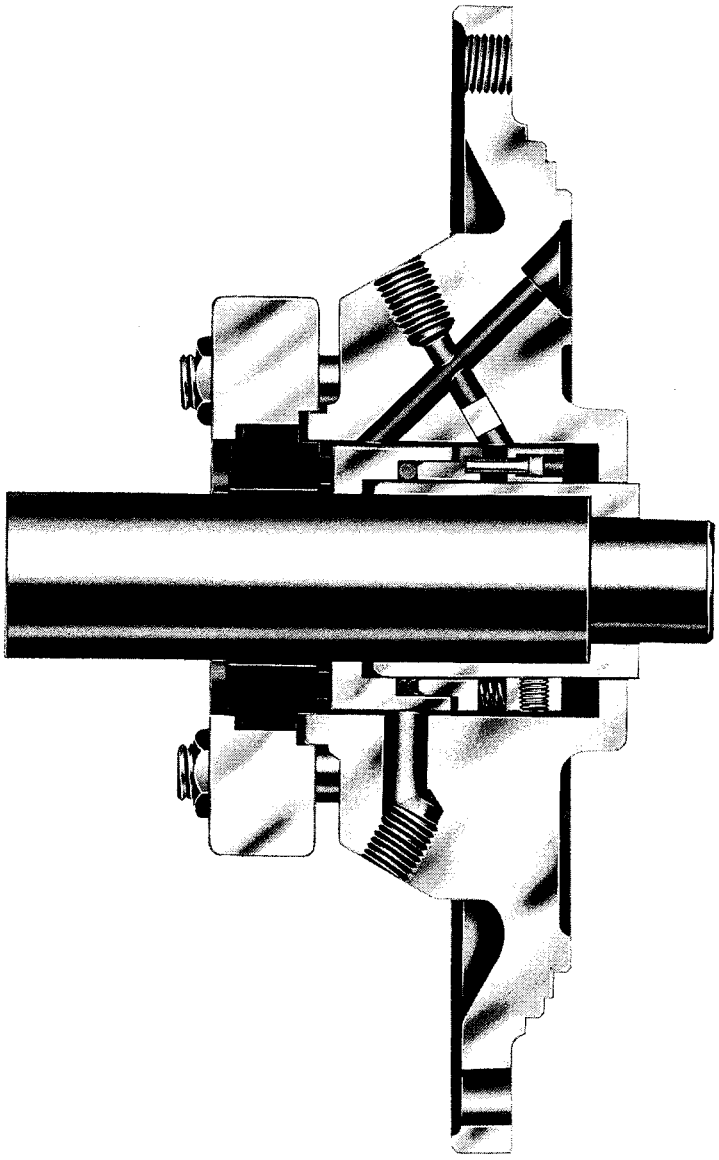
LIQUIDS: With a specific gravity of .6 or lighter.

Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS:
1. Standard (illustrated).
2. Vent and drain with tapped openings.
3. Vent, drain and cooled with tapped openings.
4. Cooled with coolant tapped openings.

NOTE: An alloy shaft will be furnished with this option.

*DUPONT REG. TRADEMARK



MECHANICAL SEAL
DOUBLE INSIDE-UNBALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

NOTE:
1. Double seals are only recommended when operating conditions are such that a single seal is not practical. Double seals provide a greater degree of safety in sealing hazardous and toxic fluids.
2. Double seal operation requires that a sealing fluid be circulated between both sealing faces at a pressure 10-20 P.S.I. greater than that of the pumped liquid at the stuffing box. The secondary liquid furnishes lubrication to the sealing faces and provides cooling.

PRESSURES: Below atmospheric pressure up to approximately 450 P.S.I. depending upon velocity and pressurizing liquid.

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a bypass arrangement which permits either internal or external flushing to the mechanical seal faces.

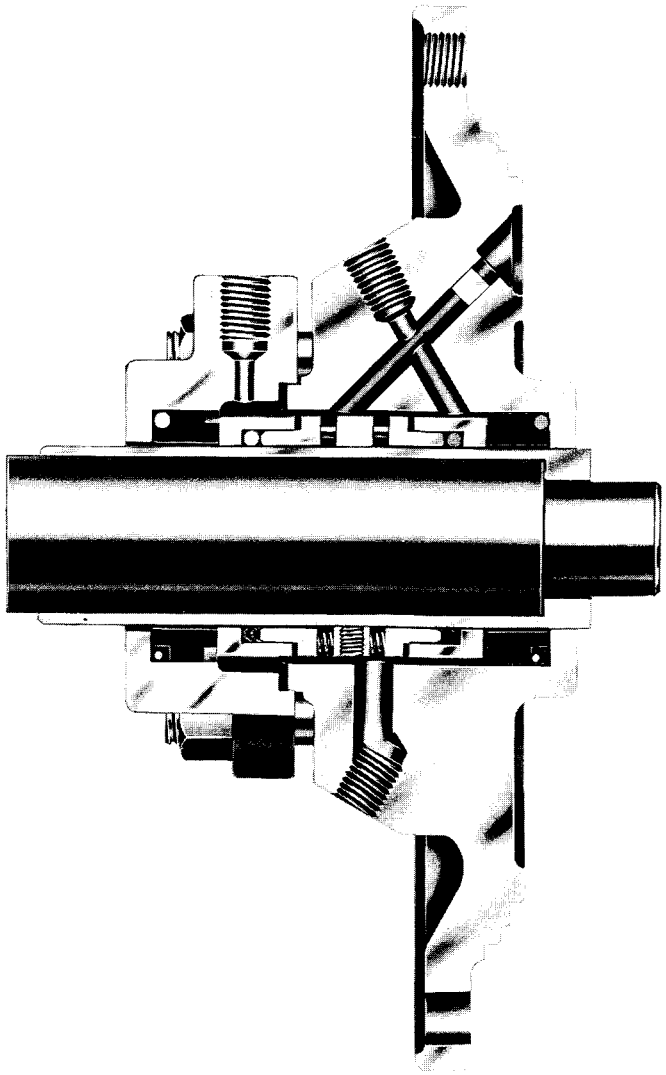
TEMPERATURES: From minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

LIQUIDS: With a specific gravity heavier than .6.

Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS: Standard with sealant tapped opening (illustrated).



*DUPONT REG. TRADEMARK

MECHANICAL SEAL
DOUBLE INSIDE-BALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

NOTE:

1. Double seals are only recommended when operating conditions are such that a single seal is not practical. Double seals provide a greater degree of safety in sealing hazardous and toxic fluids.
2. Double seal operation requires that a sealing fluid be circulated between both sealing faces at a pressure 10-20 P.S.I. greater than that of the pumped liquid at the stuffing box. The secondary liquid furnishes lubrication to the sealing faces and provides cooling.

PRESSURES: Up to 600 P.S.I. (for pressures in excess of 600 P.S.I., please refer to the factory for recommendations).

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a bypass arrangement which permits either internal or external flushing to the mechanical seal faces.

TEMPERATURES: Minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

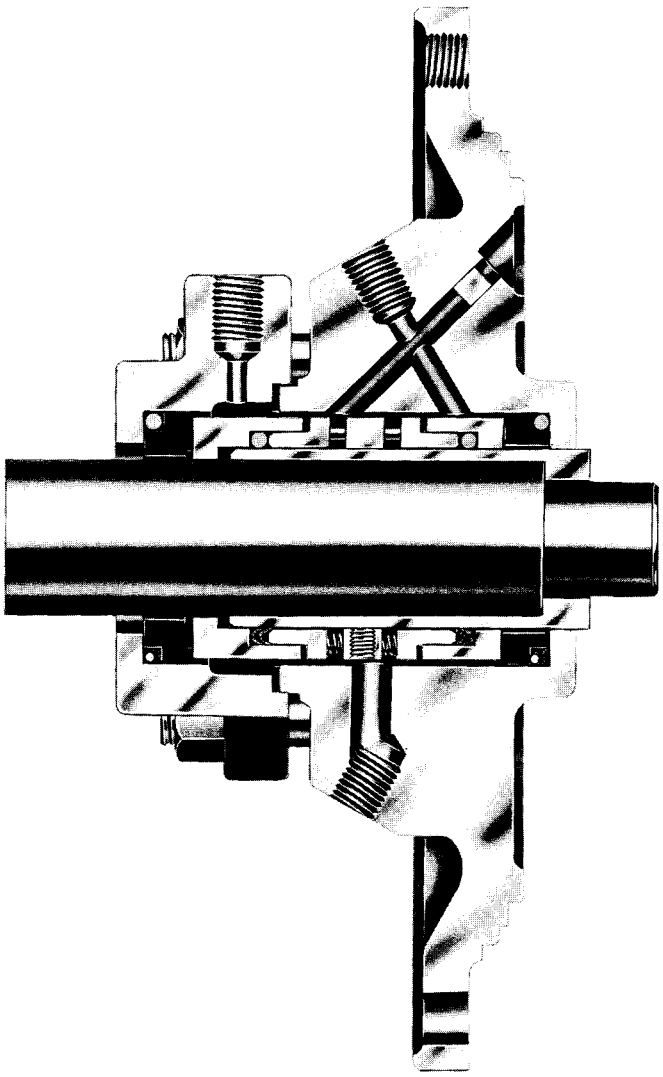
LIQUIDS: With a specific gravity of .6 or lighter. Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS: Standard with sealant tapped opening (illustrated).

NOTE:

1. An alloy shaft will be furnished with this option.
2. This seal option is not available for model 151 pumps.

*DUPONT REG. TRADEMARK



OPTION NO. 5
MECHANICAL SEAL
SINGLE OUTSIDE-BALANCED
TYPE APCO-CHEM PUMPS

Factory option seals are of high quality and supplied by leading mechanical seal manufacturers.

Seal faces are carbon vs. ceramic, with corrosion resistant alloy metal parts and TEFLON* secondary sealing elements. Various other materials are also available.

Gland plates are stainless steel and can be supplied as indicated in alternate designs.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

PRESSURES: Below atmospheric pressure up to 400 P.S.I.

The pressures referred to are those found at the pump discharge. Most seal manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a bypass arrangement which permits either internal or external flushing to the mechanical seal faces.

TEMPERATURES: From minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

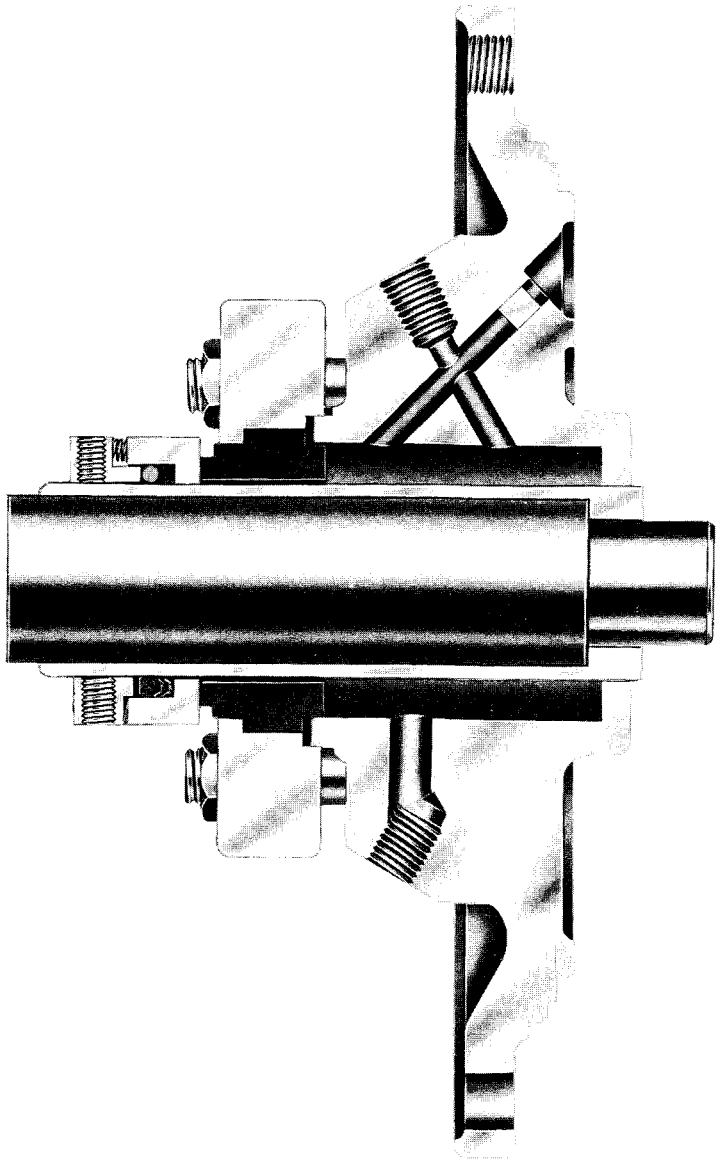
The temperature limitation of a mechanical seal is frequently determined by the shaft packing material. The various elastomer "O" ring materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 425°F.

LIQUIDS: With a specific gravity of .6 or lighter.

Due to varying degrees of resistance of various sealing compounds in different pumped liquids, the following mechanical seal shaft packings are available: BUNA-N, NEOPRENE, VITON, TEFLON* and other synthetic elastomers. All liquids except molten alkali metals and some fluorine compounds in the higher temperatures can be pumped.

SEAL GLANDS:

1. Standard (illustrated).
2. Cooled with coolant tapped openings.



*DUPONT REG. TRADEMARK

OPTION NO. 6
PACKING
TYPE APCO-CHEM PUMPS

Factory option die molded, diagonal cut packing rings are of high quality and supplied by leading manufacturers.

Packing rings are impregnated braided acrylic yarn. Various other materials are also available. Lantern rings are TEFLON* and diagonally cut for easy assembly.

Gland plates are stainless steel and can be supplied as indicated.

Recommendations and limitations are general. Specific selections can be offered only after rotating speeds, pressures, temperatures, type of equipment and liquid nature are known.

PRESSURES: Below atmospheric pressure up to approximately 150 P.S.I.

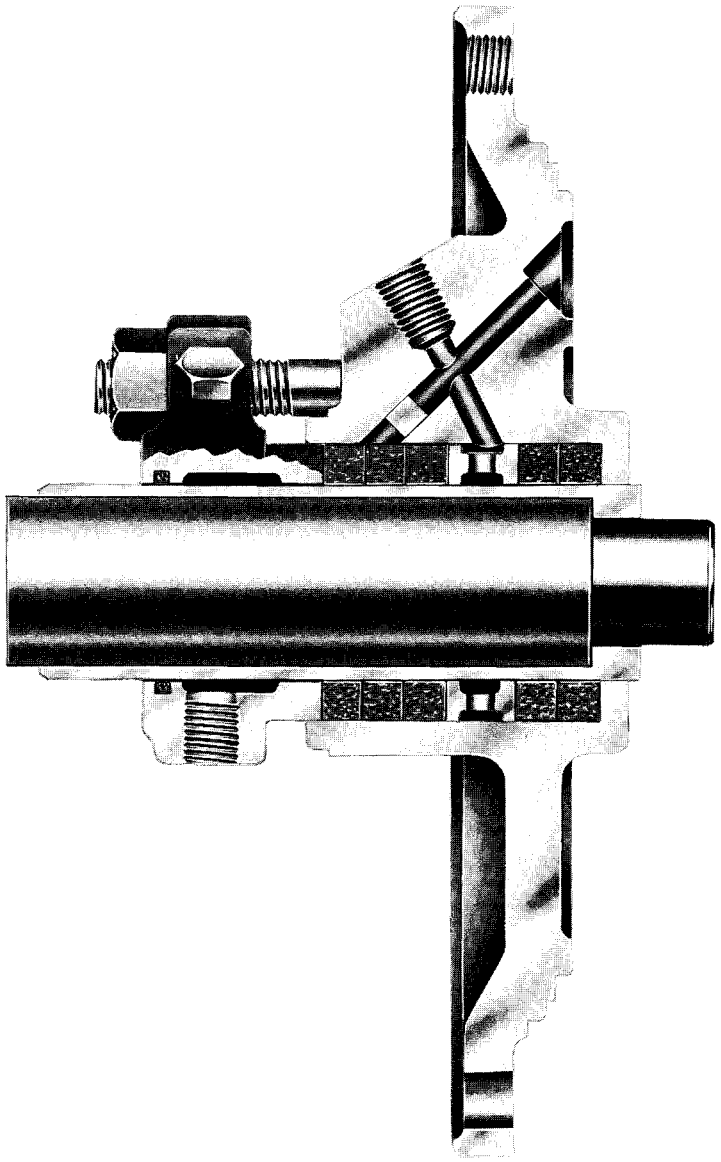
The pressures referred to are those found at the pump discharge. Most packing manufacturers recommend a flushing arrangement from the discharge to the stuffing box where "below atmospheric pressure" is encountered. The APCO-CHEM stuffing box incorporates a by-pass arrangement which permits either internal or external flushing to the lantern ring.

TEMPERATURES: From minus 100°F. up to 300°F. non-cooled and 500°F. cooled.

The temperature limitation of packing is frequently determined by the shaft packing material. The various materials have varying temperature limits, depending upon the chemical and/or physical properties of the process fluid. Filled TEFLON* shaft packings are available for temperatures up to 500°F.

LIQUIDS: All liquids that are compatible with white asbestos yarn. Other packings are available for special applications.

PACKING GLAND: Quench with coolant tapped openings (standard illustrated).
NOTE: Hardened stainless steel (450 minimum brinnel) shaft sleeves are furnished with this option.



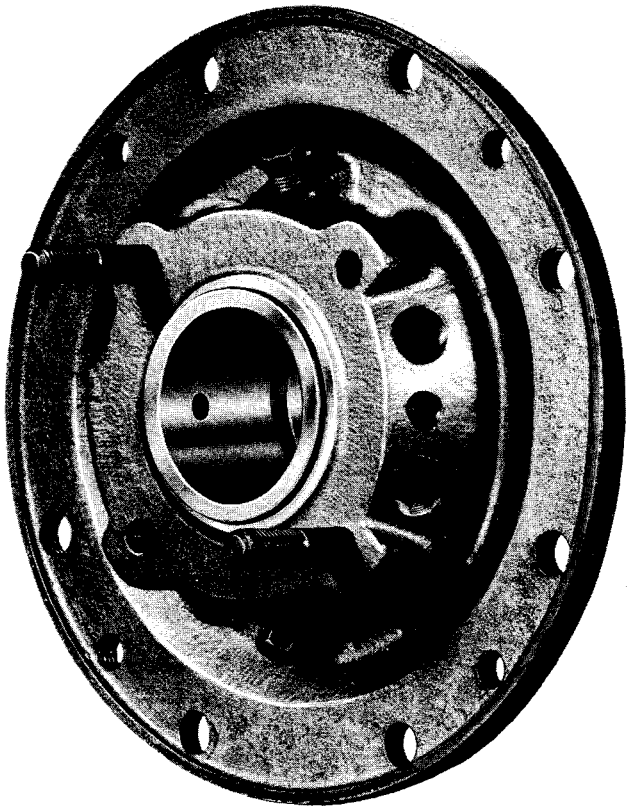
*DUPONT REG. TRADEMARK

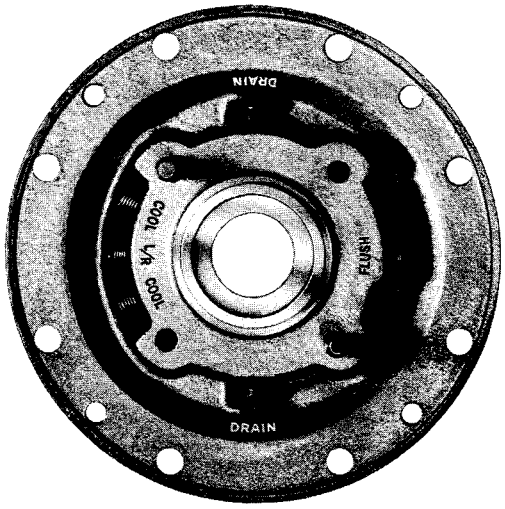
OPTION NO. 7
WATER COOLED STUFFING BOX
TYPE APCO-CHEM PUMPS

The water cooled stuffing box is interchangeable with the standard box and is required for high temperature applications.

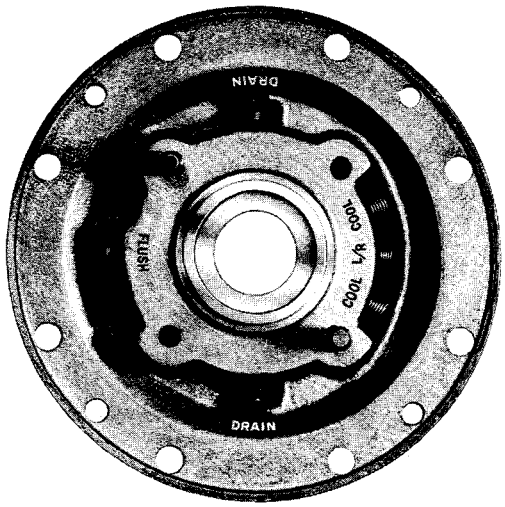
Stuffing box covers offer maximum interchangeability. One cover can be used for either mechanical seals or packing. The cover is a back pull out design and includes an integrally cast stuffing box. The cover is register aligned and securely clamped between the casing and the power frame with eight capscrews. Four additional capscrews lock the stuffing box cover to the power frame which allows the frame and cover assembly to be removed as a unit for maintenance purposes. Two of these capscrews (opposing) may be substituted with extra length capscrews to serve as jack screws to facilitate removal of the cover and frame assembly from the casing.

The covers are fully machined and the stuffing boxes are machine faced for seal or packing and include facilities for internal or external flushing or lubrication of mechanical seals or packing. One quarter (1/4") N.P.S.F. taps are provided for external flushing. Mechanical seal gland gaskets are TEFLON* and are completely confined. Water jacketing includes 1/2" N.P.S.F. inlet and outlet taps in the model 152, 153 and 154; and 3/8" N.P.S.F. taps in the model 151 pumps. The covers are completely interchangeable in the field for seals or packing and require only the necessary glands.





MODEL 151 & 152
SINGLE STAGE



MODEL 153 & 154
TWO STAGE

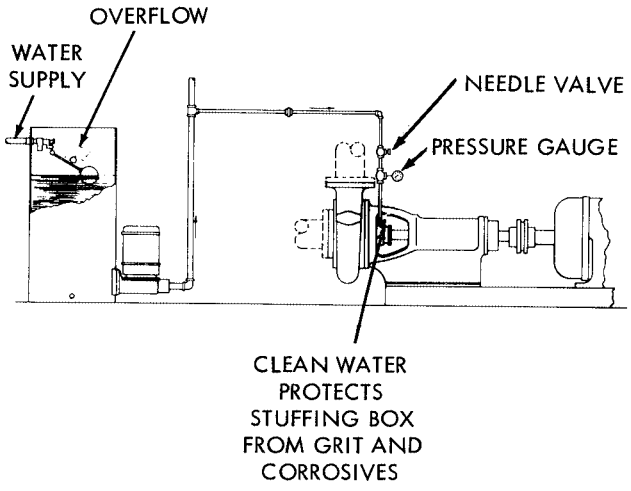
PIPING ORIENTATION ON APCO-CHEM PUMPS

*DUPONT REG. TRADEMARK

OPTION NO. 8
WATER SEAL UNITS
TYPE APCO-CHEM PUMPS

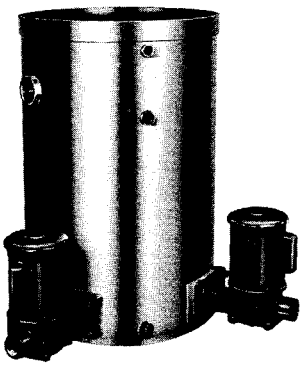
Water seal units are complete pumping systems used with, but independent of, larger industrial pumps. Their purpose is to pump clean water into the stuffing box or for wear ring flushing of pumps handling abrasive or corrosive materials. This provides clear water lubricating and flushing of mechanical seals, packing or wear ring faces. For complete details, see Bulletin 680.

TYPICAL INSTALLATION OF AN AURORA WATER SEAL UNIT

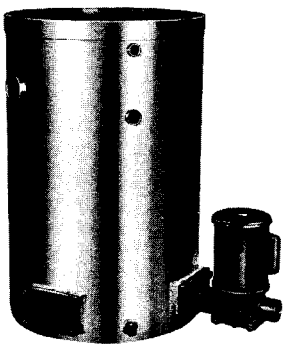


Water Seal Units are available in either a SIMPLEX (one pump) or DUPLEX (two pumps) configuration.

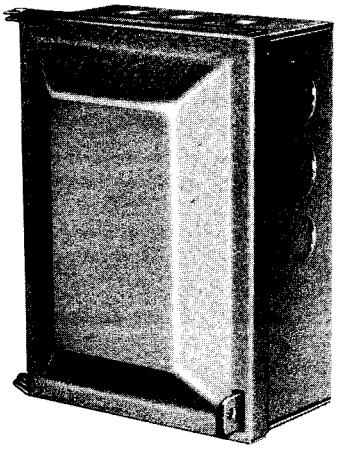
Duplex units extend pump life by alternating pump operation. An electric sequence changer is available to alternate the operation of the two pumps provided in the duplex system.



DUPLEX



SIMPLEX

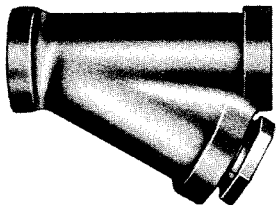


OPTION 8A

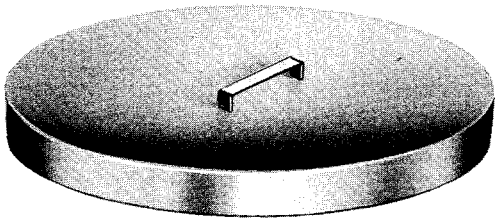
Sequence changer is available in Standard, Weatherproof, or Explosion Proof Enclosures 60/50 Cycle only, 230 volt Maximum.

OPTION 8B

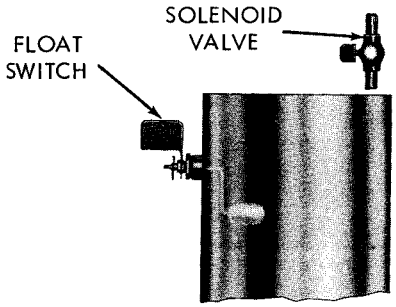
"Y" strainers are available for installation in the inlet pipe line.



OPTION 8C



A 24 gauge galvanized steel cover is available for covering the open top water seal receiver. A handle allows easy removal.



OPTION 8D

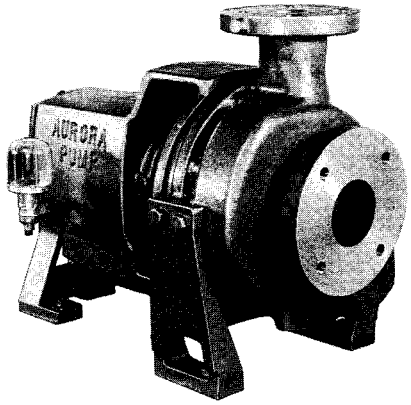
Specify this option when local codes require more than a 7" air gap between the incoming water supply and the tank overflow. As the water level drops in the receiver to a predetermined level the float switch activates the solenoid valve which in turn refills the receiver with fresh water. When the high water level is reached the float switch deactivates the solenoid valve, stopping the incoming water flow.

OPTION NO.'S 13 THRU 15
CENTERLINE MOUNT, DRIP CUP, AND W/J BEARING FRAME

TYPE APCO-CHEM PUMPS

OPTION 13

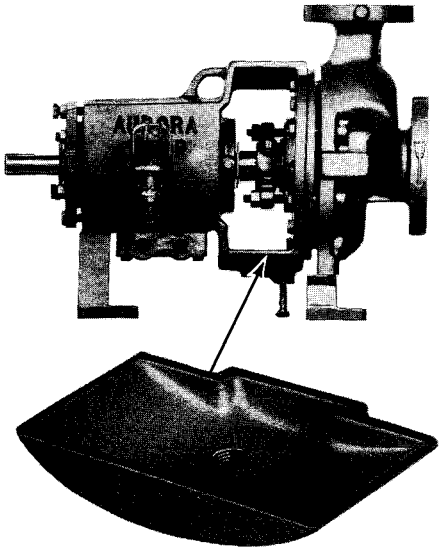
CENTERLINE MOUNTED CASING: Pump models 152, 153 and 154 are recommended for high operating temperatures (generally above 300°F.). This option allows for expansion in all directions from the horizontal ℄ of the shaft. The support does not affect the A.N.S.I. pump mounting dimensions.



OPTION 14

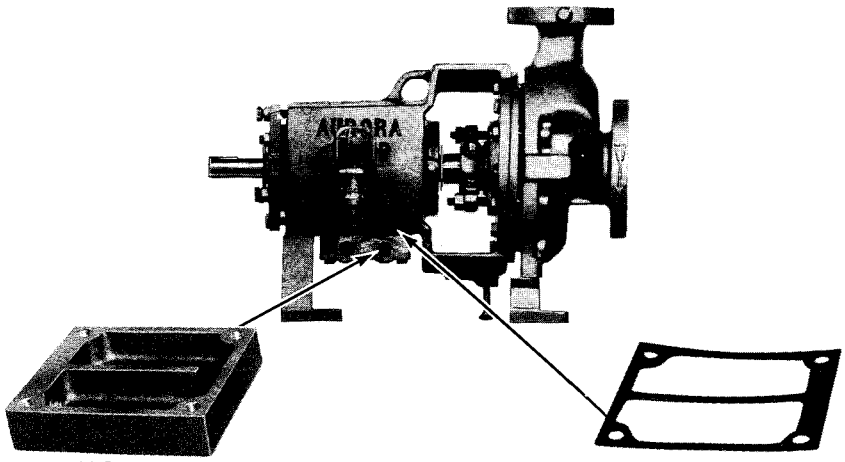
DRIP CUP: Prevents stuffing box leakage from corroding the bearing frame. Models 152, 153 and 154 have a 3/8" N.P.S.F. and model 151 a 1/4" N.P.S.F. pipe tap in the bottom of the cup for drain piping.

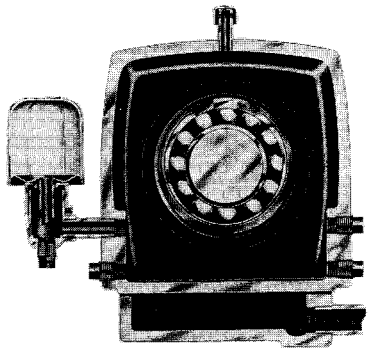
This option is furnished as standard on all model 152, 153 and 154 alloy pumps.



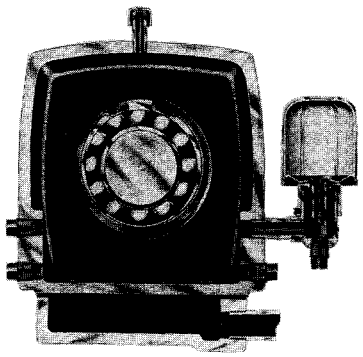
OPTION 15

WATER JACKETED BEARING FRAME: For operation over 300° F., a bolt on water jacket for easy inspection and cleaning, provides oil lubrication cooling for the power frame of models 152, 153 and 154, and should be specified. Actual limitations vary due to other considerations.

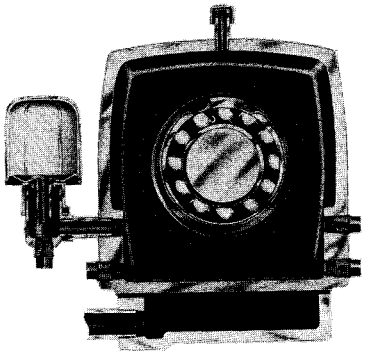




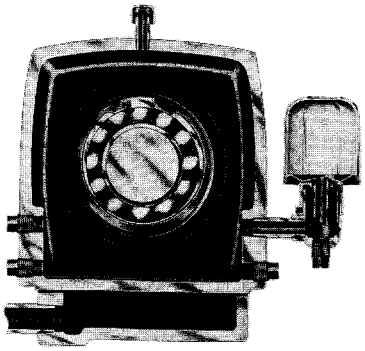
POSITION 1
OPTION 15A



POSITION 2
OPTION 15B



POSITION 3
STANDARD



POSITION 4
OPTION 15C

VARIOUS POWER FRAME PIPING AND LUBRICATION ARRANGEMENTS
(AS VIEWED FROM SUCTION FLANGE)

GAUGE AND DRAIN CONNECTIONS - FLANGES

TYPE APCO-CHEM PUMPS

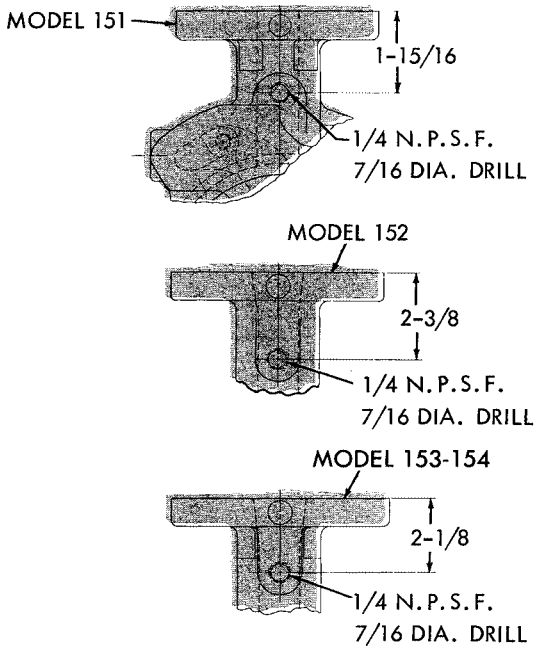
Conveniently located bosses are provided for optional gauge and drain taps.

The casing is not tapped as standard to provide maximum corrosion protection. Casing drain taps are furnished with 1/4 N.P.S.F. threads. Two stage model 153 pumps have provision for two (2) taps, one for each stage.

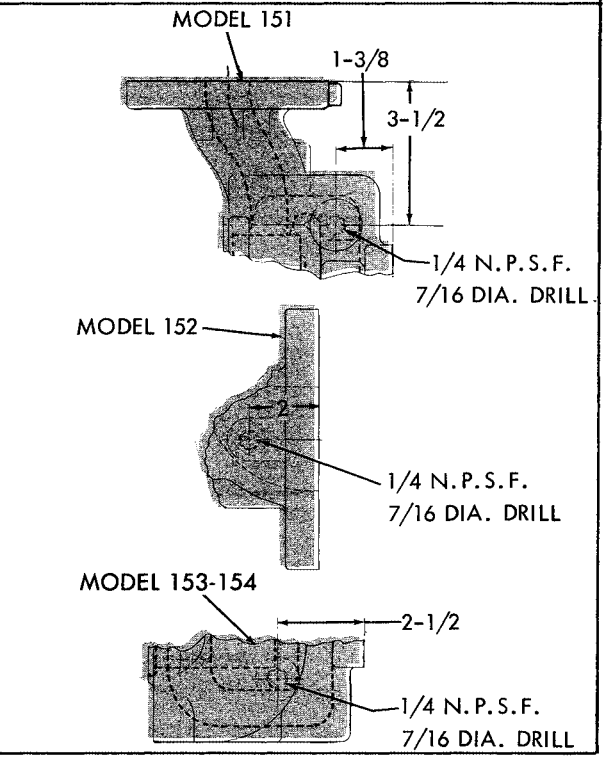
Gauge taps are standard 1/4" N.P.S.F.

OPTION NO. 16
NOZZLE GAUGE CONNECTIONS

DISCHARGE TAP
AS VIEWED FROM SUCTION



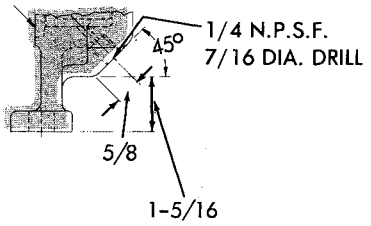
SUCTION TAP
AS VIEWED FROM SIDE



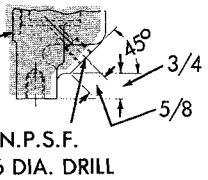
OPTION NO. 17

CASING DRAIN
1/4 N.P.S.F.

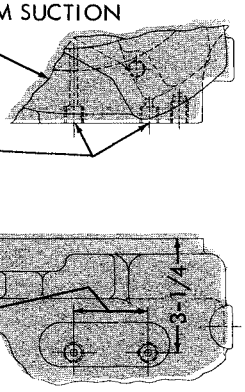
MODEL 151 - AS VIEWED FROM SIDE



MODEL 152
AS VIEWED FROM SIDE

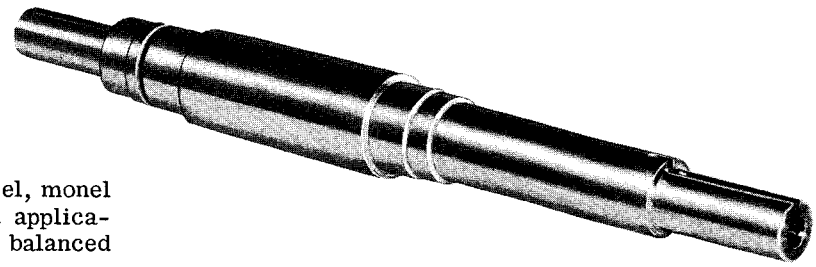


MODEL 153 - AS VIEWED FROM SUCTION



*DUPONT REG. TRADEMARK

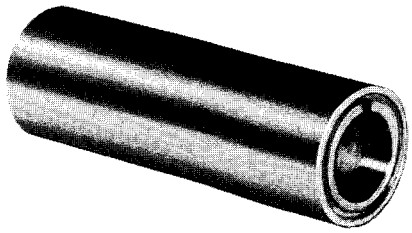
OPTION NO.'S 19 THRU 22
SHAFTS, SLEEVES, GREASE LUBE AND MOTORS
TYPE APCO-CHEM PUMPS



OPTION 19

Precision machined shafts of stainless steel, monel and other alloys are available for difficult application. Alloy shafts are required when inside balanced seals are specified.

OPTION 20



Shaft sleeves, machined to close tolerances are available for mechanical seals in various alloys. Stainless steel sleeves of 450 minimum brinell hardness are standard for packed pumps.

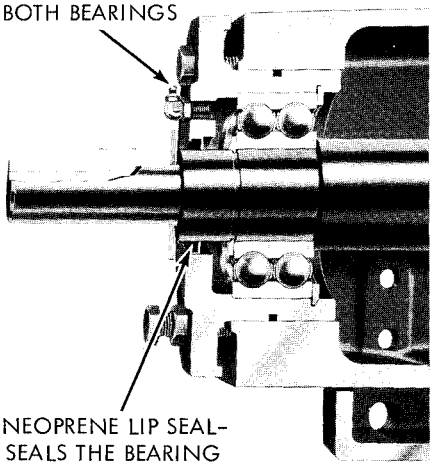
OPTION 22

The Aurora Apco-Chem pump can be provided with any driver. When specified an electric motor, of suitable horsepower, RPM, voltage, phase and enclosure characteristics will be furnished.

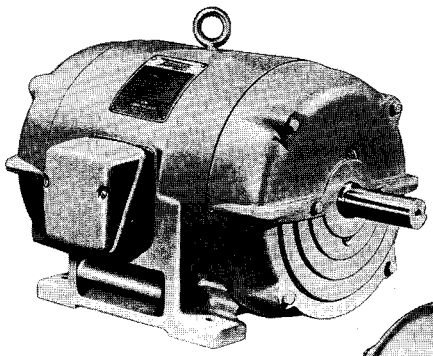
OPTION 21

GREASE LUBRICATION: Can be specified for specific applications.

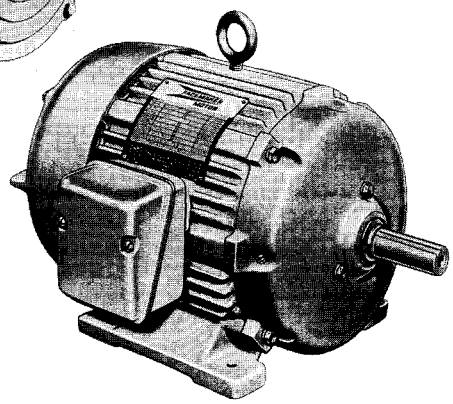
PIPE PLUG IS REPLACED BY A GREASE FITTING AT BOTH BEARINGS



NEOPRENE LIP SEAL-SEALS THE BEARING



OPEN DRIPPROOF ELECTRIC MOTOR

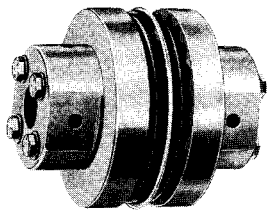


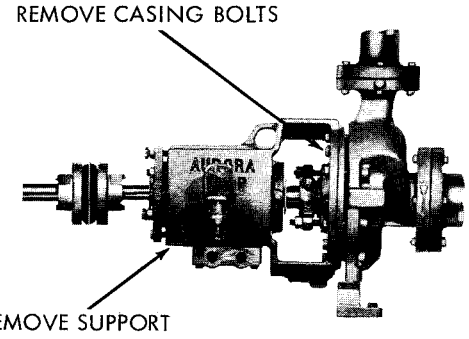
TOTALLY ENCLOSED OR EXPLOSION PROOF ELECTRIC MOTOR

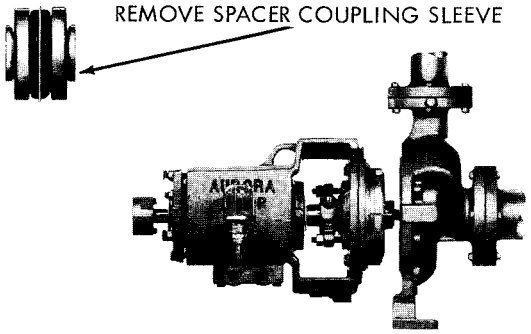
OPTION NO.'S 23 THRU 27
COUPLINGS, COUPLING GUARDS AND BASES
TYPE APCO-CHEM PUMPS

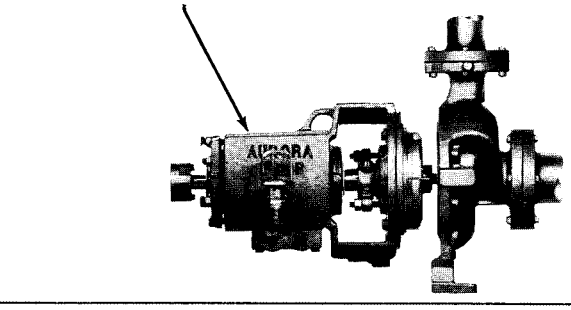
OPTION 23

SPACER COUPLINGS - are recommended for horizontal pump applications where it is desirable to remove the bearing assembly without disturbing the pump or motor. The ANSI Standard for chemical pumps specify spacer couplings. Aurora Pump will provide spacer couplings for complete pump units unless otherwise specified.





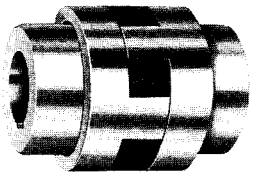


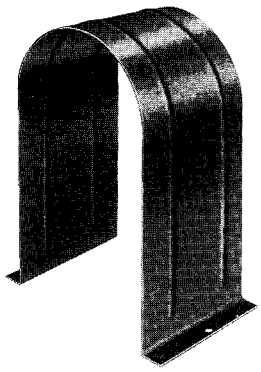


SUPPORT IS INTEGRALLY CAST ON MODEL 151 PUMPS

OPTION 24

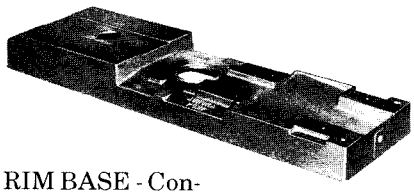
FLEXIBLE COUPLINGS - Factory selected couplings from leading manufacturers are available. Special couplings are also available. The motor must be moved to allow back pull out of the pump bearing assembly.





OPTION 25

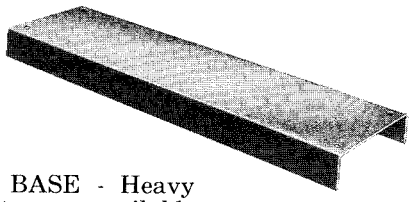
COUPLING GUARD - A formed steel coupling guard for rigid bolting to the base plate is standard. Non-sparking and special enclosed guards are optionally available.



OPTION 26

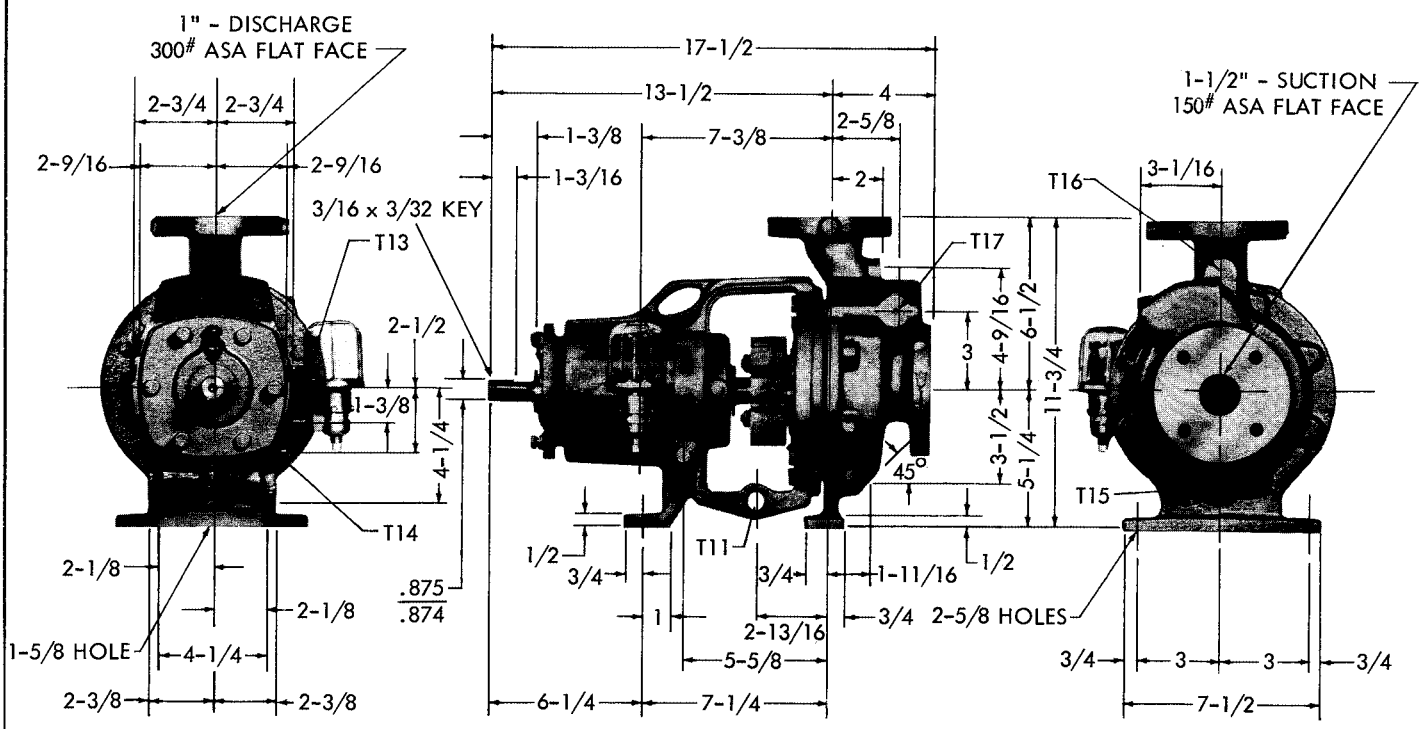
CAST IRON DRIP RIM BASE - Conform to all ANSI dimensions. Cast iron drip rim type base plates are designed to form a rigid mount for pump and motor. It has machined mounting pads for both the pump and motor and an integral tapered drip rim for condensation and stuffing box leakage.

A 1" pipe tap is provided for drain piping. Grouting holes are also provided.



OPTION 27

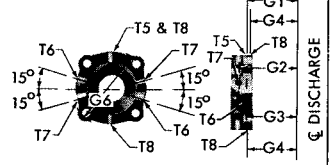
FORMED STEEL BASE - Heavy duty steel base plates are available and conform to all ANSI dimensions.

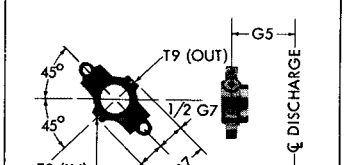


TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	2	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	1/4 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE

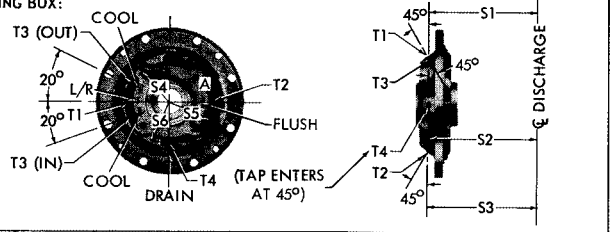
GLANDS:





G1	G2	G3	G4	G5	G6	G7
2-11/16	2-11/16	2-1/8	2-1/8	2-1/2	4	3

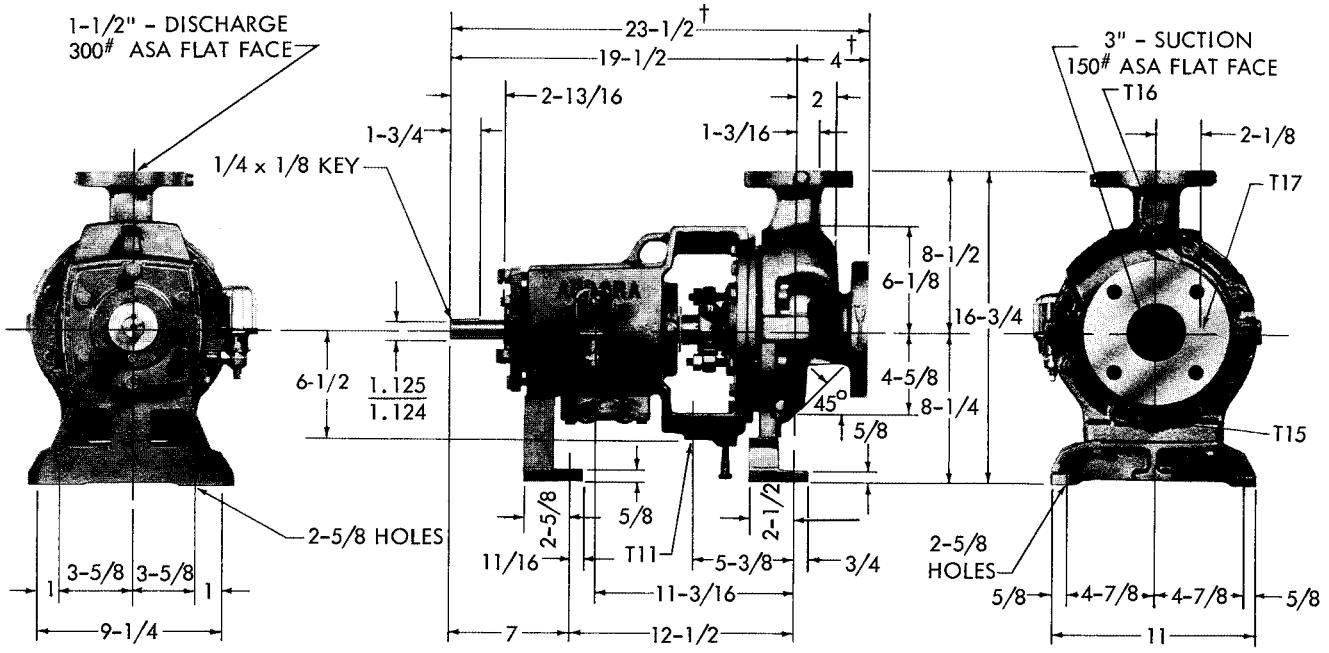
STUFFING BOX:



S1	S2	S3		S4	S5		S6
		STD	W/C		STD	W/C	
1-1/2	1-1/8	1-5/16	1-7/16	2-9/16	2-1/4	2-9/16	2-1/16

NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 STUFFING BOX
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
5 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

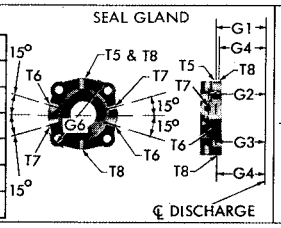
AURORA MODEL 152 PUMPS
PUMP ONLY
STANDARD FOOT MOUNTED CASING

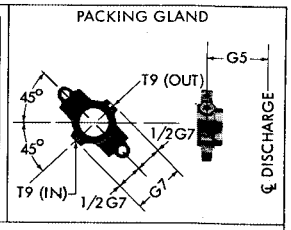


TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	1/2 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

GLANDS:

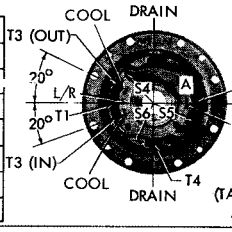
G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

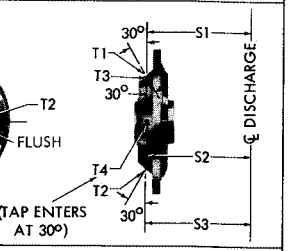




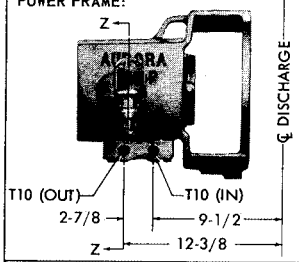
STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8

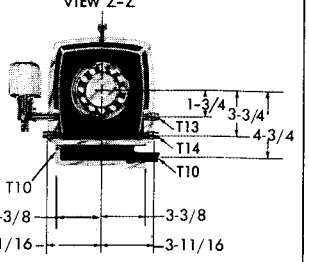




POWER FRAME:



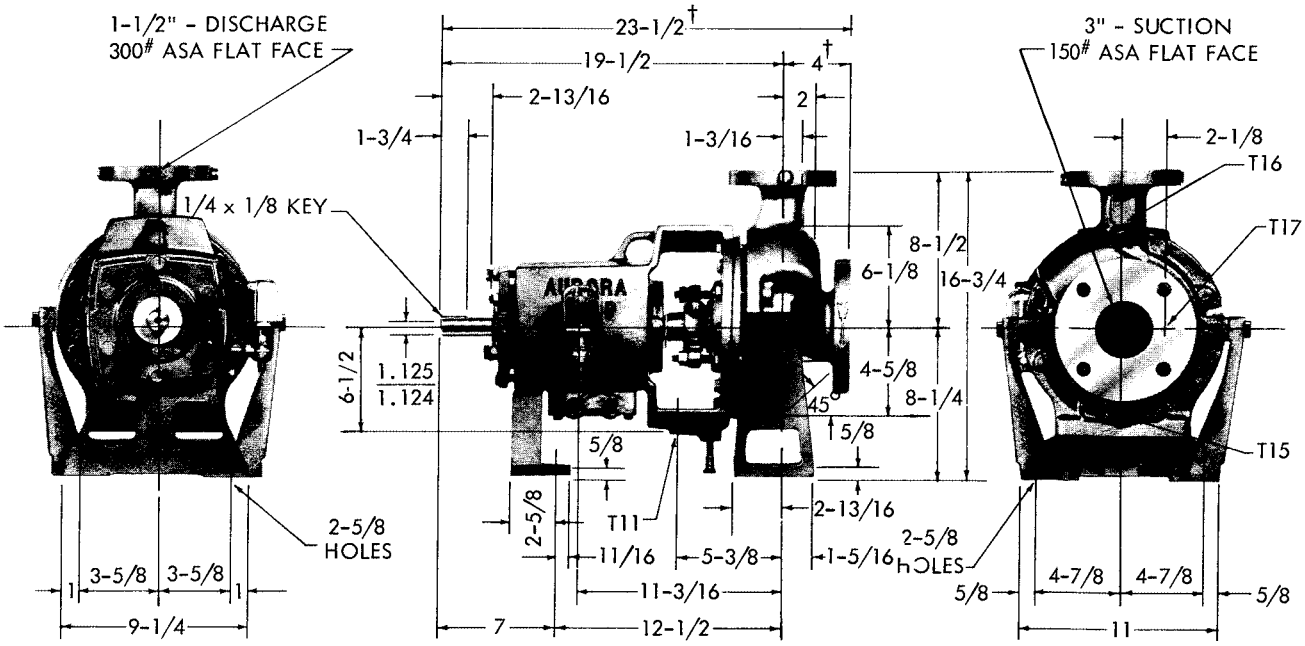
VIEW Z-Z



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 STUFFING BOX
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
5 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 3/16".

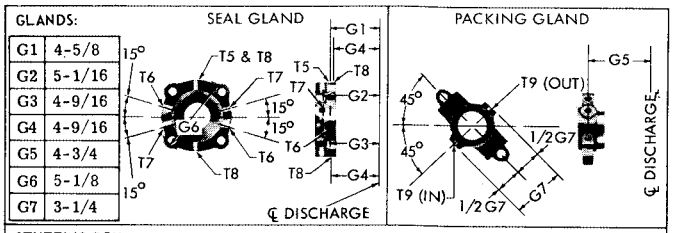
PUMP ONLY
OPTIONAL CENTERLINE MOUNTED CASING



TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

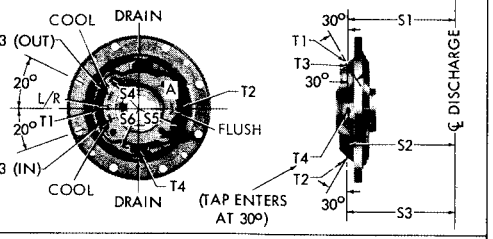
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

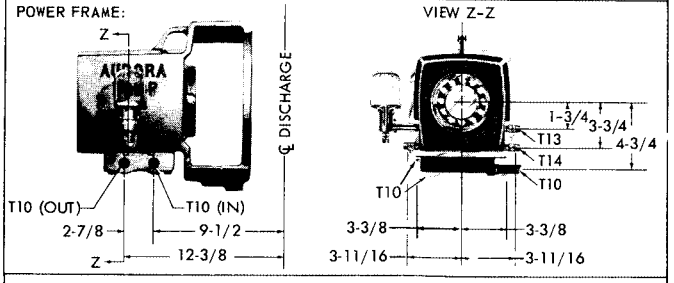


STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8



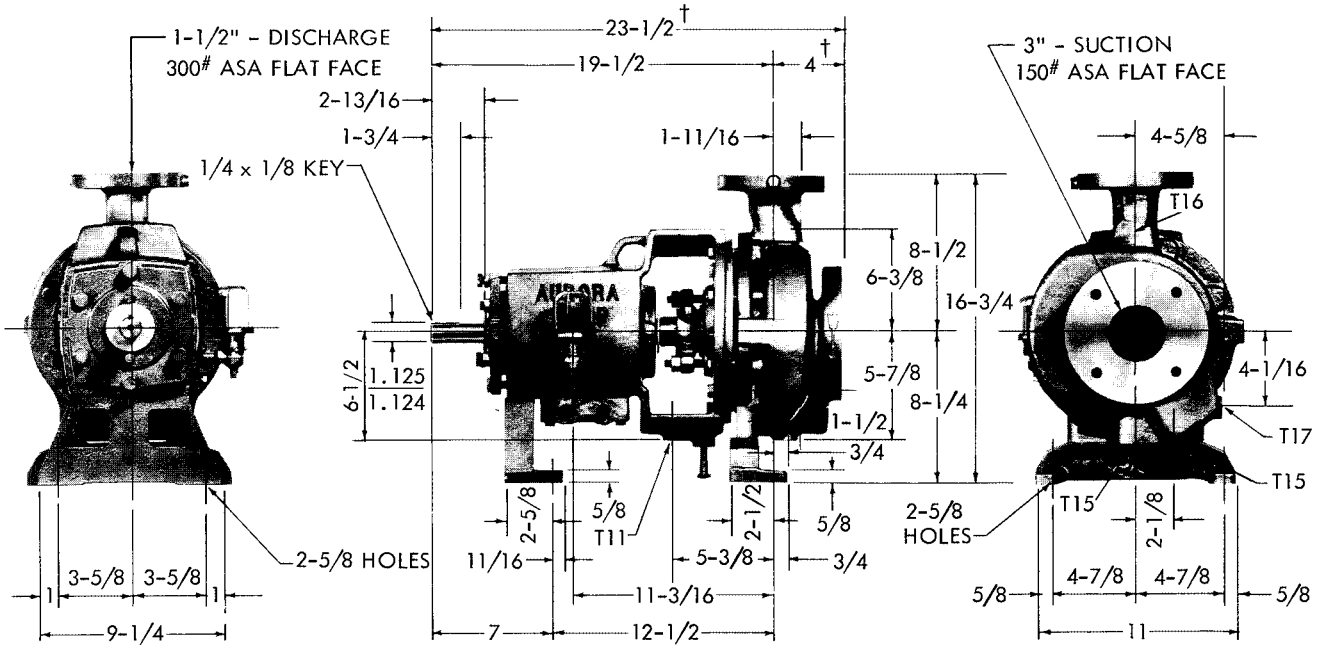
POWER FRAME:



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1, 8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 STUFFING BOX
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
5 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

* DIRECTLY OPPOSITE
** ONE (1) IN. ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 3/16".

AURORA MODEL 153 PUMPS
PUMP ONLY
STANDARD FOOT MOUNTED CASING

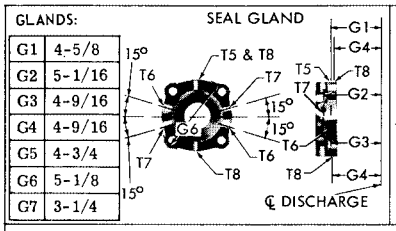


TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 13/16".

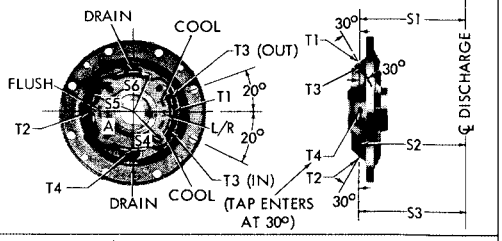
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

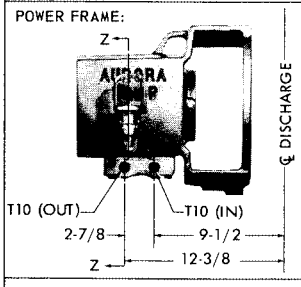


STUFFING BOX:

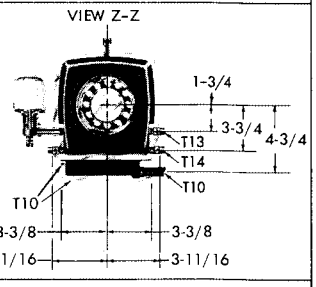
S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8



POWER FRAME:

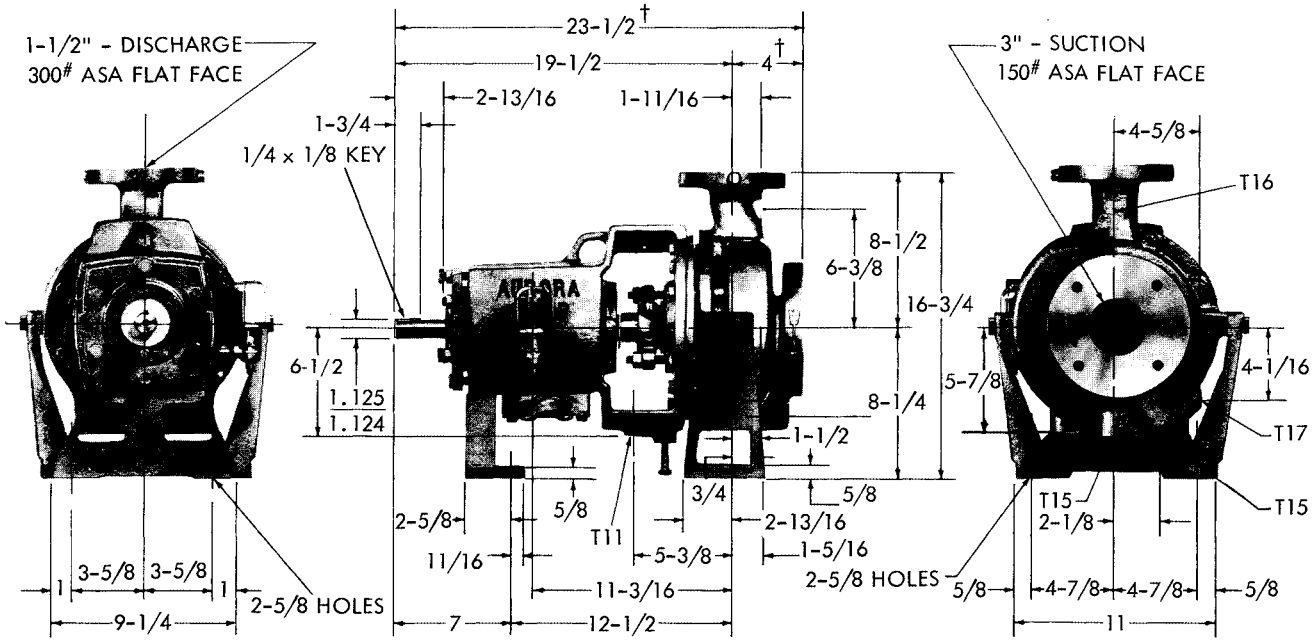


VIEW Z-Z



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 STUFFING BOX
A. W.C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W.C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
5 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

PUMP ONLY
OPTIONAL CENTERLINE MOUNTED CASING

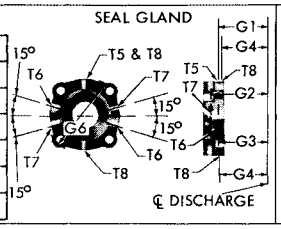


TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 13/16".

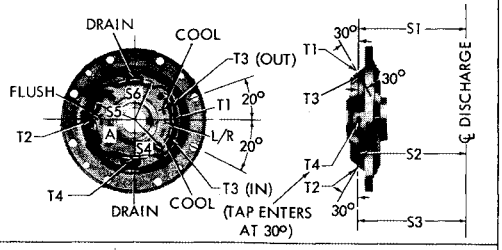
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

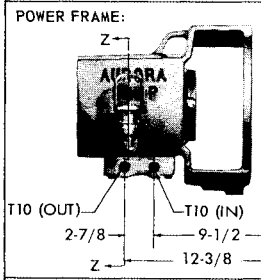


STUFFING BOX:

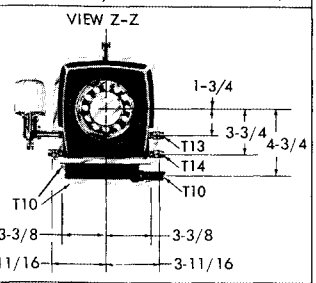
S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8



POWER FRAME:



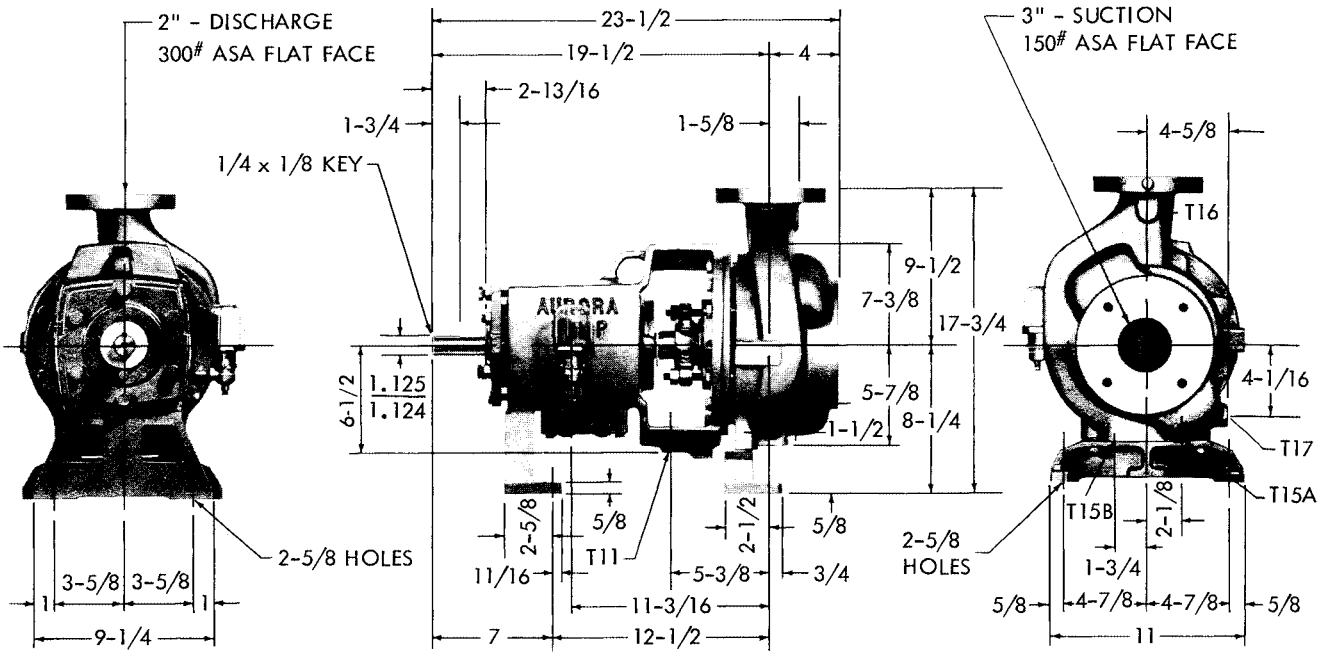
VIEW Z-Z



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 STUFFING BOX
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
5 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 154 PUMPS

PUMP ONLY
STANDARD FOOT MOUNTED CASING

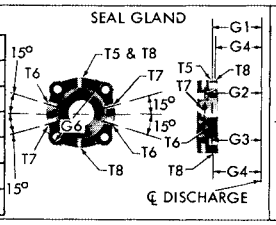


TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)

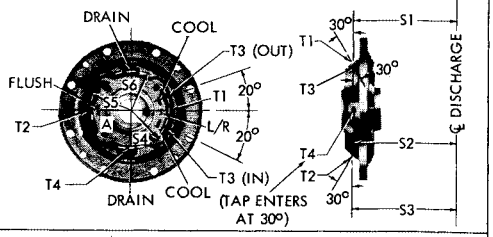
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

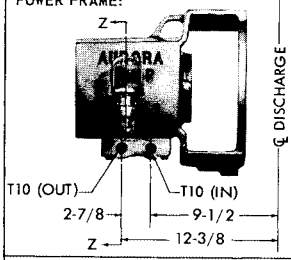


STUFFING BOX:

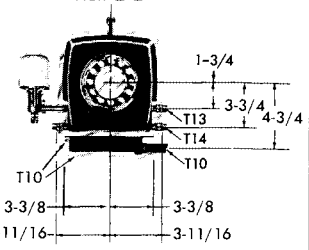
S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8



POWER FRAME:

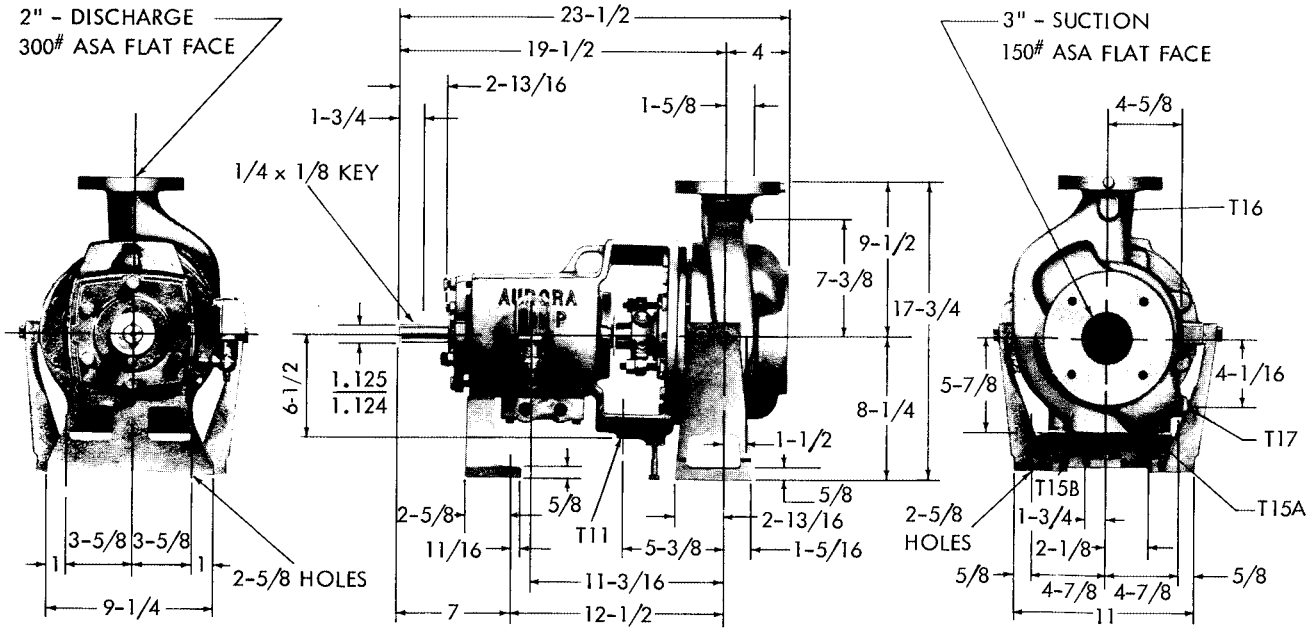


VIEW Z-Z



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 STUFFING BOX
A. W,C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W, C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
5 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

PUMP ONLY
OPTIONAL CENTERLINE MOUNTED CASING

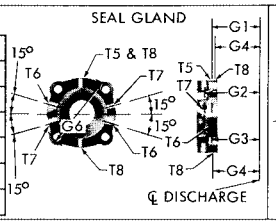


TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)

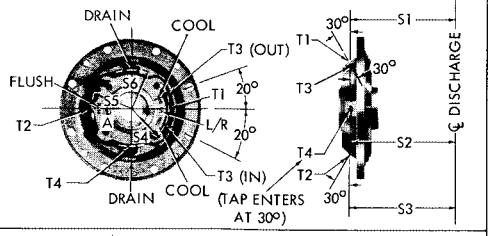
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

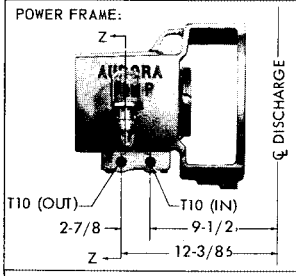


STUFFING BOX:

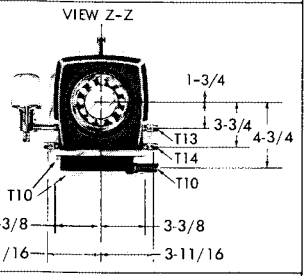
S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8



POWER FRAME:

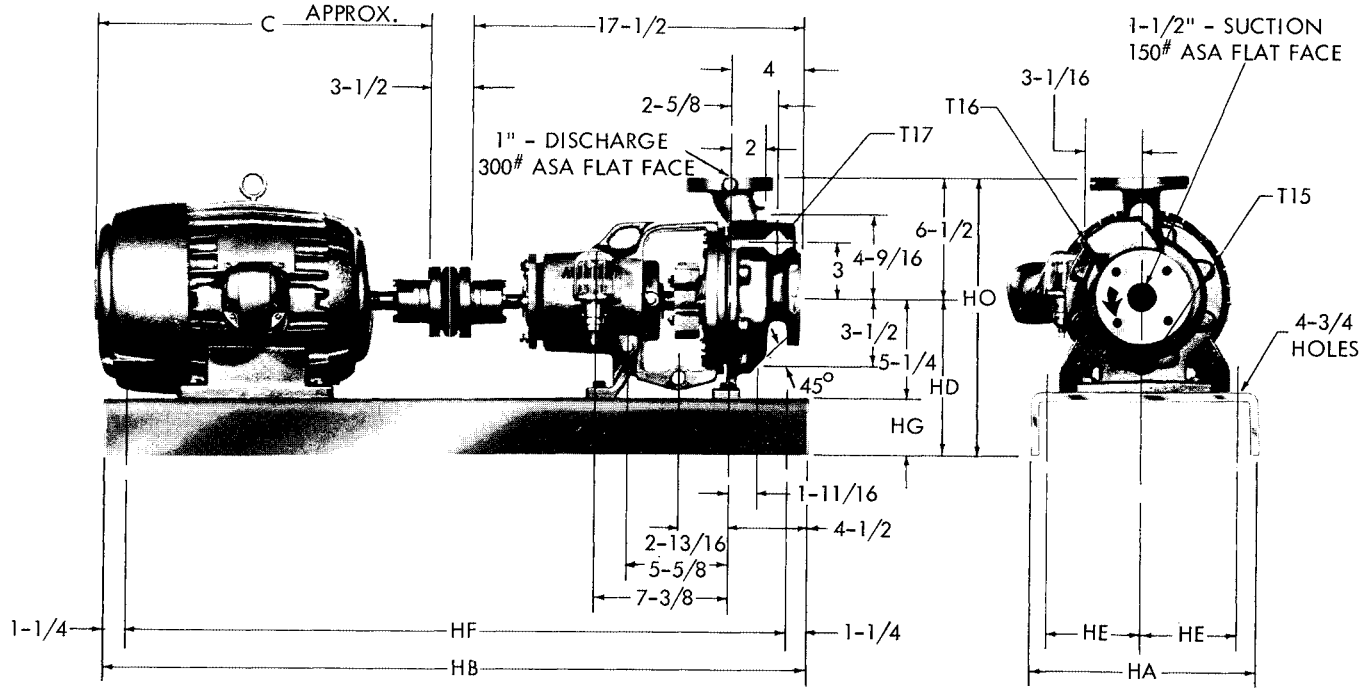


VIEW Z-Z



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 STUFFING BOX
A. W.C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W. C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
5 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 151 PUMPS
ON FORMED STEEL BASE
STANDARD FOOT MOUNTED CASING



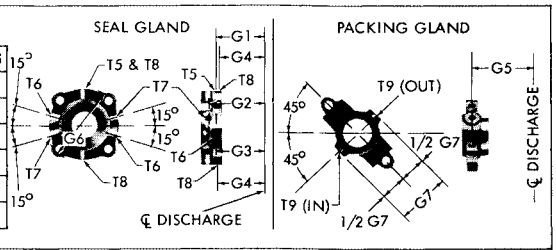
MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HO	AVS BASE PLATE DESIGNATION
143T	12								
145T	13	10	35	8-1/4	4	32-1/2	3	14-3/4	1T
182T	13								
184T	14								
213T	16	12	39	8-1/2	4-1/2	36-1/2	3-1/4	15	2T
215T	18								

TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	2	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	1/4 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE

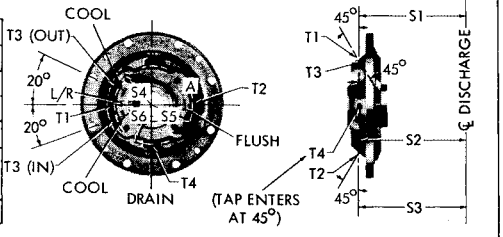
GLANDS:

G1	2-11/16
G2	2-11/16
G3	2-1/8
G4	2-1/8
G5	2-1/2
G6	4
G7	3

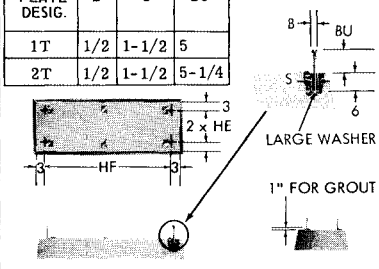


STUFFING BOX:

S1		1-1/2
S2		1-1/8
S3	STD.	1-5/16
	W/C	1-7/16
S4		2-9/16
S5	STD.	2-1/4
	W/C	2-9/16
S6		2-1/16

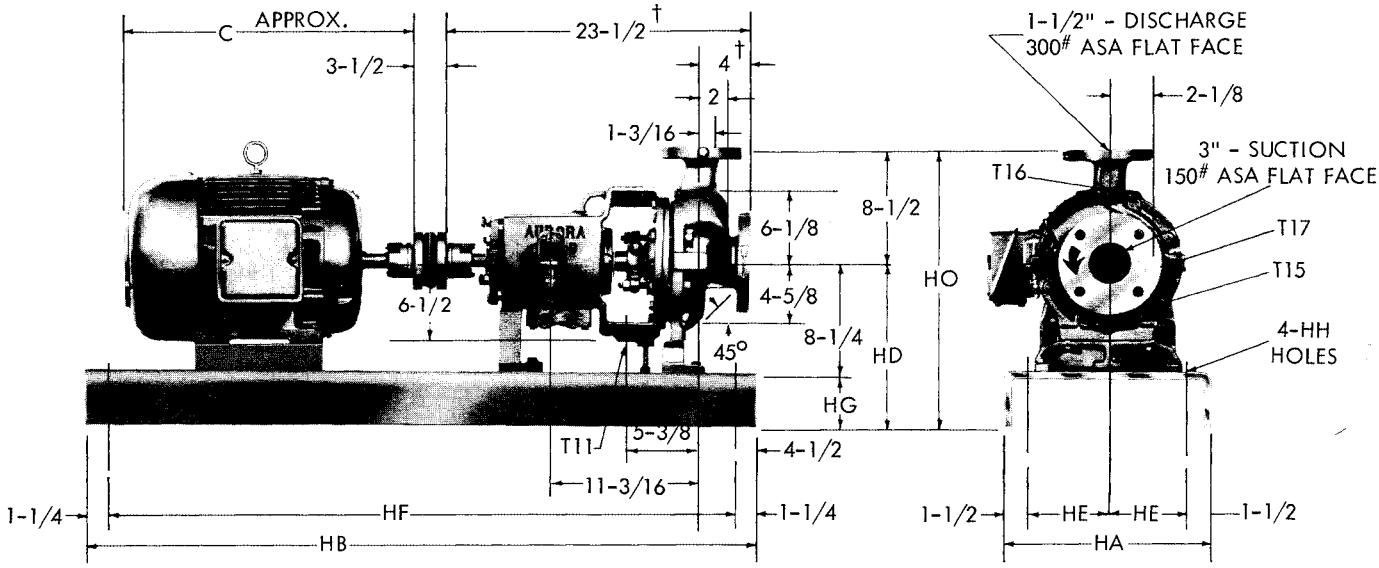


BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5
2T	1/2	1-1/2	5-1/4

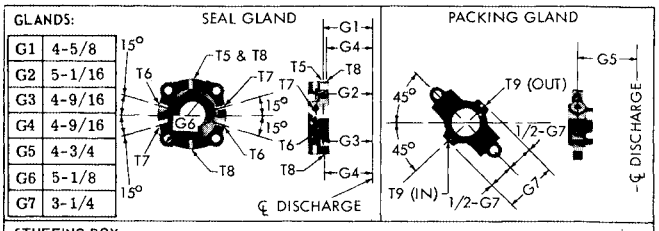


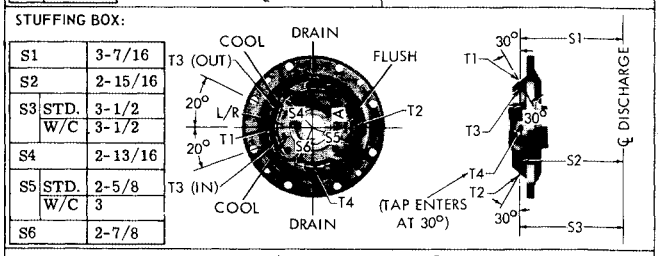
NOTES:
1. DIMENSIONS ARE APPROXIMATE.
2. ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5. CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6. STUFFING BOX.
   A. W.C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
   B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7. SEAL GLAND
   A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

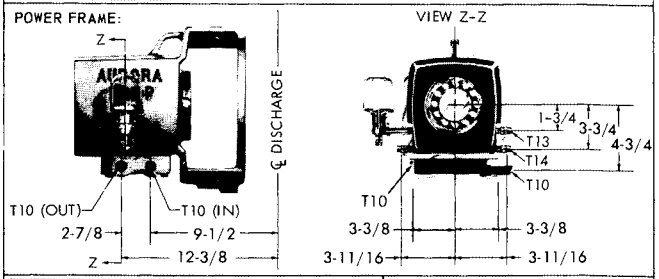
AURORA MODEL 152 PUMPS
ON FORMED STEEL BASE
STANDARD FOOT MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	20-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	20-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									



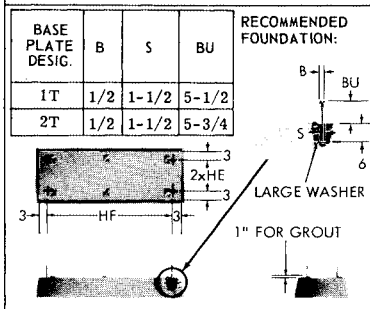




TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

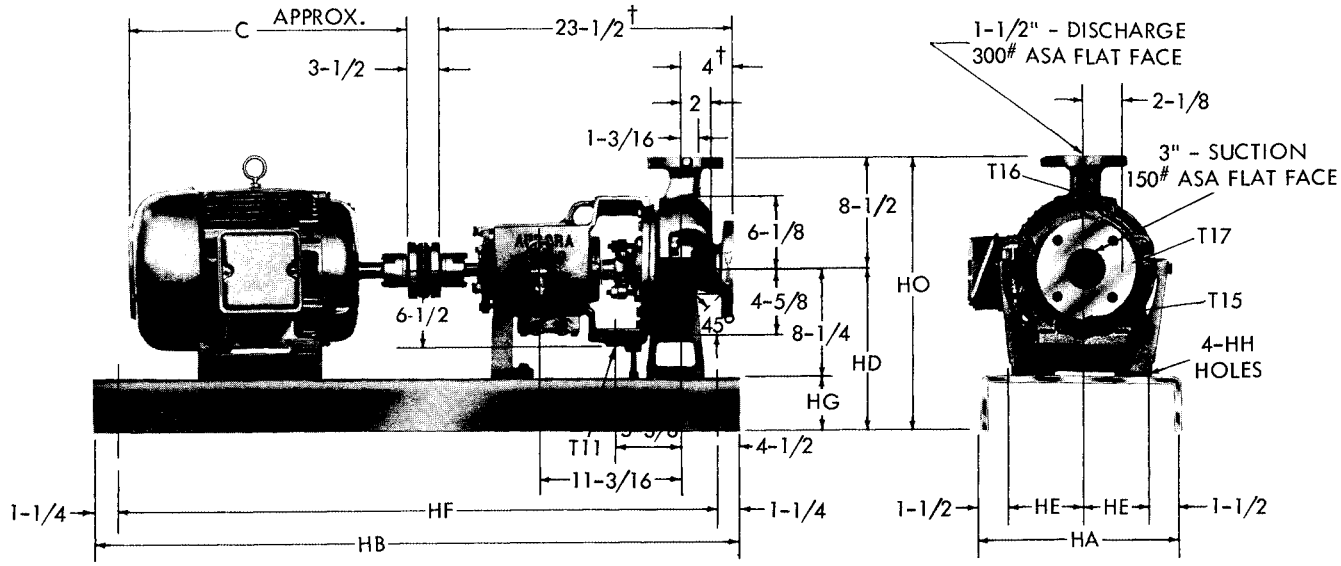
* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 3/16".

BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5-1/2
2T	1/2	1-1/2	5-3/4



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5 CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6 STUFFING BOX.
A. W C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 152 PUMPS
ON FORMED STEEL BASE
OPTIONAL CENTERLINE MOUNTED CASING



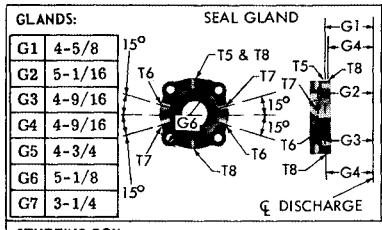
MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	20-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	20-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									

TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 3/16".

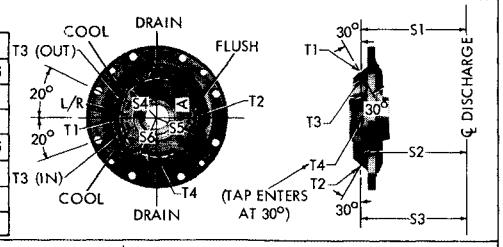
GLANDS:

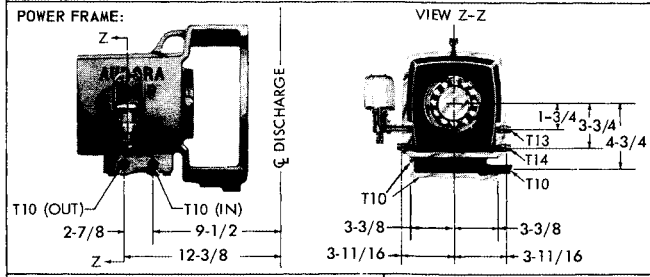
G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4



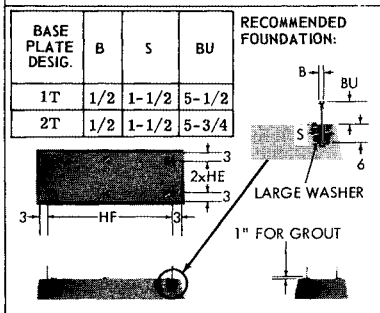
STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8



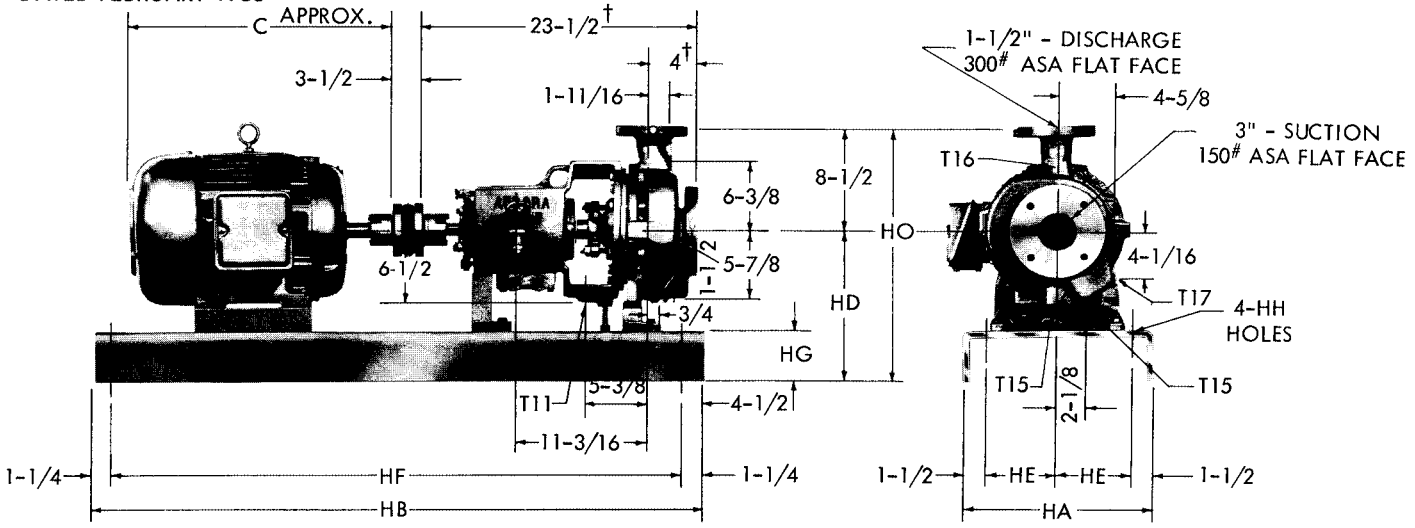


BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5-1/2
2T	1/2	1-1/2	5-3/4



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ±1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5 CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6 STUFFING BOX.
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 153 PUMPS
ON FORMED STEEL BASE
STANDARD FOOT MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	20-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	20-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									
324TS	25	18	58	12-1/4	7-1/2	55-1/2	4	1	20-3/4	3
326TS	26									
364TS	27	18	58	13	7-1/2	55-1/2	4	1	21-1/2	

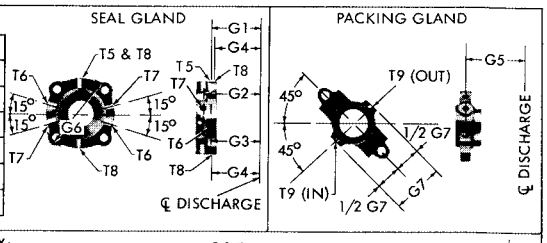
TAPPED PIPE CONNECTIONS

TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 13/16".

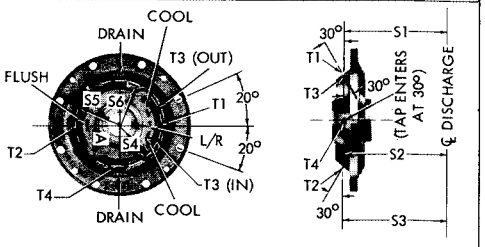
GLANDS:

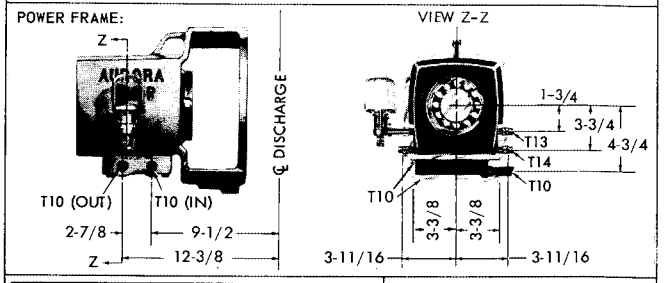
G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4



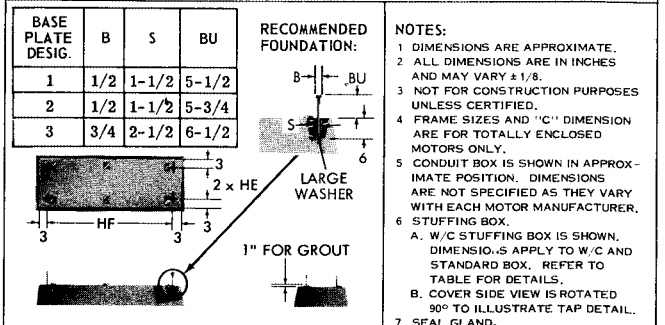
STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8



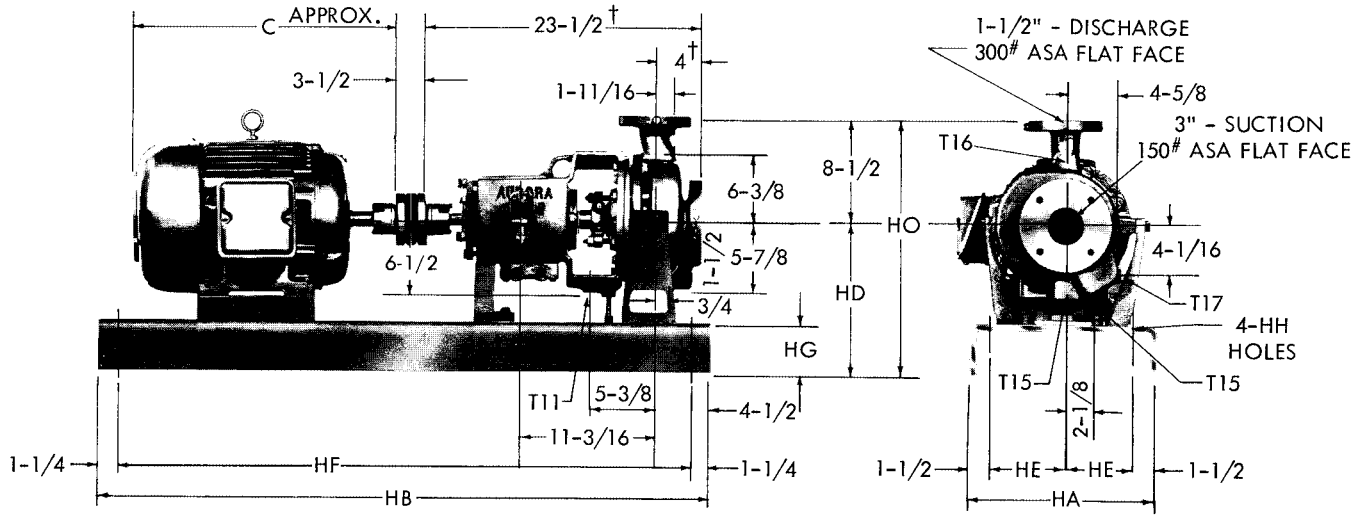


BASE PLATE DESIG.	B	S	BU
1	1/2	1-1/2	5-1/2
2	1/2	1-1/2	5-3/4
3	3/4	2-1/2	6-1/2



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5 CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6 STUFFING BOX.
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND.
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 153 PUMPS
ON FORMED STEEL BASE
OPTIONAL CENTERLINE MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	20-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	20-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									
324TS	25	18	58	12-1/4	7-1/2	55-1/2	4	1	20-3/4	3
326TS	26									
364TS	27	18	58	13	7-1/2	55-1/2	4	1	21-1/2	

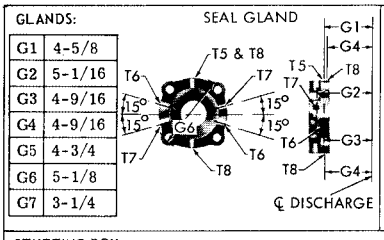
TAPPED PIPE CONNECTIONS

TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 13/16".

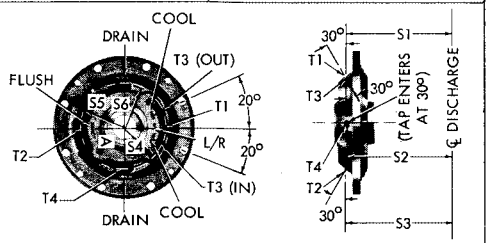
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

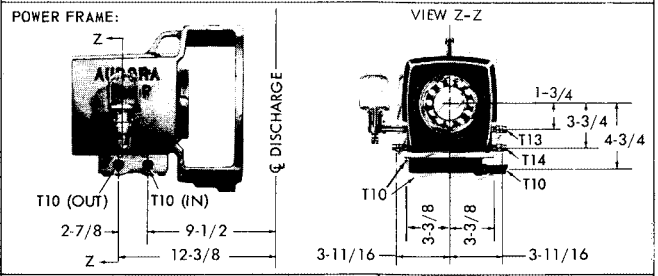


STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8

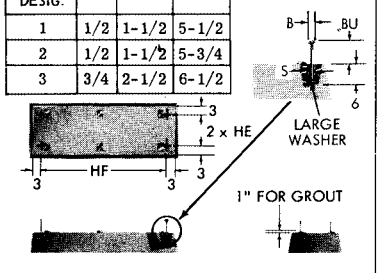


POWER FRAME:



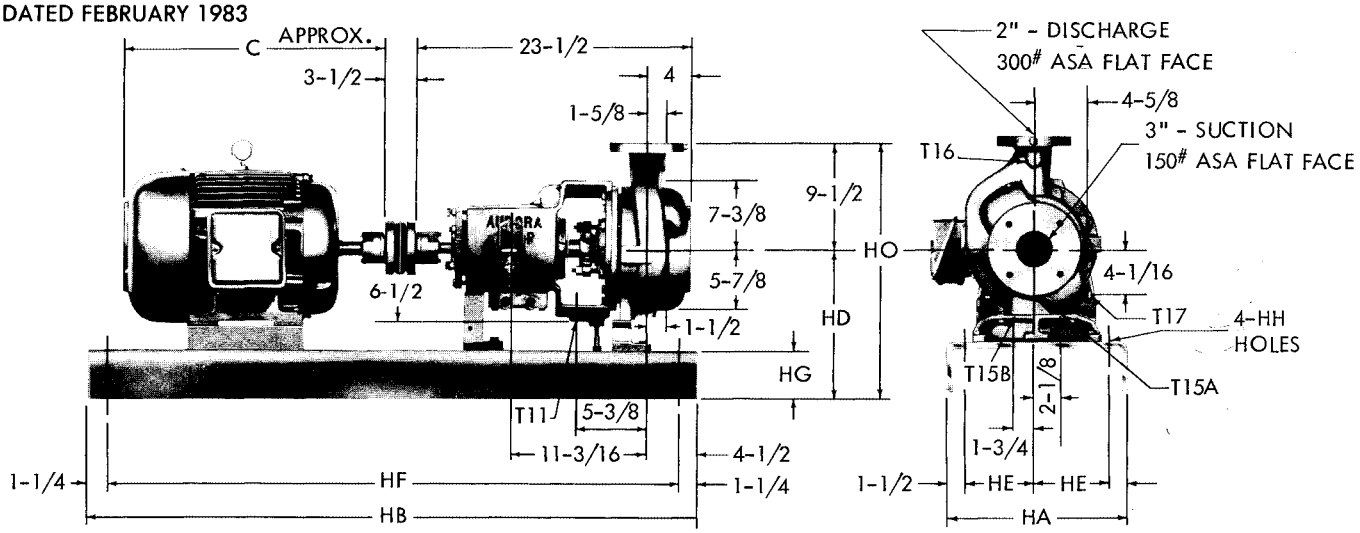
BASE PLATE DESIG.	B	S	BU
1	1/2	1-1/2	5-1/2
2	1/2	1-1/2	5-3/4
3	3/4	2-1/2	6-1/2

RECOMMENDED FOUNDATION:



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
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6 STUFFING BOX.
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND.
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 154 PUMPS
ON FORMED STEEL BASE
STANDARD FOOT MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	21-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	21-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									
324TS	25	18	58	12-1/4	7-1/2	55-1/2	4	1	20-3/4	3
326TS	26									
364TS	27	18	58	13	7-1/2	55-1/2	4	1	21-1/2	

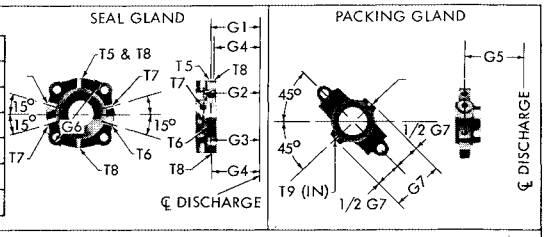
TAPPED PIPE CONNECTIONS

TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)

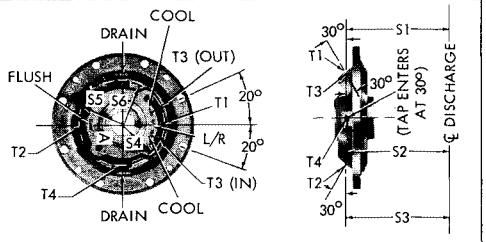
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

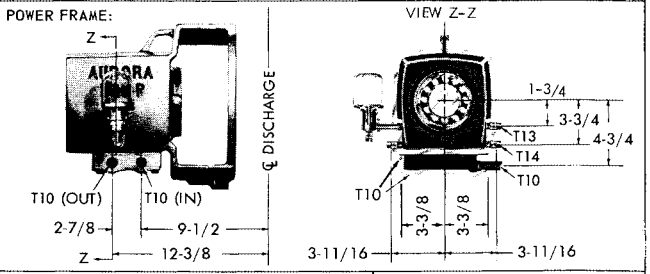


STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8

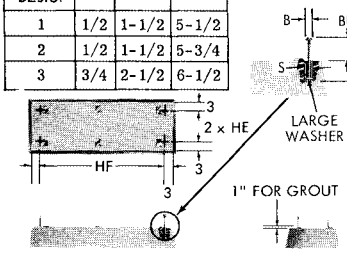


POWER FRAME:



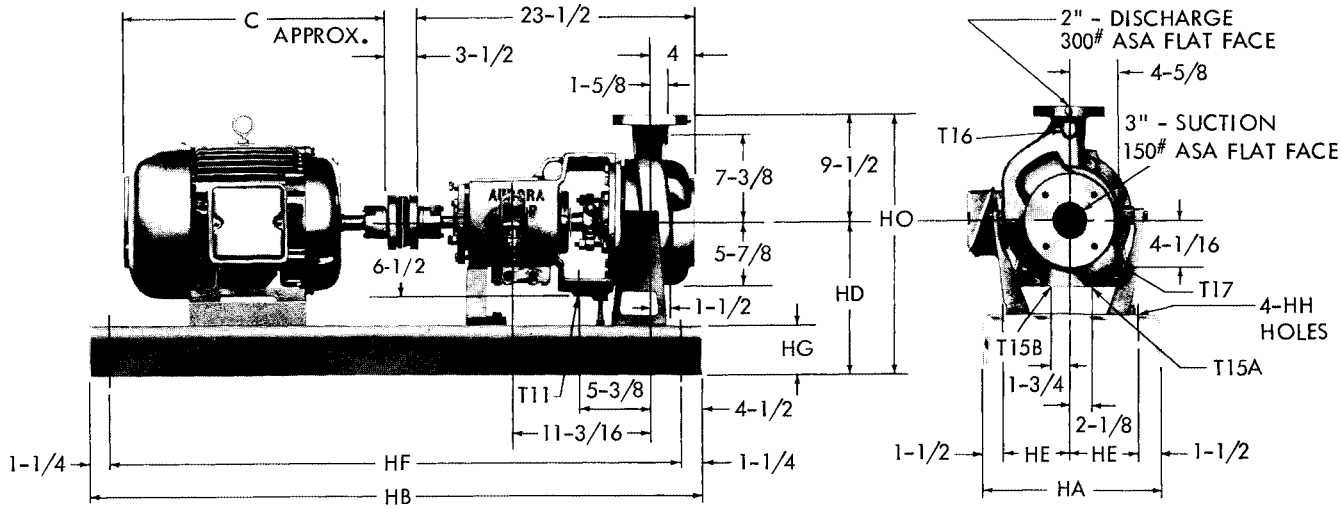
BASE PLATE DESIG.	B	S	BU
1	1/2	1-1/2	5-1/2
2	1/2	1-1/2	5-3/4
3	3/4	2-1/2	6-1/2

RECOMMENDED FOUNDATION:



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5 CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6 STUFFING BOX.
A. W.C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W.C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND.
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 154 PUMPS
ON FORMED STEEL BASE
OPTIONAL CENTERLINE MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	21-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	21-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									
324TS	25	18	58	12-1/4	7-1/2	55-1/2	4	1	21-3/4	3
326TS	26									
364TS	27	18	58	13	7-1/2	55-1/2	4	1	22-1/2	

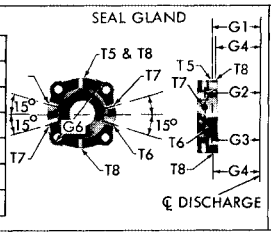
TAPPED PIPE CONNECTIONS

TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (JACKET CAN ROTATE 180°)

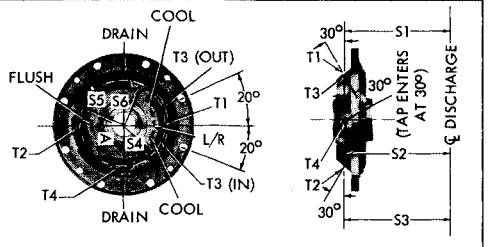
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

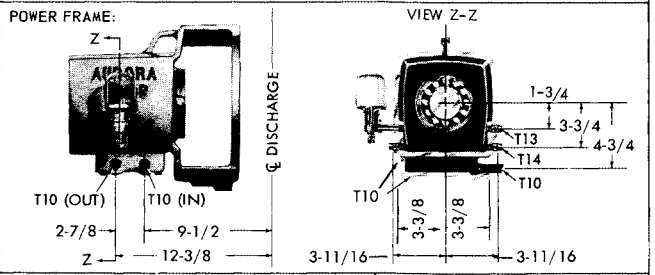


STUFFING BOX:

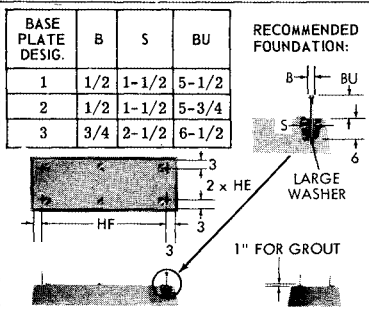
S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8



POWER FRAME:

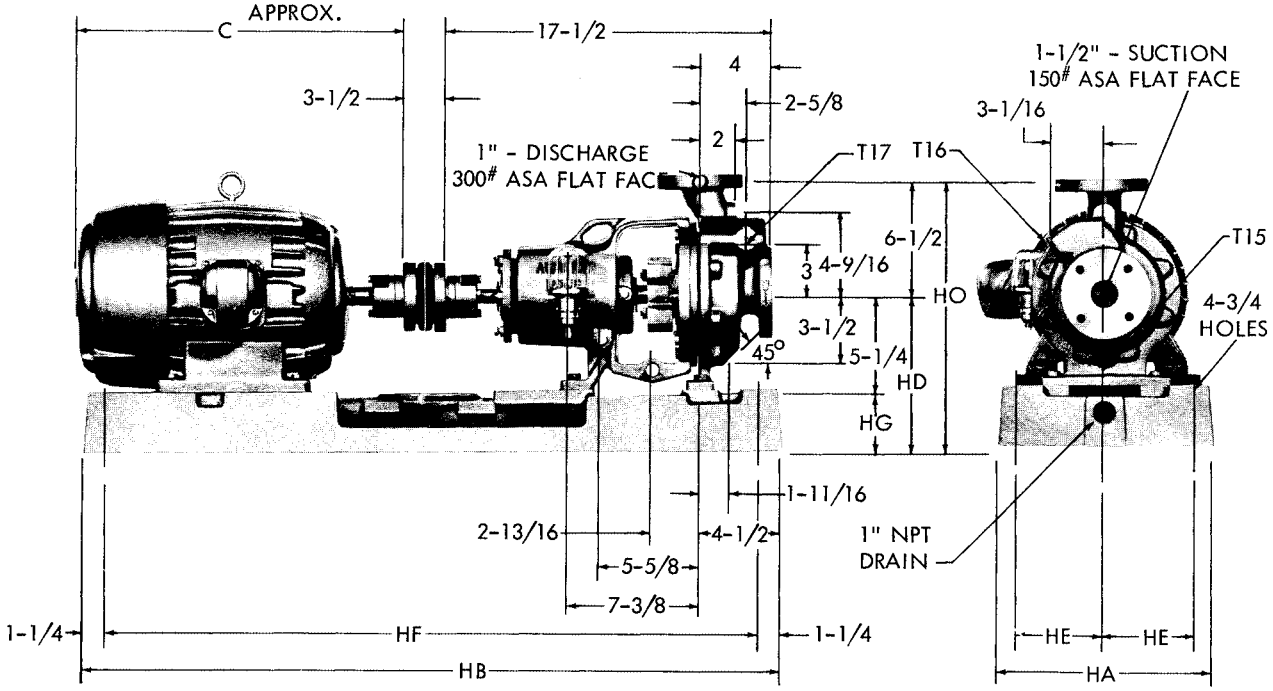


BASE PLATE DESIG.	B	S	BU
1	1/2	1-1/2	5-1/2
2	1/2	1-1/2	5-3/4
3	3/4	2-1/2	6-1/2



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5 CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6 STUFFING BOX.
A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W.C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND.
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 151 PUMPS
ON CAST IRON - DRIP RIM BASE
STANDARD FOOT MOUNTED CASING



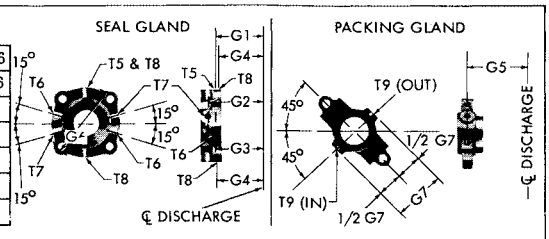
MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HO	AVS BASE PLATE DESIGNATION
143T	12								
145T	13	10	35	8-1/4	4	32-1/2	3	14-3/4	1T
182T	13								
184T	14								
213T	16	12	39	8-1/2	4-1/2	36-1/2	3-1/4	15	2T
215T	18								

TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	2	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	1/4 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE

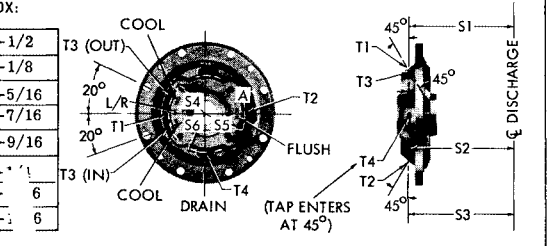
GLANDS:

G1	2-11/16
G2	2-11/16
G3	2-1/8
G4	2-1/8
G5	2-1/2
G6	4
G7	3

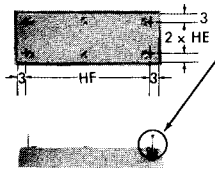


STUFFING BOX:

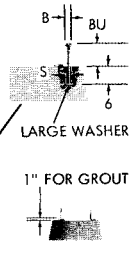
S1		1-1/2
S2		1-1/8
S3	STD.	1-5/16
	W/C	1-7/16
S4		2-9/16
S5	STD.	2-
	W/C	2- 6
S6		2- 6



BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5
2T	1/2	1-1/2	5-1/4

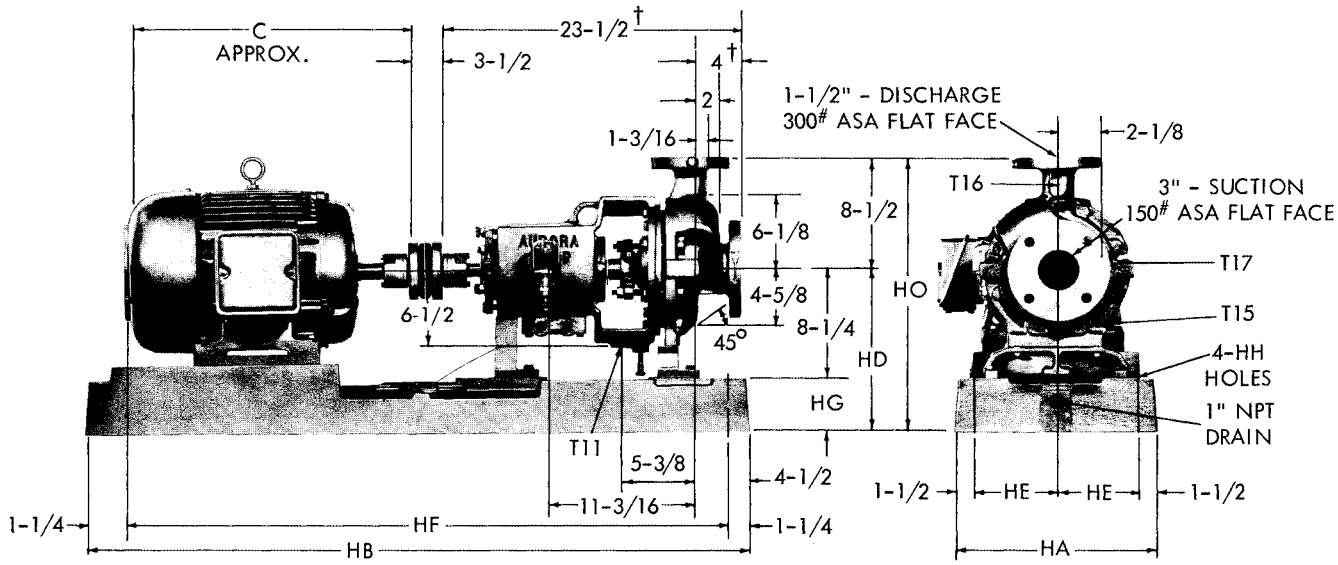


RECOMMENDED FOUNDATION:

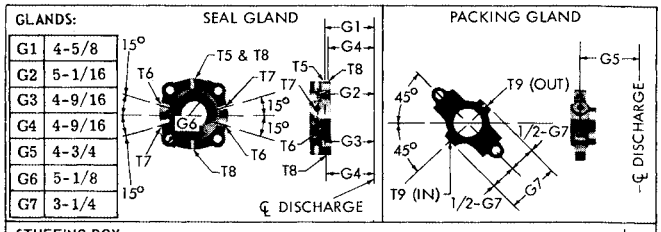


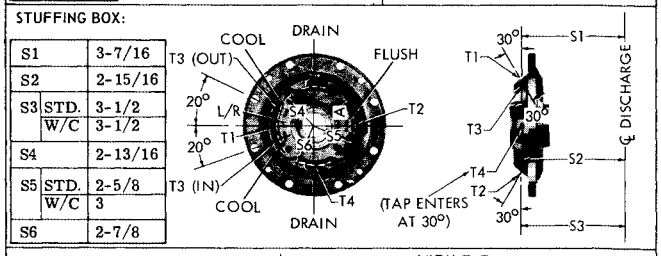
NOTES:
1. DIMENSIONS ARE APPROXIMATE.
2. ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5. CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6. STUFFING BOX.
   A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
   B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7. SEAL GLAND
   A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

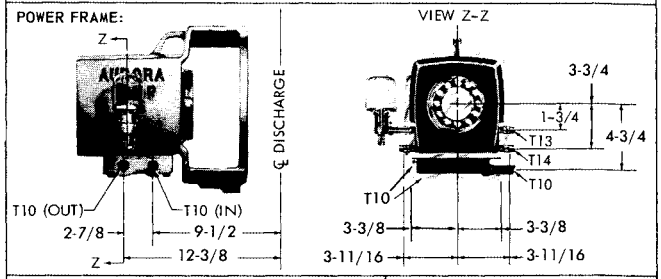
AURORA MODEL 152 PUMPS
ON CAST IRON - DRIP RIM BASE
STANDARD FOOT MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	20-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	20-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									





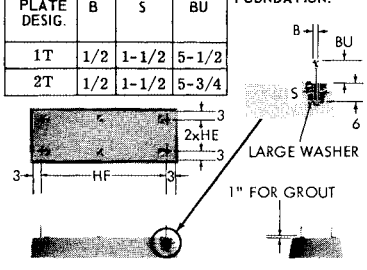


TAPPED PIPE CONNECTIONS				
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 3/16".

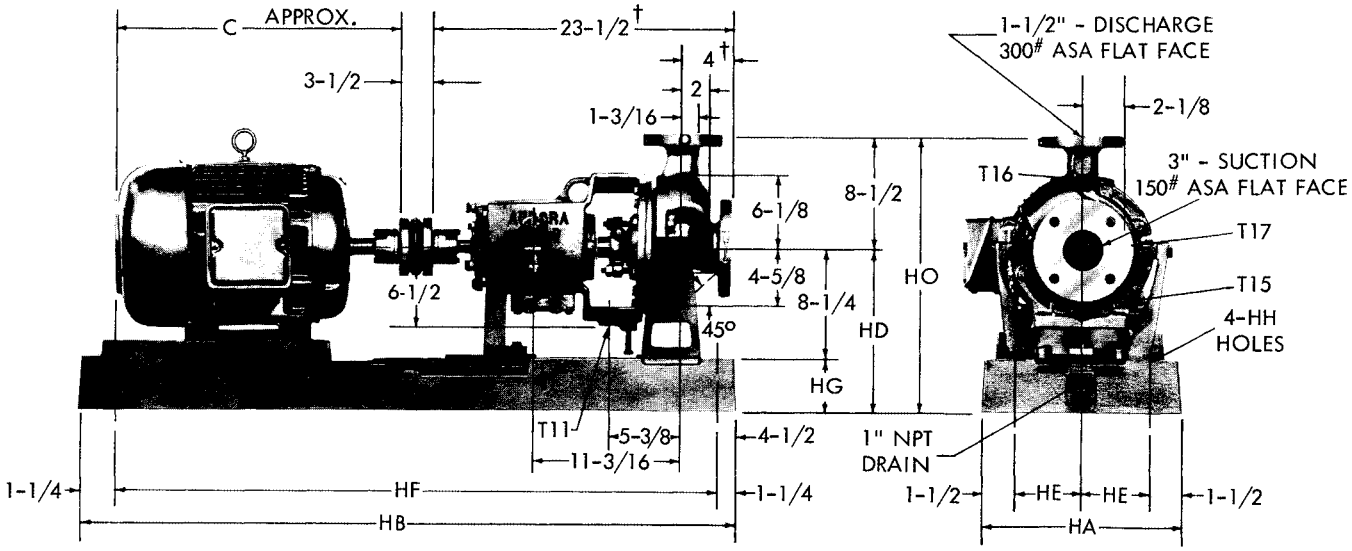
BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5-1/2
2T	1/2	1-1/2	5-3/4

RECOMMENDED FOUNDATION:



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5 CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6 STUFFING BOX.
A. W C STUFFING BOX IS SHOWN, DIMENSIONS APPLY TO W C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 152 PUMPS
ON CAST IRON - DRIP RIM BASE
OPTIONAL CENTERLINE MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	20-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	20-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									

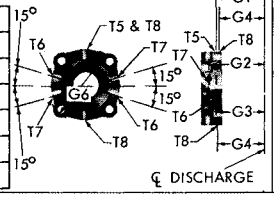
TAPPED PIPE CONNECTIONS

TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	1	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 3/16".

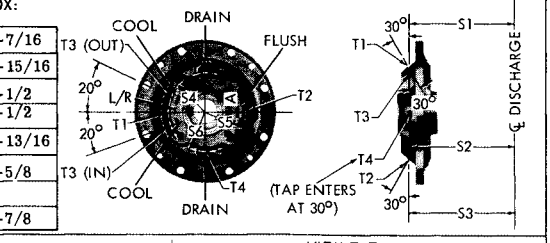
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

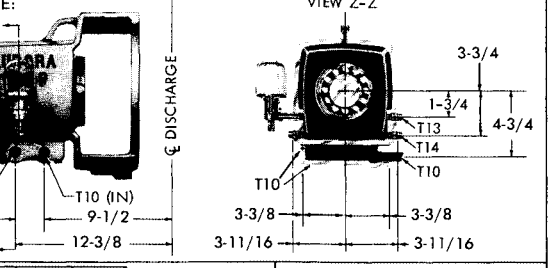


STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8

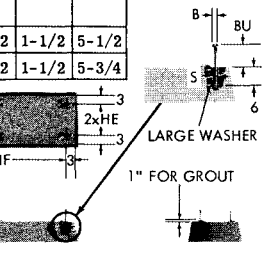


POWER FRAME:



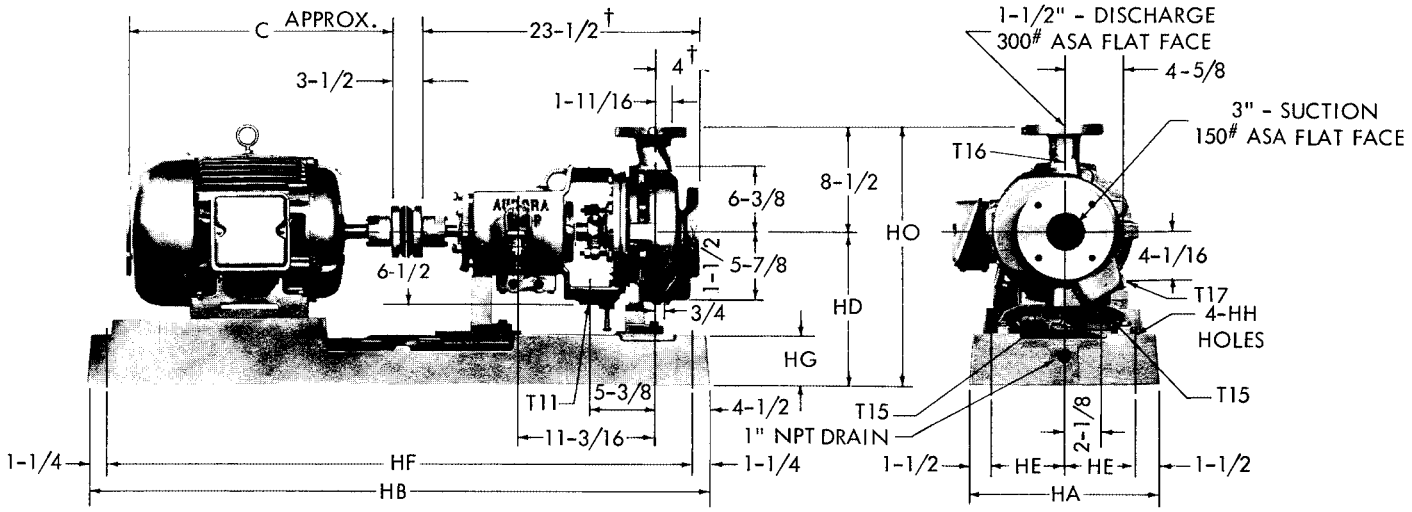
BASE PLATE DESIG.	B	S	BU
1T	1/2	1-1/2	5-1/2
2T	1/2	1-1/2	5-3/4

RECOMMENDED FOUNDATION:



NOTES:
1. DIMENSIONS ARE APPROXIMATE.
2. ALL DIMENSIONS ARE IN INCHES AND MAY VARY ±1/8.
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5. CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6. STUFFING BOX.
   A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
   B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7. SEAL GLAND
   A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

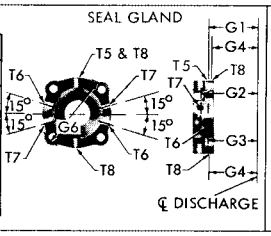
AURORA MODEL 153 PUMPS
ON CAST IRON - DRIP RIM BASE
STANDARD FOOT MOUNTED CASING

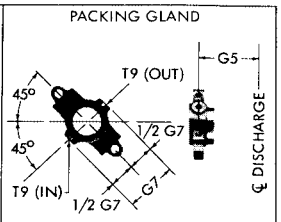


MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	20-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	20-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									
324TS	25	18	58	13	7-1/2	55-1/2	4-3/4	1	21-1/2	3
326TS	26									
364TS	27	18	58	14	7-1/2	55-1/2	4-3/4	1	22-1/2	

GLANDS:

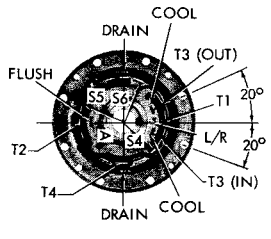
G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

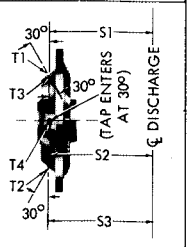




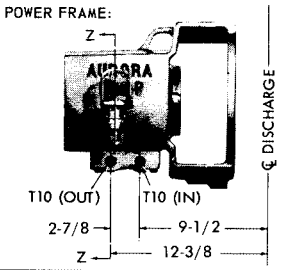
STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8

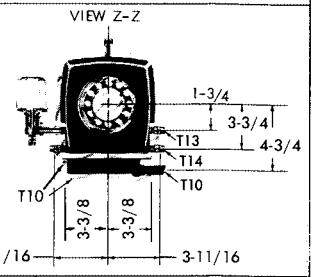




POWER FRAME:

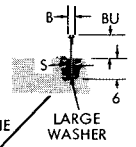


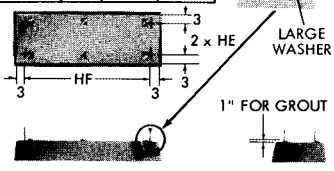
VIEW Z-Z



BASE PLATE DESIG.	B	S	BU
1	1/2	1-1/2	5-1/2
2	1/2	1-1/2	5-3/4
3	3/4	2-1/2	6-1/2

RECOMMENDED FOUNDATION:





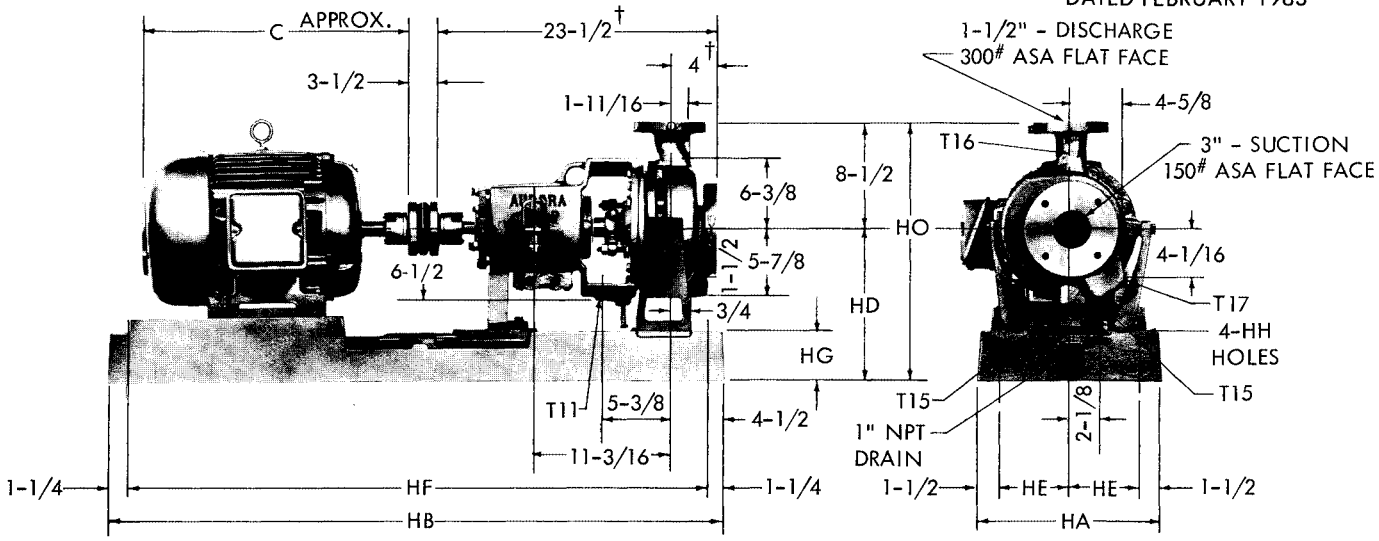
NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
3 NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4 FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
5 CONDUIT BOX IS SHOWN IN APPROXIMATE POSITION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
6 STUFFING BOX.
A. W/C STUFFING BOX IS ' HOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND.
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

TAPPED PIPE CONNECTIONS

TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 13/16".

AURORA MODEL 153 PUMPS
ON CAST IRON - DRIP RIM BASE
OPTIONAL CENTERLINE MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	20-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	20-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									
324TS	25	18	58	13	7-1/2	55-1/2	4-3/4	1	21-1/2	3
326TS	26									
364TS	27	18	58	14	7-1/2	55-1/2	4-3/4	1	22-1/2	

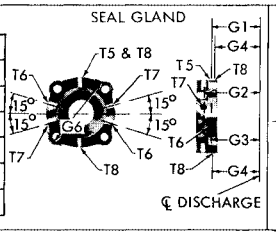
TAPPED PIPE CONNECTIONS

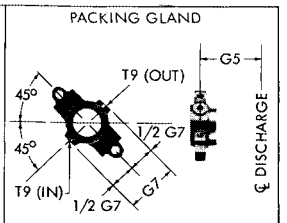
TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)
† WHEN OPTIONAL 300# ASA FLAT FACE SUCTION FLANGE IS USED ADD 13/16".

GLANDS:

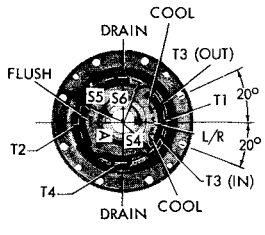
G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

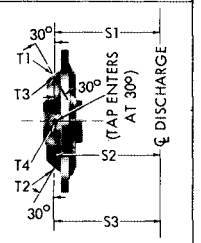




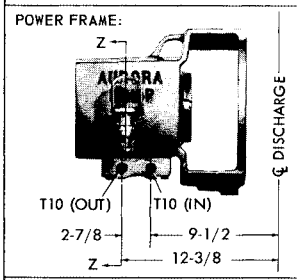
STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8

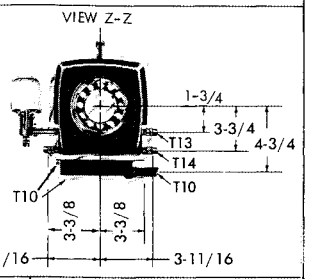




POWER FRAME:

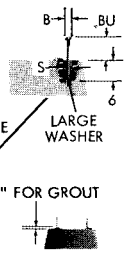


VIEW Z-Z



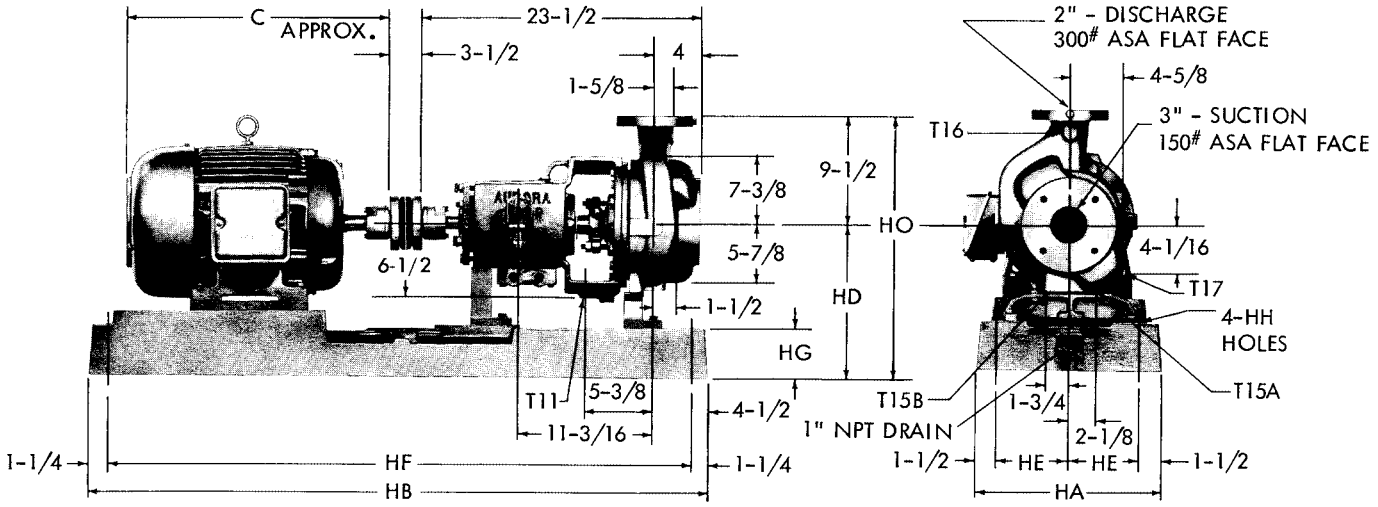
BASE PLATE DESIG.	B	S	BU
1	1/2	1-1/2	5-1/2
2	1/2	1-1/2	5-3/4
3	3/4	2-1/2	6-1/2

RECOMMENDED FOUNDATION:



NOTES:
1 DIMENSIONS ARE APPROXIMATE.
2 ALL DIMENSIONS ARE IN INCHES AND MAY VARY ± 1/8.
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A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W/C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND.
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 154 PUMPS
ON CAST IRON - DRIP RIM BASE
STANDARD FOOT MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	21-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	21-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									
324TS	25	18	58	13	7-1/2	55-1/2	4-3/4	1	22-1/2	3
326TS	26									
364TS	27	18	58	14	7-1/2	55-1/2	4-3/4	1	23-1/2	

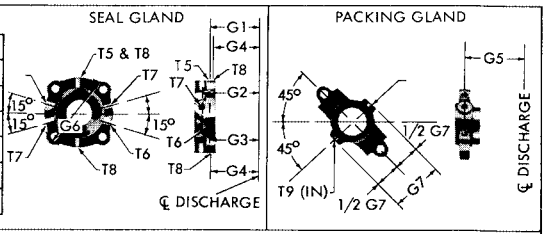
TAPPED PIPE CONNECTIONS

TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
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T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)

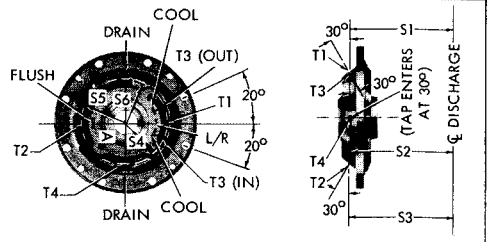
GLANDS:

G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4

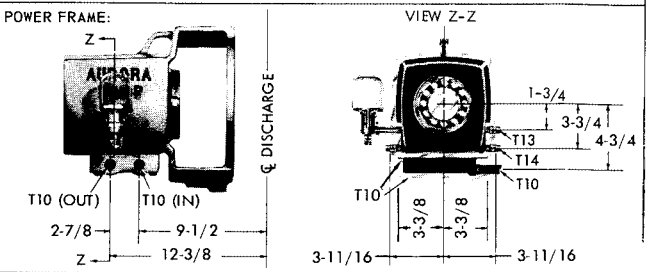


STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8

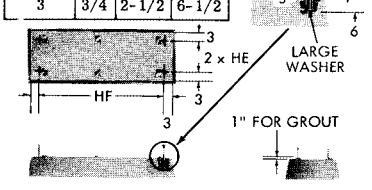


POWER FRAME:



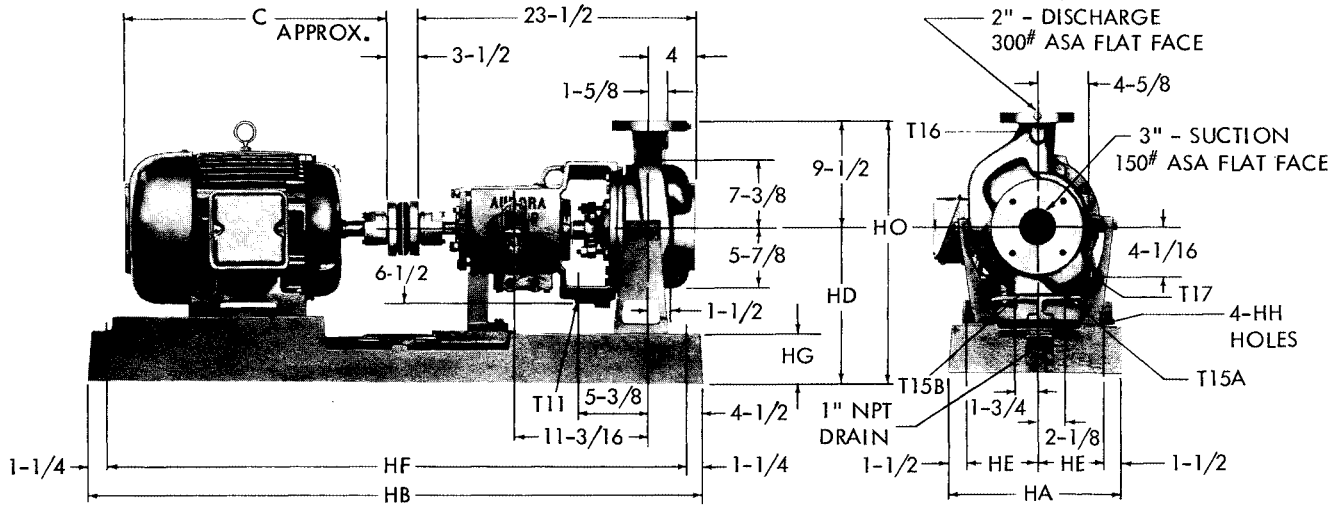
BASE PLATE DESIG.	B	S	BU
1	1/2	1-1/2	5-1/2
2	1/2	1-1/2	5-3/4
3	3/4	2-1/2	6-1/2

RECOMMENDED FOUNDATION:



NOTES:
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B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7 SEAL GLAND.
A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

AURORA MODEL 154 PUMPS
ON CAST IRON - DRIP RIM BASE
OPTIONAL CENTERLINE MOUNTED CASING



MOTOR FRAME	C	HA	HB	HD	HE	HF	HG	HH	HO	AVS BASE PLATE DESIGNATION
143T	12	12	45	12	4-1/2	42-1/2	3-3/4	3/4	21-1/2	1
145T	13									
182T	13									
184T	14									
213T	16									
215T	18									
254T	21	15	52	12-3/8	6	49-1/2	4-1/8	3/4	21-7/8	2
256T	23									
284T	24									
284TS	22									
286T	25									
286TS	24									
324TS	25	18	58	13	7-1/2	55-1/2	4-3/4	1	22-1/2	3
326TS	26									
364TS	27	18	58	14	7-1/2	55-1/2	4-3/4	1	23-1/2	

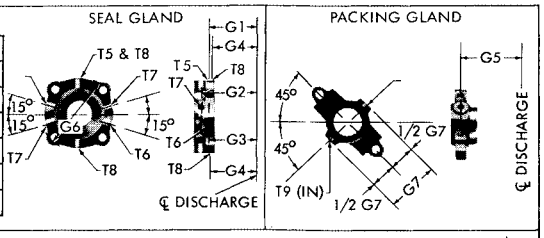
TAPPED PIPE CONNECTIONS

TAP NO.	DESCRIPTION	TAP QTY.	TAP SIZE	FURNISHED AS:
T1	IN CONNECTION IN STUFFING BOX COVER FOR LANTERN RING OR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T2	OUT CONNECTION IN STUFFING BOX COVER FOR MECHANICAL SEAL FLUSHING	1	1/4 NPSF	STANDARD
T3	IN & OUT CONNECTIONS FOR COOLING - W.C. ST. BOX COVER ONLY	2	3/8 NPSF	OPTIONAL
T4	DRAIN CONNECTION FOR COOLING - W.C. ST. BOX COVER ONLY	1	1/4 NPSF	OPTIONAL
T5	IN CONNECTION FOR MECHANICAL SEAL GLAND. DOUBLE SEAL ONLY	1	1/4 NPSF	OPTIONAL
T6	IN & OUT LUBRICATION CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T7	VENT & DRAIN CONNECTION FOR MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T8	COOLING CONNECTION FOR SINGLE MECHANICAL SEAL QUENCH GLAND	2	1/4 NPSF	OPTIONAL
T9	QUENCH CONNECTION - PACKED STUFFING BOX GLAND	2	1/4 NPSF	OPTIONAL
T10	FRAME COOLING	4**	3/8 NPSF	OPTIONAL
T11	FRAME DRIP BASIN DRAIN	1	1/2 NPSF	STANDARD
T12	FRAME DRIP PAN DRAIN	1	3/8 NPSF	OPTIONAL
T13	FRAME OILER CONNECTION	2*	1/4 NPSF	STANDARD
T14	FRAME OIL DRAIN	2*	1/4 NPSF	STANDARD
T15	CASING DRAIN	2	1/4 NPSF	OPTIONAL
T16	CASING DISCHARGE NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL
T17	CASING SUCTION NOZZLE GAUGE CONNECTION	1	1/4 NPSF	OPTIONAL

* DIRECTLY OPPOSITE
** ONE (1) IN, ONE (1) OUT (EACH SIDE)

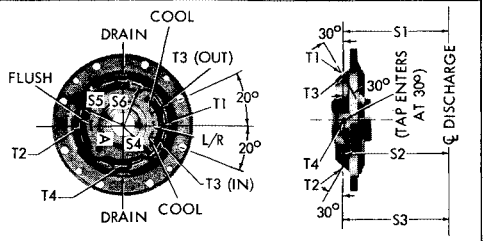
GLANDS:

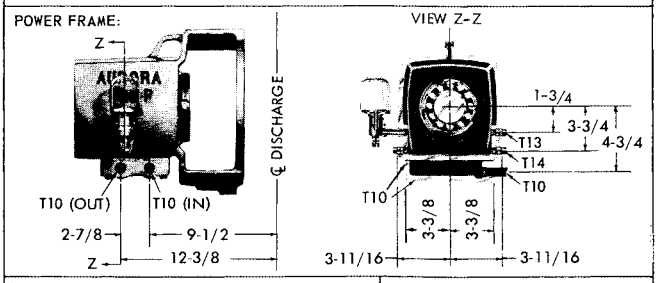
G1	4-5/8
G2	5-1/16
G3	4-9/16
G4	4-9/16
G5	4-3/4
G6	5-1/8
G7	3-1/4



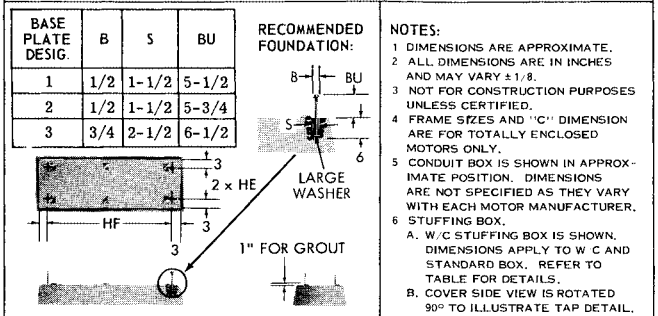
STUFFING BOX:

S1		3-7/16
S2		2-15/16
S3	STD.	3-1/2
	W/C	3-1/2
S4		2-13/16
S5	STD.	2-5/8
	W/C	3
S6		2-7/8





BASE PLATE DESIG.	B	S	BU
1	1/2	1-1/2	5-1/2
2	1/2	1-1/2	5-3/4
3	3/4	2-1/2	6-1/2



NOTES:
1. DIMENSIONS ARE APPROXIMATE.
2. ALL DIMENSIONS ARE IN INCHES AND MAY VARY ±1/8.
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. FRAME SIZES AND "C" DIMENSION ARE FOR TOTALLY ENCLOSED MOTORS ONLY.
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6. STUFFING BOX.
   A. W/C STUFFING BOX IS SHOWN. DIMENSIONS APPLY TO W C AND STANDARD BOX. REFER TO TABLE FOR DETAILS.
   B. COVER SIDE VIEW IS ROTATED 90° TO ILLUSTRATE TAP DETAIL.
7. SEAL GLAND.
   A. ILLUSTRATION COMBINES ALL COMBINATIONS FOR TAP DETAIL.

SECTION 6 ITEM 150
DATED JUNE 1985
SUPERSEDES ITEMS 151, 152, 153, 154
DATED FEBRUARY 1983

AURORA®
Pentair Pump Group

INSTRUCTION MANUAL
(APCO-CHEM)
MODELS 151, 152, 153, 154 REPAIR

6

NOTE

This repair manual is applicable to pump Models 151, 152, 153, 154. All photos illustrate Model 153.

SERVICE

Your Aurora pump requires no maintenance other than periodic inspection, lubrication and occasional cleaning. The intent of inspection is to prevent breakdown, thus obtaining optimum service life.

LUBRICATION OF BEARINGS

The 150 series pumps are available with two options for lubricating the shaft bearings:

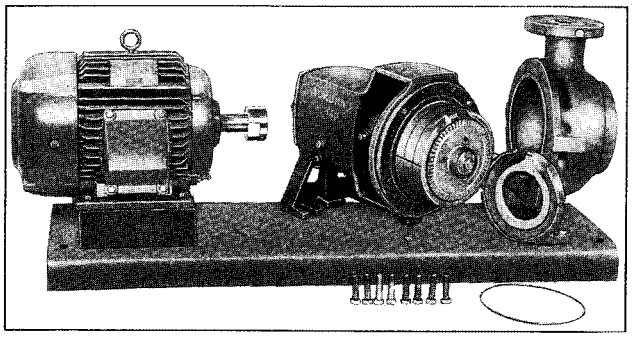
1. Oil Lubrication
2. Regreasable

Oil lubricated bearings are standard on all 150 series pumps. A fixed oil level is maintained within the power frame of an oiler which allows visual indications of reserve oil.

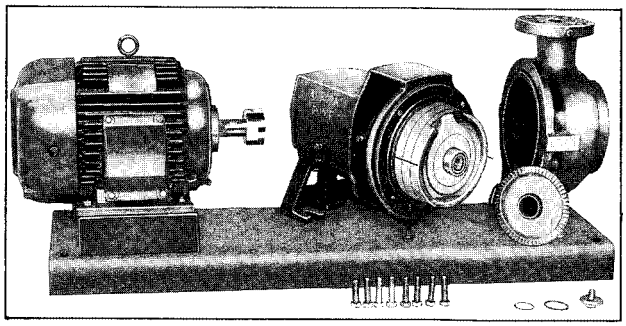
At initial installation and before starting a unit that has been shut down for repairs or for any extended length of time, run enough 10W-30 weight motor oil through the oiler to maintain a constant oil level to insure that the bearing will never be without an oil supply. Oil will have to be added at intervals to maintain a constant level in the oiler. This interval can only be determined by experience.

Under working conditions, oil will breakdown and need to be replaced at regular intervals. The length of these intervals will depend on many factors. Under normal operation, in clean and dry locations, the oil should be changed about once a year. However, when the pump is exposed to dirt contamination, high temperatures (200° F. or above) or a wet location, the oil may have to be changed every 2 or 3 months.

Regreasable bearings will require periodic lubrication and can be accomplished by using the zerk or lubrication fittings



A. Channel ring and casing o-ring removed.



B. Lock nut, o-rings and impeller removed.

in the cartridge cap and power frame. Lubricate the bearings at regular intervals using a grease of high quality. Lithium, lithium soda or calcium base grease is recommended as lubricants for pumps operating in both wet and dry locations. Mixing of different brands of grease should be avoided due to possible chemical reactions between the brands which could damage the bearings. Accordingly, avoid grease of vegetable or animal base which can develop acids, as well as grease containing rosin, graphite, talc and other impurities. Under no circumstances should used grease be reused.

Over lubrication should be avoided as it may result in overheating and possible bearing failure. Under normal application, adequate lubrication is assured if the amount of grease is maintained at 1/3 to 1/2 the capacity of the bearing and adjacent space surrounding it.

In dry locations, each bearing will need lubrication at least every 4,000 hours of running time or every 6 to 12 months, whichever is more frequent. In wet locations the bearings should be lubricated at least after every 2,000 hours of running time or every 4 to 6 months, whichever is more frequent. A unit is considered to be installed in a wet location if the pump and motor are exposed to dripping water, to the weather, or to heavy condensation such as is found in unheated and poorly ventilated underground locations.

At times it may be necessary to clean the bearings due to accumulated dirt or deteriorated lubricants. This can be accomplished by flushing the bearing with a light oil heated to 180 to 200°F. While rotating it on a spindle, wipe the bearing housing with a clean rag soaked in a cleaning solvent and flush all surfaces.

Dry bearing thoroughly before relubricating. Compressed air can be used to speed drying, but care should be taken not to let bearings rotate while being dried.

CAUTION

Use normal fire caution procedures when using any petroleum cleaner.

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The motor which drives your Aurora pump may or may not require lubrication. Consult the manufacturer's recommendations for proper maintenance instructions.

REPAIRS

The pump may be disassembled using the illustrations and text provided. Although complete disassembly is covered, it will seldom be necessary to completely disassemble your Aurora pump.

The illustrations accompanying the disassembly instructions show the pump at various stages of disassemnbly. The illustrations are intended to aid in the correct identification of the parts mentioned in the text.

Inspect removed parts at disassembly to determine their reusability. Cracked castings should never be reused. All packing and gaskets should be replaced with new ones at reassembly simply as a matter of economy; they are much less expensive to replace routinely than to replace as the need occurs. In general it is economical to return to the manufacturer for repair only the motor and motor controller.

Disassembly of Apco-Chem 150 Series (Figure 1 thru 7).

Repair of Model 152 is discussed and illustrated in this manual. Model 152-153-154 pumps use different casings (1), but otherwise all compenents are interchangeable. Model 151 disassembly is the same as larger models.

1. Break the electrical connections to motor; so pump will not be accidently energized during disassembly.

2. Close all valves or flow devises that regulate flow of liquids to or from pump.

3. Remove any external flushing or cooling lines from pump.

4. Remove four capscrews from each hub of spacer type coupling and remove coupling flange and rubber insert. This leaves a 3-1/2" space between end of motor shaft and pump shaft to facilitate back pull out of pump.

5. If possible drain and/or flush pump to remove any corrosive or toxic liquid before attempting further disassembly. Many units will not have drain taps.

6. Unscrew two capscrews holding frame foot to the base. Remove eight capscrews (47) which hold frame (6) to casing (1). The frame and rotating assembly can be pulled away from the casing and taken to a work bench for further disassembly.

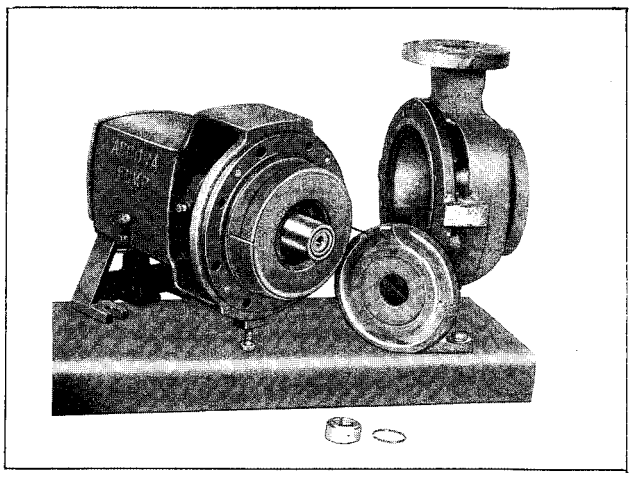
NOTE

If difficulty in withdrawing the frame and rotating element is encountered, remove any two capscrews (46) that are 180 degrees apart. Thread two longer capscrews into their holes. These longer capscrews will act as jackscrews to aid with the disassembly.

7. Right hand channel ring (2) will remain in casing (1). If the ring can not be readily removed by hand, a simple puller can be used incorporating the slots on inside diameter of channel ring.

NOTE

For customer's convenience, a special tool is optionally available from Aurora Pump to remove this ring.



C. Sleeve extension, o-ring and channel ring removed.

8. Impeller screw (20) and "O" ring (18) can be removed. Impeller (3) and impeller key (74) can be removed at this point.

9. Remove left hand channel ring (4), interstage bushing (72), channel ring (2), shaft sleeve extension (16) on Model 153 and 154 pumps.

10. Remove impeller (3), channel ring (4), impeller key (74), and pin (33) for all models.

11. Remove four capscrews (46) and pipe plug (69) which will allow the stuffing box along with the gland, shaft sleeve, sleeve key (21), and packing or mechanical seal (whichever the case may be) to be separated from shaft (10) and bracket (35) or frame (6) depending upon pump model. Remove "O" ring (17).

12. For complete disassembly of the various stuffing boxes, refer to the specific type below.

Single Inside Unbalanced Mechanical Seal (Figure 1, 2 or 3)

a. Remove nuts (39) from studs (38) and slide gland (11) off shaft sleeve (12).

b. The stationary seat, part of the mechanical seal (13), will remain in gland (11). Remove this seat if necessary, using caution not to crack or scratch lapped face. Also remove gaskets (40 and 70) from the gland.

NOTE

Gasket (70) is not used with all types of single inside unbalanced seals, refer to the drawing of your particular seal.

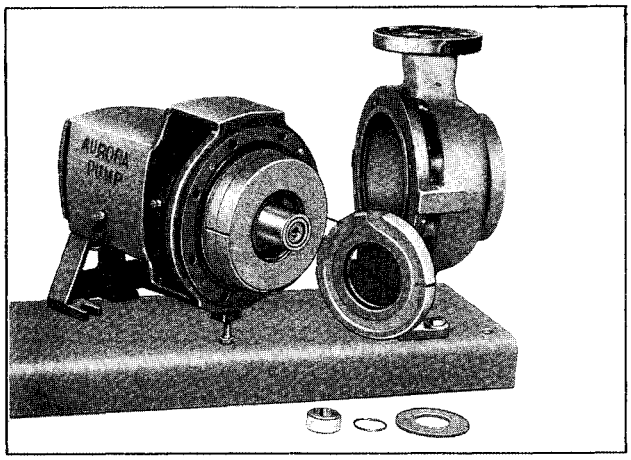
c. The balance of mechanical seal parts can be slid out of stuffing box (5) along with shaft sleeve (12). The seal's washer, retainer ring, flexible bellows, and spring are loose and may be removed from the shaft sleeve.

d. After scribing the sleeve to locate the position of the seal on reassembly, the seal collar (58) can be removed by loosening setscrews (59).

Standard Packing (Figure 4)

a. Remove nuts (39) from studs (38) and slide gland (61) off shaft sleeve (12).

b. Withdraw shaft sleeve (12) from stuffing box (5). Remove packing (65) and lantern ring (66) from the stuffing box.



D. Channel ring, sleeve extension, o-ring and bushing removed.

c. Gland (61) can be separated into two halves by removing capscrews (63) and nuts (64). This exposes gland packing (62) which can be removed.

Single Inside Balanced Mechanical Seal (Figure 5)

a. Remove nuts (39) from studs (38) and slide gland (11) from stuffing box (5).

b. The mechanical seal's stationary seat and gaskets (40 and 70) can be removed from the gland.

NOTE

Gasket (70) is not used with all types of single inside balanced seals, refer to the drawing of your particular seal.

c. Shaft sleeve (12) and mechanical seal (13) can be removed from the stuffing box (5). The loose seal parts can then be removed. After scribing the sleeve to locate the position of the seal on reassembly, the seal lock collar (58) is removed from shaft sleeve by loosening setscrews (59) and sliding it off.

Double Inside Unbalanced Mechanical Seal (Figure 6)

a. Remove nuts (39) from studs (38) and slide gland (11) off shaft sleeve (12).

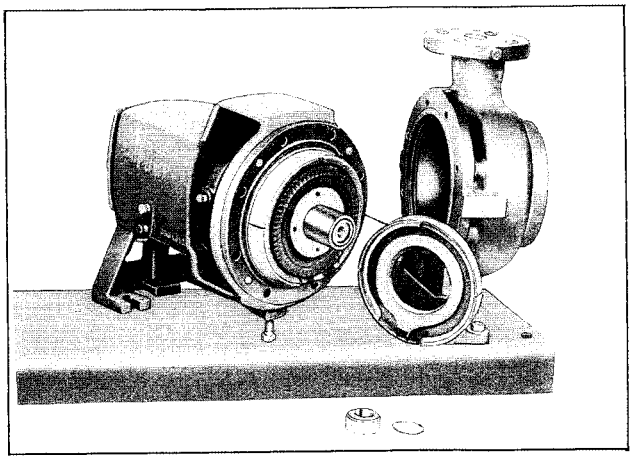
b. One mechanical seal (13) stationary seat will remain in the gland cavity and the other will stay in the stuffing box (5).

c. Withdraw shaft sleeve (12) from stuffing box (5). The loose parts of mechanical seal (13) can be removed and the lock collar taken off the shaft sleeve. (Scribe the shaft sleeve before removal to facilitate reassembly of seal.)

d. The stationary seats can be removed if necessary.

Double Inside Balanced Mechanical Seal

Disassembly of a double inside balanced seal is basically the same as for a double inside unbalanced seal.



E. Right hand channel ring removed.

Single Outside Balanced Mechanical Seal (Figure 7)

a. Scribe the shaft sleeve to locate position of seal on reassembly. Then remove mechanical seal (13), except for the stationary seat which held in the gland, by loosening the setscrews in its lock collar.

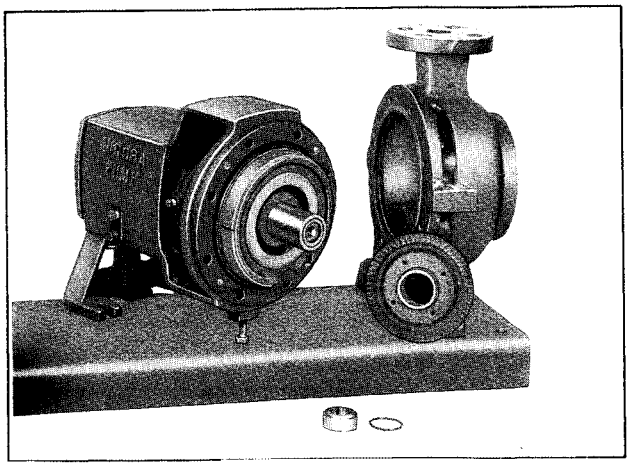
c. Withdraw shaft sleeve (12) from stuffing box (5).

d. Remove nuts (39) from studs (38) which allows gland (11) to be removed. Remove the seal's stationary seat and gaskets (40 and 70) from the gland (11).

CAUTION

The parts of any mechanical seal are easily damaged if they are not properly handled. The ceramic and carbon parts can be chipped or cracked by being allowed to slide loose on the shaft. Care should also be taken not to scratch lapped faces of a seal.

13. For Model 152, 153 and 154 pumps, foot (8) may be removed by unscrewing capscrews (44). Bracket (35) may be removed by unscrewing capscrews (19).



F. Impeller removed. Note position of left hand channel ring opening.

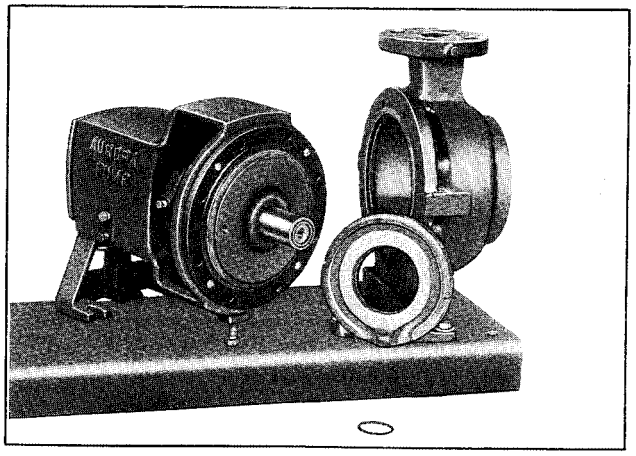
14. Also on Model 152, 153 and 154 pumps frame cooling cover (34) and gasket (42) may be removed by unscrewing capscrews (45).

15. Remove slinger (31) from inboard end of shaft (10). Key (28) and slinger (32) are then removed from outboard end of shaft.

16. Remove capscrews (37). When this is done the shaft and bearing assembly can be withdrawn from frame (6).

17. Use a pair of truarc pliers to remove retainer ring (22) from bearing cartridge (7). Slide bearing cartridge and oil seal (29) off shaft. The oil seal can be tapped from its cavity if necessary. Remove "O" ring (23) from bearing cartridge (7).

18. If pump is oil lubricated, plug (30) can be removed or if it is grease lubricated, zerk fittings can be removed from bearing cartridge (7). On the oil lubricated frame remove constant level oiler (48), nipple (49), plug (67), and breather (50).



G. Left hand channel ring removed.

On the grease lubricated frame, zerk fittings can be removed from the inboard end of the frame. On either frame option, oil seal (29) can be tapped from its cavity on the inboard end of frame (6).

19. Remove retaining ring (24) with a pair of truarc pliers.

20. Bearings (14 and 15) are pressed on the shaft and must be pulled or pressed off shaft (10).

Reassembly of Apco-Chem 150 Series

1. Position gasket (42) and frame cooling cover (34) to frame (6) with capscrews (45) on Model 152, 153 and 154 pumps.

2. Fasten foot (8) to frame (6) with capscrews (44). Position bracket (35) on frame (6) and secure with capscrews (19) on Model 152, 153 and 154 pumps.

3. Press bearing (14) onto inboard end of shaft (10). Press bearing (15) onto outboard end of shaft. Snap retaining ring (24) into its groove by bearing (15) with a pair of truarc pliers.

CAUTION

This ring is beveled on its inside diameter. This beveled side must always be away from the bearing.

4. Press grease seals (29) into their cavities in bearing cap (7) and frame (6).

5. Place "O" Ring (23) in its groove on bearing cap (7). Slide the bearing cap over outboard bearing (15). The bearing is held in place in the bearing cap by retaining ring (22). Use a pair of truarc pliers to set this ring.

CAUTION

This ring is beveled on its outside diameter. This beveled side must always be away from the bearing.

6. The assembly from steps 3, 4, 5 is placed through the outboard opening of power frame (6) and is held is place by turning capscrews (37) into frame (6) until tight. Impeller adjustment is not required due to a floating impeller design.

7. Place slinger (32) on outboard end of shaft (10) and slinger (31) on the inboard end. Set key (28) in the keyway on the shaft's outboard end. Place plug (30) in bearing cap (7). Put breather tube (50) and constant oiler parts (48 and 49) on frame (6). Also put drain plug (67) back in the power frame.

If pump has grease lubrication option, place grease zerk fitting in bearing cap (7), grease zerk fitting in the inboard end of frame (6).

8. Reassemble the various types of stuffing boxes as follows:

NOTE

Thoroughly clean all metal parts of any residue that may be on them. Pay particular attention to the seal faces so that they are not scratched or damaged by improper handling.

Do not return any mechanical seal to service unless the stationary seat and washer have been replaced or their faces lapped. If shaft sleeve (12) is corroded or badly worn, it should be replaced.

NOTE

Be sure to check the proper position of stuffing box (5). On Model 151 and 152 pumps the internal bypass opening in the face should be on the horizontal center line to the RIGHT of the shaft extension when facing the pump end. On Model 153 and 154 pumps the internal bypass opening in the face should be on the horizontal center line to the LEFT of the shaft extension when facing the pump end.

Standard Packing (Figure 4)

a. Insert sleeve (12) in stuffing box (5). Carefully place two pieces of packing (65) around the sleeve, then insert lantern ring (66) and three more pieces of packing.

b. Place gland packing (62) in the groove of the two split gland halves (61) and join these halves together with capscrews (63) and nuts (64).

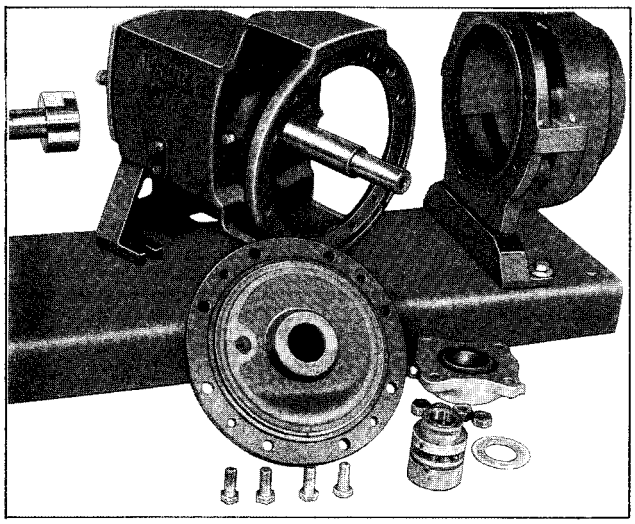
c. Place assembled gland over studs (38) and lightly tighten nuts (39).

NOTE

Do not over tighten packing, final adjustment must be made after pump is operating.

When adjusting packing, turn both nuts down evenly a flat or two at a time. Let packing work in, then tighten the gland nut another flat or two. This process should be continued until drip rate is approximately 20 to 30 drops per minute. Over tightening a gland will cause the stuffing box to heat up and will also cause excessive wear on the shaft sleeve.

d. Take the above assembly and slide it onto shaft (10). Capscrews (46) are used to fasten stuffing box (5) to bracket (35). Be sure the by-pass is properly oriented. See NOTE on page 4.



H. Stuffing box and mechanical seal removed from power frame.

Single Inside Unbalanced Mechanical Seal (Figure 1, 2 or 3)

a. Set seal collar (58) on shaft sleeve (12) with setscrews (59). Refer to drawing of your specific seal for the location of seal collar or at location scribed on the sleeve during disassemby.

b. Place gasket (70) in the gland if used with your seal arrangment. Insert the stationary seat in gland (11). Place gasket (40) in the groove formed by the stationary seat and gland.

c. Carefully place gland (11) and stationary seat on the shaft. With the balance of mechanical seal (13) parts in place on shaft sleeve (12), slide the sleeve onto the shaft.

d. Carefully position stuffing box (5) over shaft sleeve (12). Be sure the by-pass is properly oriented. See NOTE on page 4. Secure the stuffing box to bracket (35) or frame (6) on Model 151 with capscrews (46).

e. Slide gland (11) over shaft sleeve (12) and studs (38). Tighten nuts (39) onto the studs until the gaskets are compressed.

CAUTION

Do not over over tighten gland as this will distort the mechanical seal's stationary face and cause excessive leakage.

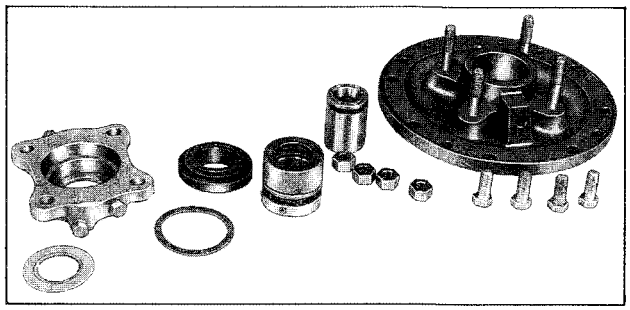
Single Inside Balanced Mechanical Seal (Figure 5)

The same instructions apply to single balanced mechanical seals as to single unbalanced mechanical seals.

Double Inside Unbalanced Mechanical Seal (Figure 6)

a. Place the mechanical seal's collar on shaft sleeve (12). Refer to the drawing of your specific seal for the location of seal collar or at location scribed on the sleeve during disassembly.

b. Insert one stationary seat in gland (11) and the other in stuffing box (5).



I. Disassembly of stuffing box and mechanical seal.

c. Place gland (11) on shaft (10). After the balance of the mechanical seal's parts have been properly placed on the shaft sleeve, slide it onto the shaft.

d. Carefully position stuffing box (5) over shaft sleeve (12). Be sure the by-pass is properly oriented. See NOTE on page 4. Secure stuffing box to bracket (35) or frame (6) on Model 151 with capscrews (46).

e. Set gland (11) over studs (38) and tighten nuts (39) only enough to compress gasket (40), which was placed in the gland earlier. Over tightening will cause the seal to leak.

Double Inside Balanced Mechanical Seal

The same instructions apply to the double inside balanced mechanical seal as to the double inside unbalanced seal.

Single Outside Balanced Mechanical Seal (Figure 7)

a. Place gasket (70) in gland (11). Insert the stationary seat, part of mechanical seal (13), in the gland and set gasket (40) on it. Position gland on stuffing box (5) and tighten nuts (39) on stud (38) finger tight.

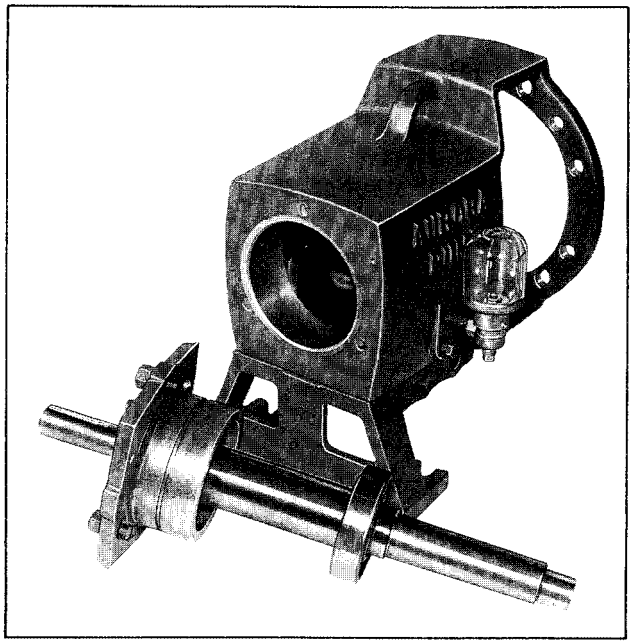
b. Secure the mechanical seal's lock collar on shaft sleeve (12) with the setscrews furnished with it at location scribed on the sleeve during disassembly.

c. Place the shaft sleeve on shaft (10) and slide the remaining seal parts onto it as shown on drawing of your seal.

d. Place gland (11), stationary seat, and the stuffing box assembly from step a, on shaft sleeve (12).

e. Position stuffing box (5) on shaft sleeve (12) and secure it to bracket (35) or frame (6) on Model 151 with capscrews (46). Be sure the by-pass is properly oriented. See NOTE on page 4.

f. Tighten nuts (39) only enough to compress gaskets (70 and 40). Over tightening of the gland will cause seal to leak.

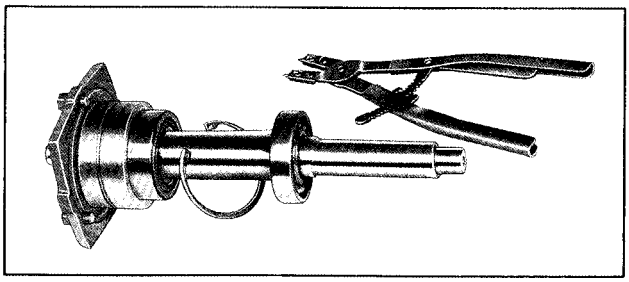


J. Power frame with rotating element removed.

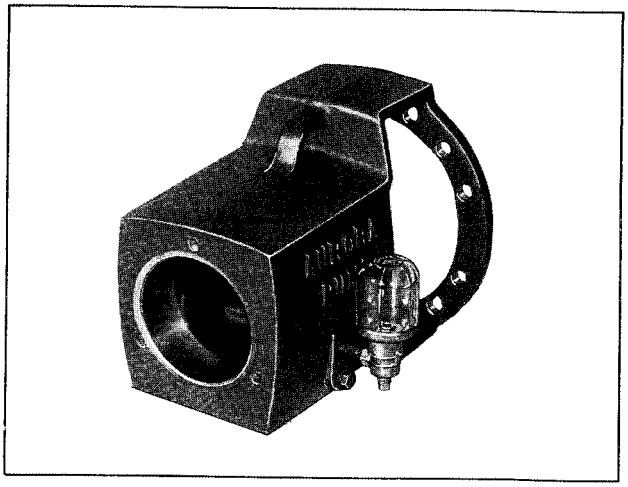
9. For Model 153 and 154, place pin (33) in position on right hand side of stuffing box (5). For Model 151 and 152 place pin (33) in position on LEFT hand side of stuffing box (5). Place channel ring (4) in its rabbeted groove on stuffing box (5). The discharge opening must be at the bottom with the pin in place.

10. Set "O" ring (18) in the groove in shaft sleeve (12).

11. Slide key (21) into the keyway on shaft (10) and the shaft sleeve (12).



K. Remove retainer ring from bearing cap with truarc pliers.



L. Constant oiler connection to power frame.

12. Place impeller key (74) in sleeve (12) and slide impeller (3) on sleeve.

13. Slide sleeve extension (16) onto shaft (10) and against the shaft sleeve (12) on Model 153 and 154.

14. Place a channel ring (2), channel ring (4) and interstage bushing (72) on shaft (10). The discharge opening of channel ring (4) should face up. Also note that pin (71) is in place in ring (4) on Model 153 and 154.

15. Place impeller key (74) in sleeve (16) and slide impeller (3) on sleeve. Insert "O" ring (18) in the groove provided in the sleeve extension and secure with impeller screw (20).

16. "O" Ring (17) can be set in its groove in casing by applying a light coat of oil and sticking it in place.

17. Channel ring (2) is placed over the rabbet face of channel ring (4).

18. Slide the pump into casing (1). Secure with capscrews (47).

19. Place the spacer coupling back on pump and motor. Tighten capscrews holding frame foot (8) to base.

20. Connect all flushing and cooling lines that were removed from pump.

21. Open all valves or flow devises that control flow of liquids to or from the pump.

22. Check pump to make sure alignment between pump and motor has not been disturbed.

23. Read the starting instructions before attempting to put your Apco-Chem pump back in operation.

24. Before starting, double check for free rotation of impeller with no bind. If a rub is noted, recheck all assembly steps.

Model 151 List of Parts (See Figures 1 and 4 thru 7)

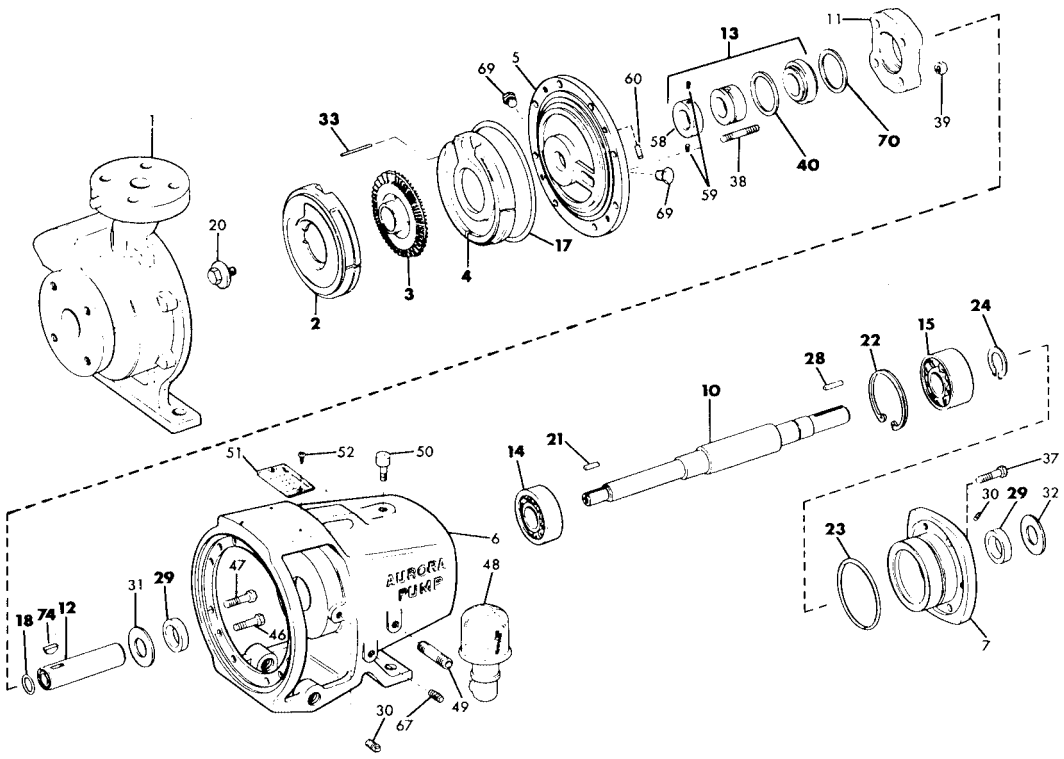
1. Casing
2. Channel Ring RH
3. Impeller
4. Channel Ring LH
5. Stuffing Box
6. Frame
7. Cartridge
10. Shaft
11. Gland
12. Sleeve
13. Seal
14. Bearing
15. Bearing
17. "O" Ring
18. "O" Ring
20. Screw
21. Key - Sleeve
22. Ring
23. "O" Ring
24. Ring
28. Key
29. Seal
30. Plug
31. Slinger
32. Slinger
33. Pin
37. Capscrew
38. Stud
39. Nut
40. Gasket
41. Drip Cup
46. Capscrew
47. Capscrew
48. Oiler
49. Nipple
50. Breather
51. Nameplate
52. Screw
58. Seal Collar
59. Setscrew
60. Pin
61. Packing Gland
62. Gland Packing
63. Capscrew
64. Nut
65. Packing
66. Lantern Ring
67. Plug
69. Plug
70. Gasket
74. Key - Impeller

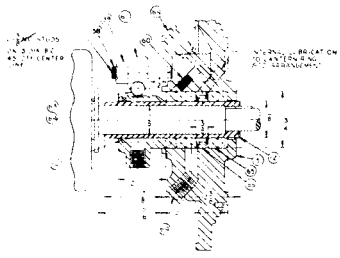
Model 152 List of Parts (See Figures 2 and 4 thru 7)

1. Casing
1A. Casing (C/L MTD)
2. Channel Ring RH
3. Impeller
4. Channel Ring LH
5. Stuffing Box
5A. Stuffing Box (Water JKTD)
6. Frame
7. Cartridge
8. Frame Foot
9. Casing Foot
10. Shaft
11. Gland
12. Sleeve
13. Seal
14. Bearing
15. Bearing
17. "O" Ring
18. "O" Ring
19. Capscrew
20. Screw
21. Key - Sleeve
22. Ring
23. "O" Ring
24. Ring
25. Capscrew
26. Nut
27. Nut
28. Key
29. Seal
30. Plug
31. Slinger
32. Slinger
33. Pin
34. Cover
35. Bracket
37. Capscrew
38. Stud
39. Nut
40. Gasket
41. Drip Cup
42. Gasket
43. Capscrew
44. Capscrew
45. Capscrew
46. Capscrew
47. Capscrew
48. Oiler
49. Nipple
50. Breather
51. Nameplate
52. Screw
53. Casing Foot RH
54. Casing Foot LH
55. Capscrew
56. Eye Bolt
58. Seal Collar
59. Setscrew
60. Pin
61. Packing Gland
62. Gland Packing
63. Capscrew
64. Nut
65. Packing
66. Lantern Ring
67. Plug
68. Plug
69. Plug
70. Gasket
74. Key - Impeller

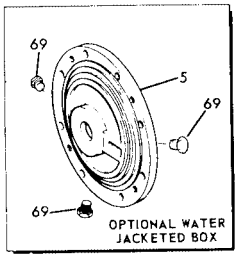
Model 153-154 List of Parts (See Figures 3 and 4 thru 7)

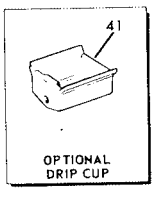
1. Casing
1A. Casing (C/L MTD)
2. Channel Ring RH
3. Impeller
4. Channel Ring LH
5. Stuffing Box
5A. Stuffing Box (Water JKTD)
6. Frame
7. Cartridge
8. Frame Foot
9. Casing Foot
10. Shaft
11. Gland
12. Sleeve
13. Seal
14. Bearing
15. Bearing
16. Sleeve Extension
17. "O" Ring
18. "O" Ring
19. Capscrew
20. Screw
21. Key - Sleve
22. Ring
23. "O" Ring
24. Ring
25. Capscrew
26. Nut
27. Nut
28. Key
29. Seal
30. Plug
31. Slinger
32. Slinger
33. Pin
34. Cover
35. Bracket
37. Capscrew
38. Stud
39. Nut
40. Gasket
41. Drip Cup
42. Gasket
43. Capscrew
44. Capscrew
45. Capscrew
46. Capscrew
47. Capscrew
48. Oiler
49. Nipple
50. Breather
51. Nameplate
52. Screw
53. Casing Foot RH
54. Casing Foot LH
55. Capscrew
56. Eye Bolt
58. Seal Collar
59. Setscrew
60. Pin
61. Packing Gland
62. Gland Packing
63. Capscrew
64. Nut
65. Packing
66. Lantern Ring
67. Plug
69. Plug
70. Gasket
71. Pin
72. Bushing
74. Key - Impeller

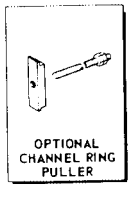




PACKING BOX
(STANDARD)





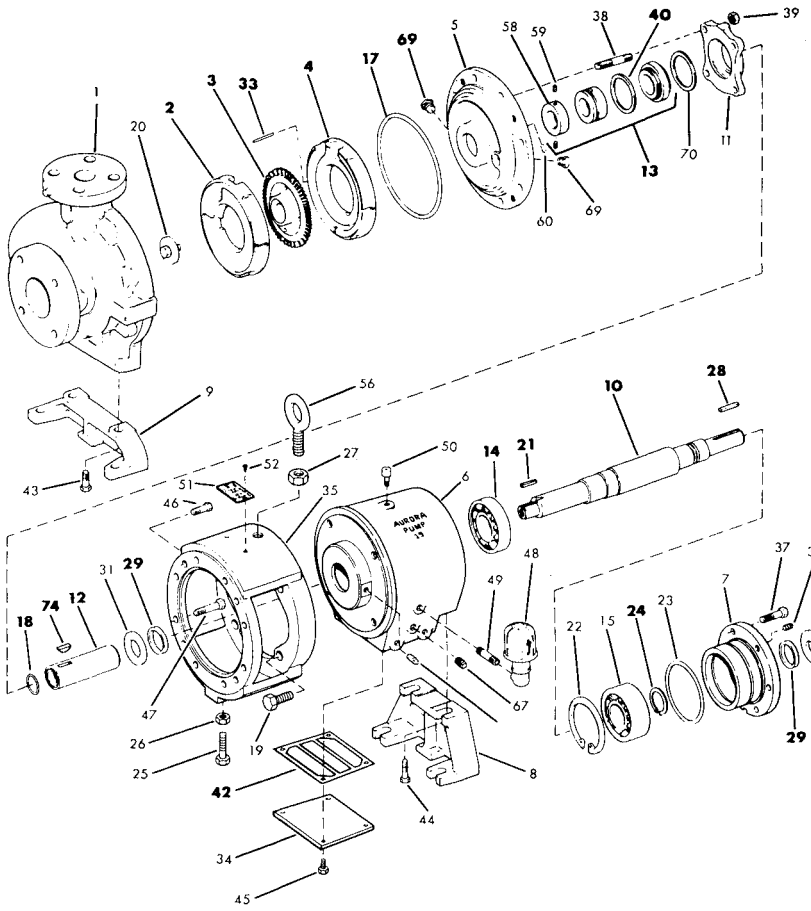


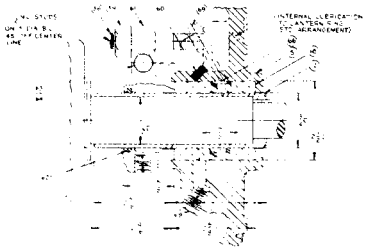
NOTE

WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL.

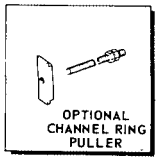
ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR, FACTORY BRANCH SALES OFFICE OR THE FACTORY AT NORTH AURORA, ILLINOIS.

Figure 1. Apco-Chem Model 151 Exploded View

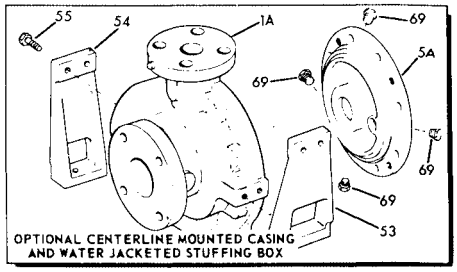




PACKING BOX
(STANDARD)





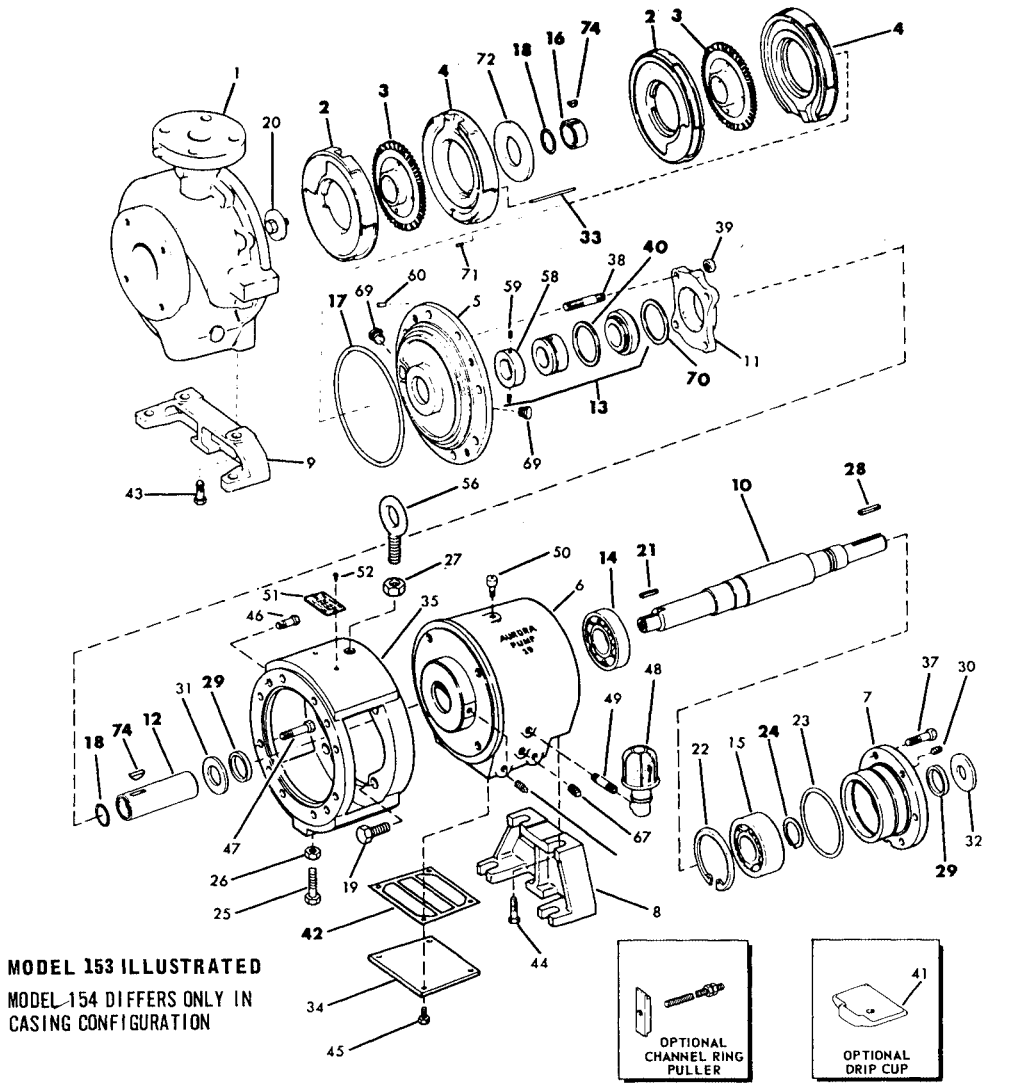


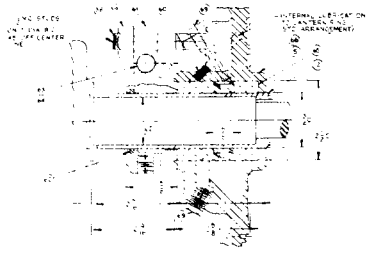
NOTE

WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL.

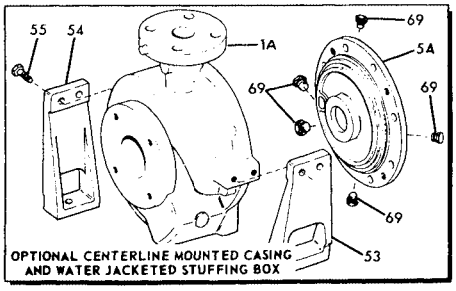
ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR, FACTORY BRANCH SALES OFFICE OR THE FACTORY AT NORTH AURORA, ILLINOIS.

Figure 2. Apco-Chem Model 152 Exploded View





PACKING BOX
(STANDARD)



NOTE

WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL.

ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR, FACTORY BRANCH SALES OFFICE OR THE FACTORY AT NORTH AURORA, ILLINOIS.

Figure 3. Apco-Chem Model 153-154 Exploded View

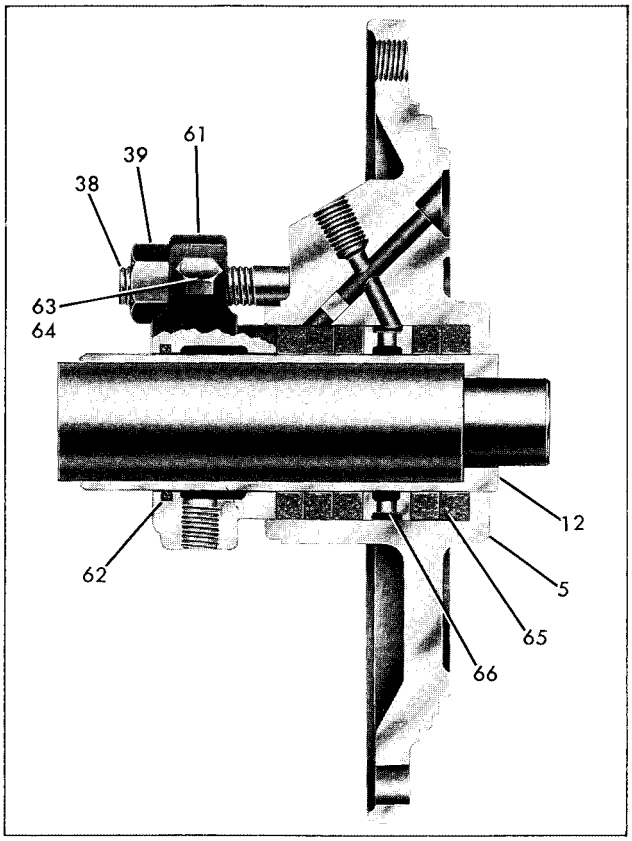


Figure 4. Standard Packing With Lantern Ring

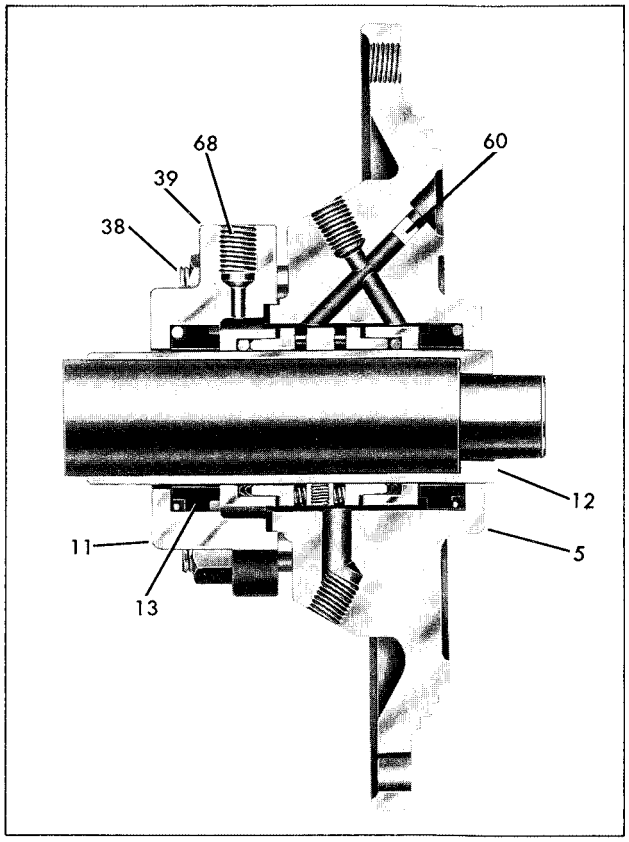


Figure 6. Double Inside-Unbalanced Mechanical Seal

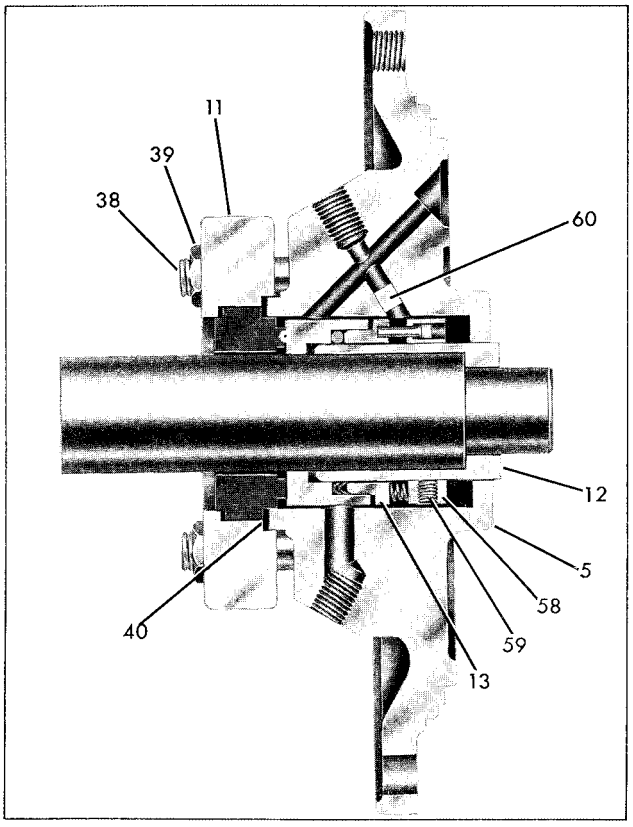


Figure 5. Single Inside-Balanced Mechanical Seal

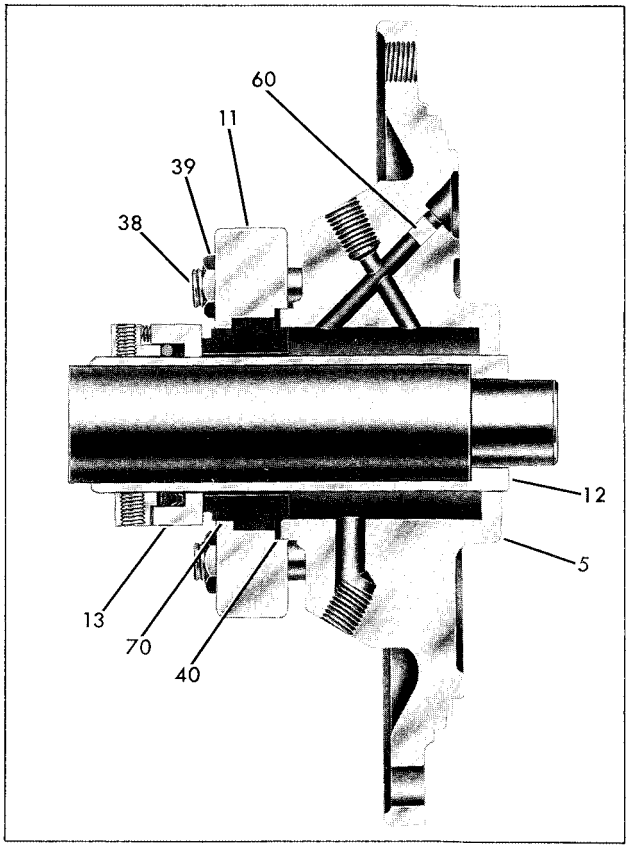
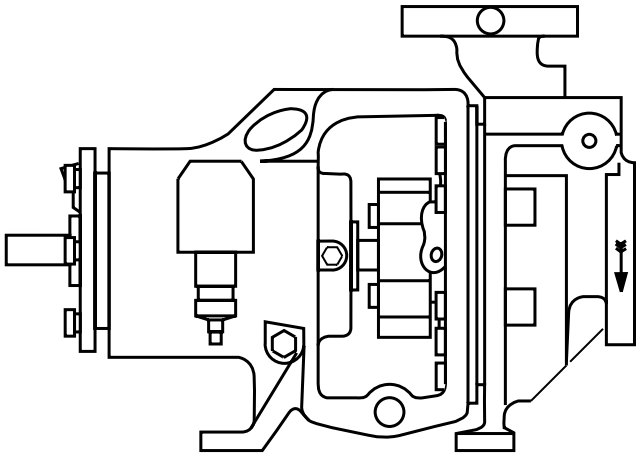


Figure 7. Single Outside-Balanced Mechanical Seal

SUPERSEDES 150P PAGE 1
DATED NOVEMBER 1988

150 SERIES
REPAIR PARTS INDEX



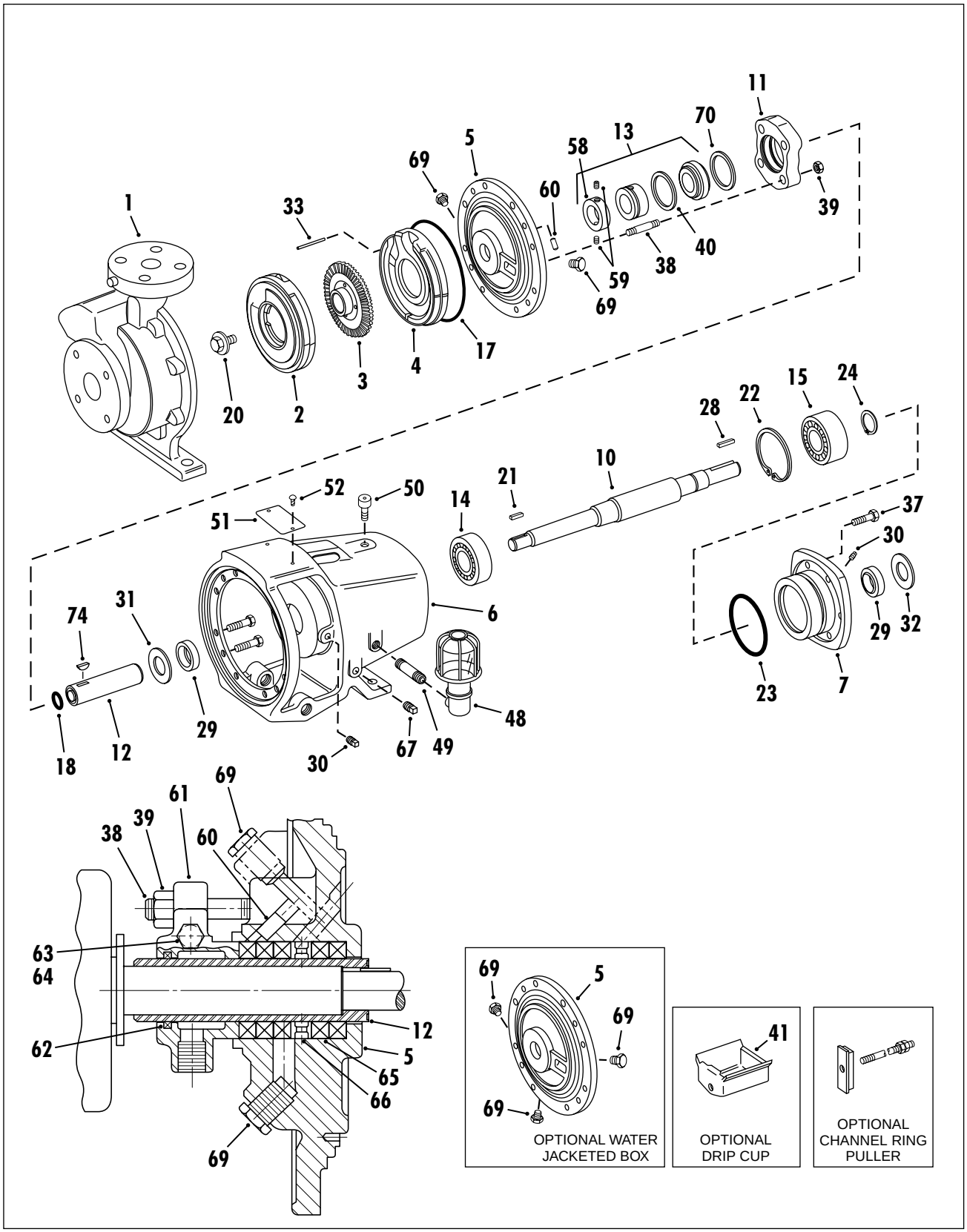
READ AND UNDERSTAND THE PUMP AND MOTOR INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL, DISASSEMBLE OR REPAIR THE PUMP

AURORA®
Pentair Pump Group

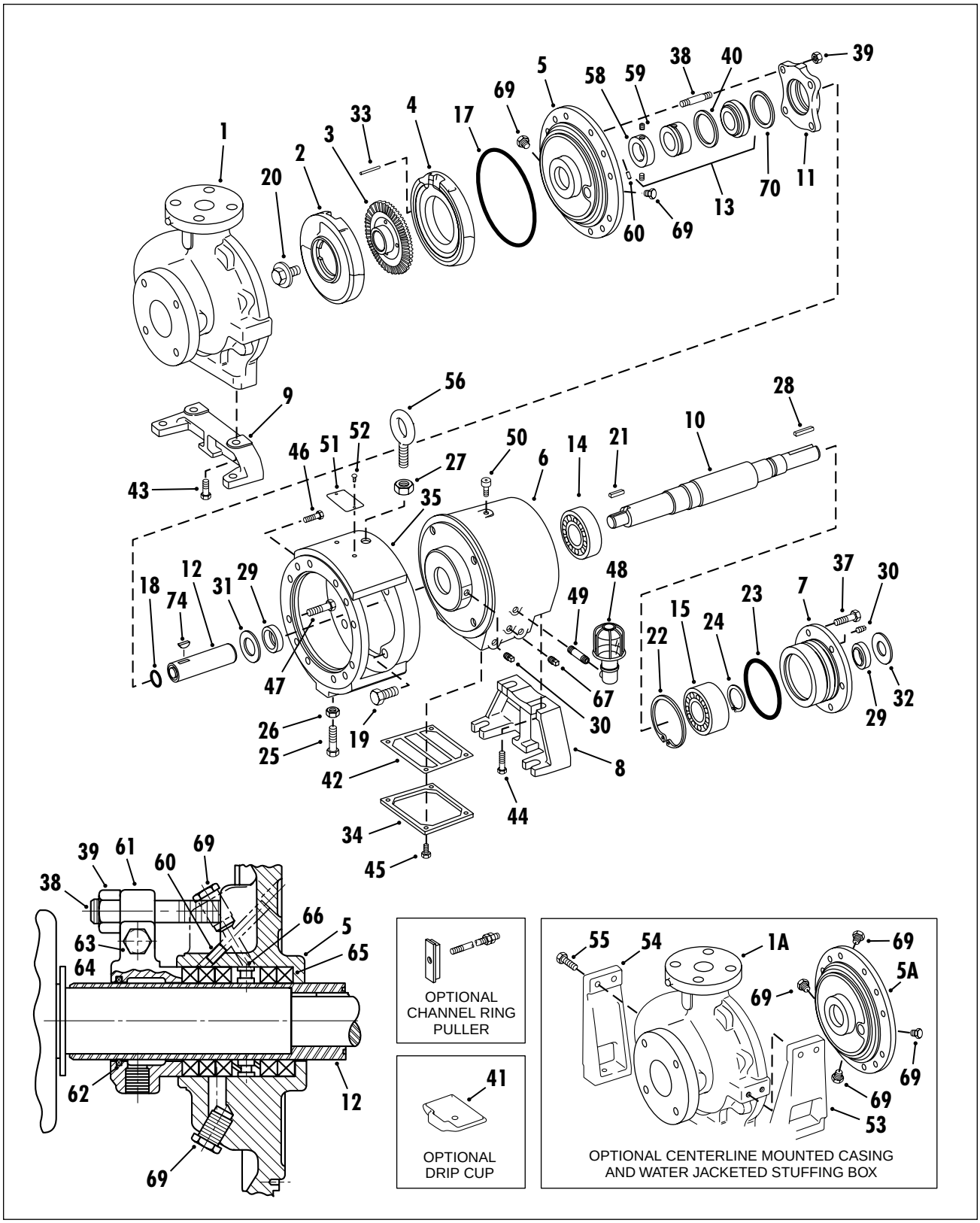
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152	19-20-21-14	715	7-8
152	19-20-21-14	811	7-8
152	19-20-21-14	911	7-8
152	19-20-21-14	912	7-8
152	19-20-21-14	913	7-8
152	19-20-21-14	914	7-8
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153-154	19-20-21-14	725	9-10
153-154	19-20-21-14	821	9-10
153-154	19-20-21-14	921	9-10
153-154	19-20-21-14	922	9-10
153-154	19-20-21-14	923	9-10
153-154	19-20-21-14	924	9-10
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152	22	911	11-12
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152	22	913	11-12
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153-154	22	821	11-12
153-154	22	921	11-12
153-154	22	922	11-12
153-154	22	923	11-12
153-154	22	924	11-12
153-154	22	991	11-12
153-154	22	992	11-12
153-154	22	993	11-12
153-154	22	994	11-12

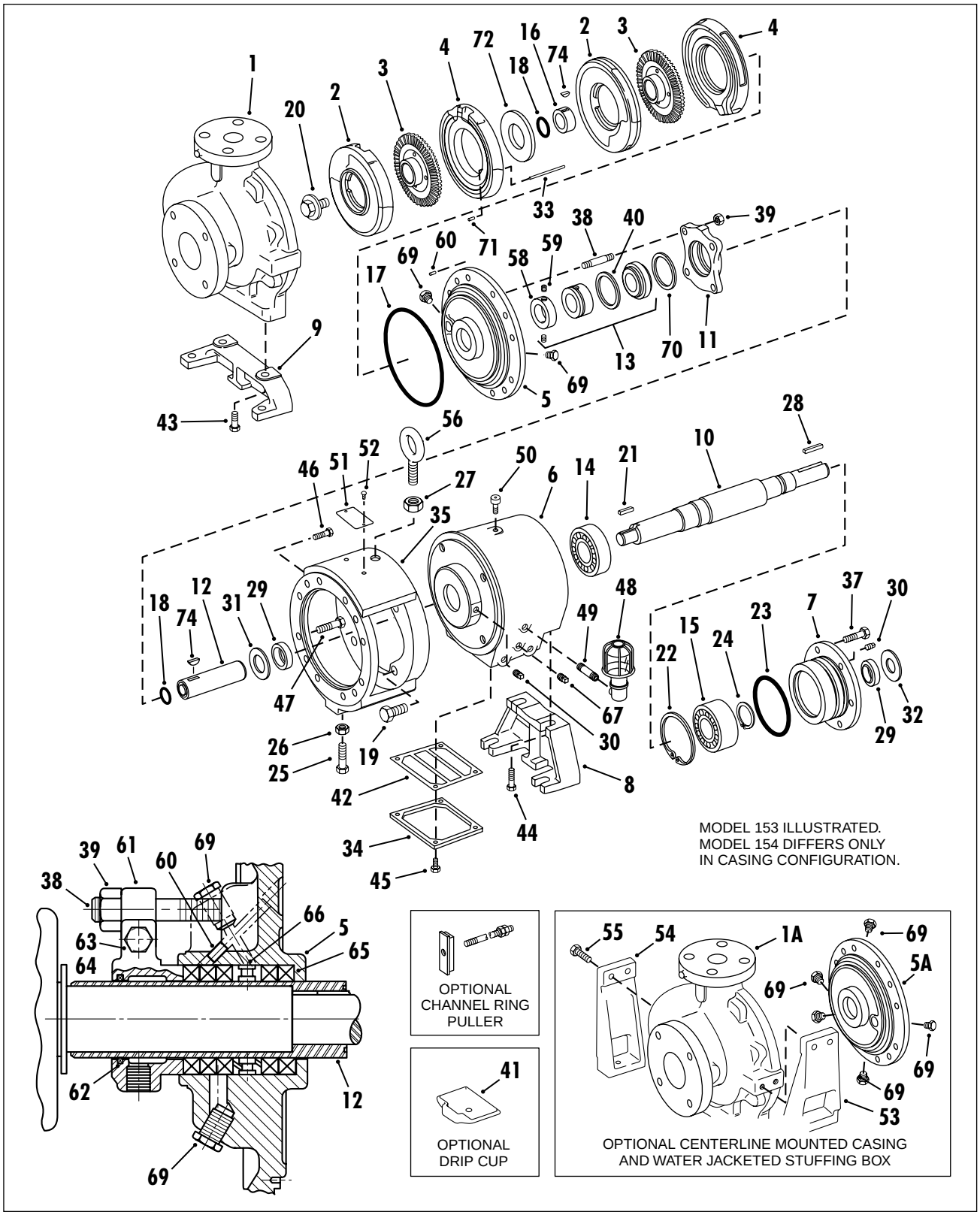
150 SERIES
MODEL 151
PIECE NUMBERS



150 SERIES
MODEL 152
PIECE NUMBERS



150 SERIES
MODEL 153-154
PIECE NUMBERS



150 SERIES
MODEL 151
111 THRU 212
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
1	CASING	1	180-0622	053	104	053	104
2	CHANNEL RING						
	(RIGHT HAND) 111	1	676-1939	010	010		
	111	1	676-0154			548	548
	211	1	676-1940	010	010		
	211	1	676-0156			548	548
	212	1	676-1941	010	010		
	212	1	676-0158			548	548
3	IMPELLER 111	1	444-2253	053	053	104	104
	211	1	444-2254	053	053	104	104
	212	1	444-2255	053	053	104	104
4	CHANNEL RING						
	(LEFT HAND) 111	1	676-1936	010	010		
	111	1	676-0153			548	548
	211	1	676-1937	010	010		
	211	1	676-0155			548	548
	212	1	676-1938	010	010		
	212	1	676-0157			548	548
5	STUFFING BOX	1	812-0317	053	104	053	104
5A	STUFFING BOX	1	812-0318	053	104	053	104
	(OPTIONAL WATER						
	JACKETED)						
6	FRAME	1	356-0176	010	010	010	010
7	BRG. CARTRIDGE	1	164-0453	010	010	010	010
10	SHAFT	1	728-0427	063	063	063	104
11	SEAL GLAND	1	372-0337	053	104	053	104
12	SLEEVE PACKING	1	756-0507	108	108	108	104
	SLEEVE, ROTT & 9T	1	756-0507	104	104	104	104
	PT & 9BT	1	756-0508	104	104	104	104
13	SEAL ROTT	1	712-6175	776	776	776	776
	PT	1	712-6165	776	776	776	776
	9BT	1	712-6155	762	762	762	762
	9T	1	712-6145	762	762	762	762
14	BEARING	1	068-0157	647	647	647	647
15	BEARING	1	068-0455	647	647	647	647
17	O-RING	1	364-0447	494	494	494	494
18	O-RING	1	364-0321	494	494	494	494
20	IMPELLER SCREW	1	544-2158	104	104	104	104
21	KEY	1	472-0180	104	104	104	104
22	RETAINING RING	1	676-0445	088	088	088	088

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
23	O-RING	1	364-0427	457	457	457	457
24	RETAINING RING	1	676-0929	088	088	088	088
28	KEY	1	472-0201	087	087	087	087
29	SEAL	2	712-0250	653	653	653	653
30	PLUG	3	600-0001	087	087	087	087
31	SLINGER	1	764-0057	522	522	522	522
32	SLINGER	1	764-0057	522	522	522	522
33	PIN	1	592-0806	104	104	104	104
37	CAPSCREW	3	168-0386	082	082	082	082
38	STUD	2	808-0111	104	104	104	104
39	NUT	2	544-0109	104	104	104	104
40	GASKET	1	364-1315	509	509	509	509
41	DRIP CUP (OPT.)	1	268-0156	104	104	104	104
46	CAPSCREW	4	168-0382	082	082	082	104
47	CAPSCREW	8	168-0390	082	082	082	104
48	OILER	1	552-0027	652	652	652	652
49	NIPPLE	1	600-1204	387	387	387	387
50	BREATHER	1	864-0053	656	656	656	656
51	NAMEPLATE	1	532-0056	114	114	114	114
52	DRIVE SCREW	2	708-0013	365	365	365	365
57	THROTTLE BUSHING	(NOT SHOWN)					
	ROTT & 9T	1	136-1362	540	540	540	540
	PT & 9BT	1	136-1363	540	540	540	540
58	SEAL COLLAR	(NOT REQUIRED)					
59	SETSCREW	(NOT REQUIRED)					
60	PIN	1	592-0028	104	104	104	104
61	PACKING GLAND	1	372-0330	053	104	053	104
62	GLAND PACKING	2	564-0303	802	802	802	802
63	CAPSCREW	2	168-0280	104	104	104	104
64	NUT	2	544-0105	104	104	104	104
65	PACKING	6	564-0069	802	802	802	802
66	LATERN RING	1	676-0960	512	512	512	512
67	PLUG	3	600-0020	087	087	087	087
69	PLUG	3	600-0002	087	104	087	104
70	GASKET	1	364-1317	509	509	509	509
74	KEY	1	472-0109	104	104	104	104
	OPT. RING PULLER						
	PULLER	1	628-0009	058			
	SCREW	1	708-0815	058			
	NUT	2	544-0109	080			

150 SERIES
MODEL 152
713 THRU 914
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
1	CASING	1	180-0620	053	104	053	104
1A	CASING - CENTERLINE MOUNT	1	180-0623	053	104	053	104
2	CHANNEL RING (RIGHT HAND) 713	1	676-1928	010	010		
	713	1	676-0160			548	548
	715	1	676-1929	010	010		
	715	1	676-0162			548	548
	811	1	676-1930	010	010		
	811	1	676-0164			548	548
	911	1	676-1931	010	010		
	911	1	676-0166			548	548
	912	1	676-1932	010	010		
	912	1	676-0168			548	548
	913	1	676-1933	010	010		
	913	1	676-0170			548	548
	914	1	676-1934	010	010		
	914	1	676-0172			548	548
3	IMPELLER 713	1	444-2256	053	053	104	104
	715	1	444-2256	053	053	104	104
	811	1	444-2257	053	053	104	104
	911	1	444-2258	053	053	104	104
	912	1	444-2259	053	053	104	104
	913	1	444-2260	053	053	104	104
	914	1	444-2261	053	053	104	104
4	CHANNEL RING (LEFT HAND) 713	1	676-1921	010	010		
	713	1	676-0159			548	548
	715	1	676-1922	010	010		
	715	1	676-0161			548	548
	811	1	676-1923	010	010		
	811	1	676-0163			548	548
	911	1	676-1924	010	010		
	911	1	676-0165			548	548
	912	1	676-1925	010	010		
	912	1	676-0167			548	548
	913	1	676-1926	010	010		
	913	1	676-0169			548	548
	914	1	676-1927	010	010		
	914	1	676-0171			548	548

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
5	STUFFING BOX	1	812-0315	053	104	053	104
5A	STUFFING BOX - JACKETED	1	812-0316	053	104	053	104
6	FRAME (STD)	1	356-0004	010	010	010	010
	(JACKETED)	1	356-0007	010	010	010	010
7	BRG. CARTRIDGE	1	164-0108	010	010	010	010
8	FRAME FOOT	1	820-0125	010	010	010	010
9	CASING FOOT	1	820-0127	010	010	010	010
10	SHAFT	1	728-0425	063	063	063	104
11	GLAND		REFER TO FACTORY				
12	SLEEVE PACKING	1	756-0504	108	108	108	104
	ROTT & 9T	1	756-0504	104	104	104	104
	PT & 9BT	1	756-0505	104	104	104	104
13	SEAL ROTT	1	712-6176	776	776	776	776
	9T	1	712-6146	762	762	762	762
	PT	1	712-6166	776	776	776	776
	9BT	1	712-6156	762	762	762	762
14	BEARING	1	068-0160	647	647	647	647
15	BEARING	1	068-0458	647	647	647	647
17	O-RING	1	364-0456	494	494	494	494
18	O-RING	2	364-0329	494	494	494	494
19	CAPSCREW	4	168-0562	082	082	082	082
20	IMPELLER SCREW	1	544-2159	104	104	104	104
21	KEY	1	472-0201	104	104	104	104
22	RETAINING RING	1	676-0446	088	088	088	088
23	O-RING	1	364-0436	457	457	457	457
24	RETAINING RING	1	676-0943	088	088	088	088
25	CAPSCREW	1	168-0496	082	082	082	082
26	NUT	1	544-0113	082	082	082	082
27	NUT	1	544-0117	082	082	082	082
28	KEY	1	472-0245	087	087	087	087
29	SEAL	2	712-0256	653	653	653	653
30	PLUG	3	600-0001	087	087	087	087
31	SLINGER	1	764-0055	522	522	522	522
32	SLINGER	1	764-0056	522	522	522	522
33	PIN	1	592-0806	104	104	104	104
34	POWER FRAME COVER	1	260-0682	087	087	087	087
35	BRACKET	1	116-0461	010	010	010	010
37	CAPSCREW	3	168-0492	082	082	082	082

150 SERIES
MODEL 152
713 THRU 914
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
38	STUD (STD PUMP)	2	808-0315	104	104	104	104
	(JACKETED PUMP)	2	808-0313	104	104	104	104
39	NUT	2	544-0113	104	104	104	104
40	GASKET	1	364-1314	509	509	509	509
41	DRIP CUP (OPT.)	1	268-0155	104	104	104	104
42	POWER FR. GASKET	1	364-0811	614	614	614	614
43	CAPSCREW	2	168-0488	082	082	082	082
44	CAPSCREW	3	168-0492	082	082	082	082
45	CAPSCREW	4	168-0252	082	082	082	082
46	CAPSCREW	4	168-0488	082	082	082	104
47	CAPSCREW	8	168-0496	082	082	082	104
48	OILER	1	552-0027	652	652	652	652
49	NIPPLE	1	600-1204	387	387	387	387
50	BREATHER	1	864-0053	656	656	656	656
51	NAMEPLATE	1	532-0056	114	114	114	114
52	DRIVE SCREW	2	708-0013	365	365	365	365
53	CASING FT. RH	1	820-0126	010	010	010	010
54	CASING FT. RH	1	820-0128	010	010	010	010
55	CAPSCREW	4	168-0492	082	082	082	082
56	EYEBOLT	1	100-0110	082	082	082	082
57	THROTTLE BUSHING						
	(NOT SHOWN)						
	ROTT & 9T	1	136-1359	540	540	540	540
	PT & 9BT	1	136-1360	540	540	540	540
58	SEAL COLLAR		REFER TO FACTORY				
59	SETSCREW	2	724-0077	104	104	104	104
60	PIN	1	592-0028	104	104	104	104
61	PACKING GLAND	1	372-0323	053	104	053	104
62	GLAND PACKING	2	564-0302	802	802	802	802
63	CAPSCREW	2	168-0394	104	104	104	104
64	NUT	2	544-0109	104	104	104	104
65	PACKING	7	564-0105	802	802	802	802
66	LANTERN RING	1	676-0953	512	512	512	512
67	PLUG	3	600-0002	087	087	087	087
69	PLUG	4	600-0002	087	104	087	104
70	GASKET	1	364-1316	509	509	509	509

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
74	KEY	1	472-0109	104	104	104	104
	OPTIONAL RING PULLER						
	PULLER	1	628-0010	058			
	SCREW	1	708-0815	058			
	NUT	2	544-0109	080			
	REPAIR KIT INCLUDES PIECE NOS. 2, 3, 4, 17, 18, 20, 23						
	151 CT-111		476-0319	642			623
	CT-211		476-0320	642			623
	CT-212		476-0321	642			623
	152 CT-713		476-0322	642			623
	CT-715		476-0323	642			623
	CT-811		476-0324	642			623
	CT-911		476-0325	642			623
	CT-912		476-0326	642			623
	CT-913		476-0327	642			623
	CT-914		476-0328	642			623

150 SERIES
MODEL 153-154
723 THRU 994
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
1	CASING - 153	1	180-0621	053	104	053	104
	CASING - 154	1	180-0616	053	104	053	104
1A	CASING - CENTERLINE	1	180-0624	053	104	053	104
	MOUNT - 153						
	CASING - CENTERLINE	1	180-0617	053	104	053	104
	MOUNT - 154						
2	CHANNEL RING						
	(RIGHT HAND) 723	2	676-1928	010	010		
	723	2	676-0160			548	548
	725	2	676-1929	010	010		
	725	2	676-0162			548	548
	821	2	676-1930	010	010		
	821	2	676-0164			548	548
	921 & 991	2	676-1931	010	010		
	921 & 991	2	676-0166			548	548
	922 & 992	2	676-1932	010	010		
	922 & 992	2	676-0168			548	548
	923 & 993	2	676-1933	010	010		
	923 & 993	2	676-0170			548	548
	924 & 994	2	676-1934	010	010		
	924 & 994	2	676-0172			548	548
3	IMPELLER 723	2	444-2256	053	053	104	104
	725	2	444-2256	053	053	104	104
	821	2	444-2257	053	053	104	104
	921 & 991	2	444-2258	053	053	104	104
	922 & 992	2	444-2259	053	053	104	104
	923 & 993	2	444-2260	053	053	104	104
	924 & 994	2	444-2261	053	053	104	104
4	CHANNEL RING						
	(LEFT HAND) 723	2	676-1921	010	010		
	723	2	676-0159			548	548
	725	2	676-1922	010	010		
	725	2	676-0161			548	548
	821	2	676-1923	010	010		
	821	2	676-0163			548	548
	921 & 991	2	676-1924	010	010		
	921 & 991	2	676-0165			548	548
	922 & 992	2	676-1925	010	010		
	922 & 992	2	676-0167			548	548

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
4	CHANNEL RING LH						
	923 & 993	2	676-1926	010	010		
	923 & 993	2	676-0169			548	548
	924 & 994	2	676-1927	010	010		
	924 & 994	2	676-0171			548	548
5	STUFFING BOX	1	812-0315	053	104	053	104
5A	STUFFING BOX -	1	812-0316	053	104	053	104
	JACKETED						
6	FRAME (STD.)	1	356-0004	010	010	010	010
	(JACKETED)	1	356-0007	010	010	010	010
7	BRG. CARTRIDGE	1	164-0108	010	010	010	010
8	FRAME FOOT	1	820-0125	010	010	010	010
9	CASING FOOT	1	820-0127	010	010	010	010
10	SHAFT	1	728-0426	063	063	063	104
11	GLAND		REFER TO FACTORY				
12	SLEEVE PACKING	1	756-0504	108	108	108	104
	ROTT & 9T	1	756-0504	104	104	104	104
	PT & 9BT	1	756-0505	104	104	104	104
13	SEAL						
	ROTT	1	712-6176	776	776	776	776
	9T	1	712-6146	762	762	762	762
	PT	1	712-6166	776	776	776	776
	9BT	1	712-6156	762	762	762	762
14	BEARING	1	068-0160	647	647	647	647
15	BEARING	1	068-0458	647	647	647	647
16	SLEEVE EXTENSION	1	756-0503	104	104	104	104
17	O-RING	1	364-0456	494	494	494	494
18	O-RING	2	364-0329	494	494	494	494
19	CAPSCREW	4	168-0562	082	082	082	082
20	IMPELLER SCREW	1	544-2159	104	104	104	104
21	KEY - SLEEVE	1	472-0211	104	104	104	104
22	RETAINING RING	1	676-0446	088	088	088	088
23	O-RING	1	364-0436	457	457	457	457
24	RETAINING RING	1	676-0943	088	088	088	088
25	CAPSCREW	1	168-0496	082	082	082	082
26	NUT	1	544-0113	082	082	082	082
27	NUT	1	544-0117	082	082	082	082
28	KEY	1	472-0245	087	087	087	087

150 SERIES
MODEL 153-154
723 THRU 994
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
29	SEAL	2	712-6327	653	653	653	653
30	PLUG	3	600-0001	087	087	087	087
31	SLINGER	1	764-0055	522	522	522	522
32	SLINGER	1	764-0056	522	522	522	522
33	PIN	1	592-0817	104	104	104	104
34	POWER FRAME	1	260-0682	087	087	087	087
	COVER						
35	BRACKET	1	116-0461	010	010	010	010
37	CAPSCREW	3	168-0492	082	082	082	082
38	STUD		REFER TO FACTORY				
39	NUT	2	544-0113	104	104	104	104
40	GASKET	1	364-1314	509	509	509	509
41	DRIP CUP	1	268-0155	104	104	104	104
42	POWER FR. GASKET	1	364-0811	614	614	614	614
43	CAPSCREW	2	168-0488	082	082	082	082
44	CAPSCREW	2	168-0492	082	082	082	082
45	CAPSCREW	4	168-0252	082	082	082	082
46	CAPSCREW	4	168-0488	082	082	082	104
47	CAPSCREW	8	168-0496	082	082	082	104
48	OILER	1	552-0027	652	652	652	652
49	NIPPLE	1	600-1204	387	387	387	387
50	BREATHER	1	864-0053	656	656	656	656
51	NAMEPLATE	1	532-0056	114	114	114	114
52	DRIVE SCREW	2	708-0013	365	365	365	365
53	CASING FT. RH	1	820-0126	010	010	010	010
54	CASING FT. LH	1	820-0128	010	010	010	010
55	CAPSCREW	4	168-0492	082	082	082	082
56	EYEBOLT	1	100-0110	082	082	082	082
57	THROTTLE BUSHING						
	(NOT SHOWN)						
	ROTT & 9T	1	136-1359	540	540	540	540
	PT & 9BT	1	136-1360	540	540	540	540
58	SEAL COLLAR		REFER TO FACTORY				
59	SETSCREW	2	724-0077	104	104	104	104
60	PIN	1	592-0028	104	104	104	104
61	PACKING GLAND	1	372-0323	053	104	053	104
62	GLAND PACKING	2	564-0302	802	802	802	802
63	CAPSCREW	2	168-0394	104	104	104	104
64	NUT	2	544-0109	104	104	104	104
65	PACKING	7	564-0105	802	802	802	802

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 19	20	21	14
66	LANTERN RING	1	676-0953	512	512	512	512
67	PLUG	3	600-0002	087	087	087	087
69	PLUG	5	600-0002	087	104	087	104
70	GASKET	1	364-1316	509	509	509	509
71	PIN	1	592-0238	104	104	104	104
72	BUSHING	1	136-0117	104	104	104	104
74	KEY	2	472-0109	104	104	104	104
	OPTIONAL RING PULLER						
	PULLER	1	628-0010	058			
	SCREW	1	708-0815	058			
	NUT	2	544-0109	080			
	REPAIR KIT INCLUDES PIECE NOS. 2, 3, 4, 16, 17, 18, 20, 33, 71, 72, 74						
	CT-723		476-0329	642			623
	CT-725		476-0330	642			623
	CT-821		476-0331	642			623
	CT-921		476-0332	642			623
	CT-922		476-0333	642			623
	CT-923		476-0334	642			623
	CT-924		476-0335	642			623
	CT-991		476-0332	642			623
	CT-992		476-0333	642			623
	CT-993		476-0334	642			623
	CT-994		476-0335	642			623

150 SERIES
MODEL 152-153-154
713 THRU 914, 723 THRU 994
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 22	–	–	–
1	CASING 152	1	180-0620	111			
	153	1	180-0621	111			
	154	1	180-0616	111			
1A	CASING						
	CENTERLINE MOUNT						
	152	1	180-0623	111			
	153	1	180-0624	111			
	154	1	180-0617	111			
2	CHANNEL RING						
	(RIGHT HAND)						
	152 713	1	676-0160	549			
	715	1	676-0162	549			
	811	1	676-0164	549			
	911	1	676-0166	549			
	912	1	676-0168	549			
	913	1	676-0170	549			
	914	1	676-0172	549			
	153-154 723	2	676-0160	549			
	725	2	676-0162	549			
	821	2	676-0164	549			
	921 & 991	2	676-0166	549			
	922 & 992	2	676-0168	549			
	923 & 993	2	676-0170	549			
	924 & 994	2	676-0172	549			
3	IMPELLER						
	152 713	1	444-2256	111			
	715	1	444-2256	111			
	811	1	444-2257	111			
	911	1	444-2258	111			
	912	1	444-2259	111			
	913	1	444-2260	111			
	914	1	444-2261	111			
	153-154 723	2	444-2256	111			
	725	2	444-2256	111			
	821	2	444-2257	111			
	921 & 991	2	444-2258	111			
	922 & 992	2	444-2259	111			
	923 & 993	2	444-2260	111			
	924 & 994	2	444-2261	111			

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL 22	–	–	–
4	CHANNEL RING						
	(LEFT HAND)						
	152 713	1	676-0159	549			
	715	1	676-0161	549			
	811	1	676-0163	549			
	911	1	676-0165	549			
	912	1	676-0167	549			
	913	1	676-0169	549			
	914	1	676-0171	549			
	153-154 723	2	676-0159	549			
	725	2	676-0161	549			
	821	2	676-0163	549			
	921 & 991	2	676-0165	549			
	922 & 992	2	676-0167	549			
	923 & 993	2	676-0169	549			
	924 & 994	2	676-0171	549			
5	STUFFING BOX	1	812-0315	111			
5A	STUFFING BOX -	1	812-0316	111			
	JACKETED						
6	FRAME	1	356-0004	010			
	JACKETED	1	356-0007	010			
7	BRG. CARTRIDGE	1	164-0108	010			
8	FRAME FOOT	1	820-0125	010			
9	CASING FOOT	1	820-0127	010			
10	SHAFT 152	1	728-0425	111			
	153-154	1	728-0426	111			
11	GLAND		REFER TO FACTORY				
12	SLEEVE PACKING	1	756-0504	111			
	ROTT & 9T	1	756-0504	111			
	PT & 9BT	1	756-0505	111			
13	SEAL						
	ROTT	1	712-6176	775			
	9T	1	712-6146	768			
	PT	1	712-6166	775			
	9BT	1	712-6156	768			
14	BEARING	1	068-0160	647			
15	BEARING	1	068-0458	647			
16	SLEEVE EXTENSION						
	153-154	1	756-0503	111			
17	O-RING	1	364-0456	509			
18	O-RING	1	364-0329	509			

150 SERIES
MODEL 152-153-154
713 THRU 914, 723 THRU 994
PARTS LIST

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL			
				22	–	–	–
19	CAPSCREW	4	168-0562	082			
20	IMPELLER SCREW	1	544-2159	111			
21	KEY 152	1	472-0201	111			
	153-154	1	472-0211	111			
22	RETAINING RING	1	676-0446	088			
23	O-RING	1	364-0436	457			
24	RETAINING RING	1	676-0943	088			
25	CAPSCREW	1	168-0496	082			
26	NUT	1	544-0113	080			
27	NUT	1	544-0117	080			
28	KEY	1	472-0245	087			
29	SEAL	2	712-6327	653			
30	PLUG	2	600-0001	087			
31	SLINGER	1	764-0055	522			
32	SLINGER	1	764-0056	522			
33	PIN 152	1	592-0806	111			
	153-154	1	592-0817	111			
34	POWER FRAME						
	COVER	1	260-0682	087			
35	BRACKET	1	116-0461	010			
37	CAPSCREW	3	168-0492	082			
38	STUD		REFER TO FACTORY				
39	NUT 152	2	544-0113	111			
	153-154	2	544-0013	111			
40	GASKET	1	364-1314	509			
41	DRIP CUP	1	268-0155	104			
42	GASKET	1	364-0811	614			
43	CAPSCREW	2	168-0488	082			
44	CAPSCREW	3	168-0492	082			
45	CAPSCREW	4	168-0252	082			
46	CAPSCREW	2	168-0488	104			
47	CAPSCREW	8	168-0496	104			
48	OILER	1	552-0027	652			
49	NIPPLE	1	600-1204	387			
50	BREATHER	1	864-0053	656			
51	NAMEPLATE	1	532-0056	114			
52	DRIVE SCREW	2	708-0013	365			
53	CASING FOOT RH	1	820-0126	010			
54	CASING FOOT LH	1	820-0128	010			
56	EYEBOLT	1	100-0110	082			

PC. NO.	DESCRIPTION	QTY	PART NO.	MATERIAL			
				22	–	–	–
57	THROTTLE BUSHING						
	(NOT SHOWN)						
	ROTT & 9T	1	136-1359	540			
	PT & 9BT	1	136-1360	540			
58	SEAL COLLAR		REFER TO FACTORY				
59	SETSCREW	2	724-0077	111			
60	PIN	1	592-0028	111			
61	PACKING GLAND	1	372-0323	111			
62	GLAND PACKING	2	564-0302	802			
63	CAPSCREW	2	168-0394	111			
64	NUT	2	544-0109	111			
65	PACKING	7	564-0105	802			
66	LANTERN RING	1	676-0953	512			
67	PLUG	3	600-0002	087			
69	PLUG	5	600-0002	087			
70	GASKET	1	364-1316	509			
71	PIN 153-154	1	592-0238	111			
72	BUSHING 153-154	1	136-0117	111			
74	KEY	1	472-0109	111			
	OPTIONAL RING						
	PULLER						
	SCREW	1	708-0815	058			
	NUT	2	544-0109	080			
	PULLER	1	628-0010	058			
75	PLUG						
	152		N/R*				
	153		N/R				
	154	1	600-0005	087	104	087	104

AP-150P-REPAIR 12.99

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Pentair Pump Group

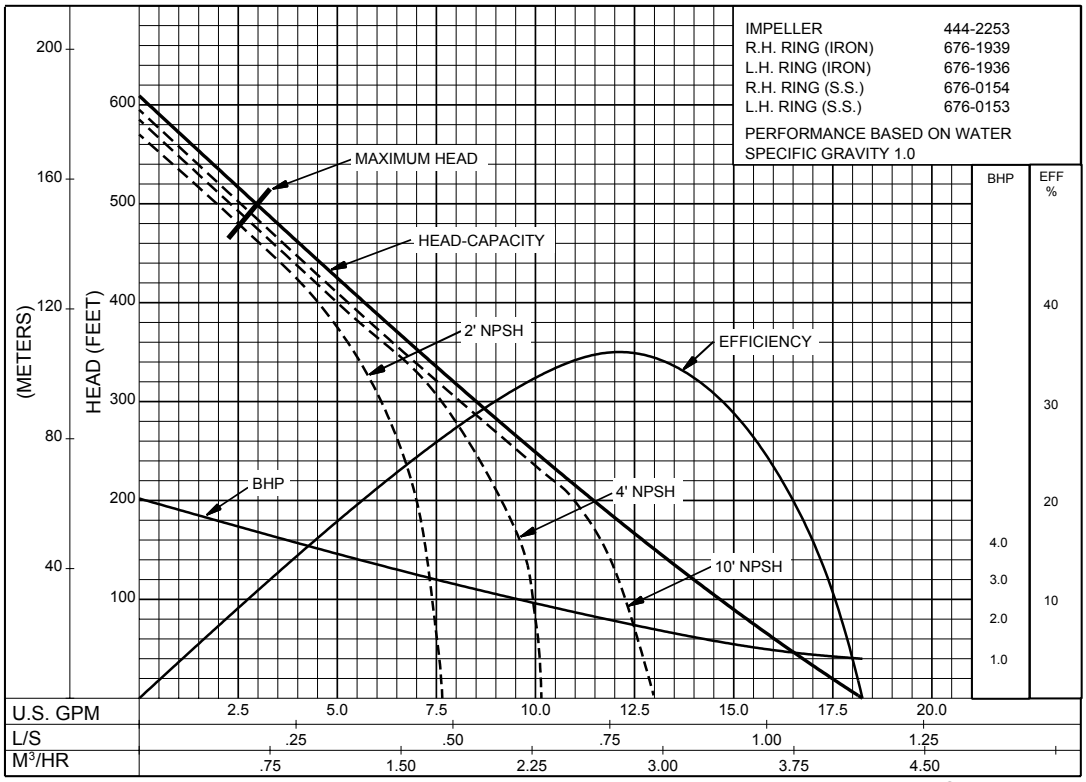
Aurora Pumps
800 Airport Road
North Aurora, IL 60542
phone: 630-859-7000
fax: 630-859-7060

NOTE:
Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information without notice

Performance Curves for the 150 Series

MODEL/SIZE	R.P.M.	CATALOG PAGE	PDF PAGE
CT-111 APCO-CHEM	3500/1750	401	2
CT-211 APCO-CHEM	3500/1750	402	3
CT-212 APCO-CHEM	3500/1750	403	4
CT-713 APCO-CHEM	3500/1750	404	5
CT-715 APCO-CHEM	3500/1750	405	6
CT-811 APCO-CHEM	3500/1750	406	7
CT-911 APCO-CHEM	3500/1750	407	8
CT-912 APCO-CHEM	3500/1750	408	9
CT-913 APCO-CHEM	3500/1750	409	10
CT-914 APCO-CHEM	3500/1750	410	11
CT-723 APCO-CHEM	3500/1750	411	12
CT-725 APCO-CHEM	3500/1750	412	13
CT-821 APCO-CHEM	3500/1750	413	14
CT-921 APCO-CHEM	3500/1750	414	15
CT-922 APCO-CHEM	3500/1750	415	16
CT-923 APCO-CHEM	3500/1750	416	17
CT-924 APCO-CHEM	3500/1750	417	18
CT-991 APCO-CHEM	3500/1750	418	19
CT-992 APCO-CHEM	3500/1750	419	20
CT-993 APCO-CHEM	3500/1750	420	21
CT-994 APCO-CHEM	3500/1750	421	22

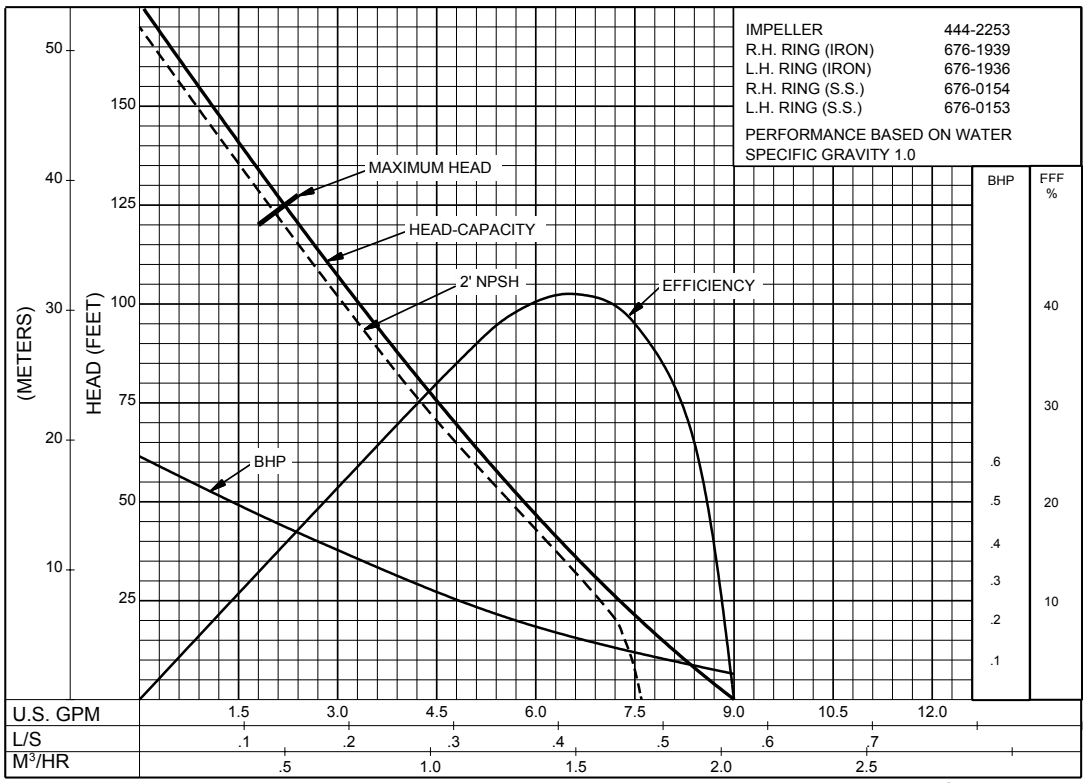
SIZE : CT-111 **TYPE : 150** **R. P. M. : 3500**



11PC-115632A

3500 R.P.M

SIZE : CT-111 **TYPE : 150** **R. P. M. : 1750**



11PC-115631A

1750 R.P.M

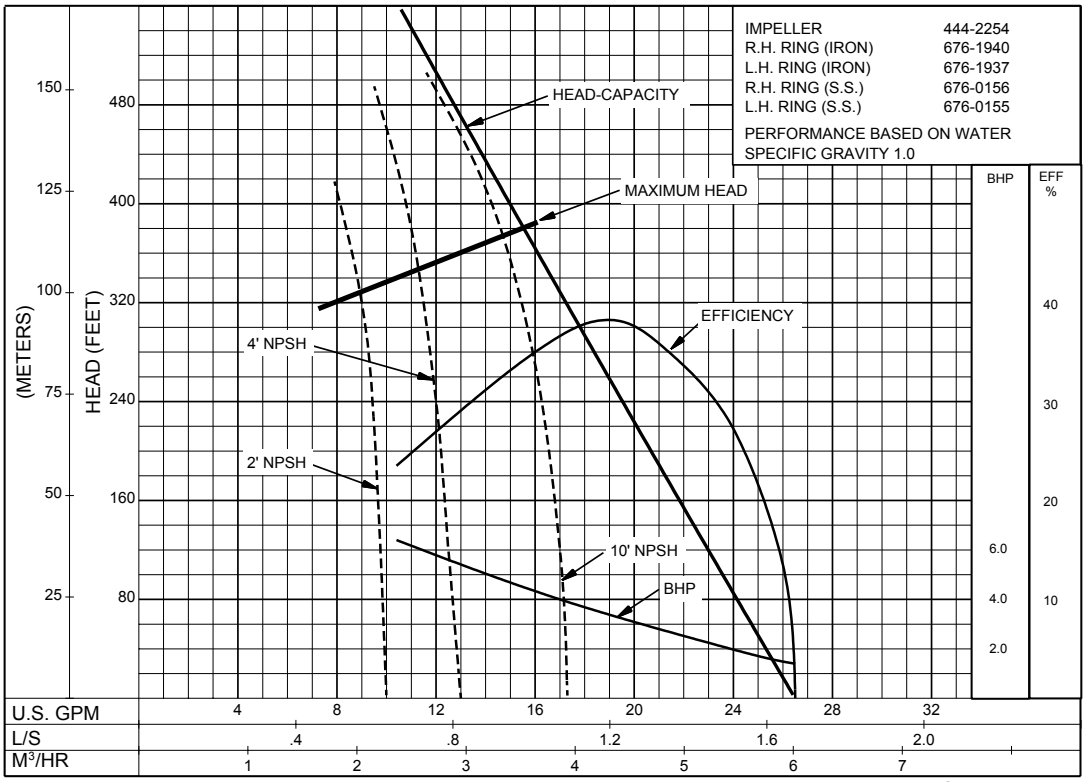
Supersedes Section 150 Page 402
Dated August 1989

CT-211 APCO-CHEM

STANDARD CLEARANCE

3500
R.P.M

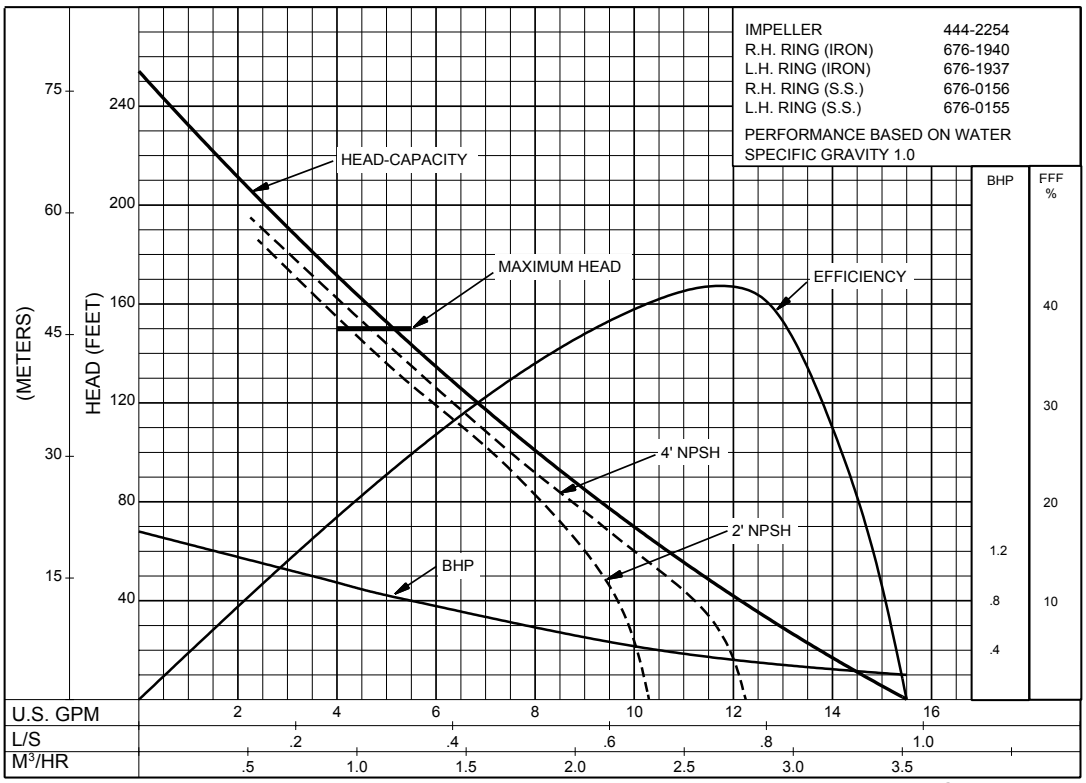
SIZE : CT-211 **TYPE : 150** **R. P. M. : 3500**



11PC-115634

1750
R.P.M

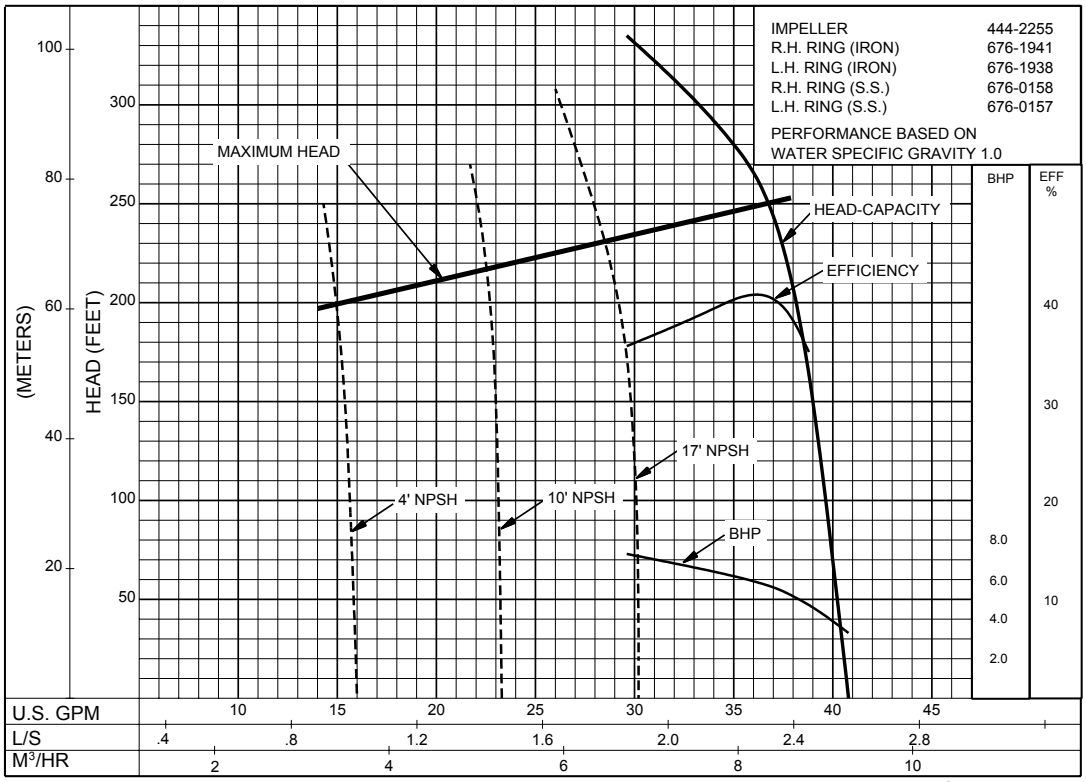
SIZE : CT-211 **TYPE : 150** **R. P. M. : 1750**



11PC-115633

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Pentair Pump Group

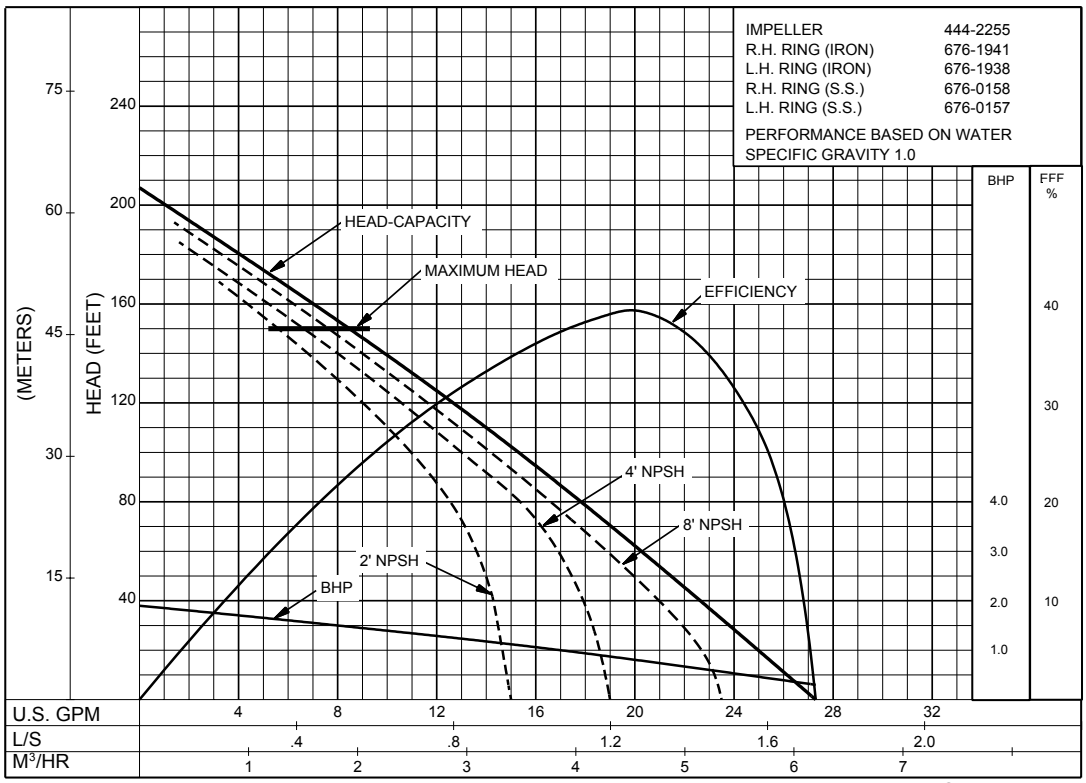
SIZE : CT-212 **TYPE : 150** **R. P. M. : 3500**



11PC-115636

3500 R.P.M

SIZE : CT-212 **TYPE : 150** **R. P. M. : 1750**



11PC-115635

1750 R.P.M

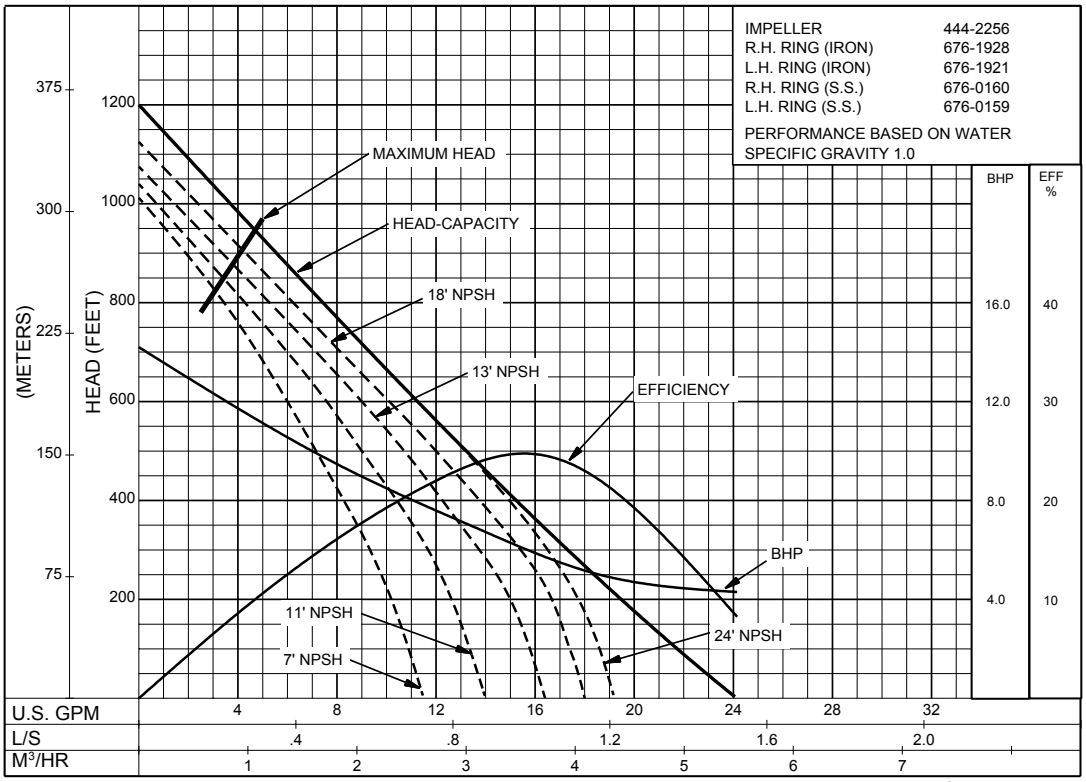
Supersedes Section 150 Page 404
Dated August 1989

CT-713 APCO-CHEM

STANDARD CLEARANCE

3500
R.P.M

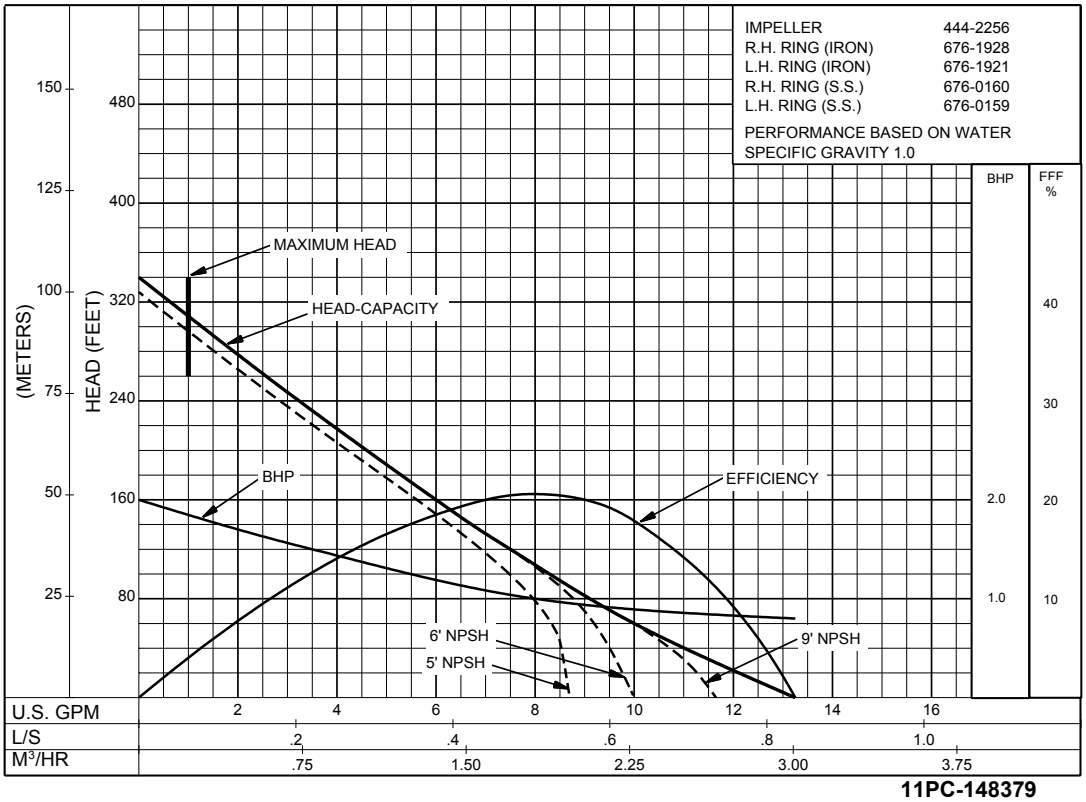
SIZE : CT-713 **TYPE : 150** **R. P. M. : 3500**



11PC-148380

1750
R.P.M

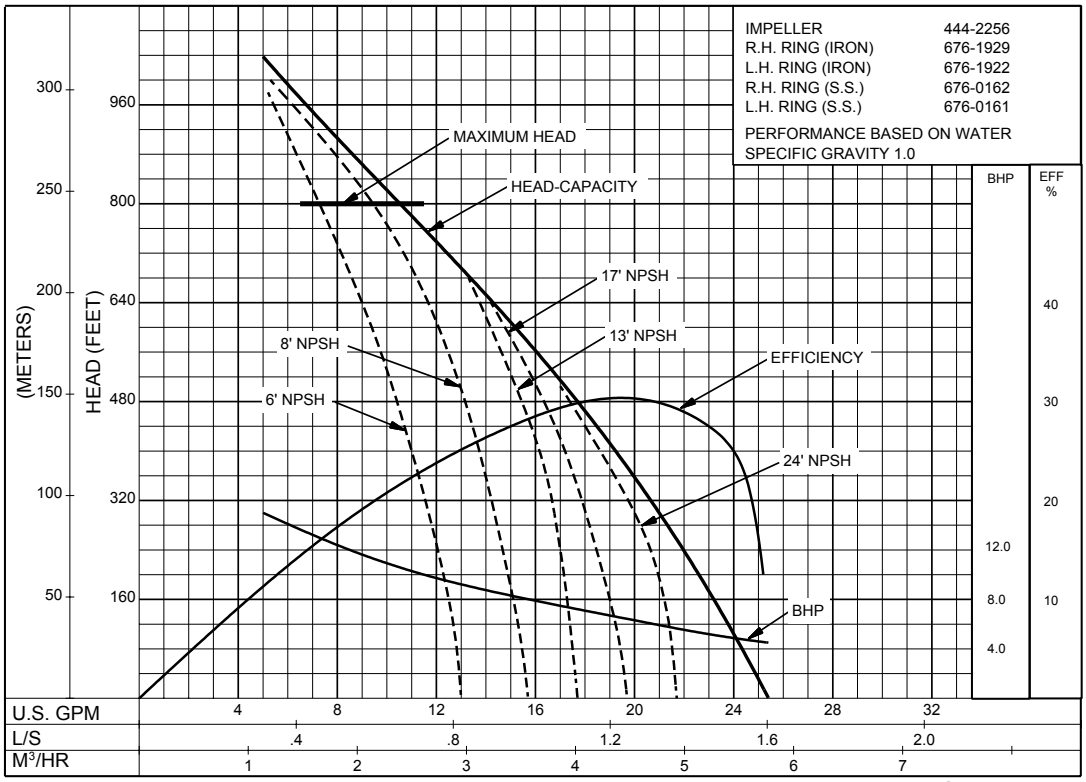
SIZE : CT-713 **TYPE : 150** **R. P. M. : 1750**



11PC-148379

AURORA®
Pentair Pump Group

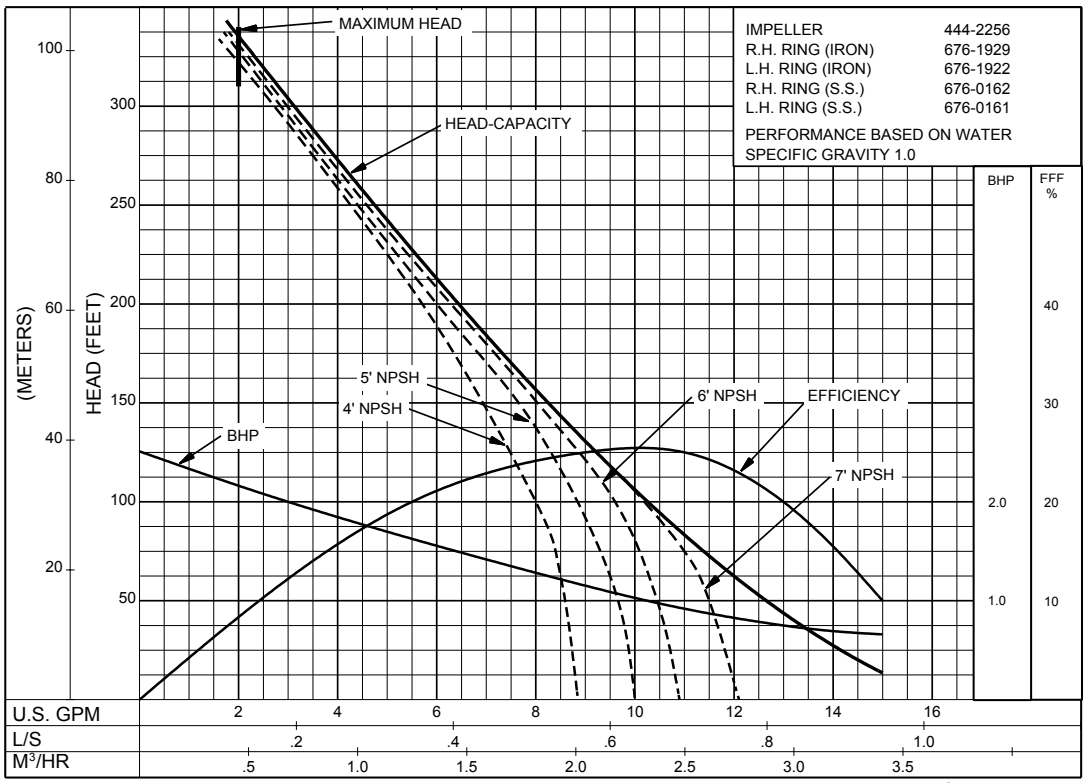
SIZE : CT-715 **TYPE : 150** **R. P. M. : 3500**



11PC-149038

3500 R.P.M

SIZE : CT-715 **TYPE : 150** **R. P. M. : 1750**



11PC-149037

1750 R.P.M

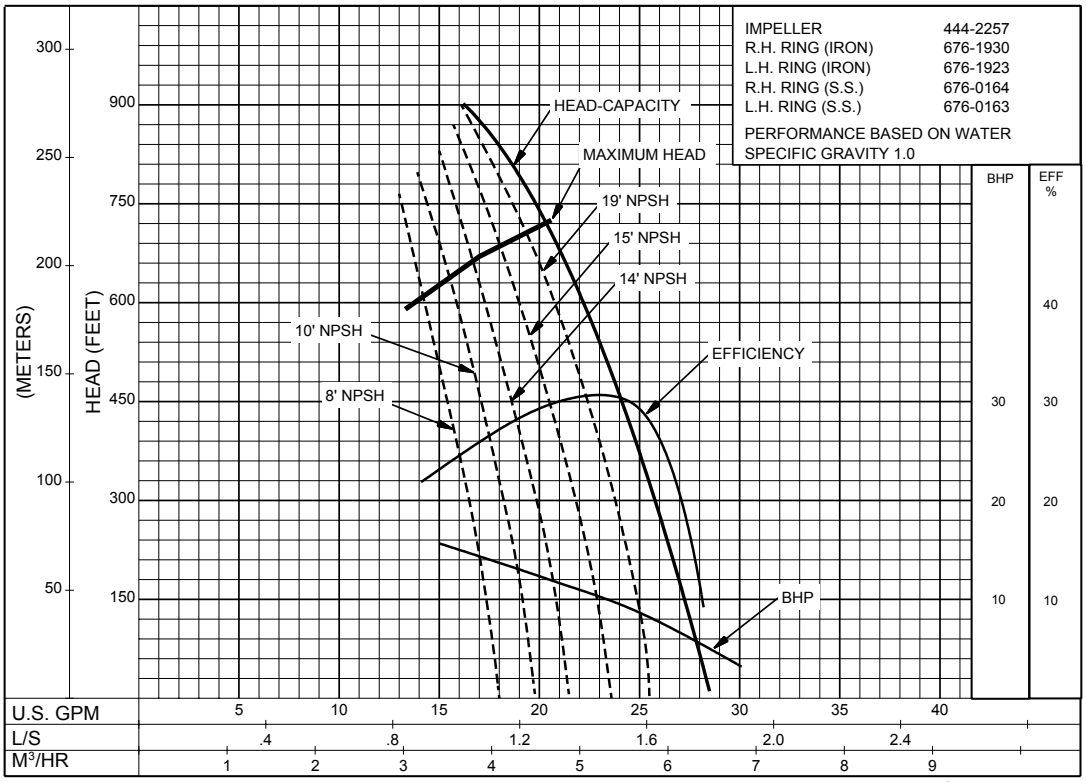
Supersedes Section 150 Page 406
Dated August 1989

CT-811 APCO-CHEM

STANDARD CLEARANCE

3500
R.P.M

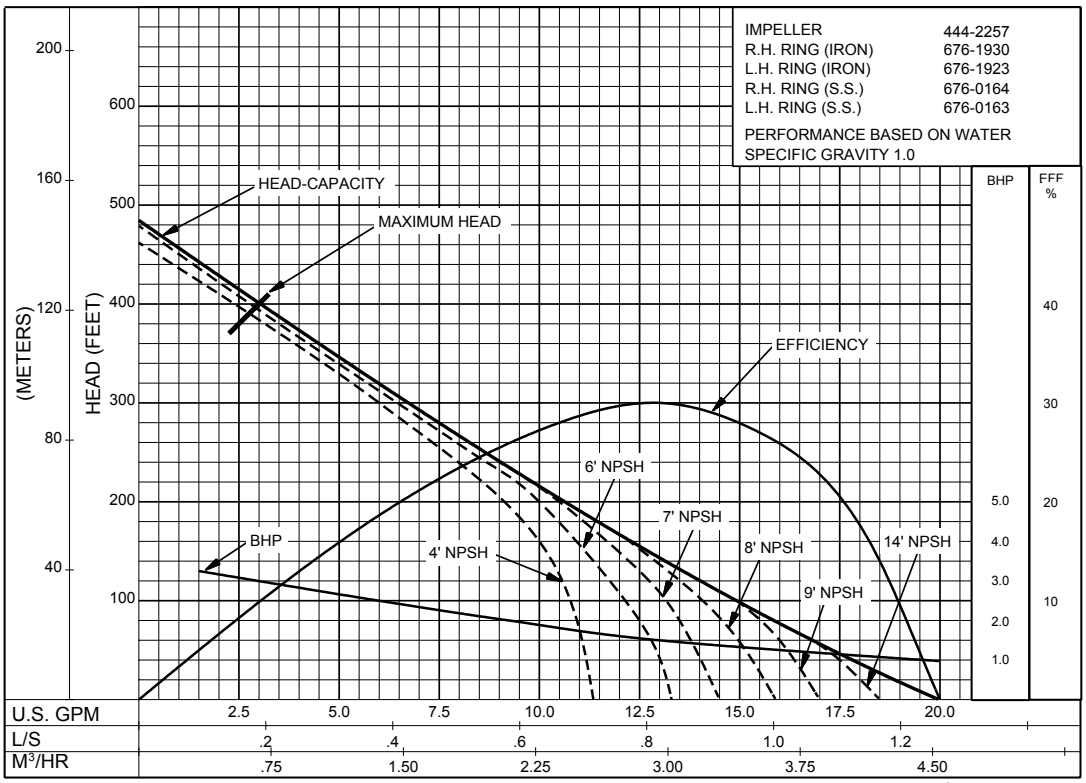
SIZE : CT-811 **TYPE : 150** **R. P. M. : 3500**



11PC-148655

1750
R.P.M

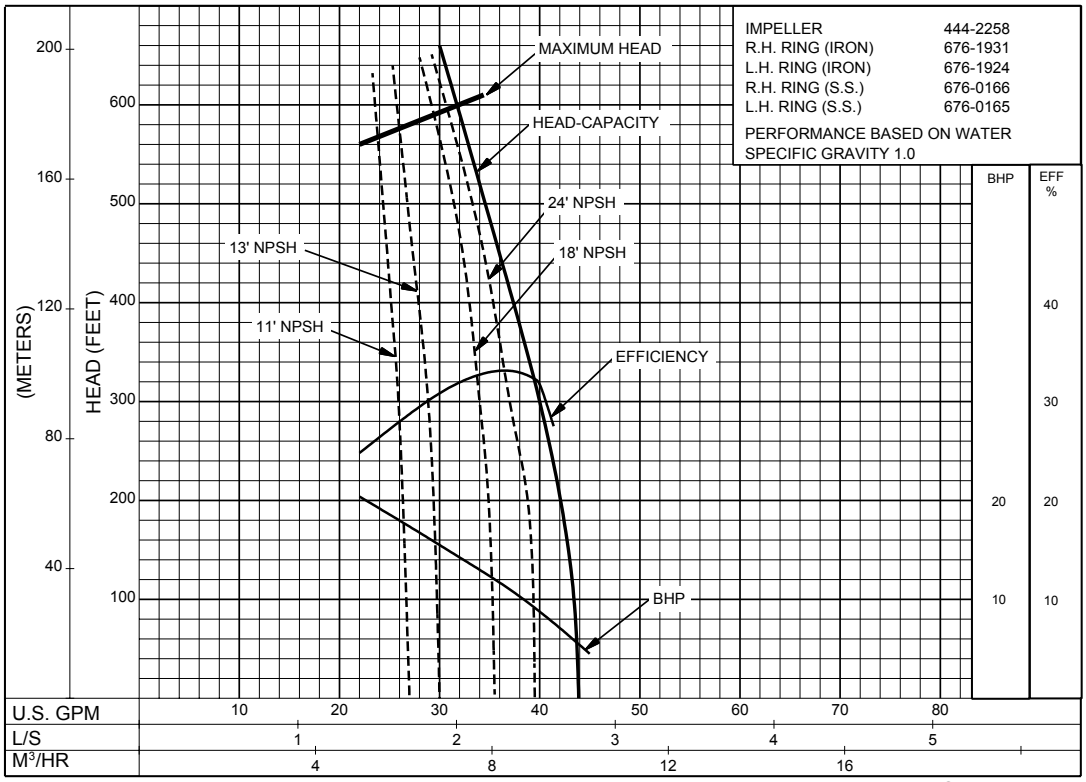
SIZE : CT-811 **TYPE : 150** **R. P. M. : 1750**



11PC-148654

AURORA®
Pentair Pump Group

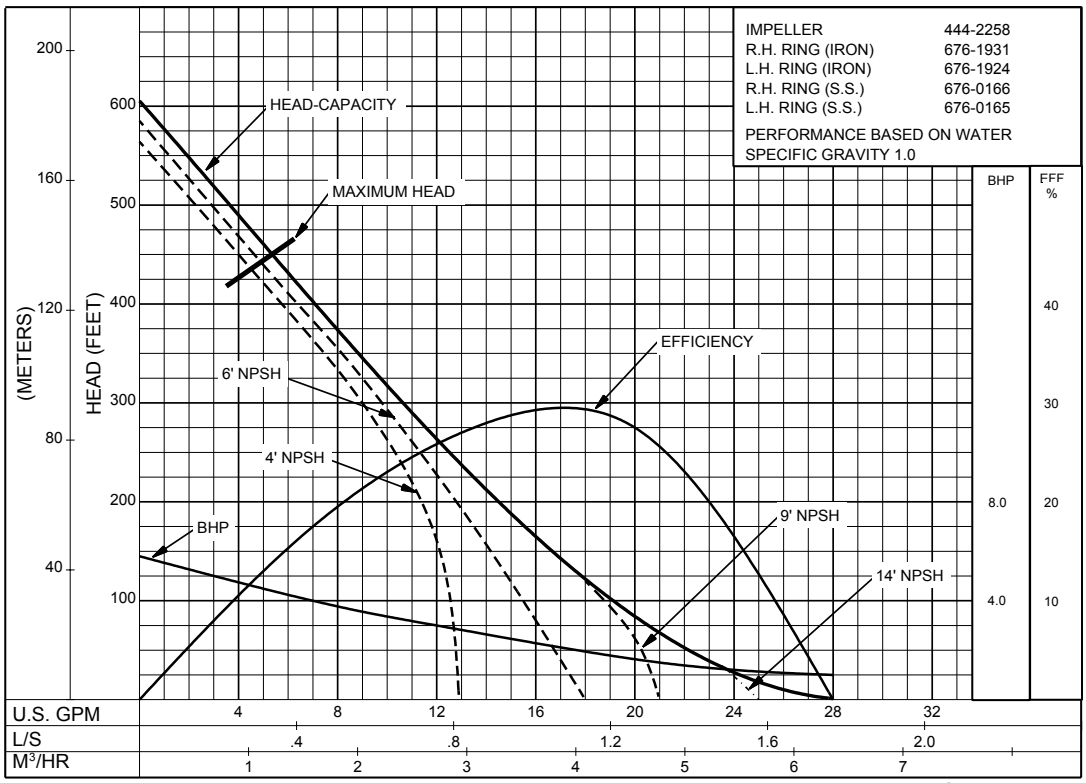
SIZE : CT-911 **TYPE : 150** **R. P. M. : 3500**



11PC-148411

3500 R.P.M

SIZE : CT-911 **TYPE : 150** **R. P. M. : 1750**



11PC-148410

1750 R.P.M

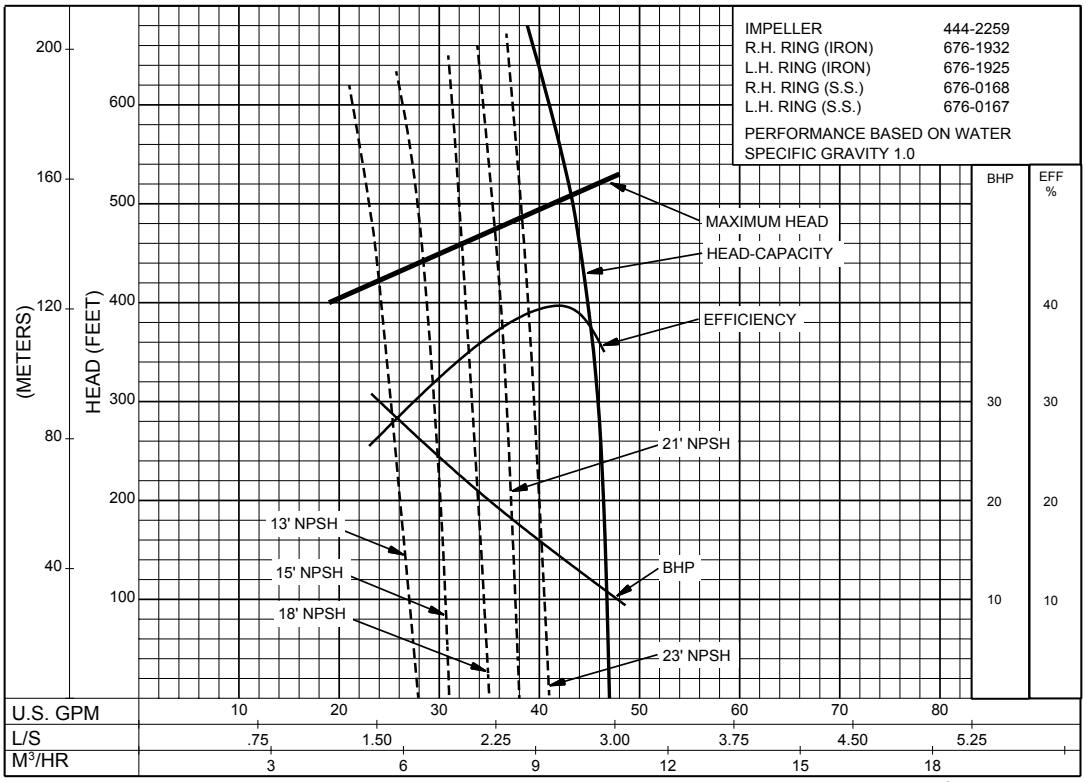
Supersedes Section 150 Page 408
Dated August 1989

CT-912 APCO-CHEM

STANDARD CLEARANCE

3500 R.P.M

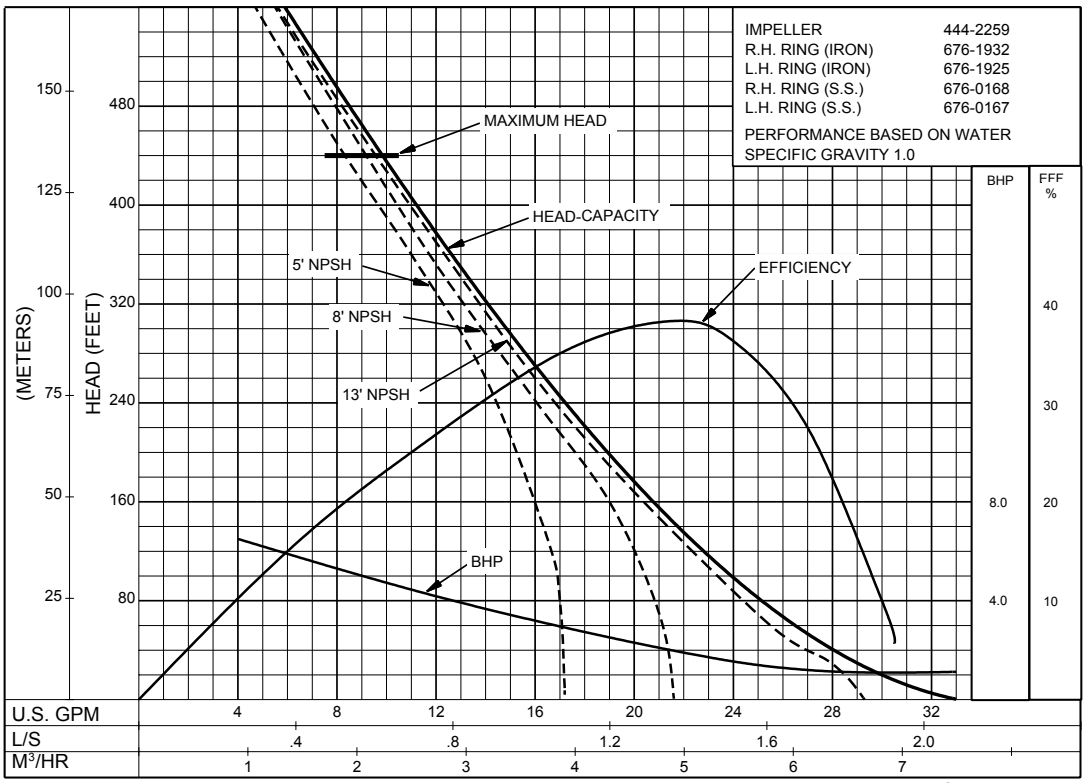
SIZE : CT-912 **TYPE : 150** **R. P. M. : 3500**



11PC-148425

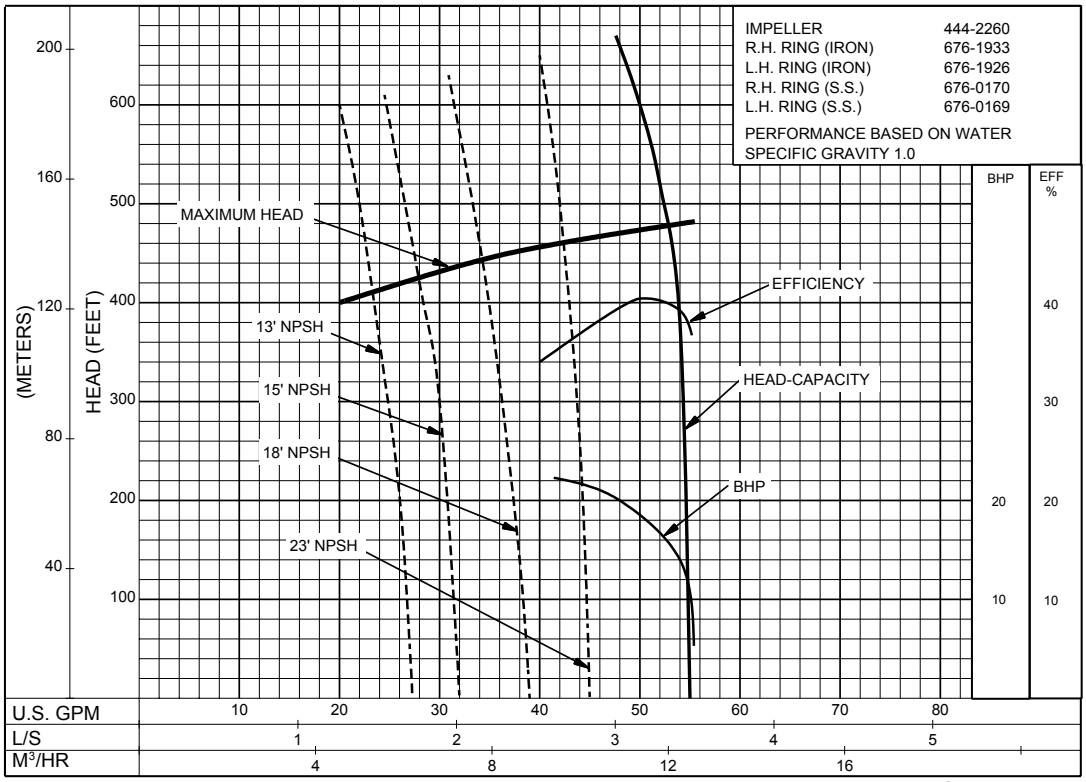
1750 R.P.M

SIZE : CT-912 **TYPE : 150** **R. P. M. : 1750**



11PC-148424

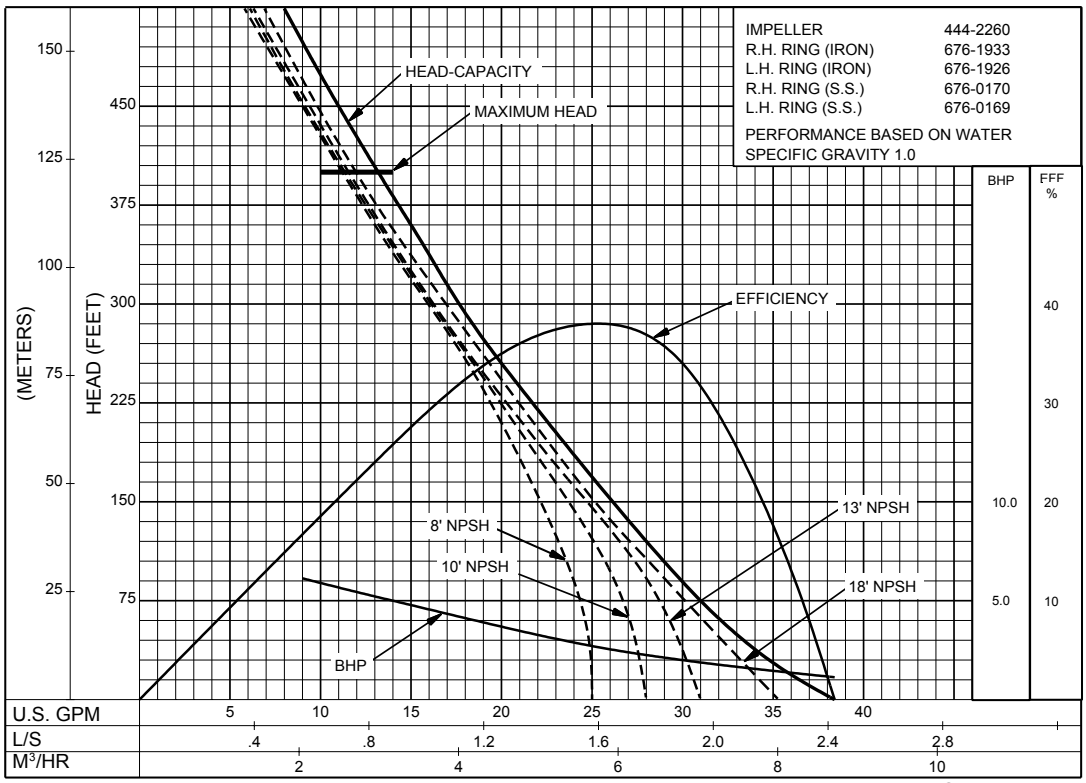
SIZE : CT-913 **TYPE : 150** **R. P. M. : 3500**



11PC-148467

3500 R.P.M

SIZE : CT-913 **TYPE : 150** **R. P. M. : 1750**



11PC-148466

1750 R.P.M

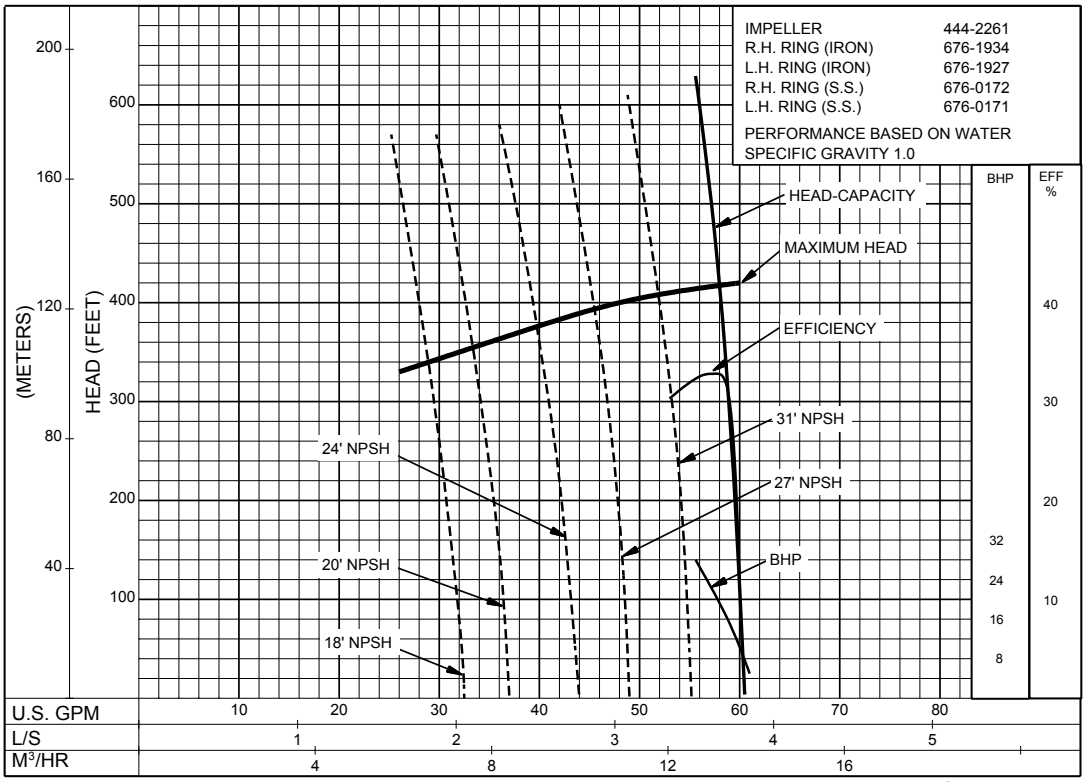
Supersedes Section 150 Page 410
Dated August 1989

CT-914 APCO-CHEM

STANDARD CLEARANCE

3500 R.P.M

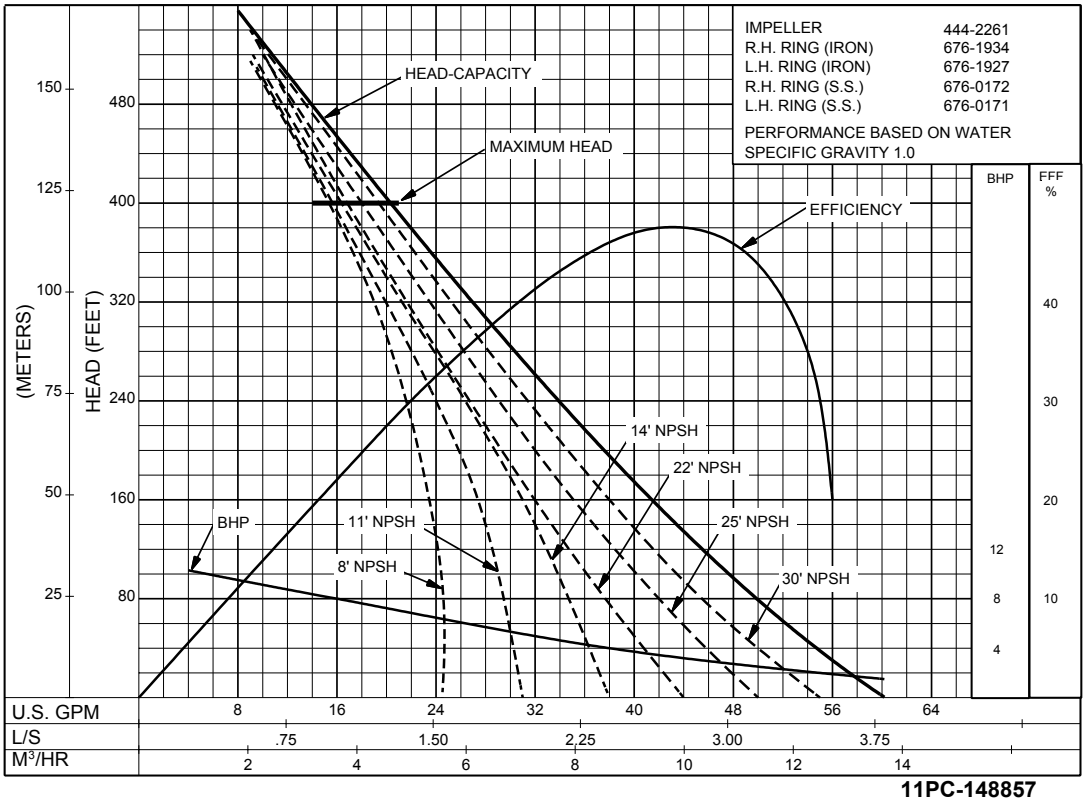
SIZE : CT-914 **TYPE : 150** **R. P. M. : 3500**



11PC-148858

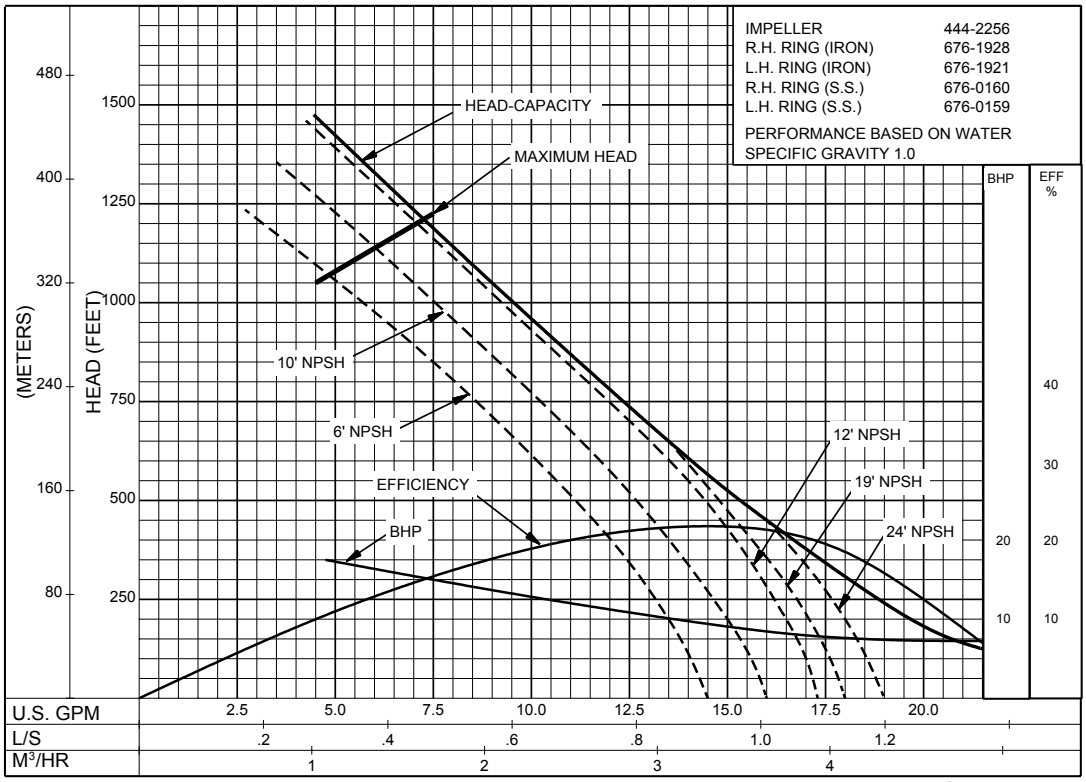
1750 R.P.M

SIZE : CT-914 **TYPE : 150** **R. P. M. : 1750**



11PC-148857

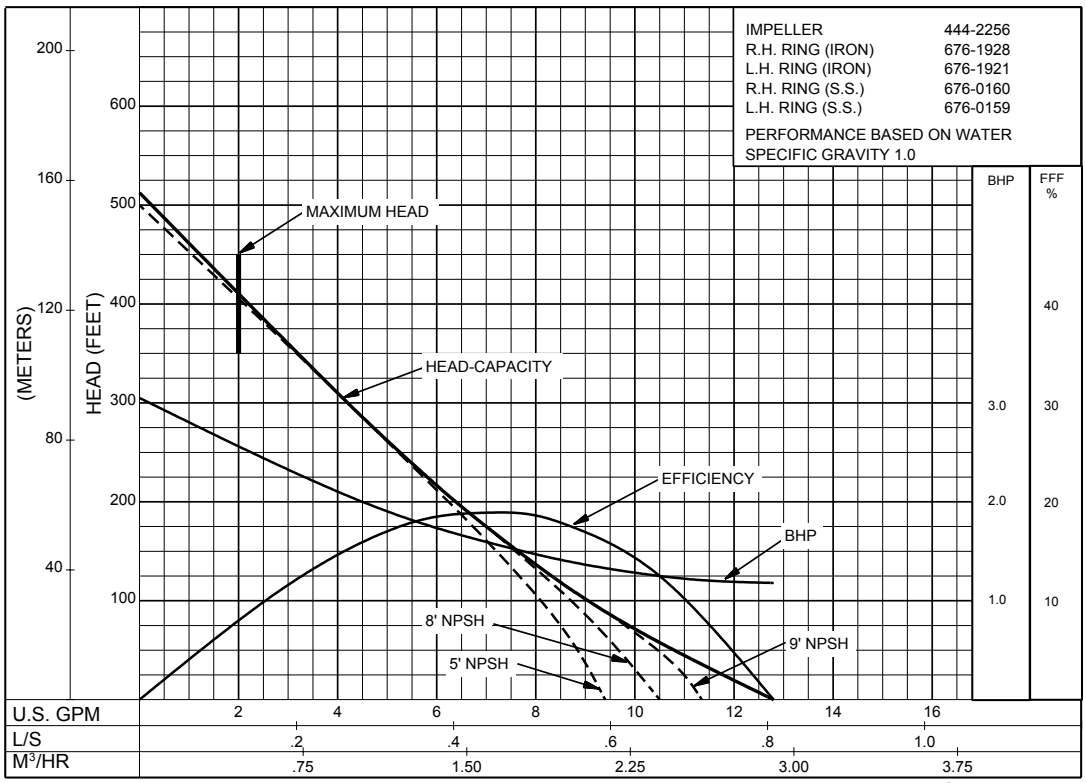
SIZE : CT-723 **TYPE : 150** **R. P. M. : 3500**



11PC-148461

3500 R.P.M

SIZE : CT-723 **TYPE : 150** **R. P. M. : 1750**



11PC-148460

1750 R.P.M

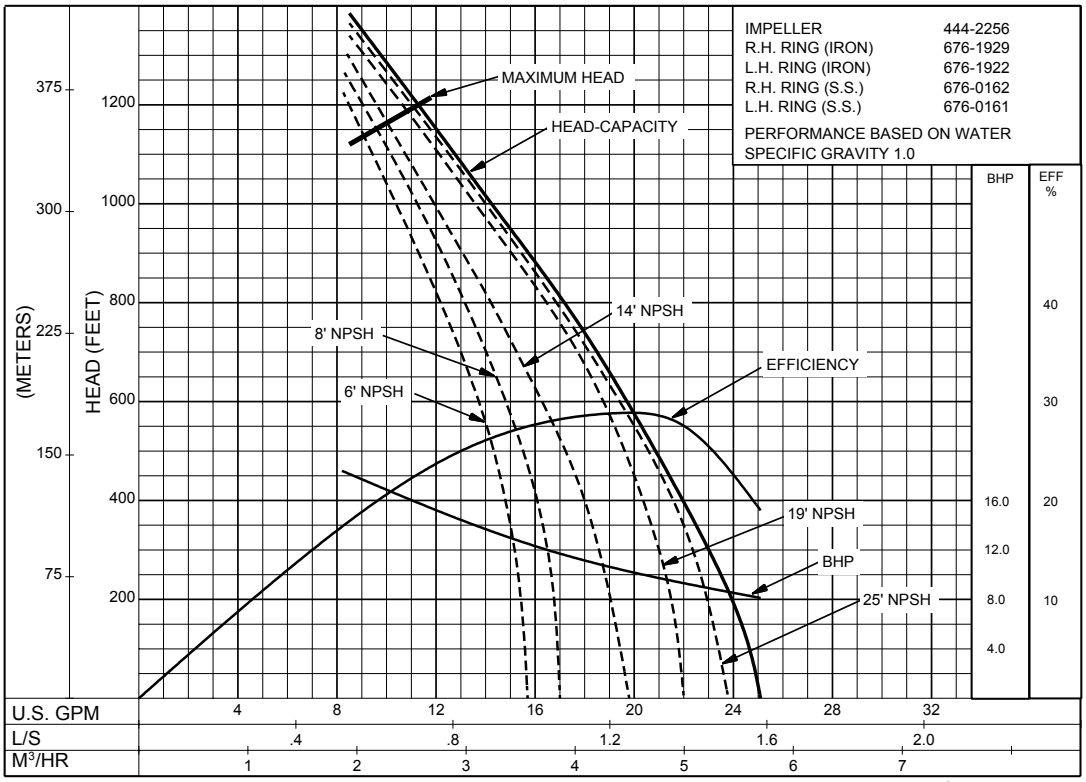
CT-725 APCO-CHEM

STANDARD CLEARANCE

Supersedes Section 150 Page 412
Dated August 1989

3500
R.P.M

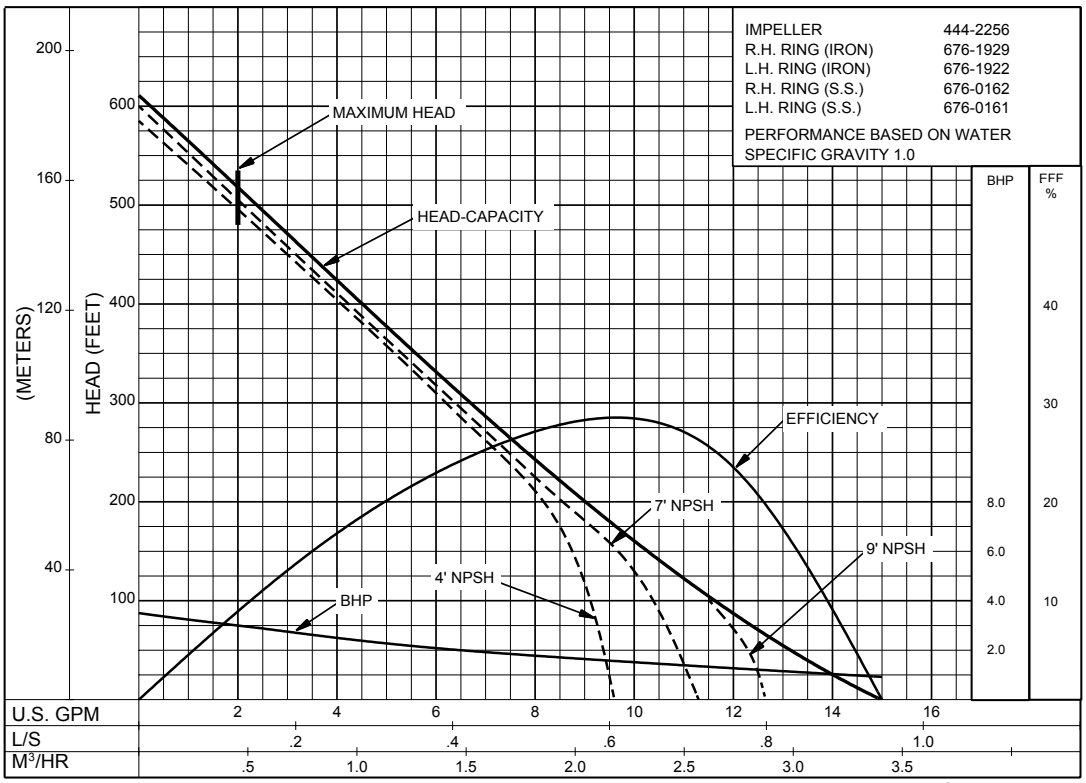
SIZE : CT-725 **TYPE : 150** **R. P. M. : 3500**



11PC-149049

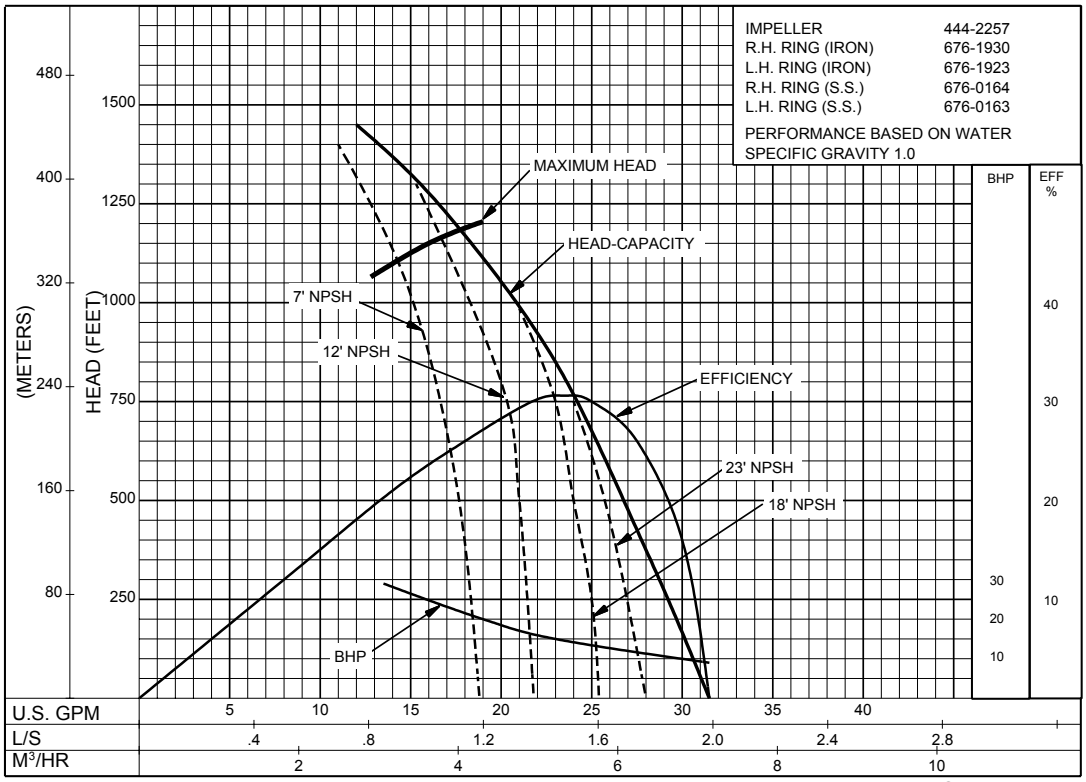
1750
R.P.M

SIZE : CT-725 **TYPE : 150** **R. P. M. : 1750**



11PC-149048

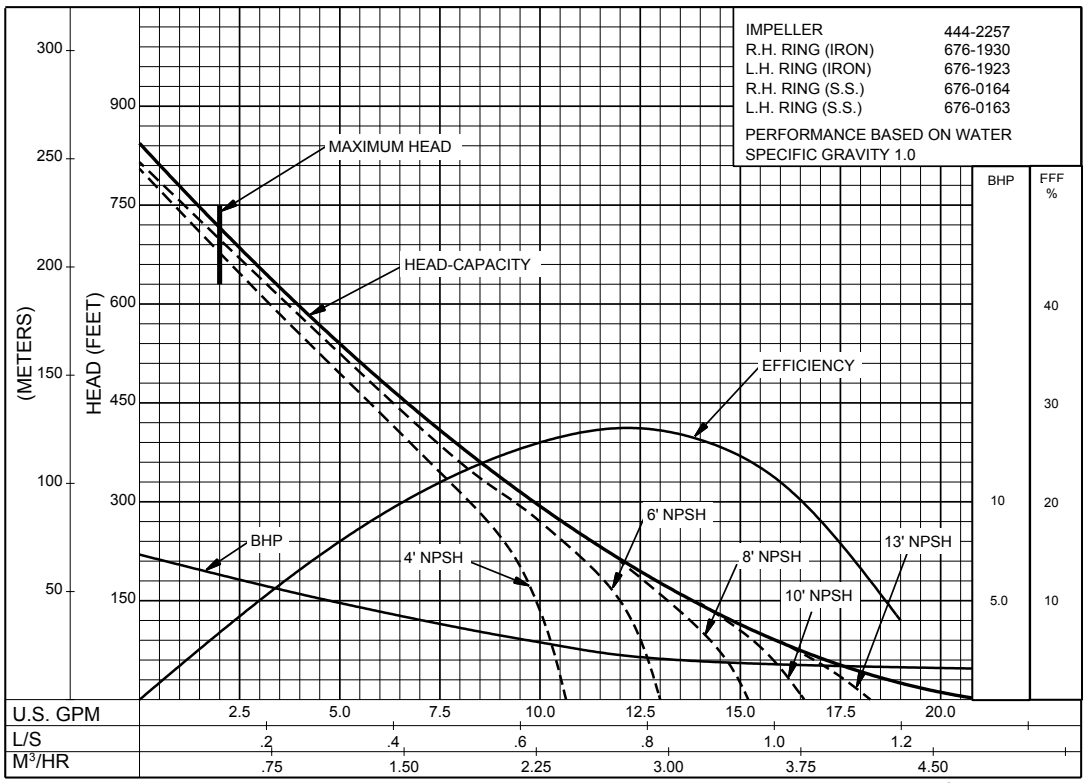
SIZE : CT-821 **TYPE : 150** **R. P. M. : 3500**



11PC-148535

3500 R.P.M

SIZE : CT-821 **TYPE : 150** **R. P. M. : 1750**



11PC-148662

1750 R.P.M

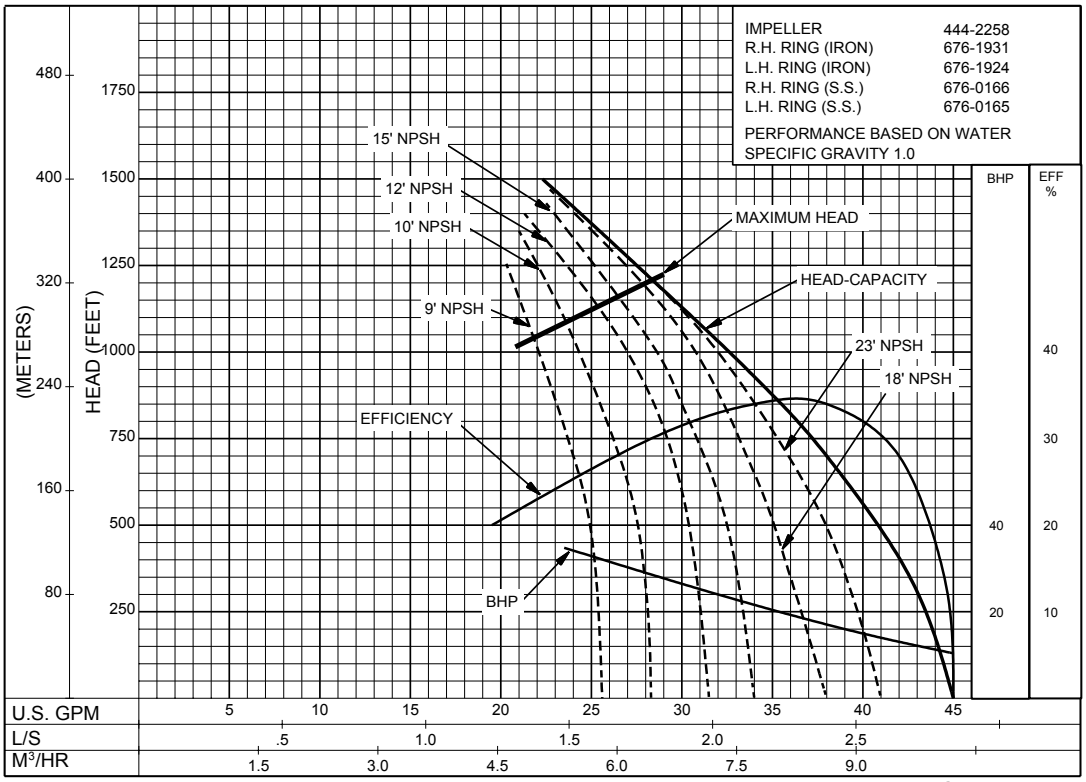
CT-921 APCO-CHEM

STANDARD CLEARANCE

Supersedes Section 150 Page 414
Dated August 1989

3500 R.P.M

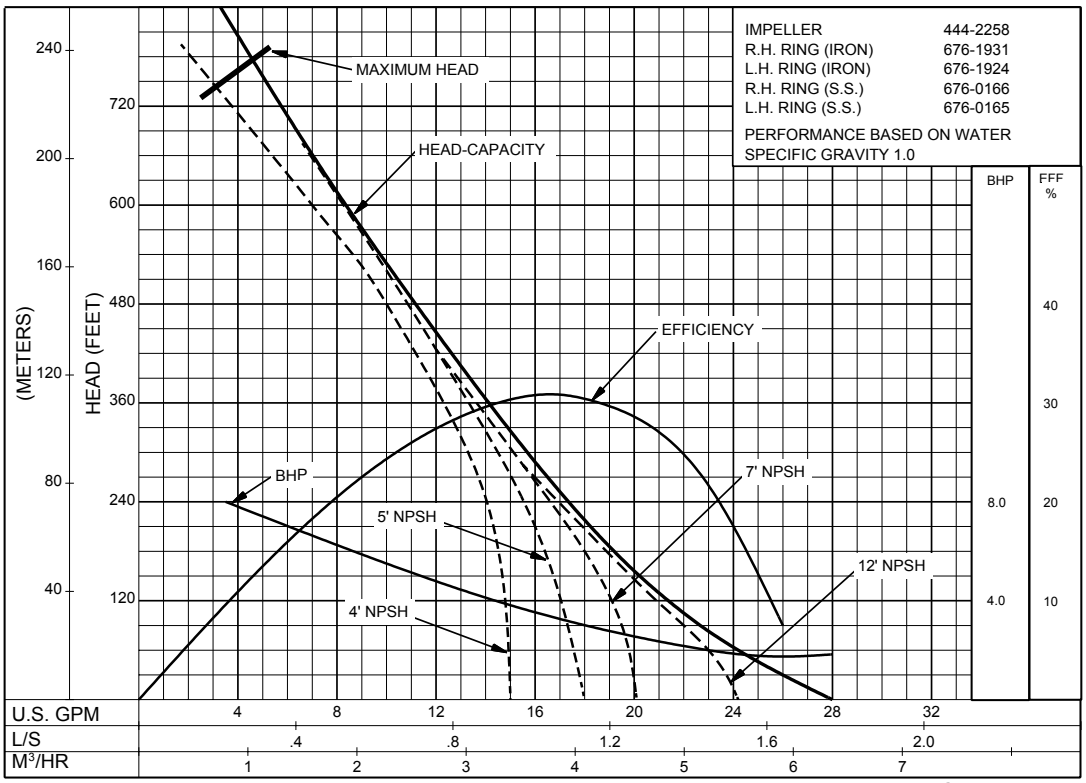
SIZE : CT-921 **TYPE : 150** **R. P. M. : 3500**



11PC-148472

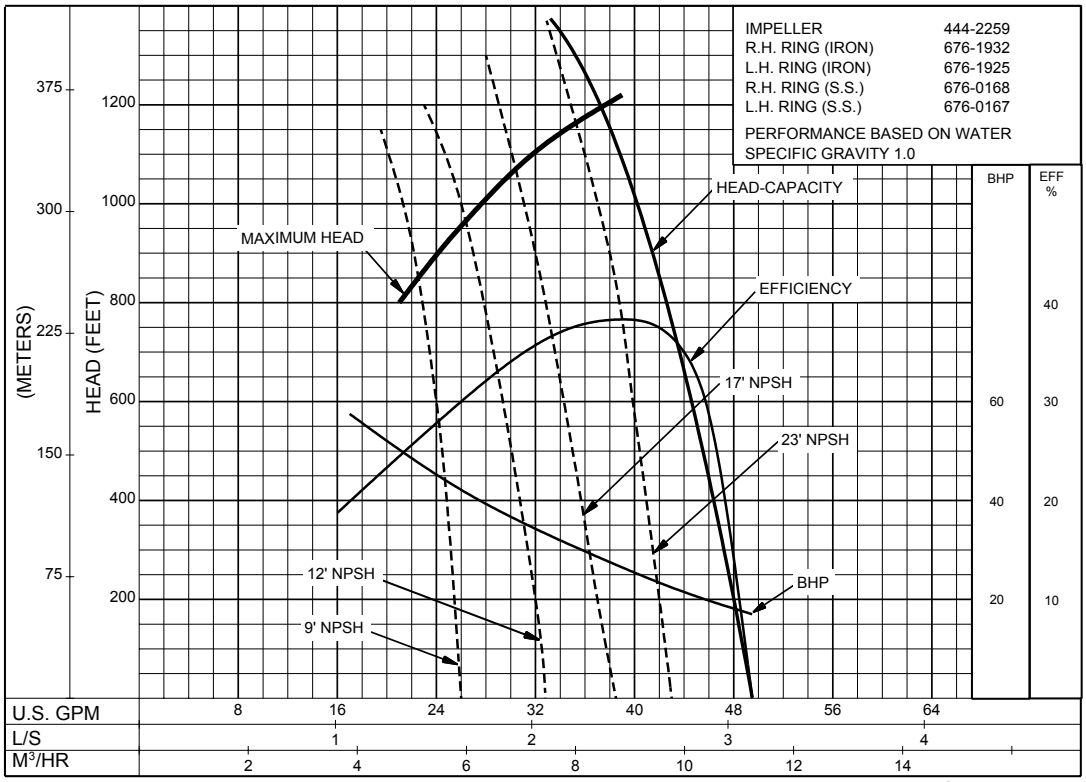
1750 R.P.M

SIZE : CT-921 **TYPE : 150** **R. P. M. : 1750**



11PC-148471

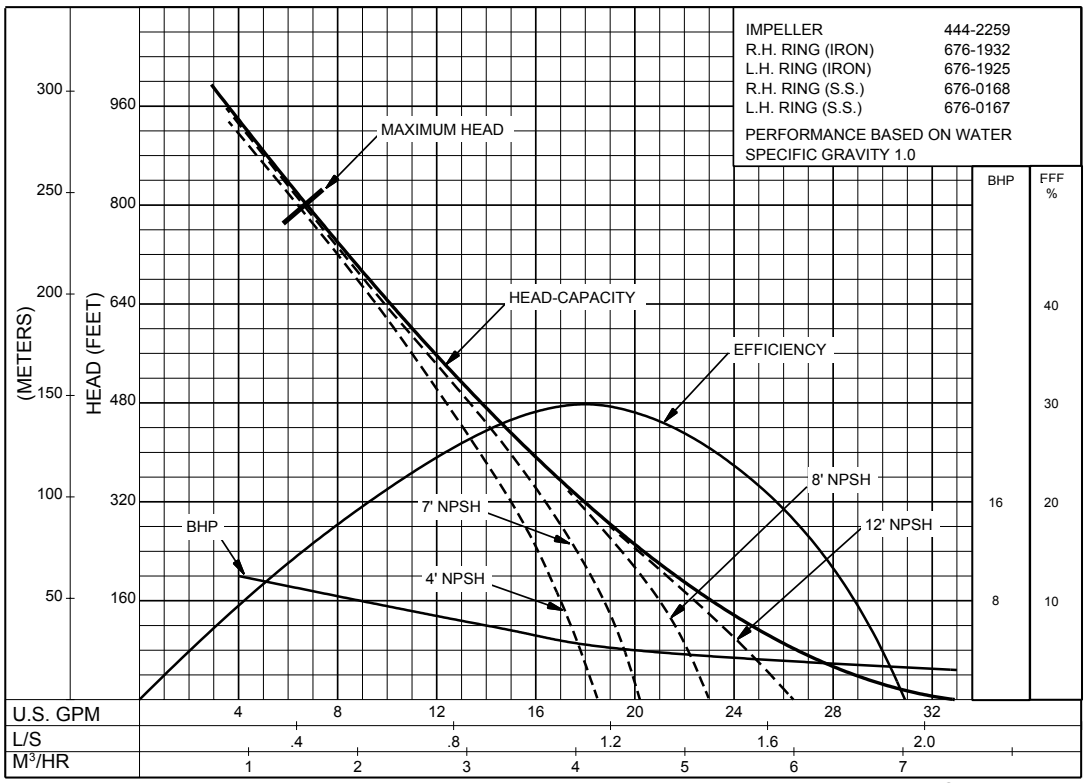
SIZE : CT-922 **TYPE : 150** **R. P. M. : 3500**



11PC-148381

3500 R.P.M

SIZE : CT-922 **TYPE : 150** **R. P. M. : 1750**



11PC-148423

1750 R.P.M

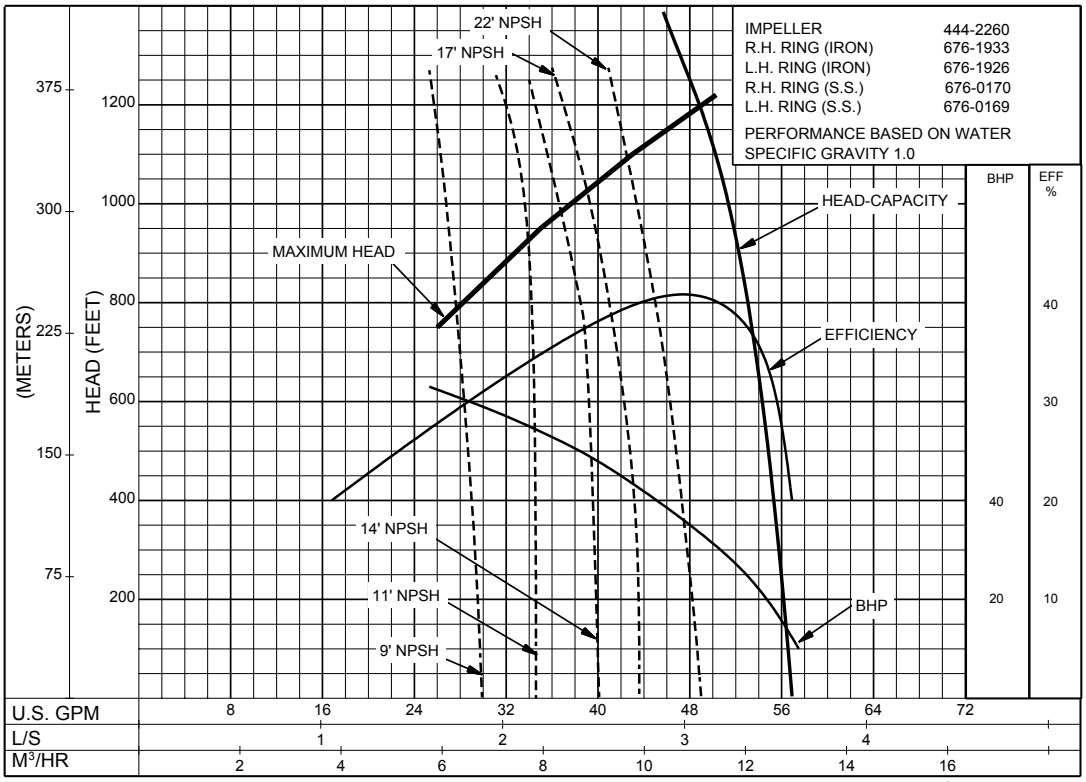
Supersedes Section 150 Page 416
Dated August 1989

CT-923 APCO-CHEM

STANDARD CLEARANCE

3500
R.P.M

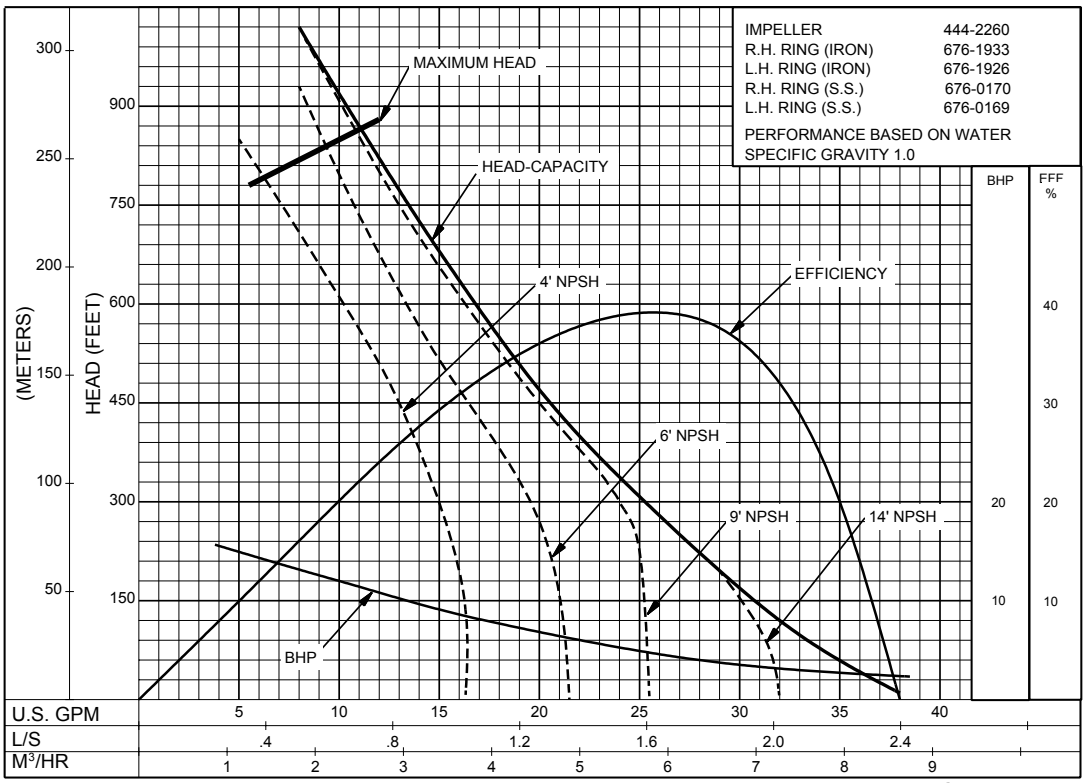
SIZE : CT-923 **TYPE : 150** **R. P. M. : 3500**



11PC-148505

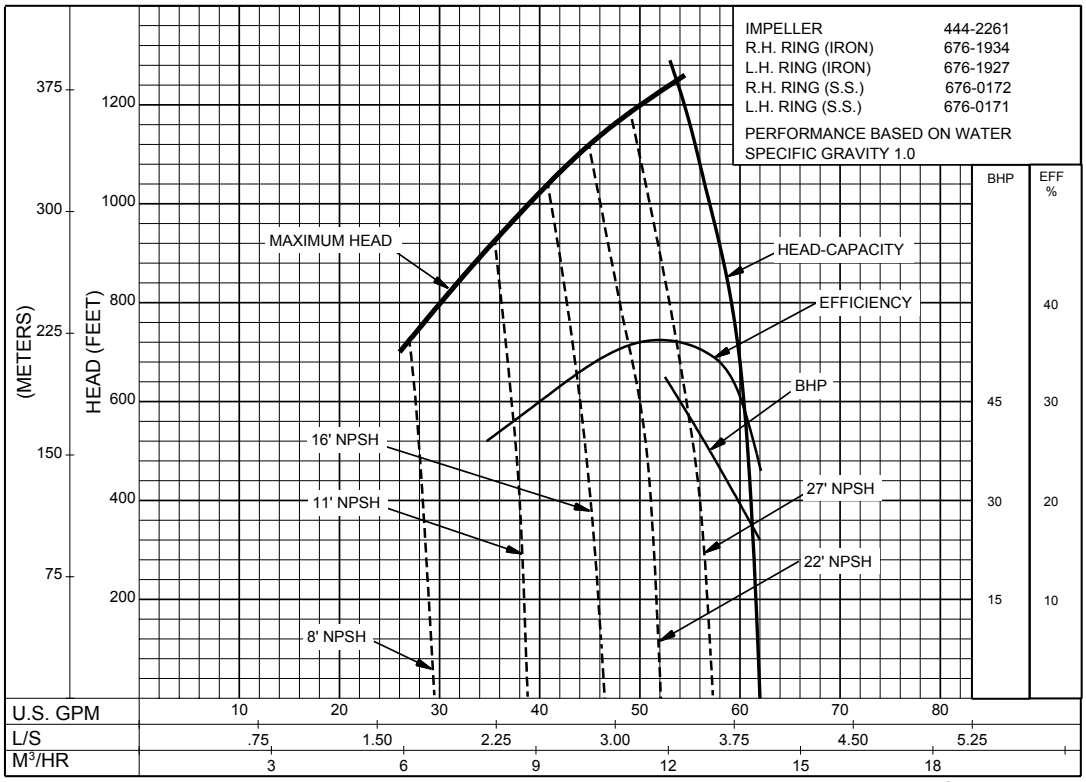
1750
R.P.M

SIZE : CT-923 **TYPE : 150** **R. P. M. : 1750**



11PC-148504

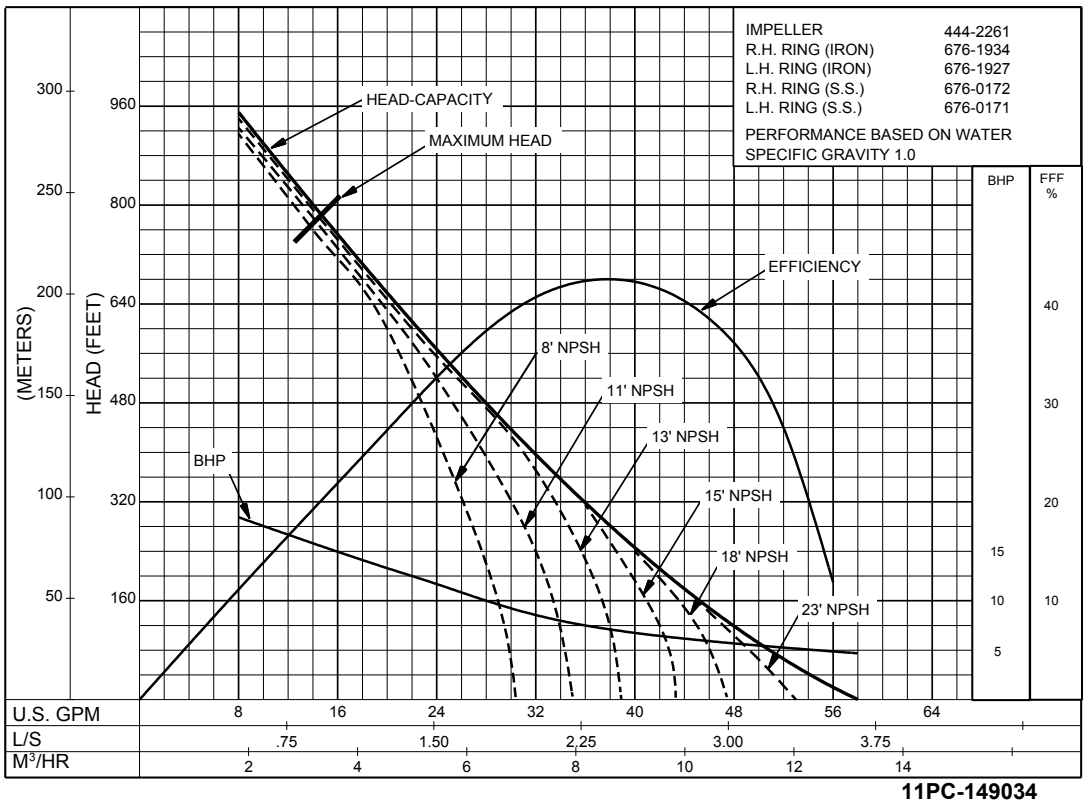
SIZE : CT-924 **TYPE : 150** **R. P. M. : 3500**



11PC-149035

3500 R.P.M

SIZE : CT-924 **TYPE : 150** **R. P. M. : 1750**



11PC-149034

1750 R.P.M

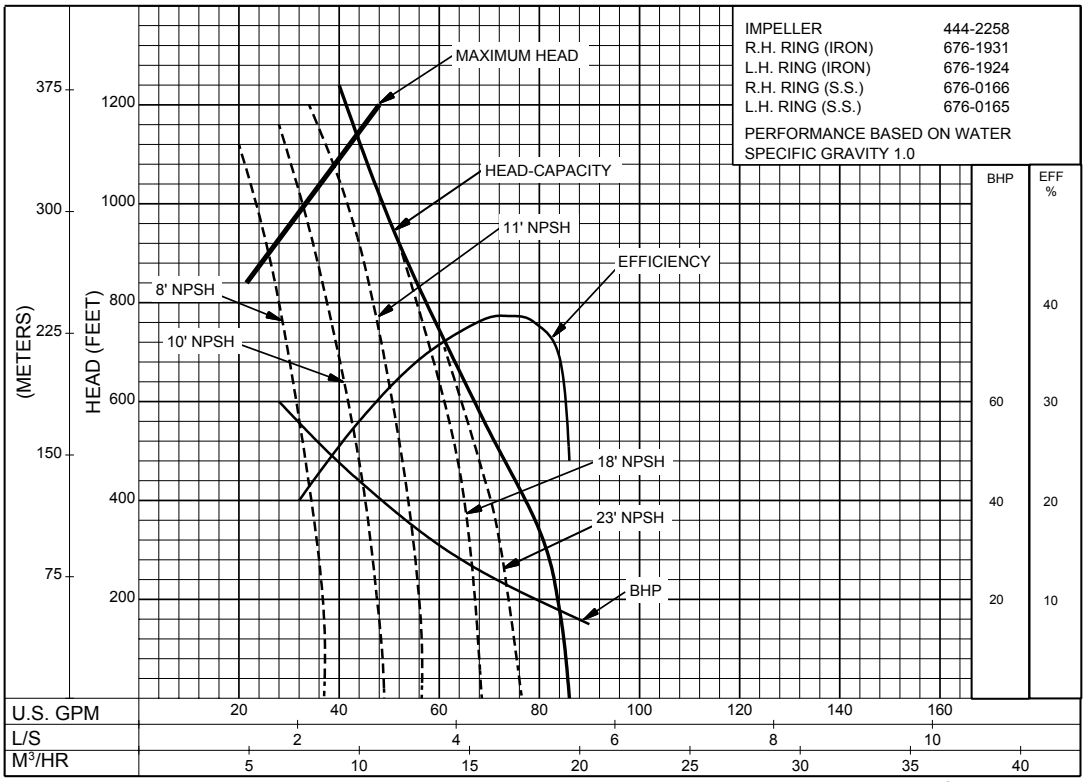
Supersedes Section 150 Page 418
Dated August 1989

CT-991 APCO-CHEM

STANDARD CLEARANCE

3500 R.P.M

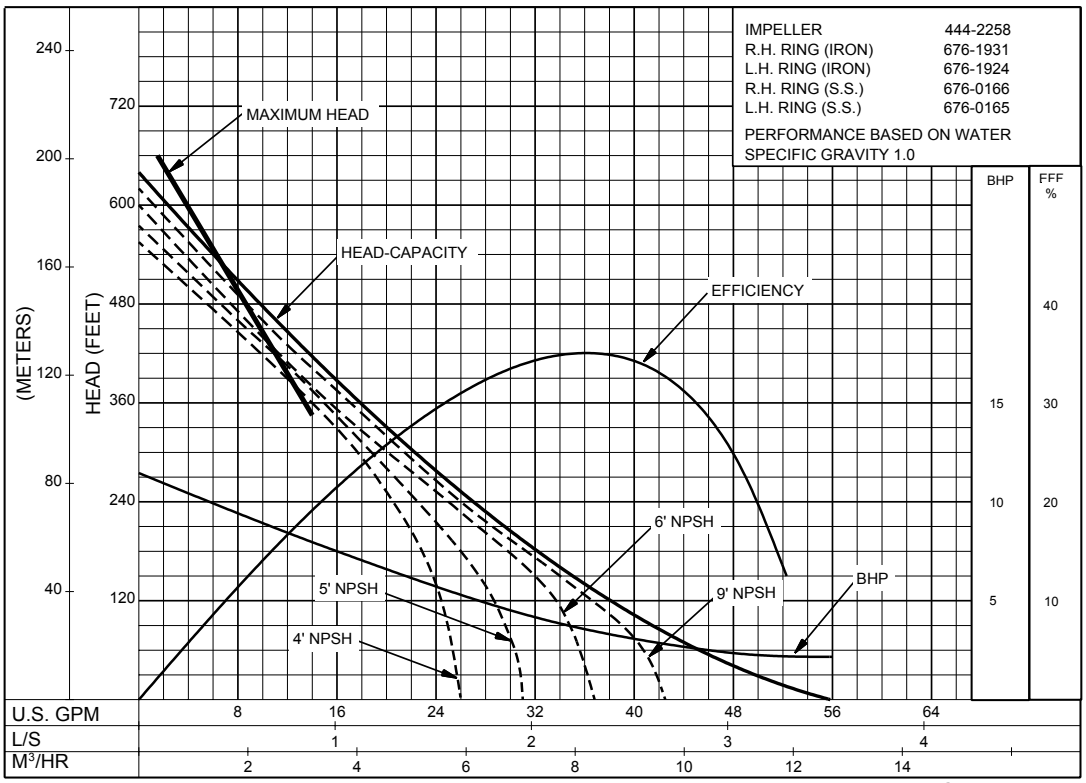
SIZE : CT-991 **TYPE : 150** **R. P. M. : 3500**



11PC-148596

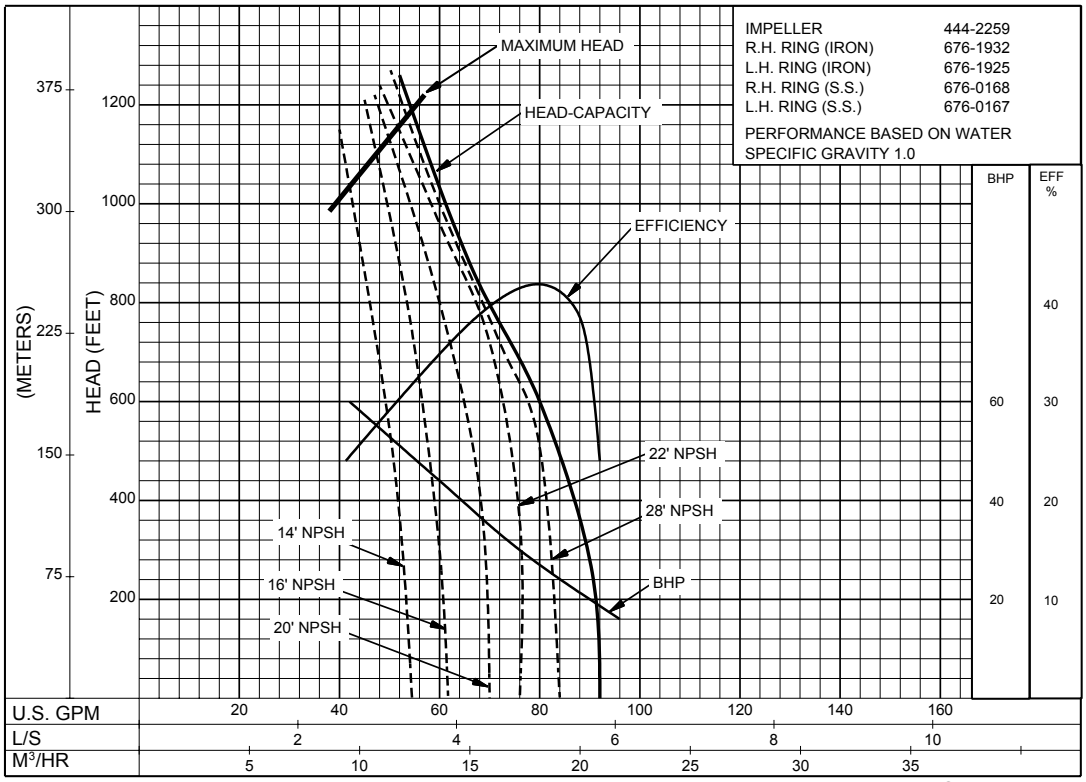
1750 R.P.M

SIZE : CT-991 **TYPE : 150** **R. P. M. : 1750**



11PC-148595

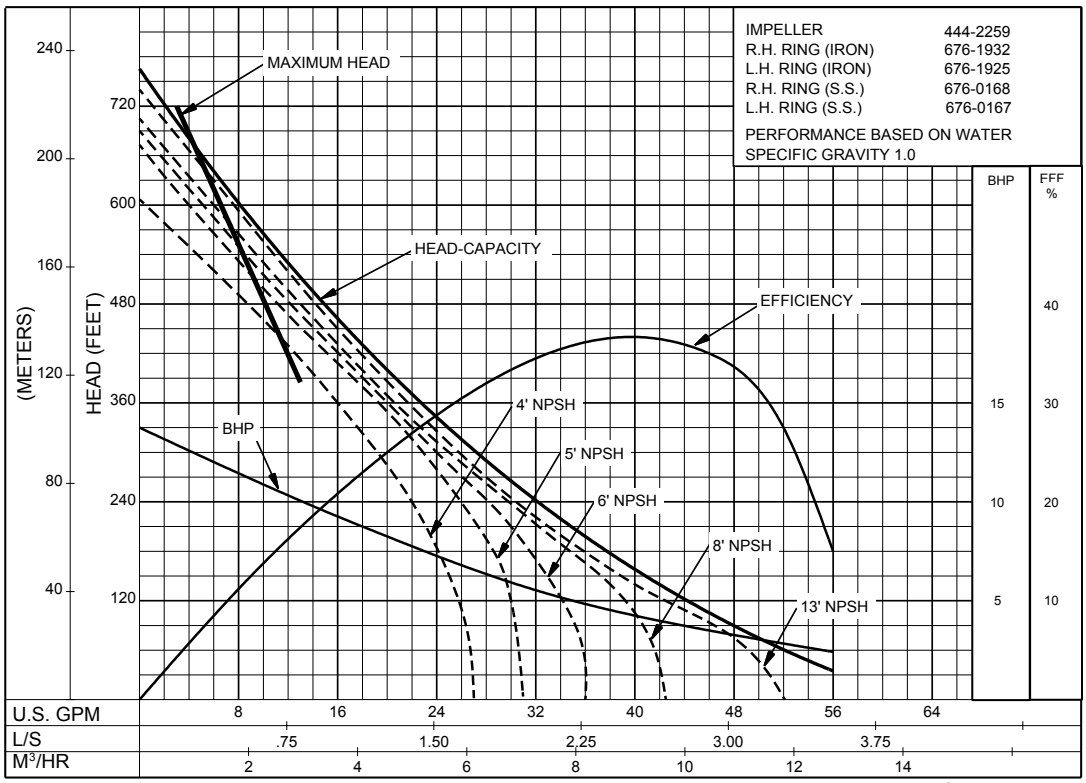
SIZE : CT-992 **TYPE : 150** **R. P. M. : 3500**



11PC-148583

3500 R.P.M

SIZE : CT-992 **TYPE : 150** **R. P. M. : 1750**



11PC-148582

1750 R.P.M

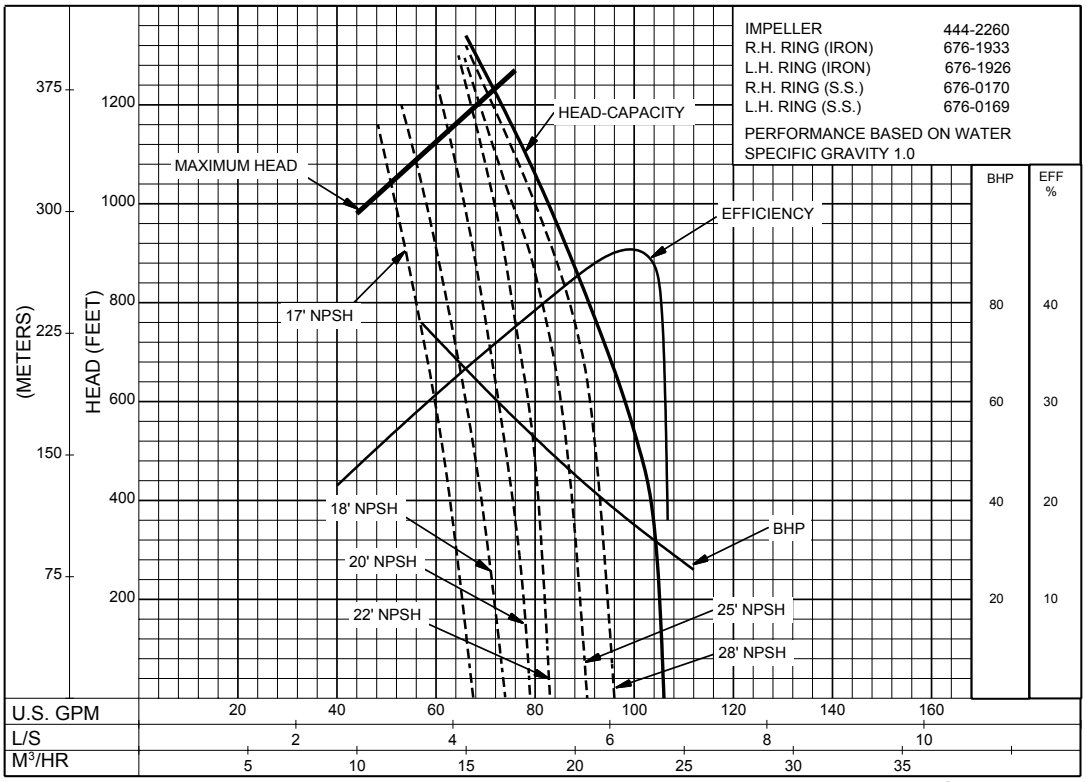
CT-993 APCO-CHEM

STANDARD CLEARANCE

Supersedes Section 150 Page 420
Dated August 1989

3500
R.P.M

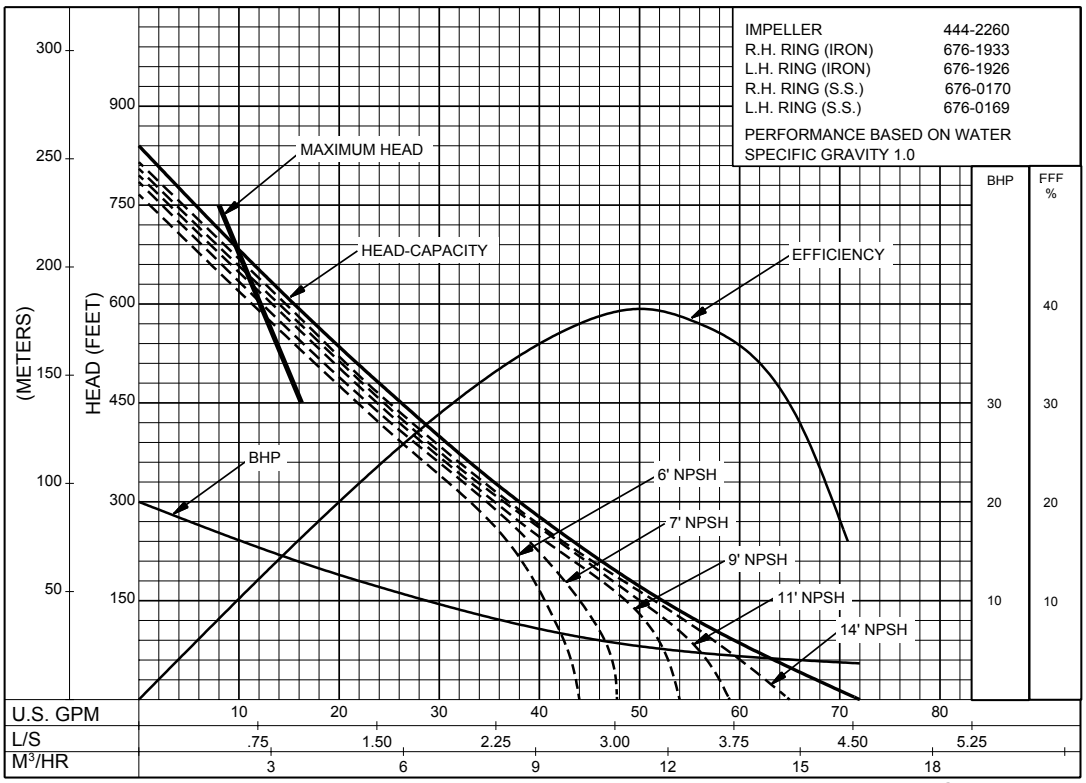
SIZE : CT-993 **TYPE : 150** **R. P. M. : 3500**



11PC-148644

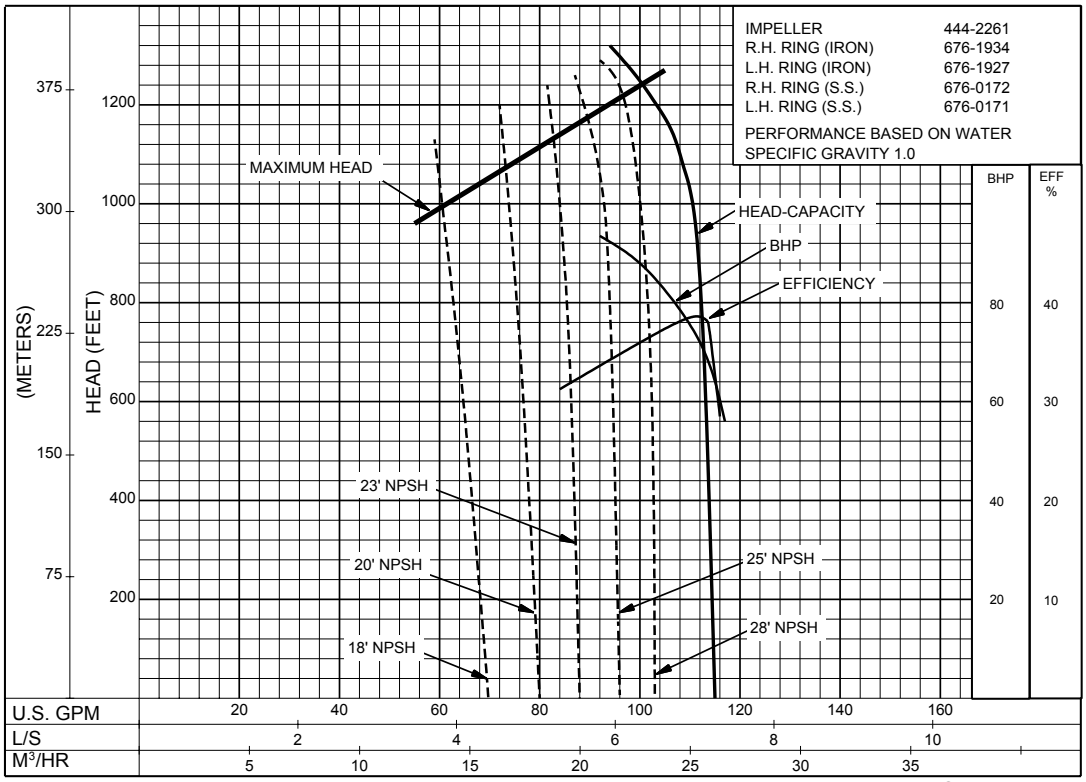
1750
R.P.M

SIZE : CT-993 **TYPE : 150** **R. P. M. : 1750**



11PC-148643

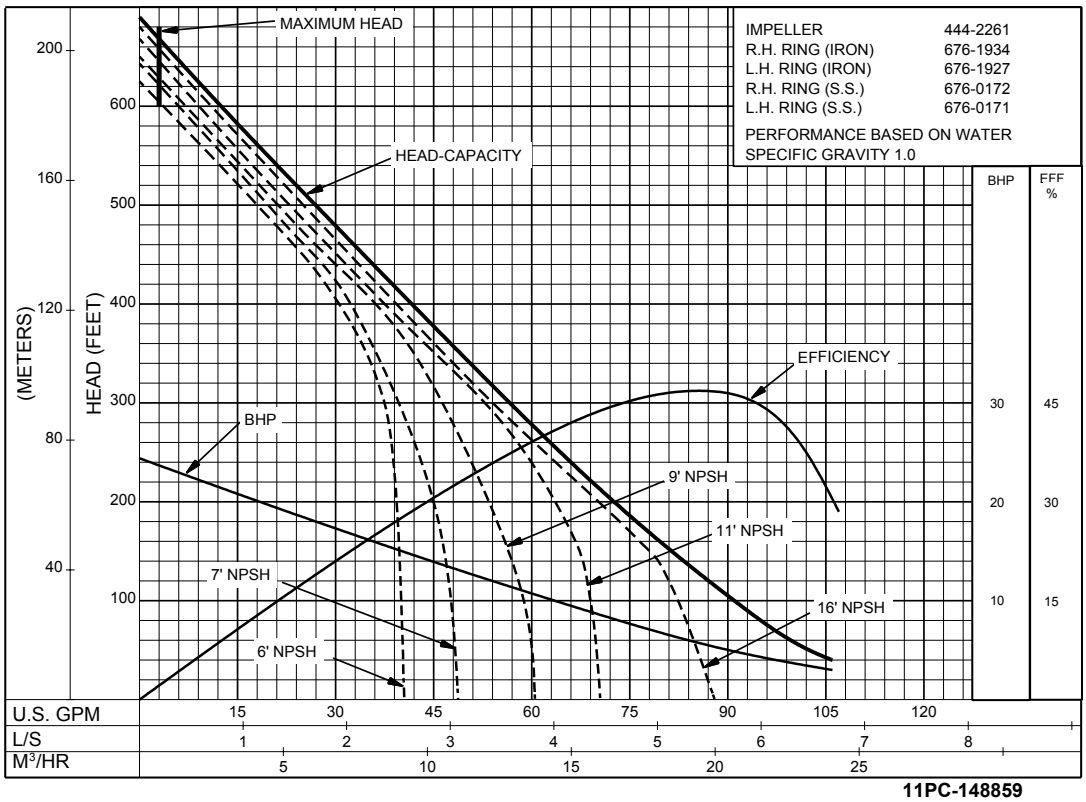
SIZE : CT-994 **TYPE : 150** **R. P. M. : 3500**



11PC-148860

3500 R.P.M

SIZE : CT-994 **TYPE : 150** **R. P. M. : 1750**



11PC-148859

1750 R.P.M

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Dated August 1989

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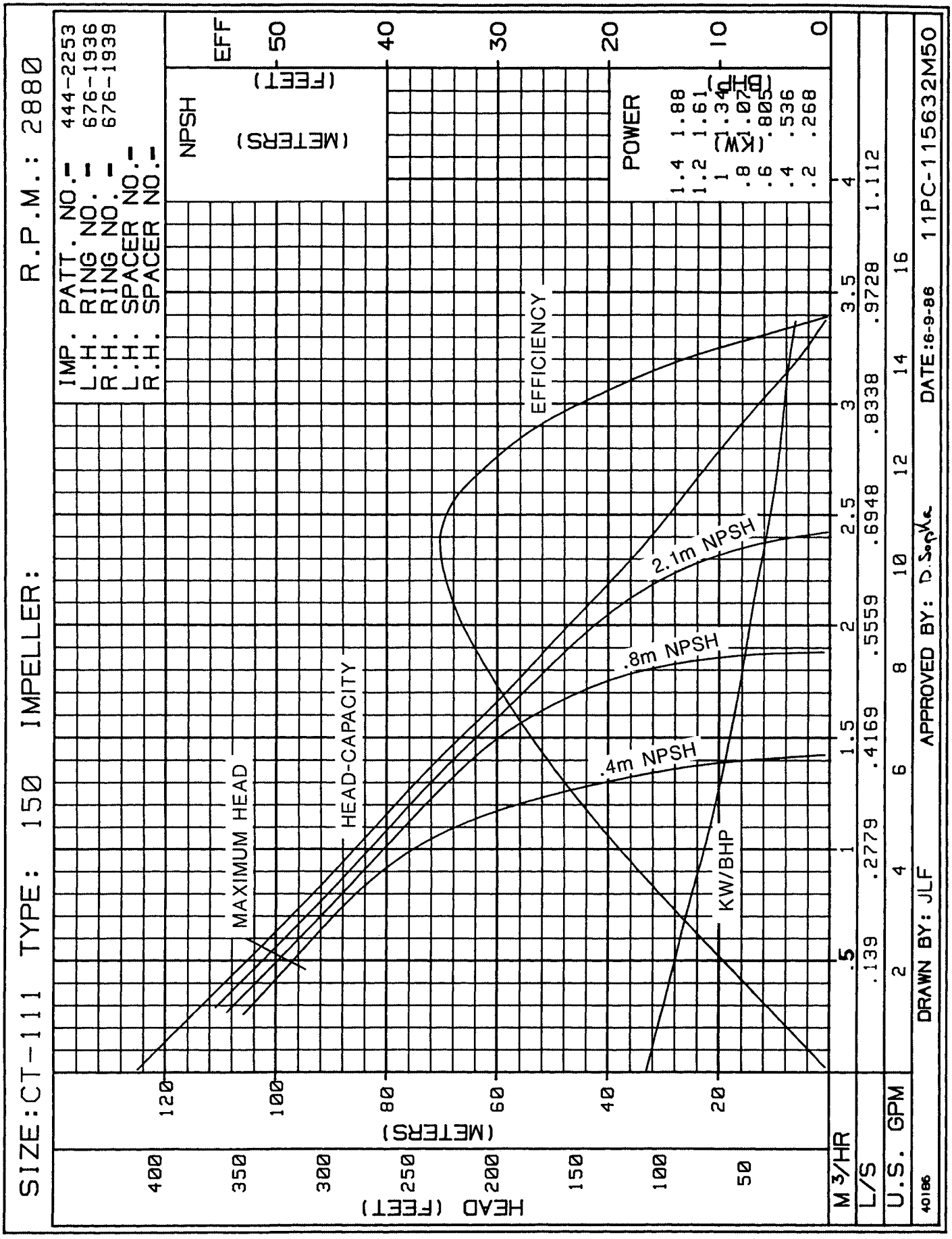
Performance Curves for the 150 Series (50 Hz)

MODEL/SIZE	R.P.M.	PDF PAGE
CT-111	2880	2
CT-111	1440	3
CT-211	2880	4
CT-211	1440	5
CT-212	2880	6
CT-212	1440	7
CT-713	2880	8
CT-713	1440	9
CT-715	2880	10
CT-715	1440	11
CT-811	2880	12
CT-811	1440	13
CT-911	2880	14
CT-911	1440	15
CT-912	2880	16
CT-912	1440	17
CT-913	2880	18
CT-913	1440	19
CT-914	2880	20
CT-914	1440	21
CT-723	2880	22
CT-723	1440	23
CT-725	2880	24
CT-725	1440	25
CT-821	2880	26
CT-821	1440	27
CT-921	2880	28
CT-921	1440	29
CT-922	2880	30
CT-922	1440	31
CT-923	2880	32
CT-923	1440	33
CT-924	2880	34
CT-924	1440	35
CT-991	2880	36
CT-991	1440	37
CT-992	2880	38
CT-992	1440	39
CT-993	2880	40
CT-993	1440	41
CT-994	2880	42
CT-994	1440	43

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CT-111 - 2880 RPM
IMPELLER

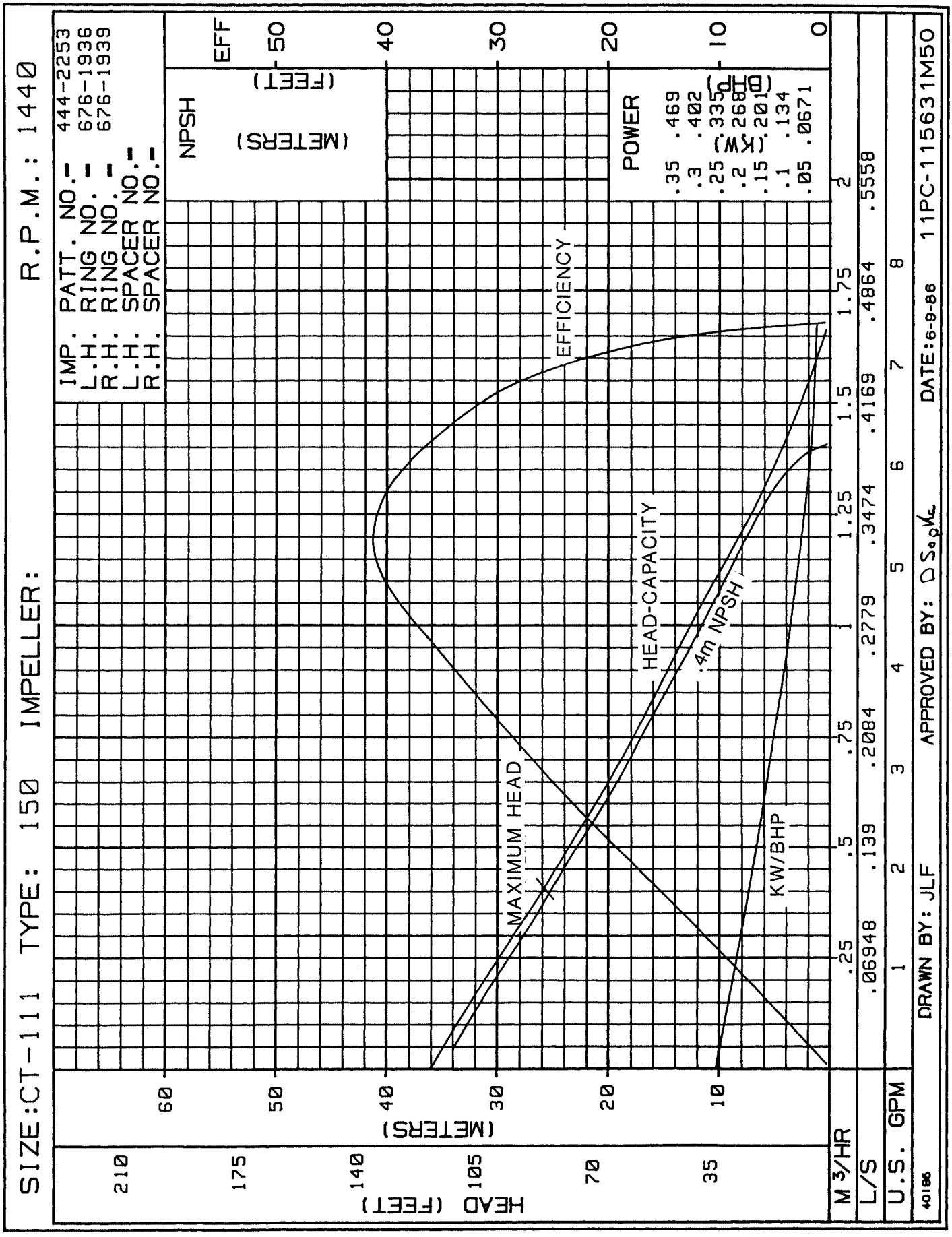
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION **150 (Metric 50Hz)**
DATE **JULY 1994**
SUPERCEDES MARCH 1986

CT-111 - 1440 RPM
IMPELLER

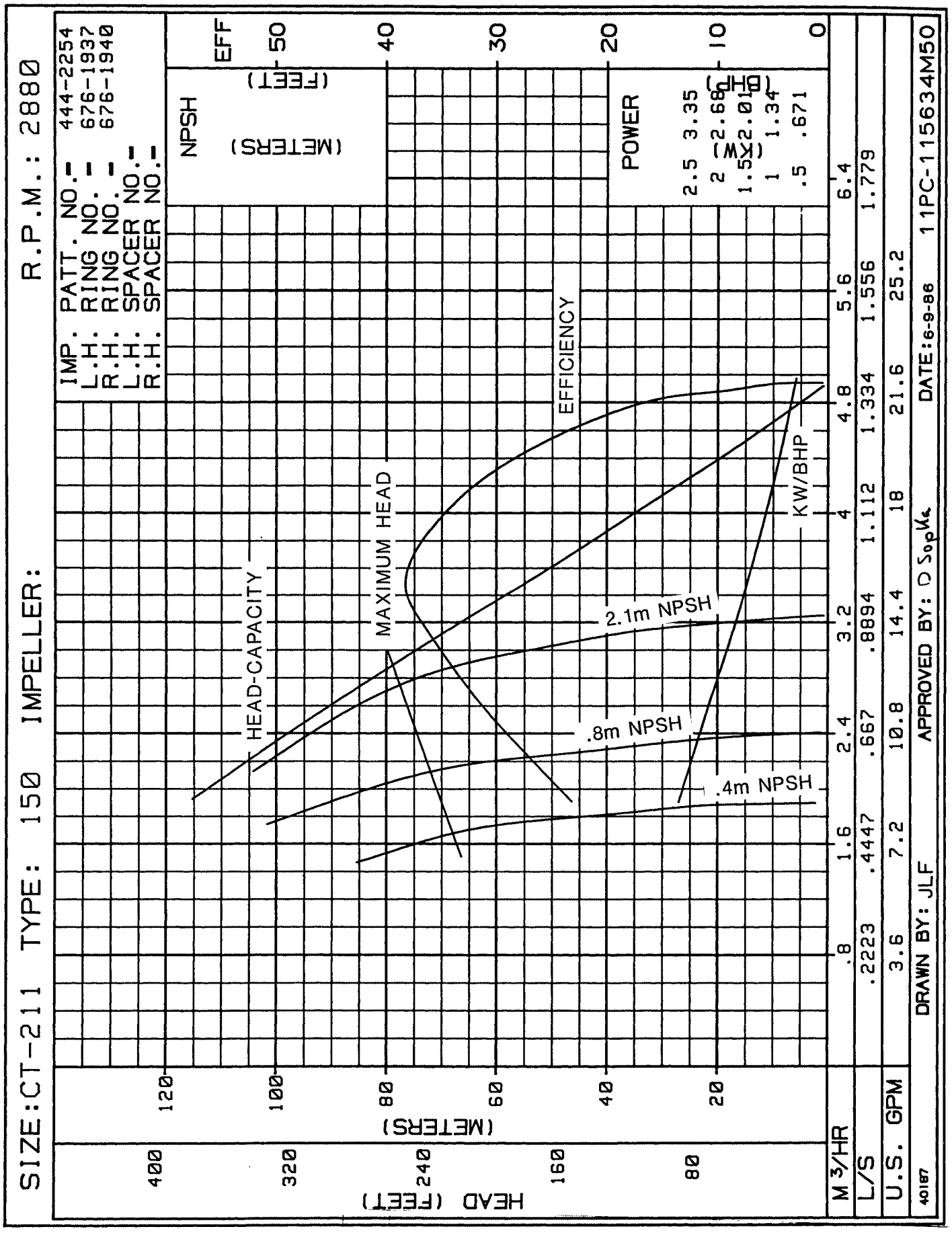
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CT-211 - 2880 RPM
IMPELLER

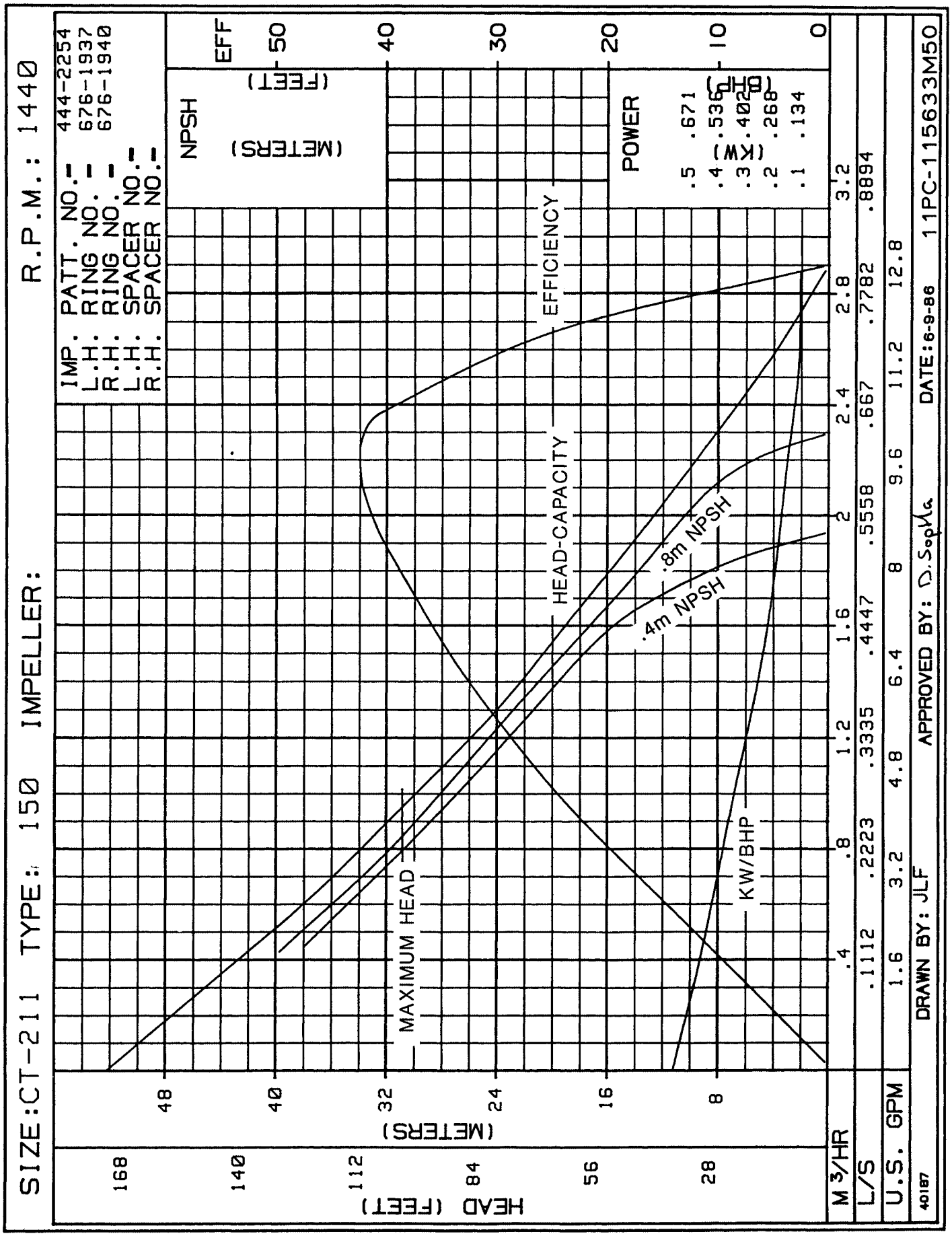
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION **150 (Metric 50Hz)**
DATE **JULY 1994**
SUPERCEDES MARCH 1986

CT-211 - 1440 RPM
IMPELLER

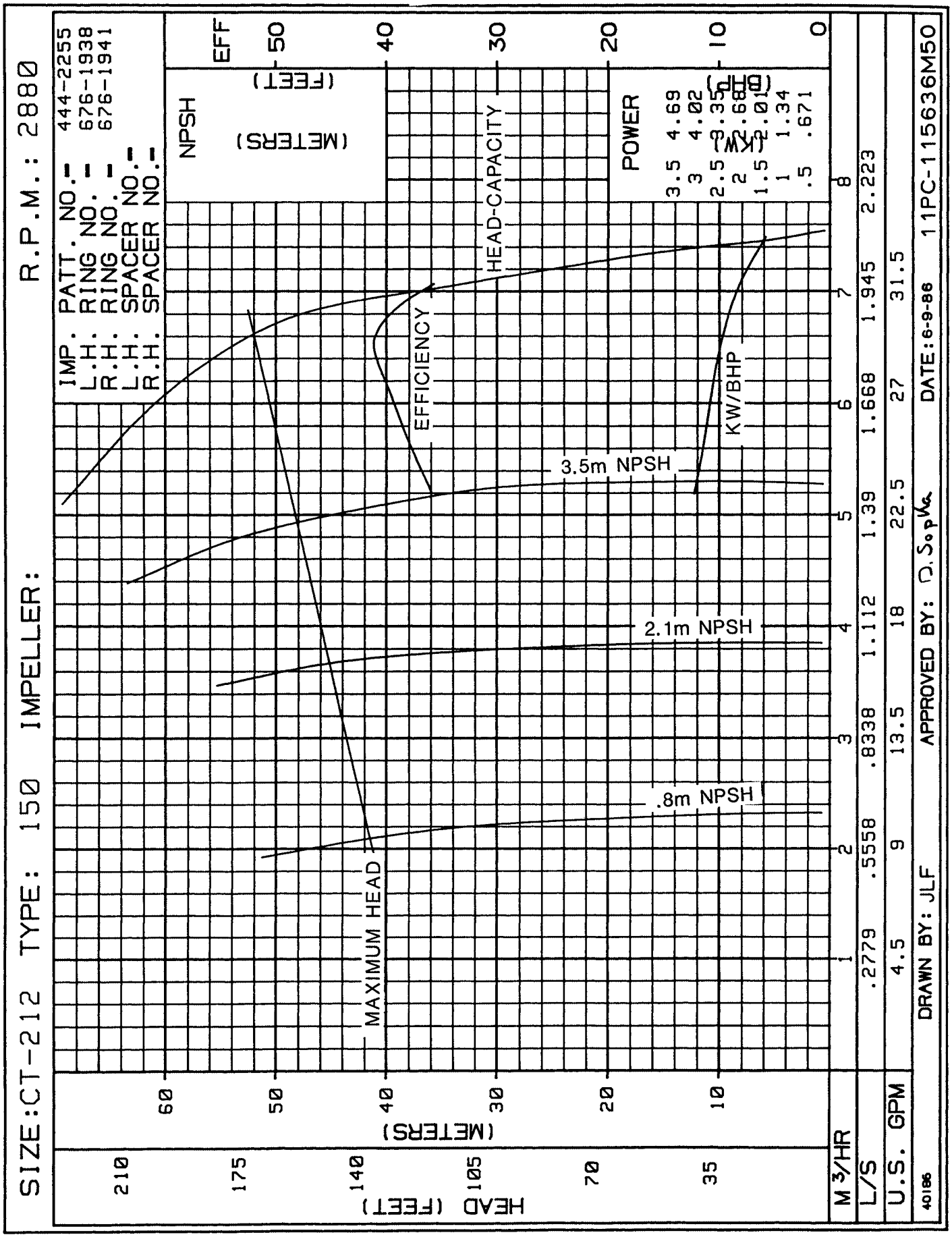
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CT-212 - 2880 RPM
IMPELLER

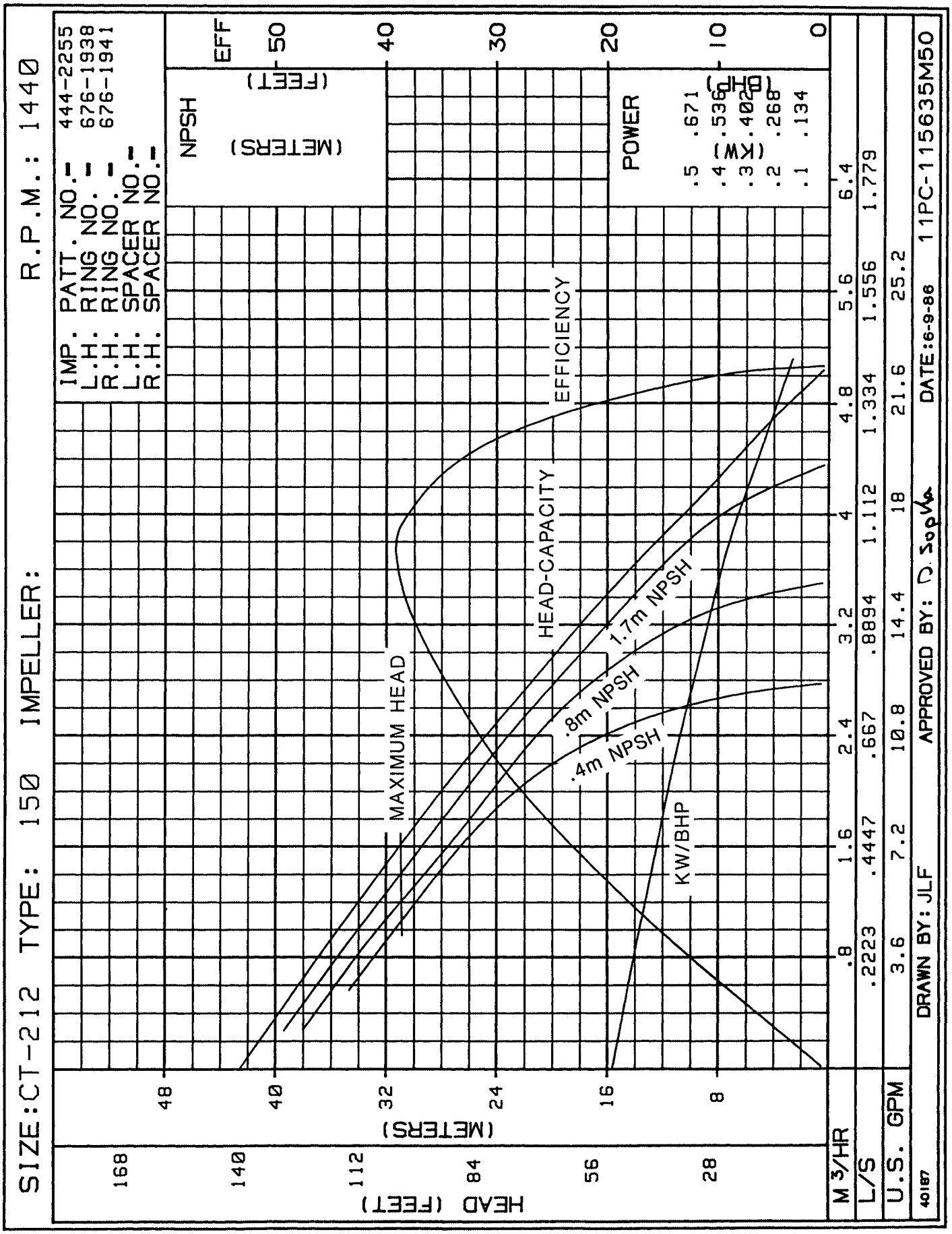
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-212 - 1440 RPM
IMPELLER

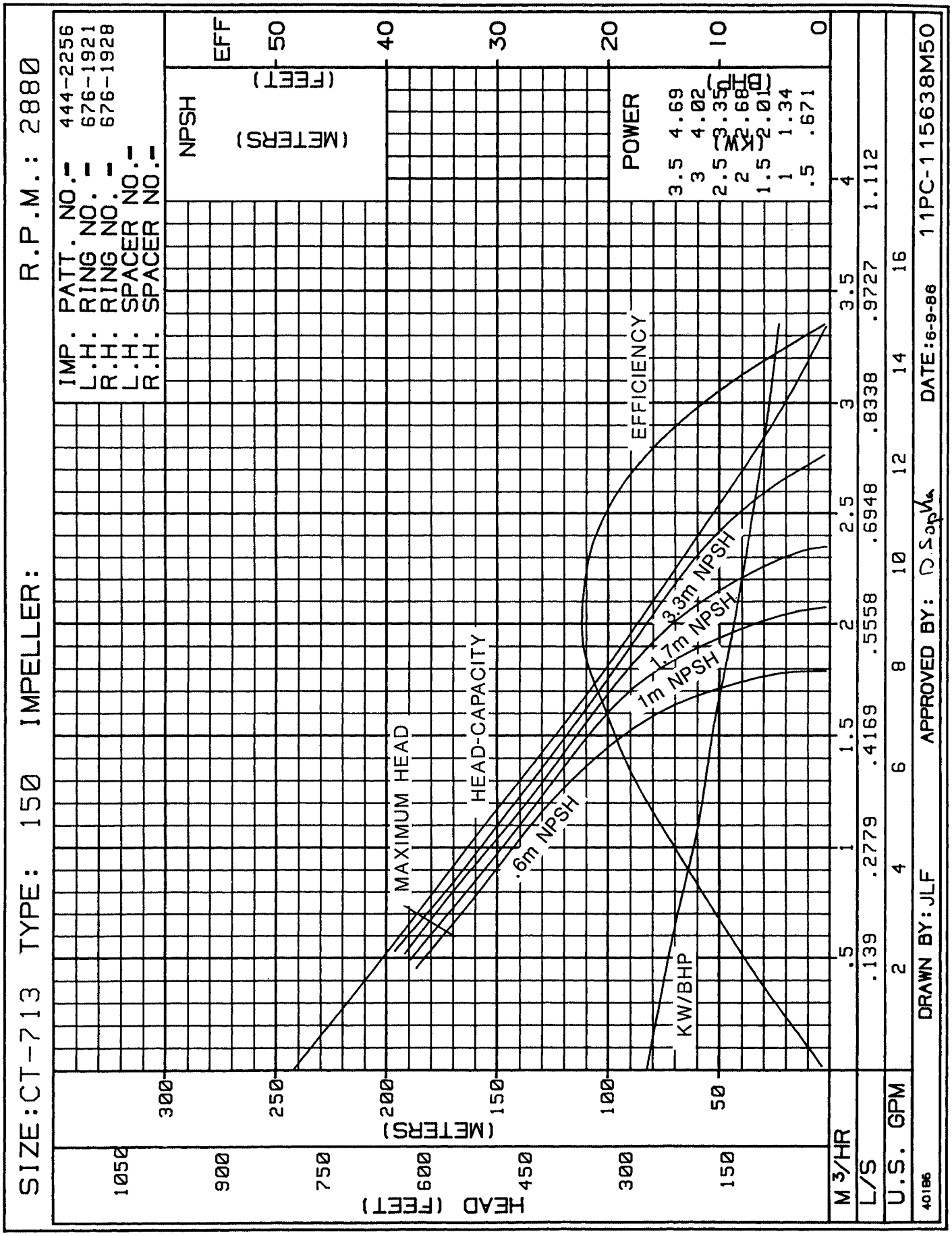
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CT-713 - 2880 RPM
IMPELLER

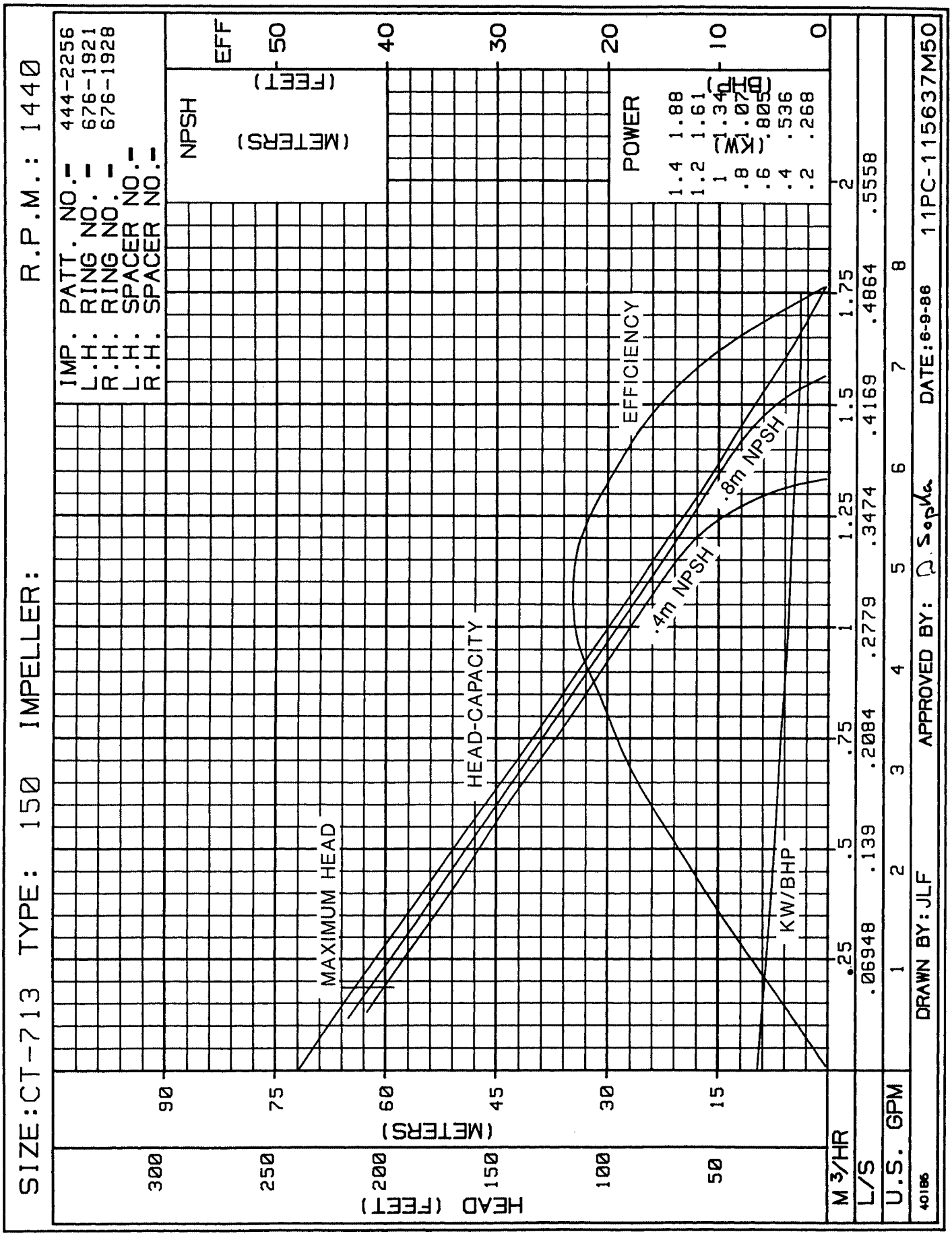
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-713 - 1440 RPM
IMPELLER

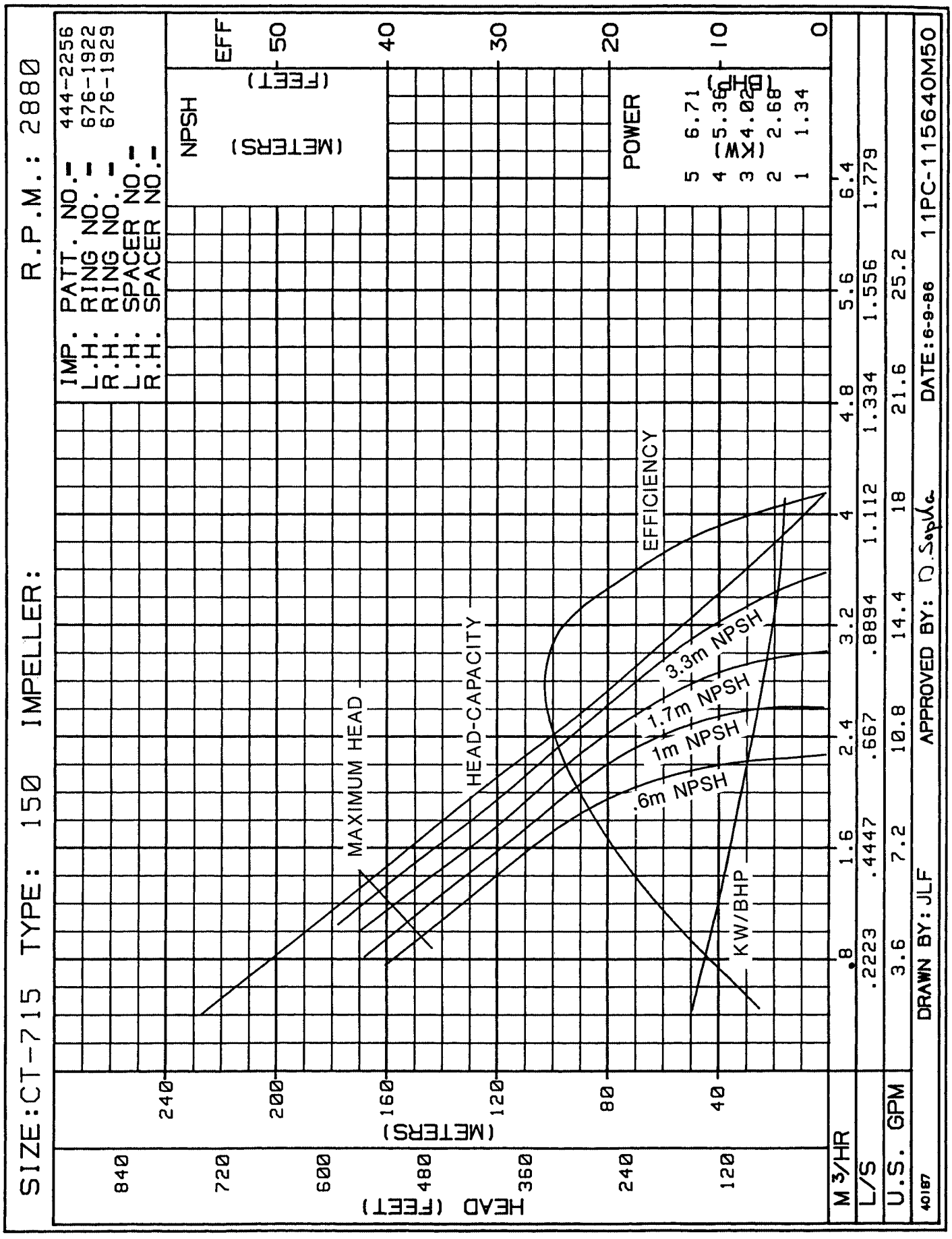
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CT-715 - 2880 RPM
IMPELLER

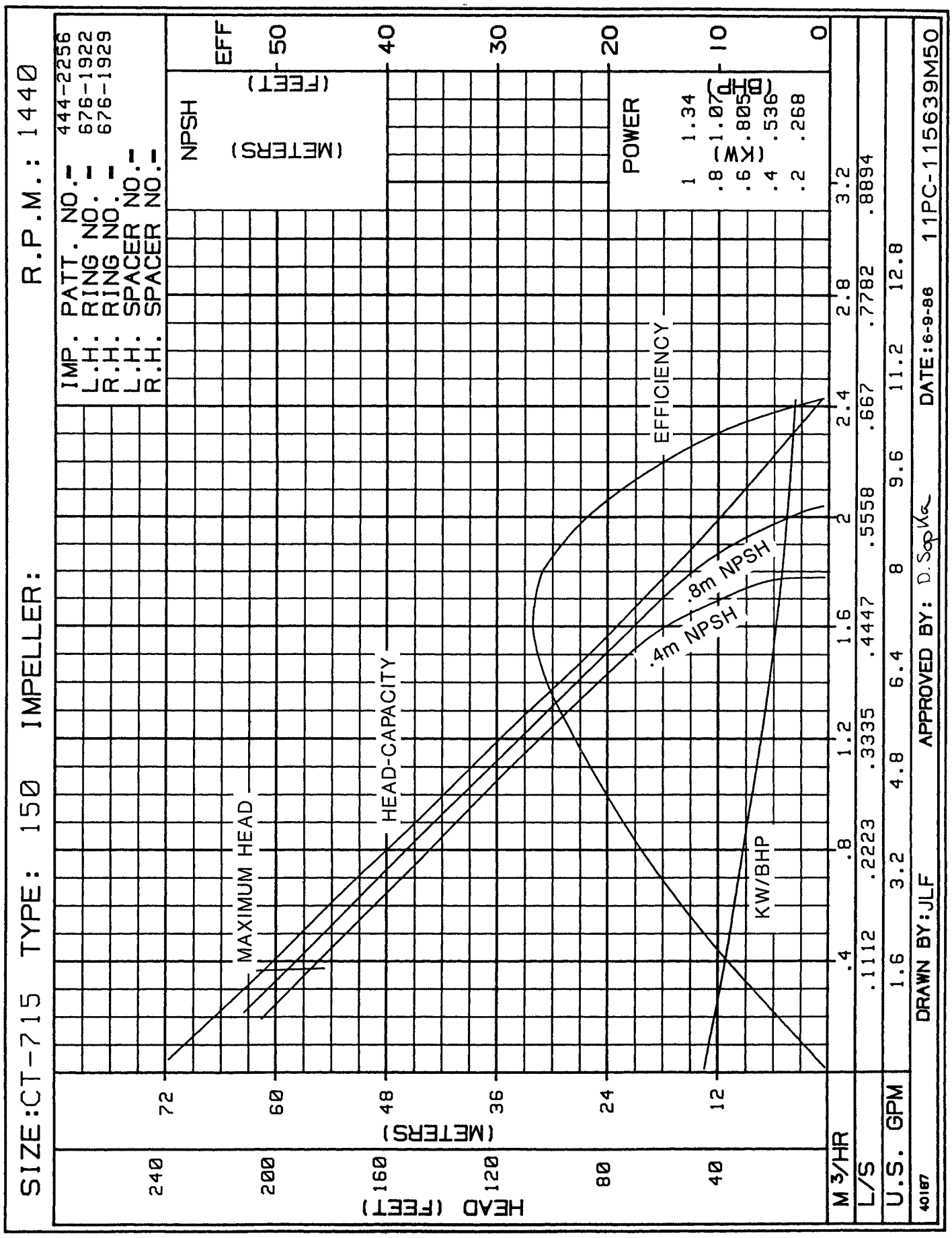
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-715 - 1440 RPM
IMPELLER

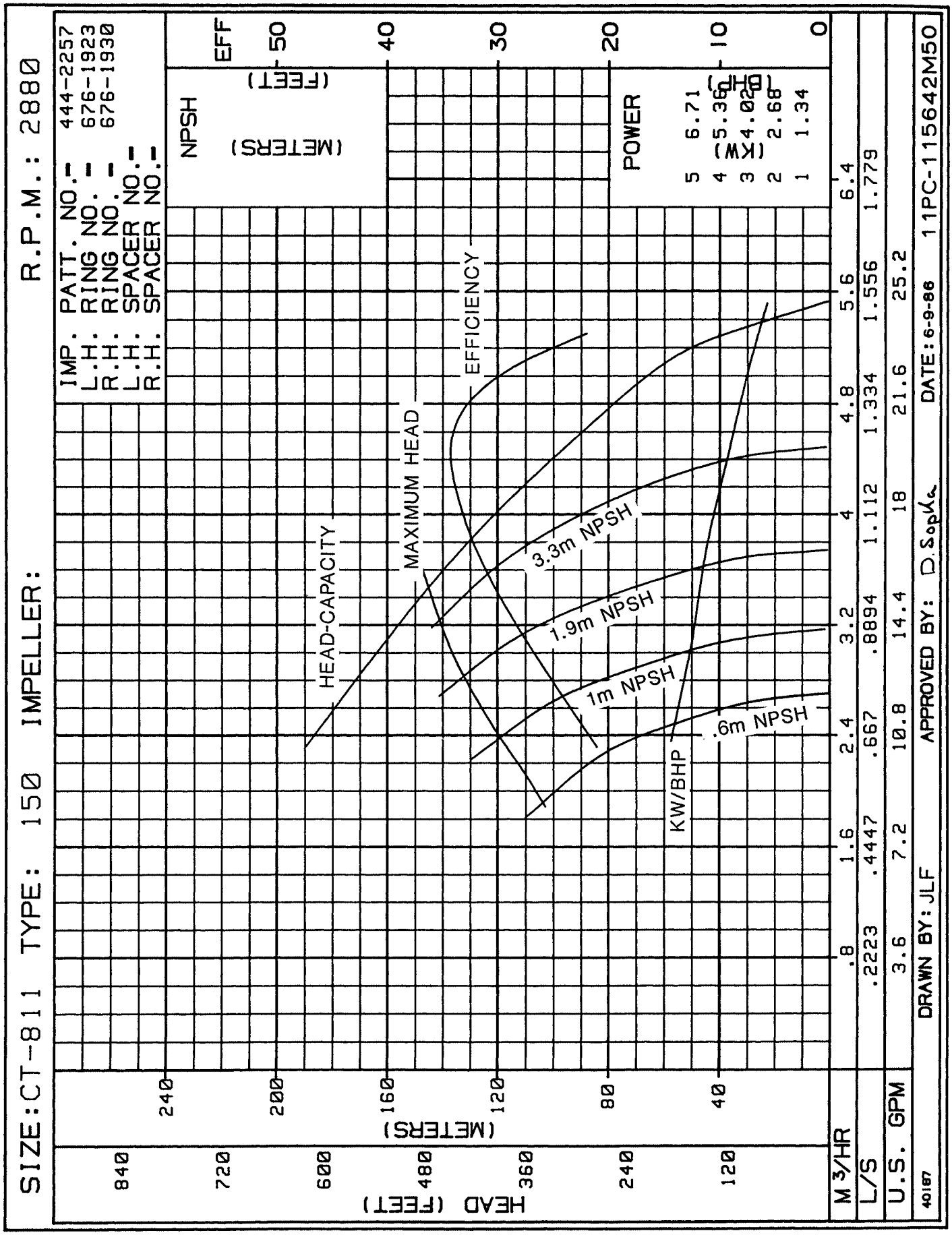
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CT-811 - 2880 RPM
IMPELLER

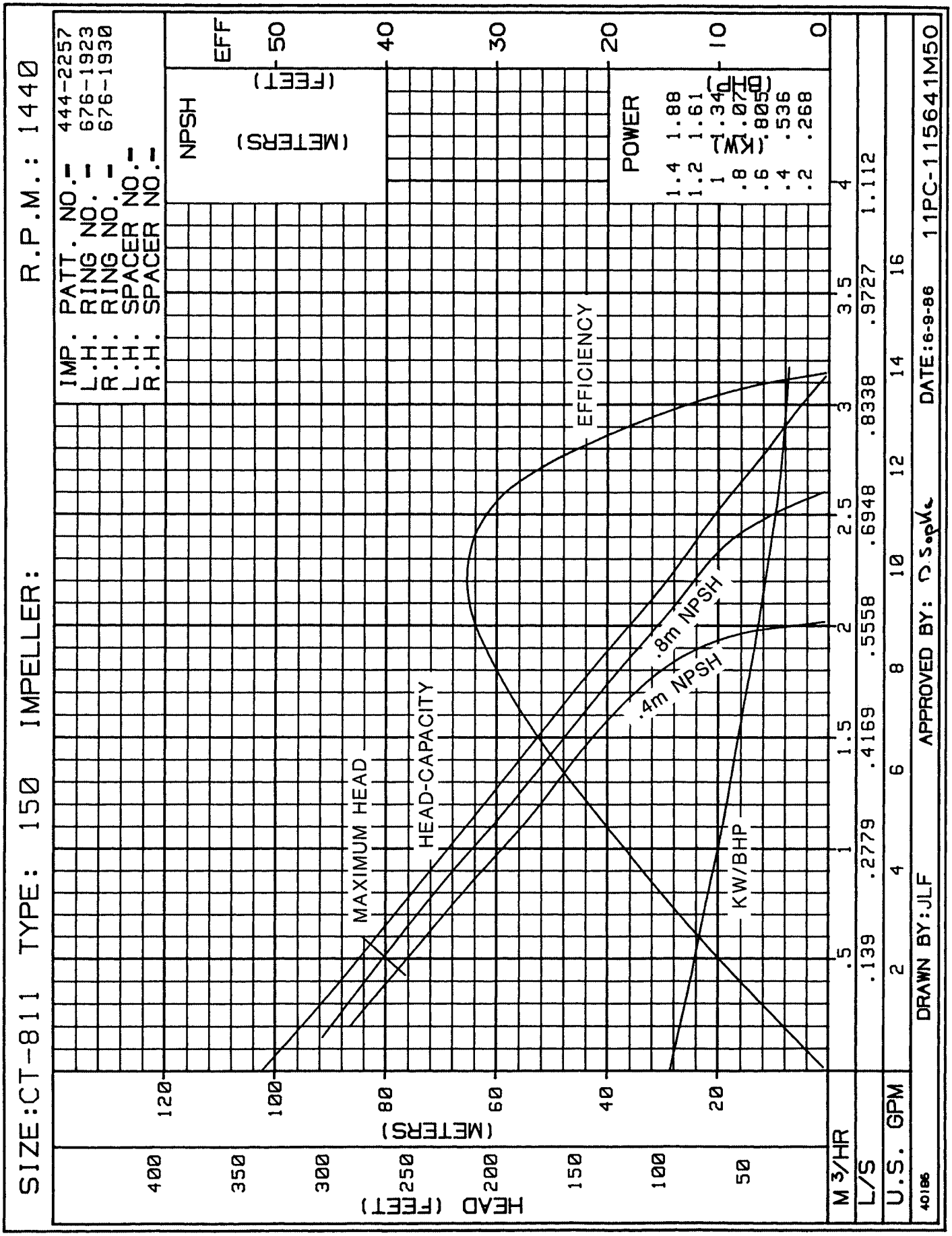
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-811 - 1440 RPM
IMPELLER

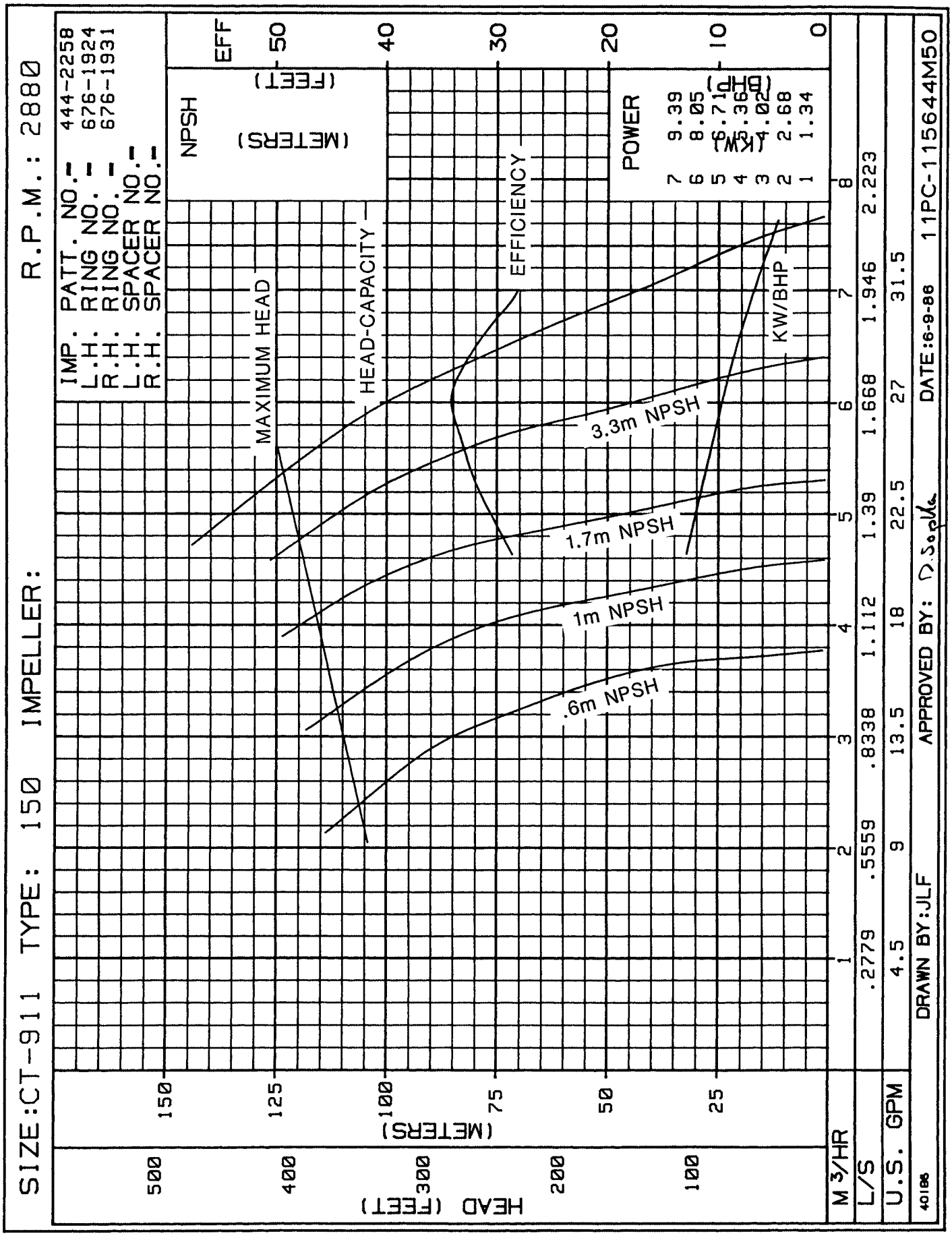
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CT-911 - 2880 RPM
IMPELLER

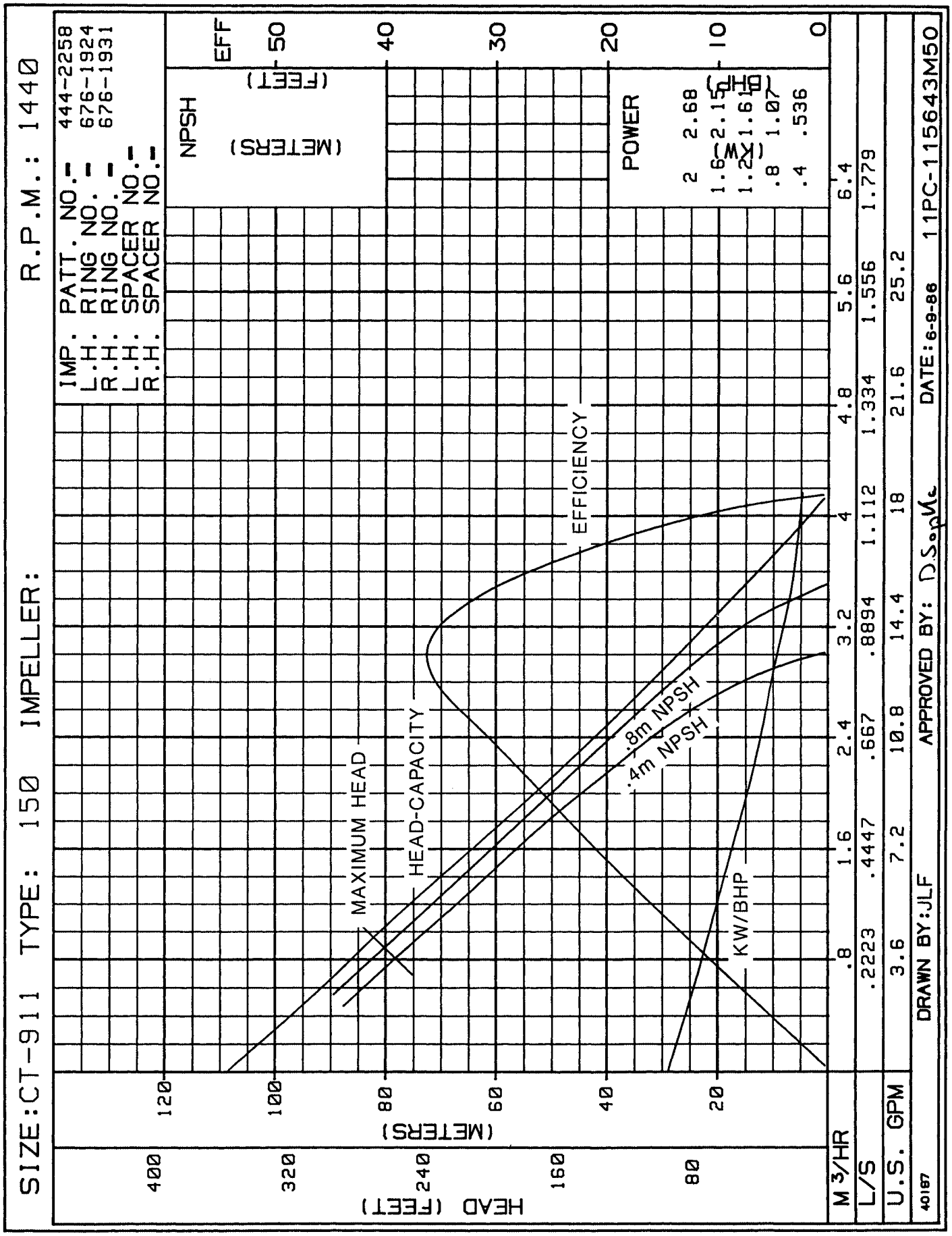
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-911 - 1440 RPM
IMPELLER

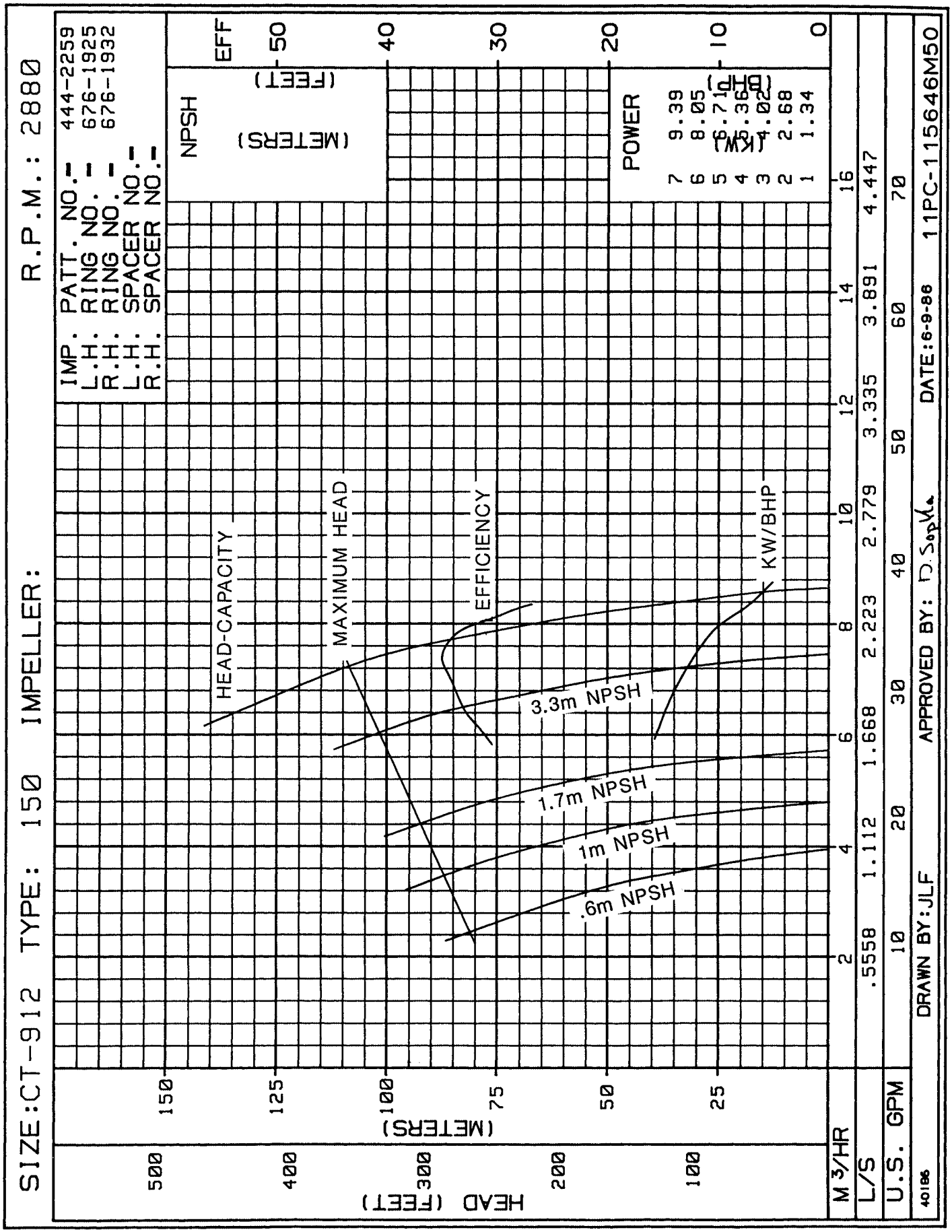
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CT-912 - 2880 RPM
IMPELLER

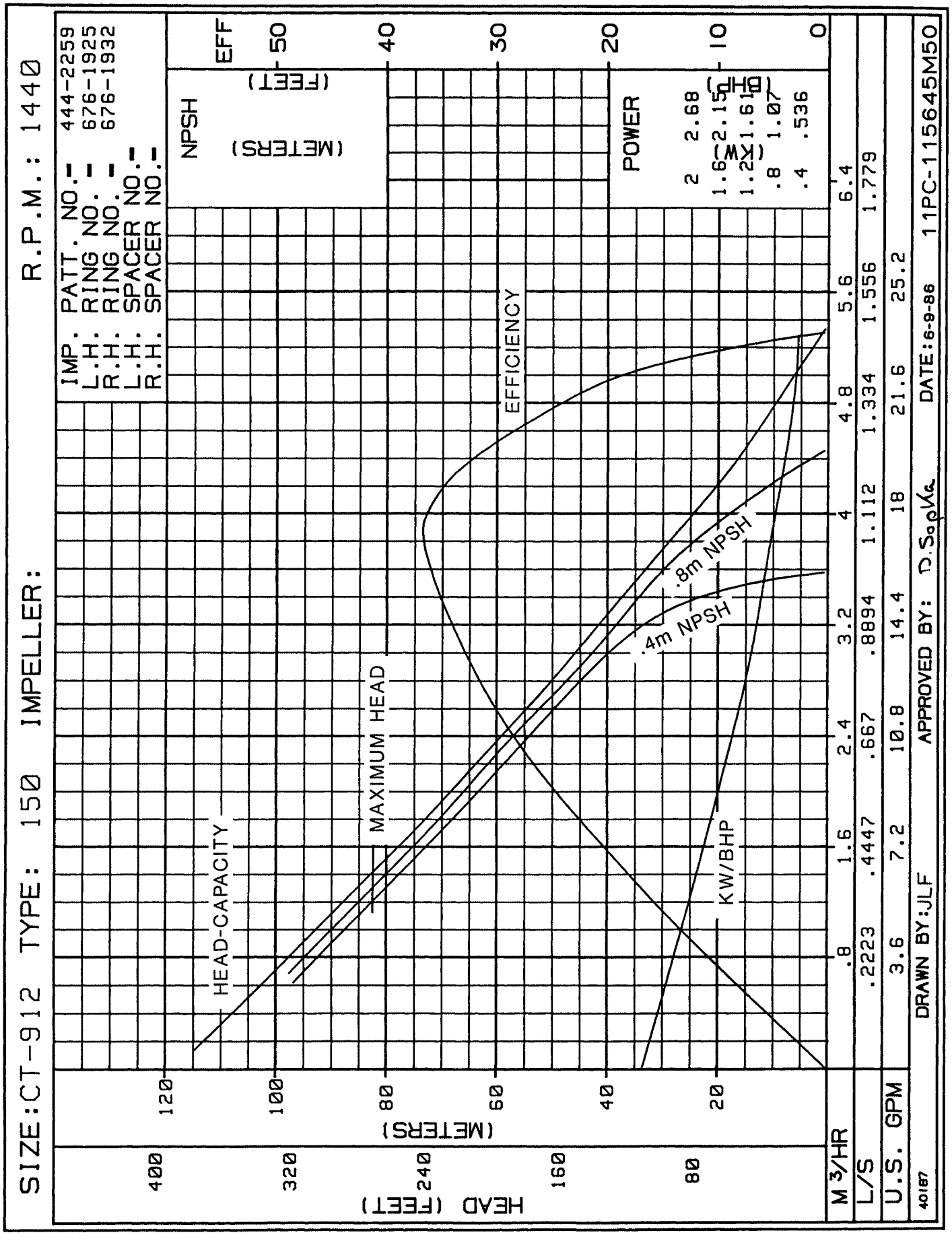
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-912 - 1440 RPM
IMPELLER

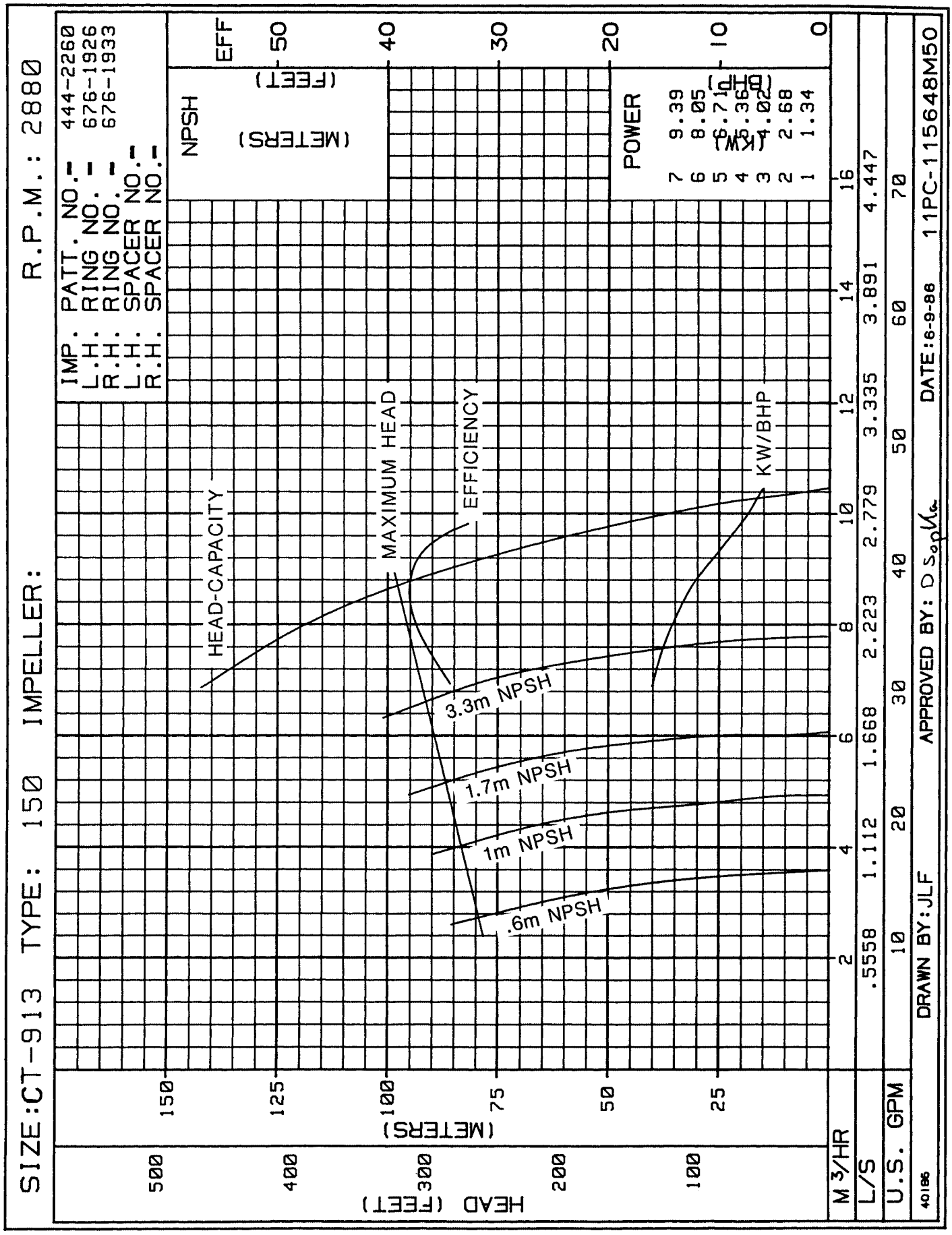
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CT-913 - 2880 RPM
IMPELLER

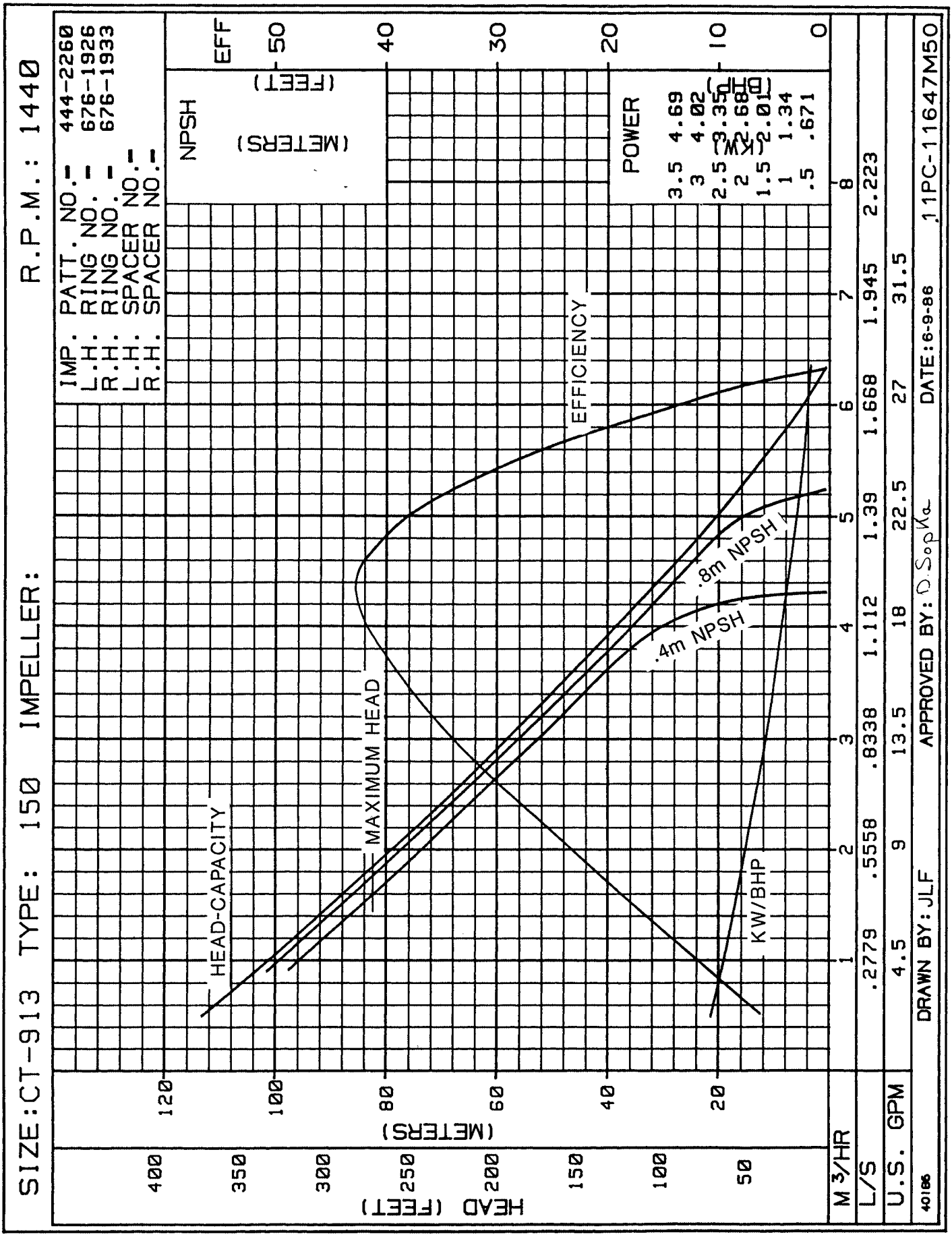
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-913 - 1440 RPM
IMPELLER

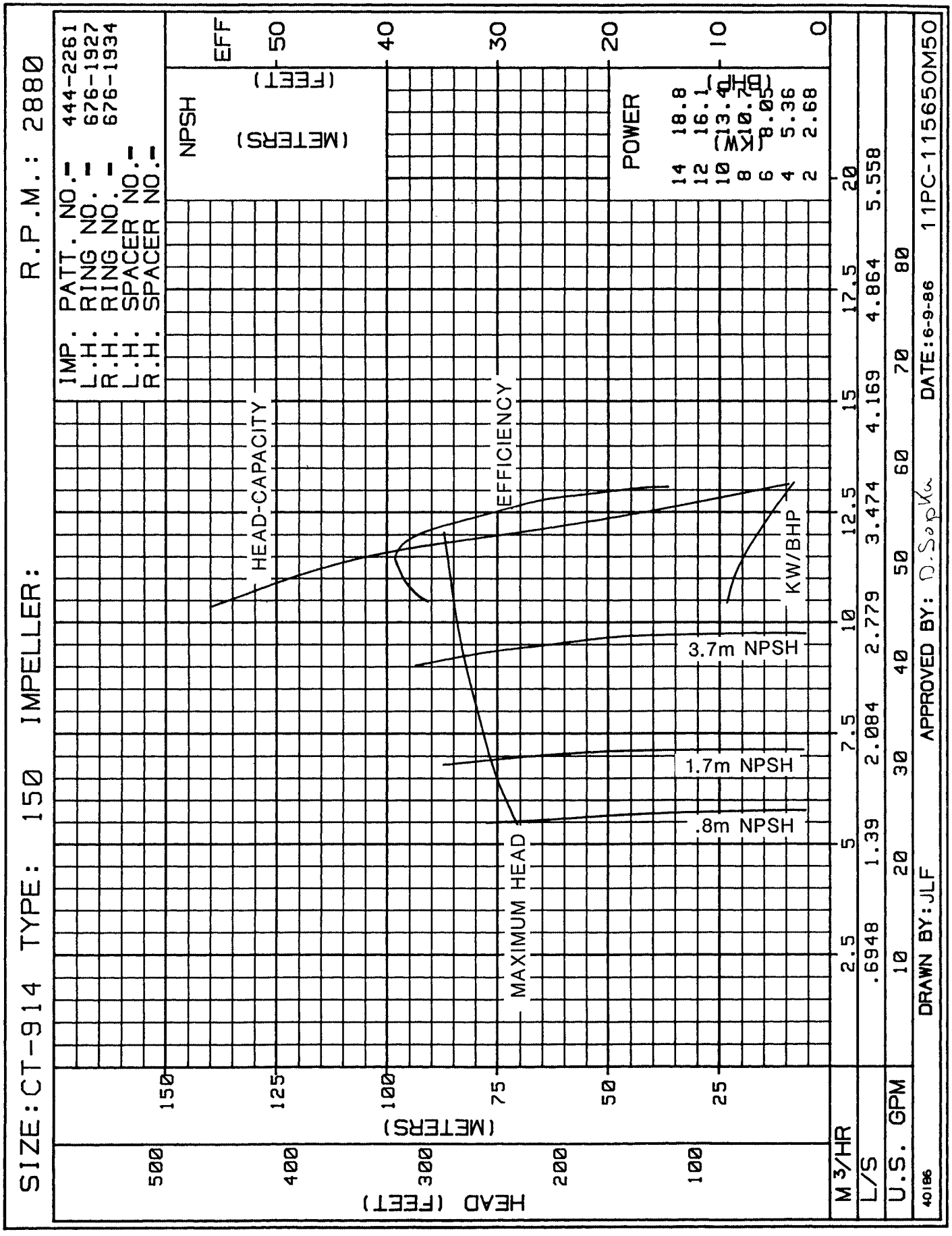
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CT-914 - 2880 RPM
IMPELLER

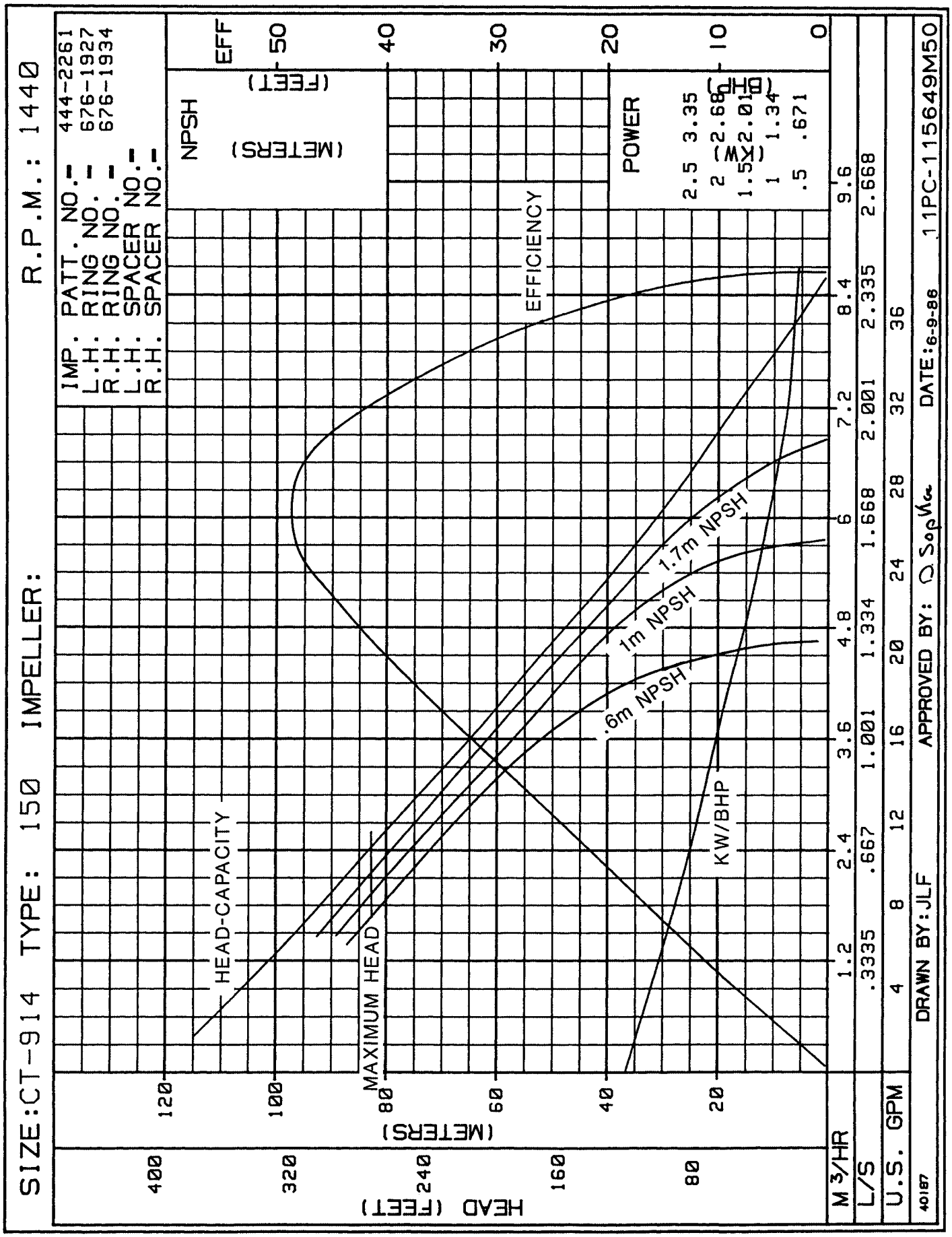
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-914 - 1440 RPM
IMPELLER

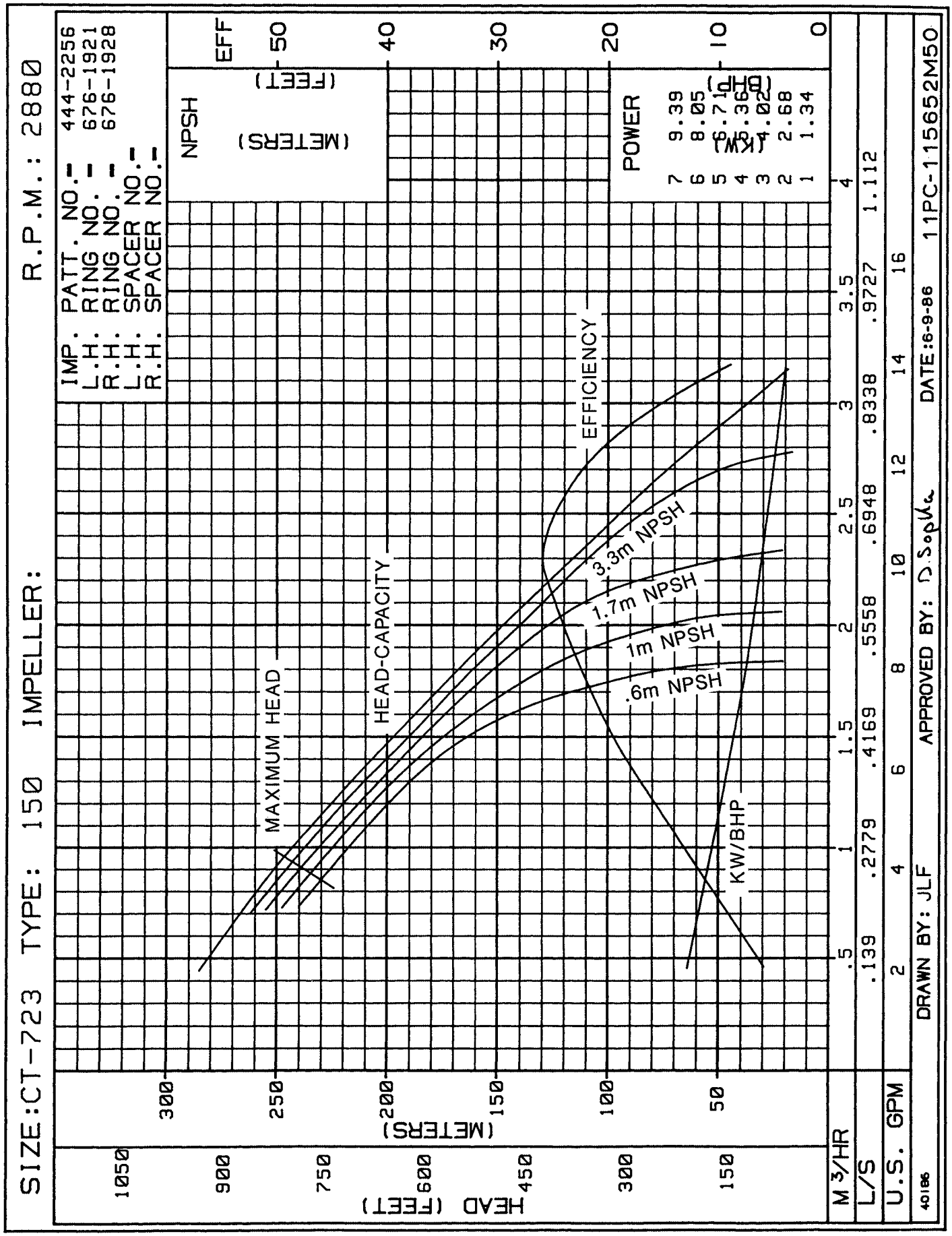
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CT-723 - 2880 RPM
IMPELLER

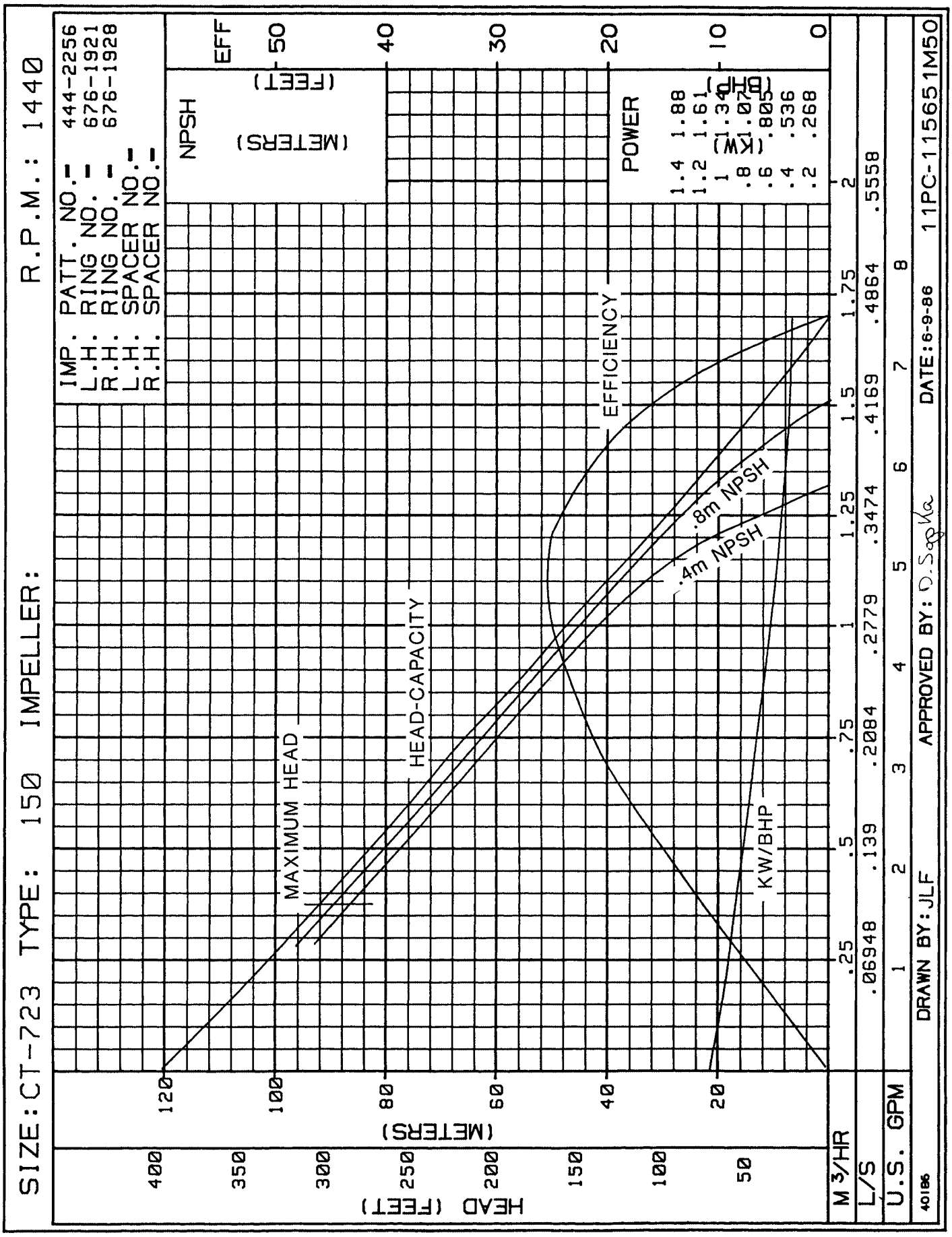
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION **150 (Metric 50Hz)**
DATE **JULY 1994**
SUPERCEDES MARCH 1986

CT-723 - 1440 RPM
IMPELLER

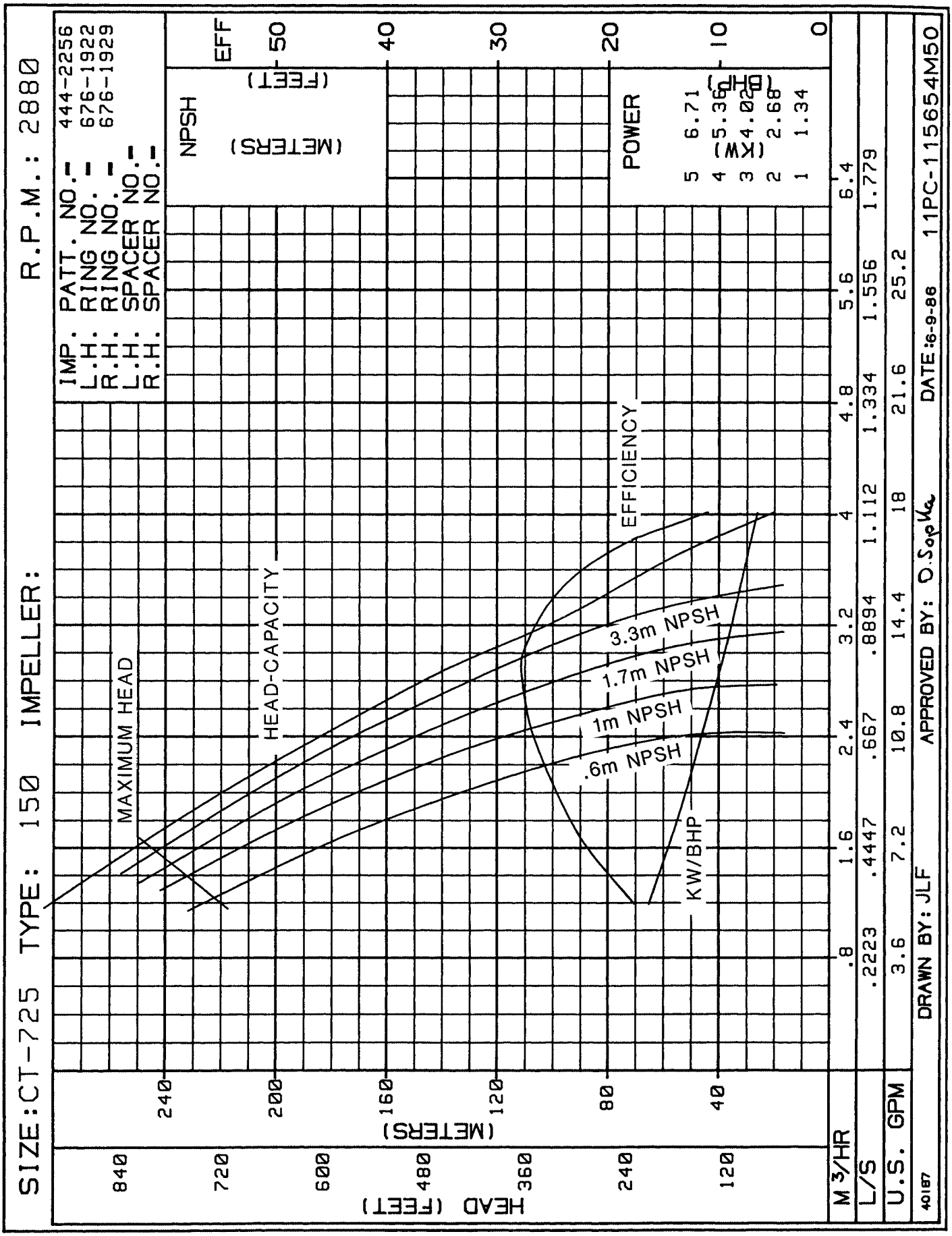
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CT-725 - 2880 RPM
IMPELLER

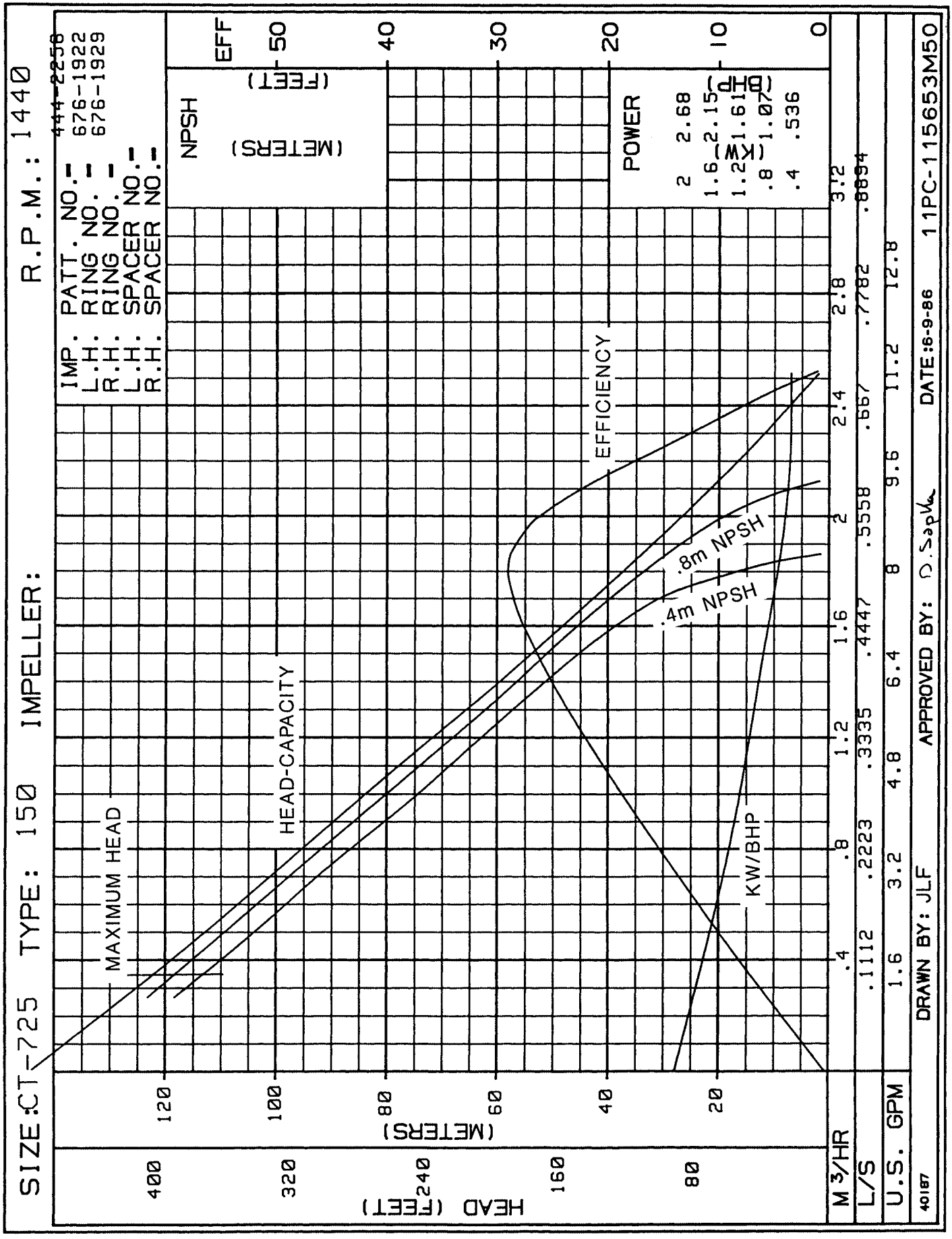
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-725 - 1440 RPM
IMPELLER

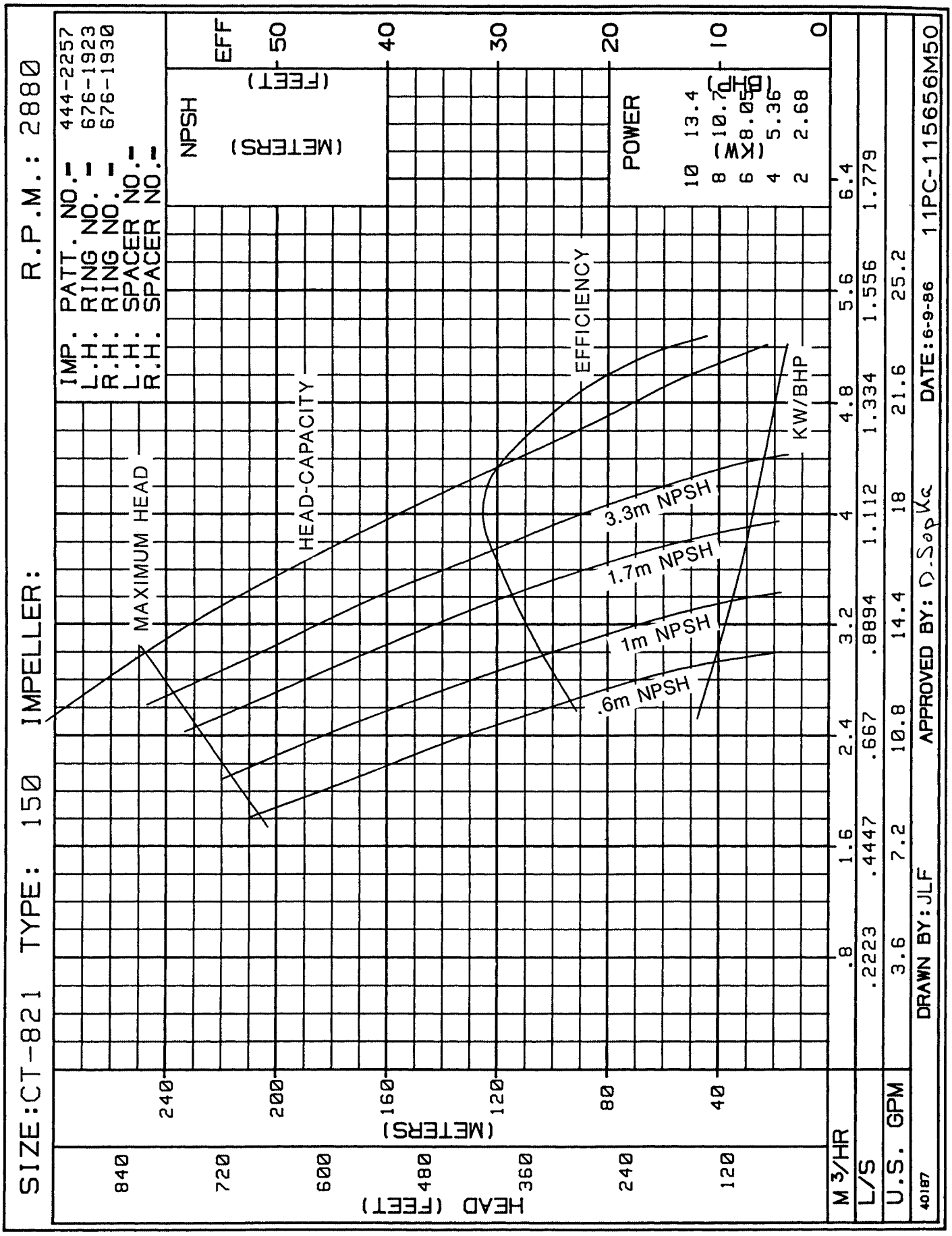
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CT-821 - 2880 RPM
IMPELLER

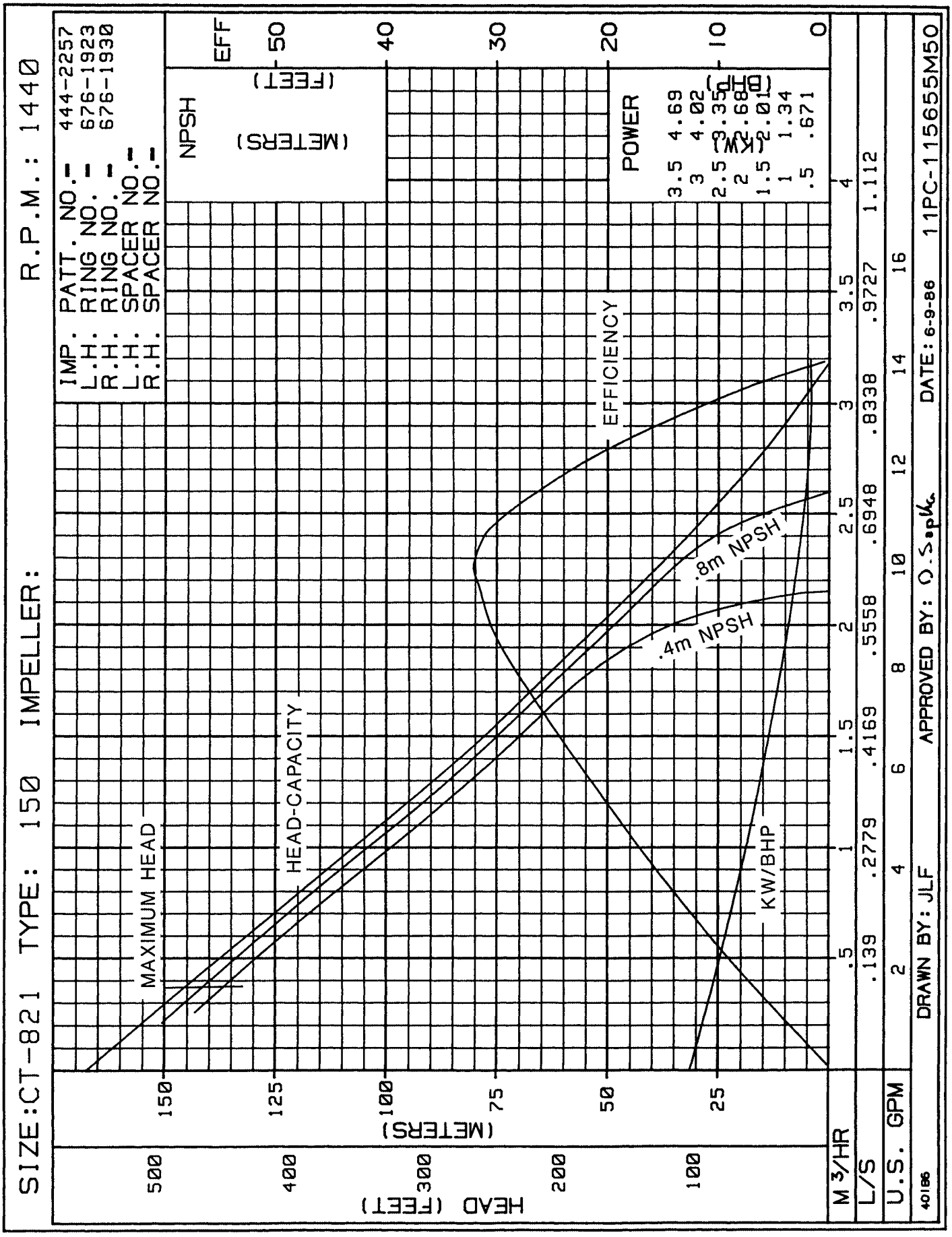
SECTION **150 (Metric 50Hz)**
DATE **JULY 1994**
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-821 - 1440 RPM
IMPELLER

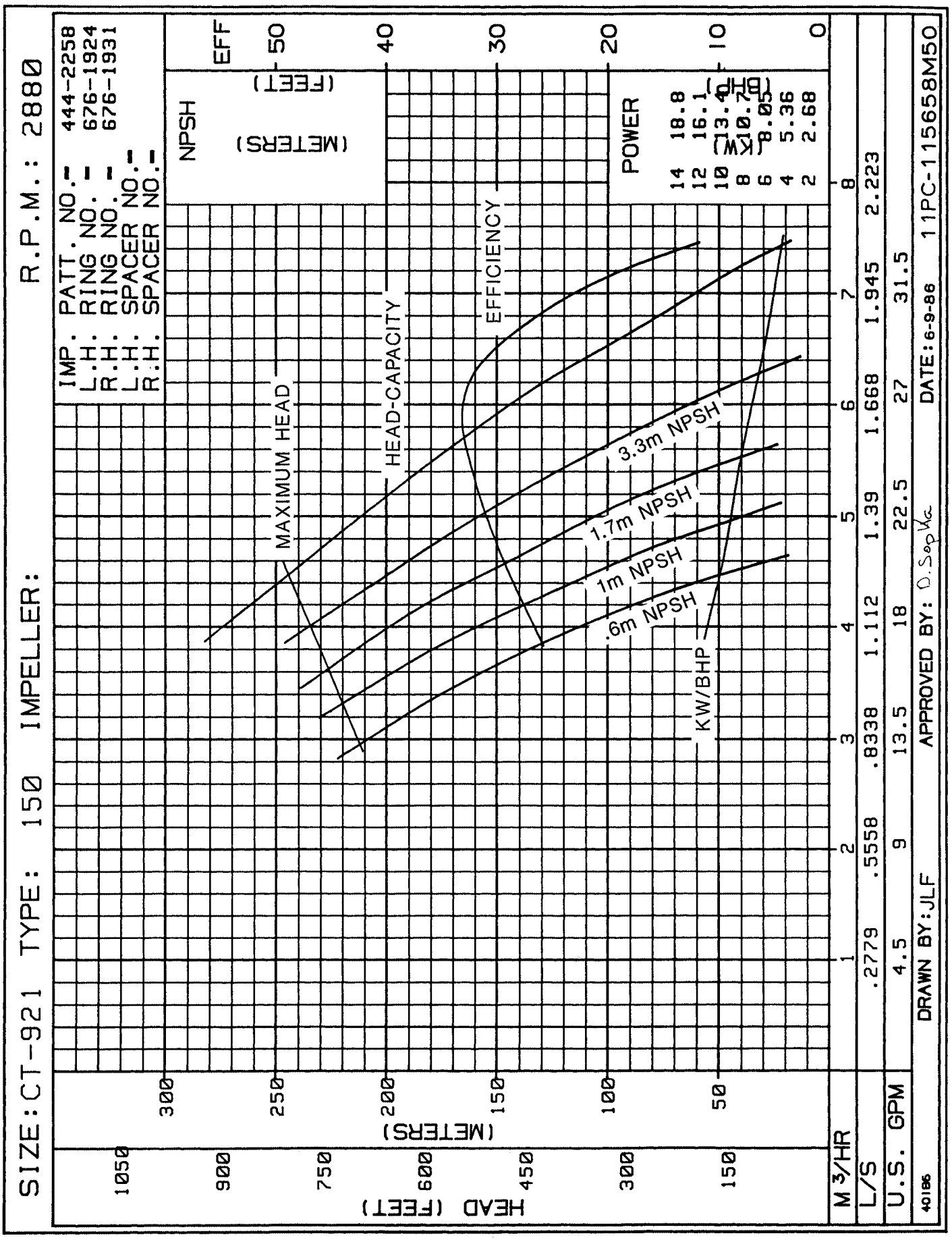
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CT-921 - 2880 RPM
IMPELLER

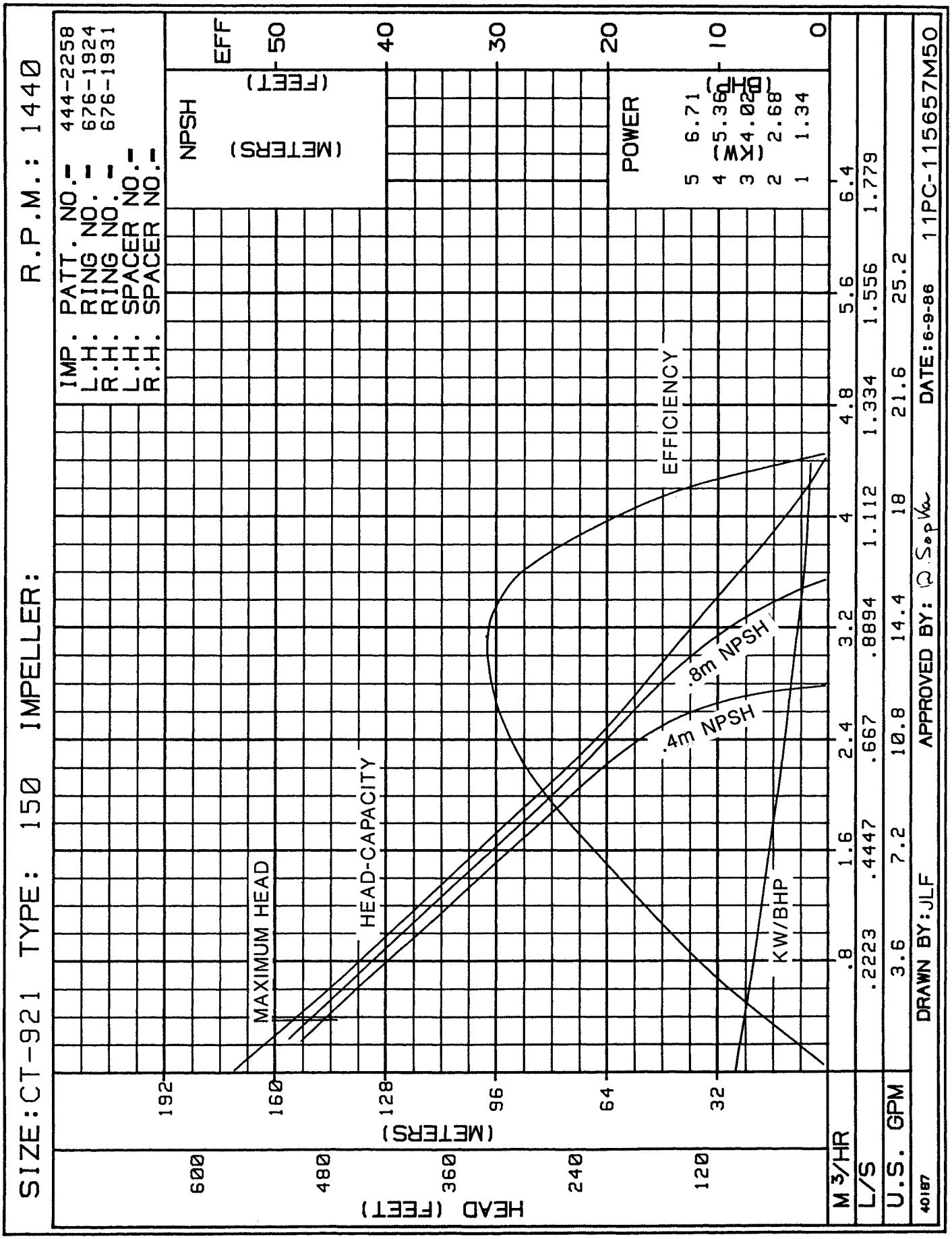
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-921 - 1440 RPM
IMPELLER

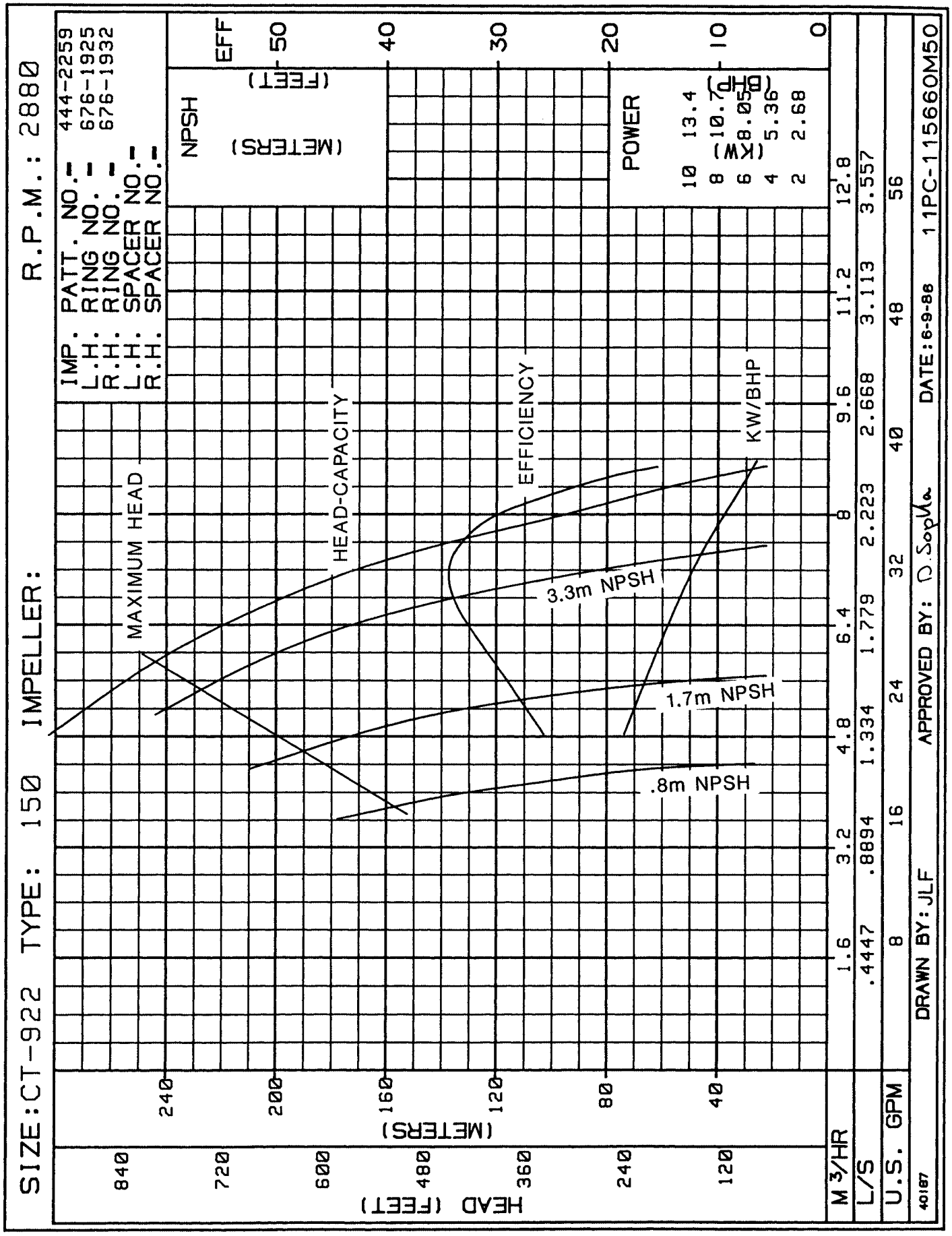
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CT-922 - 2880 RPM
IMPELLER

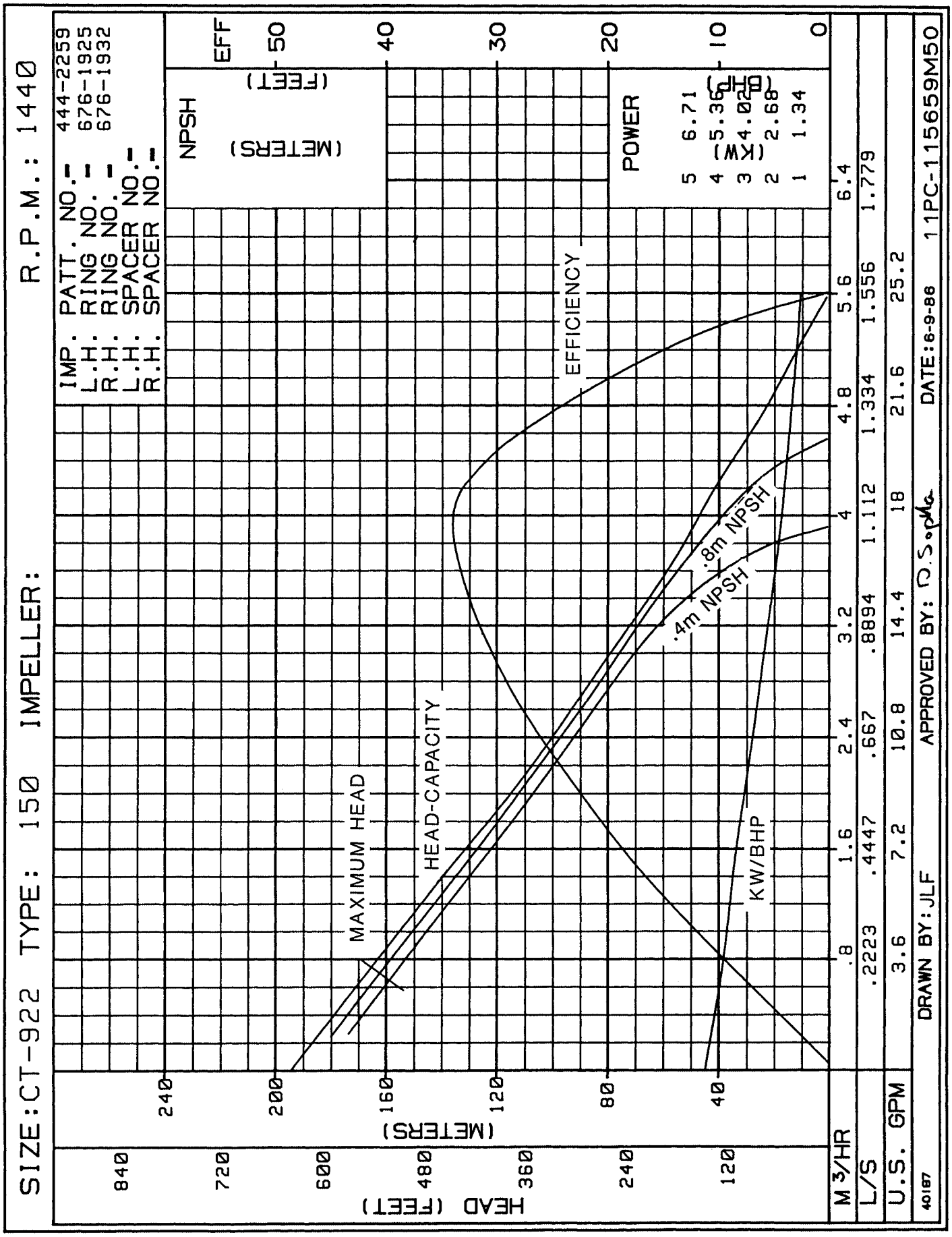
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-992 - 1440 RPM
IMPELLER

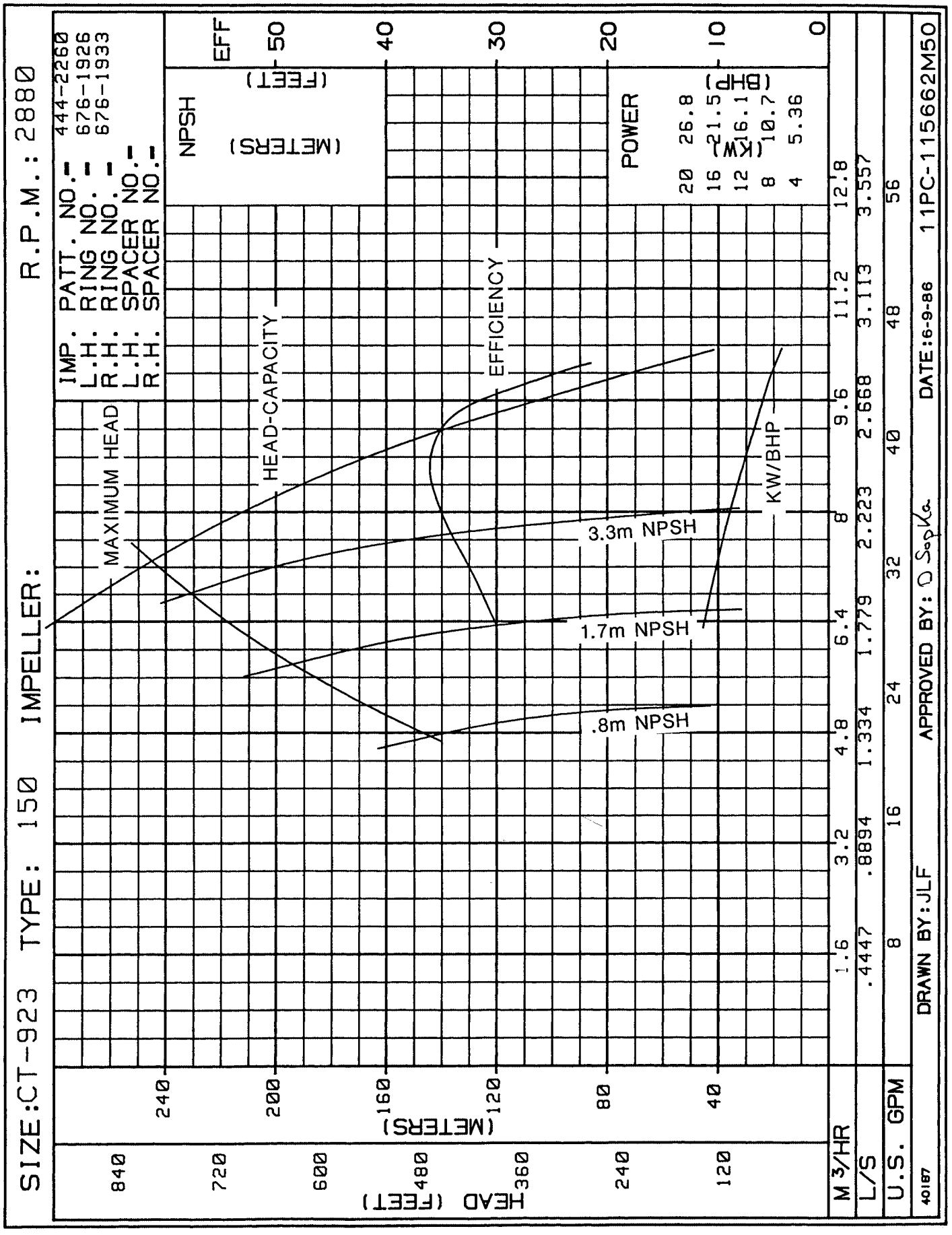
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CT-923 - 2880 RPM
IMPELLER

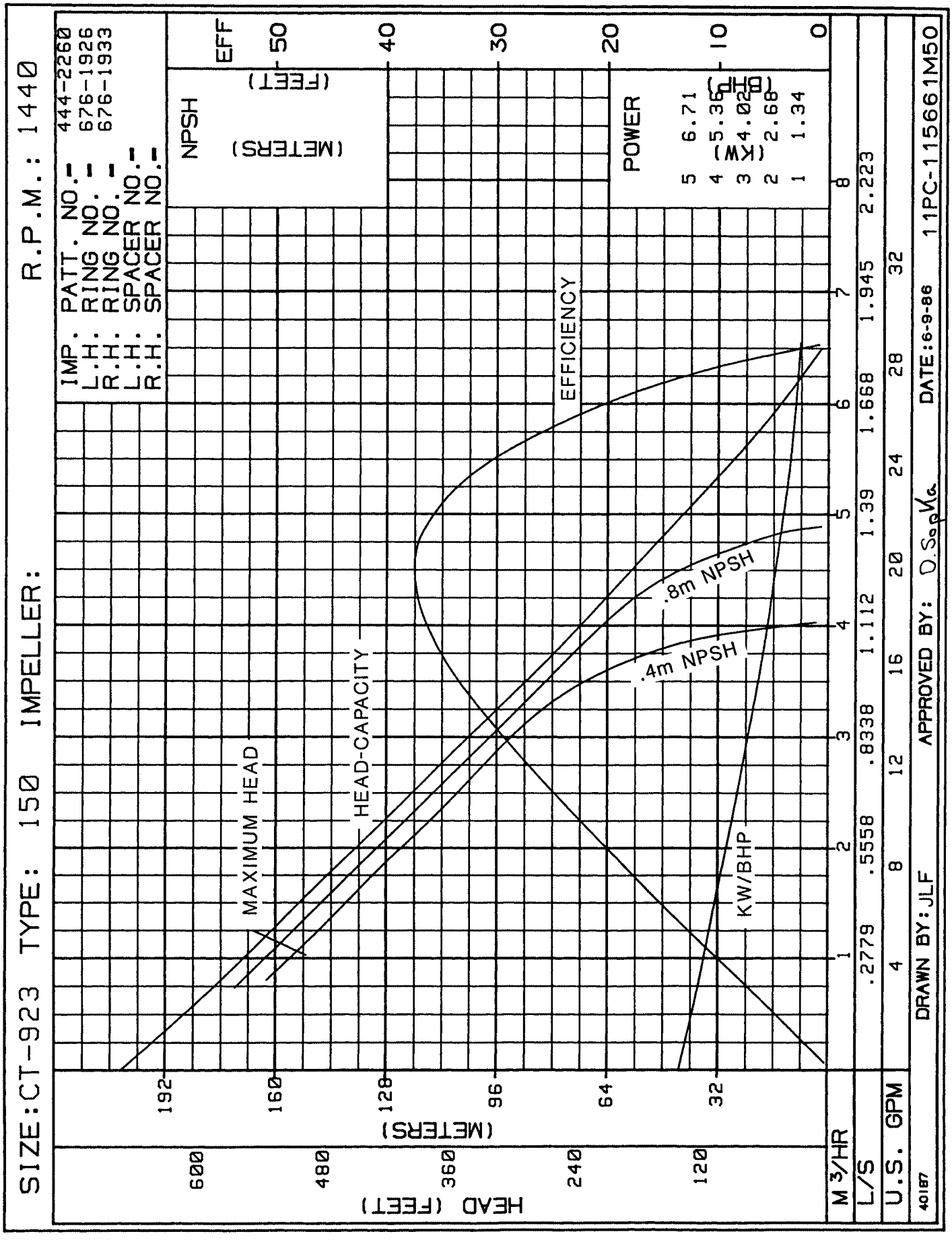
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-923 - 1440 RPM
IMPELLER

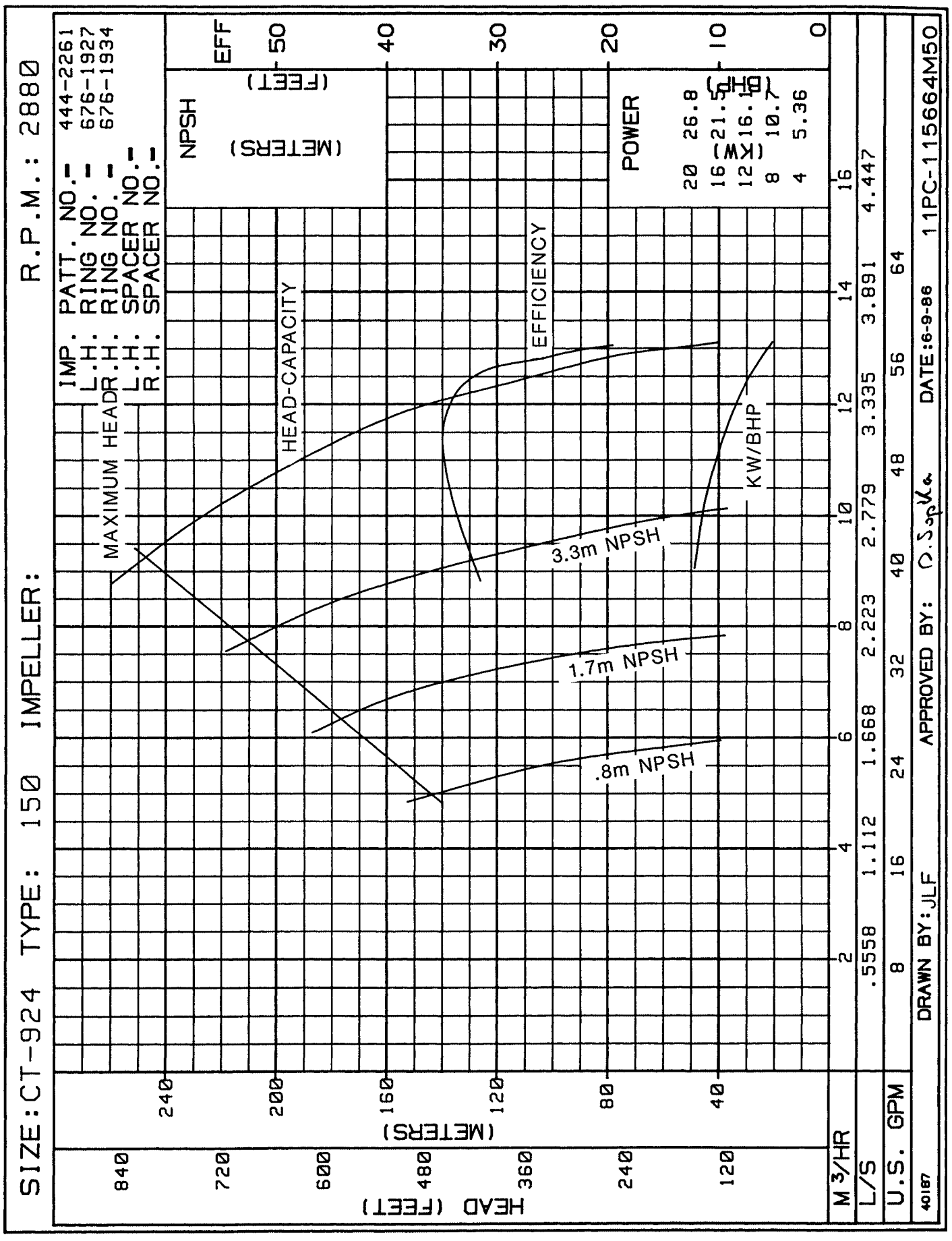
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CT-924 - 2880 RPM
IMPELLER

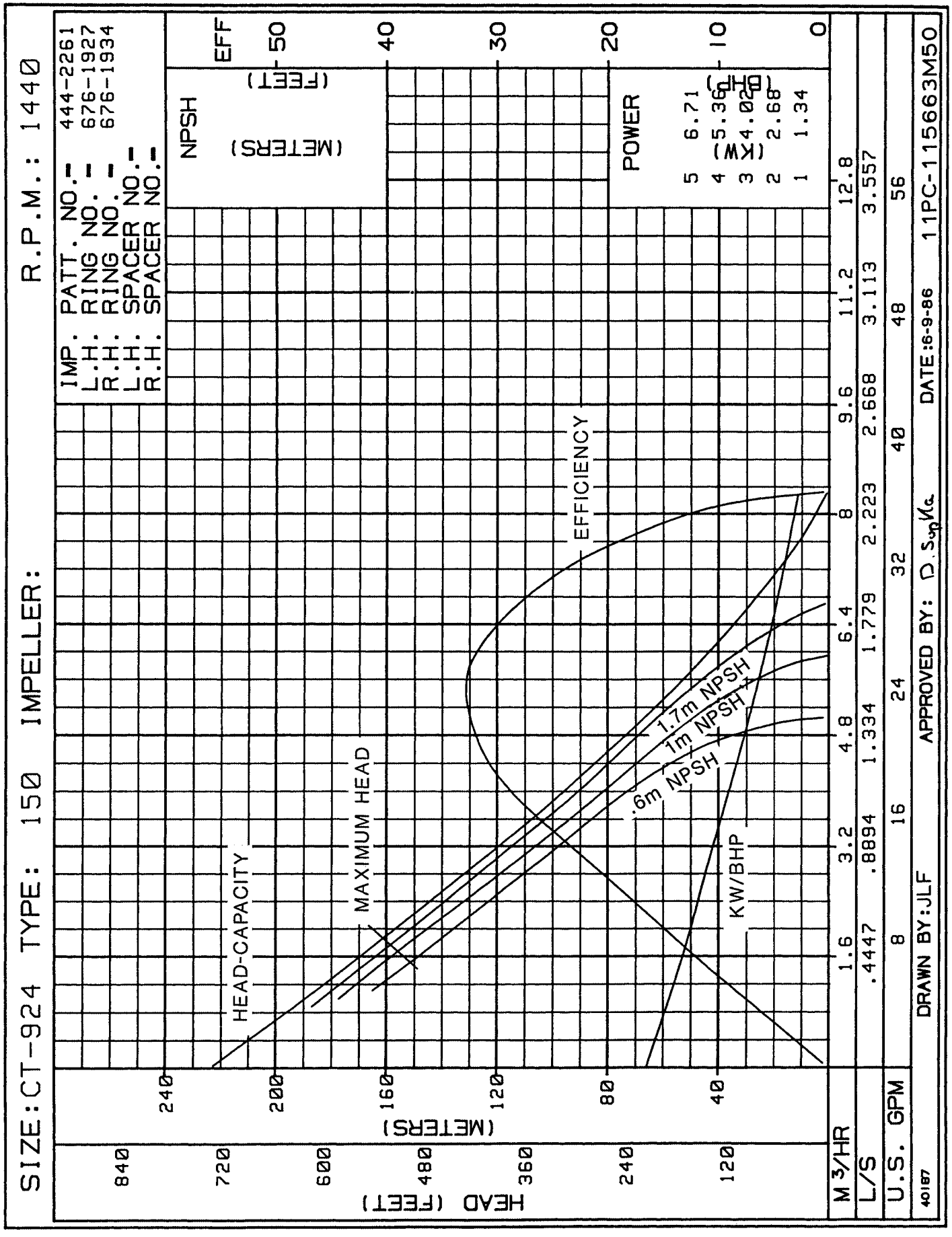
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-924 - 1440 RPM
IMPELLER

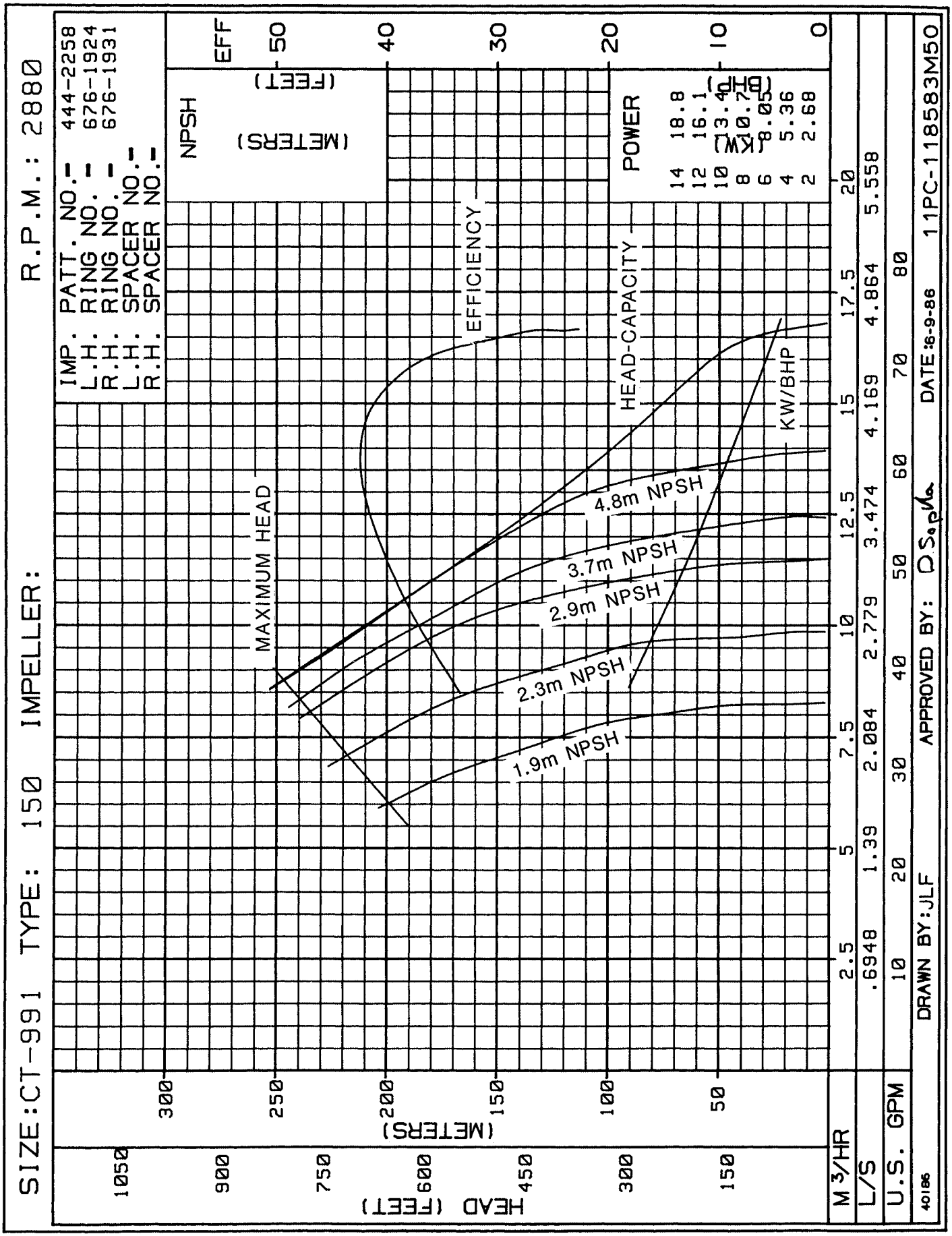
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CT-991 - 2880 RPM
IMPELLER

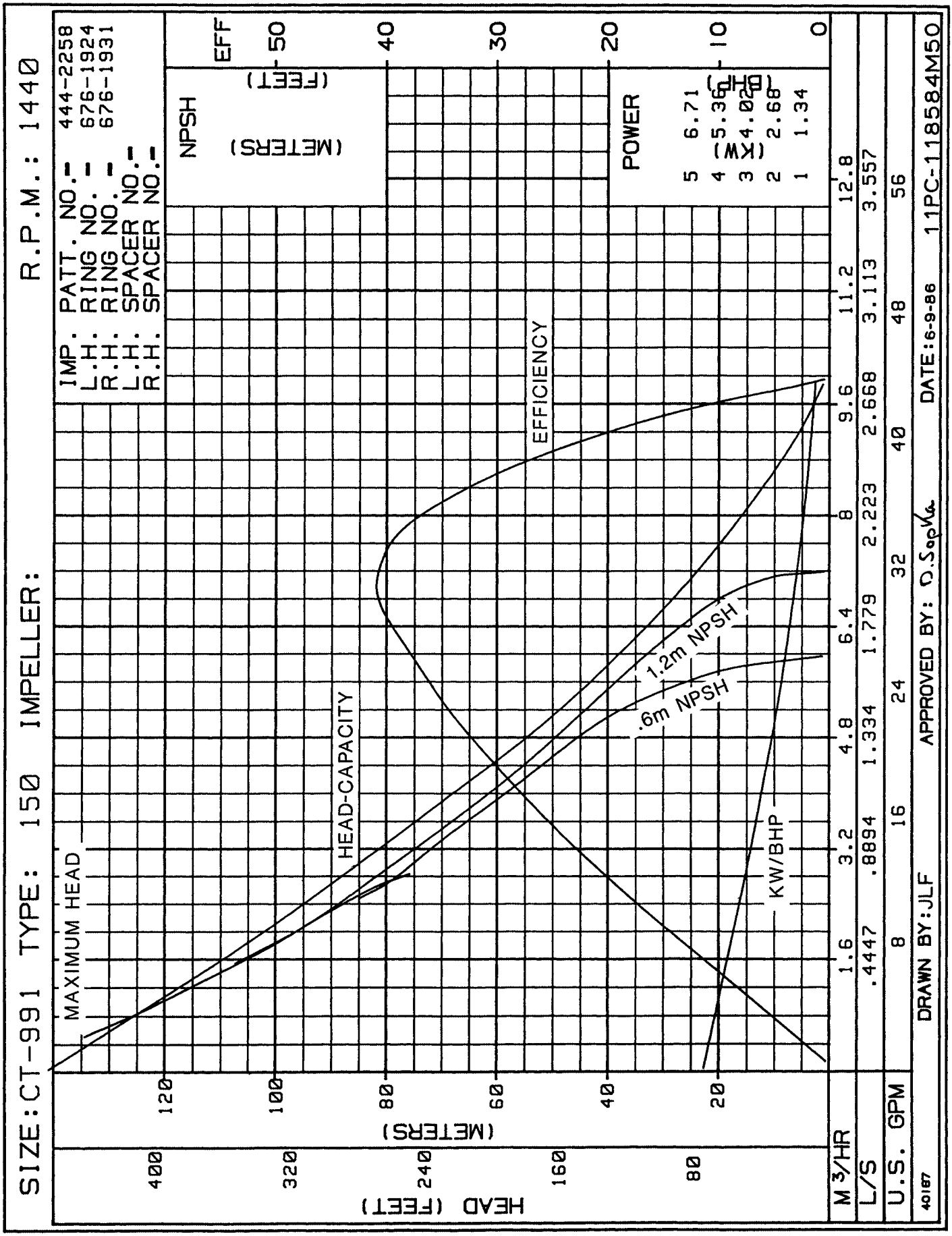
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION **150 (Metric 50Hz)**
DATE **JULY 1994**
SUPERCEDES MARCH 1986

CT-991 - 1440 RPM
IMPELLER

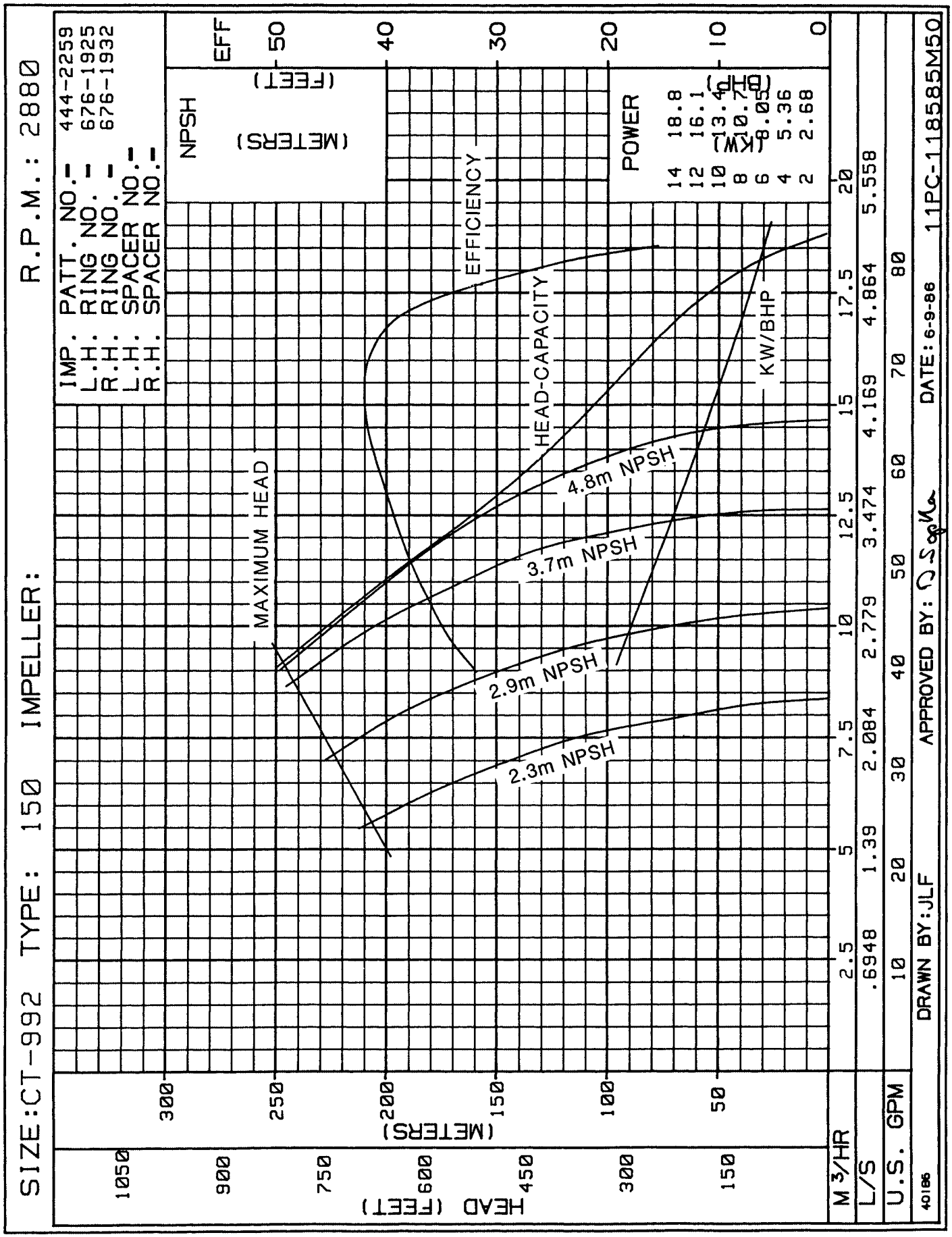
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CT-992 - 2880 RPM
IMPELLER

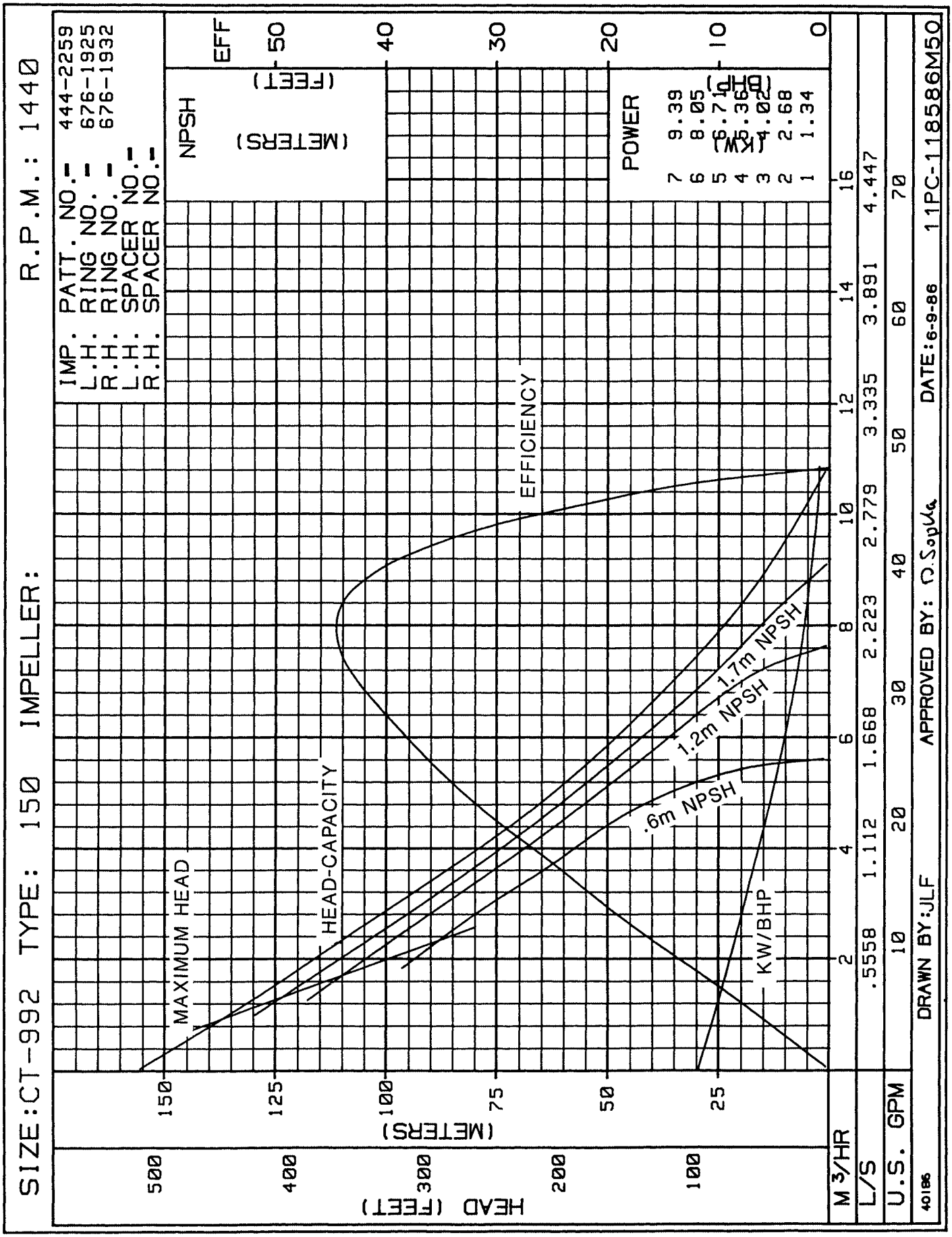
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-922 - 1440 RPM
IMPELLER

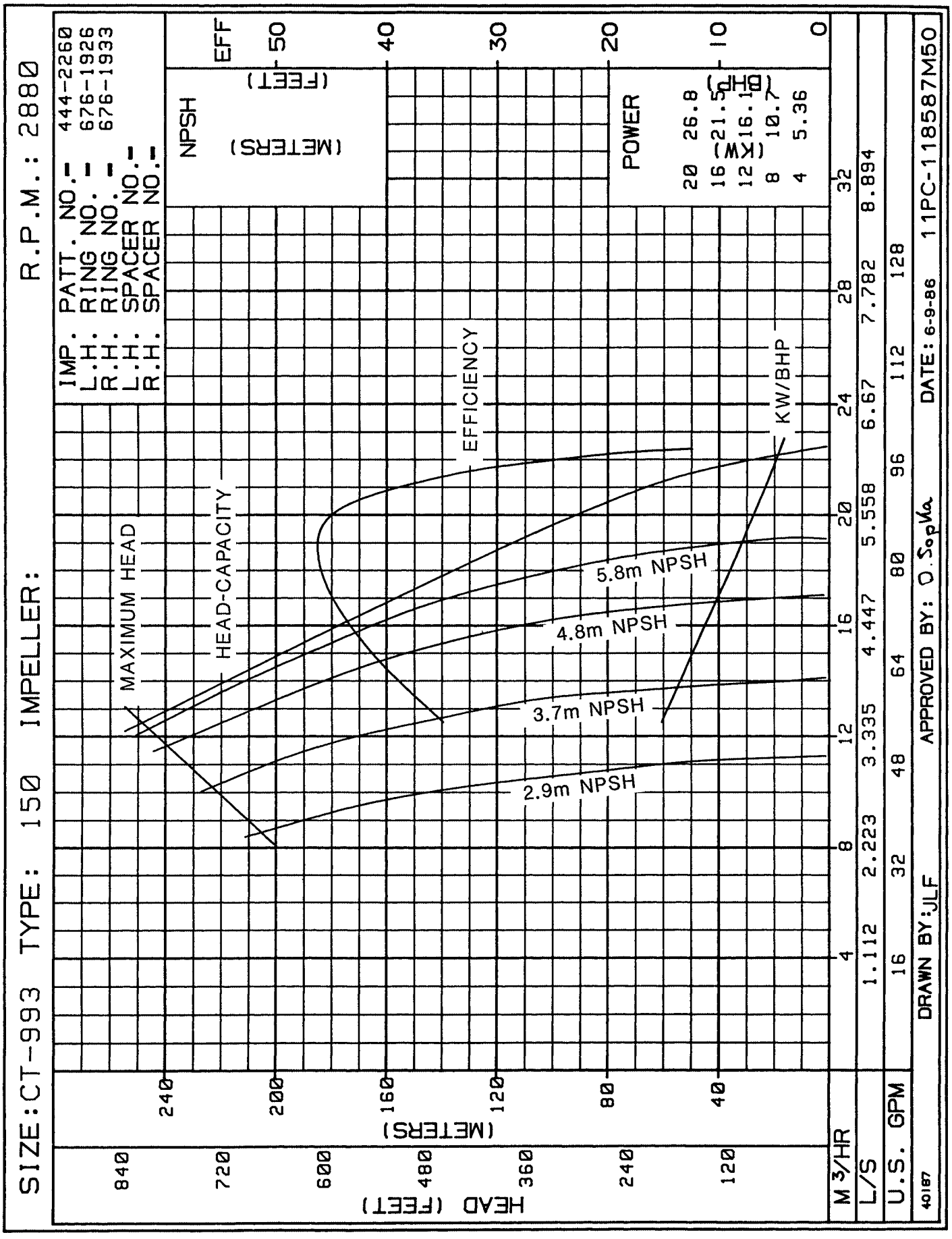
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CT-993 - 2880 RPM
IMPELLER

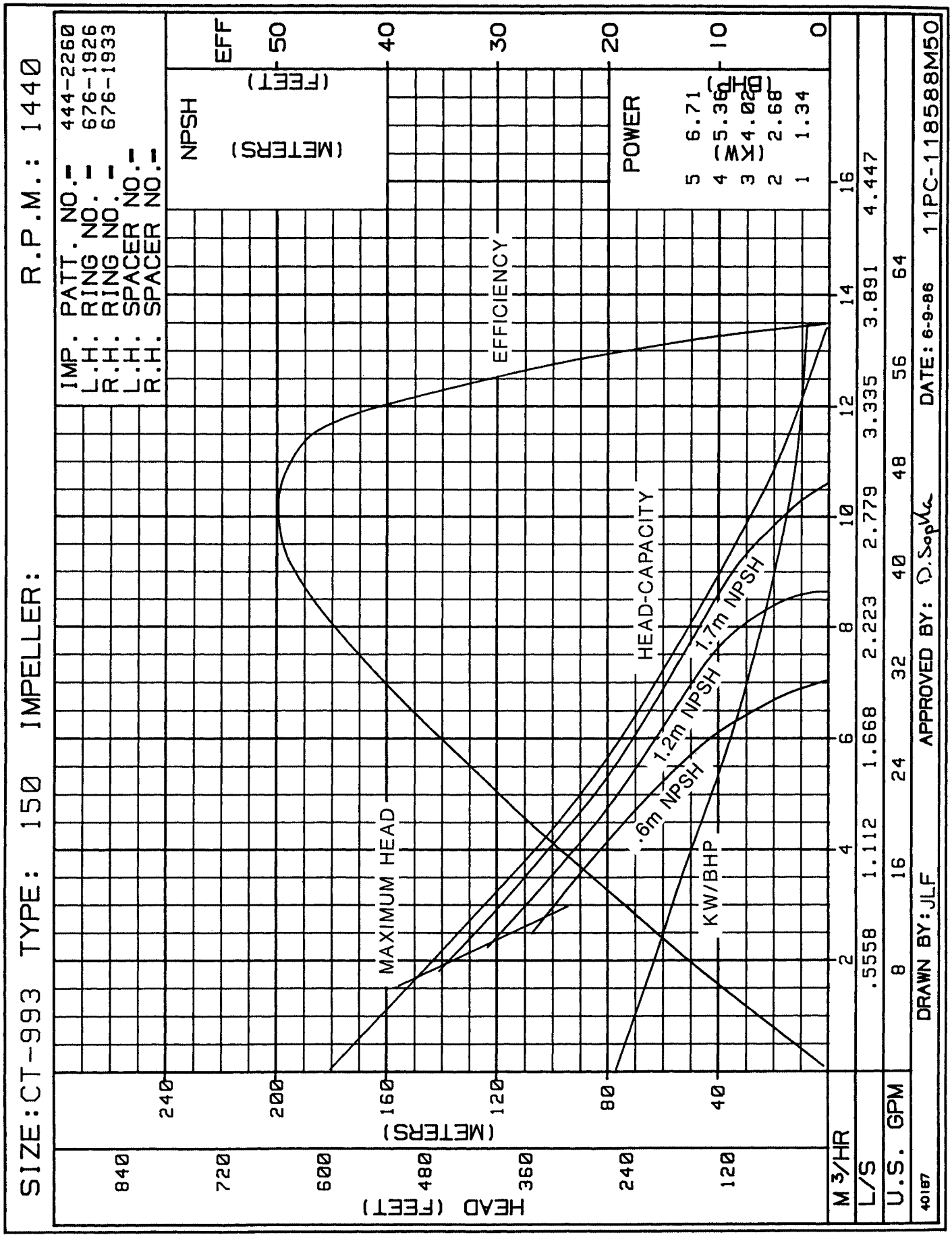
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986

CT-993 - 1440 RPM
IMPELLER

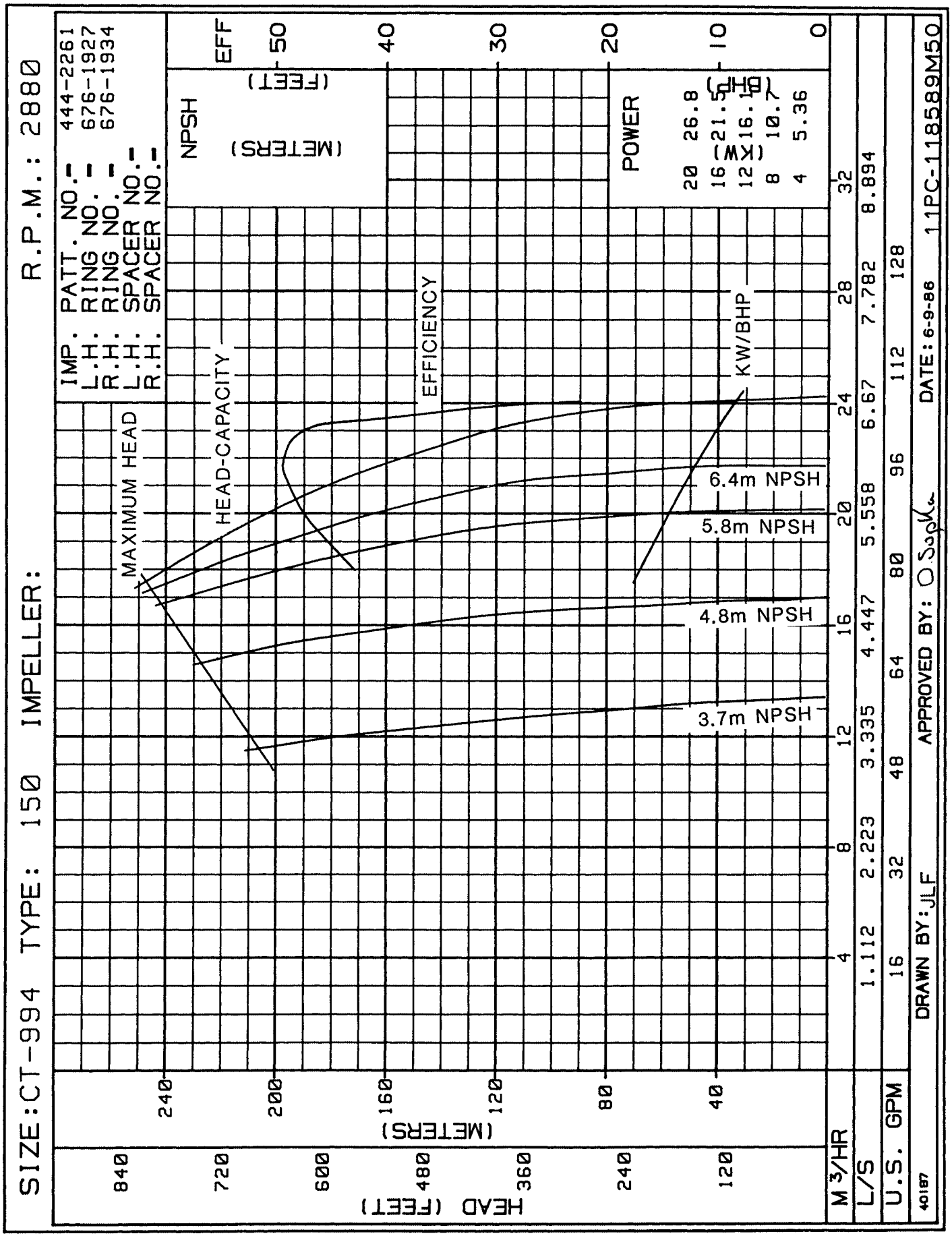
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CT-994 - 2880 RPM
IMPELLER

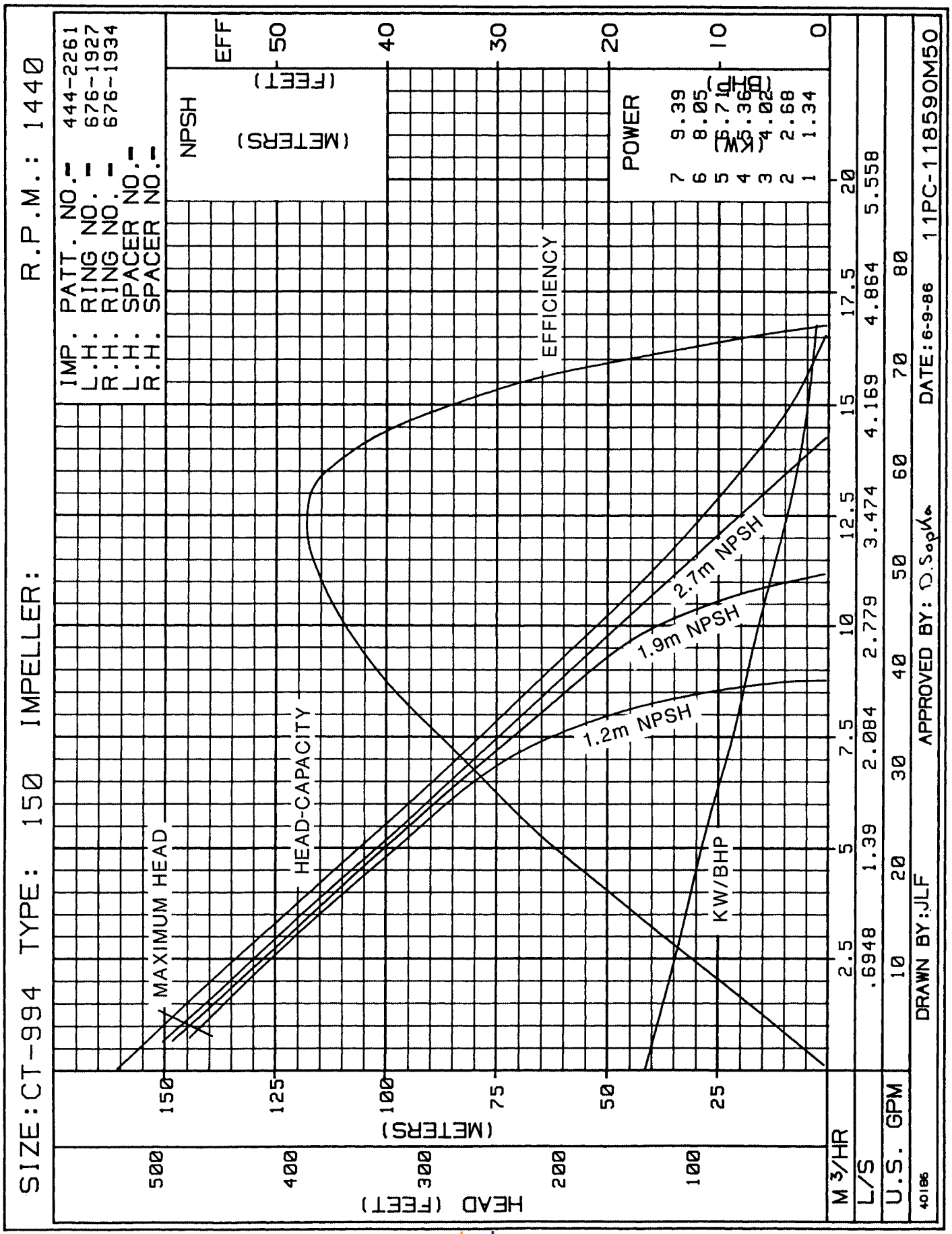
SECTION 150 (Metric 50Hz)
DATE JULY 1994
SUPERCEDES MARCH 1986



SECTION **150 (Metric 50Hz)**
DATE **JULY 1994**
SUPERCEDES MARCH 1986

CT-994 - 1440 RPM
IMPELLER

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