

Existing Pump 1 Data Package

DE ALICE NOTHART MHR 264-452-6711



NOTE N:
 AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".

NOTE M:
 .0002 MM - .0003 MM
 AT ASSEMBLY USE SHIMS AS REQUIRED TO GIVE IMPELLER PROPER LOCATION IN CASING.

NOTE I
 TIGHTEN SCREWS TO (150-180 FT LBS)
 205Nm 245Nm

16.597
 - 16.540
 0.057

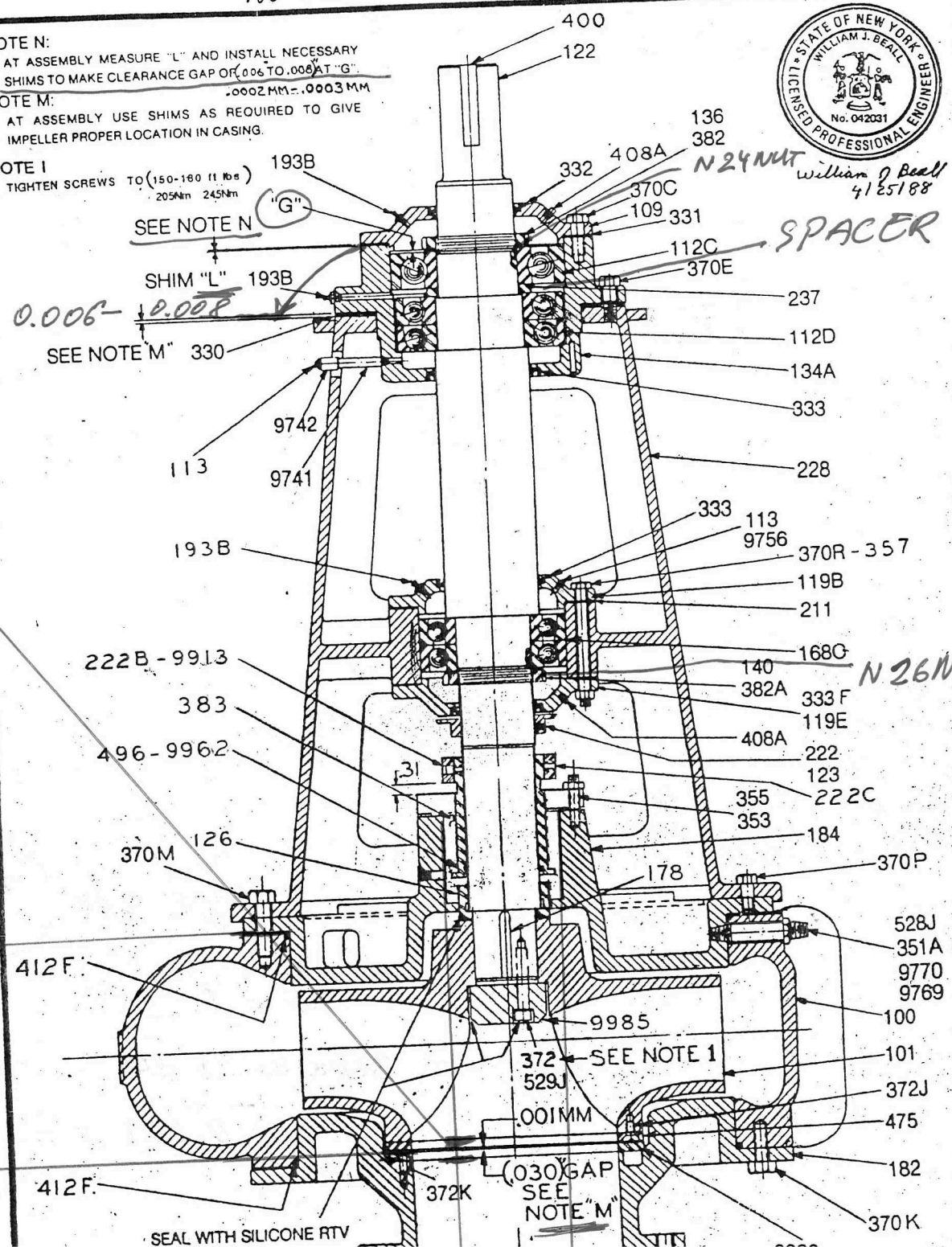
IMPELLER TO BACKING PLATE
 GAP = 0.057"

IMPELLER TO BOWEL DEPTH
 16.540"
 16.597"

July 2 2010

SEE NOTE N
 SHIM "L" 193B
 0.006 - 0.008
 SEE NOTE M 330

SEAL WITH SILICONE RTV
 .001MM
 (.030) GAP
 SEE NOTE M



N 24 NUT
 William J. Beall
 4/25/88
 SPACER

N 26 NUT

DEALER NOTAR? MAR 06 204-452-6411



NOTE N:
 AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G"
 NOTE M:
 .0002 MM TO .0003 MM
 AT ASSEMBLY USE SHIMS AS REQUIRED TO GIVE IMPELLER PROPER LOCATION IN CASING.

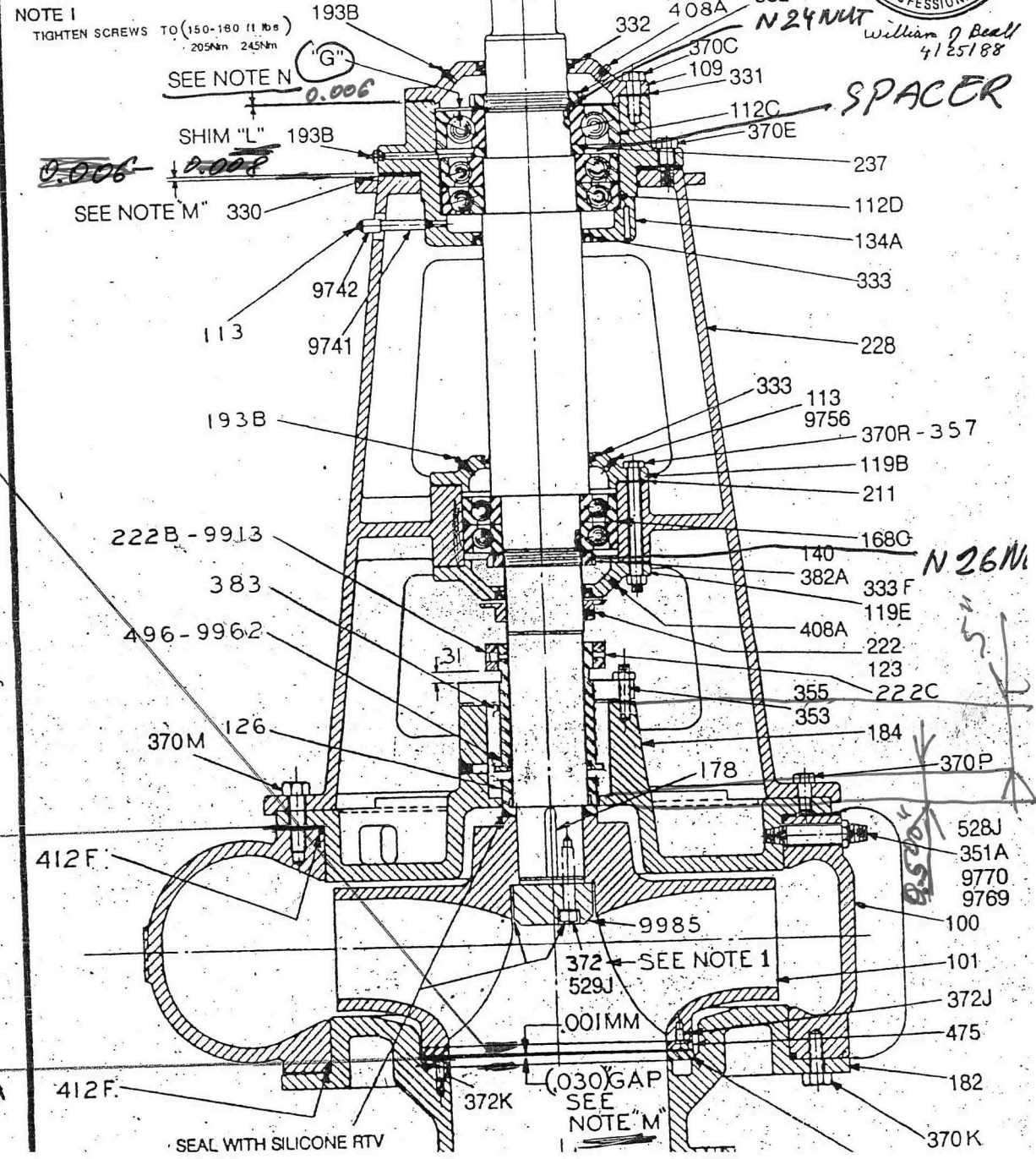
NOTE I
 TIGHTEN SCREWS TO (150-180 FT LBS)
 205Nm 245Nm

16.597
 - 16.540
 0.057

IMPELLER TO BACKING PLATE
 GAP = 0.057"

BOWEL DEPTH

July 2 2010
 16.540"
 16.597"



SEAL WITH SILICONE RTV





INSTALLATION AND OPERATING INSTRUCTIONS

TYPICAL RECOMMENDED SPARE PARTS LIST

<u>ITEM</u>	<u>QTY./PUMP</u>	<u>PART NAME</u>
101	1	Impeller
105	1	Lantern Ring
106	1 set	Packing
107	1	Gland
126	1	Shaft Sleeve
351A	1	Gasket
360B	1	Gasket
412F	2	O-Ring
475	1	Ring, Impeller
9980	1	Ring, Suction Cover
9985	1	Plate, Impeller Lock
112C	1	Bearing, Thrust
112D	2	Bearing, Thrust
168C	2	Bearing, Radial
330	12	Shim, Impeller Adjustment
331	1	Shim, Bearing Cover
332	1	Seal, Outboard Grease
333	2	Seal, Inboard Grease
333F	1	Seal, Inboard Grease

TPG Pritchard Machine

Precision component design,
repair and maintenance

A Division of
The Pritchard Group of Companies
100 Otter Street
P.O. Box 1740
Winnipeg, Manitoba, Canada
R3C 3A1
Phone: (204) 632-0639
Fax: (204) 632-0171
www.thepritchardgroup.com

To: City of W26

From: Tony Peluso

Attn: Emil KROCIK

Date: July 14-10

Subject: Wilkes - Drive Shaft.

Pages: 1

Emil, we can offer the following

- Check & clean all mating faces on couplings and drive flanges
- Check & straighten drive shaft.
(.015" Bend on long section)
- Inspect V-Joints and splined ends - OK
- Set-up and Balance unit for



BRANCH ADDRESS

WINNIPEG
 1643 DUBLIN AVENUE
 WINNIPEG MB R3H 0G9

 (204) 694-0050

SHIP TO (SAME AS "SOLD TO" UNLESS SHOWN)

CITY OF WINNIPEG
 WATER AND WASTE
 WASTEWATER SERVICES
 7740 WILKES AVE
 WINNIPEG, MB R4H 1B8
 2049865216

REMIT TO:

MOTION INDUSTRIES, INC

SOLD TO

CARD NAME: MAST
 APP CODE: 615331 CNTRL # 0
 MERCHANT: MOT0052
 ST BONIFACE STORES

ENT BY: MB211575 DIST: 0

CUSTOMER COPY

ORDER DATE 07/06/10	TERMS CRDTCB	SHIP DATE 07/06/10	SHIP VIA CUST.PICK-UP BR	ACCT NUMBER 200388-01
ORDER DUE DATE 07/06/10	OCN OCN: 180169	COMMENTS:		

LINE	VEN	MI NO	DESCRIPTION	CUSTOMER INFORMATION	CUST PO ITEM	QUANTITIES		
						ORDER	B/O	SHIPP
1	00835 P	55142	00554279			1	0	
	W 26		WASHER					
			SAF TYPE MTD.UNITS	\$16.190 EA	\$16.190 TOTAL			
2	00835 P	55134	00554255			1	0	
	W 24		WASHER					
			SAF TYPE MTD.UNITS	\$13.330 EA	\$13.330 TOTAL			
TOTAL TAX			\$3.54	TOTAL FRT	\$.00	TOTAL INV	\$33.06	
PLEASE NOTE OUR NEW REMITTANCE ADDRESS						CUST TAX ID:		
TO RECEIVE FUTURE INVOICES BY FAX OR EMAIL, PLEASE CONTACT YOUR MOTION BRANCH								

** RECEIVED BY _____ DATE _____ ** PICKED BY _____ CI

NO MERCHANDISE MAY BE RETURNED WITHOUT OUR PERMISSION

Si !

Krocil, Emil

From: MacDonald, Michael
Sent: June 25, 2010 10:31 AM
To: Krocil, Emil
Cc: Martins, Jorge; Allingham, Colin; James, Mike; Dufault, Fred
Subject: FW: Mechanics

-----Original Message-----

From: Clovechok, Larry (SCISS CA) [mailto:larry.clovechok@siemens.com]
Sent: Friday, June 25, 2010 10:27 AM
To: MacDonald, Michael
Subject: Mechanics

Hi Mike,

Please send your mechanics for 10:00 am on Monday.

Thanks, Larry

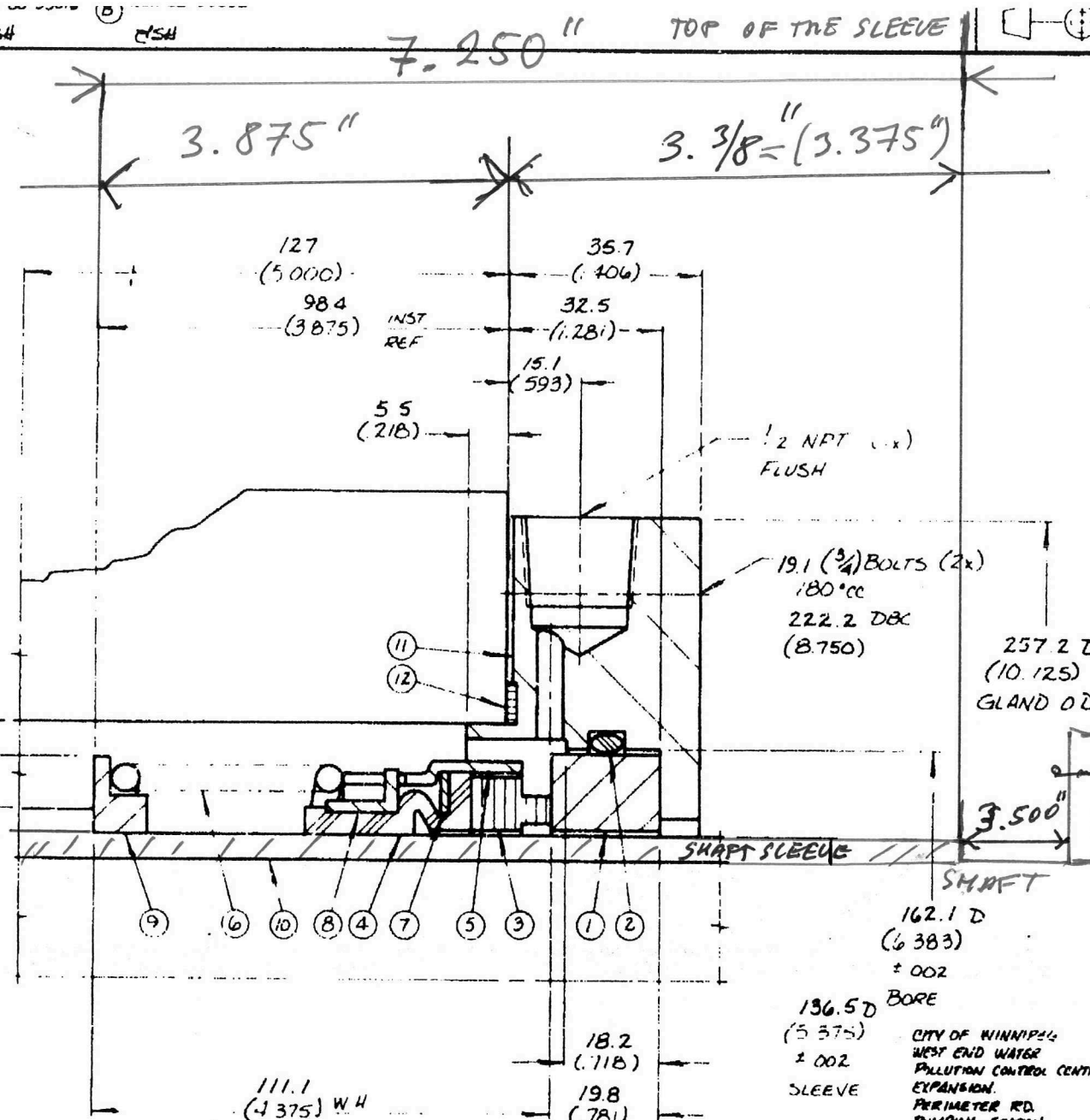
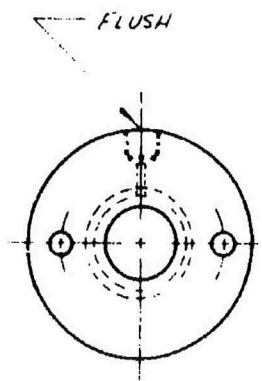
_____ SIEMENS EL.
(#10 - 130 MIDLAND ST.)

15

982-2969 LARRY. CLOVECHOK

_____ BOB WORD

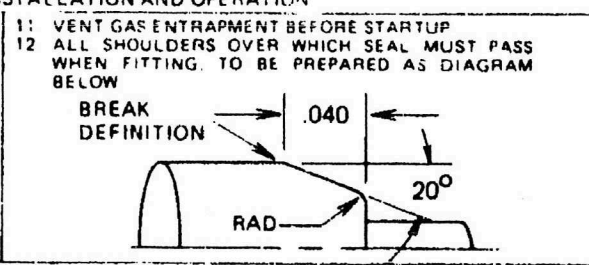
981-5165



ALL DIMENSIONS ARE EXPRESSED IN MM ENGLISH UNITS ARE IN BRACKETS MANUFACTURING WILL BE TO ENGLISH MEASURE TOLERANCES

THE FOLLOWING NOTES ARE IMPORTANT AND MUST BE OBSERVED FOR CORRECT SEAL INSTALLATION AND OPERATION

- REMOVE ALL SHARP EDGES ON SHAFT & OR SLEEVE BEFORE INSTALLATION OF SEAL.
- SURFACE OF SHAFT OR SLEEVE ON WHICH SEAL IS INSTALLED MUST BE MACHINED TO 32/25 RA FINISH OR BETTER.
- LUBRICATE SHAFT SLEEVE & SEAL WEDGE RING O-RING BELLOW TO ASSIST INSTALLATION OF SEAL WITH
- LUBRICATE MATING RING (SEAT), SEALING MEMBER AND HOUSING TO ASSIST INSTALLATION
- MUST BE CIRCULATED AROUND PRIMARY RING SEAL FACE THROUGH MATING RING (SEAT) AT NOT LESS THAN IN ORDER TO REMOVE HEAT GENERATED, OR FAILURE MAY OCCUR
- WHEN SHAFT IS SLEEVED THROUGH STUFFING BOX, SLEEVE MUST BE LIQUID TIGHT THROUGH BORE
- SHAFT OR SLEEVE MUST BE OF CORROSION RESISTANT MATERIAL WITH A HARDNESS OF 125 BRINELL MINIMUM AND BE MACHINED TO DIMENSIONS AND TOLERANCES STATED
- END OF SEAL CHAMBER & AXIS OF SHAFT MUST BE AT 90° TO EACH OTHER WITHIN .002 F.I.M
- PRESSURE IN SEAL CHAMBER MUST BE MAINTAINED AT MINIMUM ABOVE MAXIMUM PRESSURE GENERATED AT INNER SEAL
- BEFORE COMPLETING SEAL INSTALLATION WIPE LAPPED SURFACES OF MATING RING (SEAT) AND PRIMARY RING (SEAL FACE) PERFECTLY CLEAN
- VENT GAS ENTRAPMENT BEFORE STARTUP
- ALL SHOULDERS OVER WHICH SEAL MUST PASS WHEN FITTING, TO BE PREPARED AS DIAGRAM BELOW



ITEM	COMPONENT	DESCRIPTION	MATERIAL	SPARES	QTY.
1	D 5875 084 9200	MATING RING	TUNG. CARB.	/ X	1
2	0600 240 9501	O-RING	BUNA-N OR EQ.	/ X	1
3	D 5875 145 9200	PRIMARY RING	TUNG. CARB.	/ X	1
4	D 5875 015 3892	BELLOWS	BUNA-N OR EQ.	/ X	1
5	D 5875 104 0550	RETAINER	316 SS	/	1
6	4607	SPRING	18-8 SS	/ X	1
7	D 5875 105 1950	DISC	316 SS	/	1
8	D 5875 105 0550	DRIVE BAND	316 SS	/	1
9	F 5875 019 0550	SPRING HOLDER	316 SS	/	1
10	BY CUST	SLEEVE			
11	F 5875 104 0550	GLAND PLATE	316 SS	/	1
12	D 7250 045 7554	GASKET	STYLE 2160	/ X	1
13					
14					
15					
16					
17					
18					
19					
20					

SEAL ASS'Y NO. D-5375-121

COMPLETE SEAL HD

MTG. RG. ASS'Y NO.

ASS'Y ITEMS NUMBER

BILL OF MATERIALS NUMBER

EQUIPMENT REFERENCE

UNIT BY GOULDS PUMP INC / SLURRY

EQUIPMENT TYPE X PUMP [] AGITATOR [] COMPRESSOR [] OTHER

MODEL SIZE 16" AGD

SERIAL NO M34762

CUSTOMER INFORMATION

CUSTOMER GOULDS PUMP / SLURRY DIV.

P.O. NO 24320

END USER CITY OF WINNIPEG

LOCATION PERIMETER RD. PUMP STA.

REQ NO

INSTALLED AT

SEAL DATA

SEAL DESCRIPTION A011

MAT'L CODE BD1D1

API CODE

API PLAN

SERVICE DATA

FLUID RAW SEWAGE

BARRIER FLUID

SEAL PRESS

SUCT PRESS

TEMP 5-25°C (41-77°F)

DISCH PRESS

SHAFT SPEED 705 RPM

SP GR 1.0

HAZARD CODE

REFERENCE DATA

DRAWN MSA

DATE 030400

CHK'D MSA

APP'D SOB

SCALE none

INST CODE

FILE REFERENCE CAT

DRAWING NO. CF-SP-100268-1

ISSUE B

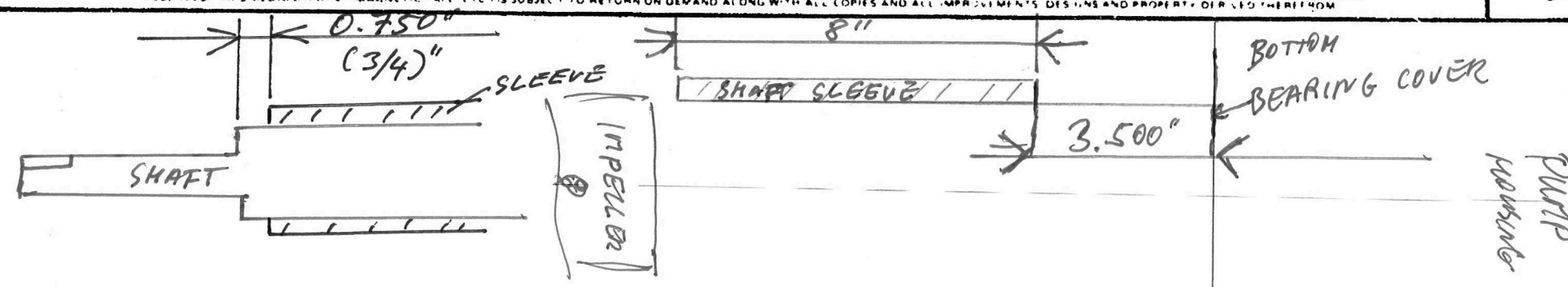
SEAL SIZE TYPE 5375 D T-1 (*3807)

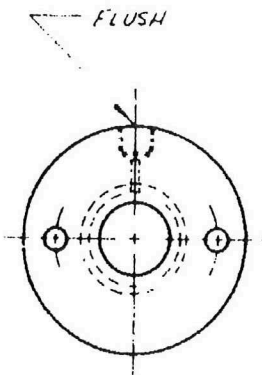
JOHN CRANE

International Sealing Systems

6400 W Oakton Street, Morton Grove

Illinois U. S. A. 60053-0805

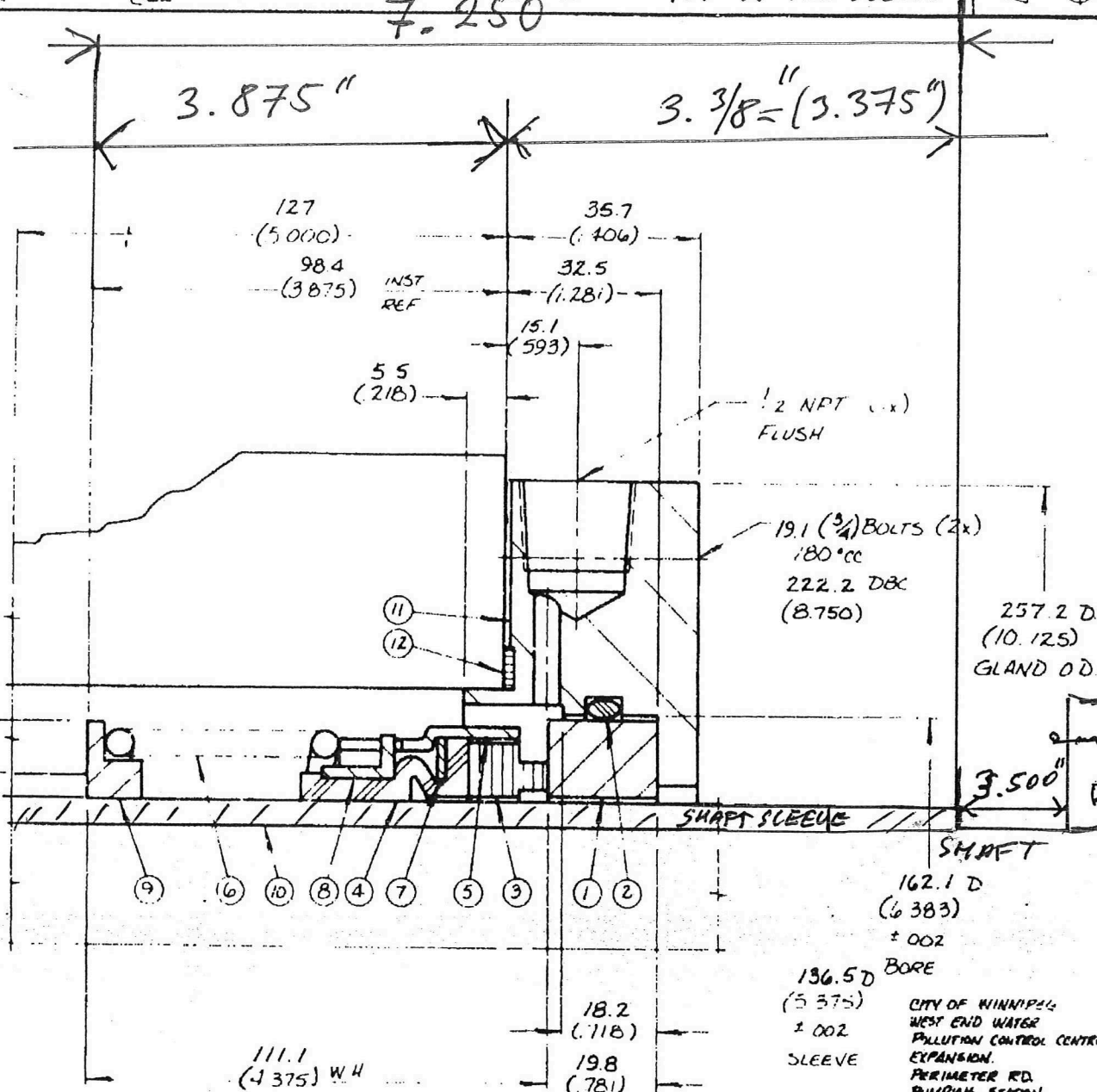




July 2, 2010

184.1 D (+005 -000) BORE
 172.4 D (+0.189) SEAL O.D.

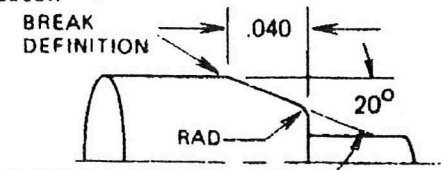
142.9 D (+0.25) SLEEVE



ALL DIMENSIONS ARE EXPRESSED IN MM
 ENGLISH UNITS ARE IN BRACKETS
 MANUFACTURING WILL BE TO ENGLISH
 MEASURE TOLERANCES

THE FOLLOWING NOTES ARE IMPORTANT AND MUST BE OBSERVED FOR CORRECT SEAL INSTALLATION AND OPERATION

- REMOVE ALL SHARP EDGES ON SHAFT & OR SLEEVE BEFORE INSTALLATION OF SEAL.
- SURFACE OF SHAFT OR SLEEVE ON WHICH SEAL IS INSTALLED MUST BE MACHINED TO 32/25 RA FINISH OR BETTER.
- LUBRICATE SHAFT/SLEEVE & SEAL WEDGE RING OR RING BELLOWS TO ASSIST INSTALLATION OF SEAL WITH
- LUBRICATE MATING RING (SEAT), SEALING MEMBER AND HOUSING TO ASSIST INSTALLATION
- MUST BE CIRCULATED AROUND PRIMARY RING SEAL FACE THROUGH MATING RING (SEAT) (AT NOT LESS THAN) IN ORDER TO REMOVE HEAT GENERATED, OR FAILURE MAY OCCUR
- WHEN SHAFT IS SLEAVED THROUGH STUFFING BOX, SLEEVE MUST BE LIQUID TIGHT THROUGH BORE
- SHAFT OR SLEEVE MUST BE OF CORROSION RESISTANT MATERIAL WITH A HARDNESS OF 125 BRINELL MINIMUM AND BE MACHINED TO DIMENSIONS AND TOLERANCES STATED.
- END OF SEAL CHAMBER & AXIS OF SHAFT MUST BE AT 90° TO EACH OTHER WITHIN .002 F.I.M.
- PRESSURE IN SEAL CHAMBER MUST BE MAINTAINED AT MINIMUM ABOVE MAXIMUM PRESSURE GENERATED AT INNER SEAL
- BEFORE COMPLETING SEAL INSTALLATION WIPE LAPPED SURFACES OF MATING RING (SEAT) AND PRIMARY RING (SEAL FACE) PERFECTLY CLEAN
- VENT GAS ENTRAPMENT BEFORE STARTUP
- ALL SHOULDERS OVER WHICH SEAL MUST PASS WHEN FITTING, TO BE PREPARED AS DIAGRAM BELOW



THIS CONFIDENTIAL DESIGN IS OWNED BY JOHN CRANE HOLDING LLC AND MAY NOT BE USED EXCEPT IN CONFIDENCE AND FOR THE BENEFIT OF JOHN CRANE HOLDING LLC. ALL RIGHTS ARE RESERVED. THIS MEDIUM PRINT MAGNETIC TAPE ETC. IS SUBJECT TO RETURN ON DEMAND ALONG WITH ALL COPIES AND ALL IMPROVEMENTS DESIGNS AND PROPERTY DERIVED THEREFROM.

ITEM	COMPONENT	DESCRIPTION	MATERIAL	QTY.
1	D 5375 084 9200	MATING RING	TUNG. CARB.	1 X
2	0000 140 9501	O-RING	BUNA-N OR EG.	1 X
3	D 5375 143 9200	PRIMARY RING	TUNG. CARB.	1 X
4	D 5375 013 3892	BELLOWS	BUNA-N OR EG.	1 X
5	D 5375 104 0350	RETAINER	316 SS	1
6	4607	SPRING	18-8 SS	1 X
7	D 5375 105 1950	DISC	316 SS	1
8	D 5375 103 0350	DRIVE BAND	316 SS	1
9	F 5375 019 0350	SPRING HOLDER	316 SS	1
10	BY CUST	SLEEVE		
11	F 5375 104 0350	GLAND PLATE	316 SS	1
12	D 7250 045 7554	GASKET	STYLE 2160	1 X
13				
14				
15				
16				
17				
18				
19				
20				

SEAL ASS'Y NO. D-5375-121 COMPLETE

MTG. RG. ASS'Y NO. SEAL HD

ASS'Y.	ITEMS	NUMBER
BILL OF MATERIALS NUMBER		

EQUIPMENT REFERENCE
 UNIT BY GOULDS PUMP INC / SLURRY
 EQUIPMENT TYPE
 PUMP AGITATOR
 COMPRESSOR OTHER

MODEL SIZE 16" NCD
 SERIAL NO. M34762

CUSTOMER INFORMATION
 CUSTOMER GOULDS PUMP / SLURRY DIV.
 P.O. NO. 24320
 END USER CITY OF WINNIPEG
 LOCATION PERIMETER RD. PUMP STA.
 REQ NO.
 INSTALLED AT

SEAL DATA

SEAL DESCRIPTION A011 MAT'L CODE BD1D1

API CODE API PLAN

SERVICE DATA

FLUID RAW SEWAGE BARRIER FLUID

SEAL PRESS	SUCT PRESS	VISC @ P.T.
TEMP 5-25°C (41-77°F)	DISCH PRESS	V.P. @ P.T.
SHAFT SPEED 705 RPM	SP GR 1.0	HAZARD CODE

REFERENCE DATA

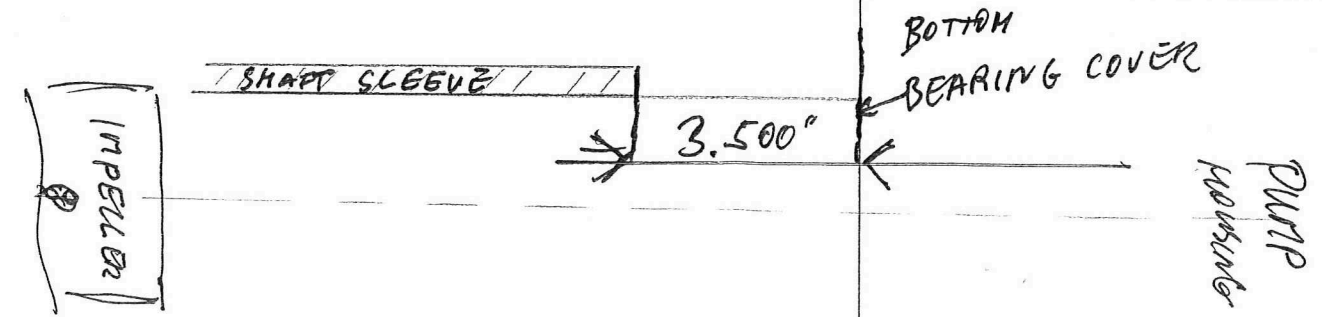
DRAWN	DATE	CHK'D	APP'D	SCALE	INST CODE
M/S	030400	M/S	S&B	NONE	

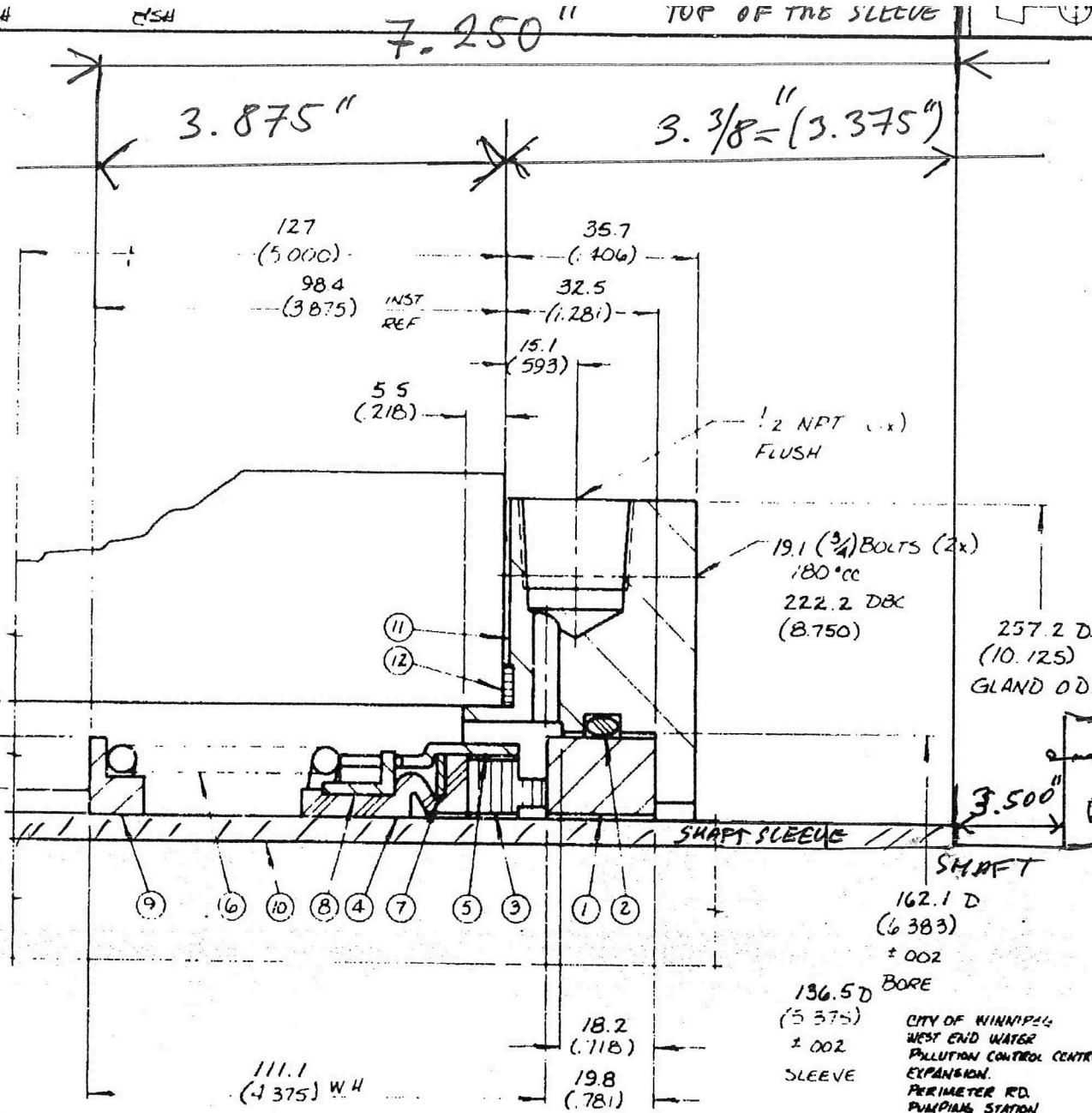
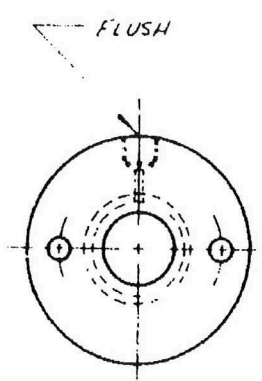
3804-3809
 GPCI P89001
 PRITCHARD #83112
 REF. Des. CF-SF-96761 DTD 7-86

FILE REFERENCE BUF 21 CAT C DRAWING NO. CF-SP-100268-1 ISSUE B

SEAL SIZE TYPE 5375 D T-1 (*3807)

John Crane
 International Sealing Systems
 6400 W. Oakton Street, Morton Grove
 Illinois U. S. A. 60053-0805

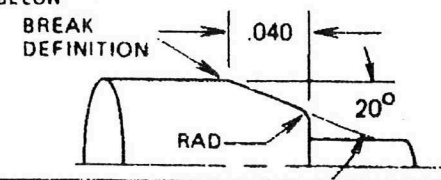




ALL DIMENSIONS ARE EXPRESSED IN MM
ENGLISH UNITS ARE IN BRACKETS
MANUFACTURING WILL BE TO ENGLISH
MEASURE TOLERANCES

THE FOLLOWING NOTES ARE IMPORTANT AND MUST BE OBSERVED FOR CORRECT SEAL INSTALLATION AND OPERATION

- 1 REMOVE ALL SHARP EDGES ON SHAFT & OR SLEEVE BEFORE INSTALLATION OF SEAL.
- 2 SURFACE OF SHAFT OR SLEEVE ON WHICH SEAL IS INSTALLED MUST BE MACHINED TO 32/25 RA FINISH OR BETTER.
- 3 LUBRICATE SHAFT/SLEEVE & SEAL WEDGE RING OR BELLOWS TO ASSIST INSTALLATION OF SEAL WITH
- 4 LUBRICATE MATING RING (SEAT), SEALING MEMBER AND HOUSING TO ASSIST INSTALLATION.
- 5 PRIMARY RING SEAL FACE THROUGH MATING RING (SEAT) (AT NOT LESS THAN 1 IN ORDER TO REMOVE HEAT GENERATED, OR FAILURE MAY OCCUR
- 6 WHEN SHAFT IS SLEEVED THROUGH STUFFING BOX, SLEEVE MUST BE LIQUID TIGHT THROUGH BORE
- 7 SHAFT OR SLEEVE MUST BE OF CORROSION RESISTANT MATERIAL WITH A HARDNESS OF 125 BRINELL MINIMUM AND BE MACHINED TO DIMENSIONS AND TOLERANCES STATED
- 8 END OF SEAL CHAMBER & AXIS OF SHAFT MUST BE AT 90° TO EACH OTHER WITHIN .002 F.I.M
- 9 PRESSURE IN SEAL CHAMBER MUST BE MAINTAINED AT MINIMUM ABOVE MAXIMUM PRESSURE GENERATED AT INNER SEAL
- 10 BEFORE COMPLETING SEAL INSTALLATION WIPE LAPPED SURFACES OF MATING RING (SEAT) AND PRIMARY RING (SEAL FACE) PERFECTLY CLEAN
- 11 VENT GAS ENTRAPMENT BEFORE STARTUP
- 12 ALL SHOULDERS OVER WHICH SEAL MUST PASS WHEN FITTING, TO BE PREPARED AS DIAGRAM BELOW



THIS CONFIDENTIAL DESIGN IS OWNED BY JOHN CRANE HOLDING LTD. AND MAY NOT BE USED EXCEPT IN CONFIDENCE AND FOR THE BENEFIT OF JOHN CRANE HOLDINGS LTD. ALL RIGHTS ARE RESERVED. THIS MEDIUM PRINT MAGNETIC TAPE IS SUBJECT TO RETURN ON DEMAND ALONG WITH ALL COPIES AND ALL IMPROVEMENTS DESIGNS AND PROPERTY OF JOHN CRANE.

ITE	COMPONENT	DESCRIPTION	MATERIAL	QTY.
1	D 5875 084 9200	MATING RING	TUNG. CARB.	1 X
2	0000 240 9501	O-RING	BUNA-N OR EQ.	1 X
3	D 5875 143 9200	PRIMARY RING	TUNG. CARB.	1 X
4	D 5875 013 3892	BELLOWS	BUNA-N OR EQ.	1 X
5	D 5875 104 0350	RETAINER	316 SS	1
6	4607	SPRING	18-8 SS	1 X
7	D 5875 105 1950	DISC	316 SS	1
8	D 5875 103 0550	DRIVE BAND	316 SS	1
9	F 5875 019 0350	SPRING HOLDER	316 SS	1
10	BY CUST	SLEEVE		
11	F 5875 104 0350	GLAND PLATE	316 SS	1
12	D 7250 045 7354	GASKET	STYLE 2160	1 X
13				
14				
15				
16				
17				
18				
19				
20				

SEAL ASS'Y NO. D-5375-121

COMPLETE SEAL HD

MTG. RG. ASS'Y NO.

ASS'Y. ITEMS NUMBER

BILL OF MATERIALS NUMBER

EQUIPMENT REFERENCE

UNIT BY GOULDS PUMP INC / SLURRY

EQUIPMENT TYPE

X PUMP [] AGITATOR

[] COMPRESSOR [] OTHER

MODEL SIZE 16" NCD

SERIAL NO M34762

CUSTOMER INFORMATION

CUSTOMER GOULDS PUMP / SLURRY DIV.

P O NO 24320

END USER CITY OF WINNIPEG

LOCATION PERIMETER RD. PUMP STA.

REQ NO

INSTALLED AT

SEAL DATA

SEAL DESCRIPTION A011

MAT'L CODE BD1D1

API CODE

API PLAN

SERVICE DATA

FLUID RAW SEWAGE

SEAL PRESS

SUCT PRESS

TEMP 5-25°C (41-77°F)

L1SCH PRESS

SHAFT SPEED 705 RPM

SP GR 1.0

BARRIER FLUID

VISC @ P T

V P @ P T

HAZARD CODE

REFERENCE DATA

DRAWN DATE CHK'D APP'D SCALE INST CODE

MSA 030480 MSA SOB NAME

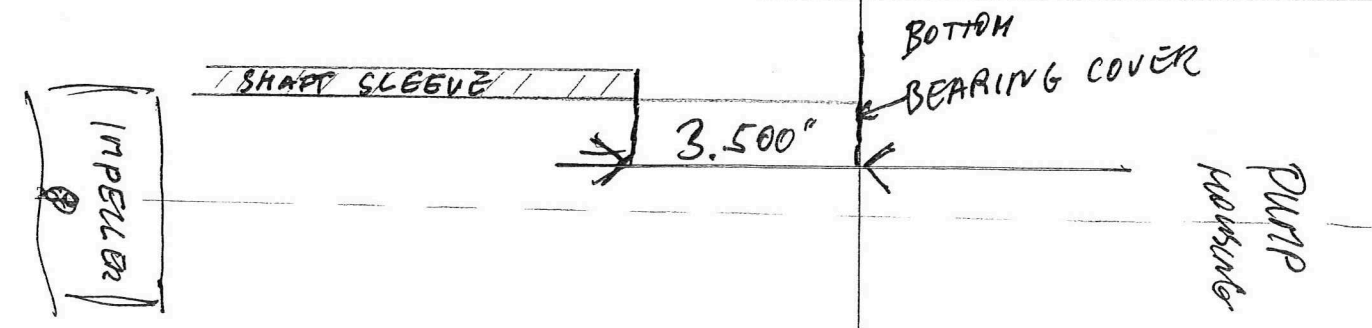
FILE REFERENCE CAT

DRAWING NO. ISSUE

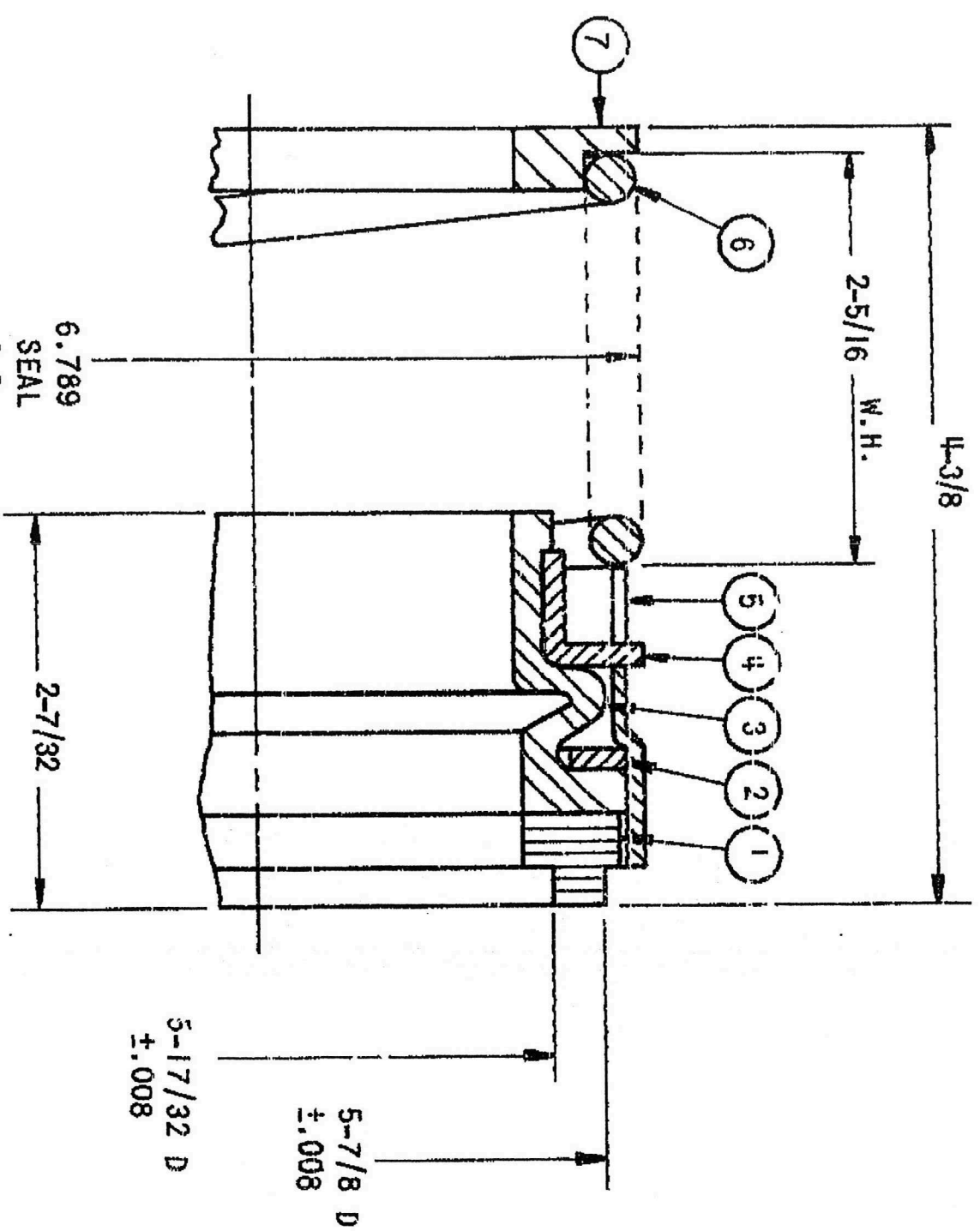
BUF 21 C CF-SP-100268-1 B

SEAL SIZE TYPE 5375 D T-1 (*3807)

JOHN CRANE
International Sealing Systems
6400 W Oakton Street, Morton Grove
Illinois U. S. A. 60053-0805



DWG No
D-5375-121



F-5375-014 (CARBON)
D-5375-143 (TUNG. CARB.)

32 P.S.I.
LOAD AT W.H. = 100 # +15 - 25%

(A)

7	SPRING HOLDER	F-5375-019
		4607 18-8 S.S.
6	SPRING	
5	RETAINER	D-5375-104
4	DRIVE BAND	D-5375-103
3	BELLOWS	D-5375-013
2	DISC	D-5375-105
1	PRIMARY RING	**
	NO. PART	DWG.

OTHERWISE SPECIFIED
 = FLATNESS
 = RUNOUT
 = PARALLELISM
 = PERPENDICULARITY
 IF 125/FAO
 REOD BRK EDGES .005 R

REV		
A	REV. 11/30/83-03422	

PROPERTY OF CRANE PACKING CO SUBJECT TO
 UPON DEMAND TITLE TO SAME NEVER SOLD OR
 RHEU FOR ANY REASON ALL RIGHTS TO IN
 RESERVED

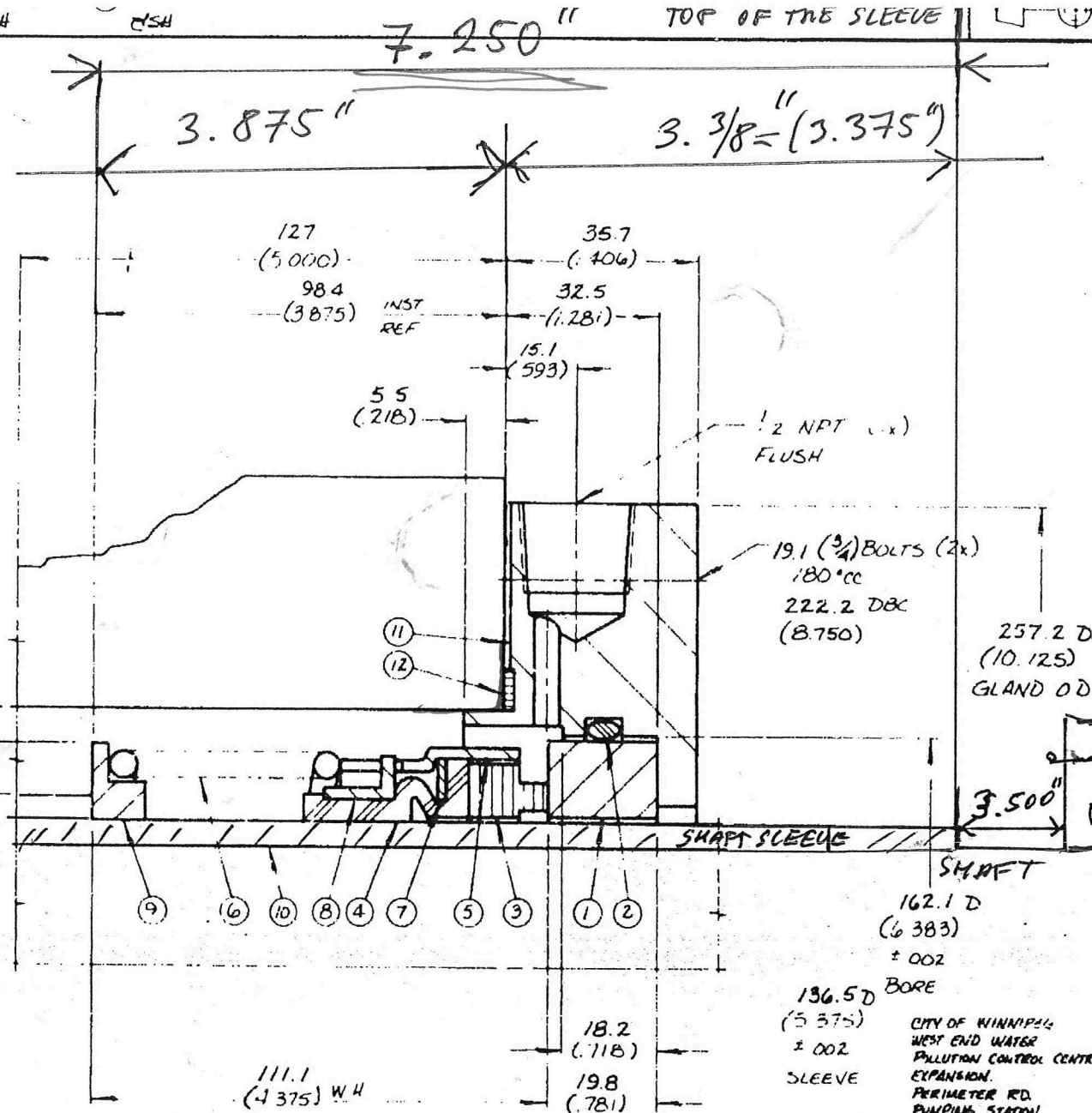
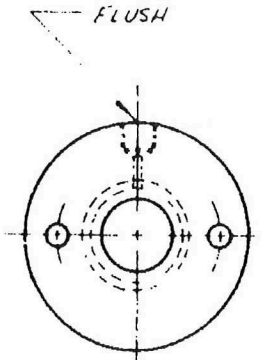
CRANE PACKING
 COMPANY
 6400 W OAKTON ST
 MORTON GROVE ILL

DR APP	DR APP
DATE 8-11-77	DATE 8-11-77
SCALE NONE	SCALE NONE

STD ASS'Y
 OF
 5-3/8 D T-1 SEAL

DWG No
D-5375-121

CODE 0-1-080-005-XX00-05375-06789-02218-04375-02312-05531-05875-00C00-10000-0000000000-000D-05375-121



ITEM	COMPONENT	DESCRIPTION	MATERIAL	QTY.
1	D 5875 08A 9200	MATING RING	TUNG. CARB.	1 X
2	0000 260 9501	O-RING	BUNA-N OR EQ.	1 X
3	D 5875 14B 9200	PRIMARY RING	TUNG. CARB.	1 X
4	D 5875 01B 5892	BELLOWS	BUNA-N OR EQ.	1 X
5	D 5875 10A 0950	RETAINER	316 SS	1
6	4607	SPRING	18-8 SS	1 X
7	D 5875 105 1950	DISC	316 SS	1
8	D 5875 103 0550	DRIVE BAND	316 SS	1
9	F 5875 019 0950	SPRING HOLDER	316 SS	1
10	BY CUST	SLEEVE		
11	F 5875 104 0950	GLAND PLATE	316 SS	1
12	D 7250 045 7354	GASKET	STYLE 2160	1 X
13				
14				
15				
16				
17				
18				
19				
20				

SEAL ASS'Y NO. D-5375-121	COMPLETE SEAL HD	
MTG. RG. ASS'Y NO.	MTG. RG	
	ASS'Y	ITEMS NUMBER
BILL OF MATERIALS NUMBER		
EQUIPMENT REFERENCE	CUSTOMER INFORMATION	
UNIT BY GOULDS PUMP INC / SLURRY	CUSTOMER GOULDS PUMP / SLURRY DIV.	
EQUIPMENT TYPE	P O NO 24820	
X PUMP [] AGITATOR	END USER CITY OF WINNIPEG	
[] COMPRESSOR [] OTHER	LOCATION PERIMETER ED. PUMP STA.	
MODEL SIZE 16" NCD	REQ NO	
SERIAL NO M34762	INSTALLED AT	

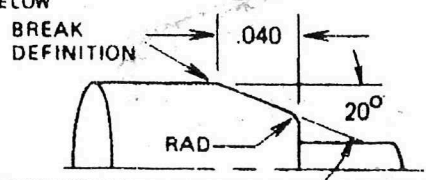
SEAL DATA	
SEAL DESCRIPTION A011	MAT'L CODE BD1DI
API CODE	API PLAN

SERVICE DATA			
FLUID RAW SEWAGE	BARRIER FLUID		
SEAL PRESS	SUCT PRESS	VISC @ P T	
TEMP 5-25°C (41-77°F)	DISCH PRESS	V P @ P T	
SHAFT SPEED 705 RPM	SP GR 1.0	HAZARD CODE	

REFERENCE DATA					
DRAWN MSH	DATE 030486	CHK'D MSH	APP'D SOB	SCALE NONE	INST CODE
3804-3809	FILE REFERENCE	CA	DRAWING NO.		ISSUE
GPCI P89001	BUF 21	C	CF-SP-100268-1		B
PRITCHARD #83112	SEAL SIZE TYPE 5375 D T-1 (*3807)				

ALL DIMENSIONS ARE EXPRESSED IN MM ENGLISH UNITS ARE IN BRACKETS MANUFACTURING WILL BE TO ENGLISH MEASURE TOLERANCES.

- THE FOLLOWING NOTES ARE IMPORTANT AND MUST BE OBSERVED FOR CORRECT SEAL INSTALLATION AND OPERATION
- REMOVE ALL SHARP EDGES ON SHAFT & OR SLEEVE BEFORE INSTALLATION OF SEAL.
 - SURFACE OF SHAFT OR SLEEVE ON WHICH SEAL IS INSTALLED MUST BE MACHINED TO 32/25 RA FINISH OR BETTER.
 - LUBRICATE SHAFT/SLEEVE & SEAL WEDGE RING O-RING/BELLOWS TO ASSIST INSTALLATION OF SEAL WITH
 - LUBRICATE MATING RING (SEAT), SEALING MEMBER AND HOUSING TO ASSIST INSTALLATION.
 - PRIMARY RING (SEAL FACE) THROUGH MATING RING (SEAT) AT NOT LESS THAN 1 IN ORDER TO REMOVE HEAT GENERATED, OR FAILURE MAY OCCUR.
 - WHEN SHAFT IS SLEEVED THROUGH STUFFING BOX, SLEEVE MUST BE LIQUID TIGHT THROUGH BORE.
 - SHAFT OR SLEEVE MUST BE OF CORROSION RESISTANT MATERIAL WITH A HARDNESS OF 125 BRINELL MINIMUM AND BE MACHINED TO DIMENSIONS AND TOLERANCES STATED.
 - END OF SEAL CHAMBER & AXIS OF SHAFT MUST BE AT 90° TO EACH OTHER WITHIN .002 F.I.M.
 - PRESSURE IN SEAL CHAMBER MUST BE MAINTAINED AT MINIMUM ABOVE MAXIMUM PRESSURE GENERATED AT INNER SEAL.
 - BEFORE COMPLETING SEAL INSTALLATION WIPE LAPPED SURFACES OF MATING RING (SEAT) AND PRIMARY RING (SEAL FACE) PERFECTLY CLEAN.
 - VENT GAS ENTRAPMENT BEFORE STARTUP.
 - ALL SHOULDERS OVER WHICH SEAL MUST PASS WHEN FITTING, TO BE PREPARED AS DIAGRAM BELOW.



THIS CONFIDENTIAL DESIGN IS OWNED BY JOHN CRANE HOLDINGS INC AND MAY NOT BE USED EXCEPT IN CONFIDENCE AND FOR THE BENEFIT OF JOHN CRANE HOLDINGS INC. ALL RIGHTS ARE RESERVED. THIS MEDIUM PRINT MAGNETIC TAPE ETC. IS SUBJECT TO RETURN ON DEMAND ALONG WITH ALL COPIES AND ALL IMPROVEMENTS DESIGNS AND PROPERTY OF JOHN CRANE.



JOHN CRANE
International Sealing Systems
6400 W. Oakton Street, Morton Grove
Illinois U. S. A. 60053-0805

6.000"

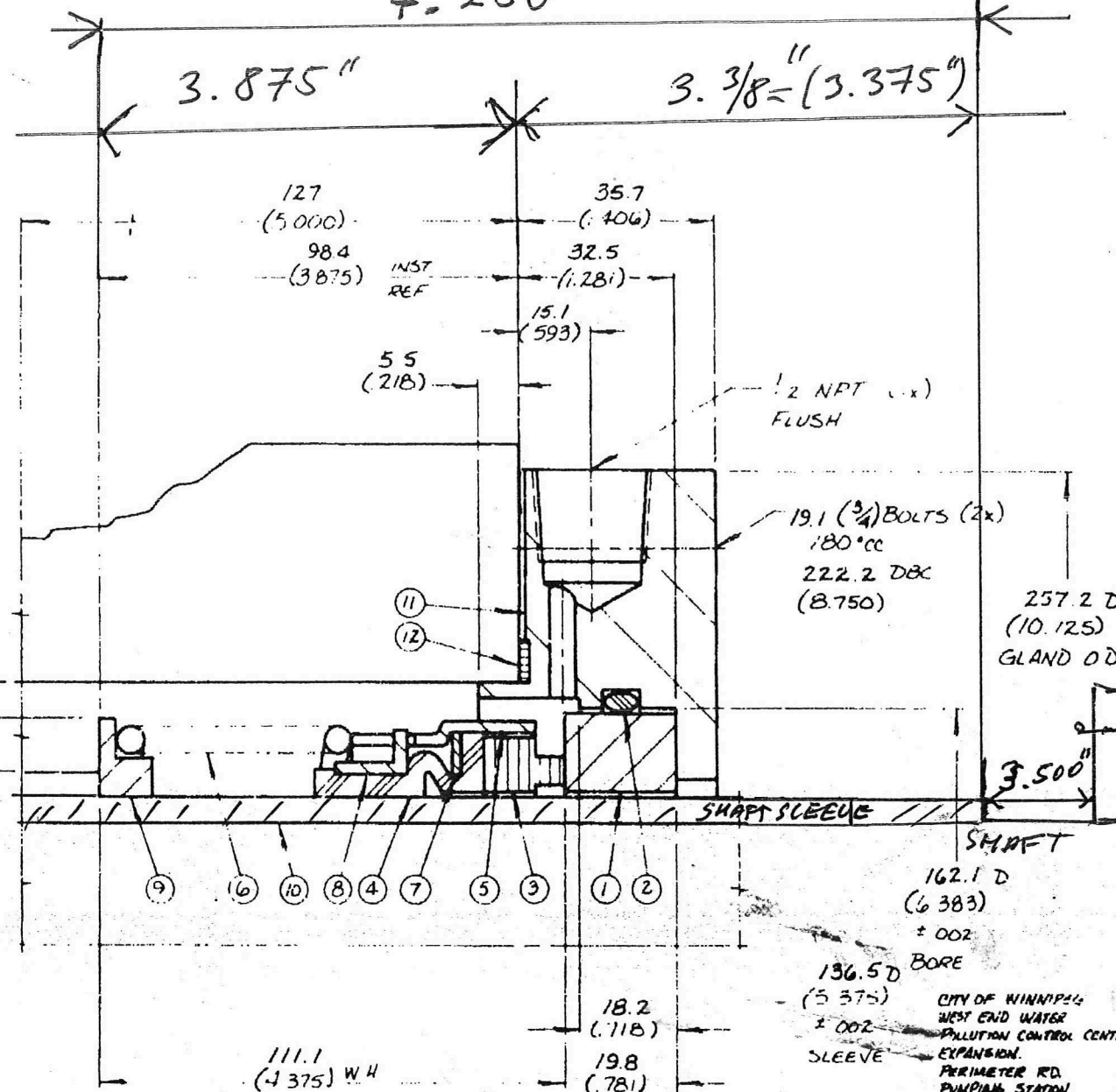
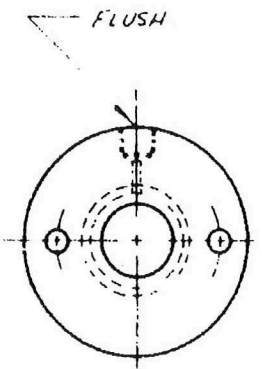


SHAFT SLEEVE

3.500"

BOTTOM BEARING COVER

PUMP HOUSING



184.1 D
(7250)
+ .005
-.000
BORE

172.4 D.
(6789)
SEAL O.D.

142.9 D.
(5625)
SLEEVE

162.1 D
(6383)
± .002
BORE

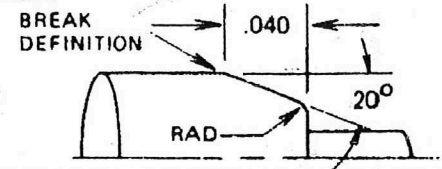
136.5 D
(5375)
± .002
SLEEVE

111.1
(4375) W.H

ALL DIMENSIONS ARE EXPRESSED IN MM
ENGLISH UNITS ARE IN BRACKETS
MANUFACTURING WILL BE TO ENGLISH
MEASURE TOLERANCES.

THE FOLLOWING NOTES ARE IMPORTANT AND MUST BE OBSERVED FOR CORRECT SEAL INSTALLATION AND OPERATION

- | | | |
|--|--|--|
| <p>1 REMOVE ALL SHARP EDGES ON SHAFT & OR SLEEVE BEFORE INSTALLATION OF SEAL.</p> <p>2 SURFACE OF SHAFT OR SLEEVE ON WHICH SEAL IS INSTALLED MUST BE MACHINED TO 32/25 RA FINISH OR BETTER.</p> <p>3 LUBRICATE SHAFT/SLEEVE & SEAL WEDGE RING OR RING BELLOWS TO ASSIST INSTALLATION OF SEAL WITH</p> <p>4 LUBRICATE MATING RING (SEAT), SEALING MEMBER AND HOUSING TO ASSIST INSTALLATION</p> <p>5 MUST BE CIRCULATED AROUND PRIMARY RING (SEAL FACE) THROUGH MATING RING (SEAT) AT NOT LESS THAN 1 IN ORDER TO REMOVE HEAT GENERATED, OR FAILURE MAY OCCUR</p> | <p>6 WHEN SHAFT IS SLEEVED THROUGH STUFFING BOX, SLEEVE MUST BE LIQUID TIGHT THROUGH BORE</p> <p>7 SHAFT OR SLEEVE MUST BE OF CORROSION RESISTANT MATERIAL WITH A HARDNESS OF 125 BRINELL MINIMUM AND BE MACHINED TO DIMENSIONS AND TOLERANCES STATED.</p> <p>8 END OF SEAL CHAMBER & AXIS OF SHAFT MUST BE AT 90° TO EACH OTHER WITHIN .002 F.I.M</p> <p>9 PRESSURE IN SEAL CHAMBER MUST BE MAINTAINED AT MINIMUM ABOVE MAXIMUM PRESSURE GENERATED AT INNER SEAL</p> <p>10 BEFORE COMPLETING SEAL INSTALLATION WIPE LAPPED SURFACES OF MATING RING (SEAT) AND PRIMARY RING (SEAL FACE) PERFECTLY CLEAN.</p> | <p>11 VENT GAS ENTRAPMENT BEFORE STARTUP</p> <p>12 ALL SHOULDERS OVER WHICH SEAL MUST PASS WHEN FITTING, TO BE PREPARED AS DIAGRAM BELOW</p> |
|--|--|--|



ITEM	COMPONENT	DESCRIPTION	MATERIAL	QTY.
1	D 5875 084 9200	MATING RING	TUNG. CARB.	1 X
2	0000 260 9501	O-RING	BUNA-N OR EQ.	1 X
3	D 5875 143 9200	PRIMARY RING	TUNG. CARB.	1 X
4	D 5875 013 3892	BELLOWS	BUNA-N OR EQ.	1 X
5	D 5875 104 0350	RETAINER	316 SS	1
6	4607	SPRING	10-8 SS	1 X
7	D 5875 105 1350	DISC	316 SS	1
8	D 5875 103 0550	DRIVE BAND	316 SS	1
9	F 5875 019 0350	SPRING HOLDER	316 SS	1
10	BY CUST	SLEEVE		
11	F 5875 104 0550	GLAND PLATE	316 SS	1
12	D 7250 045 7354	GASKET	STYLE 2160	1 X
13				
14				
15				
16				
17				
18				
19				
20				

SEAL ASS'Y NO. D-5375-121

COMPLETE SEAL HD

MTG. RG. ASS'Y NO.

ASS'Y ITEMS NUMBER

BILL OF MATERIALS NUMBER

EQUIPMENT REFERENCE

UNIT BY GOULDS PUMP INC / SLURRY

EQUIPMENT TYPE

X PUMP () AGITATOR

() COMPRESSOR () OTHER

MODEL SIZE 16" NCD

SERIAL NO M34762

CUSTOMER INFORMATION

CUSTOMER GOULDS PUMP / SLURRY DIV.

P O NO 24320

END USER CITY OF WINNIPEG

LOCATION PERIMETER RD. PUMP STA.

REQ NO

INSTALLED AT

SEAL DATA

SEAL DESCRIPTION A011

MAT'L CODE BD1D1

API CODE

API PLAN

SERVICE DATA

FLUID RAW SEWAGE

BARRIER FLUID

SEAL PRESS

SUCT PRESS

DISCH PRESS

SP GR 1.0

HAZARD CODE

TEMP 5-25°C (41-77°F)

SHAFT SPEED 705 RPM

REFERENCE DATA

DRAWN MSH

DATE 030400

CHK'D MSH

APP'D SSB

SCALE none

INST CODE

3804-5809

GPCI P89001

PRITCHARD *83112

FILE REFERENCE CAT

DRAWING NO. CF-SP-100268-1

ISSUE B

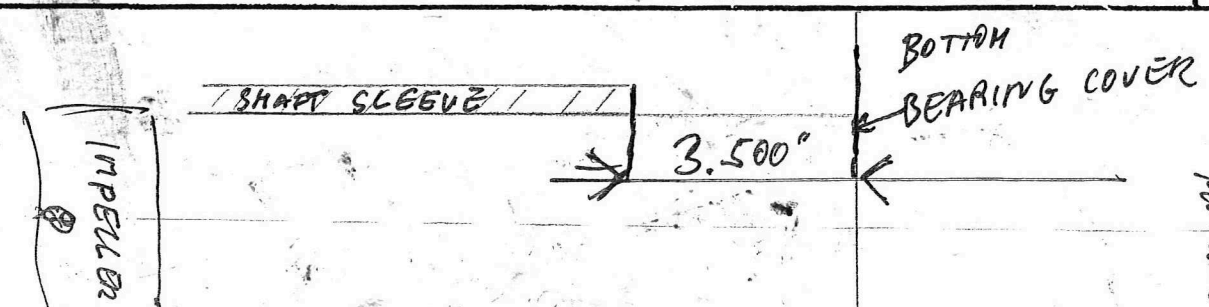
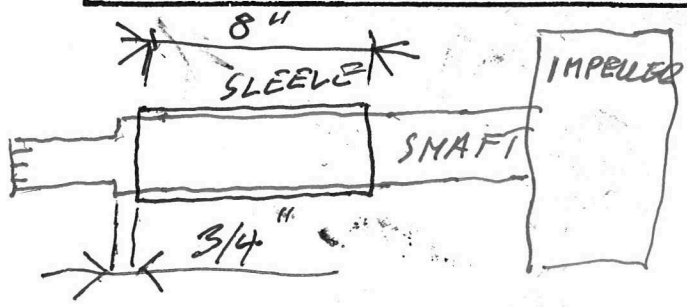
SEAL SIZE TYPE 5375 D 7-1 (*3807)

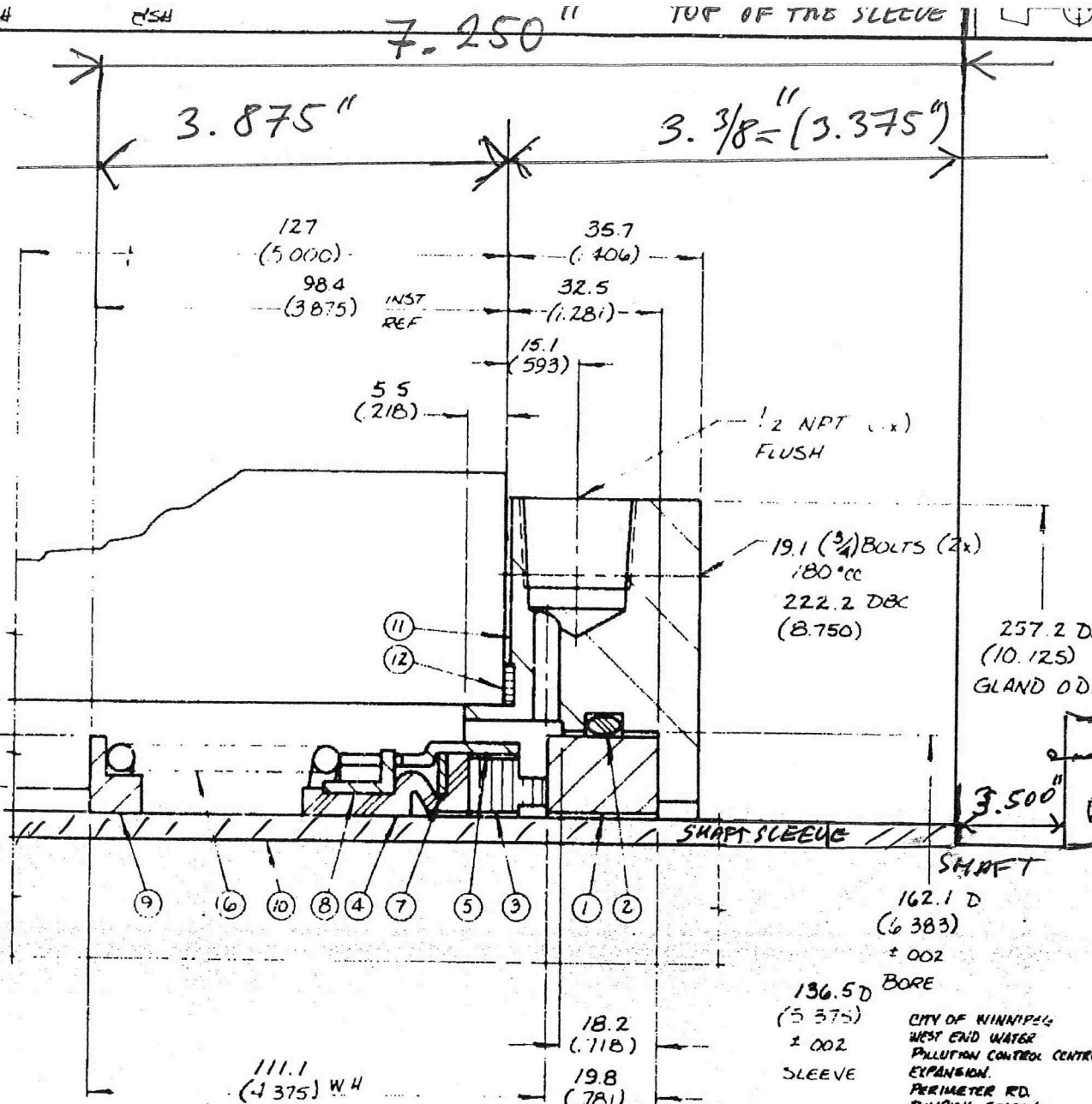
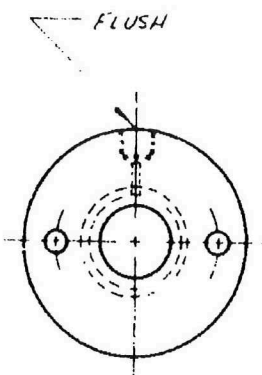
JOHN CRANE

International Sealing Systems

6400 W Oakton Street, Morton Grove

Illinois U. S. A. 60053-0805

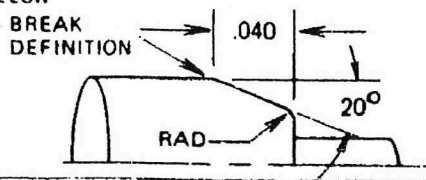




ALL DIMENSIONS ARE EXPRESSED IN MM
ENGLISH UNITS ARE IN BRACKETS
MANUFACTURING WILL BE TO ENGLISH
MEASURE TOLERANCES

THE FOLLOWING NOTES ARE IMPORTANT AND MUST BE OBSERVED FOR CORRECT SEAL INSTALLATION AND OPERATION

- REMOVE ALL SHARP EDGES ON SHAFT & OR SLEEVE BEFORE INSTALLATION OF SEAL.
- SURFACE OF SHAFT OR SLEEVE ON WHICH SEAL IS INSTALLED MUST BE MACHINED TO 32/25 RA FINISH OR BETTER.
- LUBRICATE SHAFT/SLEEVE & SEAL WEDGE RING OR BELLOWS TO ASSIST INSTALLATION OF SEAL WITH
- LUBRICATE MATING RING (SEAT), SEALING MEMBER AND HOUSING TO ASSIST INSTALLATION
- MUST BE CIRCULATED AROUND PRIMARY RING SEAL FACE THROUGH MATING RING (SEAT) (AT NOT LESS THAN 1 IN ORDER TO REMOVE HEAT GENERATED, OR FAILURE MAY OCCUR
- WHEN SHAFT IS SLEEVED THROUGH STUFFING BOX, SLEEVE MUST BE LIQUID TIGHT THROUGH BORE
- SHAFT OR SLEEVE MUST BE OF CORROSION RESISTANT MATERIAL WITH A HARDNESS OF 125 BRINELL MINIMUM AND BE MACHINED TO DIMENSIONS AND TOLERANCES STATED.
- END OF SEAL CHAMBER & AXIS OF SHAFT MUST BE AT 90° TO EACH OTHER WITHIN .002 F.I.M.
- PRESSURE IN SEAL CHAMBER MUST BE MAINTAINED AT MINIMUM ABOVE MAXIMUM PRESSURE GENERATED AT INNER SEAL
- BEFORE COMPLETING SEAL INSTALLATION WIPE LAPPED SURFACES OF MATING RING (SEAT) AND PRIMARY RING (SEAL FACE) PERFECTLY CLEAN
- VENT GAS ENTRAPMENT BEFORE STARTUP
- ALL SHOULDERS OVER WHICH SEAL MUST PASS WHEN FITTING, TO BE PREPARED AS DIAGRAM BELOW



ITEM	COMPONENT	DESCRIPTION	MATERIAL	QTY.
1	D 5875 084 9200	MATING RING	TUNG. CARB.	1 X
2	0000 260 9501	O-RING	BUNA-N OR EQ.	1 X
3	D 5875 145 9200	PRIMARY RING	TUNG. CARB.	1 X
4	D 5875 015 3892	BELLOWS	BUNA-N OR EQ.	1 X
5	D 5875 104 0950	RETAINER	316 SS	1
6	4607	SPRING	10-8 SS	1 X
7	D 5875 105 1950	DISC	316 SS	1
8	D 5875 103 0550	DRIVE BAND	316 SS	1
9	F 5875 019 0950	SPRING HOLDER	316 SS	1
10	BY CUST	SLEEVE		
11	F 5875 104 0550	GLAND PLATE	316 SS	1
12	D 7250 045 7854	GASKET	STYLE 2160	1 X
13				
14				
15				
16				
17				
18				
19				
20				

SEAL ASS'Y NO. D-5875-121

COMPLETE SEAL HD

MTG. RG. ASS'Y NO.

ASS'Y. ITEMS NUMBER

BILL OF MATERIALS NUMBER

EQUIPMENT REFERENCE

UNIT BY GOULDS PUMP INC / SLURRY

EQUIPMENT TYPE PUMP AGITATOR COMPRESSOR OTHER

MODEL SIZE 16" NCD

SERIAL NO. M34762

CUSTOMER INFORMATION

CUSTOMER GOULDS PUMP / SLURRY DIV.

P.O. NO. 24520

END USER CITY OF WINNIPEG

LOCATION PERIMETER RD. PUMP STA.

REQ NO.

INSTALLED AT

SEAL DATA

SEAL DESCRIPTION A011

MAT'L CODE BD1D1

API CODE

API PLAN

SERVICE DATA

FLUID RAW SEWAGE

SEAL PRESS

SUCT PRESS

TEMP 5-25°C (41-77°F)

LISCH PRESS

SHAFT SPEED 705 RPM

SP GR 1.0

BARRIER FLUID

VISC @ P.T.

V.P. @ P.T.

HAZARD CODE

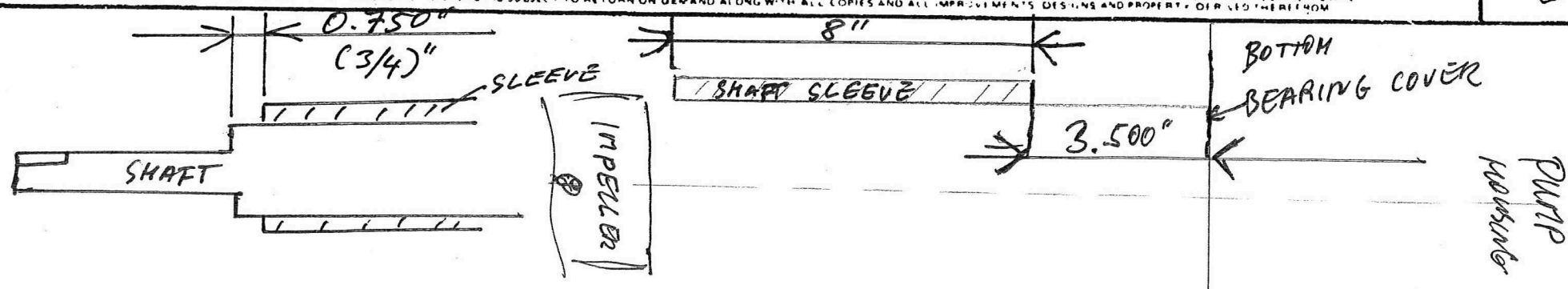
REFERENCE DATA

DRAWN MSA DATE 030480 CHK'D MSA APP'D MSA SCALE NONE INST CODE

FILE REFERENCE BUF 21 CAT C DRAWING NO. CF-SP-100268-1 ISSUE B

SEAL SIZE TYPE 5875 D T-1 (*3807)

JOHN CRANE
International Sealing Systems
6400 W. Oakton Street, Morton Grove
Illinois U. S. A. 60053-0805



THIS CONFIDENTIAL DESIGN IS OWNED BY JOHN CRANE. HOLD A L.L. NO. AND MAY NOT BE USED EXCEPT IN LICENSURE AND FOR THE BENEFIT OF JOHN CRANE. HOLD A L.L. NO. ALL RIGHTS ARE RESERVED. THIS MEDIUM PRINT MAGNETIC TAPE ETC. IS SUBJECT TO RETURN ON DEMAND ALONG WITH ALL COPIES AND ALL IMPROVEMENTS DESIGNS AND PROPERTY OF JOHN CRANE.

DEALER NOTED MAR 06 264-452-6411



William J Beall
4125188

(188 + 30 = 218)

NOTE N:

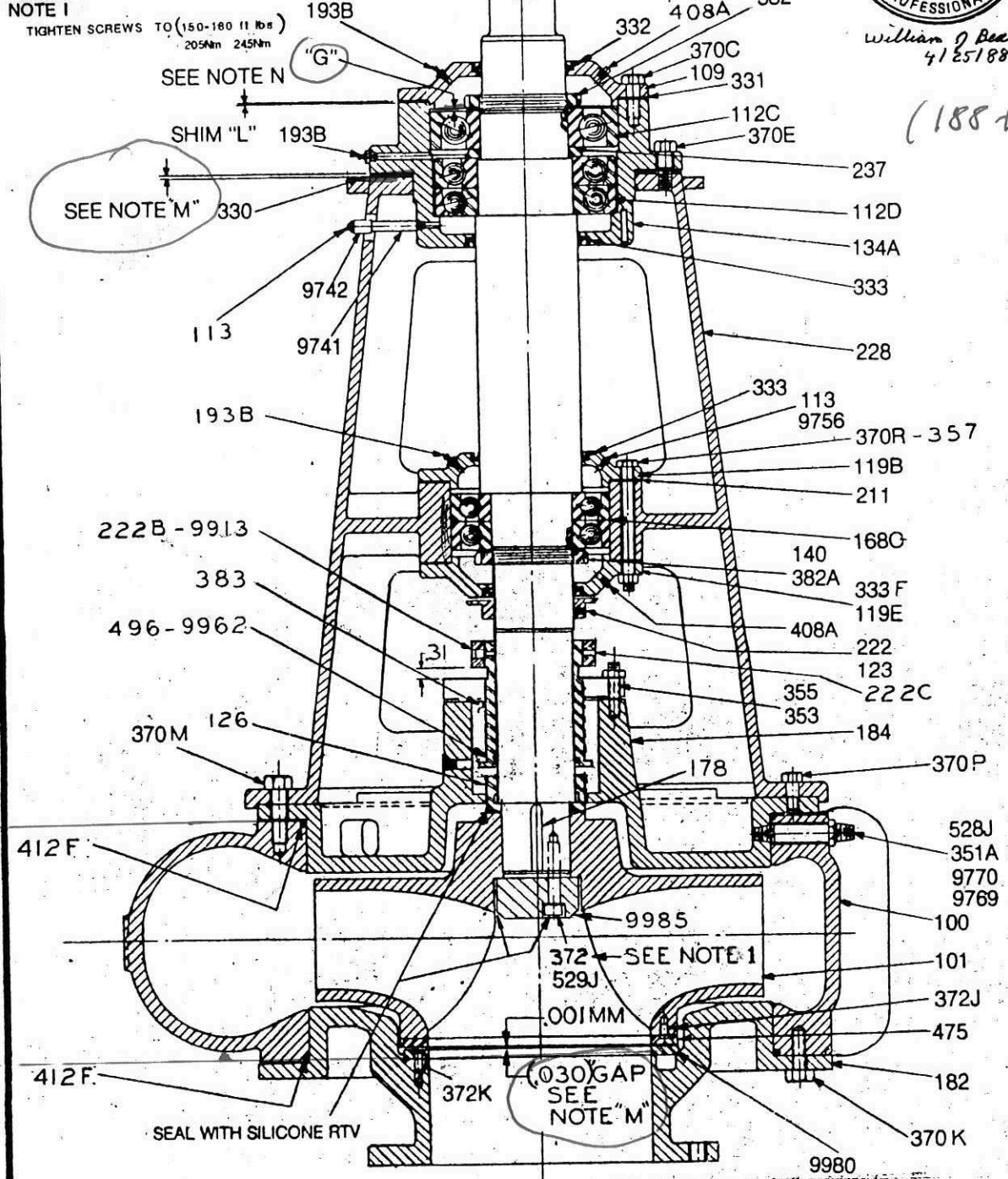
AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".

NOTE M:

AT ASSEMBLY USE SHIMS AS REQUIRED TO GIVE IMPELLER PROPER LOCATION IN CASING.

NOTE I

TIGHTEN SCREWS TO (150-180 ft lbs)
205Nm 245Nm



6.920"

CITY OF WINNIPEG
NAME OF PROJECT: WEST END WATER POLLUTION CONTROL
CENTRE EXPANSION PERIMETER ROAD PUMPING STATION
CITY PROJECT NUMBER: JA (RAW SEWAGE PUMP)
SPECIFICATION: SECTION NUMBER SP 16

GAP 0.040"
DEC. 29. 08 R. ZILMANN

GOULDS SERIAL NO. M-34762
CUSTOMER GOULDS CANADA
CUSTOMER P.O. NO. P89001
ITEM NO.
SERVICE RAW SEWAGE
BRG. LABMOD. GREASE LUBE

DRAWING IS NOT TO SCALE
CERTIFIED:
 FOR APPROVAL
 FOR RECORD
BY: P.A. Skinner 4-25-88
SIGNATURE DATE

16" Model NCD
SECTIONAL ASSEMBLY

GOULDS PUMPS, INC.
SLURRY PUMP DIVISION

DRAWN: DAS APPROVED: DATE: 2-22-88
DRAWING: M34762-2 REV: 1

*3805



PRITCHARD INDUSTRIAL
a division of Pritchard Engineering Co., Ltd.

GOULDS PUMPS CANADA INC.

CITY OF WINNIPEG
WEST END WATER POLLUTION CONTROL CENTRE
EXPANSION PERIMETER ROAD PUMPING STATION

CONTRACT 1A

RAW SEWAGE PUMP

SPECIFICATION SECTION NUMBER: SP.16

Section:

1. Pump Performance Data
2. Pump Installation, Maintenance and Parts Lists
3. Motor Drawings, Specifications
4. Motor Installation and Maintenance
5. Pump Seal Maintenance and Parts
6. Watson Spicer Drive Shaft
7. Relcon Control Accessories
8. Relcon Control Drawings and Parts Lists

PUMP
16 x 16 x 33 NCD

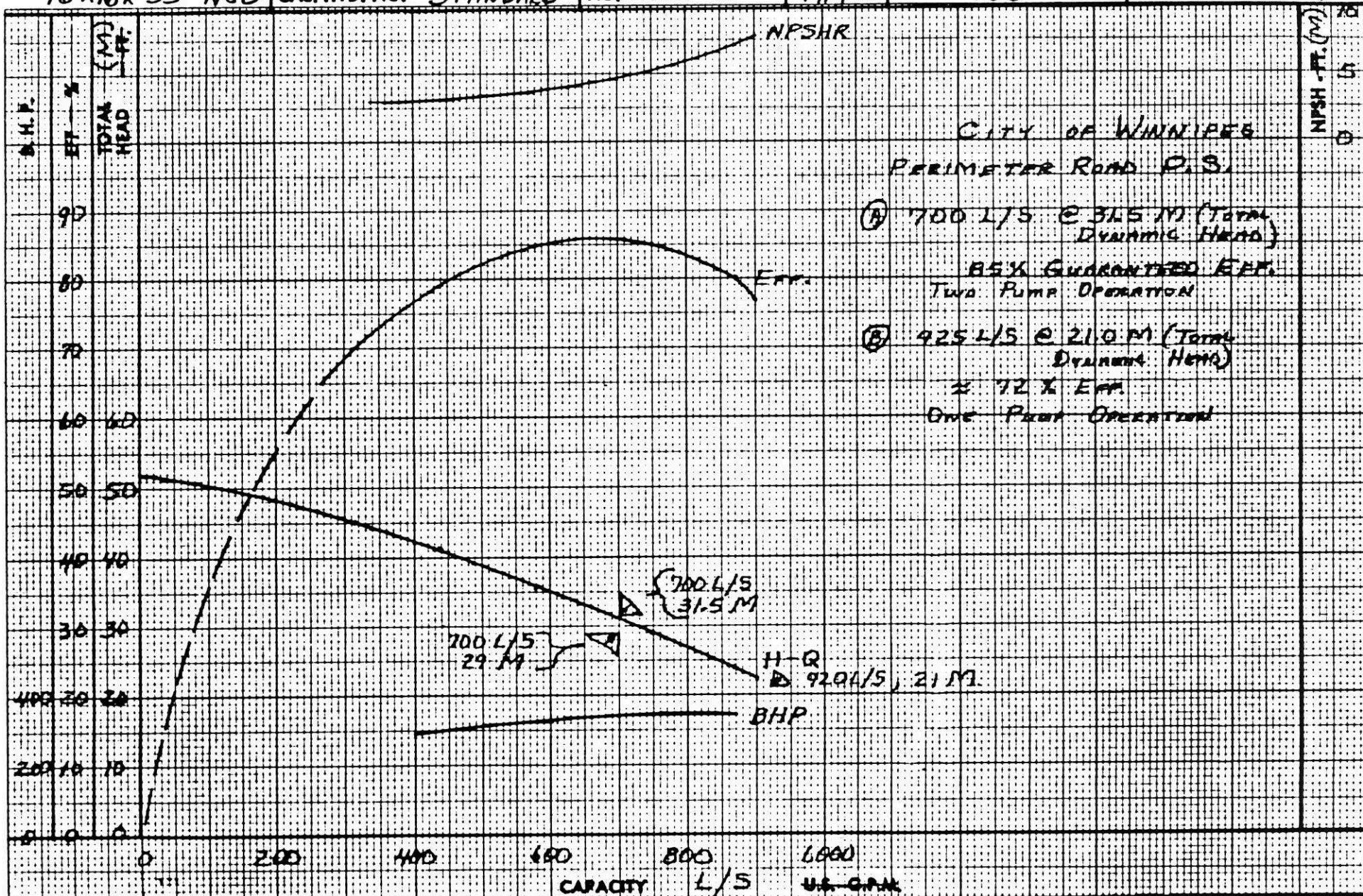
IMP. HYD. NO. 5616347
CAS. HYD. NO. STANDARD

IMP. DIA. 31.5"
NO. VANES 2

SPHERE
170
MM HT.

700 R.P.M.

NO. D-13456
DATE 23 Nov 87



LIQUID: WATER
TEMP: 48°F (16°C)

SG = 1.0
N_s = 29.9

DRAWN - DBH

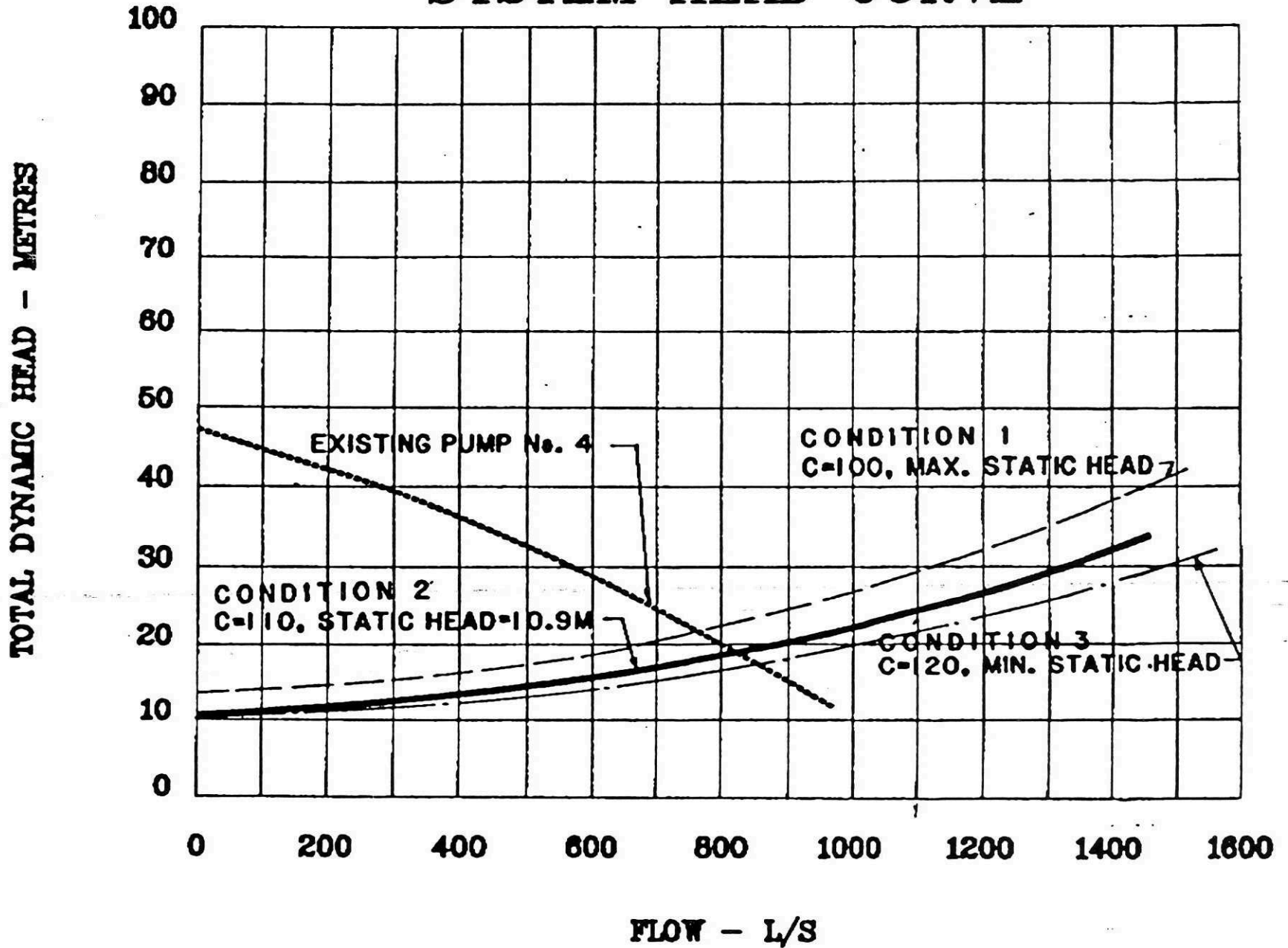
ORDER NO.

GOULDS PUMPS, INC.
ALLIUM PUMP DIVISION

REF. CURVE NO. BM 9766

***3804**

FIGURE 1
SYSTEM HEAD CURVE

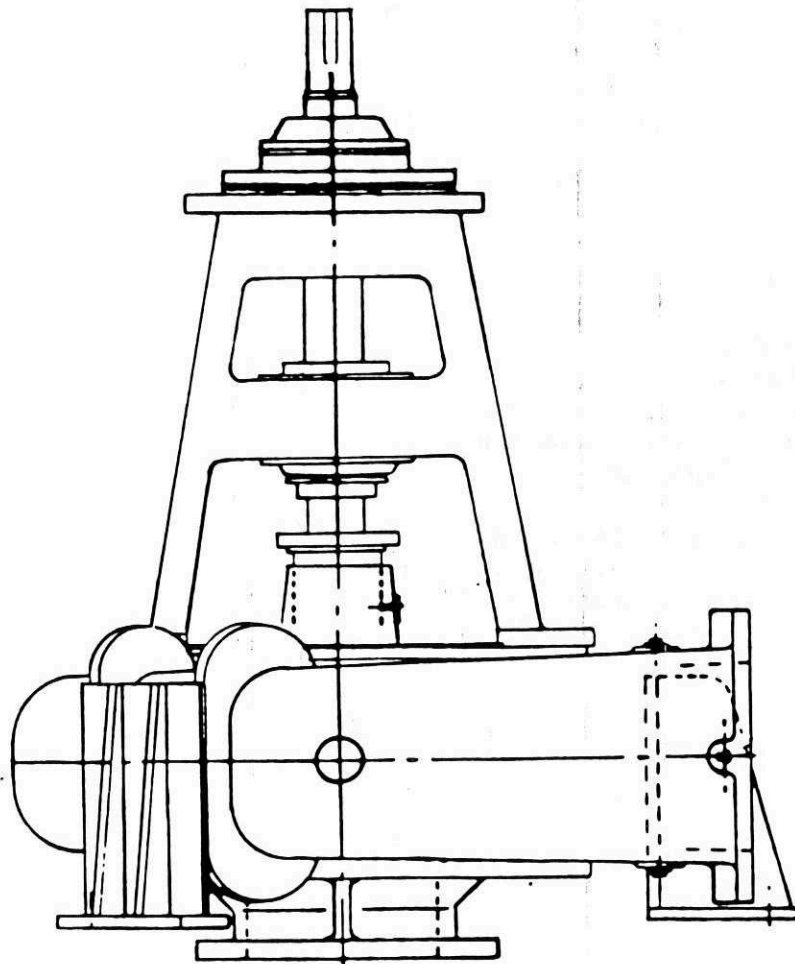




GOULDS PUMPS

SLURRY PUMP DIVISION

Installation, Operation and Maintenance Instructions



Manual No

300

MODEL NCD

* 3806



INSTALLATION AND OPERATING INSTRUCTIONS

TABLE OF CONTENTS

	<u>Page</u>
GENERAL	
Introduction	1
Importance of Instruction	1
Special Warnings	1
Receiving Inspection - Shortages	1
Preservation and Storage	2
Ordering Spares	2
INSTALLATION INSTRUCTIONS	
Location of Unit	2
Foundation	2
Discharge Pipe	3
Suction Pipe	3
Installing Pump on Foundation	3
OPERATING AND MAINTENANCE INSTRUCTIONS	
Drive Alignment	3
Direct Connect Motors and Gears	3
Drive Shafts	3-4
Lubrication and Shaft Seals	4
Grease Lubrication	4
Shaft Seals	4
Stuffing Box	4
Lubrication	4
Packing and Adjustment	5
Pump Start Up and Operation	5
Maintained Capacity	6
Locating Problems	6
Insufficient Discharge	6
Excessive Power Consumption	7
Excessive Bearing Temperature	7
Excessive Vibration	7
Water Hammer	8
PUMP LIQUID END	
Disassembly	8
Reassembly	9
PUMP BEARING ASSEMBLY	
Impeller Clearance Adjustment	10
Bearing Disassembly	10
Bearing Reassembly	11
ILLUSTRATIONS	
RECOMMENDED SPARE PARTS	



INSTALLATION AND OPERATING INSTRUCTIONS

INTRODUCTION

This instruction manual is intended to assist those involved with the installation, operations and maintenance of Goulds SPD slurry pumps. It is recommended that this manual be thoroughly reviewed prior to installing or performing any work on the pump or motor.

IMPORTANCE OF INSTRUCTIONS

The design, material and workmanship incorporated in the construction of Goulds' pumps makes them capable of giving long, trouble-free service. The life and satisfactory service of any mechanical unit, however, is enhanced and extended by periodic inspection and careful maintenance. This Instruction Manual was prepared to assist operators in understanding the construction and correct methods of installing, operating and maintaining these pumps.

Study and follow the instructions for installation and operation. Keep this instruction manual handy for reference. Further information can be obtained by contacting the Slurry Pump Division, P.O. Box 419, Baldwinsville, New York 13027.

SPECIAL WARNINGS

Goulds' Slurry Pump Division will not be liable for any damages or delay caused by failure to comply with the provisions of this Instruction Manual. This pump is not to be operated at speeds, working pressure, discharge pressures, or temperatures higher than, nor used with liquids other than stated in the original order acknowledgement, without written permission of the Slurry Pump Division, Goulds Pumps, Inc.

Any modifications to the procedures or requirements covered in this manual should be in accordance with good engineering and shop practice.

RECEIVING INSPECTION - SHORTAGES

Care should be taken when unloading pumps. If shipment is not delivered in good order and in accordance with the bill of lading, note the damage or shortage on both receipt and freight bill. MAKE ANY CLAIMS TO THE TRANSPORTATION COMPANY PROMPTLY.



INSTALLATION AND OPERATING INSTRUCTIONS

PRESERVATION AND STORAGE

Goulds' Slurry Pump Division's normal domestic shipping and storage preparation is suitable for protecting the pump during shipment. It also provides protection during covered storage at the jobsite and for a short period between installation and start-up. If the pump is to be idle and exposed to the elements for an extended period, either before or after installation, special precautions are required. One approach is to provide special preservatives and wrapping before shipment; however, after installation, the protective wrappings will have been removed. Therefore, application of preservatives after installation is considered good practice. Hand rotation of the shaft is recommended every 30 days to prevent damage to bearings.

-- SPECIAL NOTICE --

ORDERING SPARES

When ordering spare parts for this pump, always refer to the pump serial number and part number. This will avoid delays in identification. In certain cases where pumps are furnished with special metals, deliveries are quite lengthy. It is therefore advisable to anticipate your requirements several months in advance so that possible long deliveries will not handicap your operation.

INSTALLATION INSTRUCTIONS

VERTICAL DRY PIT PUMPS

LOCATION OF UNIT

The pump should be located in an area free from flooding, with sufficient overhead height for ease of installation and removal. There should also be access space around the pump for the required maintenance.

FOUNDATION

The pump foundation must be sufficiently substantial to give rigid support to the pump and to absorb vibration. The pump casing is typically supported above the floor with a metal pump support or reinforced concrete piers. Lateral rigidity is required to minimize vibration in the horizontal plane. Strong attachment of the piers to the foundation is important to prevent rocking of the piers. Any movement at the base of the piers results in a larger movement at the pump.

An anchor bolt assembly has a sleeve to allow lateral movement of the bolt after it has been cast in the concrete. Anchor bolts should be located in the concrete by a template dimensioned from the pump installation drawing. The top of the sleeve should be temporarily sealed with waste material to prevent concrete from entering during the concrete pouring operation.



INSTALLATION AND OPERATING INSTRUCTIONS

DISCHARGE PIPE

The pipe must be supported independently near the pump to prevent any strain being transmitted to the pump.

It is recommended that a check valve be used in the discharge line to protect the pump from reverse flow and excessive pressure during a shut down when there is a high static head.

SUCTION PIPE

The suction pipe should also be supported near the pump and must not have a flow regulating valve. (A shutoff valve is acceptable.)

Air leaks may cause a reduction in performance or a complete loss of prime if the pump operates with a suction lift. Excessive friction losses will cause cavitation.

INSTALLING PUMP ON FOUNDATION

The pump unit is placed on the foundation and leveled with shims at the proper height to match the piping. Grout under the pads and tighten the anchor bolts after the grout has hardened. Using nuts under the pads on the anchor bolts to level and support the unit will not allow the top side nuts to push the pads tight onto the grout. If the pump unit is not tight on the foundation, there may be problems with vibration.

An illustration page shows a typical support pad installed on a pier.

OPERATING AND MAINTENANCE INSTRUCTIONS

DRIVE ALIGNMENT

DIRECT CONNECT MOTORS

Check parallel alignment by placing a straight edge across the two coupling flanges or using a dial indicator. Check angular alignment with a micrometer or feeler gauge. Measure from the outside of one flange to the outside of the other at intervals around the periphery of the coupling. Alignment of drive and pump should be within .003" or within the coupling manufacturers specifications. See illustration at the end of these instructions.

DRIVE SHAFTS

A drive shaft is used when the motor is not direct connected to the pump. Depending on the choice, the drive shaft may use flexible couplings or universal joints.



INSTALLATION AND OPERATING INSTRUCTIONS

Flexible couplings require the same alignment limits as close coupled applications, but the longer distance between the couplings gives more allowable parallel offset between the motor and pump for the same angular misalignment at each coupling. Coupling life depends on good alignment.

Universal joint drive shafts require some parallel offset to cause proper lubrication of the needle bearings in joints. It is important to have the motor shaft parallel with the pump shaft.

The manufacturers instructions for the couplings or complete drive shaft must be followed for proper operation and service life.

LUBRICATION AND SHAFT SEALS

GREASE LUBRICATION

The bearing housing is properly filled before shipment. Under normal conditions, grease should be added as required at regular intervals and care should be taken not to over-lubricate. Use Shell Alvania No. 2, Mobile Mobilux No. 2, Texaco Multifak No. 2, Sun Oil Company Prestige No. 42, American Oil Company Amolith Grease No. 2 or equal. When it becomes necessary to replace the bearing housing seals, the housing and the bearings should be flushed clean with a solvent and repacked with new grease. Over-lubrication results in excessive bearing temperatures.

SHAFT SEALS

Exposed shaft seals, for the bearing housing, should be given a few drops of oil before the initial start up to insure lubrication. The area around the shaft seals should be kept clean to avoid excessive wear at the seal lip and dirt entering the bearing housing.

STUFFING BOX

LUBRICATION

A clear liquid such as water must be supplied at a pressure 10-15 PSI higher than the liquid pressure inside the pump where the shaft exits the stuffing box to keep abrasive pumpage out of the sealing surfaces. Grease is used for the lubricant when water is not available.

General purpose and process pumps have two (2) taps. The second tap is usually plugged but can be used for an outlet when cooling is required for high temperature application. The outlet has to be restricted to maintain pressure inside the stuffing box. Double mechanical seals also require in and out connections; one or both may be in the gland.



INSTALLATION AND OPERATING INSTRUCTIONS

If the stuffing box is on the suction side of the impeller, the lubricant supply pressure is based on the suction pressure. This also applies for pumps with expellers when the pump is not operating. Assume the pressure at the shaft for all other pumps is the discharge pressure.

PACKING AND ADJUSTMENT

A significant amount of lubricating liquid should leak from gland side of stuffing box. Operate pump for at least 15 minutes before tightening gland nuts. Make small, even gland nut adjustments to reduce leakage. Allow adequate run-in time between adjustments. Acceptable leakage may be from 30 drops per minute to a small stream to keep the temperature of the leakage below 130°F.

NOTE: Do not overtighten gland nuts. Packing may set permanently and require removal. Overtightened packing causes excessive friction between packing and sleeve, and will result in damaged components. A noticeable temperature increase in stuffing box would indicate insufficient lubrication.

Periodic maintenance is required for all packed stuffing boxes.

Normal shaft runout should be under .005 inch to avoid pounding of stuffing box packing. With excessive shaft runout, shaft straightening or replacement is necessary.

When repacking the stuffing box, be sure the packing ends are staggered and the seal cage is located as shown on the liquid end drawing. Each packing ring should be formed and cut on a mandrel to obtain the correct size with a minimum gap at the ends.

PUMP START UP AND OPERATION

Check the following items before the initial pump startup:

1. The driver rotation for being correct before the driver is connected to the pump. Some pumps have parts that could unscrew, causing considerable damage, if the pump was started in the reverse direction.
2. The shaft turns free by hand with due consideration for normal bearing and sealing drag.
3. All foundation, piping and coupling bolts have been properly tightened.
4. The required lubrication has been supplied to all components; bearings, couplings and stuffing box.
5. The pump is completely primed, i.e. no air in the impeller.



INSTALLATION AND OPERATING INSTRUCTIONS

WARNING: DO NOT OPERATE THE PUMP WITHOUT PROPER DRIVE GUARD IN PLACE.

After the pump has been started monitor the operation for any sign of developing problems.

Do not continuously operate the pump against a closed discharge valve.

WARNING: OPERATING A PUMP WITH A CLOSED SUCTION AND DISCHARGE VALVE PRESENTS A GREAT DANGER OF A VIOLENT FAILURE BECAUSE THE HORSEPOWER OF THE DRIVER IS DIRECTLY CONVERTED TO HEAT INSIDE THE CASING.

MAINTAINED CAPACITY

Pumps having a suction liner or suction wear ring are provided with a method for repositioning the impeller to restore the proper clearance on the suction side of the impeller. Wear at this gap will lessen the amount of liquid being pumped because of excessive leakage through the gap.

Instructions of resetting the impeller clearance are given in the Bearing Assembly Instructions. The normal clearance is shown on the Liquid End Assembly drawing or in the liquid end instructions.

LOCATING PROBLEMS

1. Conditions Causing Insufficient or No Discharge

a. Pump not primed

The pump generally cannot be primed with the shaft turning. Air leaks may cause pump to lose prime especially at low flow rates while discharge valve is being opened.

b. Excessive head requirements

Extra pipeline length and increases in pipe elevation require the pump to develop more head for the same flow rate.

c. Insufficient NPSH available

Extra suction pipe length and pump elevation above the water level reduce the NPSH available to the pump.

d. Worn pump components

Wear at the impeller ring gap increases the internal leakage and is correctable without disassembly.

e. Insufficient pump speed



INSTALLATION AND OPERATING INSTRUCTIONS

- f. Pipeline or pump clogged or partially clogged.
 - g. Wrong direction of rotation
2. Conditions Causing Excessive Power Consumption
 - a. Pump speed too high
 - b. Pump not operating at design capacity

Pump is operating at higher HP point of its performance curve.
 - c. Mechanical rubbing or binding of rotating parts

Rubbing at the impeller can cause considerable power loss in the pump. The equivalent power loss in a bearing or stuffing box would produce high temperature.
3. Conditions Causing Excessive Bearing Temperatures
 - a. Misalignment of the bearings

This should be checked first if the problem developed immediately after any work was done that could have changed the bearing alignment.
 - b. Insufficient amount of lubricant
 - c. Excessive amount of lubricant

The problem is noticed a short time after lubricant is added to the bearings.
 - d. Deteriorated lubricant

A gradual, over a period of days, temperature rise above the ambient temperature indicates a deterioration of the lubricant around the rolling elements provided the bearing is not generating unusual noise.
 - e. Bearing failing

This will cause an increase in its noise.
4. Conditions Causing Excessive Vibration
 - a. Partially clogged impeller
 - b. Foundation not properly supporting pump
 - c. Misalignment



INSTALLATION AND OPERATING INSTRUCTIONS

d. Mechanical defects

Bent shaft, failed bearing, impeller out of balance.

5. Conditions Causing Water Hammer

Water hammer is a high pressure surge through a pipeline resulting from an event that forces all the liquid in the line to rapidly change velocity.

a. Rapid valve closing

b. Lack of a vacuum breaker in pipeline going over a hill

c. Full speed filling a pipeline that has a sudden pipe friction increasing section down stream from the pump.

PUMP LIQUID END

IMPELLER WEAR RING CLEARANCE

The following tabulation gives the wear ring clearance for the pump based on the size of the discharge:

<u>Pump Discharge Size</u>	<u>Clearance</u>
6"-10"	.025"
12"	.030"
16"	.035"
20"-30"	.040"
36"-48"	.045"

LIQUID END DISASSEMBLY

Any step requiring removing or separating components also means removal of the fasteners securing the parts together.

1. Close the valves to the pump and drain the liquid from the pump casing.
2. Remove any equipment, such as drives or drive shaft, above the pump to allow lifting the rotating element free of the casing.
3. Remove lubricant lines to the stuffing box and the stuffing box cover drain line. If the drain pipe goes through the casing and into the stuffing box cover, it must be removed.



INSTALLATION AND OPERATING INSTRUCTIONS

4. Mark the flanges, frame, stuffing box cover, and casing for parts orientation at reassembly.
5. Remove the pump rotating assembly from the casing. The wear rings, #475 and #9980, can be removed and replaced if required.
6. Remove impeller plate #9985.
7. Pull the impeller, #101, off the shaft. If wedges are used behind the impeller, they should be located behind the vanes rather than in the middle of an unsupported shroud area.
8. Remove the stuffing box cover, #184, from the shaft assembly.
9. Remove the shaft sleeve from the shaft. This could be done after step 7.
10. Remove the gland, packing and lantern ring from the stuffing box.

LIQUID END REASSEMBLY

Reassembly is the reverse sequence of disassembly. The following notes apply:

1. Silicone RTV is used to seal the impeller hub at the shaft sleeve and impeller plate.
2. If heat is used to facilitate installation of the impeller on the shaft, be careful to apply heat gradually to the impeller hub. Hard irons are also brittle and more likely to crack from thermal shock than cast iron impellers.
3. Tighten the impeller locking screws, #372, to the torque given below:

<u>Screw Size</u>	<u>Lb. - Ft.</u>
5/8 - 11	60 - 80
3/4 - 10	90 - 120
7/8 - 9	150 - 180
1 - 8	240 - 300

4. Be sure O-ring, #412F, is in place before the rotating assembly is lowered into the casing.
5. If the impeller or wear rings were replaced, loosen the screws fastening the thrust bearing housing, #134A, to the frame to prevent damage to the outboard bearing if there is no ring clearance gap when the stuffing box cover is tightened to the casing.



INSTALLATION AND OPERATING INSTRUCTIONS

PUMP BEARING ASSEMBLY

CLEARANCE ADJUSTMENT

To adjust the impeller wear ring gap:

1. Loosen the cap screws fastening the thrust bearing housing, #134A, to the frame.
2. Uniformly turn jack screws to lift the thrust bearing housing enough for removing the shims, #330.
3. Uniformly back off the jack screws, while turning the pump shaft by hand, until the impeller rubs.
4. Use feeler gauges and a block to measure the gap between the thrust bearing housing and frame where the shims were. If the gap is not uniform around the thrust bearing housing, readjust the jack screws until it is uniform.
5. To the measured gap, add the required ring gap found in the liquid end section or on the liquid end assembly drawing. This is the required shim stack thickness.
6. Make up shim stacks. They must have the same thickness to prevent thrust bearing misalignment.
7. Jack screw up the thrust bearing housing, install the shims, lower the housing onto the shims, and secure with cap screws.
8. Check for uniform gap between the shim stacks to be sure there isn't any bearing misalignment.

BEARING DISASSEMBLY

The bearing illustration shows ball bearings. Application requirements may have required roller bearings at one or more of the locations, however that does not affect these instructions.

1. Remove the inboard bearing covers and the inboard slinger (deflector).
2. Remove the cap screws securing the thrust bearing housing to the frame. Slide the shaft assembly out of the frame.
3. Remove the outboard bearing cover, #109.
4. Remove the bearing locknuts and lockwashers. There may be one or two sets.



INSTALLATION AND OPERATING INSTRUCTIONS

5. Slide the thrust bearing housing towards the radial bearing. Press the thrust bearing stack off the shaft by pushing against the inner race of the thrust bearing.
6. Press the inboard bearing off the shaft. There may be one or two bearings at the inboard end.
7. Remove and replace shaft seals as required.

BEARING ASSEMBLY

1. Make sure the shaft and parts are clean and free from nicks or burrs.
2. Slide the inboard bearing cover and thrust bearing housing to the middle of the shaft between the bearing seats.
3. Heat the bearings to 200°F and slide into position against the shaft shoulders.

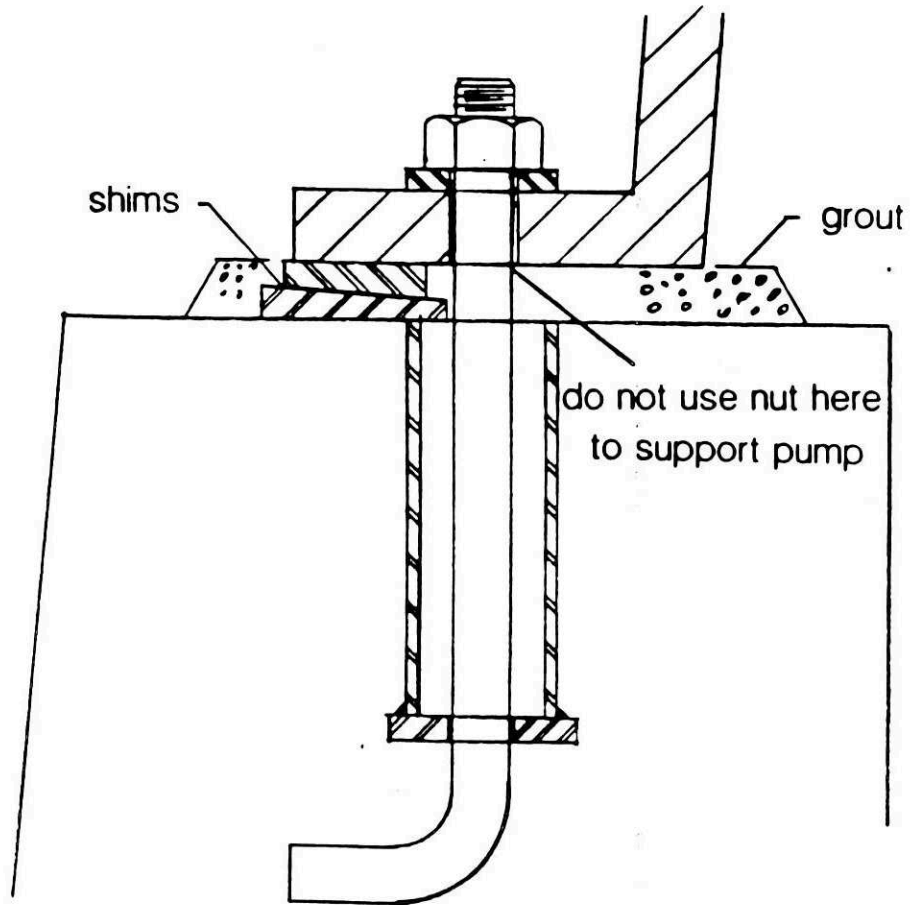
Note: If there are two (2) separate inboard bearings, #168C, mounted together, they have to be "Universal Ground" or installed with a .010" thick spacer shim between the inner races to prevent possible preload at the outer races.

4. Install lockwashers and locknuts, tightening as the bearings cool. Set lockwasher tangs.
5. Hand pack each bearing envelope one-third full of grease.
6. Temporarily install the outboard end cover with two cap screws, partially tight.
7. Measure the gap between the cover and thrust bearing housing.
8. Make a shim stack .008" thicker than the measured gap. Remove the cover and reinstall with the shim.

Note: The object is to have enough end play in the thrust bearing stack to prevent bearing axial preload from thermal expansion without having excessive end play.

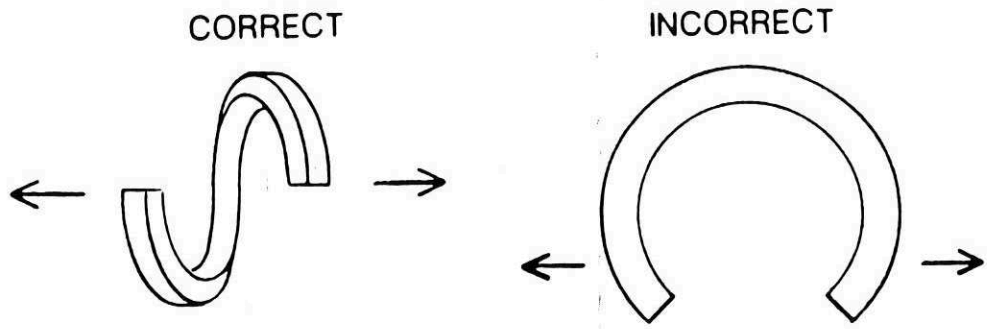
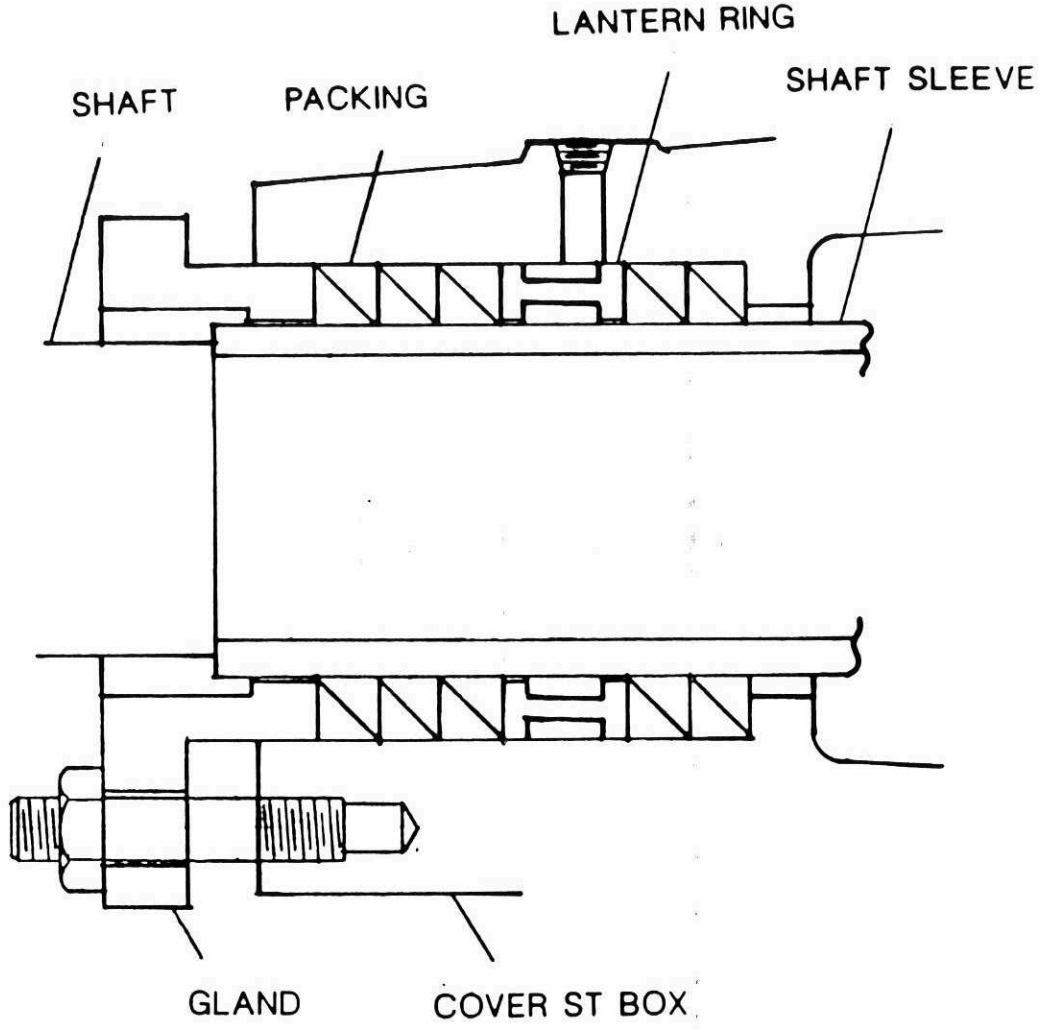
9. Install the shaft assembly in the frame. Leave the cap screws which fasten the thrust bearing housing to the frame loose until the shims have been made for the impeller clearance.
10. Install the inboard bearing covers and deflector.
11. Continue the pump assembly. Refer back to the liquid end assembly notes.

INSTALLATION AND OPERATING INSTRUCTIONS



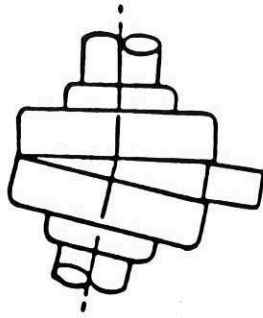
TYPICAL INSTALLATION ON THE FOUNDATION

**INSTALLATION AND
OPERATING INSTRUCTIONS**

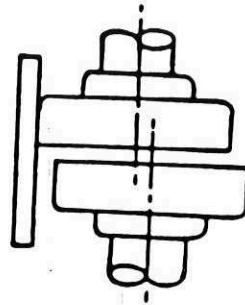


STUFFING BOX PACKING

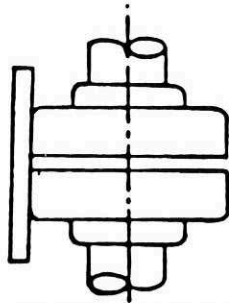
INSTALLATION AND OPERATING INSTRUCTIONS



ANGULAR MISALIGNMENT



PARALLEL MISALIGNMENT

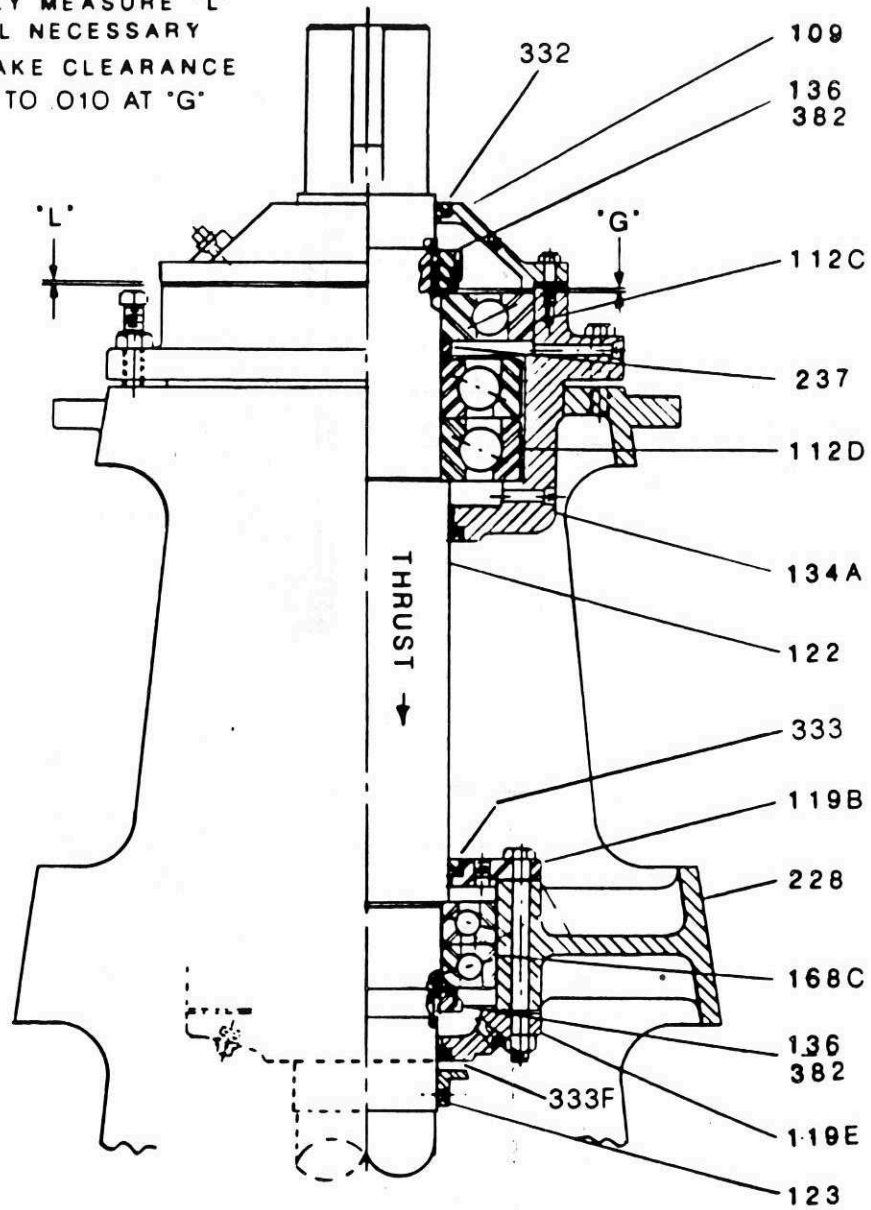


PERFECT ALIGNMENT

COUPLING ALIGNMENT

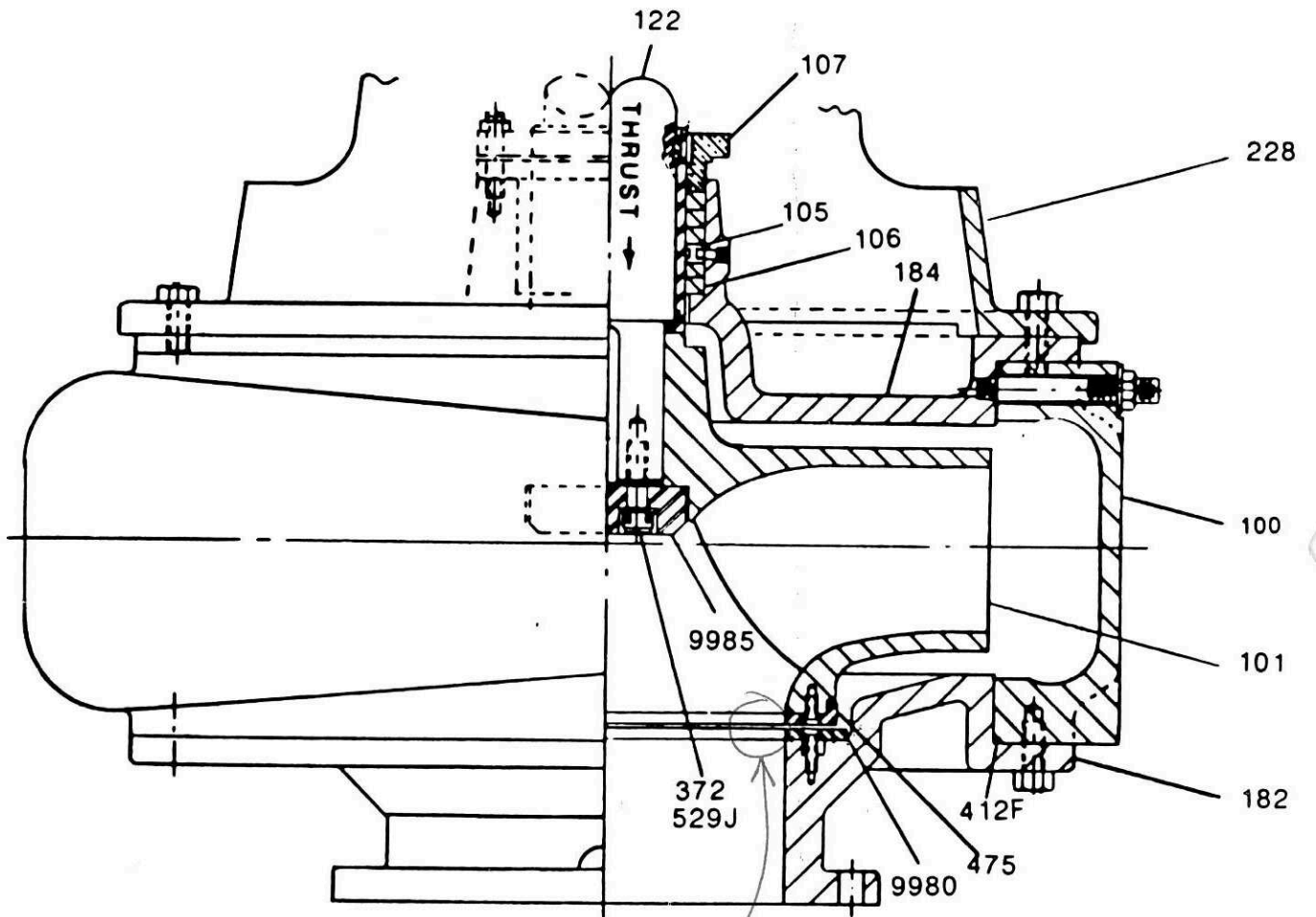
INSTALLATION AND OPERATING INSTRUCTIONS

AT ASSEMBLY MEASURE 'L'
AND INSTALL NECESSARY
SHIMS TO MAKE CLEARANCE
GAP OF .006 TO .010 AT 'G'



BEARING ASSEMBLY

INSTALLATION AND OPERATING INSTRUCTIONS



0.035"
WEAR
RING
CLEARANCE.

TIGHTEN ITEM # 372
TO TORQUE GIVEN
IN THE INSTRUCTIONS

LIQUID END



INSTALLATION AND OPERATING INSTRUCTIONS

TYPICAL RECOMMENDED SPARE PARTS LIST

<u>ITEM</u>	<u>QTY./PUMP</u>	<u>PART NAME</u>
101	1	Impeller
105	1	Lantern Ring
106	1 set	Packing
107	1	Gland
126	1	Shaft Sleeve
351A	1	Gasket
360B	1	Gasket
412F	2	O-Ring
475	1	Ring, Impeller
9980	1	Ring, Suction Cover
9985	1	Plate, Impeller Lock
112C	1	Bearing, Thrust
112D	2	Bearing, Thrust
168C	2	Bearing, Radial
330	12	Shim, Impeller Adjustment
331	1	Shim, Bearing Cover
332	1	Seal, Outboard Grease
333	2	Seal, Inboard Grease
333F	1	Seal, Inboard Grease



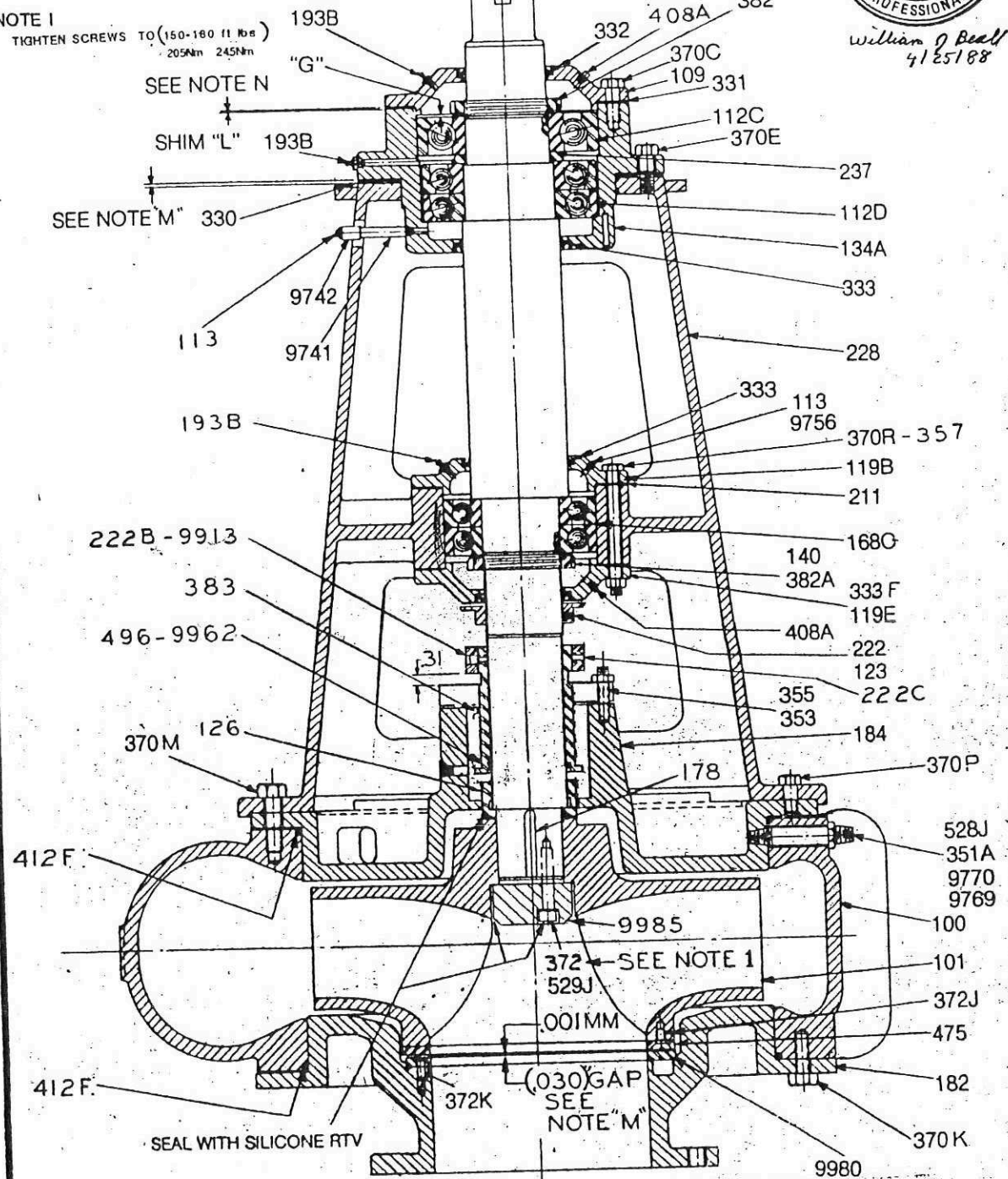
Goulds Pumps, Inc.
Slurry Pump Division
31 East Genesee Street
Baldwinsville, NY 13027

DELETED NOTED MAR 06 204-452-6411



William J. Beall
4125188

NOTE N:
AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".
NOTE M: .0002 MM - .0003 MM
NOTE I
TIGHTEN SCREWS TO (150-180 II lbs) 205Nm 245Nm



CITY OF WINNIPEG
NAME OF PROJECT: WEST END WATER POLLUTION CONTROL
CENTRE EXPANSION PERIMETER ROAD PUMPING STATION
CITY PROJECT NUMBER: JA (RAW SEWAGE PUMP)
SPECIFICATION: SECTION NUMBER SP 16

GOULDS SERIAL NO. M-3 4762
CUSTOMER GOULDS CANADA
CUSTOMER P.O. NO. P89001
ITEM NO.
SERVICE RAW SEWAGE
BRG. LABMOD. GREASE LUBE

DRAWING IS NOT TO SCALE
CERTIFIED:
 FOR APPROVAL
 FOR RECORD
BY: D.A. Skinner 4-25-88
SIGNATURE DATE

16" Model NCD
SECTIONAL ASSEMBLY
GOULDS PUMPS INC.
SLURRY PUMP DIVISION
DRAWN: DAS
APPROVED: [Signature]
DATE: 2-22
DRAWING: M34762-2
*3805

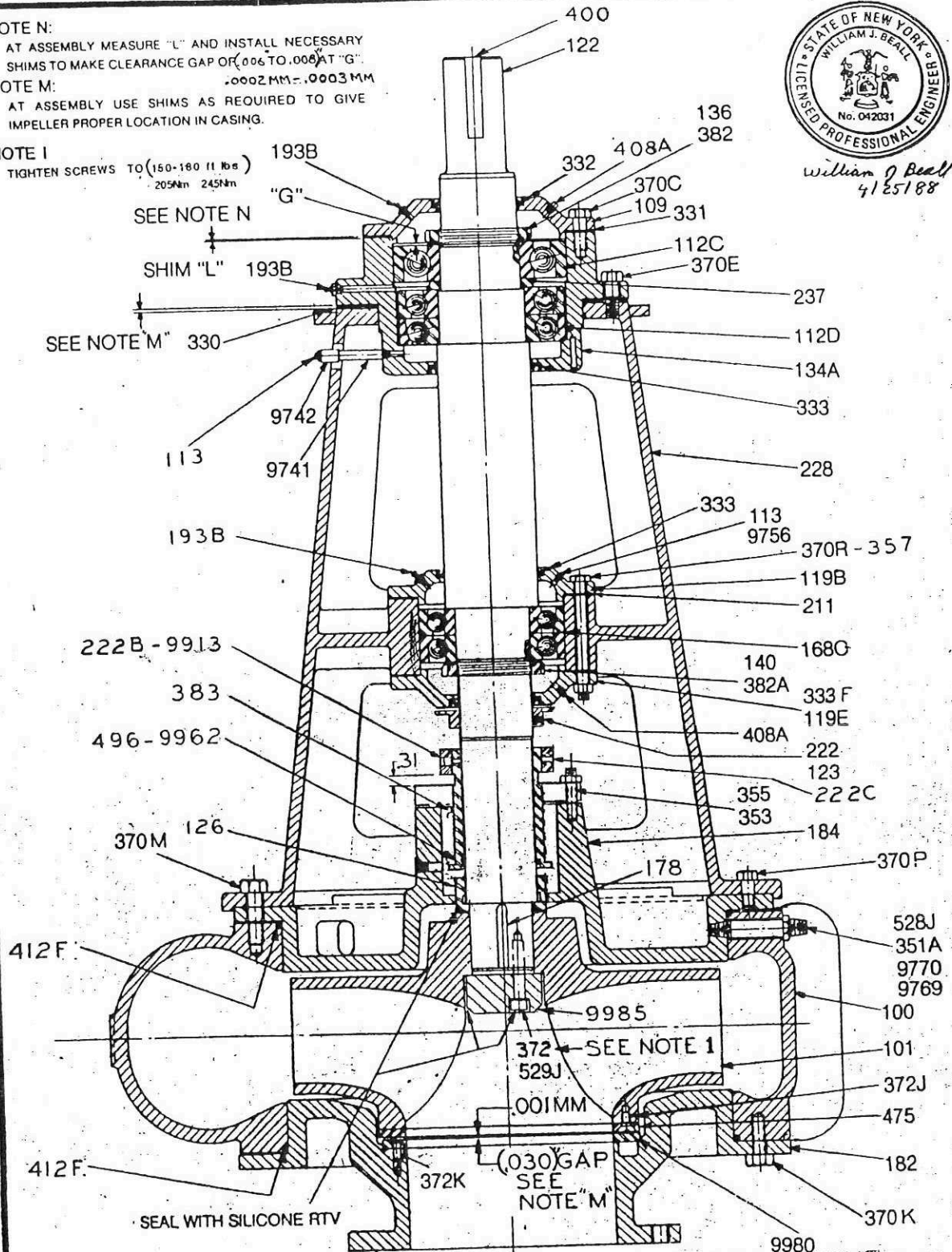
DEALER NOTED MAR 06 204-452-6411



William J. Beall
4125188

NOTE N:
AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".
NOTE M:
.0002 MM = .0003 MM

NOTE I
TIGHTEN SCREWS TO (150-180 lb lbs)
205 Nm 245 Nm



CITY OF WINNIPEG
NAME OF PROJECT: WEST END WATER POLLUTION CONTROL
CENTRE EXPANSION PERIMETER ROAD PUMPING STATION
CITY PROJECT NUMBER: 1A (RAW SEWAGE PUMP)
SPECIFICATION: SECTION NUMBER SP 16

GOULDS SERIAL NO. M-3 4762
CUSTOMER GOULDS CANADA
CUSTOMER P.O. NO. P8 9001
ITEM NO.
SERVICE RAW SEWAGE
BRG. IABMOD. GREASE LUBE

DRAWING IS NOT TO SCALE
CERTIFIED:
 FOR APPROVAL
 FOR RECORD
BY: P.A. Skinner 4-25-88
SIGNATURE DATE

16" Model NCD
SECTIONAL ASSEMBLY
GOULDS PUMPS INC.
SLURRY PUMP DIVISION
DRAWN: DAS
APPROVED: [Signature]
DATE: 2-28
DRAWING: M34762-2
*3805

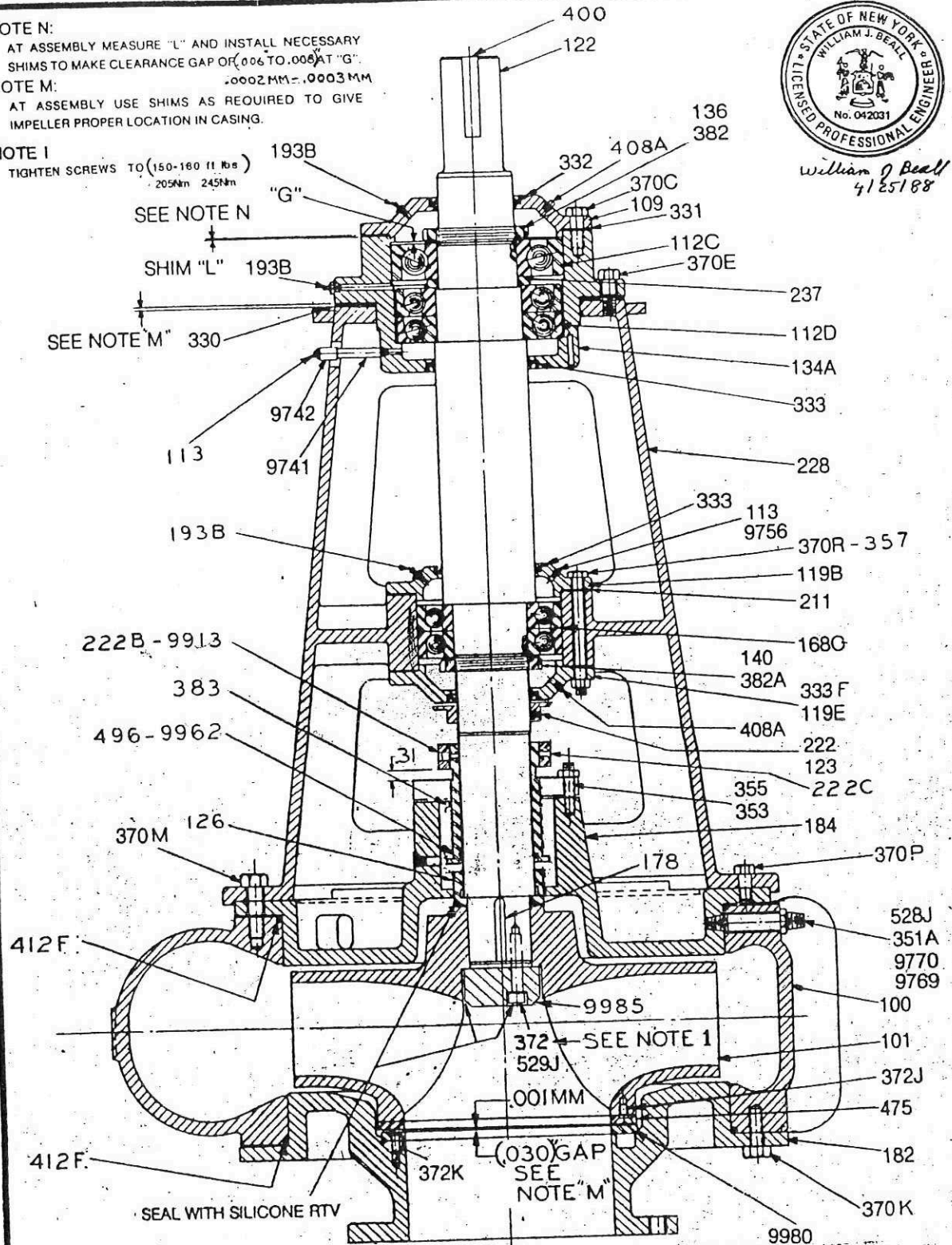
DEALER NOTED MAR 06 264-452-6411



William J. Beall
4125188

NOTE N:
AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".
NOTE M:
AT ASSEMBLY USE SHIMS AS REQUIRED TO GIVE IMPELLER PROPER LOCATION IN CASING.

NOTE I
TIGHTEN SCREWS TO (150-180 ft lbs)
205Nm 245Nm



CITY OF WINNIPEG
NAME OF PROJECT: WEST END WATER POLLUTION CONTROL
CENTRE EXPANSION PERIMETER ROAD PUMPING STATION
CITY PROJECT NUMBER: (RAW SEWAGE PUMP)
SPECIFICATION: SECTION NUMBER: SP 16

GOULDS SERIAL NO. M-3 4762
CUSTOMER GOULDS CANADA
CUSTOMER P.O. NO. P89001
ITEM NO.
SERVICE RAW SEWAGE
BRG. LABMOD. GREASE LUBE

DRAWING IS NOT TO SCALE
CERTIFIED:
 FOR APPROVAL
 FOR RECORD
BY: P.A. Skinner 4-25-88
SIGNATURE DATE

16" Model NCD
SECTIONAL ASSEMBLY
GOULDS PUMPS INC
SLURRY PUMP DIVISION
DRAWN: DAS
APPROVED: [Signature]
DATE: 2-22
DRAWING: M34762-2
*3805

DEALER NOTED MAR 06 264-452-6411

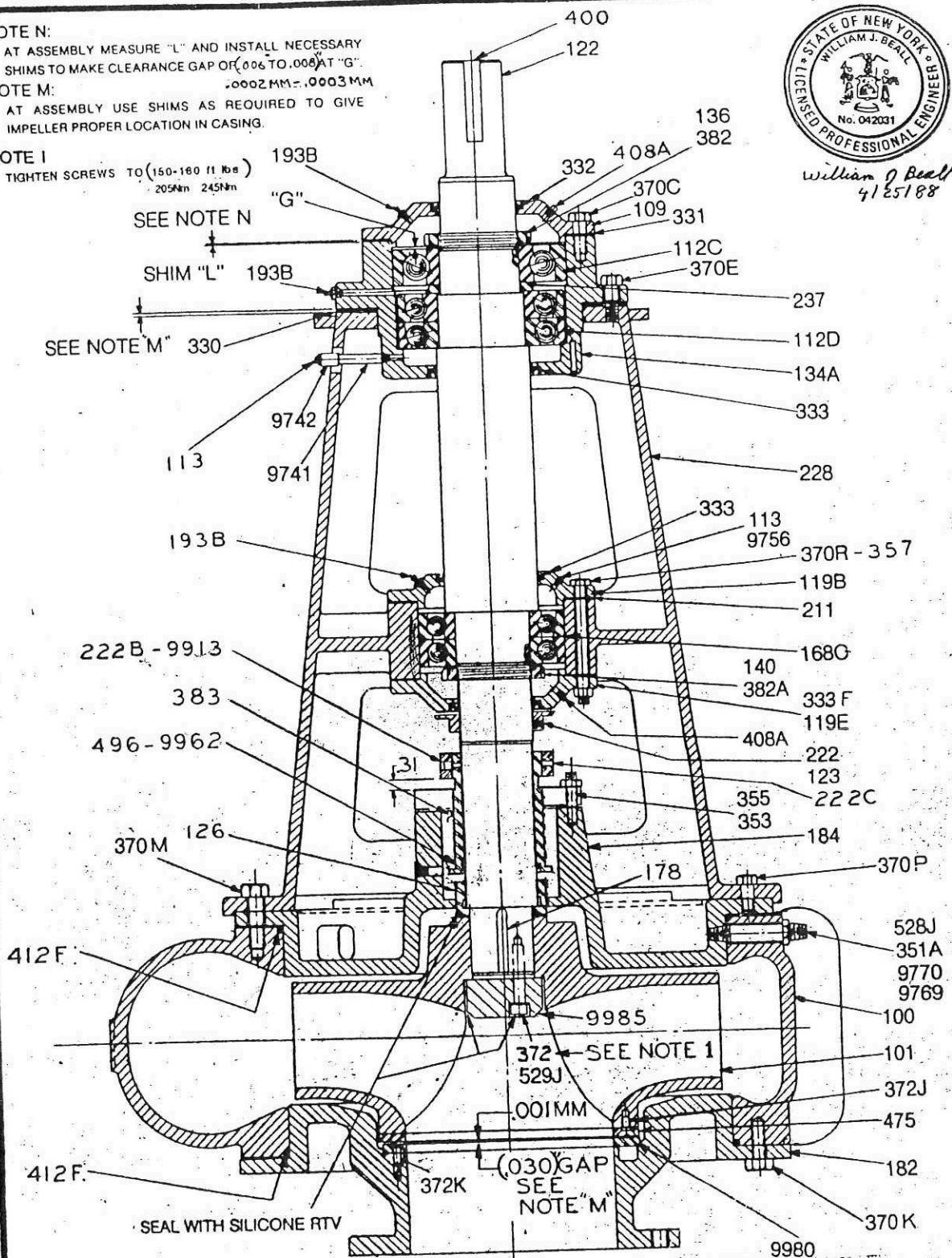


William J. Beall
4125188

NOTE N:
AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".
.0002 MM = .0003 MM

NOTE M:
AT ASSEMBLY USE SHIMS AS REQUIRED TO GIVE IMPELLER PROPER LOCATION IN CASING.

NOTE I:
TIGHTEN SCREWS TO (150-180 ft lbs)
205Nm 245Nm



CITY OF WINNIPEG
NAME OF PROJECT: WEST END WATER POLLUTION CONTROL
CENTRE EXPANSION PERIMETER ROAD PUMPING STATION
CITY PROJECT NUMBER: (RAW SEWAGE PUMP)
SPECIFICATION SECTION NUMBER: SP 16

GOULDS SERIAL NO. M-3 4762 CUSTOMER GOULDS CANADA	DRAWING IS NOT TO SCALE	16 Model NCD SECTIONAL ASSEMBLY
CUSTOMER P.O. NO. P8 9001	CERTIFIED: <input type="checkbox"/> FOR APPROVAL <input checked="" type="checkbox"/> FOR RECORD	GOULDS PUMPS INC. SLURRY PUMP DIVISION
ITEM NO. SERVICE RAW SEWAGE BRG. IABMOD. GREASE LUBE	BY: <i>P.A. Skinner</i> 4-25-88 SIGNATURE DATE	DRAWN: DAS APPROVED: [Signature] DATE: 2-22 DRAWING: M34762-2

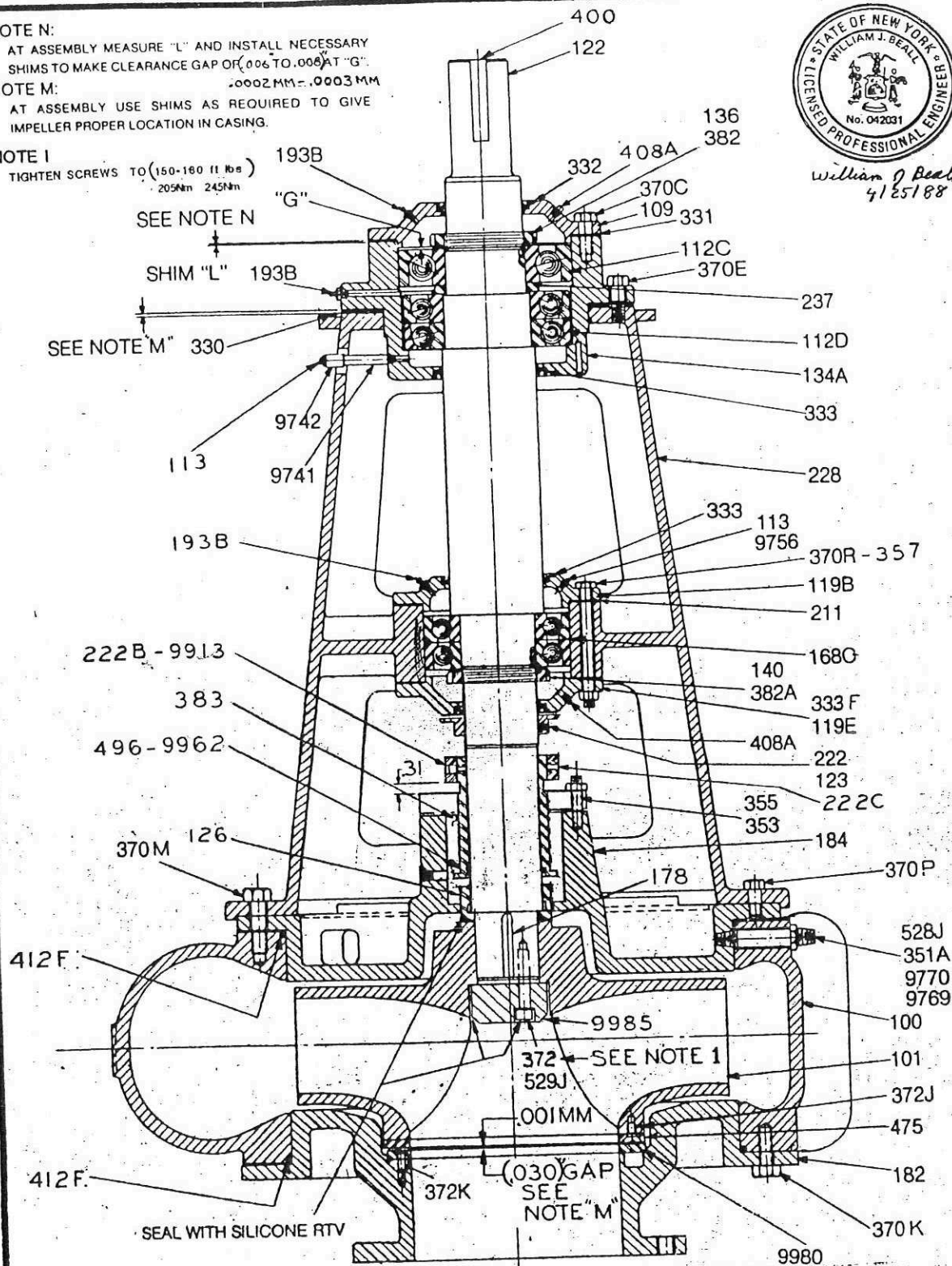
DEALER NOTED MRR 06 264-452-6411



William J. Beall
4125188

NOTE N:
AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".
NOTE M:
AT ASSEMBLY USE SHIMS AS REQUIRED TO GIVE IMPELLER PROPER LOCATION IN CASING.

NOTE I
TIGHTEN SCREWS TO (150-180 ft lbs)
205Nm 245Nm



GOULDS SERIAL NO. M-3 4762
CUSTOMER GOULDS CANADA
CUSTOMER P.O. NO. P8 9001
ITEM NO. SERVICE RAW SEWAGE
BRG. IABMOD. GREASE LUBE

DRAWING IS NOT TO SCALE
CERTIFIED:
 FOR APPROVAL
 FOR RECORD
BY: P.A. Skinner 4-25-88
SIGNATURE DATE

16" Model NCD
SECTIONAL ASSEMBLY
GOULDS PUMPS INC.
SLURRY PUMP DIVISION
DRAWN: DAS
APPROVED: [Signature]
DATE: 2-22
DRAWING: M34762-2
*3805

CITY OF WINNIPEG
NAME OF PROJECT WEST END WATER POLLUTION CONTROL
CENTRE EXPANSION PERIMETER ROAD PUMPING STATION
CITY PROJECT NUMBER JA (RAW SEWAGE PUMP)
SPECIFICATION SECTION NUMBER SP 16

DEALER NOTED MARR 06 264-452-6411

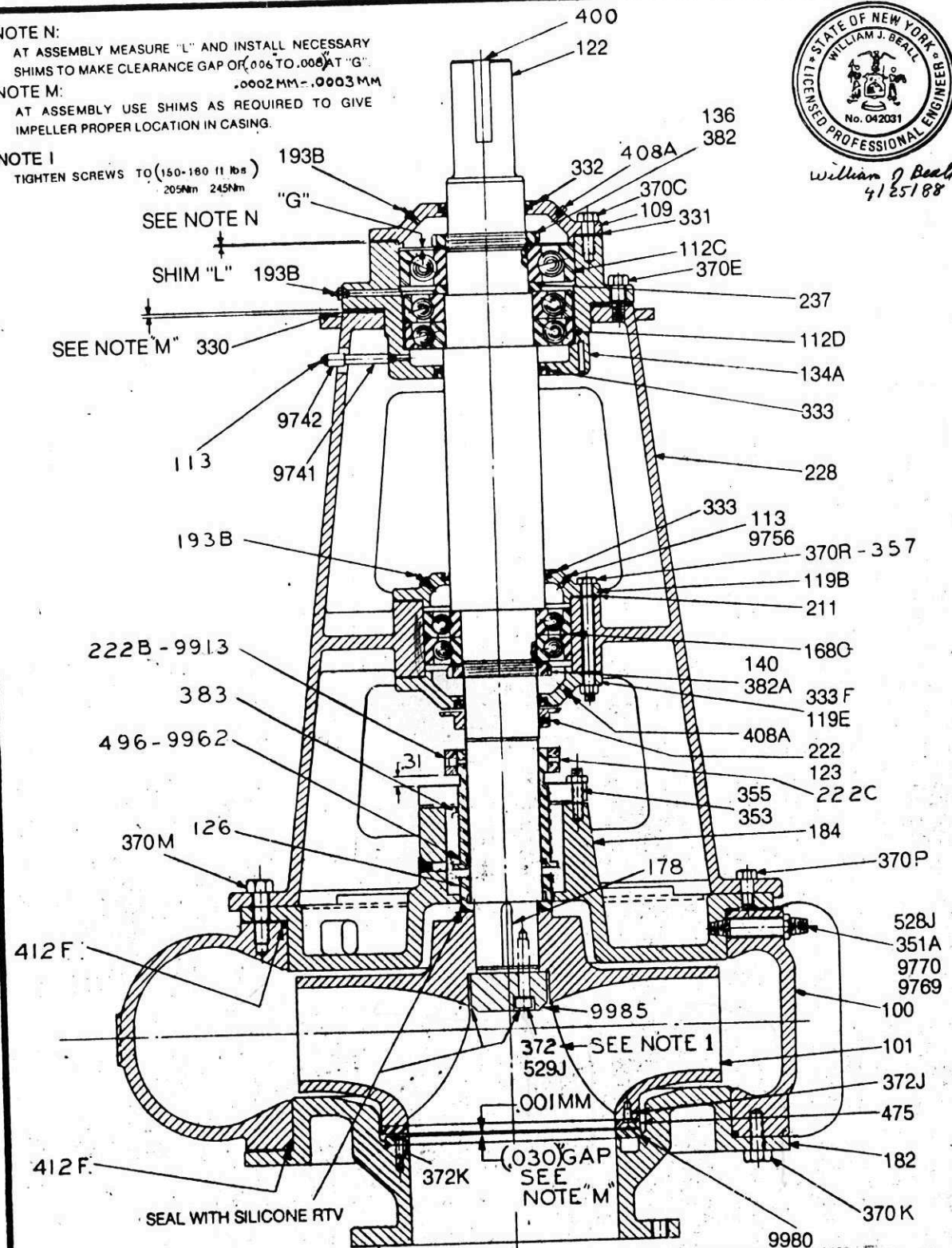


William J. Beall
4/25/88

NOTE N:
AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".
.0002MM-.0003MM

NOTE M:
AT ASSEMBLY USE SHIMS AS REQUIRED TO GIVE IMPELLER PROPER LOCATION IN CASING.

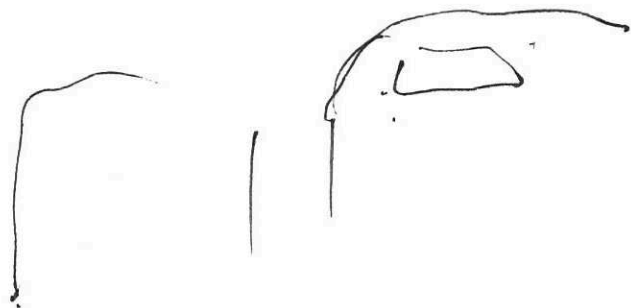
NOTE I
TIGHTEN SCREWS TO (150-180 ft lbs)
205Nm 245Nm



CITY OF WINNEPEG
NAME OF PROJECT: WEST END WATER POLLUTION CONTROL
CENTRE EXPANSION PERIMETER ROAD PUMPING STATION
CITY PROJECT NUMBER: 1A (RAW SEWAGE PUMP)
SPECIFICATION SECTION NUMBER: SP 16

GOULDS SERIAL NO. M-3 4762 CUSTOMER GOULDS CANADA CUSTOMER P.O. NO. P89001 ITEM NO. SERVICE RAW SEWAGE BRG. LABMOD. GREASE LUBE	DRAWING IS NOT TO SCALE	16" Model NCD SECTIONAL ASSEMBLY	
	CERTIFIED: <input type="checkbox"/> FOR APPROVAL <input checked="" type="checkbox"/> FOR RECORD	GOULDS PUMPS, INC. BLURRY PUMP DIVISION	
BY: <i>P.A. Skinner</i> 4-25-88 SIGNATURE DATE	DRAWN: DAS	APPROVED:	REV: 1
		DRAWING: M34762-2	REV: 1

*3805



BILL OF MATERIAL SERIAL NO: PM34762

CUST NO:3926 SERIAL NO:M34762 QTY: 1

CUSTOMER:GOULDS PUMPS CANADA INC. MODEL : NCD 16X16-33

CUST PO:P89001/83112 MATERIAL : 3% NICKEL

END USER: CITY OF WINNEPEG ROTATION: CW

DIMENSION DWG:M34762-1 REV.2 CONFIG:COUPLED

SECTIONAL DWG:M34762-2 REV.1 DISCH POS:SIDE

INSTRUCTION MANUAL: 300 SUCT. POS. : BOTTOM

WRITTEN:D. SKINNER DATE: 3/14/88 BEARING:1AB MOD. - GREASE

*3812

SECTION 1 ACCESSORIES AND REQUIREMENTS SECTION 1

* INDICATES QUANTITY AS SHOWN.

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING	MAIL	REMARKS
------	-----------	----------	--------------	------------------------	------	---------

HYDROSTATIC TEST: 195 PSIG - HOLD FOR FIVE MINUTES

PERFORMANCE TEST: REQUIRED - WITNESSED
(SPECIAL PENALTY FOR EFF.)

PAINT: SPD-STANDARD SURFACE PREPARATION AND PRIMER

NAME PLATE DATA:
S.G.: 1.0, CAPACITY: 11,096 GPM, BHP: 342.8,
TOTAL HEAD: 104 FT., SPEED: 705 RPM

MOTOR: U.S.E.M., FR. #5810P, 400 HP, 705 RPM
BY CUSTOMER - COMING FOR TEST

VFD: BY CUSTOMER - COMING FOR TEST

QUALITY ASSURANCE PROCEDURE: SPD-MORRIS STANDARD

PUMP - BEARING LIFE: B10, 100,000 HOURS

***3812**

BILL OF MATERIAL

SERIAL NO: PM34762

SECTION 1 ACCESSORIES AND REQUIREMENTS
* INDICATES QUANTITY AS SHOWN.

SECTION 1

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING	MAIL	REMARKS
	WATSON FLEXIBLE SHAFTING FOR VERTICAL APPLICATION WITH 400 HP, 705 RPM ELECTRIC MOTOR (OR EXACT EQUAL)					
122A	SHAFT		1			LOWER SHAFT, WVA-150 5.62 X .313 WALL TUBE X 64.75" LG., DYNAMIC BALANCED.
122B	SHAFT	STEEL (122A)	1	A00049G002	3230	PUMP FLANGE
122C	SHAFT	STEEL	1		3230	UPPER SHAFT, WVB-150 5.62 X .313 WALL TUBE X 120.00" LG., DYNAMIC BALANCED.
122D	SHAFT	STEEL (122C)	1	A00079G002	3230	MOTOR FLANGE
122E	SHAFT	STEEL (122D)	1	A00006G016	3230	& CUSTOMER MOTOR AT FINAL ASSEMBLY (CIRCULAR KEY)
122F	SHAFT		1			(122C) H.S. WATSON STEADY BRG. W91-17-1 FOR 3.19 DIA. SHAFT
383	MECH SEAL		1			(9962)(184) JOHN CRANE SINGLE, MATERIAL 1B1D1 S.G. 1.0, SHAFT SPEED 705 RPM. ALL IN ACCORDANCE WITH SPEC. PARA 16.3.9 AND PER ADVNACE REQUISITION BY S. FITZGERALD, 2/19/88.
9551	MISC		1			(9852) MECHANALYSIS IRD TYPE 544M SHIELDED VIBRATION PICK UP.
9715	DET-TEMP		1			(134A) CONEX R.T.D. 100 OHM PLATINUM 3 WIRE PART NO. 43Y3-SS25-T8-MK250A-L = 6.00" 0 DEG. C = (32 DEG. F.).

BILL OF MATERIAL SERIAL NO: PM34762

SECTION 2 PUMP WET END SECTION 2
 * INDICATES QUANTITY AS SHOWN.

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING	MATL	REMARKS
100	CASING	3% NICKEL	1	056041G590	1053	
101	IMPELLER	3% NICKEL	1	056163G470	1053	
		IMPELLER DIA. :		31.625		
		2V, DYNAMIC BALANCE		TO WITHIN 28 OZ.		INCHES
122	SHAFT	1141 STEEL	1	056162G980	2211	
2 126	SHAFT SLEEVE	304SS CAST	1	B00638G000	1284	
		(122-101)				
175	COVER-HAND H	3% NICKEL	1	049696G010	1053	
		(315A)				
175A	COVER-HAND H	3% NICKEL	1	052304G000	1053	
		(100)				
178	KEY-IMPELLER	STEEL	1	A00123G001	3230	
		(101-122)				
182	COVER-SUCT.	3% NICKEL	1	052147G010	1053	
		(100)				
184	COVER-ST BOX	3% NICKEL	1	056004G100	1053	
		(100)				
222B	SCR-SOC SET	18-8 SS	3	A00104G212	2367	
		(9962-122)	1/4" X	1-1/2" LG.		
222C	SCR-SOC SET	18-8 SS	3	A00104G204	2367	
		(9913-9962)	1/4" X	3/8" LG.		
315A	ELBOW-SUCT	3% NICKEL	1	049677G000	1053	
		(100-315A)				
340	MOTOR MOUNT	STEEL	1	W00146G000	3230	
		(CUST. MOTOR)				
351	GASKET	RUBB CLOTH	1	A00152G008	5120	

BILL OF MATERIAL SERIAL NO: PM34762

SECTION 2 PUMP WET END
* INDICATES QUANTITY AS SHOWN.

SECTION 2

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING	MATL	REMARKS
		(182-315A)				
351A	GASKET	RUBB CLOTH (100-528J)	1	A00128G001	5120	
353	STUD-GLAND	BRONZE-40 (184-383)	2	A00118G257	1102	3/4" X 3-3/4" LG.
355	NUT-GLAND	BRONZE-40 {353}	2	A00102G010	1102	3/4"
357F	NUT-HEX	STEEL (370W)	16	A00102G013	3230	1"
357G	NUT-HEX	STEEL (370X)	4	A00102G010	3230	3/4"
357H	NUT-HEX	STEEL (370Y)	16	A00102G004	3230	3/8"
357J	NUT-HEX	STEEL (370Z)	2	A00102G004	3230	3/8"
360B	GASKET	RUBB CLOTH (100-175A)	1	A00057G001	5120	
360L	GASKET	RUBB CLOTH (175-315A)	1	A00152G007	5120	
370K	SCREW-HEXCAP	STEEL (100-182)	24	A00100G401	3230	1" X 2-1/4" LG.
370L	SCREW-HEXCAP	STEEL (100-175A)	8	A00100G303	3230	3/4" X 1-3/4" LG.
370M	SCREW-HEXCAP	STEEL (100-184-228)	24	A00100G410	3230	1" X 3-1/4" LG.
370P	SCREW-HEXCAP	STEEL (184-228)	4	A00100G400	3230	1" X 2" LG.

BILL OF MATERIAL

SERIAL NO: PM34762

SECTION 2 PUMP WET END
* INDICATES QUANTITY AS SHOWN.

SECTION 2

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING	MATL	REMARKS
370U	SCREW-HEXCAP	STEEL (9551-9852)	4 1/4" X 1" LG.	A00100G003	3230	
370V	SCREW-HEXCAP	STEEL (175-315A)	8 3/4" X 1-1/2" LG.	A00100G302	3230	
370W	SCREW-HEXCAP	STEEL (315A-182)	16 1" X 4-1/2" LG.	A00100G407	3230	
370X	SCREW-HEXCAP	STEEL (340-CUST. MOTOR)	4 3/4" X 3-1/4" LG.	A00100G310	3230	
370Y	SCREW-HEXCAP	STEEL (501)-(340)	16 3/8" X 1" LG.	A00100G102	3230	
370Z	SCREW-HEXCAP	STEEL (228-9852)	2 3/8" X 2-1/2" LG.	A00100G108	3230	
372	SCR-HEX SOC	STEEL (9985-122)	4 7/8"-9 NC2 X 3-1/4" LG.		3230	
372J	SCR-FLAT HD	18-8 SS (101-475)	8 1/2"-13 NC2 X 1-1/4" LG.		2367	
372K	SCR-FLAT HD	18-8 SS (182-9980)	8 1/2"-13 NC2 X 1-3/4" LG.		2367	
400	KEY-COUPLING	STEEL	1	A00121G400	3230	
408B	PLUG-PIPE	CAST IRON (315A)	1 1-1/2", DRAIN CONN. ELBOW	A00113G008	1000	
408F	PLUG-PIPE	CAST IRON (100)	1 3/4"	A00113G005	1000	
408G	PLUG-PIPE	CAST IRON (100)	1 2", DRAIN CONN.	A00113G009	1000	
408K	PLUG-PIPE	CAST IRON	2	A00113G003	1000	

BILL OF MATERIAL SERIAL NO: PM34762

SECTION 2 PUMP WET END
* INDICATES QUANTITY AS SHOWN.

SECTION 2

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING MAIL	REMARKS
		(184-9753) 3/8"			
412F	O RING	BUNA N (100-182 & 184)	2	A00125G601 5156	
475	RING-IMP	420SS CAST BRINELL 350-400	1	056018G770 1525	*
496	O RING	BUNA N (9962)-(122)	1	A00125G203 5156	
501	GUARD-CPLG	STEEL (340) USE GUARD AS TEMPLATE, DRILL MTG. HOLES AT ASSEMBLY.	4	C00147G000 3230	
528J	WASHER	STEEL (351A-9770) 1-1/8" ID X 2-1/2" OD STD.	1	3230	
529J	WASHER-LOCK	STEEL (372-9985) 7/8" STD. HELICAL TYPE	4	3230	
9616	PAINT	(GAL.) CHLORINATED RUBBER GOYNE PAINT, MIXED TO MATCH 933 FEDERAL SAFETY GREEN AS MANUFACTURED BY RUSTOLEUM	1		
9617	PAINT	(GAL.) THINNER #641 FOR ABOVE PAINT (ITEM 9616)	1		
9723	SCREW-DRIVE	18-8 SS	2	A00127G001 2367	
9725	NAME PLATE	18-8 SS	1	056203G410 2367	
9750	FITTING-PIPE	STEEL (100-315A) HEXAGON BUSHING, 3/4"-14 NPT X 3/8"-18 NPT	2	3230	
9751	FITTING-PIPE	STEEL (9750) PIPE NIPPLE, 3/8"-18 NPT X 2" LG.	2	3230	
9752	FITTING-PIPE	(9751) BRONZE, GAUGE COCK APOLLO BALL VALVE #70-102-01	2		

BILL OF MATERIAL SERIAL NO: PM34762

SECTION 2 PUMP WET END SECTION 2
* INDICATES QUANTITY AS SHOWN.

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING	MAIL	REMARKS
	3/8"-18 NPT CONN'S. FOR CUST. SUCTION & DISCH. GAUGES					
9753	FITTING-PIPE	STEEL	1	3230		
	(100)	HEXAGON BUSHING,		1-1/2"-11-1/2 NPT X		3/8"-18 NPT
9769	FITTING-PIPE	STEEL	1	3230		
	(100-184)	PIPE NIPPLE, 10" LG.				
		3/4"-14 NPT BOTH ENDS,		3/4"-14 NPSL X		5" ONE END
9770	FITTING-PIPE	CAST IRON	1	040500G050 1000		
	(9769-528J)	PIPE LOCKNUT,		3/4"-14 NPSL		
9852	BRACKET	STEEL	1	X00646G000 3230		
	(228)					
9913	SPACER-SEAL	304 SS	1	B00640G000 2361		
	(9962)					
9962	SLEEVE	304SS CAST	1	B00639G000 1284		
	(122-383)					
9980	RING-SUC COV	420SS CAST	1	056027G190 1240		X
	(182)	BRINELL 450 MIN.				
9985	PLATE-IMP LK	1045 STEEL	1	056135G060 2358		
	(101)					

BILL OF MATERIAL SERIAL NO: PM34762

SECTION 5 BEARING FRAME SECTION 5
* INDICATES QUANTITY AS SHOWN.

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING	MATL	REMARKS
109	END COVER OB	CAST IRON	1	052876G000	1000	
112C	BEARING-THR		1	9001240304		SKF #6324 OR EQUAL
112D	BEARING-THR		2	9001287203		MRC 7228 PDU OR EQUAL, DT MOUNTING
113	FIT-RELIEF		2			(9742)(9756) ALEMITE #47200, 1 TO 5 LBS., 1/8"-27 NPT
119B	END COVER IB	CAST IRON	1	056004G150	1000	
119E	END COVER IB	CAST IRON	1	053794G000	1000	
123	DEFLECTOR	CAST IRON	1	056004G180	1002	
134A	HOUS-OB BRG	CAST IRON	1	056170G720	1000	
136	LKNT-OB BRG		1	9141024104		AN-24
140	LKNT-IB BRG		1	9141026104		AN-26
168C	BEARING-RAD		2	9001260203		MRC 226 RDU OR EQUAL, DB MOUNTING
193B	FITTING-GR		3			(134A-109-119B) ALEMITE #1627-B, 1/4"-18 NPT
211	GASKET	VELLUMOID	2	A00152G038	5130	(119B & 119E-228)
222	SCR-SOC SET	18-8 SS	3	A00104G253	2367	(122-123) 3/8" X 3/8" LG.
222F	SCR-SQHD SET	STEEL	2		3230	(134A) 3/4"-10 NC2 X 3-1/2" LG.

BILL OF MATERIAL

SERIAL NO: PM34762

SECTION 5 BEARING FRAME
* INDICATES QUANTITY AS SHOWN.

SECTION 5

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING MAIL	REMARKS
228	FRAME	CAST IRON	1	056004G140 1000	
237	COLLAR-OB BRG	1020-1018	1	052869G000 2201	
330	SHIM-IMP ADJ	ALUM (LAM) (228-134A)	12	056044G020 3124	
331	SHIM-BRG CAP	PLASTIC (109-134A)	1	046957G240 6310	REQUIRES: 3-.005, 2-.0075 & 2-.020 THK.
332	SEAL-OB GR		1	9241114071 (109) J-M #9170 LUP, OR EQUAL 4.50 ID X 5.50 OD X .500 WD.	
333	SEAL-IB GR		2	9241152093 (119B & 134A) J-M #8511 LUP, OR EQUAL 6.00 ID X 7.25 OD X .500 WD.	
333F	SEAL-SB		1	9241124079 (119E) J-M #7234*LPD, OR EQUAL 4.875 ID X 6.25 OD X .500 WD.	
357	NUT-HEX	STEEL (370R) 1/2"	6	A00102G007 3230	
357A	NUT-HEX	STEEL (222F) 3/4"	2	A00102G010 3230	
370C	SCREW-HEXCAP	STEEL (109-134A) 3/4" X 1-1/2" LG.	6	A00100G302 3230	
370E	SCREW-HEXCAP	STEEL (134A-228) 3/4" X 2-1/4" LG.	8	A00100G305 3230	
370R	SCREW-HEXCAP	STEEL (119B-119E-228) 1/2" X 6" LG.	6	A00100G218 3230	
382	LKWH-OB BRG	W-24	1	9389024104	

BILL OF MATERIAL SERIAL NO: PM34762

SECTION 5 BEARING FRAME SECTION 5
* INDICATES QUANTITY AS SHOWN.

ITEM	PART NAME	MATERIAL	QTY/ PUMP	PART NUMBER DRAWING	MAIL	REMARKS
382A	LKWH-IB BRG W-26		1	9389026104		
408A	PLUG-PIPE	CAST IRON (109)(119E)	2	A00113G002	1000	1/4"
9741	FITTING-PIPE	STEEL (134A-9742)	1		3230	PIPE NIPPLE 1/8"-27 NPT BOTH ENDS X 4" LG.
9742	FITTING-PIPE	STEEL (9741-113)	1		3230	PIPE COUPLING, 1/8"-27 NPT STD.
9756	FITTING-PIPE	STEEL (119B-113)	1		3230	BUSHING, 1/4"-18 NPT X 1/8"-27 NPT

NOTE : ALWAYS REFER TO PART NUMBER, SERIAL NUMBER AND MODEL WHEN
ORDERING PARTS OR CORRESPONDING WITH FACTORY.

*** END OF BILL ***

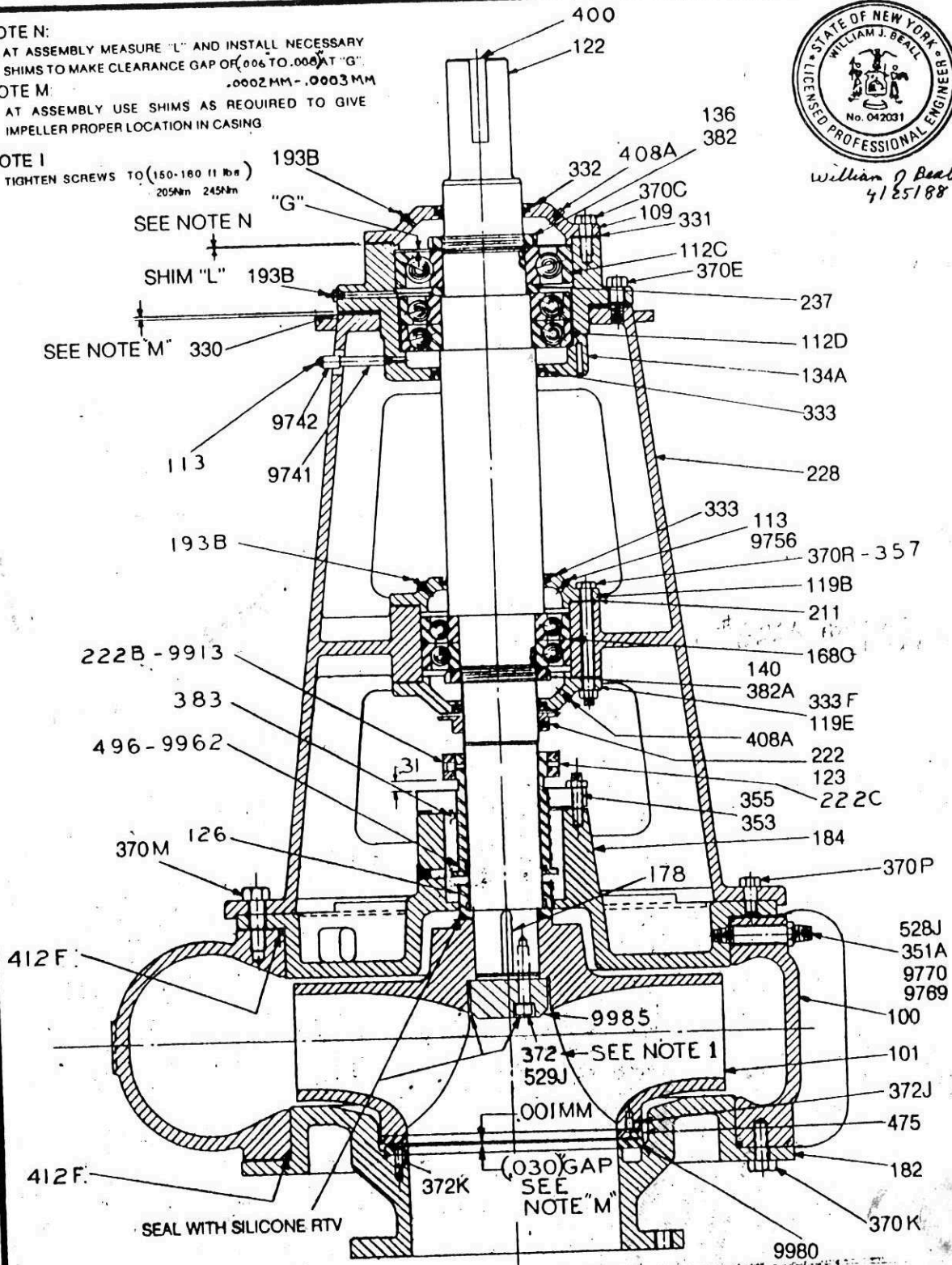
NOTE N:
 AT ASSEMBLY MEASURE "L" AND INSTALL NECESSARY SHIMS TO MAKE CLEARANCE GAP OF .006 TO .008 AT "G".
 NOTE M:
 AT ASSEMBLY USE SHIMS AS REQUIRED TO GIVE IMPELLER PROPER LOCATION IN CASING
 .0002 MM - .0003 MM

NOTE I
 TIGHTEN SCREWS TO (150-180 (11 lbs) 205Nm 245Nm)



William J. Beall
 4/25/88

PERIMETER



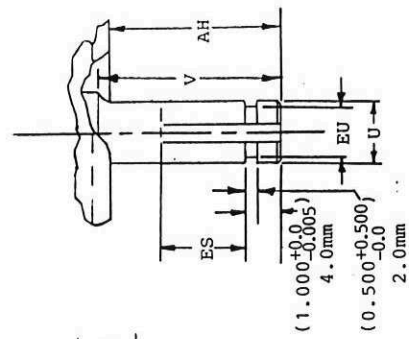
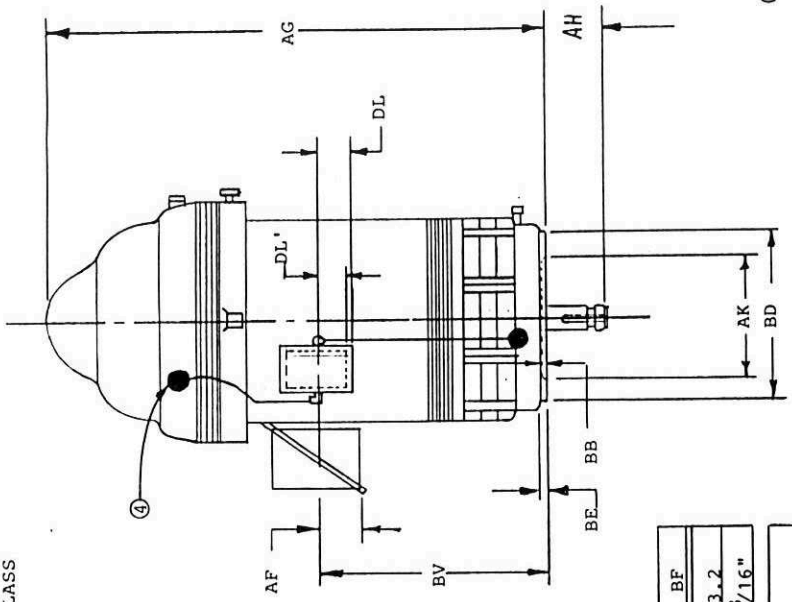
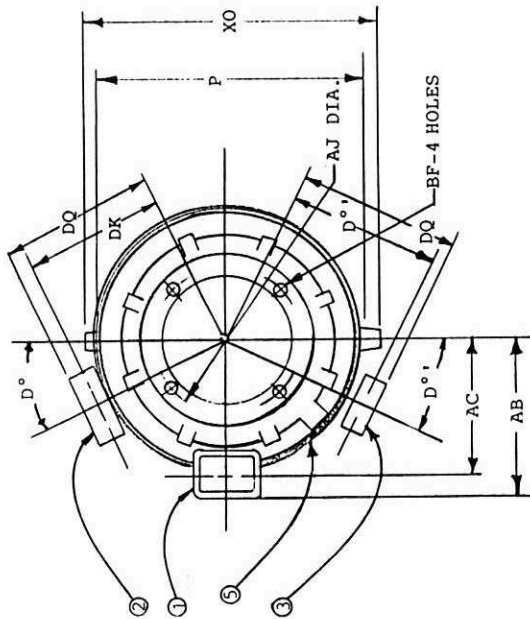
CITY OF WINNEPEG
 NAME OF PROJECT WEST END WATER POLLUTION CONTROL
 CENTRE EXPANSION PERIMETER ROAD PUMPING STATION
 WITH PROJECT NUMBER 17K (RAW SEWAGE PUMP)
 SPECIFICATION SECTION NUMBER SP 16

GOULDS SERIAL NO M-3 4762 CUSTOMER GOULDS CANADA CUSTOMER P.O. NO. P89001 ITEM NO. SERVICE RAW SEWAGE BRG. LABMOD. GREASE LUBE	DRAWING IS NOT TO SCALE CERTIFIED: <input type="checkbox"/> FOR APPROVAL <input checked="" type="checkbox"/> FOR RECORD BY: <i>P.A. Skinnu</i> 4-25-88 SIGNATURE DATE	16 Model NCD SECTIONAL ASSEMBLY GOULDS PUMPS, INC. <small>BLURRY PUMP DIVISION</small> DRAWN: DAS APPROVED: [Signature] DATE: 12-22-88 DRAWING: M34762-2 REV: 1 * 3805
---	--	--



FEATURES:

- 1 MAIN CONDUIT BOX WITH REMOVABLE BOTTOM CONDUIT PLATE (3/8" GLASS REINFORCED PLASTIC).
- 2 SEPARATE ACCESSORY BOX FOR WINDING AND BEARING DETECTOR LEADS (IRD 544, QTY. 2) 1" CONDUIT. 4 BEARING RTD (QTY. 2).
- 5 VIB. DETECTOR (2).



ALL DIMENSIONS ARE IN INCHES

FRAME	P	AA	AB	AC	AD	AE	AF	AG	AJ DIA	AK	BB	BD	BE	BF
5810 P	133.6	--	130.7	--	41.3	297.0	102.4	86.6	1.0	120.1	4.0	3.2		
TYPE-HV	34"	--	33 ³ / ₁₆ "	--	10 ¹ / ₂ "	75 ⁷ / ₁₆ "	26"	22"	1/4"	30 ¹ / ₂ "	1"	13 ¹ / ₁₆ "		
FRAME	BV	AH	U	V MIN	XO	SQ. KEYXES	EU							
5810 P	11.2	27.6	12.3	--	155.5	2.0 x 19.7	10.3							
TYPE-HV	28 ³ / ₄ "	7"	3 ¹ / ₈ "	--	39 ¹ / ₂ "	3/4" x 5"	2 ⁵ / ₈ "							
FRAME	DK	DQ	DL	D°	DK'	DQ'	DL'	D°'						
5810 P	71.9	86.4	19.7	98.4	70.9	76.0	13.3	98.4						
TYPE-HV	18 ¹ / ₄ "	21 ¹⁵ / ₁₆ "	5"	25"	18"	19 ⁵ / ₁₆ "	3/8"	25"						

NOTE: Mfg. TOLERANCES TO IMPERIAL MEASURE

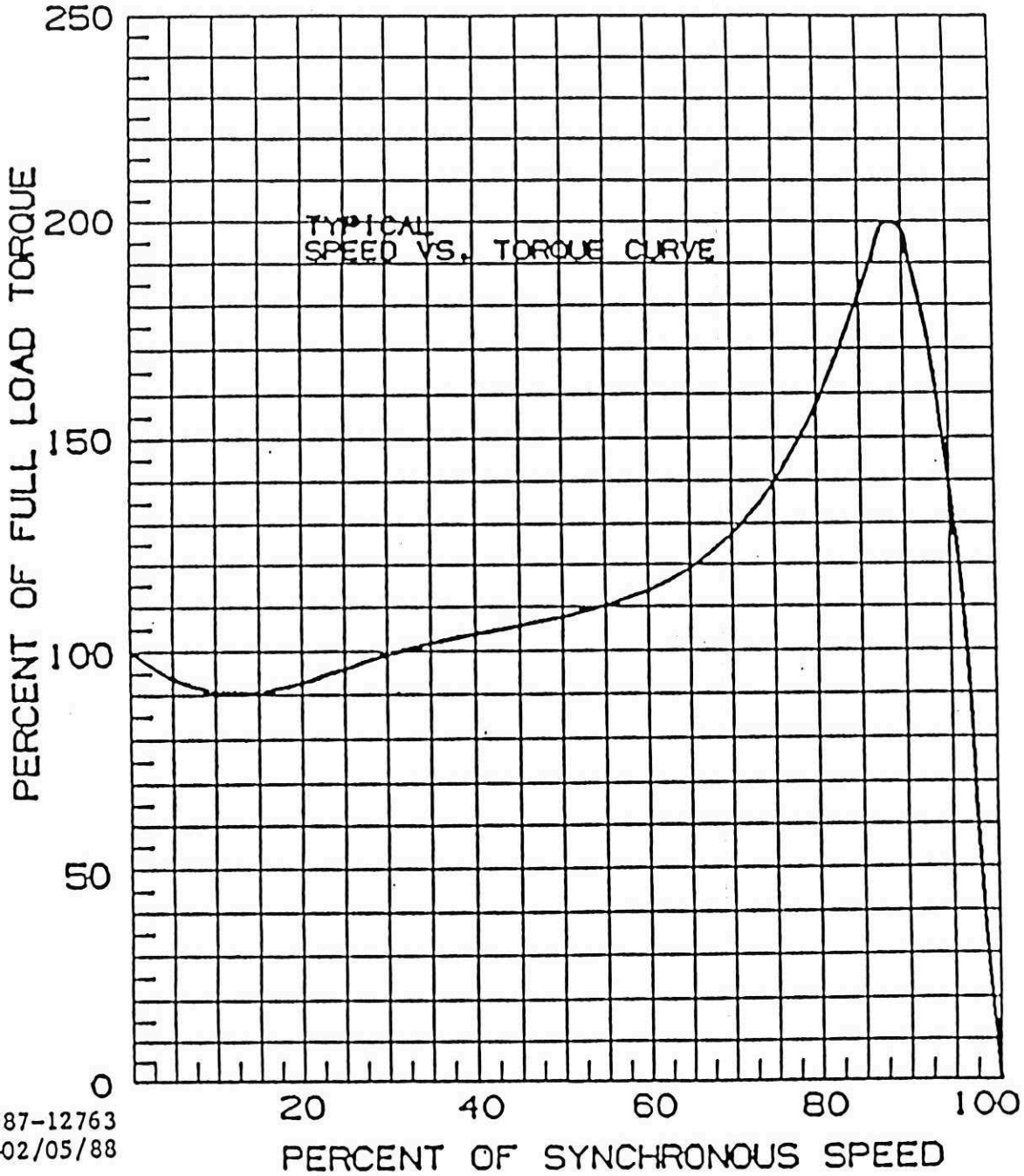
CITY OF WINNIPEG
WEST END WATER POLLUTION CONTROL CENTER
PERIMETER PUMP STATION
SECTION SP-17 CONTRACT 1A

SCALE: NONE
DATE: 2-29-88
FIRST USED ON:
NEXT ASSTY:
REV. * 3815

PRITCHARD ENGINEERING LIMITED
WINNIPEG MANITOBA
ELECTRICAL MOTORS
20-C-625

CUSTOMER: EMERSON ELECTRIC CANADA
CUSTOMER P O: PE41902
USEM ORDER NO: R0320148
FULL LOAD TORQUE: 2960 LBFT

RATINGS: 400 HP, 10 POLE
3/60/575
5810 FRAME, TYPE HV



DR #587-12763
RHF--02/05/88

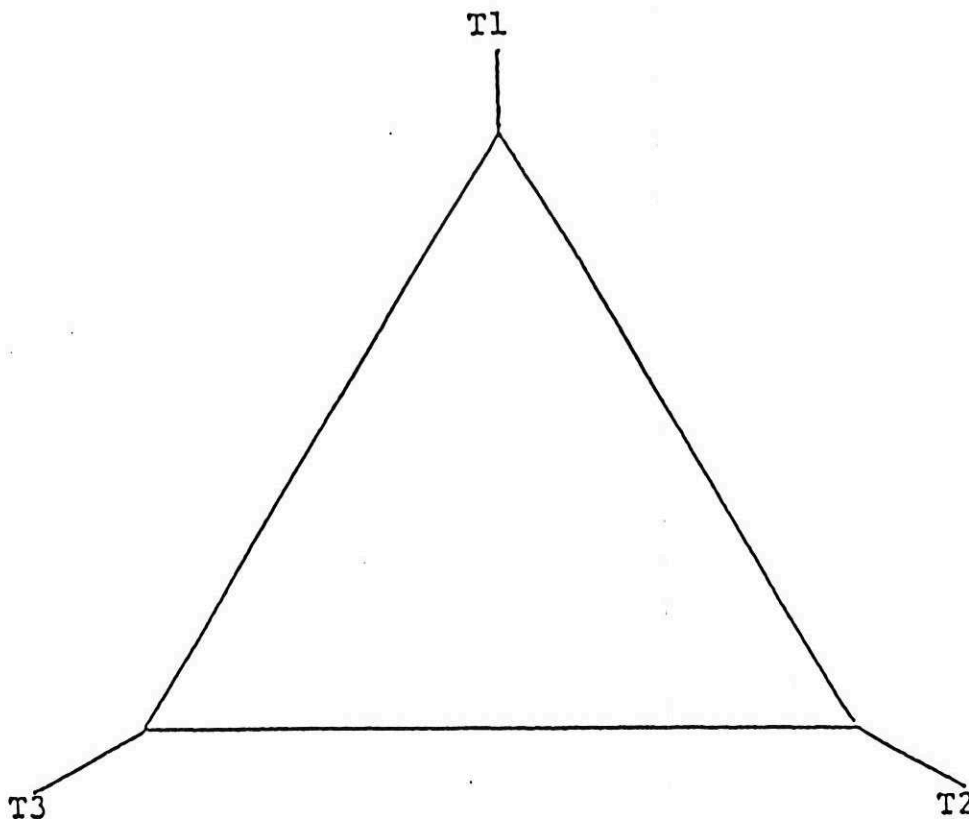
CITY OF WINNIPEG
WEST END WATER POLLUTION CONTROL CENTER
PERIMETER PUMP STATION
SECTION SP-17 CONTRACT 1A
DWG. * 3816

CUSTOMER: EMERSON ELECTRIC CANADA
CUSTOMER NO: PE41902



USEM NO.: R0320148
MARKS: TAG: PRITCHARD
F83114/448661

MOTOR WIRING DIAGRAM
DELTA CONNECTED, SINGLE VOLTAGE



L1	L2	L3
T1	T2	T3

TO REVERSE DIRECTION OF ROTATION INTERCHANGE CONNECTIONS OF L1 AND L2.

EACH LEAD MAY HAVE ONE OR MORE CABLES COMPRISING THAT LEAD. IN SUCH CASE EACH CABLE WILL BE MARKED WITH THE APPROPRIATE LEAD NUMBER.

CITY OF WINNIPEG
WEST END WATER POLLUTION CONTROL CENTER
PERIMETER PUMP STATION
SECTION SP-17

CONTRACT 1A

DWG. * 3817



CUSTOMER NAME EMERSON ELECTRIC CANADA

CUSTOMER ORDER NO. PE41902 USEM NO. R0320148

MARKS: TAG: PRITCHARD F83114/448661 TAG NOS.

DESCRIPTION

QUANTITY 1 HP 400 FRAME 5810 P TYPE HV
 PHASE 3 HERTZ 60 RPM 720 VOLTS 575 ASSY.POS. F1

FEATURES: VERTICAL SOLID SHAFT, NORMAL THRUST WPI, INVERTOR DUTY SIX
STEP PULSE WITH MODULATION, CLOCKWISE ROTATION, NON-REVERSE
RATCHET, 1.15 SERVICE FACTOR, CLASS "F" WITH "B" RISE, 100
OHM WINDING RTD'S, Q-2 100 OHM BEARING RTD'S TO SEPARATE
ACCESSORY BOX, IRD 544 VIBRATION DETECTOR LEADS TO SEPARATE
ACCESSORY BOX, SPECIAL MAIN OUTLET BOX, FIT BI-LINQUAL NAME-
PLATE (P/N 369386), Q.A. #X299378-A, U=3-1/8, AH=7, BD=30-1/2,
CLOCKWISE, BEARING SET POINTS: 90 DEGREE "C" ALARM 100 DEGREE
"C" SHUTDOWN

EXCEPTIONS & CLARIFICATIONS (IF ANY):

WHEN SIGNED BELOW, THE PRINT(S) AND/OR
 DATA ATTACHED IS (ARE) CERTIFIED
 CORRECT FOR MOTOR(S) DESCRIBED ABOVE.

BY B. R. Beaud DATE 3/9/88

CITY OF WINNIPEG
 WEST END WATER POLLUTION CONTROL CENTER
 PERIMETER PUMP STATION
 SECTION SP-17 CONTRACT 1A

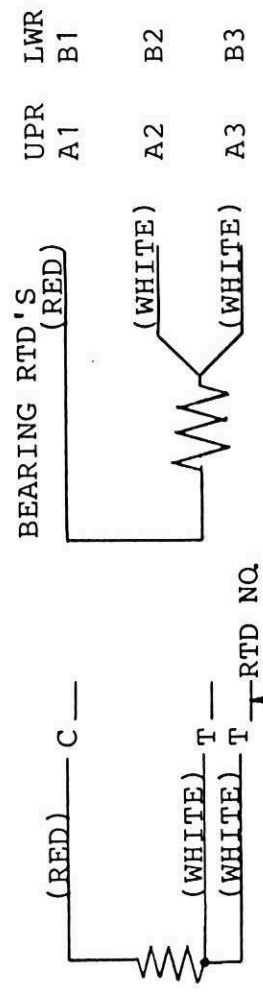
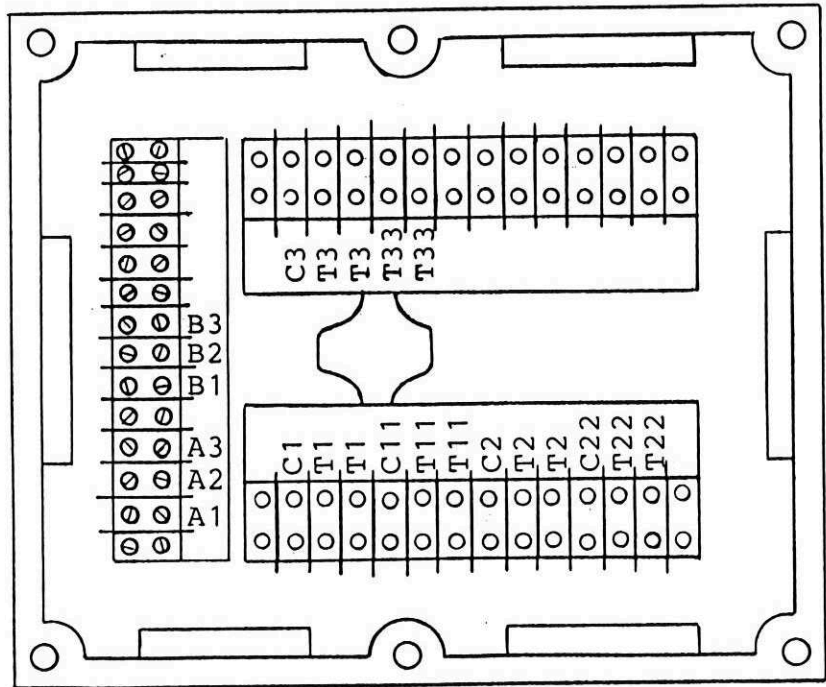
DWG. * 3818

1. THERE ARE QTY-6 RESISTANCE TYPE TEMPERATURE DETECTORS (RTD) INSTALLED IN THE STATOR WINDING. REFER TO NAMEPLATE ATTACHED TO THE MOTOR ADJACENT TO ACCESSORY OUTLET BOX FOR RATING OF THE RTD'S.
2. DETECTORS ARE INSTALLED IN PHASES AS SHOWN.


PHASE	A	B	C
RTD NO.	1,11	2,22	3,33

3. THERE ARE QTY-2 BEARING RTD'S INSTALLED, ONE PER BEARING. RTD RATING IS ON NAMEPLATE ATTACHED TO MOTOR ADJENT TO ACCESSORY OUTLET BOX.

- A. - UPPER BEARING
- B. - LOWER BEARING



CITY OF WINNIPEG
WEST END WATER POLLUTION CONTROL CENTER
PERIMETER PUMP STATION
SECTION SP.17 CONTRACT 1A



**PRITCHARD
ENGINEERING**
COMPANY LIMITED
WINNIPEG MANITOBA

SCALE: NONE
DRN: | CHK'D: | APP'D:
DATE: 8-30-88
FIRST USED ON:
NEXT ASSY:

TITLE U.S. ELECTRICAL MOTORS
X886620 B

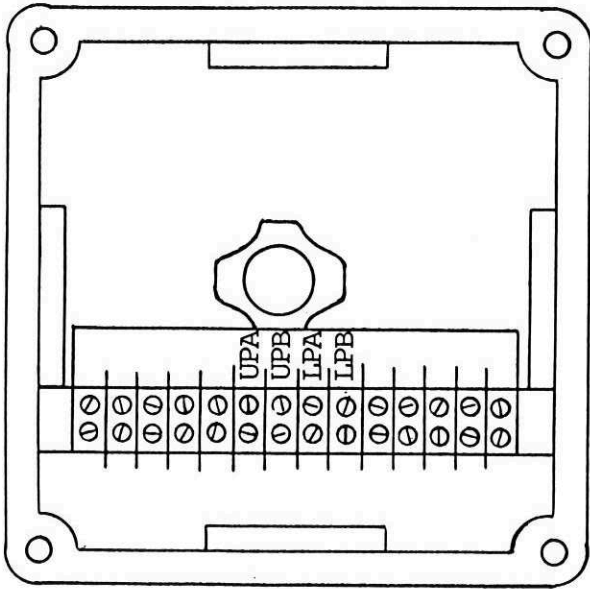
DWG: *3819A
REV.

INSTRUCTIONS (UPPER & LOWER PICKUPS)

1. MEASURE AND CUT THE IRD CABLE INTO TWO DIFFERENT LENGTHS TO REACH FROM EACH PICKUP TO THE SEPARATE OUTLET BOX AS NOTED ON DIMENSION PRINT. LEAVE ENOUGH LEADWIRE LENGTH TO REACH TERMINAL STRIPS FOR INSTALLATION.
2. INSTALL IRD RIGHT ANGLE CONNECTOR TO LOWER PICKUP AND IRD CONNECTOR TO UPPER PICKUP. BLACK LEAD (GROUND) GOES TO "PIN A" AND WHITE LEAD (SIGNAL) TO "PIN B".
3. INSTALL ONE CABLE CONNECTOR (KILLARD 2Y SERIES) TO EACH OPEN CABLE END AND SECURE TO SEPARATE OUTLET BOX SIDE OPENINGS.
4. CONNECT LEADWIRES TO TERMINAL STRIP
5. ATTACH THE LOWER PICKUP CABLE TO FRAME WITH A CONDUIT CLAMP.

VIBRATION PICKUP (IRD MODEL 544M)


1. INSURE THAT LEADS ARE TAGGED AS SHOWN. EACH PICKUP SHOULD HAVE 1 BLACK LEAD (GROUND) AND 1 WHITE LEAD (SIGNAL).
2. TERMINATE LEADS WITH SPECIFIED LUGS.
3. ROUTE LEADS BENEATH TERMINAL STRIP AND ATTACH TO STRIP ALONG OUTER EDGE. ATTACH BLACK LEADS TO TERMINALS UPA & LPA, AND WHITE LEADS TO TERMINALS UPS & LPS. U - UPPER BEARING, L - LOWER BEARING.



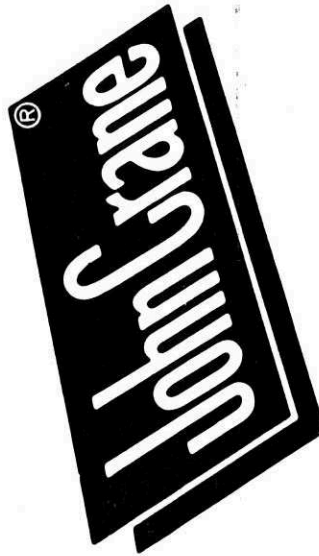
TERMINAL LUGS P/N 541420

TERMINAL IDENTIFICATION

TYPE ON CENTER MARKING STRIP THE IDENTIFICATION SYMBOLS AS SHOWN IN SKETCH (MARKING STRIPS ARE REMOVABLE).

CITY OF WINNIPEG	
WEST END WATER POLLUTION CONTROL CENTER PERIMETER PUMP STATION	
SECTION SP-17	CONTRACT 1A
 PRITCHARD ENGINEERING COMPANY LIMITED WINNIPEG MANITOBA	
SCALE: NONE	DRN: CHK'D: APP'D:
DATE: 08-30-88	FIRST USED ON:
NEXT ASSTY:	DWG: * 3819B
TITLE U.S. Electrical motors X388016_B	REV.

SIMPLE SHAFT SEAL INSTALLATION and TROUBLE SHOOTING



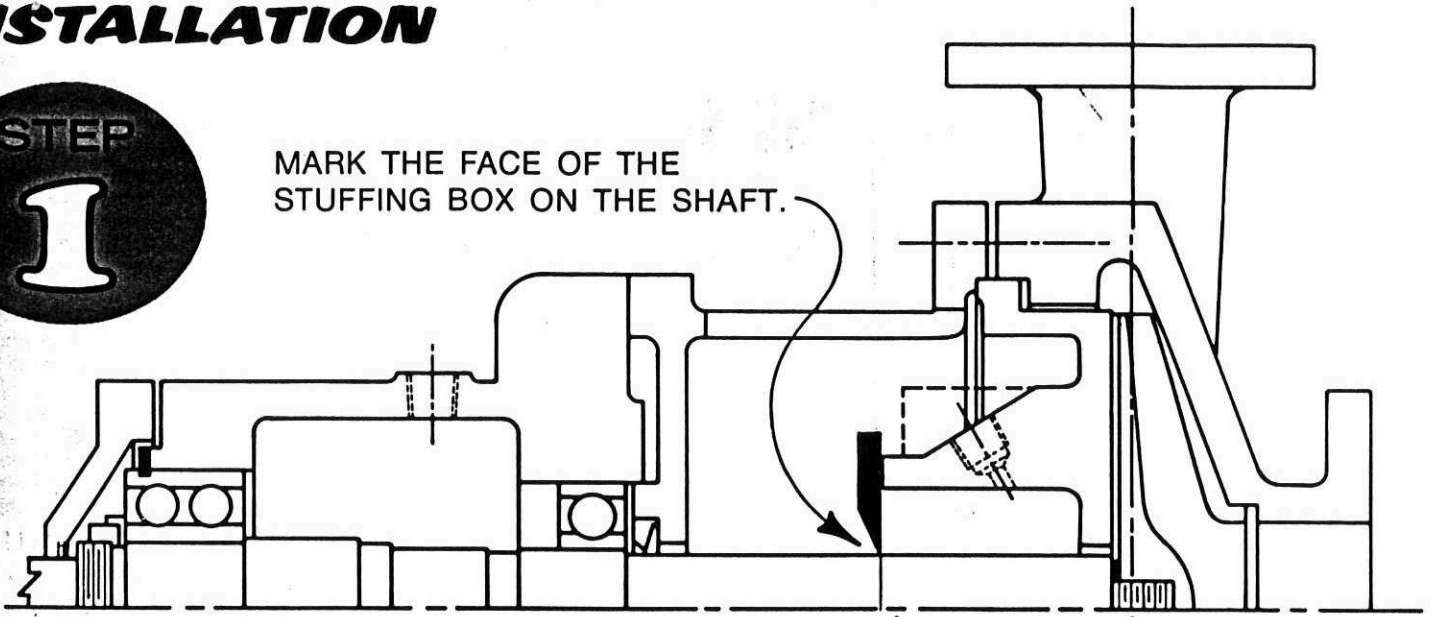
TYPE 1
TYPE 2
TYPE 21

CITY OF WINNIPEG
WEST END WATER
POLLUTION CENTER
EXPANSION
PERIMETER RD.
PUMPING STATION
CONTRACT IA
MECH. SEAL FOR
RAW SEWAGE PUMP
SP.16
* 3811

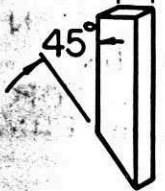
INSTALLATION



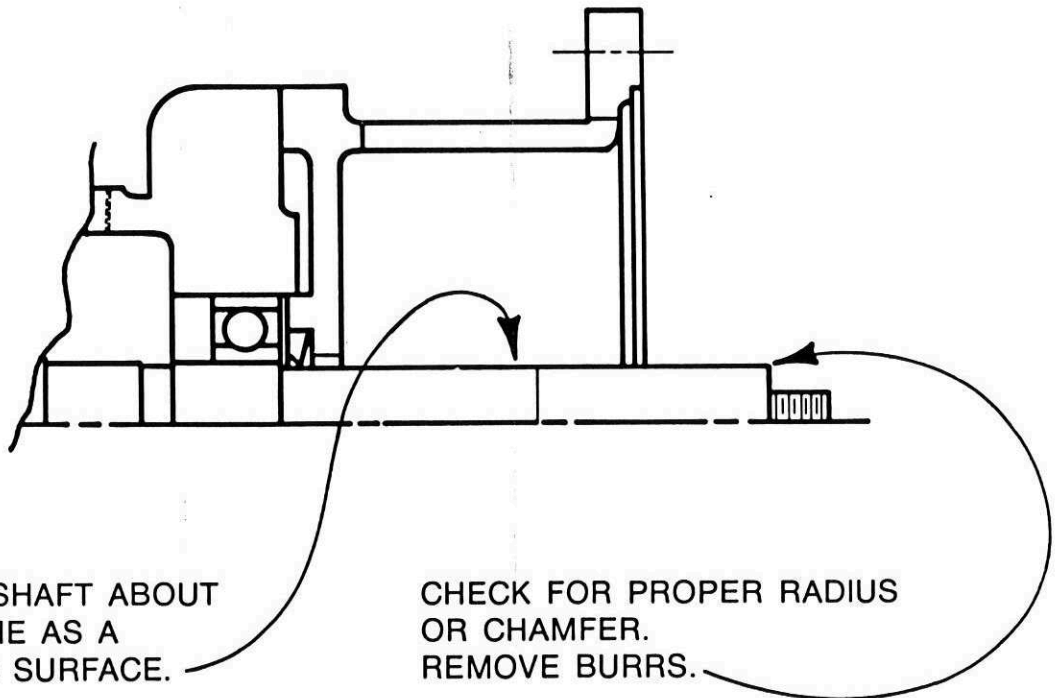
MARK THE FACE OF THE STUFFING BOX ON THE SHAFT.



4 SQUARE TOOL STOCK



SUGGESTED MARKING TOOL

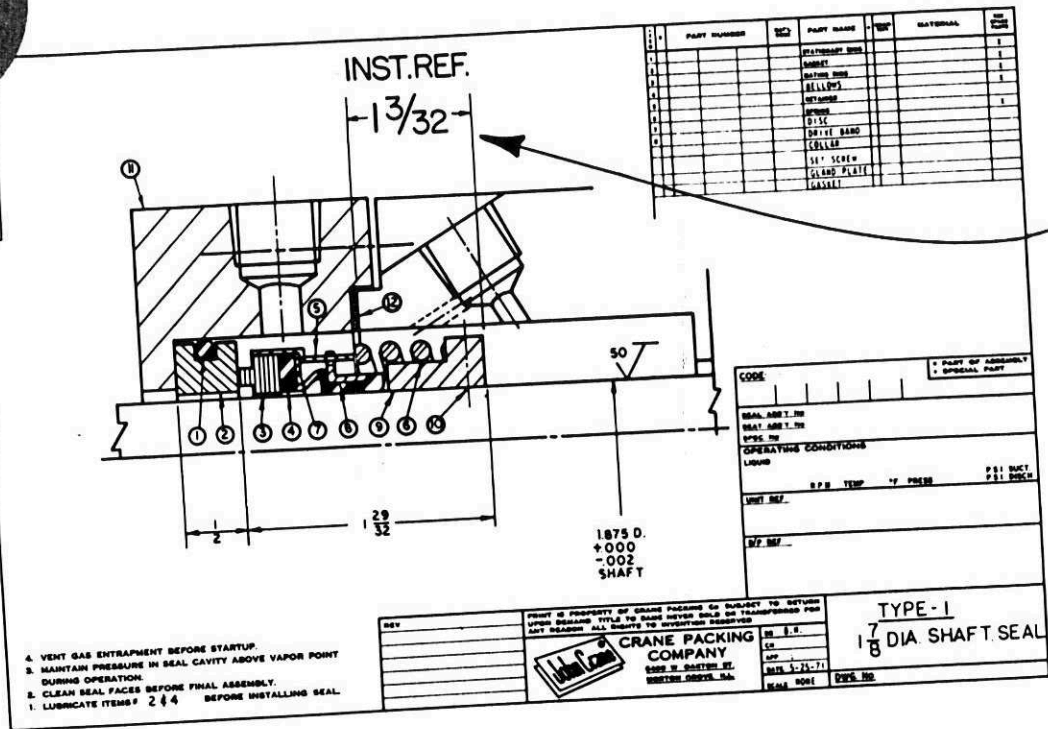


POLISH SHAFT ABOUT THE SAME AS A GROUND SURFACE.

CHECK FOR PROPER RADIUS OR CHAMFER. REMOVE BURRS.

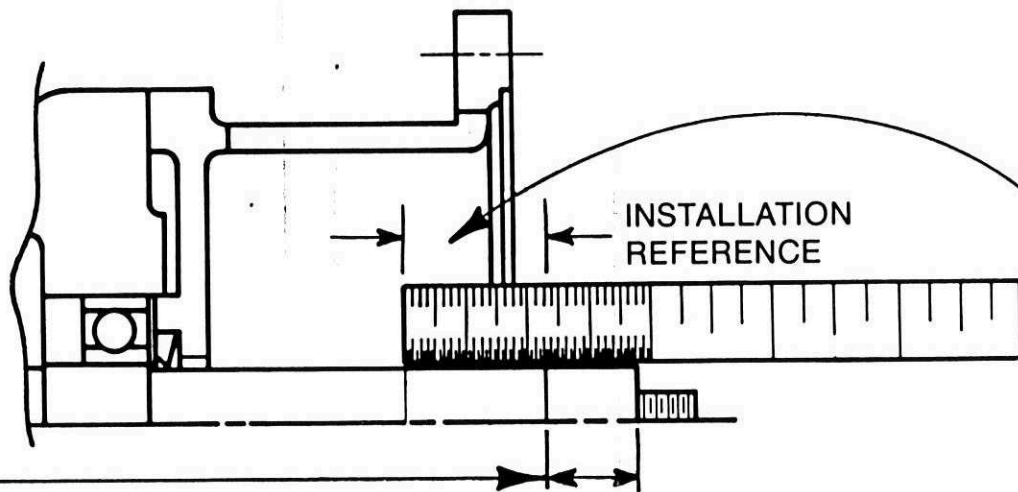
LOOK AT PUMP INSTALLATION DRAWING. LOCATE INSTALLATION REFERENCE DIMENSION (THE DIMENSION FROM THE FACE OF THE STUFFING BOX TO THE REAR OF THE SEAL).

STEP 3



4

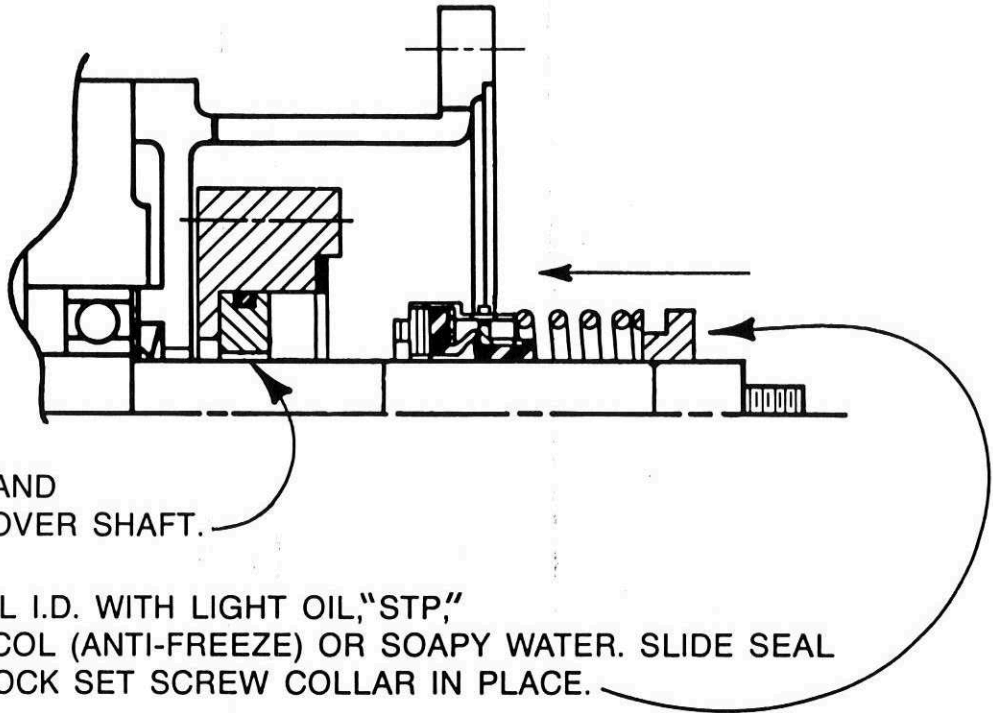
STEP 4



MEASURE THE INSTALLATION REFERENCE DIMENSION AND MARK THE SHAFT WITH A FELT TIP PEN, LAYOUT DYE OR MARKING TOOL.

AN ALTERNATE METHOD IS TO MEASURE FROM THE FACE OF THE STUFFING BOX TO THE END OF THE SHAFT. THEN, SUBTRACT THE INSTALLATION DIMENSION. THIS GIVES YOU THE DIMENSION FROM THE END OF THE SHAFT TO THE REAR OF THE SEAL.

STEP
5

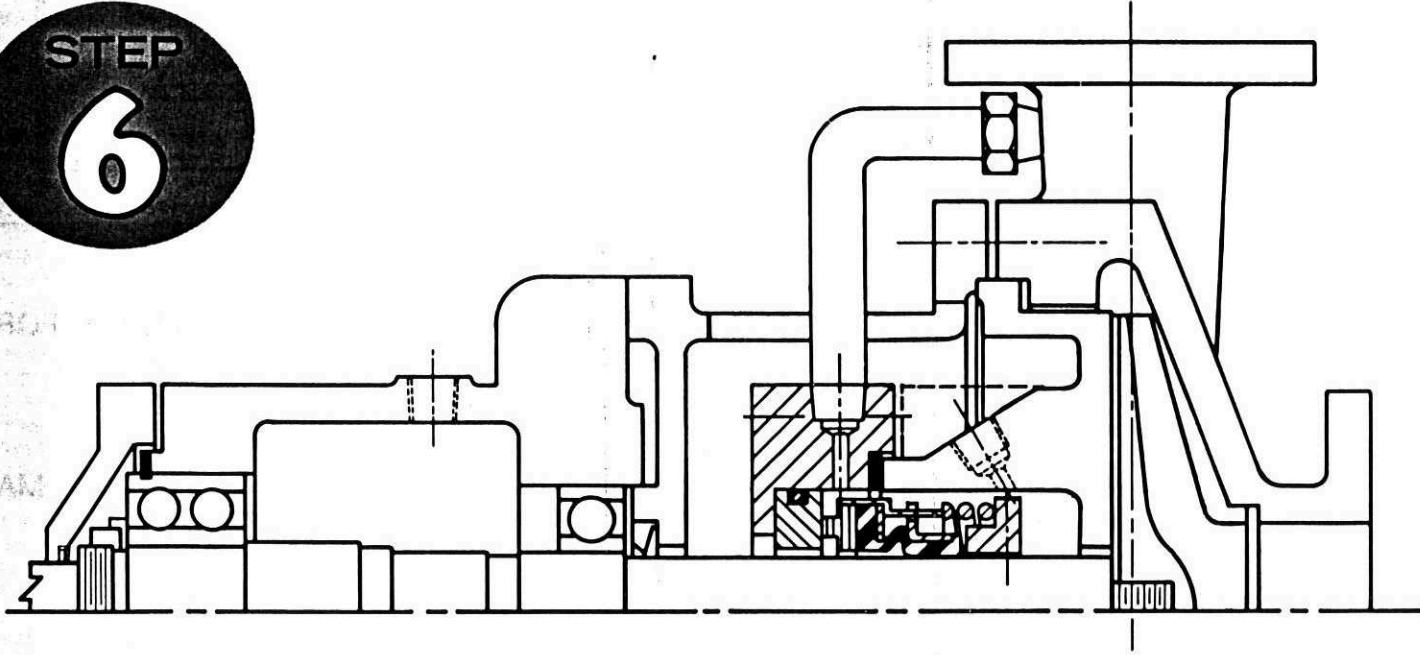


PUT THE SEAT AND GLAND TOGETHER AND SLIDE OVER SHAFT.

LUBRICATE SEAL I.D. WITH LIGHT OIL, "STP," ETHYLENE GLYCOL (ANTI-FREEZE) OR SOAPY WATER. SLIDE SEAL OVER SHAFT. LOCK SET SCREW COLLAR IN PLACE.

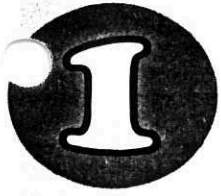
IMPORTANT: OIL IS INJURIOUS TO SOME RUBBERS SUCH AS CRANELAST (ETHYLENE PROPYLENE). USE ONLY ANTI-FREEZE OR SOAPY WATER TO LUBRICATE.

STEP
6



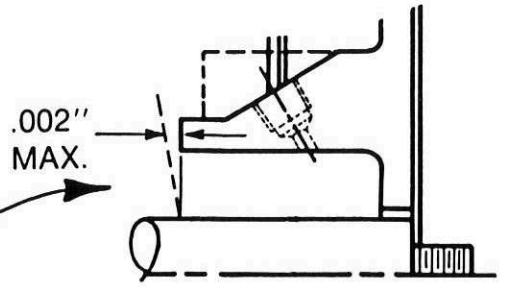
REASSEMBLE PUMP.

TROUBLE SHOOTING

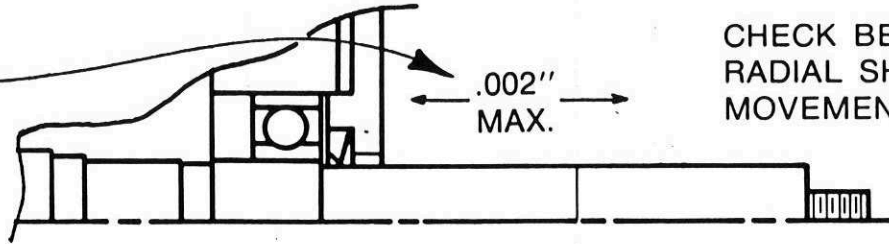


SEAL WEARS OUT SHAFT

REASON: PUMP IS IN POOR MECHANICAL CONDITION. CHECK SQUARENESS OF STUFFING BOX FACE TO SHAFT CENTERLINE (.002" MAX. \perp).



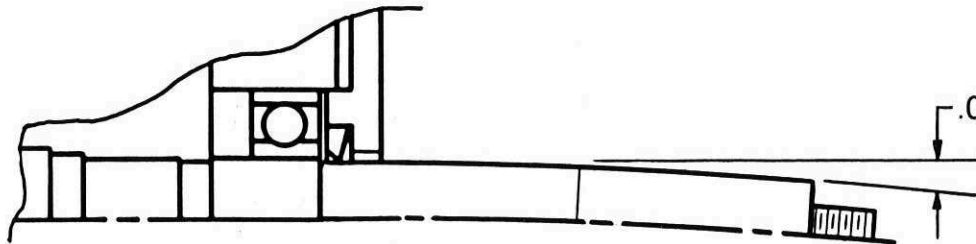
CHECK BEARINGS FOR SHAFT END PLAY.



CHECK BEARINGS FOR RADIAL SHAFT MOVEMENT.



CHECK SHAFT STRAIGHTNESS.



3

TROUBLE SHOOTING



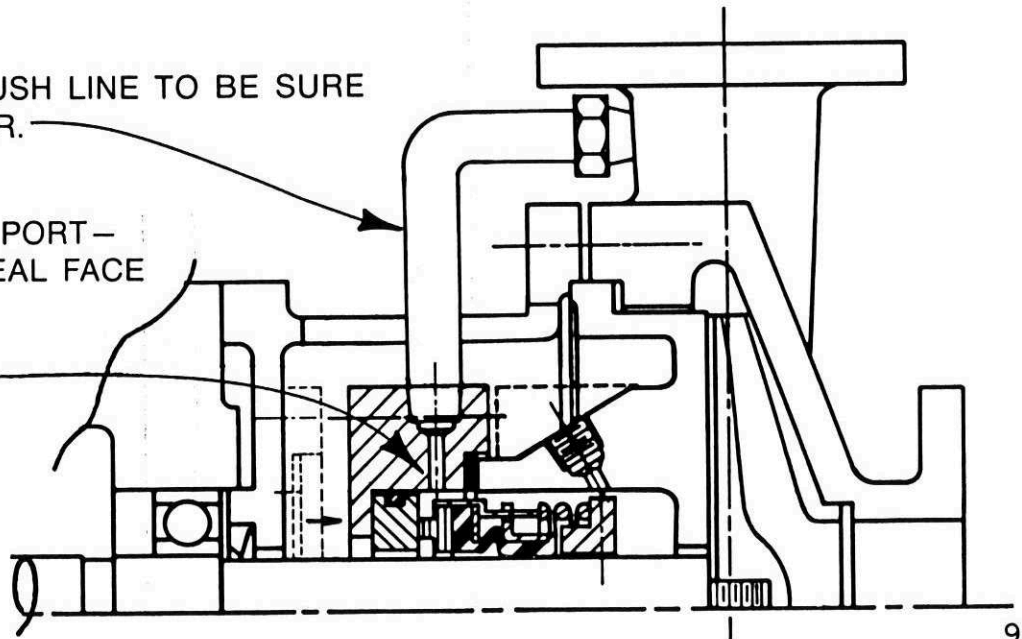
SEAL IS BURNED UP

REASON: NOT ENOUGH LIQUID FLOW TO SEAL.

CHECK FLUSH LINE TO BE SURE IT IS CLEAR.

CHECK LOCATION OF FLUSH PORT—SHOULD BE AS CLOSE TO SEAL FACE AS POSSIBLE.

DID THE PUMP CAVITATE OR RUN DRY?



TROUBLE SHOOTING

3

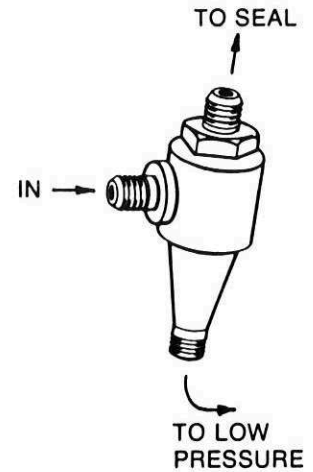
SEAL IS WORN OUT

REASON: ABRASIVES ARE IN THE SEAL CAVITY. THE PUMPED LIQUID MAY BE CARRYING DIRT, RUST OR SUSPENDED ABRASIVE PARTICLES.

IF SO, INSTALL AN ABRASIVES SEPARATOR IN THE FLUSH LINE.

A FILTER WILL ALSO WORK.

IF THE LIQUID CARRIES *DISSOLVED* SOLIDS, CONTACT YOUR LOCAL JOHN CRANE REPRESENTATIVE.



JOHN CRANE MECHANICAL SEALS ARE VERY RELIABLE.
IF YOU ARE NOT OBTAINING GOOD SERVICE LIFE,
CONTACT YOUR LOCAL CRANE PACKING COMPANY
REPRESENTATIVE.

John Crane

CRANE PACKING COMPANY

6400 OAKTON STREET, MORTON GROVE, ILLINOIS 60053
Offices, Factories and Service The World Over



PRITCHARD ENGINEERING CO. LTD.

WINNIPEG

SASKATOON

EDMONTON

CALGARY

SHEET 1 OF 1

DATE Mar. 89

QUOTE

JOB ORDER

APPLICATION DATA

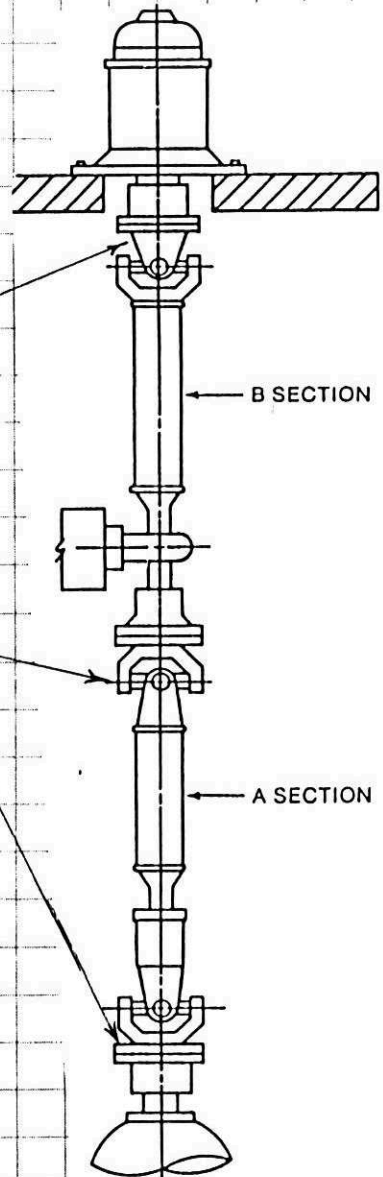
TITLE: **INSTALLATION INSTRUCTIONS**

FOR: **WATSON SPICER SHAFTING**

POSITIONING YOKES ON DRIVE SHAFT
TO PHASE.

Yoke on motor shaft
to be 90 degrees to
pump shaft

Intermediate yokes
to be at 90 degrees
also as shown.



MOTOR OR GEAR MUST BE LEVEL TO WITHIN $\pm 1^\circ$

PREPARED BY:

I. Smail

BRANCH

Wpg.

APPROVED BY:

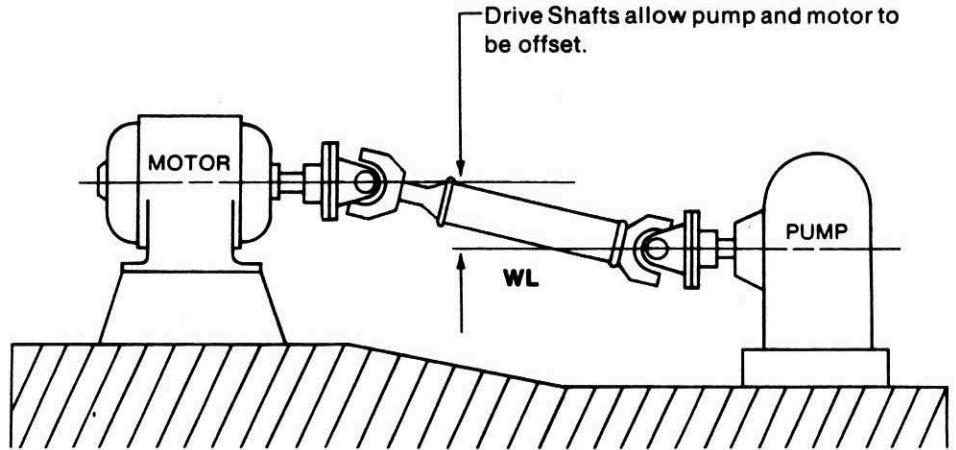
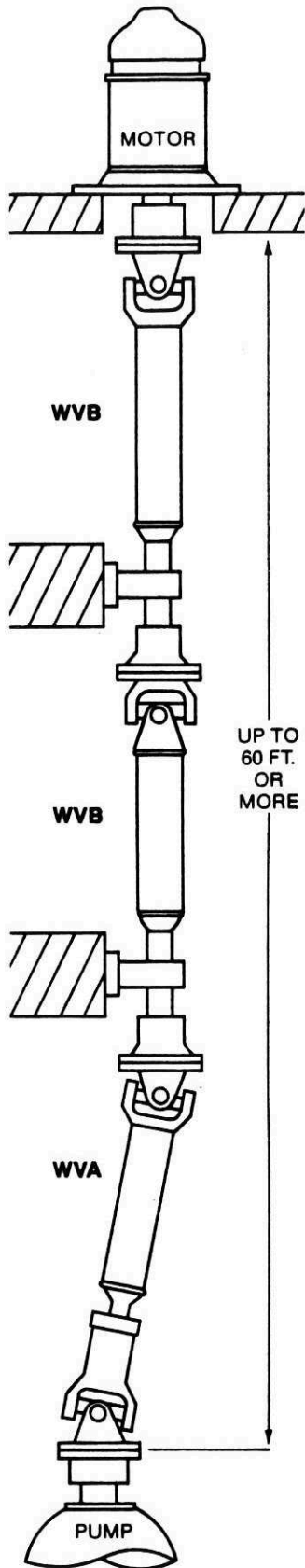
DATE APPROVED



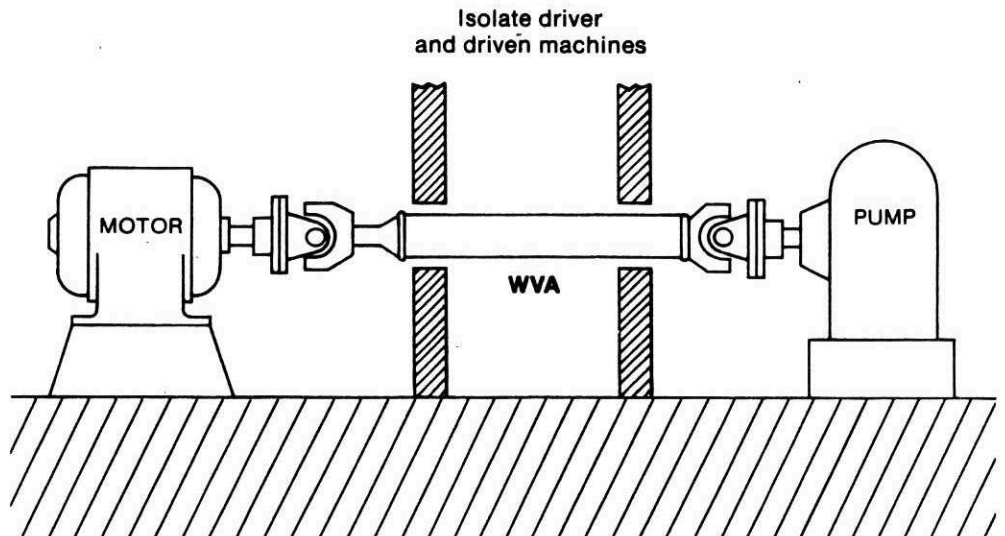
WATSON
... the drive shaft people

WHY DRIVE SHAFTS

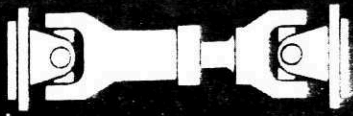
Universal Joint Drive Shafts can operate up to 8 degrees or more and they can change angle and length during operation.



Drive Shafts eliminate critical cost and alignment problems.

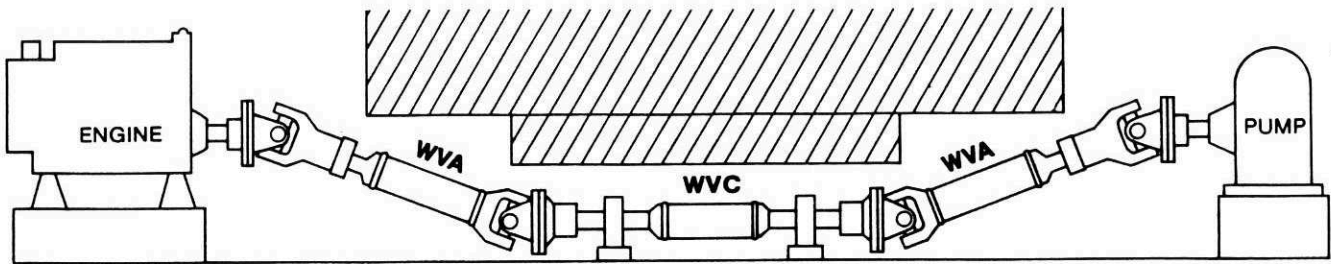


© 1981 H.S. WATSON CO.

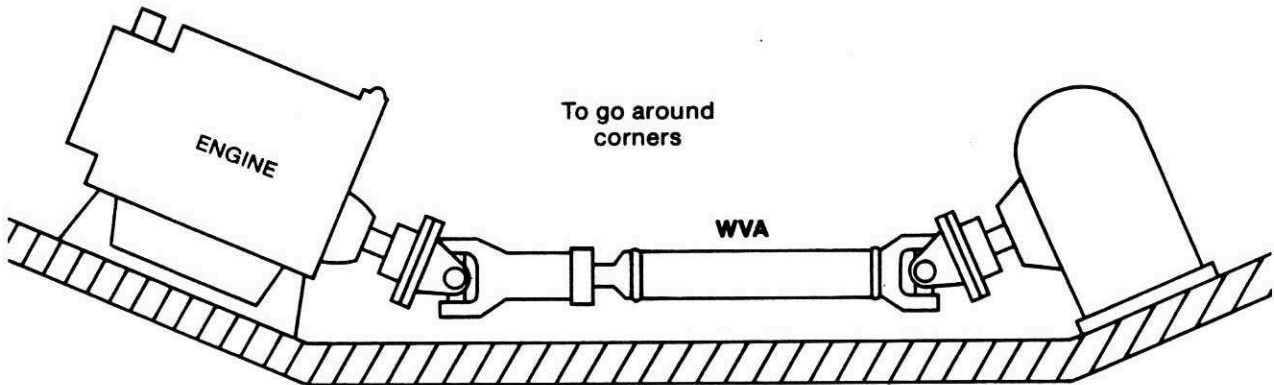


WHY DRIVE SHAFTS (Cont.)

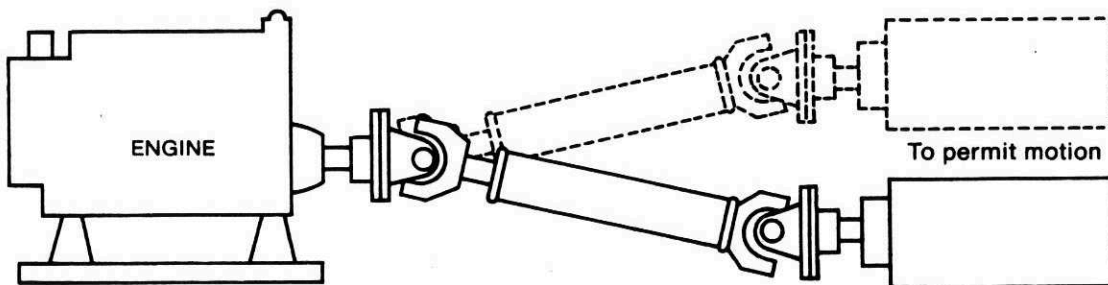
You can have a wide latitude in placement of machinery



To go around corners



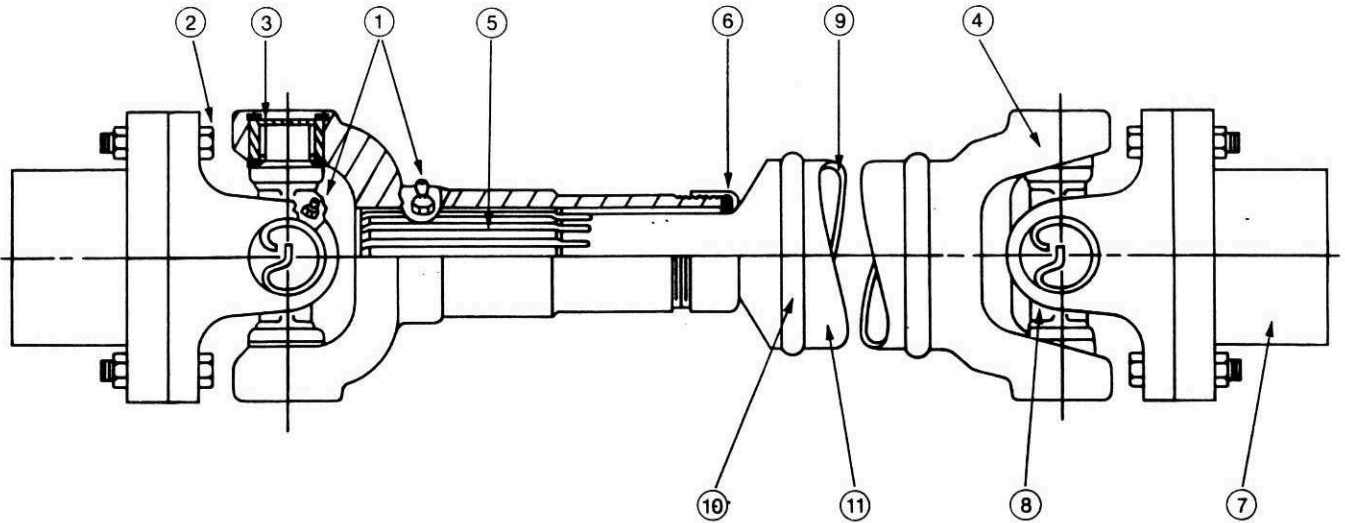
To permit motion





WATSON
... the driveshaft people

CONSTRUCTION



- ① Easy to get at lube fittings
- ② High strength bolts, simple and quick removal or installation of Drive Shaft
- ③ Needle roller bearings to withstand high loads and high speed
- ④ Forged steel yokes generally used
- ⑤ Hardened and ground splines, coated to resist galling and sliding friction
- ⑥ Long life seals keep lubricant in and contaminants out
- ⑦ Medium carbon steel flanges precision machined to fit driver and driven shafts
- ⑧ High strength, forged steel universal joints easily replaced
- ⑨ Special high strength, drawn over mandrel, steel tubing to provide maximum torque capacity at minimum weight
- ⑩ Press fit and special welds give strong connections
- ⑪ Shafts are painted for weather protection

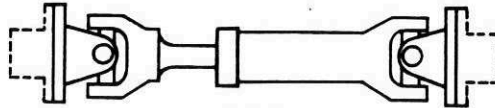
©1981 H.S. WATSON CO.

WARNING: Rotating drive shafts can be dangerous. Use shaft guards to help prevent serious injury to personnel
H.S. Watson Co. • 12061 E. Slauson Ave. • Santa Fe Springs, CA 90670 • (213) 945-2771 • Outside California (800) 423-4663 • Telex 69-1671



WATSON
... the driveshaft people

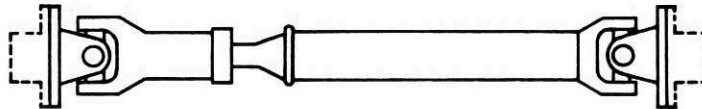
TYPES



WS

Use when shortest length is required

Shortest shafts, no tubing, 2 universal joints
Only one standard length (some special lengths available)



WL

Use when only one shaft is required

Stock lengths 24", 36" and 48"
One size of tubing

2 universal joints
Only standard lengths

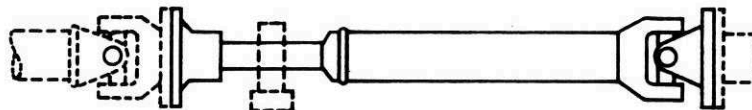
WVA

Use when only one shaft is required

Any length from minimum parts stack up to 180"
(up to 300" on special applications)

Two sizes of tubing for each series
(other sizes on special applications)

2 universal joints



WVB

Use when multiple shafts are required

Any length from minimum parts stack up to 180"

Two sizes of tubing for each series
(other sizes on special application)

One universal joint

WVB's can be bolted together

One or more WVB's must be used with one WVA

Must use pillow block or flange type steady bearing

©1981 H.S. WATSON CO.



WATSON
... the driveshaft people

DRIVE SHAFT SELECTION

Select the following:

1. **Type**, Section E
2. **Joint Series**, Section G
3. **Tube**, Section H
4. **Flanges**, Section I
5. **Steady Bearing**, Section J
6. **Shaft Guard**, Section K

You can use the catalog to select the proper Drive Shafts or you can turn to Section L (Ordering) and let our Computerized Drive Shaft Selection Program do all the work for you.

1. **Type**

WS or WL if possible. These have two joints and are the least expensive if you only need one Drive Shaft per power source.

WVA if you need a special length. Use a standard tube if the speed and length allow you to.

WVB if you need multiple shafts.

WVC if you need to go around an obstruction.

VIBRA-DAMP if you need to absorb torsional impulses.

CONSTANT VELOCITY if driver and driven shafts do not have equal angles or are not in the same plane.

2. **Joint Series**

Determine the hours of B-10 bearing life you want before you have to replace the bearings.

3. **Tube**

Try to use the standard tube size. Go to the oversize tube if rpm and length require you to. Use special oversize tubes only if absolutely necessary. Long tubes running at high speeds may vibrate.

4. **Flanges**

Select two flanges; one for the driving shaft and one for the driven shaft.

5. **Steady Bearing**

Use if you have WVB or WVC Drive Shafts.

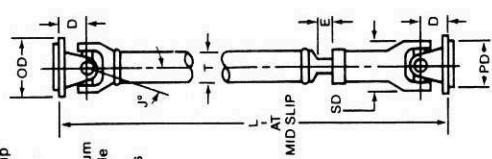
6. **Shaft Guard**

Always use shaft guards. **WARNING:** Rotating Drive Shafts can cause serious personal injury or cause serious damage.

©1981 H.S. WATSON CO.

WL & WVA		31	37	41	48	55	61	71	81	88	91	95	205	215
L	Stock Lengths	24, 36, 48	24, 36, 48	24, 36, 48	24, 36, 48	24, 36, 48	36, 48	36, 48	48	48	48	—	—	—
L	Minimum Length	15.22	16.77	17.54	16.75	17.00	25.38	24.25	26.44	27.44	31.85	46.50	52.32	63.94
T	STD Tube	2.5 x .083	3.0 x .083	3.5 x .083	3.5 x .083	3.5 x .083	3.5 x .095	4.0 x .134	4.5 x .134	4.5 x .259	4.75 x .25	5.25 x .375	8.0 x .375	9.0 x .625
T	Overize Tube	3.5 x .083	4.5 x .134	4.5 x .134	4.5 x .134	4.5 x .134	4.5 x .134	4.5 x .134	6.0 x .125	6.0 x .125	6.0 x .25	6.0 x .5	NONE	NONE
D	Face to ϕ Cross	1.38	1.56	1.69	2.00	2.00	2.75	3.00	3.38	3.50	4.25	8.62	9.50	11.75
E	Flange or Shrn	1.56	1.81	1.73	1.25	1.25	2.44	1.94	1.69	1.75	1.47	2.50	1.44	2.5
PD	Pilot Diameter	2.375	2.750	2.750	3.750	3.750	6.625	7.750	7.750	7.000	7.000	8.250	10.375	13.687
OD	Outside Diameter	3.875	4.562	4.562	5.875	5.875	6.875	8.000	8.000	9.625	9.625	11.187	13.625	17.500
SD	Swing Diameter	3.88	4.62	4.69	4.81	5.63	7.00	7.75	9.13	9.75	8.88	11.25	14.25	17.50
A	Parts Weight	13.5	25.0	25.0	27.0	37.0	45.0	68.0	99.0	152	166	385	835	1460
A	OS Tube	16.2	29.0	28.0	30.1	40.1	48.5	78.0	108	160	173	390	—	—
B	Tube	.179	.215	.252	.252	.288	.401	.461	.521	.981	1.00	1.63	2.54	4.66
B	WT/IN	.252	.521	.521	.521	.521	.521	.653	.653	.653	1.28	2.45	—	—
C	Parts	.079	.152	.237	.395	.664	1.464	2.162	3.824	5.993	9.435	37.31	120.0	297.0
C	WR ²	.119	.278	.335	.495	.764	1.564	2.862	4.505	6.975	10.13	37.78	—	—
F	Tube	.0018	.0032	.0051	.0051	.0058	.0079	.0120	.0172	.0376	.0307	.0673	.2580	.5680
F	WR ² /IN	.0051	.0172	.0172	.0172	.0172	.0172	.0376	.0376	.0376	.0733	.1290	—	—
G	SHI Deg/100 Lb. Ft.	.3596	.2475	.2279	.1919	.1175	.1027	.0653	.0309	.0263	.0160	.0098	.0037	.0027
H	SHI/IN	62.37	35.50	22.09	22.09	19.50	14.30	9.44	6.56	3.70	3.20	1.67	.438	.198
H	OS Tube	22.09	6.56	6.56	6.56	6.56	6.56	2.99	2.99	2.99	1.53	8.71	—	—

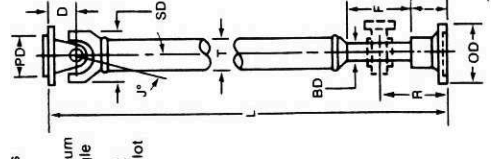
Weight = A + (B x Tube Length) = Lbs.
WR² = C + (F x Tube Length) = Lb. Ft.
Torsional Stiffness = G + (H x Tube Length) = Deg/100 Lb. Ft.
Tube Length = Shaft Length L - Minimum L
*62.37 x 10⁻⁴ = .006237 Deg/100 Lb. Ft.



2 x E = Total Slip
All Dimensions Are in Inches
J = 20° Maximum Clearance Angle
Two Male Pilots Tubing
Two Joints Splined Slip

WVB		31	37	41	48	55	61	71	81	88	91	95	205	215
L	Minimum Length	15	15	16	19	19	20	21	22	24	27	35	44	51
T	STD Tube	2.5 x .083	3.0 x .083	3.5 x .083	3.5 x .083	3.5 x .083	3.5 x .095	4.0 x .134	4.5 x .134	4.5 x .259	4.75 x .25	5.25 x .375	8.0 x .375	9.0 x .625
T	Overize Tube	3.5 x .083	4.5 x .134	4.5 x .134	4.5 x .134	4.5 x .134	4.5 x .134	6.0 x .125	6.0 x .125	6.0 x .125	6.0 x .25	6.0 x .5	NONE	NONE
D	Face to ϕ Cross	1.38	1.56	1.69	2.00	2.00	2.75	3.00	3.38	3.50	4.25	8.62	9.50	11.75
F	Bearing Seat	6.00	6.00	6.00	8.00	8.00	8.00	8.00	8.00	8.00	7.75	8.25	12.75	18.00
I	Flange Length	2.06	2.06	2.56	2.12	2.94	2.94	3.69	3.69	4.62	5.19	5.25	5.69	7.44
R	FF. to BRG	5.06	5.06	5.56	6.12	6.94	6.94	7.69	7.69	8.62	9.06	9.37	12.06	16.44
BD	BRG Diameter	1.187	1.187	1.437	1.687	1.937	1.937	2.187	2.437	2.937	3.187	3.437	4.437	6.500
PD	Pilot Diameter	2.375	2.750	2.750	3.750	3.750	6.625	7.750	7.750	7.000	7.000	8.250	10.375	13.687
OD	Outside Diameter	3.875	4.562	4.562	5.875	5.875	6.875	8.000	8.000	9.625	9.625	11.187	13.625	17.500
SD	Swing Diameter	3.88	4.62	4.69	4.81	5.63	7.00	7.75	9.13	9.75	8.88	11.25	14.25	17.50
A	Parts Weight	11.5	20.0	20.0	21.6	34.0	36.0	55.4	83.3	122	148	320	750	1318
A	OS Tube	13.9	23.0	24.0	24.7	37.9	38.1	65.5	91.7	130	155	335	—	—
B	Tube	.179	.215	.252	.252	.288	.401	.461	.521	.981	1.00	1.63	2.54	4.66
B	WT/IN	.252	.521	.521	.521	.521	.521	.653	.653	.653	1.28	2.45	—	—
C	Parts	.069	.126	.184	.352	.496	.816	2.315	3.050	5.103	6.608	21.53	64.57	193.8
C	WR ²	.084	.176	.223	.392	.536	.856	2.595	3.332	5.376	6.868	21.72	—	—
F	Tube	.0018	.0032	.0051	.0051	.0058	.0079	.0120	.0172	.0376	.0307	.0673	.2560	.5680
F	WR ² /IN	.0051	.0172	.0172	.0172	.0172	.0172	.0376	.0376	.0376	.0733	.1290	—	—
G	SHI Deg/100 Lb. Ft.	.3258	.2860	.1844	.1339	.0847	.0788	.0476	.0267	.0178	.0116	.0077	.0034	.0017
G	SHI/IN	62.37	35.50	22.09	22.09	19.50	14.30	9.44	6.56	3.70	3.20	1.67	.438	.198
H	OS Tube	22.09	6.56	6.56	6.56	6.56	6.56	2.99	2.99	2.99	1.53	8.71	—	—

Weight = A + (B x Tube Length) = Lbs.
WR² = C + (F x Tube Length) = Lb. Ft.
Torsional Stiffness = G + (H x Tube Length) = Deg/100 Lb. Ft.
Tube Length = Shaft Length L - Minimum L



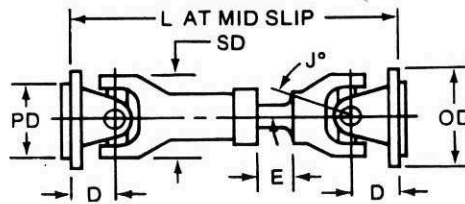
R = L + (F ÷ 2) Distance From Flange Face to Steady Brg. or Support
All Dimensions Are in Inches
J = 20° Maximum Clearance Angle
One Male Pilot Tubing
One Female Pilot Tubing
One Joint No Slip



WATSON
... the driveshaft people

DRIVE SHAFT SPECIFICATIONS

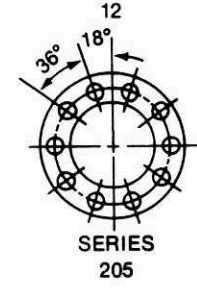
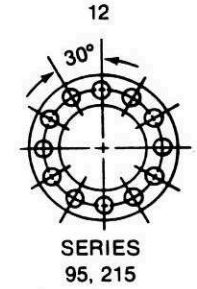
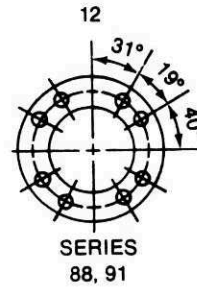
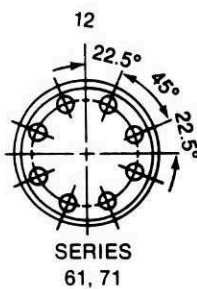
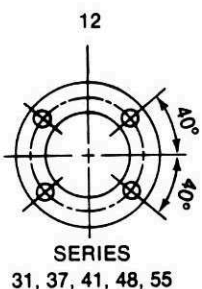
2 Male Pilots
No Tubing
2 Joints
Splined Slip



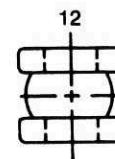
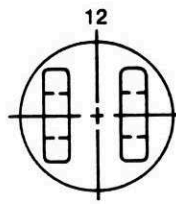
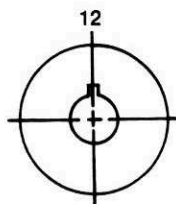
2 x E = Total Slip

All Dimensions Are in Inches

WS	L	D	E	PD	OD	SD	A	C	G	J
	Length	Face To ☉ Cross	Lengthen or Shorten	Pilot Diameter	Outside Diameter	Swing Diameter	Weight	WR ² Lb. Ft ²	Stiff Deg/ 100 Lb. Ft.	Max Angle
31	9.50	1.38	0.62	2.375	3.875	3.88	8.0	.0709	.3200	15°
37	9.87	1.56	0.37	2.750	4.562	4.62	11.0	.0730	.2302	8°
41	9.87	1.69	0.37	2.750	4.562	4.69	13.5	.1480	.2126	8°
48	9.00	1.50	0.50	3.750	5.875	4.81	19.5	.1480	.0659	8°
55	10.25	2.00	0.50	3.750	5.875	5.63	29.5	.4740	.0705	5°
61	9.49	1.88	0.37	6.625	6.875	7.00	44.0	1.464	.0499	8°
71	10.99	2.00	0.37	7.750	8.000	7.75	47.0	1.778	.0368	8°
81	13.96	2.59	0.56	7.750	8.000	9.13	78.0	3.047	.0233	12°
88	14.12	2.50	0.50	7.000	9.625	9.75	142	4.180	.0196	8°
91	22.44	4.25	0.78	7.000	9.625	8.88	195	13.58	.0133	22°
95	37.56	8.62	1.75	8.250	11.187	11.25	390	35.00	.0054	20°
205	40.81	9.50	1.44	10.375	13.625	14.25	840	120.0	.0037	17°
215	59.44	11.75	2.50	13.687	17.500	17.50	1465	297.0	.0028	19°



SERIES	31	37, 41	48, 55	61	71	81	88, 91	95	205	215
NO. BOLTS	4	4	4	8	8	12	8	12	10	12
BOLT	3/8 x 1.5	7/16 x 1.25	1/2 x 1.5	3/8 x 1.5	3/8 x 1.5	7/16 x 1.5	3/8 x 2	3/4 x 2.5	7/8 x 3.5	1 x 4



© 1981 H.S. WATSON CO.

WARNING: Rotating drive shafts can be dangerous. Use shaft guards to help prevent serious injury to personnel

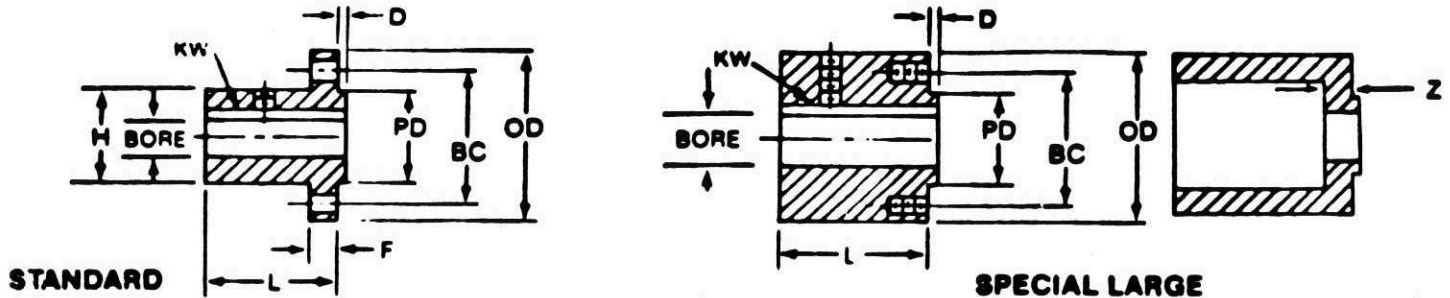
H.S. Watson Co. • 12061 E. Slauson Ave. • Santa Fe Springs, CA 90670 • (213) 945-2771 • Outside California (800) 423-4663 • Telex 69-1671



...the driveshaft people

H. S. WATSON COMPANY

12081 EAST SLAUSON AVENUE, SANTA FE SPRINGS, CALIFORNIA 90670 • (213) 945-2771 • TELEX 69-1671



150 Series

Flange Specifications

Number of bolts	8
Angle	45°
Bolt Thread	M16 X 2.0
O.D. Outside diameter	8.88
B.C. Bolt circle	7.717
P.D. Pilot diameter	5.512
D Pilot depth	.16
F Flange width	.56
H Hub diameter	6.45
L Length STD	5.00
L Length SPLG	7.25
Weight STD	51
Weight SPLG	127
Max bore STD	4.250
Max bore SPLG	5.875
Rough bore STD	1.75
Rough bore SPLG	4.12
Max K'W width STD	1.250
Max K'W width SPLG	1.500
Z Web thickness	.38

Weight above is for no bore.

Length dimensions are in inches.

Weight = A + (B X Tube Length) (lbs.)

Tube Length = Shaft Length - Minimum Length (Inch)

$WR^2 = C + (F X Tube Length) (lb-ft^2)$

Torsional Stiffness = G + H X Tube Length (Deg./100 lb.-ft.)

TORQUE RATINGS

TR 4,275 lb-ft (5000 Hours Life, Electric Motor @ 1750 RPM, 3° Joint Angle)

Shock Torque 10,300 lb-ft

Elastic Torque = 18,700 lb-ft

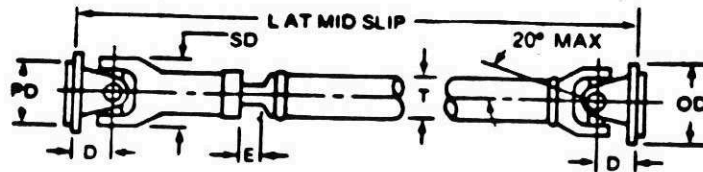


...the driveshaft people

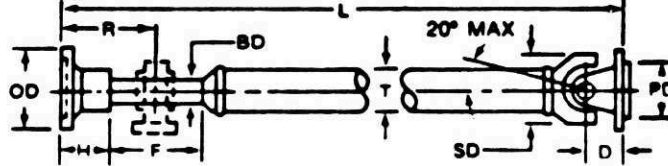
H. S. WATSON COMPANY

12061 EAST SLAUSON AVENUE, SANTA FE SPRINGS, CALIFORNIA 90670 • (213) 945-2771 • TELEX 69-1671

WL & WVA



WVB



150 Series

Driveshaft Specifications

WL & WVA

L	Minimum length	33.7
T	Tubing	4.750 X .313
D	Face to cross	4.25
E	Lengthen or Shorten	2.16
PD	Pilot diameter	5.512
OD	Outside diameter	8.86
SD	Swing diameter	8.88
A	Parts weight	161
B	Tube weight/inch	1.235
C	Parts WR^2	8.54
F	Tube WR^2	.0423
G	Stiff. Deg/100 lb.ft.	.021
H	Tube Deg/100 lb.ft.	2.65×10^{-4}
SA	= 8.5	

94-0050
781 8078

WVB

L	Minimum length	27.3
R	Flange to bearing	9.06
H	Flange length	5.06
BD	Beaming diameter	3.187
A	Parts weight	150
B	Tube weight	1.235
C	Parts WR^2	8.0
F	Tube WR^2	.0423
G	Stiff. Deg/100 lb.ft.	.016
H	Tube Deg/100 lb.ft.	2.65×10^{-4}
SB	= 13.3	