CF-SP-32012-1

ITEM	PART NUMBER	MAT'L CODE	PART NAME	QUANTITY	MATERIAL
1	D 3750 143	1881	SEAT	2	CRAN. #5
2	1866 26	5852	SEAT RING	2	SPEC. ELAST.
3	A8 4000 16	7020	WASHER	2	CARBON
4	1866 20	5852	[redacted] 'O'RING	2	SPEC. ELAST.
5	A8 4000 12	0530	RETAINER	2	304 S.S.
6	744		SPRING	24	18-8 S.S.
7	A9 4000 13	0540	DISC [redacted]	2	316 S.S.
8	A9 3875 21	0540	[redacted] SNAP RING	2	316 S.S.
9			[redacted]		
10	F 4000 102	0500	SLEEVE	1	18-8 S.S.
11	1866 16	5852	'O'RING (SLV.)	1	SPEC. ELAST.
12	D 3500 206	0500	DRIVE COLLAR	1	18-8 S.S.
13	5/16-24 x 1/2 1731-2408	0225	SET SCREW	16	HARDENED STEEL
14	F 3750 61	7831	GLAND PLATE ASS'Y	1	316 S.S. WITH BRONZE
15	1866 33	5852	[redacted] 'O'RING	1	SPEC. ELAST
16			[redacted] "O" RING		BY CUST.
17			[redacted]		
18	D 3812 18	7341	SPACER	1	555
19			[redacted]		
20	1/4-20 x 7/16 LG 1125-2007	0500	SET SCREW	6	18-8 S.S.
21			LINER		BY CUST.
22			"O" RING		BY CUST.
23	A8 4000 31	7500	BACK UP RG.	2	TEFLON

SEAL ASS'Y NO. A8-4000-30
SEAT ASS'Y NO.
SPEC. NO.

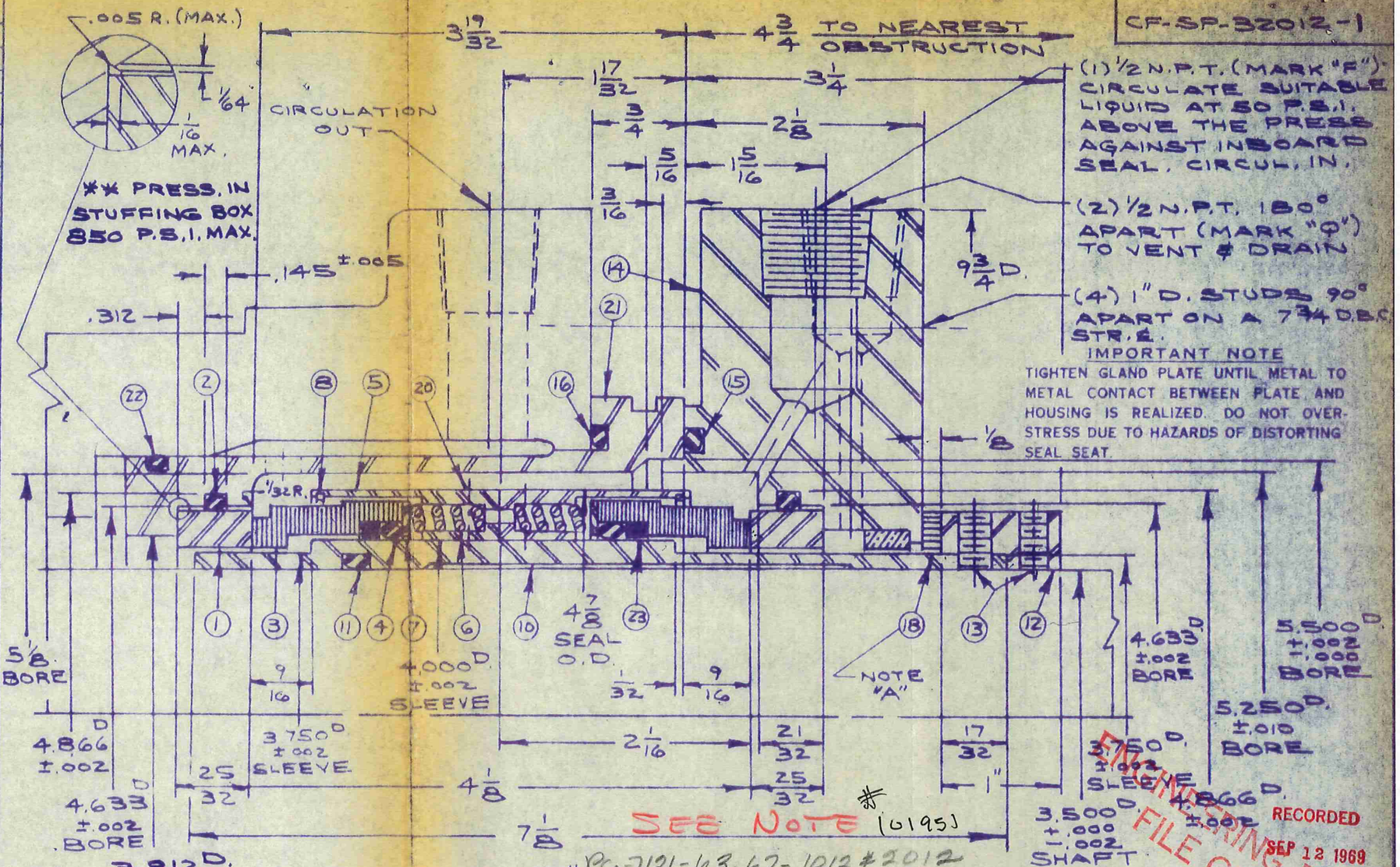
+ SPECIAL PART CODE: Q/X P3 1D1

OPERATING CONDITIONS:
LIQUID H.C. (SP. GR. .600)
SPEED 1760 R.P.M. TEMP. 235°F * PRESS ** 780 P.S.I. SUCT. 800 P.S.I. DISCH.

UNIT REF. 20 HLTE-1 PUMP BY BINGHAM PUMP CO.
SERIAL # 270787 SEE NOTE

B/P REF. DWG. #B-16953 DT'D. 1-14-66 BY BINGHAM PUMP CO.

CUST. P.O. # 32322



(1) 1/2 N.P.T. (MARK "F") CIRCULATE SUITABLE LIQUID AT 50 P.S.I. ABOVE THE PRESS AGAINST INBOARD SEAL. CIRCUL. IN.

(2) 1/2 N.P.T. 180° APART (MARK "O") TO VENT & DRAIN

(4) 1" D. STUDS 90° APART ON A 7 3/4 D.B.C. STR. E.

IMPORTANT NOTE

TIGHTEN GLAND PLATE UNTIL METAL TO METAL CONTACT BETWEEN PLATE AND HOUSING IS REALIZED. DO NOT OVER-STRESS DUE TO HAZARDS OF DISTORTING SEAL SEAT.

CUST.: PHILLIPS PETROLEUM
INSTALLED AT: PASADENA TEXAS

SEE NOTE [0195]

NOTE "A" PC-7121-63-67-1012 #2012
SPACER (No 18) IS ONLY FOR PURPOSE OF PROPERLY LOCATING SEAL. AFTER GLAND PLATE, BEARINGS, SHAFT, AND SEAL ARE LOCKED IN PLACE SPACER MUST BE REMOVED BEFORE UNIT IS PUT INTO OPERATION.

ENGINEERING DATA FILE COPY
RECORDED SEP 12 1969

REVISIONS | NOTE: FOR GENERAL INFORMATION ONLY. SEAL DWG.

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FOR PC7121-63-67-1012 #2012 SEE DWG. [redacted] WHICH WILL BE INCLUDED IN THE INSTRUCTION BOOK.

John Crane

"JOHN CRANE" DBL. T-881 PACKAGE SHAFT SEAL FOR 3.500 D. SHAFT BINGHAM PUMP COMPANY *

CF SP-32012-1

CRANE PACKING COMPANY
6400 W. OAKTON ST. MORTON GROVE, ILL.

DR. TGP | CK. PAULUS 2-9-68 | # 780 | DATE 2-9-68 | SCALE

1. OIL ITEM # 2, 4, 11, # 23 IN SEAL ASS'Y BEFORE INSTALLING IN UNIT.
2. [redacted] SHAFT MUST BE CORROSION RESISTANT MATERIAL. 125 BRINELL MIN. HARDNESS TO DIM. & TOL. INDICATED.
3. BEFORE COMPLETING THE SEAL INSTALLATION, WIPE THE LAPPED SEALING FACES OF THE SEAT AND WASHER PERFECTLY CLEAN. THEN OIL BOTH FACES WITH CLEAN LIGHT OIL.
4. SURFACE OVER [redacted] WHICH SEAL IS INSTALLED MUST BE HIGHLY POLISHED TO 32 RMS
5. 1/16 R. AT END OF 3.500 D. SHAFT TO START SLEEVE.
6. GLAND PLATE PIPE TAPS ARE MARKED AS FOLLOWS: "F" INDICATES FLUSH OVER SEAL FACES [redacted] "O" INDICATES [redacted] TO VENT AND DRAIN.
7. PRESS IN SEAL CHAMBER MUST BE MAINTAINED [redacted] ABOVE VAPOR PRESS. AT PUMPING TEMPERATURE OR SEAL MAY RUN DRY AND FAILURE OCCUR.

⚠1 REVISED FLANGE DIMENSIONS, ADDED TEMP. DRILLING TO BEARING HOUSING.
⚠2 REVISED DIMENSIONS ℄ TO FACE OF SUCTION & DISCHARGE. REVISED ITEM 67, BEARING CALL OUT.

PHILLIPS 66

Centrifugal Pump
VERTICAL-HORIZONTAL-INLINE

VENDOR NOTE: INVOICE SHALL INCLUDE SPEC NO. AND ALL DESCRIPTIVE ITEMS SHOWN BY *Italics And* Dashed Underline PLUS SERIAL NUMBERS.

SPEC FOR:
☐ INQUIRY, SH 1 OF 1 NO. 63-67-1012 & 2012
☐ QUOTATION, SH 1 OF 1 NO. 69 BT-1199
☒ PURCHASE, SH 1 OF 5 PO No. 526196-B

ITEM NO. / Spec No. PC-7121-63-67-1012 & 2012 REQ. NO. 416291 (FLOW SHEET M-28)

SERVICE REACTOR CIRCULATING PUMP USED WITH DRIVER SPEC NO.

PLANT POLYPROPYLENE LOCATION PASADENA, TEXAS Quantity TWO

INSTRUCTIONS TO VENDOR

1. SPEC NO. TO BE SHOWN on all engineering documents and correspondence. SPEC NO. & P.O. NO. to be stenciled on packing case(s) or if packing case is not used, on temporary metal or plastic tag wired conspicuously to equipment. Also an 18-8 Stainless Steel Plate shall be attached permanently to the pump and stamped to show Spec No., Capacity in GPM, Differential in Feet, Specific Gravity of Fluid and Pump Speed.
2. VENDOR SHALL complete Items 40 thru 90 on this form and return original plus other requested copies. Each requested copy to include (for both pump and drive) sufficient information and catalog drawings that will adequately describe equipment plus catalog performance curves for pump covering capacity, head, HP, NPSH and efficiency for proposed, maximum and minimum impellers. Also with each requested copy furnish list showing location of supply points and delivery time for wear parts.
3. In addition to furnishing material as specified, Vendor may propose equally suitable, but less expensive materials as an alternate. Note alternates under Item 90.
4. IF CHANGES OCCUR which affect the price or delivery of this order contact Purchasing Department immediately by wire or telephone for approval. Advise actual or estimated difference in cost or delivery caused by such changes.

PERFORMANCE DATA

5. Fluid Pumped POLYMER SLURRY Suct from REACTOR Disch to REACTOR
6. Pumping Temp 135/180 F, Sp Gr at Pumping Temp 0.37/0.36, Sp Gr at 60F 0.52, Viscosity at Pumping Temp 0.3 CP
7. Corrosion Due to ____, Erosion Due to ____, Solids (Yes) (No), Solid Size ____ In.
8. Vapor Press. at Pumping Temperature 620 PSIA, NPSH Available at Pump Center Line FLOODED
9. *Capacity: Initial* 26,500 GPM, Ultimate ____ GPM
10. Suction Pressure: Initial 683 PSIG, Ultimate ____ PSIG
11. Discharge Pressure: Initial 694 PSIG, Ultimate 754 PSIG
12. *Differential Head: Initial* 70 (SP.G - 0.36 / 180°F) Ft, Ultimate ____ Ft
13. Impeller to be sized for (Initial) [redacted] conditions.

MECHANICAL DESIGN

14. Style: [redacted] (Vertical) [redacted] (ELBOW TYPE (OTHER))
15. Horiz Pump Case Mount: [redacted] (Centerline) (Mfr Std), Horiz Pump Case Split: (Vertical) [redacted]
16. Construction: [redacted] (Mfr Std), Back pull-out rotor (Yes) (No)
17. Suction Position SEE SH 4 OF 5 Discharge Position SEE SH 4 OF 5 Speed [redacted] (1800 RPM (OTHER))
18. Water Cooled (Pedestal) (Stuffing Box) (Bearing Housing) (Quench Gland)
19. Mech Seal, Make and Code J. CRANE T-8B1 Q/X P31D1 [redacted] (Double) (Balanced)
20. Seal Flush Piping to be furnished [redacted] (No), [redacted] DWG CF-SP-32012-1 (Mfr Std)
21. Seal Flush required to be [redacted] (Mfr Std), Throttle Bushing (Yes) (No) (Mfr Std)
22. Coupling Make and Type THOMAS SPACER TYPE OR EQUAL Coupling Guard (Yes) [redacted]
23. Lube (Oil) [redacted] 24. Leveling Screws [redacted] (No) 25. Sleeve Required (Yes) [redacted]

MATERIALS

26.

Code	Material
I	Case Iron
IN	Nodular Iron (ASTM A-395)
B	Bronze
S	Steel
C	11-13% Chrome
A	Alloy
h	Hardened
f	Faced
x	Specify

SELECTION
27. Case, Outer .... 316 SS
28. Case, Inner (where applicable) .... 316 SS
29. Impeller .... 316 SS
30. Shaft .... 316 SS
31. Shaft Sleeve and Throat Bushing .... 17/4 PH SS.
32. Wear Rings .... NONE

DRIVER

33. Type: (Motor) [redacted] ON EXTENDED BASE W/ (BEDPLATE SPRINGS (OTHER)) 34. Form No. SEE ITEM 23 (ATTACHED)
35. Driver to be sized to handle (Max. BHP on curve) (VENDOR SPECIFY)
36. Furnished by PHILLIPS, Mounted by PHILLIPS
37. Address documents (Item 82) to: H. R. HERZIG 7C1PB At BARTLESVILLE OKLA
38. For engineering details contact: W. E. GARRETT 7C4PB
39. Other information
FACING OF SUCTION & DISCH. FLGS TO BE T&G TO MATCH REACTOR COMPANION FLGS. (SEE ITEM #13 ATTACHED)
NO COPPER BRASS, ALLOYS ALLOWED
CONT. DUTY 24 HR/DAY OPERATION
⚠4 WT. OF DRIVER - 12,000#
SEE ATTACHED SHEETS

40. Vendor BYRON JACKSON CORPORATION
41. *Mfr* BINGHAM PUMP COMPANY
42. *Model, Size and Figure No.* 20X20 HCTE *Stages* 1
43. *Type:* (*Horizontal*) (~~Vertical Can~~) (~~Inline~~) (OTHER)
44. Construction per (API Std 610) (AVS) ( ) 45. Speed 1760 RPM
46. Rotation facing coupling end: (~~clockwise~~) (c-clockwise) 47. Nozzle location, facing, & rating: Suct END 600# Disch TOP 600#
48. NPSH Reqd at Pump, Water 130 Ft, Fluid Handled ____ Ft. Efficiency at Design Point 68 Percent
49. BHP at Design Point 355@0.52, Maximum BHP Reqd on Curve 435, Curve No. 16035

CASE DESIGN
50. Case Split (Horiz) (Vert), Case Support (Foot) (Centerline) ((OTHER))
51. Corrosion Allowance 1/16 In, Minimum Thickness ____ In, Max Working Pressure 800 PSIG, Hydro Test 1200 PSIG
52. Front Wear Ring (~~Yes~~) (No), Back Wear Ring (~~Yes~~) (No), Case Volute (Single) (Double)

IMPELLER DESIGN
53. Type: (Open) (Closed) (Regenerative Turbine) (Single Suction) (Double Suction) (PROPELLER (OTHER))
54. Diameter Furnished 18 3/4 In, Max Dia ____ In, Min Dia ____ In, Free Eye Area ____ In.²
55. Front Wear Ring (~~Yes~~) (No), Back Wear Ring (~~Yes~~) (No)

SHAFT AND COUPLING DESIGN
56. Diameter through: Coupling 3 In, Bearings 3.15 In, Stuffing Box 3 1/2 In.
57. Shaft Sleeve (~~Yes~~) (No) 58. Coupling Guard: (Yes) (~~No~~) 59. *Vertical Pump Shaft* (*Hollow*) (*Solid*)
60. Coupling Make, Size and Model THOMAS W/SS DISCS.

STUFFING BOX
61. Bore ____ In, Shaft Dia ____ In, Sleeve Dia ____ In, Water Jacketed (Yes) (No)
62. Packing Make, Matl & Size, if furnished ____ Gland Quenched (Yes) (No)

MECH SEAL
63. Make CRANE, Model T8B1, Size ____ Matl Code Q/XP31D
64. (Single) (Double) (Balanced), Adjustment (~~Internal~~) (External)
65. Seal Flush per API Std 610 Plan ____, Other ____
66. Make and Model of Flush Piping Accessories furnished NONE OUTSIDE THE PUMP
← SEE ITEM 19 PAGE 3

BEARINGS
67. Mfr & Cat No: Radial Brng SKF 22219 ⚠2 Thrust Brng SKF 29418 Thrust Brng (Single) (Double)
68. Bearing Lube (Oil) (~~Grease~~) (~~Pumped Fluid~~). 69. Grease Method (Permanent) (Fitting)
70. Oil Method: (~~Ring~~) (~~Flood~~) (Pump) (Combination), Water Cooled (~~Yes~~) (No)

BASE
71. Type: (Drip Rim) (~~Channel~~) (~~Cast~~) (Fabricated), Min Thickness if Fabricated 1/4 In.
72. Water Cooled Pedestals (~~Yes~~) (No), Drilled, Tapped and Shimmed for Driver (Yes) (~~No~~), Leveling Screws (Yes) (~~No~~)

MATERIALS
73. *Case Outer* 316 SS 74. Case Inner ____ 75. *Shaft* 316 SS
76. Impeller 316 SS 77. Shaft Sleeve & Throat Bushing 17-4 PH 78. Wear Rings NONE

DRIVER
79. Recommended HP 450, RPM 1800 (Furnish detail information on driver spec form if driver to be furnished w/ the pump.)
80. Max Pump Thrust (Vertical Pump): Up ____ Lbs, Down ____ Lbs, Base Type ____

DRIVER SHIPPING INSTRUCTIONS (When furnished by Purchaser): Attn
Street No.
City and State

DELIVERY (After Commitment)
81. Equipment as specified APPROX. JANUARY 15, 1970
82. The following engineering documents will be furnished as follows:

QTY	DOCUMENTS (Do not duplicate documents on this order on identical equipment)	DAYS
15	Certified Dimensional Prints	290
11	Installation and Operating Instructions	145
12	Documentation to show all parts and accessory parts by description, part numbers, materials of construction, quantity of parts per machine, cross sectional drawings with parts reference numbers, prices, normal delivery and points of supply of all wearing parts.	
4	Recommended spare parts indicated or listed separately	145
11	Performance curves covering capacity, head, HP, NPSH and efficiency for furnished, maximum and minimum diameter impellers	145

83. Net weight each: with Driver ____ Lb, Less Driver ____ Lb
84. Point of Origin F.O.B. PORTLAND, OREGON

PRICE FOB ORIGIN
85. Complete Unit as Specified, Less Driver, Each .... $ 24,202
86. Extra for Driver, Each .... $
87. Transportation Charge to Destination, Each .... $
88. Total Price .... $
89. Invoice Terms
90. Exceptions, if any, from Items 1 thru 39 should be clearly noted and attached.

PREPARED MOCY DATE 4/1/68 PROCESS APPD RAF RJP DATE 5-5-69 INQUIRY APPD KEASE DATE 4-9-69 PURCH APPD ____ DATE ____
CHECKED MBW DATE 5-2-69 REV ⚠1 APPD MBW DATE 6/24/69 REV ⚠2 APPD WSH DATE 8-8-69 REV ⚠3 APPD ____ DATE ____

FORM 2351 6-68 REPRODUCTION OF STANDARD NO. 25.04-2 PRINTED IN U.S.A.

PC-7121-63-67-1012 & 2012

OPEN VALVE

TORQUE 904 LB.-FT.

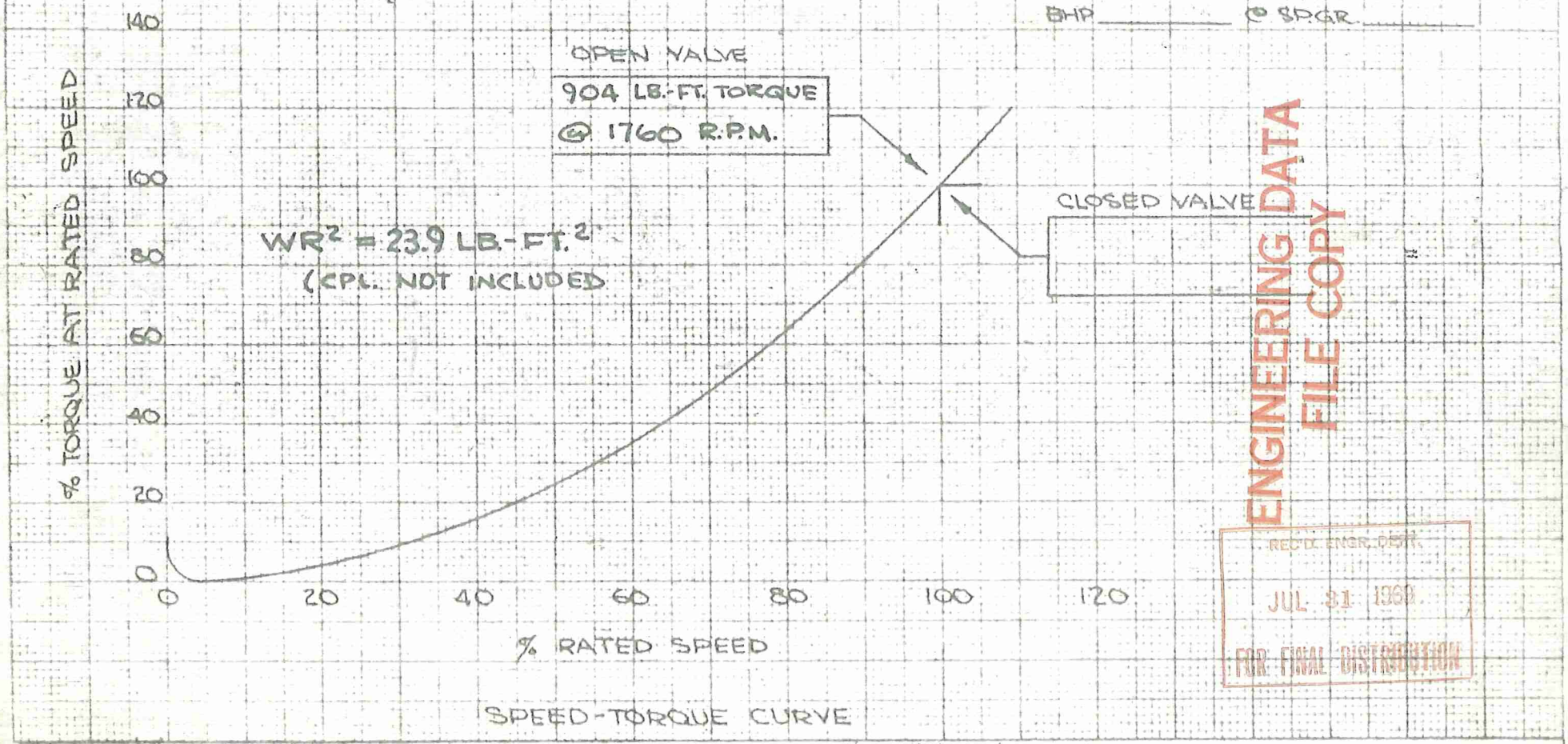
BHP 303 @ SP GR. 0.44

GPM 26,500 ; HEAD 70

CLOSED VALVE

TORQUE _____ LB.-FT.

BHP _____ @ SP.GR. _____



SPEED-TORQUE CURVE

ENGINEERING DATA
FILE COPY
RECD. ENGR. DEPT.
JUL 31 1969
FOR FINAL DISTRIBUTION

PHILLIPS PETROLEUM CO.
REACTOR CIRCULATOR
PUMP No. 290399/400

CHARACTERISTIC CURVE SHEET
BINGHAM PUMP CO.
2800 N. W. FRONT AVE.
PORTLAND OREGON

IMPELLER MAX DIA 19	20 x 20 HLTE		PUMP
MIN. DIA	DIA. IMPELLER 18 3/4	IMPELLER PATT. 2413 HLTL-1	1760 R.P.M.
EYE SQ. AREA IN.	N.P.S.H. REQUIRED	REFERENCE	CURVE NO. 27203