NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS AND TOLERANCES AS PER ASME Y14.5M–1994.
2. * INDICATES DIMENSIONS AND/OR FEATURES MODIFIED ON CURRENT REVISION LEVEL.
3. DIMENSIONS REFLECT STANDARD MFG TOLERANCES.
4. WEIGHTS ARE APPROXIMATE AND MAY VARY BASED ON MANUFACTURER'S MATERIALS AND PUMP CONFIGURATION.
5. THIS PUMP MAY HAVE TAPPED HOLES IN THE DISCHARGE FLANGE PER ASME B73.1.

- For Baseplate Grouting details, see document: "Griswold 811_IOM"
- For Maximum Allowable Nozzle Load data, see document: "Griswold 811 Max Allowable Nozzle Load Data"
- There is no seal piping provided with these pumps. All Griswold 811 pumps supplied on this project have Taper Bore seal chambers that do not require any flush. The vanes in the seal chamber provide flow which cool and lubricate the seal faces. API Plan 03 is the applicable piping plan.
- For Pump Curve and Data Sheet, see below document.
- Pump Rotation: CW, viewed from coupling

REV.	DESCRIPTION	BY	CHK.	APP.	DATE
A	RELEASED INTO PRODUCTION SEE ECN #G00994	–	–	–	–

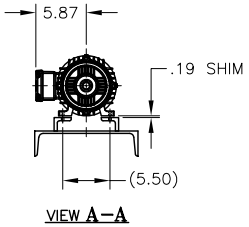
CUSTOMER Evoqua Water Technologies Canada Ltd.
END USER World Energy
PO NUMBER 4500021987
SERIAL NO 0040233081, 004023082
ITEM NO 19-P-057A, 19-P-057B
SERVICE Aerobic Reactor HX Pumps

LIQUID Water, Waste - Temp. 90-110 deg F, SP.GR 1.00, Viscosity 1.0 cP, pH: 6.0 - 9.0

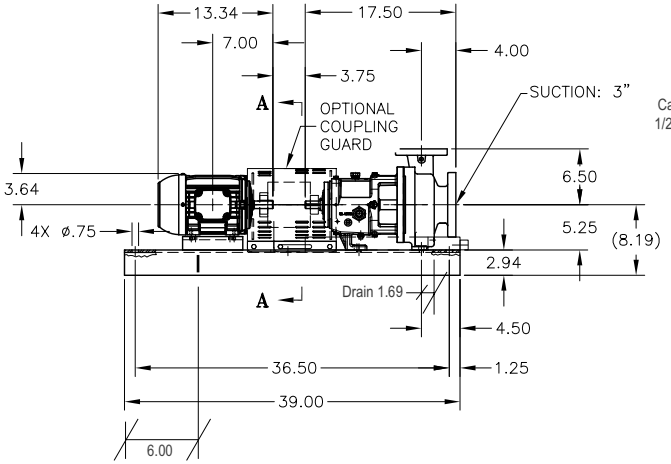
CAPACITY 115.0 USGPM MAWP 250.0 psig @ 100 deg F
HEAD 20.0 ft MDMT -20 deg F

MOTOR DETAILS Teco-Westinghouse 2.0 HP, 1800 RPM 3ph/60Hz/460V, 145T, 1.15SF, TEFC, IEEE841, VFD suitable Class 1, Division 2, Groups BCD, T3C

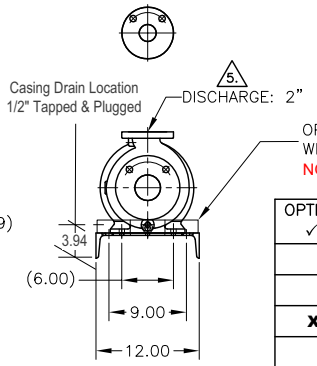
MECHANICAL SEAL John Crane 5611Q; XO581O581
Reference John Crane Drawing No. H-SP-38062-2



VIEW A–A



2 x SS Ground Lugs per Drawing PP-0001-53008-D R0 1 per side, located 6.00" from back of baseplate, halfway up baseplate



ITEM	DESC.	4. WEIGHT/LBS
PUMP	3x2–6 (AC)	103
MOTOR	145T	55
BASEPLATE	139	68
GUARD	COUPLING	8

For Baseplate Grouting details, see document: "Griswold 811_IOM"

For Maximum Allowable Nozzle Load data, see document: "Griswold 811 Max Allowable Nozzle Load Data"

OPTION ✓	AVAILABLE OPTIONS
	PUMP MATERIAL
	N6 DUCTILE IRON
X	N6 DUCTILE IRON CASE / CD4MCU IMPELLER
	91 STAINLESS STEEL
	20 HASTELLOY
	X4 CD4MCU SS
	OTHER
	BASEPLATE
X	ASTM A36 STEEL
	STAINLESS STEEL
	COMPOSITE CONSTRUCTION
	DRIP PAN
	ASTM A36 STEEL
	STAINLESS STEEL
	COUPLING GUARD
X	CARBON STEEL
	STAINLESS STEEL
	ALUMINUM
	FLANGE FACE
X	FLAT FACE
	RAISED FACE

FLANGE OPTION DIMENSIONS

OPTION ✓	NOMINAL PIPE SIZE	FLANGE DIAMETER	BOLT CIRCLE DIAMETER	NO. OF BOLTS	DIAMETER OF BOLTS	BOLT HOLE	FLANGE
X	2" ASME 150# (SHOWN) (THD)						DISCHARGE
	2.00	6.00	4.75	4	0.63	.625-11 UNC-2B	
	3" ASME 150# (SHOWN)						SUCTION
	3.00	7.50	6.00	4	0.63	0.75	
	2" ASME 300# (THD)						DISCHARGE
	2.00	6.50	5.00	8	0.63	.625-11 UNC-2B	
	3" ASME 300#						SUCTION
	3.00	8.25	6.62	8	0.75	0.88	
	50 mm DIN PN16 (THD)						DISCHARGE
	50 mm	165 mm	125 mm	4	16 mm	M16 x 2.0-6H	
	80 mm DIN PN16						SUCTION
	80 mm	200 mm	160 mm	8	16 mm	19 mm	

CERTIFIED FOR CONSTRUCTION

ONLY WHEN SIGNED

Signature Date 13-Jan-2023

Customer World Energy c/o Evoqua Water Technologies

Customer P.O. # 4500021987

DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
DECIMALS .XX ± –
.XXX ± –
ANGLES ± –
SCALE – SHEET 1 OF 1

GRISWOLD PUMP COMPANY
22969 VAN BUREN STREET
GRAND TERRACE, CA 92313-5607
PHONE: (800) 843-9222 / (229) 226-5255
WWW.GRISWOLDPUMP.COM

TITLE
3x2–6 (AC)
139 BASE, 145T MTR, SM PF

DRAWN BY	Srikanth	DATE	11/01/16
CHECKED BY	R.Schwartz	DATE	12/09/16
APPROVED BY	R.Beach	DATE	12/09/16

ASSY. NO. –
DRAWING NO. LG0846
REV. D

REVISED 03-01-2012

Installing and Grouting Base

Note:

Before the baseplate is installed, it is advisable to thoroughly clean the underside to enable the grouting to adhere to it. Do not use oil-based cleaners since grout will not bond to it.

Once the concrete pad has cured, the baseplate can be carefully lowered over the anchor bolts. Place shims or tapered wedges under the baseplate at each of the anchor bolt positions to provide about 0.75" – 1.50" clearance between the base and the foundation. Adjust shims/wedges to level the baseplate. **Since there may be some flexibility in the baseplate, we must perform an initial alignment prior to grouting to ensure that a final alignment can be achieved. See section covering Alignment of Pump/Driver Shafts.** Potential problems here include bowing and/or twisting of the baseplate. If gross misalignment is observed, shims/wedges may have to be added under the mid-point of the base or the shims/wedges at the corners may have to be adjusted to eliminate any twist. If the driver feet are bolt-bound for horizontal alignment, it may be necessary to loosen the pump hold-down bolts and shift the pump and driver to attain horizontal alignment. When alignment has been achieved, lightly tighten the anchor bolts. The anchor bolts should not be fully tightened until the grout has set.

Grouting furnishes support for the pump unit baseplate providing rigidity, helping to dampen any vibration and serves to distribute the weight of the pump unit over the foundation. To be effective, grouting must completely fill all voids under the baseplate. For proper adhesion or bonding, all areas of the baseplate that will be in contact with the grout should be thoroughly cleaned. See note above. The grout must be non-shrinking. Follow the directions of the grout manufacturer for mixing. Proceed with grouting as follows:

Note:

If the size of the equipment or the layout of the installation require it, grouting can be done in two steps as long as the first step is allowed to cure completely before the second step is applied

1. Build a sturdy form on the foundation around the baseplate to contain the grout.
2. Soak the top of the concrete foundation pad thoroughly. Remove surface water before pouring.
3. Pour the grout through the hole(s) in the top and/or through the open ends of the channel steel baseplate, eliminating air bubbles by tapping, using a vibrator or pumping the grout into place. If necessary, drill vent holes into the top of the base to evacuate air.
4. Allow grout to set completely, usually a minimum of 48 hours.
5. Tighten foundation anchor bolts.
6. Re-check alignment to ensure that there have been no changes.
7. After the grout has dried thoroughly, apply an oil base paint to shield the grout from air and moisture.

You may then proceed to connect suction and discharge piping

Maximum Allowable Forces and Moments

Griswold 811 ASME B73.1 process pumps meet or exceed the allowable nozzle load requirements shown in ANSI/HI 9.6.2. This document describes the calculations to validate a set of nozzle loads for each pump based on the pump type, material, temperature, and installation method.

Consult Griswold engineering concerning the feasibility of applying nozzle loads that exceed the requirements stated within this document. Analyses can be performed to qualify any custom combination of nozzle loads with an acceptance criteria based on calculated pump distortion and case stresses.

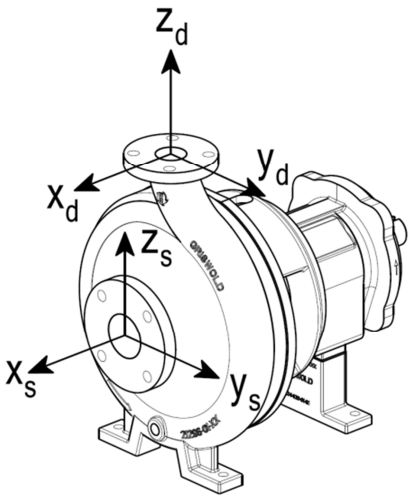


Figure 1: Coordinate System

The following steps are based on ANSI/HI 9.6.2. All information necessary to complete the calculations can be found below. For complete details refer to the standard.

a. Record the appropriate material/temperature correction factor from Table 1.

b. Refer to Table 2 and record the correction factors applicable, considering the pump installation method.

c. Compare the material/temperature correction factor determined in step (a) against the "Tables 3 & 4" correction factor obtained in step (b). The lesser of these two correction factors shall be multiplied to the appropriate values found in Table 3. Record these values as $F_{xs\_T3\_adj}$, $F_{ys\_T3\_adj}$, etc.

d. Compare the material/temperature correction factor determined in step (a) against the "Tables 3 & 4" correction factor obtained in step (b). The lesser of these two correction factors shall be multiplied to the appropriate values found in Table 4. Record these values as $F_{xs\_T4\_adj}$, $F_{ys\_T4\_adj}$, etc.

e. Using Table 5, identify the frame size of the pump of interest for use with Table 6 and Table 7.

f. Multiply the appropriate row of Table 6 with the "Tables 6 & 7" correction factor obtained in step (b) and record these values as $F_{ys\_T6\_adj}$, $M_{xs\_T6\_adj}$, etc.

g. Scale the appropriate row of Table 7 with the "Tables 6 & 7" correction factor obtained in step (b) and record these values as $F_{ys\_T7\_adj}$, $M_{xs\_T7\_adj}$, etc.

h. Compare the recorded T3_adj values to the recorded T4_adj, T6_adj and T7_adj values. If any of these values is less than the T3_adj value for a particular variable then replace the T3_adj value with that value. For example: if it is found that $M_{ys\_T6\_adj}$ is less than $M_{ys\_T3\_adj}$, $M_{ys\_T4\_adj}$, and $M_{ys\_T7\_adj}$, then assign $M_{ys\_T3\_adj}$ the value of $M_{ys\_T6\_adj}$.

i. Establish the nozzle loads that are to be evaluated against this standard considering the load coordinate system shown in Figure 1. Record these values as F_{xs}, F_{ys}, F_{zs}, M_{xs}, M_{ys}, M_{zs}, F_{xd}, F_{yd}, F_{zd}, M_{xd}, M_{yd} and M_{zd} where, for example, F_{xs} represents the force on the x-axis applied to the suction nozzle. As another example, M_{yd} represents the moment about the y-axis applied to the discharge nozzle.

j. Using the values obtained from the following steps, calculate the results of Equation Set 1, Equation 2 and Equation 3. If all equations are satisfied than the proposed nozzle loads from step (i) are deemed acceptable. If any one of the equations is not satisfied, either reduce 1 or more nozzle loads and repeat the calculations or contact Griswold engineering to determine the feasibility of qualifying the pump for the higher loads.

Maximum Allowable Forces and Moments

		Material Group No. and Description:							
				Austenitic Steels					
		1.0	1.1	2.1	2.2	2.3		2.8	
Temp. (°C)	**Temp. (°F)**	**Ductile Iron**	**Carbon Steel**	**Type 304**	**Type 316, Type 317**	**Type 304L**	**Type 316L**	**Duplex**	**Super Duplex**
-29	-20	0.89	1.00	1.00	1.00	0.83		1.00	
38	100	0.89	1.00	1.00	1.00	0.83		1.00	
93	200	0.83	0.94	0.83	0.86	0.70		1.00	
149	300	0.78	0.91	0.74	0.78	0.63		1.00	
204	400	0.73	0.88	0.65	0.72	0.58		0.98	
260	500	0.69	0.83	0.60	0.67	0.53		0.92	
316	600	0.65	0.76	0.58	0.63	0.50		0.84	
343	650	0.63	0.74	0.57	0.62	0.49		0.82	
371	700	---	0.74	0.56	0.60	0.48		0.79	

		Material Group No. and Description:					
		Nickel and Nickel Alloys					
		3.1	3.2	3.4	3.5	3.7	3.8
Temp. (°C)	**Temp. (°F)**	**Alloy 20**	**Nickel**	**Monel**	**Inconel**	**Hast. B**	**Hast. C**
-29	-20	0.83	0.50	0.83	1.00	1.00	1.00
38	100	0.83	0.50	0.83	1.00	1.00	1.00
93	200	0.77	0.50	0.74	0.93	1.00	1.00
149	300	0.73	0.50	0.69	0.89	1.00	1.00
204	400	0.67	0.50	0.67	0.85	0.98	0.98
260	500	0.65	0.50	0.66	0.83	0.92	0.92
316	600	0.63	0.50	0.66	0.80	0.84	0.84
343	650	0.63	---	0.66	0.78	0.82	0.82
371	700	0.62	---	0.66	0.77	0.79	0.79

Table 1: Pump Temperature and Material Adjustment Values

	Correction Factor For Use On:	
	Tables 3 & 4	**Tables 6 & 7**
Grouted Metal Baseplate (Anchored Down)	1	1
Ungrouted Metal Baseplate (Anchored Down)	1	0.8
Grouted Nonmetal Baseplate (Anchored Down)	0.8	0.8
Ungrouted Nonmetal Baseplate (Anchored Down)	0.7	0.7
Stilt-Mounted Baseplate	1	0.9

Table 2: Pump Mounting Correction Factors

Maximum Allowable Forces and Moments

	Suction						Discharge					
	Forces, lbf (N)			Moments, lbf·ft (N·m)			Forces, lbf (N)			Moments, lbf·ft (N·m)		
Pump Size	Fxs_T3	Fys_T3	Fzs_T3	Mxs_T3	Mys_T3	Mzs_T3	Fxd_T3	Fyd_T3	Fzd_T3	Mxd_T3	Myd_T3	Mzd_T3
1.5x1-6	1050 (4671)	750 (3336)	750 (3336)	720 (976)	170 (230)	170 (230)	800 (3559)	1350 (6005)	3000 (13345)	410 (556)	410 (556)	410 (556)
1.5x1-8	1050 (4671)	1210 (5382)	1210 (5382)	720 (976)	190 (258)	190 (258)	800 (3559)	1350 (6005)	3000 (13345)	360 (488)	360 (488)	360 (488)
LF 1.5x1-8	1050 (4671)	1210 (5382)	1210 (5382)	720 (976)	190 (258)	190 (258)	800 (3559)	1350 (6005)	3000 (13345)	360 (488)	360 (488)	360 (488)
2x1-10	2340 (10409)	960 (4270)	960 (4270)	1270 (1722)	220 (298)	220 (298)	1400 (6228)	1350 (6005)	3250 (14457)	660 (895)	660 (895)	660 (895)
LF 2x1-10	2340 (10409)	960 (4270)	960 (4270)	1270 (1722)	220 (298)	220 (298)	1400 (6228)	1350 (6005)	3250 (14457)	660 (895)	660 (895)	660 (895)
3x1.5-6	1050 (4671)	1240 (5516)	1250 (5560)	900 (1220)	490 (664)	490 (664)	800 (3559)	1350 (6005)	3000 (13345)	500 (678)	550 (746)	510 (691)
3x1.5-8	1050 (4671)	1240 (5516)	1050 (4671)	900 (1220)	490 (664)	490 (664)	800 (3559)	1350 (6005)	3000 (13345)	440 (597)	440 (597)	440 (597)
3x1.5-10	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	420 (569)	420 (569)	1400 (6228)	1350 (6005)	3250 (14457)	370 (502)	370 (502)	370 (502)
3x1.5-13	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	670 (908)	670 (908)	1400 (6228)	1350 (6005)	3250 (14457)	530 (719)	530 (719)	530 (719)
LF 3x1.5-13	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	670 (908)	670 (908)	1400 (6228)	1350 (6005)	3250 (14457)	530 (719)	530 (719)	530 (719)
3x2-6	1050 (4671)	750 (3336)	750 (3336)	720 (976)	170 (230)	170 (230)	800 (3559)	1350 (6005)	3000 (13345)	410 (556)	410 (556)	410 (556)
3x2-8	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	600 (813)	60 (81)	1400 (6228)	1350 (6005)	3250 (14457)	660 (895)	660 (895)	660 (895)
3x2-10	2700 (12010)	1350 (6005)	1480 (6583)	1300 (1763)	310 (420)	310 (420)	1400 (6228)	1350 (6005)	3250 (14457)	560 (759)	560 (759)	560 (759)
3x2-13	1920 (8541)	1230 (5471)	1230 (5471)	1300 (1763)	350 (475)	350 (475)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1270 (1722)	690 (936)
4x3-8	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	350 (475)	350 (475)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1460 (1979)	690 (936)
4x3-8G	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	350 (475)	350 (475)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1460 (1979)	690 (936)
4x3-10	2300 (10231)	1350 (6005)	1500 (6672)	1300 (1763)	310 (420)	310 (420)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1460 (1979)	690 (936)
4x3-10H	2300 (10231)	1350 (6005)	1500 (6672)	1300 (1763)	310 (420)	310 (420)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1460 (1979)	690 (936)
4x3-13	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	400 (542)	400 (542)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1500 (2034)	690 (936)
6x4-10G	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	1100 (1491)	1100 (1491)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1500 (2034)	690 (936)
6x4-10H	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	1100 (1491)	1100 (1491)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1500 (2034)	690 (936)
6x4-13	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	1300 (1763)	1100 (1491)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1500 (2034)	690 (936)
6x4-17	2700 (12010)	1350 (6005)	1500 (6672)	1300 (1763)	1300 (1763)	1100 (1491)	1400 (6228)	1350 (6005)	3250 (14457)	1200 (1627)	1500 (2034)	690 (936)
8x6-13	3500 (15569)	3180 (14145)	2000 (8896)	1500 (2034)	1170 (1586)	1170 (1586)	1500 (6672)	3000 (13345)	3500 (15569)	1250 (1695)	2840 (3851)	2840 (3851)
8x6-15	3500 (15569)	3180 (14145)	2000 (8896)	1500 (2034)	1480 (2007)	1480 (2007)	1500 (6672)	3000 (13345)	3500 (15569)	1250 (1695)	2840 (3851)	2840 (3851)
8x6-17	3500 (15569)	3180 (14145)	2000 (8896)	1500 (2034)	1480 (2007)	1480 (2007)	1500 (6672)	3000 (13345)	3500 (15569)	1250 (1695)	2840 (3851)	2840 (3851)
10x8-13	3500 (15569)	3180 (14145)	2000 (8896)	1500 (2034)	2000 (2712)	2915 (3952)	1500 (6672)	3000 (13345)	3500 (15569)	1250 (1695)	2840 (3851)	2840 (3851)
10x8-15	3500 (15569)	3180 (14145)	2000 (8896)	1500 (2034)	1130 (1532)	1130 (1532)	1500 (6672)	3000 (13345)	3500 (15569)	1250 (1695)	2840 (3851)	2840 (3851)
10x8-15G	3500 (15569)	3180 (14145)	2000 (8896)	1500 (2034)	1130 (1532)	1130 (1532)	1500 (6672)	3000 (13345)	3500 (15569)	1250 (1695)	2840 (3851)	2840 (3851)
10x8-16H	3500 (15569)	3180 (14145)	2000 (8896)	1500 (2034)	1130 (1532)	1130 (1532)	1500 (6672)	3000 (13345)	3500 (15569)	1250 (1695)	2840 (3851)	2840 (3851)
10x8-17	3500 (15569)	3180 (14145)	2000 (8896)	1500 (2034)	1130 (1532)	1130 (1532)	1500 (6672)	3000 (13345)	3500 (15569)	1250 (1695)	2840 (3851)	2840 (3851)

Table 3: Forces and Moments for use with Equation Set 1

Maximum Allowable Forces and Moments

	Suction						Discharge					
	Forces, lbf (N)			Moments, lbf·ft (N·m)			Forces, lbf (N)			Moments, lbf·ft (N·m)		
Pump Size	Fxs_T4	Fys_T4	Fzs_T4	Mxs_T4	Mys_T4	Mzs_T4	Fxd_T4	Fyd_T4	Fzd_T4	Mxd_T4	Myd_T4	Mzd_T4
1.5x1-6	2020 (8985)	750 (3336)	750 (3336)	1830 (2481)	170 (230)	170 (230)	2020 (8985)	1350 (6005)	6240 (27757)	410 (556)	410 (556)	410 (556)
1.5x1-8	2020 (8985)	1210 (5382)	1210 (5382)	1830 (2481)	190 (258)	190 (258)	2020 (8985)	1350 (6005)	6240 (27757)	360 (488)	360 (488)	360 (488)
LF 1.5x1-8	2020 (8985)	1210 (5382)	1210 (5382)	1830 (2481)	190 (258)	190 (258)	2020 (8985)	1350 (6005)	6240 (27757)	360 (488)	360 (488)	360 (488)
2x1-10	2340 (10409)	960 (4270)	960 (4270)	3640 (4935)	220 (298)	220 (298)	2020 (8985)	1350 (6005)	6240 (27757)	660 (895)	660 (895)	660 (895)
LF 2x1-10	2340 (10409)	960 (4270)	960 (4270)	3640 (4935)	220 (298)	220 (298)	2020 (8985)	1350 (6005)	6240 (27757)	660 (895)	660 (895)	660 (895)
3x1.5-6	2020 (8985)	1240 (5516)	2110 (9386)	2290 (3105)	490 (664)	490 (664)	2020 (8985)	1350 (6005)	6240 (27757)	550 (746)	550 (746)	550 (746)
3x1.5-8	2020 (8985)	1240 (5516)	1640 (7295)	2290 (3105)	490 (664)	490 (664)	2020 (8985)	1350 (6005)	6240 (27757)	440 (597)	440 (597)	440 (597)
3x1.5-10	2700 (12010)	1350 (6005)	1910 (8496)	3730 (5057)	420 (569)	420 (569)	1940 (8630)	1350 (6005)	6240 (27757)	370 (502)	370 (502)	370 (502)
3x1.5-13	2700 (12010)	1350 (6005)	3060 (13612)	3730 (5057)	670 (908)	670 (908)	2020 (8985)	1350 (6005)	6240 (27757)	530 (719)	530 (719)	530 (719)
LF 3x1.5-13	2700 (12010)	1350 (6005)	3060 (13612)	3730 (5057)	670 (908)	670 (908)	2020 (8985)	1350 (6005)	6240 (27757)	530 (719)	530 (719)	530 (719)
3x2-6	2020 (8985)	750 (3336)	750 (3336)	1830 (2481)	170 (230)	170 (230)	2020 (8985)	1350 (6005)	6240 (27757)	410 (556)	410 (556)	410 (556)
3x2-8	2700 (12010)	1350 (6005)	2490 (11076)	3730 (5057)	600 (813)	600 (813)	1970 (8763)	1350 (6005)	6240 (27757)	660 (895)	660 (895)	660 (895)
3x2-10	2700 (12010)	1350 (6005)	1480 (6583)	3730 (5057)	310 (420)	310 (420)	2020 (8985)	1350 (6005)	6240 (27757)	560 (759)	560 (759)	560 (759)
3x2-13	1920 (8541)	1230 (5471)	1230 (5471)	3730 (5057)	350 (475)	350 (475)	2020 (8985)	1350 (6005)	6240 (27757)	1460 (1979)	1460 (1979)	690 (936)
4x3-8	2700 (12010)	1350 (6005)	1840 (8185)	3730 (5057)	350 (475)	350 (475)	2020 (8985)	1350 (6005)	6240 (27757)	1460 (1979)	1460 (1979)	690 (936)
4x3-8G	2700 (12010)	1350 (6005)	1840 (8185)	3730 (5057)	350 (475)	350 (475)	2020 (8985)	1350 (6005)	6240 (27757)	1460 (1979)	1460 (1979)	690 (936)
4x3-10	2300 (10231)	1350 (6005)	1640 (7295)	3730 (5057)	310 (420)	310 (420)	2020 (8985)	1350 (6005)	6240 (27757)	1460 (1979)	1460 (1979)	690 (936)
4x3-10H	2300 (10231)	1350 (6005)	1640 (7295)	3730 (5057)	310 (420)	310 (420)	2020 (8985)	1350 (6005)	6240 (27757)	1460 (1979)	1460 (1979)	690 (936)
4x3-13	2700 (12010)	1350 (6005)	2390 (10631)	3730 (5057)	400 (542)	400 (542)	2020 (8985)	1350 (6005)	6240 (27757)	1730 (2346)	1730 (2346)	690 (936)
6x4-10G	2700 (12010)	1350 (6005)	6240 (27757)	3730 (5057)	1100 (1491)	1100 (1491)	2020 (8985)	1350 (6005)	6240 (27757)	3100 (4203)	3100 (4203)	690 (936)
6x4-10H	2700 (12010)	1350 (6005)	6240 (27757)	3730 (5057)	1100 (1491)	1100 (1491)	2020 (8985)	1350 (6005)	6240 (27757)	3100 (4203)	3100 (4203)	690 (936)
6x4-13	2700 (12010)	1350 (6005)	6240 (27757)	3730 (5057)	4980 (6752)	1100 (1491)	2020 (8985)	1350 (6005)	6240 (27757)	2150 (2915)	2150 (2915)	690 (936)
6x4-17	2700 (12010)	1350 (6005)	6240 (27757)	3730 (5057)	4980 (6752)	1100 (1491)	2020 (8985)	1350 (6005)	6240 (27757)	2150 (2915)	2150 (2915)	690 (936)
8x6-13	6360 (28291)	3180 (14145)	5080 (22597)	8970 (12162)	1170 (1586)	1170 (1586)	6360 (28291)	3180 (14145)	13460 (59873)	6780 (9192)	3850 (5220)	2840 (3851)
8x6-15	6360 (28291)	3180 (14145)	6680 (29714)	8970 (12162)	1480 (2007)	1480 (2007)	6360 (28291)	3180 (14145)	13460 (59873)	6560 (8894)	3720 (5044)	2840 (3851)
8x6-17	6360 (28291)	3180 (14145)	6680 (29714)	8970 (12162)	1480 (2007)	1480 (2007)	6360 (28291)	3180 (14145)	13460 (59873)	6560 (8894)	3720 (5044)	2840 (3851)
10x8-13	6360 (28291)	3180 (14145)	13460 (59873)	8970 (12162)	2450 (3322)	2150 (2915)	6360 (28291)	3180 (14145)	13460 (59873)	8970 (12162)	7220 (9789)	2840 (3851)
10x8-15	6360 (28291)	3180 (14145)	5130 (22819)	8970 (12162)	1130 (1532)	1130 (1532)	6360 (28291)	3180 (14145)	13460 (59873)	8970 (12162)	9060 (12284)	2840 (3851)
10x8-15G	6360 (28291)	3180 (14145)	5130 (22819)	8970 (12162)	1130 (1532)	1130 (1532)	6360 (28291)	3180 (14145)	13460 (59873)	8970 (12162)	9060 (12284)	2840 (3851)
10x8-16H	6360 (28291)	3180 (14145)	5130 (22819)	8970 (12162)	1130 (1532)	1130 (1532)	6360 (28291)	3180 (14145)	13460 (59873)	8970 (12162)	9060 (12284)	2840 (3851)
10x8-17	6360 (28291)	3180 (14145)	5130 (22819)	8970 (12162)	1130 (1532)	1130 (1532)	6360 (28291)	3180 (14145)	13460 (59873)	8970 (12162)	9060 (12284)	2840 (3851)

Table 4: Forces and Moments for use with Equation 2

Maximum Allowable Forces and Moments

Pump Size	Frame Size
1.5x1-6	Small
1.5x1-8	Small
LF 1.5x1-8	Small
2x1-10	Medium/Large
LF 2x1-10	Medium/Large
3x1.5-6	Small
3x1.5-8	Small
3x1.5-10	Medium/Large
3x1.5-13	Medium/Large
LF 3x1.5-13	Large
3x2-6	Small
3x2-8	Medium
3x2-10	Medium/Large
3x2-13	Medium/Large
4x3-8	Medium
4x3-8G	Medium
4x3-10	Medium/Large
4x3-10H	Medium/Large
4x3-13	Medium/Large
6x4-10G	Medium/Large
6x4-10H	Medium/Large
6x4-13	Medium/Large
6x4-17	XL
8x6-13	XL
8x6-15	XL
8x6-17	XL
10x8-13	XL
10x8-15	XL
10x8-15G	XL
10x8-16H	XL
10x8-17	XL

Table 5: Pump & Frame Sizes

	Suction					Discharge				
	Forces, lbf (N)		Moments, lbf·ft (N·m)			Forces, lbf (N)		Moments, lbf·ft (N·m)		
Pump Group	Fys_T6		Mxs_T6	Mys_T6	Mzs_T6	Fyd_T6		Mxd_T6	Myd_T6	Mzd_T6
Small Frame	-2000 (-8896)		900 (4003)	1200 (5338)	1250 (5560)	1500 (6672)		-500 (-2224)	1500 (6672)	1250 (5560)
Medium/Large Frames	-3500 (-15569)		1300 (5783)	1300 (5783)	3000 (13345)	2500 (11121)		-1200 (-5338)	1500 (6672)	3000 (13345)
XL Frame	-5000 (-22241)		1500 (6672)	2000 (8896)	4000 (17793)	3000 (13345)		-1250 (-5560)	5000 (22241)	4000 (17793)

Table 6: Y-axis Forces and Moments for use with Equation 3

	Suction						Discharge					
	Forces, lbf (N)			Moments, lbf·ft (N·m)			Forces, lbf (N)			Moments, lbf·ft (N·m)		
Pump Group	Fxs_T7		Fzs_T7	Mxs_T7	Mys_T7	Mzs_T7	Fxd_T7	Fyd_T7	Fzd_T7	Mxd_T7	Myd_T7	Mzd_T7
Small Frame	1050 (4671)		-1250 (-5560)	1500 (6672)	1200 (5338)	-2500 (-11121)	800 (3559)	2000 (8896)	-3000 (-13345)	1500 (6672)	1000 (4448)	-2500 (-11121)
Medium/Large Frames	3500 (15569)		-1500 (-6672)	1500 (6672)	1300 (5783)	-3500 (-15569)	1400 (6228)	2500 (11121)	-3250 (-14457)	1500 (6672)	2150 (9564)	-3500 (-15569)
XL Frame	3500 (15569)		-2000 (-8896)	1500 (6672)	4100 (18238)	-4000 (-17793)	3500 (15569)	4000 (17793)	-3500 (-15569)	1500 (6672)	5000 (22241)	-4000 (-17793)

Table 7: Z-axis Forces and Moments for use with Equation 3

Equation Set 1:

$$\left|\frac{F_{xs}}{F_{xs\_T3\_adj}}\right| \le 1 \quad \left|\frac{F_{ys}}{F_{ys\_T3\_adj}}\right| \le 1 \quad \left|\frac{F_{zs}}{F_{zs\_T3\_adj}}\right| \le 1 \quad \left|\frac{M_{xs}}{M_{xs\_T3\_adj}}\right| \le 1 \quad \left|\frac{M_{ys}}{M_{ys\_T3\_adj}}\right| \le 1 \quad \left|\frac{M_{zs}}{M_{zs\_T3\_adj}}\right| \le 1$$

$$\left|\frac{F_{xd}}{F_{xd\_T3\_adj}}\right| \le 1 \quad \left|\frac{F_{yd}}{F_{yd\_T3\_adj}}\right| \le 1 \quad \left|\frac{F_{zd}}{F_{zd\_T3\_adj}}\right| \le 1 \quad \left|\frac{M_{xd}}{M_{xd\_T3\_adj}}\right| \le 1 \quad \left|\frac{M_{yd}}{M_{yd\_T3\_adj}}\right| \le 1 \quad \left|\frac{M_{zd}}{M_{zd\_T3\_adj}}\right| \le 1$$

Equation 2:

$$\left|\frac{F_{xs}}{F_{\mathrm{xs\_T4\_adj}}}\right| + \left|\frac{F_{ys}}{F_{\mathrm{ys\_T4\_adj}}}\right| + \left|\frac{F_{zs}}{F_{\mathrm{zs\_T4\_adj}}}\right| + \left|\frac{M_{xs}}{M_{\mathrm{xs\_T4\_adj}}}\right| + \left|\frac{M_{ys}}{M_{\mathrm{ys\_T4\_adj}}}\right| + \left|\frac{M_{zs}}{M_{\mathrm{zs\_T4\_adj}}}\right| +$$

$$\left|\frac{F_{xd}}{F_{\mathrm{xd\_T4\_adj}}}\right| + \left|\frac{F_{yd}}{F_{\mathrm{yd\_T4\_adj}}}\right| + \left|\frac{F_{zd}}{F_{\mathrm{zd\_T4\_adj}}}\right| + \left|\frac{M_{xd}}{M_{\mathrm{xd\_T4\_adj}}}\right| + \left|\frac{M_{yd}}{M_{\mathrm{yd\_T4\_adj}}}\right| + \left|\frac{M_{zd}}{M_{\mathrm{zd\_T4\_adj}}}\right| \le 2$$

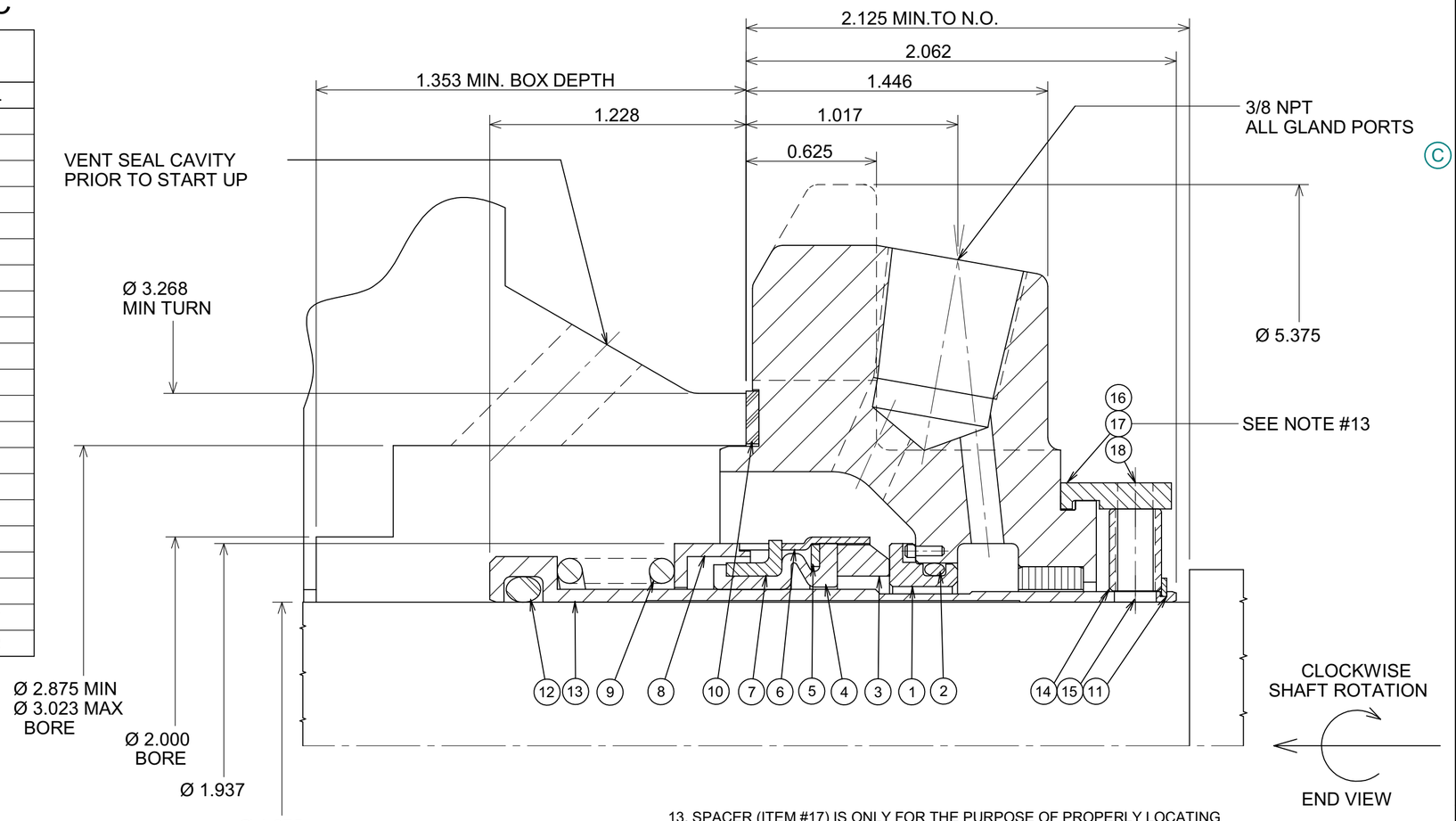
Equation 3:

$$\left(\frac{F_{ys}}{F_{\mathrm{ys\_T6\_adj}}} + \frac{M_{xs}}{M_{\mathrm{xs\_T6\_adj}}} + \frac{M_{ys}}{M_{\mathrm{ys\_T6\_adj}}} + \frac{M_{zs}}{M_{\mathrm{zs\_T6\_adj}}} + \frac{F_{yd}}{F_{\mathrm{yd\_T6\_adj}}} + \frac{M_{xd}}{M_{\mathrm{xd\_T6\_adj}}} + \frac{M_{yd}}{M_{\mathrm{yd\_T6\_adj}}} + \frac{M_{zd}}{M_{\mathrm{zd\_T6\_adj}}}\right)^2 + \left(\frac{F_{xs}}{F_{\mathrm{xs\_T7\_adj}}} + \frac{F_{zs}}{F_{\mathrm{zs\_T7\_adj}}} + \frac{M_{xs}}{M_{\mathrm{xs\_T7\_adj}}} + \frac{M_{ys}}{M_{\mathrm{ys\_T7\_adj}}} + \frac{M_{zs}}{M_{\mathrm{zs\_T7\_adj}}} + \frac{F_{xd}}{F_{\mathrm{xd\_T7\_adj}}} + \frac{F_{zd}}{F_{\mathrm{zd\_T7\_adj}}} + \frac{M_{xd}}{M_{\mathrm{xd\_T7\_adj}}} + \frac{M_{yd}}{M_{\mathrm{yd\_T7\_adj}}} + \frac{M_{zd}}{M_{\mathrm{zd\_T7\_adj}}}\right)^2 \le 1$$

DRAWING No.	ISSUE	REVISION:
HSP-38062-2	B	A REV. 10-06-EC97-03225 B 00057495 APR05 C 00107457 FEB14

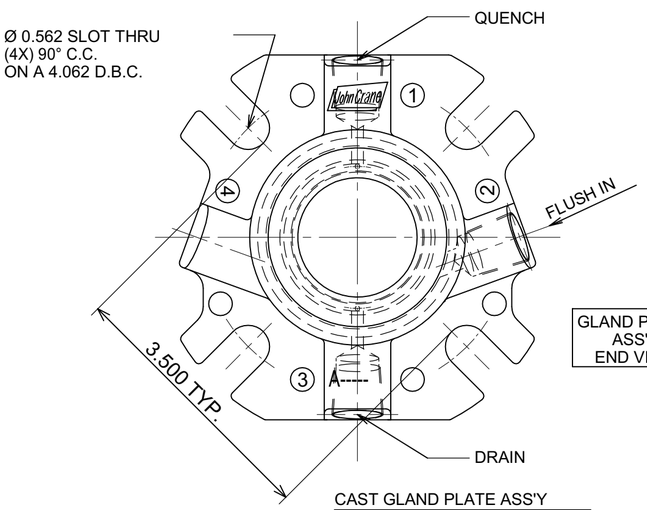
METRIC

ALL DIMENSIONS ARE IN INCHES	
IN.	M.M.
.001	.025
.002	.05
.040	1.02
.375	9.52
.562	14.27
.625	15.87
1.017	25.83
1.228	31.19
1.353	34.37
1.375	34.93
1.446	36.72
1.937	49.20
2.000	50.80
2.062	53.37
2.125	53.97
2.875	73.02
3.023	76.78
3.268	83.00
3.500	88.90
4.062	103.17
5.375	136.52



13. SPACER (ITEM #17) IS ONLY FOR THE PURPOSE OF PROPERLY LOCATING SEAL. AFTER GLAND PLATE, BEARING, SHAFT AND SEAL ARE LOCKED IN PLACE, SPACER MUST BE REMOVED BEFORE STARTING UNIT.

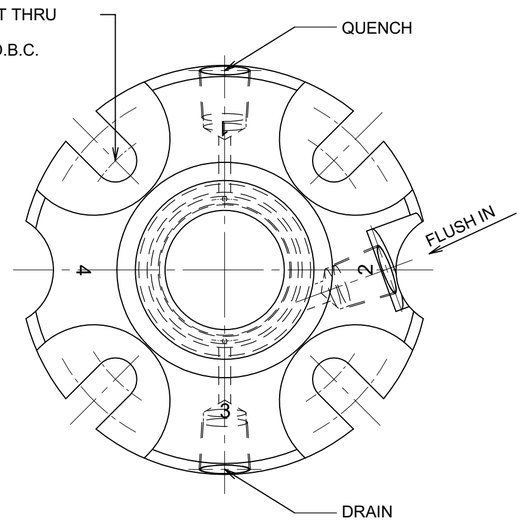
14. COOLING RECOMMENDATION: PROVIDE A FLUSH OF SUITABLE LIQUID TO THE SEAL



GLAND PLATE ASS'Y END VIEW

CAST GLAND PLATE ASS'Y

NOTE: CAST GLAND DESIGNED TO FIT COOLING JACKETS ON STANDARD PUMPS.



MACHINED GLAND PLATE ASS'Y

FOR ALTERNATE ARRANGEMENTS SEE THE FOLLOWING DRAWINGS

SINGLE O-RING SEAL	HSP-38057
RUBBER BELLOWS SEAL	HSP-38061
METAL BELLOWS SEAL	HSP-38063
O-RING SEAL W/QUENCH	HSP-38058
RUBBER BELLOWS W/QUENCH	HSP-38062
METAL BELLOWS W/QUENCH	HSP-38064
DUAL O-RING SEAL	HSP-38059
DUAL METAL BELLOWS WITH PUMPING RING	HSP-38066
DUAL O-RING SEAL W/PUMPING RING	HSP-38060
DUAL METAL BELLOWS	HSP-38065

1	H 1375 872 9221	MATING RING	SILICON CARBIDE	1	X
2	0000 030 9549	O-RING	FLUOROELASTOMER	1	X
3	D 1501 270 9221	PRIMARY RING	SILICON CARBIDE	1	X
4	D 1500 278 5850	BELLOWS	FLUOROELASTOMER	1	X
5	D 1500 725 0550	DISC	316 S.S.	1	
6	D 1500 714 0550	RETAINER	316 S.S.	1	
7	D 1500 088 0550	DRIVE BAND	316 S.S.	1	
8	D 1502 364 0550	SPRING ADAPTER	316 S.S.	1	
9	2468	SPRING	316 S.S.	1	X
10	H 1375 950 7510	GASKET	G.F. CHEMLON	1	X
11	4101 4300 002 0500	SNAP RING	18-8 S.S.	1	X
12	0000 220 9549	O-RING	FLUOROELASTOMER	1	X
13	H 1375 905 0550	SLEEVE	316 S.S.	1	
14	H 1375 888 0550	COLLAR	316 S.S.	1	
15	1710 3206 000 0650	SET SCREW	HARDENED 416 S.S.	4	X
16	H 1375 954 7854	GLAND PLATE ASS'Y **	316 S.S./CARBON	1	
17	D 0002 684 0570	SPACER	SINTERED 316 S.S.	4	X
18	2108 3206 000 0550	SOCKET HEAD CAP SCREW	316 S.S.	4	X
19					
20					
21					
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23					
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34					
35					

** H 1376 001 (MACHINED GLAND PLATE ASS'Y)

*** GRISWOLD 811 S-GROUP TAPER BORE

**** NO SEAL FLUSH REQUIRED DUE TO TAPER BORE SEAL CHAMBER

***** MIN. SPEED: 900 RPM

(A)

SEAL ASS'Y NO.	BILL OF MATERIALS NUMBER		
IN- D 1502 471	COMPLETE	1-18	M59936
OUT-	SEAL HD.		
MTG.RG.ASS'Y NO.	MTG.RG.		
IN-	ASS'Y	ITEMS	NUMBER
OUT-			

EQUIPMENT REFERENCE	CUSTOMER INFORMATION:
UNIT BY: GRISWOLD PUMPS	CUSTOMER:
EQUIPMENT TYPE:	P.O.NO.
☒ PUMP ☐ AGITATOR	END USER:
☐ COMPRESSOR ☐ OTHER	LOCATION:
MODEL / SIZE GRISWOLD 811 S 3x2-6 (AC)	REQ.NO.
SERIAL NO.	INSTALLED AT:

(A)

SEAL DATA

A.P.I.PLAN	MATERIAL CODE:
03	X1 O58 1 X O58 1 316/316
A.P.I.CODE	(B)

SERVICE DATA

FLUID WATER, WASTE				BARRIER FLUID NOT APP.		
SEAL PRESSURE 3.1 PSIG	SUCT.PRESS. 0.0 PSIG			VISC.AT P.T. 1.0 CP		
TEMPERATURE 90-110 DEG F	DISCH.PRESS. 10.4 PSIG			V.P.AT P.T.		
SHAFT SPEED 1,750 RPM	SP.GR. 1.00			HAZARD CODE		
REFERENCE DATA	DRAWN	DATE	CHK'D	APP'D	SCALE	INST CODE
E.P.#2270-9702	LFK	021897	DSC	MGK	2:1	
	FILE REFERENCE	CAT	DRAWING No.			ISSUE
CAD ENGINEERED	MG-01	D	H-SP-38062-2			C

SEAL SIZE: Ø 1.375
SEAL TYPE: T-5611-Q BIG BORE VERSION

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

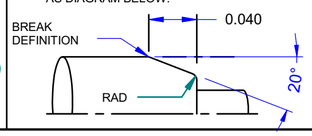
1. REMOVE ALL SHARP EDGES ON SHAFT AND/OR SLEEVE BEFORE INSTALLATION OF SEAL.
2. SURFACE OF SHAFT OR SLEEVE ON WHICH SEAL IS INSTALLED MUST BE MACHINED TO RA 63 FINISH OR BETTER.
3. LUBRICATE SHAFT/SLEEVE & SEAL WEDG[redacted]S TO ASSIST INSTALLATION OF SEAL WITH COMPATIBLE LUBRICANT.
4. LUBRICATE MATING RING (SEAT),SEALING MEMBER AND HOUSING TO ASSIST INSTALLATION. SUITABLE
5. LIQUID MUST BE CIRCULATED AROUND PRIMARY RING (SEAL FACE)/THROUGH MATING RING (SEAT) (AT NOT LESS THAN [redacted]) IN ORDER TO REMOVE HEAT GENERATED,OR FAILURE MAY OCCUR.

(B)

6. WHEN SHAFT IS SLEEVED THROUGH STUFFING BOX, SLEEVE MUST BE LIQUID TIGHT THROUGH BORE.
7. SHAFT OR SLEEVE MUST BE CORROSION RESISTANT MATERIAL WITH A HARDNESS OF 125 BRINELL MINIMUM & BE MACHINED TO DIMENSIONS & TOLERANCES STATED.
8. END OF SEAL CHAMBER & AXIS OF SHAFT MUST BE AT 90° TO EACH OTHER WITHIN F.I.M. .002

(B) [redacted] (B)

10. BEFORE COMPLETING SEAL INSTALLATION WIPE LAPPED SURFACES OF MATING RING (SEAT) & 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.



JOHN CRANE INC.
International Sealing Systems
6400 Oakton Street
Morton Grove, IL 60053, U.S.A.

PERFORMANCE CURVES

3 x 2 - 6AC 1800 RPM Curve: G-1803