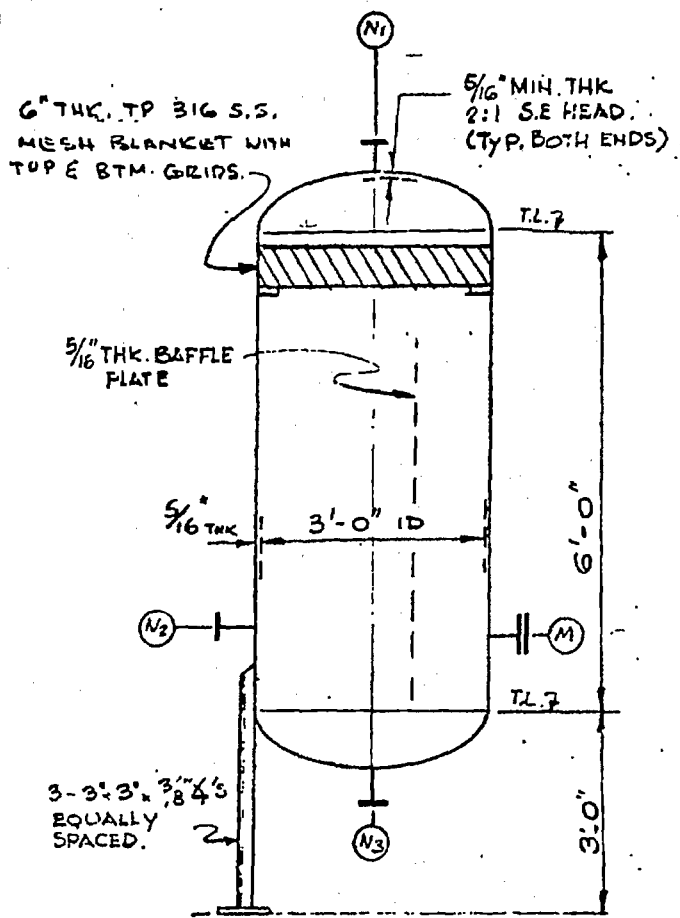


DESIGN DATA	
CODE ASME SECT VIII DIV 1	
SPECS.	
DESIGN	INT. 110 PSIG @ 300 °F
CONDITIONS	EXT. - PSIG @ - °F
OPER. PRESS.	85 PSIG @ 120 °F
HYDROGRAPHY	SPOT
POST WELD HEAT TREAT	NO
WELD EFF. SHELL BS%	HEADS 100%
EXPANSION ALLOWANCE	1/8"
NET FAB. WEIGHT	1983 #
EMPTY WEIGHT	
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-285-C FBO
HEADS	SA-285-C FBO
SUPPORT	SA-36
NOZZLE NECKS	SA-106-A & B
FLANGES	SA-191-6E I
INTERALS	C-STL. U.W.
MANWAY (MINED BY MANWAY)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM CLIPS	NO
DAVIT SUPPORTS	NO
PIPE SUPPORT LUGS	NO
PIPE GUIDE LUGS	NO
FIRE PROOFING	BY OTHERS
INSULATION	
PAINT	1 SHOP COAT PRIMER
LIFTING LUGS	YES



NO.	SIZE	RATING	FLANGES	SERVICE
M1	1 1/2"			MANWAY w/ BE STUDS, NUTS & GASKET
N3	2"			
N2	4"			
N1	4"	150°	RF	

NOZZLE SCHEDULE

RADIAL NOZZLE AND MANWAY PROJECTIONS ARE FROM O.D. OF VESSEL TO EXTREME FACE OF FLANGE EXCEPT FOR INTEGRAL REINFORCED NOZZLES OR OTHERWISE NOTED

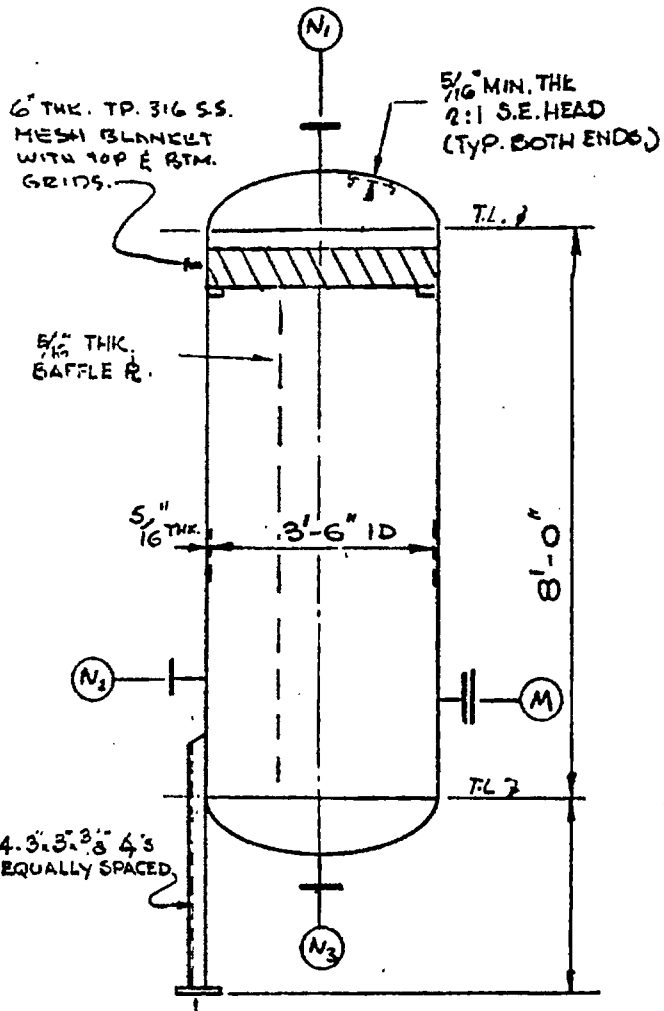
SIZE	PROJECTION	SIZE	PROJECTION
THRU	---	THRU	---
THRU	---	THRU	---

NO.	REVISION	DATE	BY	CHK.

Procon Incorporated
HIGH PRESSURE AERATION INERT
GAS COMPRESSOR DISCHARGE K.O. POT
ITEM NO 13.06-73 UNIT 1300
HYGAS
167 CHICAGO, ILL.

DRAWN T.G. DATE 1/4/72
CHECKED APPROVED R DWG. NO A

DESIGN DATA	
CODE ASME SECT VIII DIV 1	
SPECS.	
DESIGN CONDITIONS	INT. 60 PSIG @ 300 °F EXT. - PSIG @ - °F
OPER. PRESS.	34 PSIG @ 120 °F
RADIOGRAPHY	SPOT
POST WELD HEAT TREAT	NO
JOINT EFF. SHELL	85% HEADS 100%
CORROSION ALLOWANCE	1/8"
NET FAB. WEIGHT	2585 #
EMPTY WEIGHT	
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	A-285-C FBQ
HEADS	A-285-C FBQ
SUPPORT	A-36
NOZZLE NECKS	A-106-B
FLANGES	A-181-GRJ
INTERNALS	C.STL. U.N.
MANWAY (HIJSED OR GRATED)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM CLIPS	NO
DAVIT SUPPORTS	NO
PIPE SUPPORT LUGS	NO
PIPE GUIDE LUGS	NO
FIREPROOFING	BY OTHERS
INSULATION	
PAINT	1 SHOP COAT PRIMER
LIFTING LUGS	YES



MARK NO.	NO.	SIZE	RATING	FACING	SERVICE
M	1	18" ID			MANWAY W/ BF, STUDS, NUTS & GSKT
N ₃	1	4"			
N ₂	1	3"			
N ₁	1	4"	150°	RF	

NOZZLE SCHEDULE

RADIAL NOZZLE AND MANHOLE PROJECTIONS ARE FROM O.D. OF VESSEL TO EXTREME FACE OF FLANGE EXCEPT FOR INTEGRAL REINFORCED NOZZLES OR OTHERWISE NOTED

SIZE	PROJECTION	SIZE	PROJECTION
THRU		THRU	
THRU		THRU	

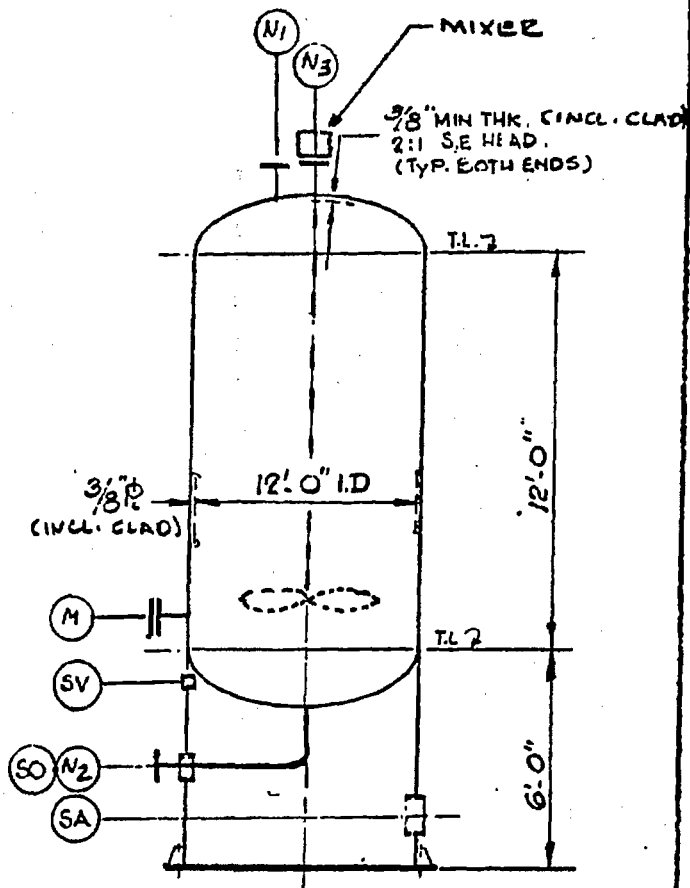
NO.	REVISION	DATE	BY	CHK.

Procon Incorporated
 LOW PRESSURE AERATION INERT
 GAS COMPRESSOR DISCHARGE K.O. POT
 ITEM NO. 13.06-44 UNIT 1300
 HYGAS
 16T CHICAGO, ILL.

DRAWN T.G. DATE 1/4/72
 CHECKED APPROVED R DWG. NO A

DESIGN DATA	
CODE	ASME SECT VIII DIV I
SPECS.	
DESIGN CONDITIONS	INT 30 PSIG @ 300 °F EXT. PSIG @ °F
OPER. PRESS.	6 PSIG @ 250 °F
RADIOGRAPHY	SPOT
POST WELD HEAT TREAT	NO
JOINT EFF. SHELL	85 %
HEADS	85 %
CORROSION ALLOWANCE	1/8"
NET FAB. WEIGHT	
EMPTY WEIGHT	
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-285 C *
HEADS	SA-285 C *
SUPPORT	SA-283 C
NOZZLE NECKS	SA-53A OR SA-106A *
FLANGES	SA-181 GR.1 *
INTERNALS	TP. 316 S.S.
GASKETS	1/16" THK. COMP. ASBESTOS
MANWAY (RHS)	(None)
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM CLIPS	YES
DAVIT SUPPORTS	NO
PIPE SUPPORT LUGS	NO
PIPE GUIDE LUGS	NO
FIREPROOFING	BY OTHERS
INSULATION	
PAINT	1 SHOP COAT PRIMER
LIFTING LUGS	YES

* CLAD SHELL AND HEADS WITH 0.125" MIN. TP. 316 S.S. PER ASTM A-264. NOZZLES LINED & FACED WITH TP. 316 S.S.



MARK	NO.	SIZE	REF. NO.	FACE	SERVICE
SO	1	8"	-	-	SKIRT OPENING
SA	1	18"	-	-	SKIRT ACCESS
SV	1	4"	-	-	SKIRT VENT
M	1	18 ID	A	A	MANWAY W/RF, STUDS, NUTS & GASK
N3	1	36"			MIX CONN. (w/MIXER)
N2	1	12"			
N1	2	12"	150°	RF	

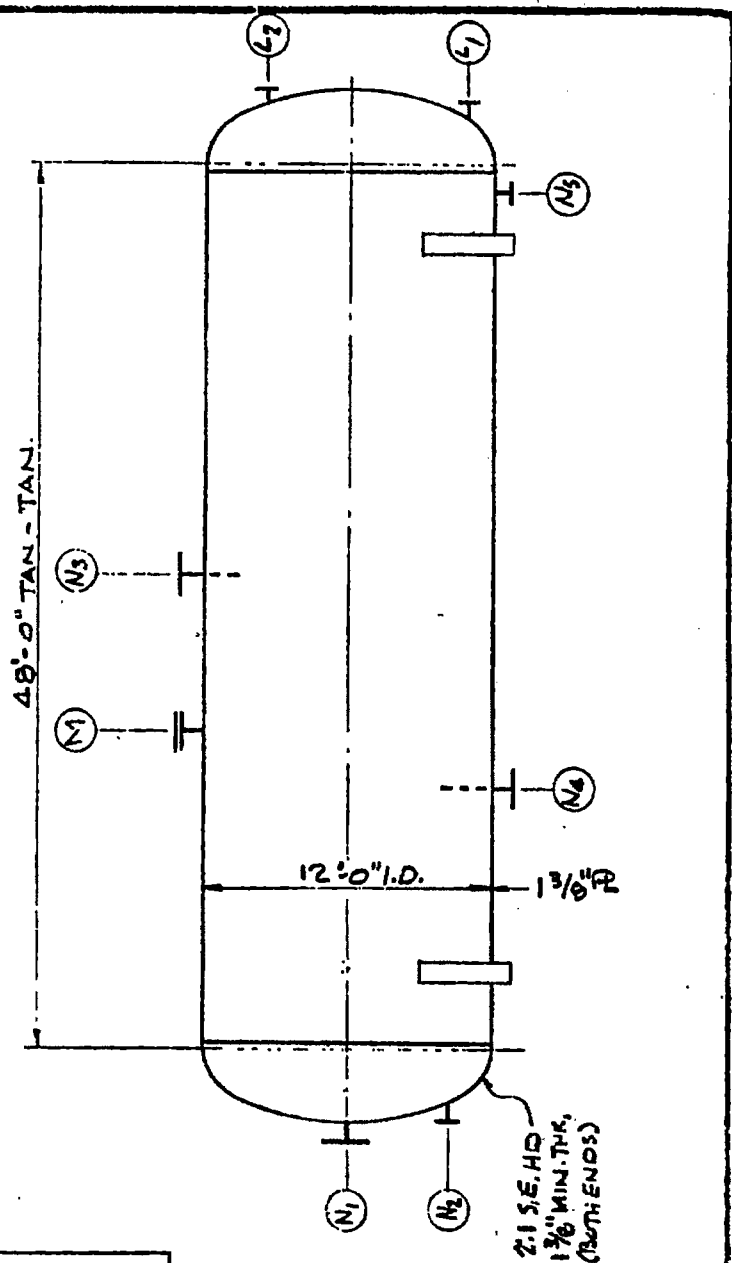
NOZZLE SCHEDULE			
SIZE	PROJECTION	SIZE	PROJECTION
THRU		THRU	
THRU		THRU	

NO.	REVISION	DATE	BY	CHK.

Procon Incorporated
 PRETREATER TAR OIL
 MIX DRUM
 ITEM NO. 13.06-45 UNIT 1300
 HVGAS
 16T CHICAGO, ILL.
 DRAWN T.G. DATE 1/4/72
 CHECKED APPROVED B DWG. NO A

DESIGN DATA	
CODE ASME 1971 SECT I	
SPECS.	
DESIGN CONDITIONS	INT. 275 PSIG @ 600°F
	EXT. PSIG @ °F
OPER. PRESS.	2.50 PSIG @ 406°F
RADIOGRAPHY	100%
POST WELD HEAT TREAT	YES
JOINT EFF. SHELL & HDS.	100%
CORROSION ALLOWANCE	1/8"
NET FAB. WEIGHT	206600#
EMPTY WEIGHT	
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-515-70
HEADS	SA-515-70
SUPPORT	SA-36*
NOZZLE NECKS	SA-106 B
FLANGES	SA-181 GR1
INTERNALS	C.S.
CSKT.	1/16" THK. JM60 OR EQUAL
MANWAY (HINGED MANWAY)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM CLIPS	YES
DAVIT SUPPORTS	NO
PIPE SUPPORT LUGS	NO
PIPE GUIDE LUGS	NO
FIREPROOFING	NONE
INSULATION	1/2" BY OTHERS.
PAINTS	SUPPLY 1-SHOP COAT

* WEAR PL. SA-515-70



NO.	SIZE	TYPE	FACING	SERVICE
N1-L4	4"	2"	300°	RF LC & LG
N5	1"	2"	300°	RF DRAIN
N4	1"	16"	300°	RF WATEROUT W/INT. PIPE
N3	1"	16"	300°	RF STEAM OUTLET W/INT. PIPE
N2	1"	8"	300°	RF INLET
M1	1"	16"	300°	RF INST
M	1"	18"	300°	RF MANHOLE W/2.F., STUDS, NUTS & CSKT

NOZZLE SCHEDULE			
SIZE	PROJECTION	SIZE	PROJECTION
THRU	---	THRU	---
THRU	---	THRU	---

NO.	REVISION	DATE	BY	CHK.

Procon Incorporated
STEAM DRUM
 ITEM NO. 13.06-96 UNIT 1300
 HYGAS

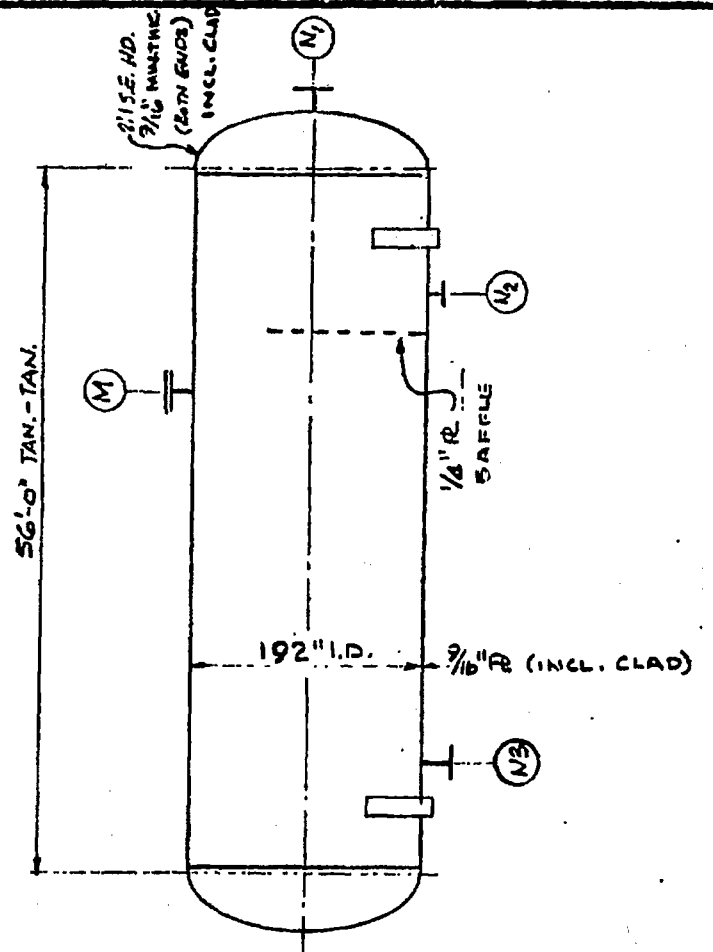
1GT CHICAGO, ILL.

DRAWN CHECKED APPROVED DATE DWG. NO A

Reproduced from best available copy.

DESIGN DATA	
CODE ASME 1971 SECTION VIII DIV. 1	
SPECS.	
DESIGN CONDITIONS	INT 50 PSIG @ 300°F
	EXT. PSIG @ °F
OPER. PRESS.	17 PSIG @ 250°F
RADIOGRAPHY	SPOT
POST WELD HEAT TREAT NO.	
JOINT EFF.	80% REMAINDER 85%
CORROSION ALLOWANCE 1/8"	
NET FAB. WEIGHT	44900*
EMPTY WEIGHT	
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-285-C *
HEADS	SA-285-C *
SUPPORT	SA-36
NOZZLE NECKS	SA-106 A or B *
FLANGES	SA-181 GR1 *
INTERNALS	TP, 316 S.S.
CKET.	1/16" 1M60 OR EQUAL
MANWAY (MINUS COVER)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM CLIPS	YES
DAVIT SUPPORTS	NO
PIPE SUPPORT LUGS	NO
PIPE GUIDE LUGS	NO
FIREPROOFING	NO
INSULATION	1" BY OTHERS
PAINT SUPPLY	1-SHOP COAT ZINC CHROMATE

* CLAD SHELL AND HEADS WITH 0.125" MIN. TP, 316 S.S. PER ASTM A-264, NOZZLES LINED & FACED WITH TP, 316 S.S.



LINE	QTY	SIZE	TYPE	FACING	SERVICE
N5	1	6"	RF	RF	VENT
N4	1	42"	RF	RF	OUTLET
N3	1	42"	CL175	RF	OUTLET
N2	1	24"	RF	RF	OUTLET
N1	1	36"	CL175	RF	INLET
M	1	18"	RF	RF	MANHOLE W/B.F., STUDS, NUTS & SOCKET

NOZZLE SCHEDULE

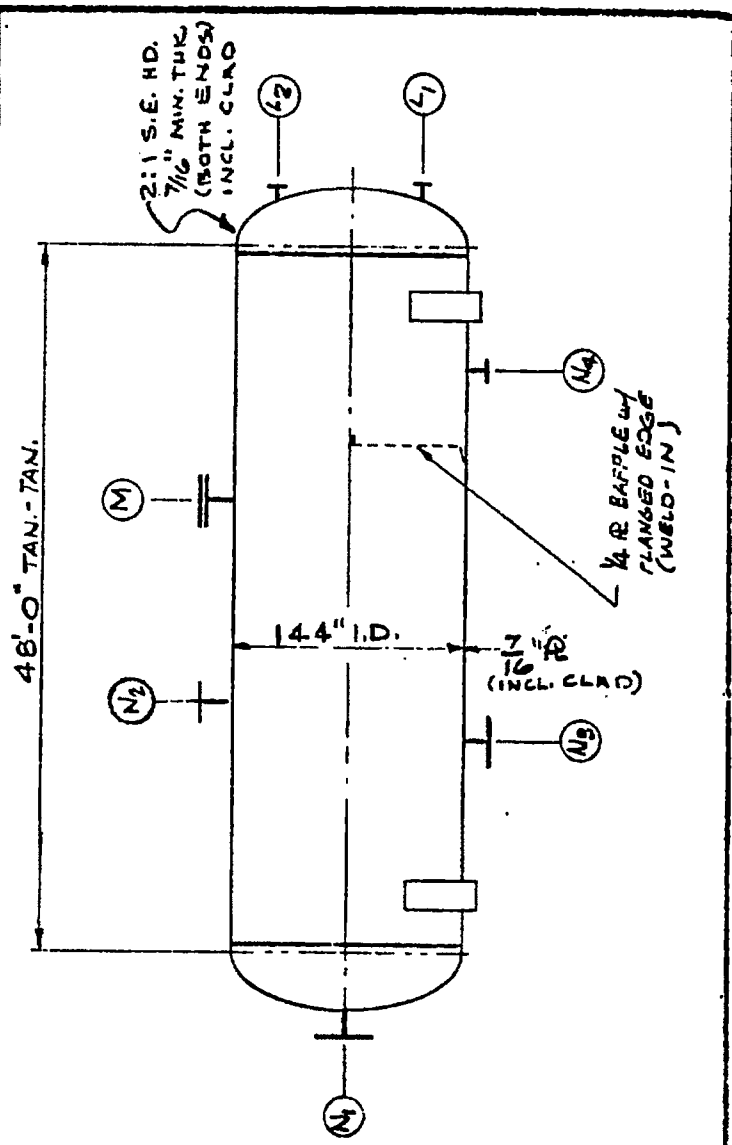
RADIAL NOZZLE AND MANHOLE PROJECTIONS ARE FROM O.D. OF VESSEL TO EXTREME FACE OF FLANGE EXCEPT FOR INTERNAL REINFORCED NOZZLES OR OTHERWISE NOTED			
SIZE	PROJECTION	SIZE	PROJECTION
THRU	_____	THRU	_____
THRU	_____	THRU	_____

NO.	REVISION	DATE	BY	CHK.

Procon Incorporated
 TAR-OIL DECANTER
 ITEM NO. 13.06-47 UNIT 1300
 HYGAS
 1617 CHICAGO, ILL.

DATE _____
 DWG. NO _____
 CHECKED _____
 APPROVED _____

DESIGN DATA	
CODE ASME 1971 SECT. VIII DIV. 1	
SPECS.	
DESIGN CONDITIONS	INT. 50 PSIG @ 250 °F EXT. PSIG @ °F
OPER. PRESS.	16 PSIG @ 125 °F
RADIOGRAPHY	SPOT
POST WELD HEAT TREAT	NO.
JOINT EFF. SHELL	85% HDS. 85%
CORROSION ALLOWANCE	1/8"
NET FAB. WEIGHT	16600*
EMPTY WEIGHT	
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-285-C *
HEADS	SA-285-C *
SUPPORT	SA-36
NOZZLE NECKS	SA-106 A OR B *
FLANGES	SA-181 GR. 1 *
INTERNALS	TP 316 S.S.
GSKT	1/4" THK. 3160 OR EQ.
MANWAY (HINGED OR OTHERWISE)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM CLIPS	YES
DAVIT SUPPORTS	NO
PIPE SUPPORT LUGS	NO
PIPE GUIDE LUGS	NO
FIREPROOFING	NO.
INSULATION	NONE
PAINT 1-SHOP COAT ZINC CHROMATE	
* CLAD SHELL AND HEADS WITH 0.125" MIN. TP. 316 S.S. PUR ASTM A-264. NOZZLES LINED AND FACED WITH TP. 316 S.S.	



MARK NO.	SIZE	NO.	TYPE	FACE	SERVICE
N5	4	2"	150°	RF	LC
N5	1	6"	150°	LF	VENT
N4	1	6"	150°	RF	OUTLET
N3	1	24"	150°	RF	OUTLET
N2	1	10"	150°	RF	VAPOR OUTLET
N1	1	30"	CL. 75°	RF	INLET
M	1	18"	150°	RF	MANHOLE w/ G.F., STUDS, NUTS & GSKT

NOZZLE SCHEDULE			
RAIHAL NOZZLE AND MANHOLE PROJECTIONS ARE FROM O.D. OF VESSEL TO EXTREME FACE OF FLANGE EXCEPT FOR INTERGRAL REINFORCED NOZZLES OR OTHERWISE NOTED			
SIZE	PROJECTION	SIZE	PROJECTION
THRU	---	THRU	---
THRU	---	THRU	---

NO.	REVISION	DATE	BY	CHK.

Procon Incorporated
PRETREATER QUENCH SEPARATOR
ITEM NO. 1306-4B UNIT 1300
HYGAS
16T CHICAGO, ILL.

DRAWN	DATE
CHECKED	
APPROVED	DWG. NO
	A

**AIR-COOLED EXCHANGER
SPECIFICATION**

Procon Incorporated

Customer	IGT - HYGAS PLANT		
Date	3/24/72	Page	Item No. 13.07-01
Service	Venturi Scrubber Recycle Water Air Fin Cooler		
Units	Model	Induced Forced Draft	No. of Bays 7
Surface Area	External 880,000 Ft. ² approx.	Base Tube	Sq. Ft.
Heat Exchanged	BTU Hr 148 x 10 ⁶	Effective MTD	F
Transfer Rate	External Surface	Base Tube Surface	BTU Hr Sq. Ft. F
PERFORMANCE DATA			
TUBE SIDE			
Fluid Circulated	H ₂ O + Traces of SO ₂ & CO ₂		Temperature In 150 F
Total Fluid Entering	Lbs. Hr 15,020,000		Temperature Out 140 F
Vapor			Inlet Pressure 55 psia psig
Liquid	15,020,000		Gravity - Liquid
Steam			Viscosity Cps F
Non-Condensables			Viscosity Cps F
Vapor Condensed			Molecular Weight 18.14
Steam Condensed			Allowable Press Drop 10 psi
Fouling Res. IS	Hr Sq. Ft. F HTU	0.002	Design Pressure Drop psi
AIR SIDE			
Air Quantity Item	Lbs. Hr		Temperature In F
Air Quantity Fan	ACFM		Temperature Out F
			Altitude Ft
CONSTRUCTION			
Design Pressure	85 PSI	Temp. Pressure ASME Code	Design Temperature 350 F
SECTION	HEADER	TUBE	
Size	Type Plug	Material C.S.	
No. Item	Material C.S.	OD 1" In 13 BWG Min. Wall	
Tube Support - Zn Al Plated Bands	No. Rows Passes	No. Section	
STRUCTURE - Carbon Steel	Plugs, Studding C.S. Material	Length 30 Ft.	
Surface Prep. Gate Brush	Coating Material Solid Metal	Pitch In Δ	
	Corrosion Allowance 1/8" In	FIN	
Finish - One Coat Primer	Size Inlet Nozzle In	Material Al	
	Size Outlet Nozzle In	Height 24" O.D.	
<input checked="" type="checkbox"/> Fan Guards	Series 150# R.F.	No. In.	
<input checked="" type="checkbox"/> Belt Guards	Vent & Drain Conn	Type	
<input type="checkbox"/> Coupling Guard	Code ASME XX Stamp Req'd		
MECHANICAL EQUIPMENT			
FAN MFR	DRIVER	SPEED REDUCER	
Model	Type Elect. Motor	Type	
No. Bay 2	No. Item 14	No. Item 28	HP Driver 25
BHP Each	BHP Total	RPM	No. Item 28
Diameter ft	RPM	Enclosure	Model
No. Blades	Pitch	Volt 460 Phase 3 Cycle 60	AGMA HP Rating
Blade Material	Mfr. Vendor Option - NEFA	Ratio	
Hub Material		Mfr.	
Min. Adj.	Auto Variable	Vib. Switch Not Req'd.	Support
Notes:			
Plot Size 180' x 30'			
Dimensions: Width	Length	Height	Shipping Weight Lbs.

Procon Incorporated

EXCHANGER DATA SHEET

W-1843

1	CUSTOMER IGT Hygas Plant		REG. No.	
2	ADDRESS		PAGE No.	
3	PLANT LOCATION		DATE	3/24/72
4	SERVICE OF UNIT H.P. Inert Gas Cooler		REVISED	
5	SIZE 4-1/2" O.D. x 240" long		ITEM NO.	13.07-52
6	TYPE Double Pipe		CONNECTED IN	Series
7	SURFACE PER UNIT 520 Ft. ²		SHELLS PER UNIT	2 Sections
8			SURFACE PER SHELL	260 Ft. ²
9	PERFORMANCE OF ONE UNIT			
10	FLUID CIRCULATED		SHELL SIDE	TUBE SIDE
11	TOTAL FLUID ENTERING #/hr.		Cooling Water	96%CO ₂ ; 3% C ₂ H ₆ ; 0.8%N ₂
12	VAPOR		36,700	19,900
13	LIQUID #/hr.			
14	STEAM			
15	NON-CONDENSABLES			19,900
16	FLUID VAPORIZED OR CONDENSED			
17	STEAM CONDENSED			
18	GRAVITY—LIQUID			
19	VISCOSITY—LIQUID			
20	MOLECULAR WEIGHT—VAPORES			43.2
21	SPECIFIC HEAT—LIQUIDS		B.T.U./#	B.T.U./#
22	LATENT HEAT—VAPORES		B.T.U./#	B.T.U./#
23	TEMPERATURE IN		85 °F	350 °F
24	TEMPERATURE OUT		115 °F	120 °F
25	OPERATING PRESSURE		65 #/SQ. IN.	72 #/SQ. IN.
26	NUMBER OF PASSES			
27	VELOCITY		FT./SEC.	FT./SEC.
28	PRESSURE DROP		10 #/SQ. IN.	3 #/SQ. IN.
29	Fouling Factor		0.002	0.001
30	HEAT EXCHANGED—B.T.U./HR.		1.1 X 10 ⁶	M.T.D. (Corrected)
31	TRANSFER RATE—SERVICE			CLEAN
32	CONSTRUCTION			
33	DESIGN PRESSURE		150 #/SQ. IN.	150 #/SQ. IN.
34	TEST PRESSURE			#/SQ. IN.
35	DESIGN TEMPERATURE		650 °F	650 °F
36	TUBES	NO.	O.D.	B.W.G.
37	SHELL	C.S.	I.D.	O.D.
38	SHELL COVER	C.S.	THICKNESS	
39	Tube Adapter	C.S.	FLOATING HEAD COVER	
40	TUBE SHEETS—STATIONARY	C.S.	CHANNEL COVER	
41	BAFFLES—CROSS		TYPE	THICKNESS
42	BAFFLE—LONG		TYPE	THICKNESS
43	TUBE SUPPORTS		THICKNESS	
44	GASKETS			
45	CONNECTIONS—SHELL—IN		OUT	SERIES
46	CHANNEL—IN		OUT	SERIES
47	CORROSION ALLOWANCE—SHELL SIDE	1/8"	TUBE SIDE	1/8"
48	CODE REQUIREMENTS	ASME VIII	TENSILE CLASS	
49	WEIGHTS—EACH SHELL		BUNDLE	FULL OF WATER
50	NOTE: INDICATE AFTER EACH PART WHETHER STRESS BELIEVED (S. B.) AND WHETHER RADIOGRAPHED (X-R)			
51	REMARKS:			
52				

Procon Incorporated

EXCHANGER DATA SHEET

W-1843

1	CUSTOMER IGT Hygas Plant		REQ. No.	
2	ADDRESS		PAGE No.	
3	PLANT LOCATION		DATE 1/24/72	
4	SERVICE OF UNIT L.P. Inert Gas Cooler		REVISED	
5	SIZE 4-1/2" O.D. x 240" long TYPE Double Pipe		ITEM NO. 13.07-53	
6	SURFACE PER UNIT 530 FT. ² SHELLS PER UNIT 2 Sections		CONNECTED IN Series	
7			SURFACE PER SHELL 265 FT. ²	
8	PERFORMANCE OF ONE UNIT			
9			SHELL SIDE	
10	FLUID CIRCULATED		Cooling Water	
11	TOTAL FLUID ENTERING #/hr.		27,800	
12	VAPOR		21,800	
13	LIQUID #/hr.		27,800	
14	STEAM			
15	NON-CONDENSABLES		21,800	
16	FLUID VAPORIZED OF CONDENSED			
17	STEAM CONDENSED			
18	GRAVITY—LIQUID			
19	VISCOSITY—LIQUID			
20	MOLECULAR WEIGHT—VAPORS		43.2	
21	SPECIFIC HEAT—LIQUIDS		B.T.U./#	
22	LATENT HEAT—VAPORS		B.T.U./#	
23	TEMPERATURE IN		85 °F	
24	TEMPERATURE OUT		115 °F	
25	OPERATING PRESSURE		65 #/SQ. IN.	
26	NUMBER OF PASSES		37	
27	VELOCITY		FT./SEC.	
28	PRESSURE DROP		10 #/SQ. IN.	
29			0.002	
30			0.001	
31	HEAT EXCHANGED—B.T.U./HR.		0.83 X 10 ⁶	
32	TRANSFER RATE—SERVICE		M.T.D. (Corroded)	
33	CONSTRUCTION			
34	DESIGN PRESSURE		150 #/SQ. IN.	
35	TEST PRESSURE		150 #/SQ. IN.	
36	DESIGN TEMPERATURE		650 °F	
37	TUBES C. S.		NO. O.D. SWG. LENGTH	
38	SHELL C. S.		I.D. O.D. THICKNESS	
39	SHELL COVER C. S.		FLOATING HEAD COVER	
40	Tube Adapter C.S.		CHANNEL COVER	
41	TUBE SHEETS—STATIONARY C. S.		FLOATING	
42	BAFFLES—CROSS C.S.		TYPE THICKNESS	
43	BAFFLE—LONG		TYPE THICKNESS	
44	TUBE SUPPORTS		THICKNESS	
45	GASKETS			
46	CONNECTIONS—SHELL—IN		OUT SERIES	
47	CHANNEL—IN		OUT SERIES	
48	CORROSION ALLOWANCE—SHELL SIDE 1/8"		TUBE SIDE 1/8"	
49	CODE REQUIREMENTS ASME VIII		TEMA CLASS	
50	WEIGHTS—EACH SHELL		BUNDLE FULL OF WATER	
51	NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S. R.) AND WHETHER RADIOGRAPHED (X-R)			
52	REMARKS:			

Procon Incorporated

EXCHANGER DATA SHEET

CUSTOMER IGT HYGAS PLANT	REQ. No. _____	
ADDRESS _____	PAGE No. _____	
PLANT LOCATION _____	DATE 3/24/72	
SERVICE OF UNIT Quench Tower Recycle Water Cooler	REVISED _____	
SIZE _____ TYPE AES	ITEM NO. 13.07-54	
SURFACE PER UNIT 13,300 Ft. ²	CONNECTED IN Parallel	
SHELLS PER UNIT 2	SURFACE PER SHELL 6700 Ft. ²	
PERFORMANCE OF ONE UNIT		
	SHELL SIDE	TUBE SIDE
FLUID CIRCULATED	Cooling Water	Water plus Traces SO ₂
TOTAL FLUID ENTERING #/Hr.	3,334,100	6,668,200
VAPOR		
LIQUID	3,334,100	6,668,200
STEAM		
NON-CONDENSABLES		
FLUID VAPORIZED OR CONDENSED		
STEAM CONDENSED		
GRAVITY—LIQUID		
VISCOSITY—LIQUID		
MOLECULAR WEIGHT—VAPORES		
SPECIFIC HEAT—LIQUIDS	B.T.U./#	B.T.U./#
LATENT HEAT—VAPORES	B.T.U./#	B.T.U./#
TEMPERATURE IN	85 °F	110 °F
TEMPERATURE OUT	95 °F	105 °F
OPERATING PRESSURE	65 #/SQ. IN.	55 #/SQ. IN.
NUMBER OF PASSES		
VELOCITY	FT./SEC.	FT./SEC.
PRESSURE DROP	10 #/SQ. IN.	10 #/SQ. IN.
HEAT EXCHANGED—B.T.U./HR. 33 x 10 ⁶	A.L.T.D. (Corrected)	
TRANSFER RATE—SERVICE	CLEAN	
CONSTRUCTION		
DESIGN PRESSURE	120 #/SQ. IN.	120 #/SQ. IN.
TEST PRESSURE	#/SQ. IN.	#/SQ. IN.
DESIGN TEMPERATURE	650 °F	650 °F
TUBES C.S. NO. 1300	O.D. 1" BWG 12	MIN. LENGTH 20' PITCH 14" □
SHELL C.S.	I.D. 54" X 54"	THICKNESS
SHELL COVER C.S.		FLOATING HEAD COVER C.S.
CHANNEL C.S.		CHANNEL COVER C.S.
TUBE SHEETS—STATIONARY C.S.		FLOATING C.S.
BAPLES—CROSS C.S.	TYPE	THICKNESS
BAPLE—LONG	TYPE	THICKNESS
TUBE SUPPORTS		THICKNESS
GASKETS		
CONNECTIONS—SHELL—IN	OUT	SERIES 150# R.F.
CHANNEL—IN	OUT	SERIES 150# R.F.
CORROSION ALLOWANCE—SHELL SIDE	1/8"	TUBE SIDE 1/8"
CODE REQUIREMENTS ASME Sect. VIII	Code Stamp	TEMA CLASS R.
WEIGHTS—EACH SHELL	BUNDLE	FULL OF WATER
NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S. R.) AND WHETHER RADIOGRAPHED (R.)		
REMARKS:		

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-13.08-1
 SHEET NO. 1
 TOTAL SHEETS 6
 DATE 1-18-72 EJM
 APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 13.08-01 A, B, C & D
 SITE _____ UNIT 1300 COAL PRETREATMENT
 SERVICE VENTURI SCRUBBER RECYCLE WATER MOTOR DRIVE 3 TURBINE DRIVE 1
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 4

OPERATING CONDITIONS		PERFORMANCE	
LIQUID <u>WATER WITH SMALL AMTS. NH₃ HCN, CH₃OH, PHENOL *</u>	U.S. GPM at 1 FT. HOR. DISCH PRESS., psig <u>10000</u> @ <u>11000</u>	PROPOSAL CURVE NO. _____	NPSH REQ'D (WATER), ft. _____
PT. <u>150</u>	SUOT PRESS., psig MAX <u>17</u> @ <u>13</u>	NO. OF STAGES _____	RPM _____
DISCH OR AT PT. <u>0.98</u>	DIFF PRESS., psi <u>52</u>	DES EFF. _____	BHP _____
VAP PRESS. at PT., psia <u>0.42</u>	DIFF HEAD, ft. <u>123</u>	MAX BHP DES IMP _____	MAX HEAD DES IMP, ft. _____
VIS at PT. <u>cp</u>	NPSH AVAIL., ft. <u>22</u>	MIN CONTINUOUS, GPM (BY MFR) _____	(1)
COOR/ENOS caused by <u>*BENZENE TOLUENE CRESOL, 0.6 SO₂, 4.1 CO₂ (WT. %)</u>		ROTATION FACING COUPLING END _____	

CONSTRUCTION AND MATERIALS				
CASING-MOUNTING (CENTERLINE) (FOOT) (BRACKET) (VERTICAL)				
SPLIT (AXIAL X) (RADIAL)				
TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE X) (DIFFUSER)				
TAPPED OPENINGS (VENT X) (DRAIN X) (GAUGE CONNS.)				
NOZZLES	SIZE	ASA RATING	FACING	POSITION
SUCTION				
DISCHARGE				
IMPELLER DIAM DFB _____	MAX _____	TYPE <u>CLOSED</u> (2)		
MFR'S BEARING NO. RADIAL _____	THRUST _____			
COUPLING and GUARD <u>THOMAS</u>	/YES BASE PLATE <u>DRAIN RIM</u>			
PACKING _____				
MECH SEAL <u>YES, BAL.</u>	CLASS. CODE _____	MFR _____		

MATERIAL CODE-EXTERNAL CASING		INTERNAL PARTS		API SEAL PIPING PLAN 31	
<u>S</u>	<u>(A)</u>	<u>I</u>	<u>(A)</u>	<u>(TRACES OF COAL FINES)</u>	
1-CAST IRON	INTERNALS CODE	I	B	S	O
2-BRONZE	IMPELLER	I	B	S	O
3-STEEL	INNER CASE PARTS	I	I	B	O
4-11-13% CHROME	SLEEVE (PACKED)	CH	CH	AI	AI
5-ALLOY	SLEEVE (SEAL)	O	O	O	O
6-HARDENED	WEAR PARTS	X	B	CH	CH
7-FACED	SHAFT	B	B	B	B
X-					
				SHOT TESTS	REQUIRED
				RUNNING PERM	X
				NPSH	
				HYDROSTATIC	PSIG
				MAX ALLOW. WP	PSIG
				WEIGHTS: PUMP	BASE
				MOTOR	TURBINE

MOTOR DRIVER BY PUMP MFR		TURBINE DRIVER BY PUMP MFR		MFR FINAL DATA (AS BUILT)	
ITEM NO. <u>A, B & C</u>	NTD BY <u>PUMP MFR</u>	ITEM NO. <u>D</u>	NTD BY <u>PUMP MFR</u>	ACTUAL IMPELLER DIAM _____	
HP _____	RPM _____	HP _____	RPM _____	TEST CURVE NO. _____	
MFR _____	TYPE <u>SCI</u>	MFR and TYPE _____	INLET STREAM, psig <u>250</u>	OUTLINE DWG NO. _____	
INSUL <u>B</u>	TEMP RISE <u>80</u>	EXHAUST <u>50 PSIG</u>	TEMP <u>456</u>	PUMP SECT. DWG NO. _____	
Δ VOLT/PHASE/CYCLES <u>4160/3/60</u>	BEARINGS <u>SLV</u>	STEAM RATE, FL _____	D/BHP/HR _____	SEAL DIAM DWG NO. _____	
LUDE <u>OIL</u>	FULL LOAD AMPS _____	BEARINGS _____	LUDE _____	PUMP SERIAL NO. _____	
		NOZZLES	SIZE	ASA RATING	FACING
		INLET			
		EXHAUST			

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
 EXCEPTIONS (ITEMIZE): (1) PLS. ADVISE. (2) FURNISH DOUBLE SUCTION IMPELLER (3) PROVIDE SPEED REDUCTION GEAR FOR ECONOMICAL TAPPING SELECTION. (4) PUMP MFR. SHALL CONFIRM SUITABILITY OF PUMP MATERIALS ON RECOMMEND. (A)

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED
Δ	3-29-72	EJM						

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-13.08-1
 SHEET NO. 2
 TOTAL SHEETS 6 Δ
 DATE 1-18-72 EJM
 APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 13.08-02 A & B
 SITE _____ UNIT 1300
 SERVICE TAR OIL TRANSFER MOTOR DRIVE 2 TURBINE DRIVE _____
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 2

OPERATING CONDITIONS				PERFORMANCE			
Δ LIQUID <u>OIL SLURRY W/ TAR</u>	U.S. GPM at PT. NOM	<u>500</u>	DEL. H.	<u>550</u>	Δ PROPOSAL CURVE NO.		
<u>& ~14 WT.% COAL FINES</u>	DISCH PRESS., psig	<u>60</u>			NPSH REQ'D (WATER), ft.		
Δ PTF <u>148</u>	SUCT PRESS., psig MAX	<u>8</u>	DEL. H.	<u>6</u>	NO. OF STAGES	RPM	
Δ SP OR at PT <u>0.956</u>	DIFF PRESS., psi	<u>54</u>			DES EFF	BHP	
TAP PRESS. at PT, psi	DIFF HEAD, ft.	<u>131</u>			Δ MAX BHP DES IMP		
Δ VIB at PT, Sec <u>cp. 2-1</u>	NPSH AVAIL., ft.	<u>10</u>			MAX HEAD DES IMP, ft.		
CORR/EROS caused by _____				MIN CONTINUOUS, GPM (BY MFR) _____ ①			

CONSTRUCTION AND MATERIALS					
CASING-MOUNTING (CENTERLINE X) (FOOT) (BRACKET) (VERTICAL)					
SPLIT (AXIAL) (RADIAL X)					
TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE) (DIFFUSER)					
TAPPED OPENINGS (VENT X) (DRAIN X) (GAUGE CONNL.)					
NOZZLES SIZE ASA RATING FACING POSITION					
SUCTION					
DISCHARGE					
IMPELLER DIAM DES MAX TYPE <u>CLOSED</u>					
MFR'S BEARING NO. RADIAL THRUST					
COUPLING and GUARD <u>THOMAS</u> /YES BASE PLATE <u>DRAIN RIM</u>					
PACKING _____					
MECH SEAL <u>YES, BAL.</u> CLASS. CODE _____ MFR _____					
PACKING COOLING _____					
FLUSHING PROVIDE FOR OUTSIDE FLUSH TO WEAR PARTS AND SEAL					
AUX PIPING BY PUMP MFR, _____					

MATERIAL CODE-EXTERNAL CASING <u>S</u>		INTERNAL PARTS <u>I</u>					
I-CAST IRON	IMPELLER	I	B	S	O	X	
B-BRONZE	INNER CASE PARTS	I	I	S	O		
S-STEEL	SLEEVE (PACKED)	Ch	Ch	AI	AI		
O-II-10% CERAMIC	SLEEVE (SEAL)	O	O	O	O		
A-ALLOY	WEAR PARTS	X	B	Ch	Ch	<u>(Ch)</u>	
D-HARDENED	SHAFT	B	B	S	B		
F-FACED							
X-							

MOTOR DRIVER BY <u>PUMP MFR</u>			TURBINE DRIVER BY _____			MFR FINAL DATA (AS BUILT)		
ITEM NO. <u>A & B</u>	NTD BY <u>PUMP MFR</u>		ITEM NO. _____	NTD BY _____		ACTUAL IMPELLER DIAM _____		
HP _____	RPM _____	FRAME _____	HP _____	RPM _____	MAT'L _____	TEST CURVE NO. _____		
MFR _____	TYPE <u>SCI</u> INSL <u>B</u>		MFR and TYPE _____			OUTLINE DWG NO. _____		
ENC <u>TEFC</u>	TEMP RISE C <u>80</u>	TEMP RISE F _____	INLET STREAM, MW _____			PUMP SECT. DWG NO. _____		
VOLTS/PHASE/CYCLES <u>460/3/60</u>	EXHAUST _____		EXHAUST _____			SEAL DIAM DWG NO. _____		
BEARINGS <u>FALL</u>	LUBR <u>GRS</u>	BEARINGS _____	LUBR _____			PUMP SERIAL NO. _____		
FULL LOAD AMPS _____	NOZZLES SIZE ASA RATING FACING POSITION		NOZZLES _____					
	INLET _____		INLET _____					
	EXHAUST _____		EXHAUST _____					

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
 EXCEPTIONS (ITEMIZ): 1 PLS. ADVISE

REV.	DATE	APPROVED	REV.	DATE	APPROVED
Δ	3-30-72	EJM			

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-13.08-1
 SHEET NO. 3
 TOTAL SHEETS 6 **A**
 DATE 1-19-72 EJM
 APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 13.08-03A,B,C
 SITE UNIT 1300
 SERVICE QUENCH TOWER RECYCLE WATER MOTOR DRIVE 3 TURBINE DRIVE _____
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 3

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>WATER W/ SMALL</u>	U.S. GPM at PT. NOH. <u>7000</u>	DESIGN <u>7700</u>	PROPOSAL CURVE NO. _____				
AMTS. <u>PHENOL, BENZENE, TOLUENE</u>	MISCH PRESS., psig <u>55</u>		NPSH REQ'D (WATER), ft. _____				
PT. <u>110</u>	SUCT PRESS., psig MAX <u>16</u>	DES. <u>16</u>	NO. OF STAGES _____				RPM _____
HP ON at PT. <u>0.991</u>	DIFF PRESS., psi <u>39</u>		DES EFF. _____				BHP _____
VAP PRESS. at PT, psia _____	DIFF HEAD, ft. <u>91</u>		MAX DHP DES IMP _____				
VIB at PT, Sec _____	NPSH AVAIL., ft. <u>16</u>		MAX HEAD DES IMP, ft. _____				
CORR/EROS caused by <u>0.6 SO₂ 4.1 CO₂ (WT. %)</u>			MIN CONTINUOUS, GPM (BY MFR) _____				(1)
CONSTRUCTION AND MATERIALS				ROTATION FACING COUPLING END			
CASING-MOUNTING (CENTERLINE) (FOOT) (BRACKET) (VERTICAL)				WATER COOLING _____			
SPLIT (AXIAL <u>X</u>) (RADIAL)				BEARINGS _____			
TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE <u>X</u>) (DIFFUSER)				STUFF BOX _____			
TAPPED OPENINGS (VENT <u>X</u>) (DRAIN <u>X</u>) (OAGE CONNG.)				PEDESTAL _____			
NOZZLES	SIZE	ASA RATING	PACING	POSITION	GLAND _____		
SUCTION					TOTAL WATER REQ'D, GPM _____		
DISCHARGE					PACKING COOLING _____		
IMPELLER DIAM DES _____	MAX _____	TYPE <u>CLOSED D.S.</u>	FLUSHING _____				
MFR'S BEARING NO. RADIAL _____	THRUST _____	AUX PIPING <u>By PUMP MFR.</u>					
COUPLING and GUARD <u>THOMAS</u>	<u>YES</u> BASE PLATE <u>DRAIN RIM</u>	API SEAL PIPING PLAN <u>12</u>					
PACKING _____							
NEOH SEAL <u>YES</u> BAL. CLASS CODE _____	MFR _____						

MATERIAL CODE-EXTERNAL CASING		INTERNAL PARTS					SHOP TESTS		
		I	B	S	O	X	REQUIRED	WITNESSED	
1-CAST IRON	IMPELLER	I	B	S	O		X		
2-BRONZE	INNER CASE PARTS	I	B	S	O				
3-STEEL	SLEEVE (PACKED)	Ch	Ch	AI	AI				
4-11-12% CHROME	SLEEVE (SEAL)	O	O	O	O				
5-ALLOY	WEAR PARTS	X	D	Ch	Ch	Ch			
6-HARDENED	SHAFT	S	S	S	S				
7-FACED									
8-									
9-									
10-									

MOTOR DRIVER BY PUMP MFR				TURBINE DRIVER BY				MFR FINAL DATA (AS BUILT)			
ITEM NO. <u>A,B & C</u>	MFR BY <u>PUMP MFR</u>	ITEM NO. _____	MFR BY _____	ACTUAL IMPELLER DIAM _____							
HP _____	RPM _____	HP _____	RPM _____	TEST CURVE NO. _____							
MFR _____	TYPE <u>SCI</u>	MFR and TYPE _____	INLET STREAM, psig _____	OUTLINE DWG NO. _____							
ENC <u>TEFC</u>	TEMP RISE <u>80</u>	EXHAUST _____	TEMP F _____	PUMP SECT. DWG NO. _____							
VOLTS/PHASE/CYCLES <u>460/3/60</u>	TEMP RISE <u>80</u>	EXHAUST _____	TEMP F _____	SEAL DIAM DWG NO. _____							
BEARINGS <u>BALL</u>	LUBE <u>GRS</u>	BEARINGS _____	LUBE _____	PUMP SERIAL NO. _____							
FULL LOAD AMPS _____		NOZZLES (SIZE ASA RATING PACING POSITION)									
		INLET									
		EXHAUST									

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
 EXCEPTIONS (ITEMIZE): **(1)** PLS. ADVISE **(2)** CONFIRM SUITABILITY OF PUMP MATERIALS OR RECOMMEND. **A**

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED
<u>A</u>	<u>3-30-72</u>	<u>EJM</u>						

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-13.06-1
 SHEET NO. 4
 TOTAL SHEETS 6
 DATE 1-19-72 EJM
 APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 13.08-04 A,B & C
 SITE _____ UNIT 1300
 SERVICE BOILER WATER CIRCULATING MOTOR DRIVE 2 TURBINE DRIVE 1
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 3

OPERATING CONDITIONS			PERFORMANCE		
LIQUID <u>BOILER WATER</u>	U.S. gpm at PT. NOM. <u>2200</u>	DESIGN <u>2500</u>	PROPOSAL CURVE NO. _____		
PT. <u>411</u>	DINCH PRESS., psig <u>305</u>		NPSH REQ'D (WATER), ft _____		
BP OR at PT. <u>0.85</u>	SUOT PRESS., psig MAX <u>280</u>	DES. HRS _____	NO OF STAGES _____	RPM _____	
VAP PRESS. at PT. psia <u>~ SAT.</u>	DIFF PRESS., psig <u>25</u>		DES EFF _____	DHP _____	
VIS at PT. Csu _____	DIFF HEAD, ft <u>68</u>		MAX BRP DES INP _____		
	NPSH AVAIL., ft <u>14</u>		MAX HEAD DES INP, ft _____		
CONRR/ERROR caused by _____			MIN CONTINUOUS, gpm (BY MFR) _____ (1)		

CONSTRUCTION AND MATERIALS				
OARING-MOUNTING (CENTERLINE <input checked="" type="checkbox"/>) (FOOT <input type="checkbox"/>) (BRACKET <input type="checkbox"/>) (VERTICAL <input type="checkbox"/>)				
SPLIT (AXIAL <input type="checkbox"/>) (RADIAL <input checked="" type="checkbox"/>)				
TYPE (SINGLE VOLUTE <input type="checkbox"/>) (DOUBLE VOLUTE <input checked="" type="checkbox"/>) (DIFFUSER <input type="checkbox"/>)				
TAPPED OPENINGS (VENT <input checked="" type="checkbox"/>) (DRAIN <input checked="" type="checkbox"/>) (GAGE CONNS. <input type="checkbox"/>)				
NOZZLES	SIZE	ASA RATING	FACING	POSITION
SUCTION				
DISCHARGE				

IMPELLER DIAM DES _____ MAX _____ TYPE CLOSED
 MFR'S BEARING NO. RADIAL _____ THRUST _____
 COUPLING AND GUARD THOMAS / YES BASE PLATE DRAIN RIM
 PACKING _____
 MFR SEAL YES, BAL. CLASS CODE _____ MFR _____
 API SEAL PIPING PLAN 23

MATERIAL CODE—EXTERNAL CASING <u>5% CHR</u> INTERNAL PARTS <u>X</u>						
1—CAST IRON	IMPELLER	I	B	S	O	X
2—BRONZE	INNER CASE PARTS	I	B	S	O	
3—STEEL	SL.FEVE (PACKED)	Ch	Ch	Al	Al	
4—11-12% CHROME	SLEEVE (SEAL)	O	O	O	O	
5—ALLOY	WEAR PARTS	I	B	Ch	Ch	
6—HARDENED	SHAFT	S	S	S	S	
7—FACED						
8—12 CHR.						

MOTOR DRIVER BY <u>PUMP MFR</u>		TURBINE DRIVER <u>(2)</u> BY <u>PUMP MFR</u>		MFR FINAL DATA (AS BUILT)		
ITEM NO. <u>A & B</u>	MTD BY <u>PUMP MFR</u>	ITEM NO. <u>C</u>	MTD BY <u>PUMP MFR</u>	ACTUAL IMPELLER DIAM _____		
HP _____	FRAME _____	HP _____	RPM _____	TEST CURVE NO. _____		
MFR _____		MFR and TYPE _____		OUTLINE DWG NO. _____		
TYPE <u>SCI</u>	INSUL. <u>B</u>	INLET STEAM, psig <u>250</u>	TEMP F <u>456</u>	PUMP SECT. DWG NO. _____		
ENG <u>TEFC</u>	TEMP RISE C. <u>50</u>	EXHAUST <u>50 PSIG</u>		SEAL DIAM DWG NO. _____		
VOLTS/PHASE/CYCLES <u>460-3-60</u>		STREAM RATE, FL _____	IN/BHP/HR _____	PUMP SERIAL NO. _____		
BEARINGS <u>BALL</u>	LUBE <u>GRS</u>	BEARINGS _____	LUBE _____			
FULL LOAD AMPS _____		NOZZLES	SIZE	ASA RATING	FACING	POSITION
		INLET				
		EXHAUST				

API STD. 610 GOVERNS UNLESS OTHERWISE STATED. FEEDWATER PUMP REQUIRED
 EXCEPTIONS (ITEMIZE): (1) PLS. ADVISE (2) PROVIDE SPEED REDUCTION GEAR FOR ECONOMICAL TURBINE SELECTION.

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED
Δ	3-30-72	EJM						

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-13.08-1
 SHEET NO. 5
 TOTAL SHEETS 6 4
 DATE 1-19-72 EJM
 APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 13.08-05 A&B
 SITE UNIT 1300
 SERVICE BOILER FEED WATER PUMPS MOTOR DRIVE 1 TURBINE DRIVE 1
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 2

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>DEAERATED, TREATED</u>	U.S. gpm at PT, NOR.	<u>875</u>	DEH	<u>1000</u>	PROPOSAL CURVE NO.		
B.F. WATER PH <u>7.5 to 8.5</u>	DISCH PRESS., psig	<u>350</u>			NPBH REQ'D (WATER), ft		
PTV <u>240</u>	SUCT PRESS., psig MAX	<u>100</u>	DEH	<u>90</u>	NO. OF STAGES		
SP OR AT PT. <u>0 95</u>	DIFF PRESS., psig	<u>260</u>			DES EFF		
VAP PRESS. at PT, psia	DIFF HEAD, ft	<u>632</u>			MAX BHP DES IMP		
VIS at PT, Csu	NPSH AVAIL., ft	<u>25</u>			MAX HEAD DES IMP, ft		
COND/EROS caused by				MIN CONTINUOUS, gpm (BY MFR)			

CONSTRUCTION AND MATERIALS				
CASING-MOUNTING (CENTERLINE X) (FOOT) (BRACKET) (VERTICAL)				
SPLIT (AXIAL) (RADIAL X)				
TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE X) (DIFFUSER)				
TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE CONNS.)				
NOZZLES	SIZE	ASA RATING	FACING	POSITION
SUCTION				
DISCHARGE				
IMPELLER DIAM DES	MAX	TYPE	<u>CLOSED</u>	
MFR'S BEARING NO. RADIAL	THRUST			
COUPLING and GUARD <u>THOMAS</u>	/YES		BASE PLATE <u>DRAIN RIM</u>	
PACKING				
MESH SEAL <u>YES, BAL.</u>	CLASS CODE	MFR		

MATERIAL CODE-EXTERNAL CASING <u>S</u>		INTERNAL PARTS <u>X</u>				
1-CAST IRON	INTERNAL CODE	I	B	S	O	Z
2-BRONZE	IMPELLER	I	B	R	O	S
3-STEEL	INNER CASE PARTS	I	I	R	O	S
4-11-1/2% CHROME	SLEEVE (PACKED)	Ch	Ch	At	At	-
5-ALLOY	SLEEVE (SEAL)	O	O	O	O	C
6-HARDENED	WEAR PARTS	I	R	Ch	Ch	Ch
7-FACED	SHAFT	S	S	R	S	4140
X-						

MOTOR DRIVER BY Pump MFR		TURBINE DRIVER BY Pump MFR		MFR FINAL DATA (AS BUILT)	
ITEM NO. <u>A</u>	MTD BY <u>Pump MFR</u>	ITEM NO. <u>B</u>	MTD BY <u>PUMP MFR</u>	ACTUAL IMPELLER DIAM	
HP	RPM	HP	RPM	TEST CURVE NO.	
MFR	FRAME	MFR	MATL	OUTLINE DWG NO.	
TYPE <u>SCI</u>	INSUL <u>B</u>	INLET STEAM, psig	<u>250</u>	TEMP <u>F 456</u>	PUMP SECT. DWG NO.
ERG <u>TEFC</u>	TEMP RISE C <u>80</u>	EXHAUST	<u>50 PSIG</u>		SEAL DIAM DWG NO.
VOLTS/PHASE/CYCLES <u>460-3-60</u>	LUBE <u>GES</u>	STEAM RATE, FL		D/BHP/HR	PUMP SERIAL NO.
BEARINGS <u>BALL</u>		BEARINGS	LUBE		
FULL LOAD AMPS		NOZZLES	SIZE	ASA RATING	FACING
		INLET			POSITION
		EXHAUST			

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
 EXCEPTIONS (ITEMIZE): 0 PLS. ADVISE

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED
<u>Δ</u>	<u>3-30-72</u>	<u>EJM</u>						

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-13.08-1
SHEET NO. 6
TOTAL SHEETS 6
DATE 3-27-72 EJM
APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 13.08-06 A & B
SITE UNIT 1300
SERVICE CONDENSATE PUMPS MOTOR DRIVE 2 TURBINE DRIVE _____
PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 2

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>WATER</u>	U.S. GPM at PT, HOR	<u>360</u> DES	<u>400</u>	PROPOSAL CURVE NO.			
PTF <u>298</u>	DISCH PRESS, psig	<u>65</u>		NPSH REQ'D (WATER), ft			
SP OR at PT <u>0.919</u>	BUCT PRESS, psig MAX	<u>8</u> DES	<u>0</u>	NO. OF STAGES	RPM		
VAP PRESS at PT, psia <u>65.12</u>	DIFF PRESS, psig	<u>65</u>		DES EFF	BEP		
VIB at PT, mm <u>0.19</u> cp.	DIFF HEAD, ft	<u>164</u>		MAX BEP DES INF			
CORR/ERROR caused by _____	NPSH AVAIL, ft	<u>17</u>		MAX HEAD DES IMP, ft			
CONSTRUCTION AND MATERIALS				MIN CONTINUOUS, gpm (BY MFR)			
CASING-MOUNTING (CENTERLINE,) (FOOT) (BRACKET) (VERTICAL)				ROTATION FACING COUPLING END			
SPLIT (AXIAL) (RADIAL X)				WATER COOLING <u>YES</u>			
TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE X) (DIFFUSER)				BEARINGS _____			
TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE CONN.)				STUFF BOX <u>YES</u>			
NOZZLES SIZE ASA RATING FACING POSITION				PEDESTAL _____			
SUCTION				GLAND _____			
DISCHARGE				TOTAL WATER REQ'D, gpm <u>4</u>			
IMPELLER DIAM DES MAX TYPE <u>CLOSED</u>				* INCL. SEAL PIPING COOLETC			
MFR'S BEARING NO. RADIAL THRUST				PACKING COOLING _____			
COUPLING and GUARD <u>THOMAS</u> /YES BASE PLATE <u>DRAIN RIM</u>				FLUSHING _____			
PACKING _____				AUX PIPING <u>BY PUMP MFR</u>			
NEON SEAL <u>YES</u> , BAL. CLASS. CODE _____ MFR _____				API SEAL PIPING PLAN <u>23</u>			

MATERIAL CODE-EXTERNAL CASING						INTERNAL PARTS							
I-CAST IRON	INTERNAL CODE					I	B	B	O	I			
B-BRONZE	IMPELLER					I	B	B	O	S			
S-STEEL	INNER CASE PARTS					I	I	B	O	-			
C-11-12% CHROME	SLEEVE (PACKED)					Ch	Ch	Al	Al	-			
A-ALLOY	SLEEVE (SEAL)					O	O	O	O	C			
H-HARDENED	WEAR PARTS					I	B	Ch	Ch	Ch			
F-FACED	SHAFT					B	B	S	S	4140			
X-													

GROUP TESTS	REQUIRED	WITNESSED
RUNNING PERFORM	X	
NPSH		
HYDROSTATIC	PSIO	
MAX ALLOW. WP	PSIO	F
WEIGHTS: PUMP	BASE	
MOTOR	TURBINE	

MOTOR DRIVER BY PUMP MFR				TURBINE DRIVER BY				MFR FINAL DATA (AS BUILT)			
ITEM NO. <u>A & B</u>	MTD BY <u>PUMP MFR</u>	ITEM NO. _____	MTD BY _____	ACTUAL IMPELLER DIAM _____							
HP _____ RPM _____	FRAME _____	HP _____ RPM _____	MAT'L _____	TEST CURVE NO. _____							
MFR _____	INSUL. <u>B</u>	MFR and TYPE _____	TEMP F _____	OUTLINE DWG NO. _____							
TYPE <u>SCI</u>	TEMP RISE <u>C 80</u>	EXHAUST _____	TEMP F _____	PUMP BECOT. DWG NO. _____							
ENC <u>TEFC</u>	TEMP RISE <u>C 80</u>	STEAM RATE, FL _____	lb/DHP/HR _____	SEAL DIAM DWG NO. _____							
VOLTS/PHASE/POLES <u>460/3/60</u>	LUBI. <u>GRS</u>	NOZZLES SIZE ASA RATING FACING POSITION		PUMP SERIAL NO. _____							
BEARINGS <u>BALL</u>		INLET _____									
FULL LOAD AMPS _____		EXHAUST _____									

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
EXCEPTIONS (ITEMIZE): (1) PLS. ADVISE

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED

PROCON, INCORPORATED
CENTRIFUGAL COMPRESSOR DATA SHEET NO. 1 OF 9 Δ REQ'N. NO. 1843-13.09-1
DATE 2-18-72 REV. 1 BY EJM

PURCHASER IGT-HYGAS PLANT MANUFACTURER _____
DESTINATION _____ TYPE AND SIZE _____
UNIT 1300 SERIAL NO. _____
ITEM NO. 13.09-01 NO. REQUIRED ONE QUOTE NO. _____ DATE _____
SERVICE PRETREATER AIR BLOWER PURCHASER ORDER NO. _____ DATE _____

PROCESS REQUIREMENTS

	Normal	Rated	Other Conditions		
			A	B	C
GAS HANDLED		AIR			
BAROMETER, psia		14.3			
STD CU FT PER MIN (14.7 psia—60 F—12%) OR WEIGHT FLOW, lb per min		6310			

INLET CONDITIONS		14.29*			
Pressure, psia		95			
Temperature, deg F		40			
Relative Humidity, percent		~ 29			
Molecular Weight (M)					
Cp/Cv (K1)					
Compressibility (Z1)					
Inlet Volume, cfm		~ 91000			

DISCHARGE CONDITIONS		43.3			
Pressure, psia					
Temperature, deg F					
Cp/Cv (K2)					
Compressibility (Z2)					

HORSEPOWER REQUIRED BY DRIVER					
SPEED, rpm					
ESTIMATED SURGE ICFM (At Speed Above)					
ADIABATIC HEAD (Hd)					
PERFORMANCE CURVE NO.					

CORROSIVENESS AND REMARKS REGARDING GAS _____

* ASSUMED ΔP THROUGH INLET AIR FILTER ~ 0.01 PSI

PROCON, INCORPORATED

REQ'N. NO. 1843-13.09-1

CENTRIFUGAL COMPRESSOR DATA SHEET NO. 2 OF 9 A

DATE 2-18-72 REV. 1 BY EJM

CONSTRUCTION FEATURES

ITEM NO. 13.09-01

SPEEDS (rpm): Max Cont. Criticals: 1st 2nd
ROTATION, Viewed from Coupling End of Compressor

CASING: Type HORIZONTAL SPLIT Material CAST IRON

Thickness Corrosion Allowance

Max Oper Temp Max Oper Press Test Press

IMPELLERS: Type CLOSED, WELDED FABRICATION Material

No. Diameters

DIAPHRAGMS: Material Cooling

LABYRINTHS: Material Radial Clearance

SHAFT: Material Diameter at Impellers

BEARING HOUSING CONSTRUCTION

RADIAL BEARINGS: Span Diameter Length

Total Clearance Oil Press

THRUST BEARING: Type Size

Location Oil Press

OTHER COMPONENTS: Material

INLET NOZZLE: Size Rating Facing Location

Table with 2 columns: Force, lb and Moment, ft-lb. Rows: Allowable Loads, Parallel to Shaft, Vertical, Horiz 90 deg to Shaft.

DISCHARGE NOZZLE: Size Rating Facing Location

Table with 2 columns: Force, lb and Moment, ft-lb. Rows: Allowable Loads, Parallel to Shaft, Vertical, Horiz 50 deg to Shaft.

CASING CONNECTIONS: Vents, No. Type and Size

Suction Nozzle: Pressure Connection Type and Size

Temperature Connection Type and Size

Discharge Nozzle: Pressure Connection Type and Size

Temperature Connection Type and Size

Casing Drains: No. Type and Size

Water Connection: No. Type and Size

Lube Oil Connection: Inlet Type and Size

Outlet Type and Size

Seal Oil Connection: Inlet Type and Size

Outlet Type and Size

Other Connection: Service

Type and Size

Table with 2 columns: Driver-Compressor and Gear-Compressor. Rows: Make (FAST OR WALDRON), Type (FLEXIBLE, SPACER GEAR), Lubrication (CONTINUOUS), Mounting.

ITEM No. 13.09-01

CONSTRUCTION FEATURES—Continued

BASEPLATE: Type COMMON (COMPRESSOR & STEAM TURBINE DRIVER)
 CONTROLS: Method CONSTANT DISCHARGE PRESSURE WITH SPEED CONTROL
 Control Device TURBINE GOVERNOR SYSTEM
 Signal: Source BY PURCHASER (DISCH. PRESS. TRANSMITTER)
 Type MIN. SPEED 3 PSIG AIR / MAX. SPEED 15 PSIG AIR Range 75% TO 105%
 Effect on Change _____

LUBE OIL SYSTEM

TYPE COMMON TO COMPRESSOR, DRIVER & COUPLING.
SEPARATE CONSOLE.
 PRESS: Driver _____ Gear _____ Control _____ System Design _____
 RELIEF VALVE SETTING _____ SCHEMATIC DIAGRAM _____
 GPM: Compressor _____ Driver _____ Gear _____ Control Oil _____
 MAIN PUMP: Make IMO Type SCREW Casing Material STEEL
 Flanges _____ Speed _____ gpm _____
Δ Driver STEAM TURBINE (API STD G11) hp _____ Coupling THOMAS SS. DISC.
 Location ON CONSOLE Control _____
 SPARE PUMP: Make IMO Type SCREW Casing Material STEEL
 Flanges _____ Speed _____ gpm _____
 Driver ELEC MOTOR (EXPL. PROOF) hp _____ Coupling THOMAS SS. DISC.
 Location _____ Control _____
 COOLERS: No. TWO Make _____ Type REMOVABLE BUNDLE, S.&T.
 Duty _____ Surface _____ Code TEMA C / ASME
 Shell: OD _____ Thickness _____ Design Press. _____
 Tubes: OD _____ Length _____ Inq _____ No. _____
 Material: Shell STEEL Channel STEEL Tubes IN. H. ADM.
 Switch Valve: Make KRAISSL Material STEEL
 Water: Temp In 85°F Out _____ Press 65 PSIG. gpm _____
 FILTERS: No. TWO Make _____ Type FULL FLOW
 Casing Material STEEL Flanges _____
 Design Press. _____ AP _____ Micron 10
 Switch Valve: Make (SAME VALVE AS COOLERS) Material _____
 RESERVOIR: Location ON CONSOLE Size 8 MIN. RETENTION Material STEEL
 Flanges _____ Interior Coating _____
 Heating Coil STEAM Insulation Supports _____
ALL OIL PIPING COMPONENTS SHALL BE STEEL.

SEAL OIL SYSTEM

TYPE OF SEAL LABYRINTH WITH BLEED TO SUCTION.
 TYPE OF SYSTEM _____
 GPM TO SEALS _____ SYSTEM DESIGN PRESS. _____
 RELIEF VALVE SETTING _____ SCHEMATIC DIAGRAM _____
 MAIN PUMP: Make _____ Type _____ Casing Material _____
 Flanges _____ Speed _____ gpm _____
 Driver _____ hp _____ Coupling _____
 Location _____ Control _____

SEAL OIL SYSTEM—Continued

SPARE PUMP: Make Type Casing Material

Flanges Speed gpm

Driver hp Coupling

Location Control

COOLERS: No. Make Type

Duty Surface Code

Shell: OD Thickness Design Press.

Tubes: OD Length Dwg No.

Material: Shell Channel Tubes

Switch Valve: Make Material

Water Temp: In Out Press. gpm

FILTERS: No. Make Type

Casing Material Flanges

Design Press. Δ P Micron

Switch Valve: Make Material

RESERVOIR: Location Size Material

Flanges Interior Coating

Heating Coil Insulation Supports

INSTRUMENTATION

PRESS. GAGES: Make Type and Size

TEMP GAGES: Make Type and Size

LEVEL GAGES: Make Type and Size

SIGHT FLOW: Make Type and Size

TACHIMETER: Make Type and Range

ALARMS: Type ELECTRICAL (EXP. PRF), CONTACTS SHALL OPEN TO SOUND ALARM.

Setting: Lube Oil LOW PRESSURE Control Oil Seal Oil

Compressor Discharge Temp HIGH Bearing Temp

Others AVX. OIL PUMP OPERATING

TRIPS: Type ELECTRICAL (EXP. PRF), CONTACTS SHALL CLOSE TO SHUT DOWN.

Setting: Lube Oil LOW PRESSURE Control Oil Seal Oil

Compressor Discharge Temp Bearing Temp

Others

INSTRUMENT PANEL BY PURCHASER

INSPECTION AND TESTS

	Not Witnessed	Witnessed
SHOP INSPECTION		YES
HYDROSTATIC		YES
MECHANICAL RUN		YES
PERFORMANCE, AIR		QUOTE AS EXTRA PRICE
PERFORMANCE, GAS		
AUXILIARY EQUIPMENT		
DRYER WITH COMPRESSOR		

WEIGHTS

COMPRESSOR DRIVER GEAR BASE
 MOTORS: Compressor Driver
 COMPRESSOR UPPER CASE AUXILIARIES (if separate)
 TOTAL SHIPPING WEIGHT MAX FOR MAINTENANCE

INSTALLATION CONDITIONS

ENCLOSURE TYPE UNHEATED SHELTER WITH ROOF AND PARTIAL SIDES.
 SETTING: Grade X Balcony: _____ Ft Above Grade: _____
 TEMP AT COMPRESSOR: Max 95 °F Min -20 °F

WINTERIZING (Outdoor Installations)

Item	By
1.....	<u>PURCHASER</u>
2.....	
3.....	
4.....	
5.....	
6.....	
7.....	
8.....	
9.....	
10.....	

UTILITY CONDITIONS

STEAM*:	Driver	Auxiliaries
Inlet, Min	psig F	psig F
Normal Δ	<u>50</u> psig <u>DRY & SAT.</u> F	<u>250</u> psig <u>456</u> F Δ
Max	psig F	psig F
Exhaust, Min Δ	<u>3" Hg ABS</u> psig F	psig F
Normal	<u>8" Hg ABS.</u> psig F	<u>50</u> psig F
Max	psig F	psig F
Total lb per hour

* Indicate by an asterisk (*) steam condition at which steam rate shall be guaranteed.

ELECTRIC:	Driver	MOTORS - Auxiliaries - CONTROL
Voltage		<u>460</u> 115
Cycle		<u>60</u> 60 Δ
Phase		<u>3</u> 1 Δ
Power factor		
Total kw		

COOLING WATER: Temp 85 °F Press 65 PSIG Allowable Rise 25 °F
 Δ Pooling Factor 0.002 (WATER SIDE) Total ppm.....
 OTHER.....

PROCON, INCORPORATED

CENTRIFUGAL COMPRESSOR DATA SHEET NO. 6 of 9 Δ

REQ'N. NO. 1843-13.09-1

DATE 2-18-72 REV. 1 BY EJM

DRIVER

ITEM NO. 13.09-01

TYPE SPECIAL PURPOSE STEAM TURBINE MAKE

RATED bhp RATED rpm SERIAL NO.

Δ DATA SHEET (SEE SHEETS 7, 8 & 9) FURNISHED BY COMPR. MFR. MOUNTED BY COMPR. MFR.

GEAR UNIT: Make and Type. NONE - DIRECT DRIVE

Gear Ratio. hp Rating AGMA Service Factor

Mechanical Efficiency. Bearings, Diameter Length

Gears: Pitch Diameter. Width Material

SUPPLEMENTAL SPECIFICATIONS AND DATA SHEETS

Δ COMPRESSOR API STD 617

Δ DRIVER API STD 617

OTHER _____

ADDITIONAL DATA

1. TORSIONAL VIBRATION ANALYSIS BY COMPRESSOR MFR. IS REQUIRED.

2. COMPRESSOR SHALL HAVE PROVISIONS FOR FUTURE INSTALLATION OF TWO VIBRATION DETECTORS (90° APART) AT EACH RADIAL BEARING. VENDOR SHALL FURNISH AND INSTALL ONE VIBRATION DETECTOR AT COUPLING END, ONE AXIAL MOVEMENT DETECTOR, REQUIRED CABLE, AND PROXIMETERS. (BENTLY-NEVADA) MONITORS BY PURCHASER.

3. COMPRESSOR MFR. SHALL ALSO FURNISH AN AUTOMATIC VERTICAL ROLL-TYPE AIR FILTER. IT SHALL BE THE RENEWABLE MEDIA TYPE WITH CAPACITY OF 110,000 CFM. MEDIA SHALL BE 2" FIBER GLASS WITH FACE VELOCITY OF 500 FPM. FILTER SECTIONS SHALL BE FABRICATED OF GALVANIZED STEEL AND SUITABLE FOR INSTALLATION IN 3 SIDES OF A CUBICLE ARRANGEMENT. DRIVE MOTOR (S) SHALL BE EXPL. PROOF AND 460-3-60 A.C. CONTROLS SHALL BE EXPL. PROOF AND 115-1-60 A.C. TYPE OF CONTROL SHALL BE BY DIFFERENTIAL PRESSURE. PROVIDE MEDIA RUNOUT ALARM SWITCH. FILTER INLETS SHALL BE PROVIDED WITH INSECT SCREENS AND WEATHER LOUVRES. ENTIRE UNIT SHALL BE COMPLETELY WEATHER-PROOF AND SHALL BE PROVIDED WITH "BLOW-IN" DOORS.

4. ALL ELECTRICAL COMPONENTS SHALL BE SUITABLE FOR AREA CLASSIFICATION CLASS I, GROUP D, DIV. 2. ALL ELECTRICAL SWITCHES SHALL BE DUAL SPDY. Δ

PROCON, INCORPORATED
SPECIAL-PURPOSE STEAM TURBINE DATA SHEET

JOB NO. _____ ITEM NO. 13,09-01
PURCHASE ORDER NO. _____
REQUISITION NO. 1843-13,09-1
INQUIRY NO. _____
Sheet No. 7 OF 9 BY EJM
DATE 2-18-72 REVISION 1

APPLICABLE TO: <input checked="" type="checkbox"/> PROPOSALS <input type="checkbox"/> PURCHASE <input type="checkbox"/> AS BUILT FOR <u>1GT-HYGAS PLANT</u> SITE _____ UNIT <u>1300</u> SERVICE <u>PRETREATER AIR BLOWER DRIVE</u> SERIAL NO. _____ RATED HP _____ MANUFACTURER _____ OUTLINE DWG. _____ NO. REQ'D <u>ONE</u> MODEL _____ TURBINE _____ TYPE _____ SECTION DWG. _____ DRIVEN EQUIPMENT <u>AIR BLOWER</u>																																	
NOTE: <input type="checkbox"/> INDICATES INFORMATION TO BE COMPLETED BY PURCHASER; <input type="checkbox"/> BY MANUFACTURER PARAGRAPH NUMBERS WITHIN () REFER TO APPLICABLE PARTS OF THIS STANDARD																																	
<table border="1"> <thead> <tr> <th colspan="2">OPERATING CONDITIONS</th> <th colspan="2">CONSTRUCTION FEATURES</th> </tr> </thead> <tbody> <tr> <td colspan="2"> INDICATE GUARANTEE POINT BY * RATED _____ HORSEPOWER _____ SPEED, RPM _____ STEAM RATE _____ LB/HP/HR _____ NORMAL _____ _____ _____ _____ </td> <td colspan="2"> TYPE <input type="checkbox"/> VERTICAL <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/> NO. STAGES _____ CASING SPLIT <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/> VERTICAL ROTOR <input type="checkbox"/> SOLID <input type="checkbox"/> BUILT UP ROTATION (FROM GOV. END) <input type="checkbox"/> CW <input type="checkbox"/> CCW MAX. TIP SPEED _____ RPM </td> </tr> <tr> <td colspan="2"> 1ST CRITICAL SPEED _____ RPM 2ND CRITICAL SPEED _____ RPM TRIP SPEED _____ RPM </td> <td colspan="2"> GOVERNOR TYPE <input type="checkbox"/> MCH <input type="checkbox"/> HYD <input checked="" type="checkbox"/> OIL RELAY <u>MEMA CLASS D (31a)</u> GOVERNOR MFG. <u>WOODWARD</u> MODEL <u>PG</u> NO. AUTO VALVES _____ TYPE LIFT <input type="checkbox"/> CAM <input type="checkbox"/> BAR HAND VALVES: <input type="checkbox"/> MIN. STEAM PRESS. <input checked="" type="checkbox"/> ECONOMY (31c) <input checked="" type="checkbox"/> AIR HEAD FOR INSTRUMENT CONTROL (31d) <input type="checkbox"/> JACKSCREW RANGE _____ RPM <input type="checkbox"/> _____ PSIG _____ RPM <input type="checkbox"/> _____ PSIG HAND SPEED CHANGER, RPM _____ MAX. _____ MIN. (31f) SEPARATE TRIP THROTTLE VALVE: <input checked="" type="checkbox"/> HYD <input type="checkbox"/> MECH (31g) <input type="checkbox"/> REMOTE TRIP <input type="checkbox"/> ACTUATION _____ </td> </tr> <tr> <td colspan="2"> STEAM CONDITIONS INLET STEAM _____ NORMAL _____ <u>50</u> PSIG _____ <u>DRY & SAT.</u> FTT MAX. INITIAL _____ MIN. INITIAL _____ </td> <td colspan="2"> BEARINGS RADIAL TYPE _____ AREA _____ SQ IN. THRUST TYPE _____ AREA _____ SQ IN. MAX. THRUST LOAD _____ LB THRUST CAPACITY _____ LB </td> </tr> <tr> <td colspan="2"> EXHAUST STEAM NORMAL _____ MAX. _____ <u>8" Hg Abs.</u> _____ FTT MIN. _____ <u>3" Hg Abs.</u> _____ <input type="checkbox"/> EXTRACTION <input type="checkbox"/> ADMISSION <input type="checkbox"/> NONRETURN VALVE <input type="checkbox"/> CONTROLLED <input type="checkbox"/> UNCONTROLLED FLOW, LB/HR _____ PSIG _____ FTT NORMAL _____ MIN. _____ MAX. _____ PERFORMANCE CURVE NO. _____ MAX. THROTTLE FLOW, LB/HR _____ MAX. FLOW TO CONDENSER, LB/HR _____ IN. HG _____ </td> <td colspan="2"> PACKING TYPE _____ (16c) INTERSTAGE GLAND SEALS _____ END GLAND SEALS <u>LABYRINTH</u> NO. PER BOX _____ <input checked="" type="checkbox"/> INSULATION <input checked="" type="checkbox"/> JACKET MATL <u>STEEL</u> (20a) </td> </tr> <tr> <td colspan="2"> DUTY <input checked="" type="checkbox"/> CONT <input type="checkbox"/> INTERMIT <input type="checkbox"/> STANDBY _____ HR/YR APPROX STEAM RATE REQUIRED _____ LB/HP/HR STEAM COST _____ \$/MBU PAYOUT PERIOD _____ YEARS LOCATION _____ (6b) </td> <td colspan="2"> TACHOMETER <input type="checkbox"/> VIB. REED <input type="checkbox"/> ELECTRIC <input checked="" type="checkbox"/> ELECTRONIC <input type="checkbox"/> NO SPEED INDICATOR REQ'D BY PURCHASER (34c) LOCATIONS <input checked="" type="checkbox"/> TACHOMETER MFR _____ MODEL _____ <input checked="" type="checkbox"/> SPLITTING WARNING VALVE SET @ _____ PSIG (7e) <input type="checkbox"/> BASEPLATE BY <u>COMP. MFR.</u> (21a) <input type="checkbox"/> UNDER TURBINE ONLY <input type="checkbox"/> UNDER TURBINE AND GEAR <input checked="" type="checkbox"/> UNDER TURBINE AND DRIVEN EQUIPMENT <input type="checkbox"/> SOLEPLATES BY _____ </td> </tr> <tr> <td colspan="2"> LOCATION <input type="checkbox"/> UNDER <input type="checkbox"/> HEATED <input checked="" type="checkbox"/> UNDER ROOF <input type="checkbox"/> OUTDOOR <input checked="" type="checkbox"/> UNHEATED <input checked="" type="checkbox"/> PARTIAL SIDES <input checked="" type="checkbox"/> SHADE <input type="checkbox"/> MEZZANINE SITE ELEVATION _____ FT. BAR <u>14.3</u> PSIA/<u>_____</u> SITE TEMP. °F. _____ SUMMER <u>-20</u> WINTER </td> <td colspan="2"> GLAND SEALING SYSTEM <input checked="" type="checkbox"/> STEAM FACTOR REQ'D <u>50</u> PSIG <u>SAT.</u> FTT (16e) <input checked="" type="checkbox"/> GLAND CONDENSER REQ'D <input type="checkbox"/> VACUUM DEVICE _____ (16d) <input checked="" type="checkbox"/> TEMA "C" _____ OTHER _____ TUBE NO. _____ IN. DWG _____ MATL _____ </td> </tr> <tr> <td colspan="2"> <input checked="" type="checkbox"/> WINTERIZATION REQ'D <input type="checkbox"/> TROPICALIZATION REQ'D WINTERIZATION CONDITIONS: <input type="checkbox"/> DUST <input type="checkbox"/> FURLS <input type="checkbox"/> OTHER CONDENSING WATER SUPPLY TEMP. _____ °F. PRESS. _____ PSIG. AP. _____ </td> <td colspan="2"> ELECTRICAL AREA CLASS _____ GR. <u>D</u> DIV. <u>2</u> (6a) </td> </tr> </tbody> </table>		OPERATING CONDITIONS		CONSTRUCTION FEATURES		INDICATE GUARANTEE POINT BY * RATED _____ HORSEPOWER _____ SPEED, RPM _____ STEAM RATE _____ LB/HP/HR _____ NORMAL _____ _____ _____ _____		TYPE <input type="checkbox"/> VERTICAL <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/> NO. STAGES _____ CASING SPLIT <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/> VERTICAL ROTOR <input type="checkbox"/> SOLID <input type="checkbox"/> BUILT UP ROTATION (FROM GOV. END) <input type="checkbox"/> CW <input type="checkbox"/> CCW MAX. TIP SPEED _____ RPM		1ST CRITICAL SPEED _____ RPM 2ND CRITICAL SPEED _____ RPM TRIP SPEED _____ RPM		GOVERNOR TYPE <input type="checkbox"/> MCH <input type="checkbox"/> HYD <input checked="" type="checkbox"/> OIL RELAY <u>MEMA CLASS D (31a)</u> GOVERNOR MFG. <u>WOODWARD</u> MODEL <u>PG</u> NO. AUTO VALVES _____ TYPE LIFT <input type="checkbox"/> CAM <input type="checkbox"/> BAR HAND VALVES: <input type="checkbox"/> MIN. STEAM PRESS. <input checked="" type="checkbox"/> ECONOMY (31c) <input checked="" type="checkbox"/> AIR HEAD FOR INSTRUMENT CONTROL (31d) <input type="checkbox"/> JACKSCREW RANGE _____ RPM <input type="checkbox"/> _____ PSIG _____ RPM <input type="checkbox"/> _____ PSIG HAND SPEED CHANGER, RPM _____ MAX. _____ MIN. (31f) SEPARATE TRIP THROTTLE VALVE: <input checked="" type="checkbox"/> HYD <input type="checkbox"/> MECH (31g) <input type="checkbox"/> REMOTE TRIP <input type="checkbox"/> ACTUATION _____		STEAM CONDITIONS INLET STEAM _____ NORMAL _____ <u>50</u> PSIG _____ <u>DRY & SAT.</u> FTT MAX. INITIAL _____ MIN. INITIAL _____		BEARINGS RADIAL TYPE _____ AREA _____ SQ IN. THRUST TYPE _____ AREA _____ SQ IN. MAX. THRUST LOAD _____ LB THRUST CAPACITY _____ LB		EXHAUST STEAM NORMAL _____ MAX. _____ <u>8" Hg Abs.</u> _____ FTT MIN. _____ <u>3" Hg Abs.</u> _____ <input type="checkbox"/> EXTRACTION <input type="checkbox"/> ADMISSION <input type="checkbox"/> NONRETURN VALVE <input type="checkbox"/> CONTROLLED <input type="checkbox"/> UNCONTROLLED FLOW, LB/HR _____ PSIG _____ FTT NORMAL _____ MIN. _____ MAX. _____ PERFORMANCE CURVE NO. _____ MAX. THROTTLE FLOW, LB/HR _____ MAX. FLOW TO CONDENSER, LB/HR _____ IN. HG _____		PACKING TYPE _____ (16c) INTERSTAGE GLAND SEALS _____ END GLAND SEALS <u>LABYRINTH</u> NO. PER BOX _____ <input checked="" type="checkbox"/> INSULATION <input checked="" type="checkbox"/> JACKET MATL <u>STEEL</u> (20a)		DUTY <input checked="" type="checkbox"/> CONT <input type="checkbox"/> INTERMIT <input type="checkbox"/> STANDBY _____ HR/YR APPROX STEAM RATE REQUIRED _____ LB/HP/HR STEAM COST _____ \$/MBU PAYOUT PERIOD _____ YEARS LOCATION _____ (6b)		TACHOMETER <input type="checkbox"/> VIB. REED <input type="checkbox"/> ELECTRIC <input checked="" type="checkbox"/> ELECTRONIC <input type="checkbox"/> NO SPEED INDICATOR REQ'D BY PURCHASER (34c) LOCATIONS <input checked="" type="checkbox"/> TACHOMETER MFR _____ MODEL _____ <input checked="" type="checkbox"/> SPLITTING WARNING VALVE SET @ _____ PSIG (7e) <input type="checkbox"/> BASEPLATE BY <u>COMP. MFR.</u> (21a) <input type="checkbox"/> UNDER TURBINE ONLY <input type="checkbox"/> UNDER TURBINE AND GEAR <input checked="" type="checkbox"/> UNDER TURBINE AND DRIVEN EQUIPMENT <input type="checkbox"/> SOLEPLATES BY _____		LOCATION <input type="checkbox"/> UNDER <input type="checkbox"/> HEATED <input checked="" type="checkbox"/> UNDER ROOF <input type="checkbox"/> OUTDOOR <input checked="" type="checkbox"/> UNHEATED <input checked="" type="checkbox"/> PARTIAL SIDES <input checked="" type="checkbox"/> SHADE <input type="checkbox"/> MEZZANINE SITE ELEVATION _____ FT. BAR <u>14.3</u> PSIA/ <u>_____</u> SITE TEMP. °F. _____ SUMMER <u>-20</u> WINTER		GLAND SEALING SYSTEM <input checked="" type="checkbox"/> STEAM FACTOR REQ'D <u>50</u> PSIG <u>SAT.</u> FTT (16e) <input checked="" type="checkbox"/> GLAND CONDENSER REQ'D <input type="checkbox"/> VACUUM DEVICE _____ (16d) <input checked="" type="checkbox"/> TEMA "C" _____ OTHER _____ TUBE NO. _____ IN. DWG _____ MATL _____		<input checked="" type="checkbox"/> WINTERIZATION REQ'D <input type="checkbox"/> TROPICALIZATION REQ'D WINTERIZATION CONDITIONS: <input type="checkbox"/> DUST <input type="checkbox"/> FURLS <input type="checkbox"/> OTHER CONDENSING WATER SUPPLY TEMP. _____ °F. PRESS. _____ PSIG. AP. _____		ELECTRICAL AREA CLASS _____ GR. <u>D</u> DIV. <u>2</u> (6a)	
OPERATING CONDITIONS		CONSTRUCTION FEATURES																															
INDICATE GUARANTEE POINT BY * RATED _____ HORSEPOWER _____ SPEED, RPM _____ STEAM RATE _____ LB/HP/HR _____ NORMAL _____ _____ _____ _____		TYPE <input type="checkbox"/> VERTICAL <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/> NO. STAGES _____ CASING SPLIT <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/> VERTICAL ROTOR <input type="checkbox"/> SOLID <input type="checkbox"/> BUILT UP ROTATION (FROM GOV. END) <input type="checkbox"/> CW <input type="checkbox"/> CCW MAX. TIP SPEED _____ RPM																															
1ST CRITICAL SPEED _____ RPM 2ND CRITICAL SPEED _____ RPM TRIP SPEED _____ RPM		GOVERNOR TYPE <input type="checkbox"/> MCH <input type="checkbox"/> HYD <input checked="" type="checkbox"/> OIL RELAY <u>MEMA CLASS D (31a)</u> GOVERNOR MFG. <u>WOODWARD</u> MODEL <u>PG</u> NO. AUTO VALVES _____ TYPE LIFT <input type="checkbox"/> CAM <input type="checkbox"/> BAR HAND VALVES: <input type="checkbox"/> MIN. STEAM PRESS. <input checked="" type="checkbox"/> ECONOMY (31c) <input checked="" type="checkbox"/> AIR HEAD FOR INSTRUMENT CONTROL (31d) <input type="checkbox"/> JACKSCREW RANGE _____ RPM <input type="checkbox"/> _____ PSIG _____ RPM <input type="checkbox"/> _____ PSIG HAND SPEED CHANGER, RPM _____ MAX. _____ MIN. (31f) SEPARATE TRIP THROTTLE VALVE: <input checked="" type="checkbox"/> HYD <input type="checkbox"/> MECH (31g) <input type="checkbox"/> REMOTE TRIP <input type="checkbox"/> ACTUATION _____																															
STEAM CONDITIONS INLET STEAM _____ NORMAL _____ <u>50</u> PSIG _____ <u>DRY & SAT.</u> FTT MAX. INITIAL _____ MIN. INITIAL _____		BEARINGS RADIAL TYPE _____ AREA _____ SQ IN. THRUST TYPE _____ AREA _____ SQ IN. MAX. THRUST LOAD _____ LB THRUST CAPACITY _____ LB																															
EXHAUST STEAM NORMAL _____ MAX. _____ <u>8" Hg Abs.</u> _____ FTT MIN. _____ <u>3" Hg Abs.</u> _____ <input type="checkbox"/> EXTRACTION <input type="checkbox"/> ADMISSION <input type="checkbox"/> NONRETURN VALVE <input type="checkbox"/> CONTROLLED <input type="checkbox"/> UNCONTROLLED FLOW, LB/HR _____ PSIG _____ FTT NORMAL _____ MIN. _____ MAX. _____ PERFORMANCE CURVE NO. _____ MAX. THROTTLE FLOW, LB/HR _____ MAX. FLOW TO CONDENSER, LB/HR _____ IN. HG _____		PACKING TYPE _____ (16c) INTERSTAGE GLAND SEALS _____ END GLAND SEALS <u>LABYRINTH</u> NO. PER BOX _____ <input checked="" type="checkbox"/> INSULATION <input checked="" type="checkbox"/> JACKET MATL <u>STEEL</u> (20a)																															
DUTY <input checked="" type="checkbox"/> CONT <input type="checkbox"/> INTERMIT <input type="checkbox"/> STANDBY _____ HR/YR APPROX STEAM RATE REQUIRED _____ LB/HP/HR STEAM COST _____ \$/MBU PAYOUT PERIOD _____ YEARS LOCATION _____ (6b)		TACHOMETER <input type="checkbox"/> VIB. REED <input type="checkbox"/> ELECTRIC <input checked="" type="checkbox"/> ELECTRONIC <input type="checkbox"/> NO SPEED INDICATOR REQ'D BY PURCHASER (34c) LOCATIONS <input checked="" type="checkbox"/> TACHOMETER MFR _____ MODEL _____ <input checked="" type="checkbox"/> SPLITTING WARNING VALVE SET @ _____ PSIG (7e) <input type="checkbox"/> BASEPLATE BY <u>COMP. MFR.</u> (21a) <input type="checkbox"/> UNDER TURBINE ONLY <input type="checkbox"/> UNDER TURBINE AND GEAR <input checked="" type="checkbox"/> UNDER TURBINE AND DRIVEN EQUIPMENT <input type="checkbox"/> SOLEPLATES BY _____																															
LOCATION <input type="checkbox"/> UNDER <input type="checkbox"/> HEATED <input checked="" type="checkbox"/> UNDER ROOF <input type="checkbox"/> OUTDOOR <input checked="" type="checkbox"/> UNHEATED <input checked="" type="checkbox"/> PARTIAL SIDES <input checked="" type="checkbox"/> SHADE <input type="checkbox"/> MEZZANINE SITE ELEVATION _____ FT. BAR <u>14.3</u> PSIA/ <u>_____</u> SITE TEMP. °F. _____ SUMMER <u>-20</u> WINTER		GLAND SEALING SYSTEM <input checked="" type="checkbox"/> STEAM FACTOR REQ'D <u>50</u> PSIG <u>SAT.</u> FTT (16e) <input checked="" type="checkbox"/> GLAND CONDENSER REQ'D <input type="checkbox"/> VACUUM DEVICE _____ (16d) <input checked="" type="checkbox"/> TEMA "C" _____ OTHER _____ TUBE NO. _____ IN. DWG _____ MATL _____																															
<input checked="" type="checkbox"/> WINTERIZATION REQ'D <input type="checkbox"/> TROPICALIZATION REQ'D WINTERIZATION CONDITIONS: <input type="checkbox"/> DUST <input type="checkbox"/> FURLS <input type="checkbox"/> OTHER CONDENSING WATER SUPPLY TEMP. _____ °F. PRESS. _____ PSIG. AP. _____		ELECTRICAL AREA CLASS _____ GR. <u>D</u> DIV. <u>2</u> (6a)																															

PROCON, INCORPORATED
SPECIAL-PURPOSE STEAM TURBINE DATA SHEET (Cont'd)

Req'n. No. 1843-13.09-1
JOB NO. _____ ITEM NO. 13.09-01
Sheet No. 8 of 9 BY EJM
DATE 2-18-74 REVISION 1

CONNECTIONS					APPLICABLE SPECIFICATIONS				
	SIZE	USASI RATING	FACING	POSITION	API 612 SPECIAL-PURPOSE STEAM TURBINE				
INLET					_____				
EXHAUST					_____				
EXTRACTION					_____				
ADMISSION					_____				
ALLOWABLE PIPING FORCES AND MOMENTS					TORSIONAL AND LATERAL CRITICAL SPEED ANALYSIS				
					BY <u>COMP. MER.</u> (18b)				
	INLET		EXHAUST		EXTRACTION				
	FORCE	MOMENT	FORCE	MOMENT	FORCE	MOMENT			
PARALLEL TO SHAFT	LB	FT-LB	LB	FT-LB	LB	FT-LB			
VERTICAL									
HORIZ. 50°									
WEIGHTS AND DIMENSIONS					SHOP TESTS				
NET WT _____ LB SHIPPING WT _____ LB					REQUIRED				
MAX. LIFTING WT _____ LB MAX. MAINT. WT _____ LB					WITNESSED (36)				
APPROX. FLOOR SPACE: LENGTH _____					(35a)				
WIDTH _____					(39)				
					(36b-5)				
<input type="checkbox"/> POTENTIAL MAX. FUTURE SHIP _____					GEAR				
<input type="checkbox"/> MAX. STEAM THRU INLET VALVE _____ LB/HR					<input type="checkbox"/> SPECIAL-PURPOSE GEAR REQ'D				
<input type="checkbox"/> MAX. ALLOWABLE CASING PRESS. ON EXHAUST END _____ PSIG					<input type="checkbox"/> GEAR FURNISHED BY _____				
TURBINE MATERIALS					CONTROL PANEL				
<input type="checkbox"/> HIGH-PRESS. CASING _____ <input type="checkbox"/> STEAM CHEST _____					FURNISHED BY <input type="checkbox"/> VENDOR <input checked="" type="checkbox"/> OTHERS				
<input type="checkbox"/> EXHAUST CASING _____ <input type="checkbox"/> DIAPHRAGMS _____					MOUNTING <input type="checkbox"/> ON TURBINE <input type="checkbox"/> FREE STANDING OFF GROUND				
<input type="checkbox"/> NOZZLES _____ <input type="checkbox"/> NOZZLE RINGS _____					ALARM CONTACTS SHALL (34b)				
<input type="checkbox"/> BLADES _____ <input type="checkbox"/> SHROUDS _____					<input type="checkbox"/> OPEN TO SOUND ALARM <input type="checkbox"/> CLOSE TO SOUND ALARM				
<input type="checkbox"/> WHEEL _____ <input type="checkbox"/> GOV. VALVE TRIM _____					SHUTDOWN CONTACTS SHALL				
<input type="checkbox"/> SHAFT _____					<input type="checkbox"/> OPEN TO SHUT DOWN <input type="checkbox"/> CLOSE TO SHUT DOWN				
<input type="checkbox"/> SHAFT MATERIAL UNDER SEALS _____ (14b)					CONTROL CURRENT _____ VOLTS _____ PHASE _____ HERTZ				
<input type="checkbox"/> APPLIED BY SPRAYING _____ <input type="checkbox"/> PLATING _____					SWITCH ENCLOSURE <input type="checkbox"/> EXP. PROOF <input type="checkbox"/> WEATHERPROOF _____				
LUBE OIL					_____				
<input type="checkbox"/> SEPARATE <input checked="" type="checkbox"/> COMMON					_____				
<input type="checkbox"/> WITH DRIVER (26a) <input checked="" type="checkbox"/> WITH DRIVEN UNIT					_____				
<input checked="" type="checkbox"/> MAIN OIL PUMP: <input type="checkbox"/> SHAFT DRIVEN. <input checked="" type="checkbox"/> SEPARATELY DRIVEN					_____				
<input type="checkbox"/> 85 OIL DRAIN HEADER (12d)					_____				
<input type="checkbox"/> 85 OIL SUPPLY HEADER					_____				
<input type="checkbox"/> OIL VISCOSITY _____ SUS @ 100 F. _____ SUS @ 210 F.					_____				
<input type="checkbox"/> MAX. PERMISSIBLE OIL VISCOSITY @ STARTUP _____ SUS					_____				
COUPLING					_____				
<input checked="" type="checkbox"/> MOUNT 1/2 COUPLING (17a) <input type="checkbox"/> TYPE _____ (17d)					_____				
<input type="checkbox"/> MFR _____ (17b-1)					_____				
<input type="checkbox"/> SPACER REQ'D					_____				
<input type="checkbox"/> COUPLING FURNISHED BY <u>COMP. MER.</u> (17d)					_____				
TURBINE SHAFT <input type="checkbox"/> TAPER <input type="checkbox"/> CYLINDRICAL					_____				
DRIVEN SHAFT <input type="checkbox"/> TAPER <input type="checkbox"/> CYLINDRICAL					_____				
COUPLING GUARD <input type="checkbox"/> MFR STD <input type="checkbox"/> OTHER					_____				

PROCON, INCORPORATED
SPECIAL-PURPOSE STEAM TURBINE DATA SHEET (Cont'd)

Req'n. No. 1843-13.09-1

JOB NO. _____ ITEM NO. 13.09-01

Sheet No. 9 OF 9 BY EJM

DATE 2-18-72 REVISION 1

ALARMS AND SHUTDOWNS		(34)	INSTRUMENT PANEL		(33)
	ALARM	SHUT-DOWN			
(SEE SHEET 4, COMPR. DATA)					
<input type="checkbox"/> STANDBY LUBE OIL PUMP OPERATING	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> STEAM HILL PRESSURE GAGE		
<input type="checkbox"/> LOW OIL PRESSURE (HIGH LEVEL)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> EXHAUST STEAM PRESSURE GAGE		
<input checked="" type="checkbox"/> OVERSPEED TRIP OPERATION	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> STEAM CHEST PRESSURE GAGE		
<input type="checkbox"/> HIGH TURBINE EXTRACTION PRESSURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> FIRST-STAGE PRESSURE GAGE		
<input type="checkbox"/> HIGH EXHAUST PRESSURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> EXTRACTION PRESSURE GAGE		
<input type="checkbox"/> HIGH OIL FILTER ΔP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> STEAM SEAL PRESSURE GAGE		
<input type="checkbox"/> HIGH AND LOW OIL RESERVOIR LEVEL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> LUBE OIL PRESSURE GAGE		
<input type="checkbox"/> HIGH OIL COOLER OILTEMPERATURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> CONTROL OIL PRESSURE GAGE		
<input type="checkbox"/> EXCESSIVE VIBRATION IN TURBINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> SPLED INDICATOR		
<input type="checkbox"/> EXCESSIVE AXIAL DISPLACEMENT OF TURBINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> GAGES FOR DRIVEN EQUIPMENT		
<input type="checkbox"/> SEE NOTE 1 & 2 BELOW (34)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> ALARM HOWLER		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> ANNUNCIATOR		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
VIBRATION DETECTORS * (SEE NOTE 3) (34)			NOTE 4 TURBINE SHALL BE EQUIPPED WITH A LABYRINTH SEAL RING HAVING PROVISION FOR PRESSURIZING WITH INSTRUMENT AIR, AT THE INBOARD SIDE OF EACH RADIAL BEARING.		
<input type="checkbox"/> TYPE _____	<input type="checkbox"/> MODEL _____				
<input type="checkbox"/> MFR _____					
<input type="checkbox"/> NO. _____ AT EACH SHAFT BEARING	TOTAL NO. _____				
<input type="checkbox"/> NO. OF VIBRATION MONITORS _____	BY PURCHASER _____				
<input type="checkbox"/> ALARM <input type="checkbox"/> SHUTDOWN					
<input type="checkbox"/> TIME DELAY _____ SEC					
<input type="checkbox"/> MONITOR LOCATION _____					
<input type="checkbox"/> MONITOR ENCLOSURE _____					
AXIAL MOVEMENT DETECTOR (SEE NOTE 3) (34)					
<input type="checkbox"/> TYPE _____					
<input type="checkbox"/> MFR _____					
<input type="checkbox"/> NO. REQUIRED _____					
<input type="checkbox"/> NO. OF VIBRATION MONITORS _____	BY PURCHASER _____				
<input type="checkbox"/> ALARM <input type="checkbox"/> SHUTDOWN					
<input type="checkbox"/> TIME DELAY _____ SEC					
<input type="checkbox"/> MONITOR LOCATION _____					
<input type="checkbox"/> MONITOR ENCLOSURE _____					
<input type="checkbox"/> PROVISIONS FOR FIELD BALANCING (19)					
<input type="checkbox"/> VENDOR'S REVIEW AND COMMENT ON PURCHASER'S PILING AND FOUNDATION DRAWINGS ARE REQUIRED (60)					
* STEAM TURBINE SHALL HAVE PROVISIONS FOR FUTURE INSTALLATION OF TWO VIBRATION DETECTORS (90° APART) AT EACH RADIAL BEARING. (BENTLY-NEVADA)					
<u>NOTE 1</u> PROVIDE LIMIT SWITCH AT TRIP & THROTTLE VALVE.					
<u>NOTE 2</u> ALL ELECTRICAL SWITCHES SHALL BE DUAL SPDT. Δ					
<u>NOTE 3</u> VENDOR SHALL FURNISH AND INSTALL ONE VIBRATION DETECTOR AT COUPLING END, ONE AXIAL MOVEMENT DETECTOR, CABLE AND PROXIMETERS. (BENTLY-NEVADA)					

PROCON, INCORPORATED
CENTRIFUGAL COMPRESSOR DATA SHEET NO. 1 of 8

REQ'N. NO. 1843-13.09-2 (REV. 2)
DATE 2-16-72 BY EJM

PURCHASER IGT-HYGAS PLANT MANUFACTURER _____
DESTINATION _____ TYPE AND SIZE _____
UNIT 1200 SERIAL NO. _____
ITEM NO. 13.09-02A+E NO. REQUIRED TWO (2) QUOTE NO. _____ DATE _____
SERVICE AERATION INERT GAS PURCHASER ORDER NO. _____ DATE _____

PROCESS REQUIREMENTS

	Normal	Rated	Other Conditions		
			A	B	C
GAS HANDLED	① INERT GAS				
BAROMETER, psia	14.3				
STD CU FT PER MIN (14.7 psia-- 60 F--Dry) OR WEIGHT FLOW, lb per HOUR	△ 19910				

INLET CONDITIONS	△ 16.5				
Pressure, psia					
Temperature, deg F	△ 60				
Relative Humidity, percent					
Molecular Weight (M)	△ 43.21				
Cp/Cv (K ₁)	△ 1.28				
Compressibility (Z ₁)					
Inlet Volume, cfm	△ 2595				

DISCHARGE CONDITIONS	109.3				
Pressure, psia					
Temperature, deg F					
Cp/Cv (K ₂)					
Compressibility (Z ₂)					

HORSEPOWER REQUIRED BY DRIVER					
SPEED, rpm					
ESTIMATED SURGE, ICFM (At Speed Above)					
ADIABATIC HEAD (H _f)					
PERFORMANCE CURVE NO					

CORROSION AND REMARKS REGARDING GAS ① GAS ANALYSIS ON SHEET 2
② TWO 100% MACHINES REQUIRED. (HI-SPEED PLANT AIR PACKAGE TYPE)
△ REV. 2 3-30-72-EJM

CONSTRUCTION FEATURES

SPEEDS (rpm): Max Cont Criticals: 1st 2nd

ROTATION, Viewed from Coupling End of Compressor

CASING: Type MFR. STD. Material

Thickness Corrosion Allowance

Max Oper Temp Max Oper Press Test Press

IMPELLERS: Type Material

No. Diameters

DIAPHRAGMS: Material Cooling

LADYRINTHS: Material Radial Clearance

SHAFT: Material Diameter at Impellers

BEARING HOUSING CONSTRUCTION MFR. STD

RADIAL BEARINGS: Span Diameter Length

Total Clearance Oil Press

THRUST BEARING: Type Size

Location Oil Press

OTHER COMPONENTS: Material

INLET NOZZLE: Size Rating Facing Location

Allowable Loads	Force, lb	Moment, ft-lb
Parallel to Shaft		
Vertical		
Horiz 90 deg to Shaft		

DISCHARGE NOZZLE: Size Rating Facing Location

Allowable Loads	Force, lb	Moment, ft-lb
Parallel to Shaft		
Vertical		
Horiz 90 deg to Shaft		

CASING CONNECTIONS: Vents, No. Type and Size

Suction Nozzle: Pressure Connection Type and Size

Temperature Connection Type and Size

Discharge Nozzle: Pressure Connection Type and Size

Temperature Connection Type and Size

Casing Drains: No. Type and Size

Water Connection: No. Type and Size

Lube Oil Connection: Inlet Type and Size

Outlet Type and Size

Seal Oil Connection: Inlet Type and Size

Outlet Type and Size

Other Connection: Service

Type and Size

COUPLINGS:	Driver-Compressor or Driver-Case	Gear-Compressor
Make		
Type	FLEXIBLE GEAR	
Lubrication		
Mounting		

CONSTRUCTION FEATURES—Continued

BASEPLATE: Type COMMON TO COMPRESSOR, INTERCOOLERS, LUKE SYSTEM, PANEL & DRIVER,
CONTROLS: Method MFR. STD.

Control Device _____
Signal: Source _____
Type _____ Range _____
Effect on Change _____

LUBE OIL SYSTEM

TYPE MFR. STD. - PRESSURIZED.

PRESS: Driver _____ Gear _____ Control _____ System Design _____
RELIEF VALVE SETTING _____ SCHEMATIC DIAGRAM _____
GPM: Compressor _____ Driver _____ Gear _____ Control Oil _____
MAIN PUMP: Make _____ Type _____ Casing Material _____
Flanges _____ Speed _____ RPM _____
Driver (SHAFT DRIVEN) _____ hp _____ Coupling _____
Location MAIN MOTOR SHAFT _____ Control _____
SPARE PUMP: Make _____ Type _____ Casing Material _____
Flanges _____ Speed _____ GPM _____
Driver X.P. ELEC. MOTOR _____ hp _____ Coupling _____
Location ON COMMON BASEPLATE _____ Control _____

COOLERS: No. ONE Make _____ Type MFR. STD. _____
Duty _____ Surface _____ Code _____
Shell: OD _____ Thickness _____ Design Press. _____
Tubes: OD _____ Length _____ Bwg _____ No. _____
Material: Shell _____ Channel _____ Tubes _____
Switch Valve: Make _____ Material _____
Water: Temp In 85°F Out _____ Press. 65 PSIG _____ GPM _____
FILTERS: No. ONE Make _____ Type MFR. STD. FULL FLOW _____
Casing Material _____ Flanges _____
Design Press. _____ Δ P _____ Micon 12 _____
Switch Valve: Make _____ Material _____
RESERVOIR: Location WITHIN BASEPLATE Size 3 MIN. RETENTION Material STEEL
Flanges _____ Interior Coating _____
Heating Coil ELECTRIC W/THERMOSTAT (X.P.) Insulation Supports _____

SEAL OIL SYSTEM

TYPE OF SEAL LABYRINTH
TYPE OF SYSTEM MFR. STD.

GPM TO SEALS _____ SYSTEM DESIGN PRESS. _____
RELIEF VALVE SETTING _____ SCHEMATIC DIAGRAM _____
MAIN PUMP: Make _____ Type _____ Casing Material _____
Flanges _____ Speed _____ GPM _____
Driver _____ hp _____ Coupling _____
Location _____ Control _____

SEAL OIL SYSTEM—Continued

SPARE PUMP: Make Type Casing Material

Flanges Speed gpm.....

Driver hp Coupling.....

Location Control.....

COOLERS: No. Make Type

Duty Surface..... Code.....

Shell: OD..... Thickness..... Design Press.....

Tubes: OD..... Length..... Bwg..... No.....

Material: Shell..... Channel..... Tubes.....

Switch Valve: Make Material.....

Water Temp: In..... Out..... Press..... gpm.....

FILTERS: No. Make Type

Casing Material..... Flanges.....

Design Press..... Δ P..... Micron.....

Switch Valve: Make Material.....

RESERVOIR: Location..... Size..... Material.....

Flanges Interior Coating.....

Heating Coil..... Insulation Supports.....

INSTRUMENTATION (MFR. STD.)

PRESS. GAGES: Make Type and Size

TEMP GAGES: Make Type and Size

LEVEL GAGES: Make Type and Size

SIGHT FLOW: Make Type and Size

TACHOMETER: Make Type and Range.....

ALARMS: Type

Setting: Lube Oil..... Control Oil..... Seal Oil.....

Compressor Discharge Temp..... Bearing Temp.....

Others

TRIPS: Type

Setting: Lube Oil..... Control Oil..... Seal Oil.....

Compressor Discharge Temp..... Bearing Temp.....

Others

INSTRUMENT PANEL MFR. STD. BY COMR. VENDOR.

INSPECTION AND TESTS

	Not Witnessed	Witnessed
SHOP INSPECTION		X
HYDROSTATIC		X
MECHANICAL RUN		X
PERFORMANCE, AIR		
PERFORMANCE, GAS		
AUXILIARY EQUIPMENT		
DRIVER WITH COMPRESSOR		

WEIGHTS

COMPRESSOR DRIVER GEAR BASE
 ROTORS: Compressor Driver
 COMPRESSOR UPPER CASE AUXILIARIES (if separate)
 TOTAL SHIPPING WEIGHT MAX FOR MAINTENANCE

INSTALLATION CONDITIONS

ENCLOSURE TYPE: UNHEATED SHELTER WITH ROOF AND PARTIAL SIDES.
 SETTING: Grade X Balcony Ft Above Grade
 TEMP AT COMPRESSOR: Max 95°F Min -20°F

WINTERIZING (Outdoor Installations)

Item	By
1.....
2.....
3.....
4.....
5.....
6.....
7.....
8.....
9.....
10.....

UTILITY CONDITIONS

STEAM*:	Driver		Auxiliaries	
Inlet, Min	psig	F	psig	F
Normal	psig	F	psig	F
Max	psig	F	psig	F
Exhaust, Min	psig	F	psig	F
Normal	psig	F	psig	F
Max	psig	F	psig	F
Total lb per hour	

* Indicate by an asterisk (*) steam condition at which steam rate shall be guaranteed.

ELECTRIC:	MAIN Driver	AUX. OIL PUMP	Auxiliaries	CONTROL
Voltage	4160	460		115
Cycle	60	60		60
Phase	3	3		1
Power factor				
Total kw				

COOLING WATER: Temp 85°F Press 65 PSIG Allowable Rise 25°
 Fouling Factor 0.002 (WATER SIDE) Total gpm.....
 OTHER

DRIVER

TYPE INDUCTION MOTORS MAKE.....
RATED hp..... RATED rpm..... SERIAL NO.....
DATA SHEET SEE SHEET 8 FURNISHED BY COMP. MFR. MOUNTED BY COMP. MFR.
GEAR UNIT: Make and Type MFR. STD. INTEGRAL
Gear Ratio..... hp Rating..... AGMA Service Factor.....
Mechanical Efficiency..... Bearings, Diameter..... Length.....
Gears: Pitch Diameter..... Width..... Material.....

SUPPLEMENTAL SPECIFICATIONS AND DATA SHEETS

COMPRESSOR _____

DRIVER _____

OTHER _____

ADDITIONAL DATA

1. VENDOR SHALL MAKE COMPLETE LATERAL AND TORSIONAL ANALYSIS OF COMPRESSOR-DRIVER UNIT.
2. VENDOR SHALL SUPPLY INTERSTAGE COOLER (WITH STRAIGHT TUBES) AND MOISTURE SEPARATOR/WITH TRAP.
3. VENDOR SHALL QUOTE AFTER COOLER AND SEPARATOR AS EXTRA PRICE. (INCL. TRAP)
4. VENDOR SHALL FURNISH AND INSTALL BENTLY-NEVADA EXP. PROOF VIBRATION DETECTION SYSTEM ON COMPRESSOR AND INCLUDE MONITOR(S) IN CONTROL PANEL.
5. ALL ELECTRICAL COMPONENTS SHALL BE SUITABLE FOR CLASS I, GROUP D, DIV. 2.

PROCON, INCORPORATED
MOTOR DATA SHEET

JOB NO. _____ ITEM NO. 13.09-02 A&B
PURCHASE ORDER NO. _____
REQUISITION NO. 1843-13.09-2
Sheet No. B OF B BY EJM
DATE 2-16-72 REV. 1

MOTOR DESIGN DATA	MANUFACTURERS DATA
DRIVE SYSTEM: <input type="checkbox"/> DIRECT CONNECTED <input checked="" type="checkbox"/> GEAR REDUCER <input type="checkbox"/> V-BELTS CURRENT CONDITIONS <u>4160</u> VOLTS <u>3</u> PHASE <u>60</u> CYCLES TYPE MOTOR: <input checked="" type="checkbox"/> SQUIRREL CAGE IND NEMA DESIGN <input type="checkbox"/> SYNCHRONOUS <input type="checkbox"/> WOUND ROTOR INDUCTION ENCLOSURE: <input type="checkbox"/> CLASS I, GROUP D, EXP PROOF <input type="checkbox"/> TFC/TEFC <input checked="" type="checkbox"/> WEATHER PROTECTED (III) <input type="checkbox"/> FORCED VENTILATED <input type="checkbox"/> OPEN-DRIP-PROOF NAMEPLATE HORSEPOWER _____ SERVICE FACTOR _____ SITE ALTITUDE _____ SYNCHRONOUS, RPM _____ POWER FACTOR REQ'D _____ INSULATION CLASS <u>B</u> TYPE _____ TEMPERATURE RISE, DEG C <u>80</u> SYN MOTOR ROTOR: <input type="checkbox"/> SOLID <input type="checkbox"/> SPLIT SYN MOTOR HUB: <input type="checkbox"/> SOLID <input type="checkbox"/> SPLIT STARTING: <input type="checkbox"/> FULL VOLTAGE <input type="checkbox"/> UNLOADED <input type="checkbox"/> LOADED <input type="checkbox"/> REDUCED VOLTAGE _____ %	MFR _____ FULL LOAD RPM _____ EFFICIENCY: F.L. <u>3/4</u> L. <u>1/2</u> L. _____ POWER FACTOR: F.L. <u>3/4</u> L. <u>1/2</u> L. _____ CURRENT: FULL LOAD _____ LOCKED ROTOR _____ FULL-LOAD TORQUE, FT-LB _____ STARTING TORQUE, FT-LB _____ PULL-OUT TORQUE, FT-LB _____ ACCELERATION TIME _____ SEC ROTATION FACING COUPLING END _____ NUMBER CONSECUTIVE STARTS _____ FIELD DISCHARGE RESISTOR _____ OHMS BEARINGS, TYPE _____ LUBR _____ TOTAL SHAFT END FLOAT _____ LIMIT END FLOAT TO _____
TRANSMISSION EQUIPMENT	ACCESSORY EQUIPMENT
<input checked="" type="checkbox"/> SPEED-REDUCING GEAR <input checked="" type="checkbox"/> INTEGRAL <input type="checkbox"/> SEPARATE MFR _____ SIZE & TYPE _____ MAX. CONT HP RATING _____ AGMA SERVICE FACTOR _____ RATIO _____ MECH EFFICIENCY _____ <input type="checkbox"/> PRESSURE LUBE <input type="checkbox"/> SPLASH LUBE <input type="checkbox"/> V-BELTS AND V-BELT SHEAVES. <input type="checkbox"/> STATIC CONDUCTING <input type="checkbox"/> GUARD REQUIRED	<input type="checkbox"/> BASEPLATE <input type="checkbox"/> SOLEPLATE <input type="checkbox"/> STATOR SHIFT FOR _____ <input checked="" type="checkbox"/> SPACE HEATERS: KW _____ _____ VOLTS _____ PHASE _____ CYCLES <input type="checkbox"/> RESISTANCE TEMPERATURE DETECTORS NUMBER _____ RESISTANCE MAT'L _____ SELECTOR SWITCH AND INDICATOR-BY: <input type="checkbox"/> PURCHASER R.T.D.'S SET @ _____ C <input type="checkbox"/> MFR <input type="checkbox"/> D.C. EXCITATION KW REQ'D _____ VOLTS _____ BY: <input type="checkbox"/> PURCHASER <input type="checkbox"/> MANUFACTURER DESCRIPTION _____ <input type="checkbox"/> MOTOR ARRANGED FOR DIFFERENTIAL PROTECTION <input type="checkbox"/> EXTENDED LEADS LENGTH _____ FT <input type="checkbox"/> ENCLOSED COLLECTOR RINGS <input type="checkbox"/> PURGED MEDIUM _____ PRESS. _____ PSIG <input type="checkbox"/> EXPLOSION-RESISTANT NONPURGED <input type="checkbox"/> FORCED VENTILATION CFM _____ PRESS. DROP _____ IN. H ₂ O CONDUIT BOX SIZED FOR: <input checked="" type="checkbox"/> STRESS CONES <input type="checkbox"/> R.T.D.'S IN SEPARATE COX <input type="checkbox"/> MAIN MOTOR LEADS <input type="checkbox"/> C.T.'S FOR DIFF PROTECTION <input type="checkbox"/> SURGE PROTECTION
WEIGHTS AND DIMENSIONS	
MOTOR: NET WGT. _____ MAX. ERECTION WGT. _____ HEIGHT _____ FLOOR SPACE: L _____ W _____ H _____ GEAR: NET WGT. _____ MAX. ERECTION WGT. _____ MAX. MAINT WGT. _____ FLOOR SPACE: L _____ W _____ H _____	
REMARKS _____	

(Manufacturer to fill in all missing data)

PROCON, INCORPORATED
CENTRIFUGAL COMPRESSOR DATA SHEET NO. 10F10 Δ

REQ'N. NO. 1843-13.09-1
DATE 2-18-72 REV. BY EJM

PURCHASER IGT - HYGAS PLANT MANUFACTURER _____
 DESTINATION _____ TYPE AND SIZE _____
 UNIT 1300 SERIAL NO. _____
 ITEM NO. 13.09-03 NO. REQUIRED ONE QUOTE NO. _____ DATE _____
 SERVICE RECYCLE INERT GAS COMPRESSOR PURCHASER ORDER NO. _____ DATE _____

PROCESS REQUIREMENTS

	Normal	Rated	Other Conditions		
			A	B	C
GAS HANDLED (SEE SHEET No. 2) <u>Δ</u>		INERT GAS (NOTE 1)			
BAROMETER, psia		14.3			
STD CU FT PER MIN (14.7 psia— 60 F—Dry) OR WEIGHT FLOW, lb per <u>HR.</u> <u>Δ</u>		125,320			
INLET CONDITIONS					
Pressure, psia <u>Δ</u>		16.5			
Temperature, deg F <u>Δ</u>		60			
Relative Humidity, percent					
Molecular Weight (M) <u>Δ</u>		43.21			
Cp/Cv (K1) <u>Δ</u>		1.28			
Compressibility (Z.)					
Inlet Volume, cfm <u>Δ</u>		16,350			
DISCHARGE CONDITIONS					
Pressure, psia		51.3			
Temperature, deg F					
Cp/Cv (K2)					
Compressibility (Z.)					
HORSEPOWER REQUIRED BY DRIVER					
SPEED, rpm					
ESTIMATED SURGE, ICFM (At Speed Above)					
ADIABATIC HEAD (H _g)					
PERFORMANCE CURVE NO.					

CORROSIVENESS AND REMARKS REGARDING GAS _____

NOTE 1: FOR STARTUP AND EMERGENCIES, COMPRESSOR WILL TAKE SUCTION ON FILTERED ATMOSPHERIC AIR, VENDOR SHALL RECOMMEND AND FURNISH ANY SPECIAL PROVISIONS (INCLUDING AIR FILTER) REQUIRED TO ACCOMMODATE THIS CONDITION.

Δ REV. 2 3-30-72 EJM

CONSTRUCTION FEATURES

ITEM NO. 13.09-03

SPEEDS (rpm): Max Cont. Criticals: 1st 2nd

ROTATION, Viewed from Coupling End of Compressor

CASING: Type HORIZ. SPLIT Material CAST IRON

Thickness Corrosion Allowance

Max Oper Temp. Max Oper Press. Test Press.

IMPELLERS: Type CLOSED, WELDED FABRICATION Material

No. Diameters

DIAPHRAGMS: Material Cooling

LABYRINTHS: Material Radial Clearance

SHAFT: Material Diameter at Impellers

BEARING HOUSING CONSTRUCTION

RADIAL BEARINGS: Span Diameter Length

Total Clearance Oil Press.

THRUST BEARING: Type Size

Location Oil Press.

OTHER COMPONENTS: Material

INLET NOZZLE: Size Rating Facing Location

Allowable Loads	Force, lb	Moment, ft-lb
Parallel to Shaft		
Vertical		
Horiz 90 deg to Shaft		

DISCHARGE NOZZLE: Size Rating Facing Location

Allowable Loads	Force, lb	Moment, ft-lb
Parallel to Shaft		
Vertical		
Horiz 90 deg to Shaft		

CASING CONNECTIONS: Vents, No. Type and Size

Suction Nozzle: Pressure Connection Type and Size

Temperature Connection Type and Size

Discharge Nozzle: Pressure Connection Type and Size

Temperature Connection Type and Size

Casing Drains: No. Type and Size

Water Connection: No. Type and Size

Lube Oil Connection: Inlet Type and Size

Outlet Type and Size

Seal Oil Connection: Inlet Type and Size

Outlet Type and Size

Other Connection: Service

Type and Size

COUPLINGS:	Direct Compressor	Gear-Compressor
Male	FAST OR WALDRON	
Type	FLEXIBLE, SPACER, GEAR	
Lubrication	CONTINUOUS	
Mounting		

ITEM No. 13.09-03

CONSTRUCTION FEATURES—Continued

BASEPLATE: Type COMMON (COMPRESSOR & STEAM TURBINE DRIVER)
CONTROLS: Method CONSTANT DISCHARGE PRESSURE WITH SPEED CONTROL
Control Device TURBINE GOVERNOR SYSTEM
Signal: Source BY PURCHASER (DISCH. PRESS. TRANSMITTER)
Type MIN. SPEED 3PSIG AIR / MAX. SPEED 15PSIG AIR Range 75% TO 105%
Effect on Change _____

LUBE OIL SYSTEM

TYPE COMMON TO COMPRESSOR, DRIVER & COUPLING.
SEPARATE CONSOLE
PRESS: Driver _____ Gear _____ Control _____ System Design _____
RELIEF VALVE SETTING _____ SCHEMATIC DIAGRAM _____
GPM: Compressor _____ Driver _____ Gear _____ Control Oil _____
MAIN PUMP: Make IMO Type SCREW Casing Material STEEL
Flanges _____ Speed _____ gpm _____
Driver STEAM TURBINE (API STD 611) hp _____ Coupling THOMAS S.S. DISC
Location ON CONSOLE Control _____
SPARE PUMP: Make IMO Type SCREW Casing Material STEEL
Flanges _____ Speed _____ gpm _____
Driver EXPL. PROOF ELEC. MOTOR hp _____ Coupling THOMAS S.S. DISC
Location ON CONSOLE Control _____
COOLERS: No. TWO Make _____ Type REMOVABLE BUNDLE S & T
Duty _____ Surface _____ Code TEMA C / ASME
Shell: OD _____ Thickness _____ Design Press. _____
Tubes: OD _____ Length _____ Bwg _____ No. _____
Material: Shell STEEL Channel STEEL Tubes INH. ADM.
Switch Valve: Make KRAISSL Material STEEL
Water: Temp In 85°F Out _____ Press 65 PSIG gpm _____
FILTERS: No. TWO Make _____ Type FULL FLOW
Casing Material STEEL Flanges _____
Design Press. _____ A.P. _____ Micron 10
Switch Valve: Make (SAME VALVE AS COOLERS) Material -
RESERVOIR: Location ON CONSOLE Size 8 MIN. RETENTION Material STEEL
Flanges _____ Interior Coating _____
Heating Coil STEAM Insulation Supports _____
ALL OIL PIPING COMPONENTS SHALL BE STEEL.

SEAL SYSTEM

TYPE OF SEAL LABYRINTHS - EJECTOR TYPE
TYPE OF SYSTEM COMPR. MFR. SHALL FURNISH EJECTOR & STEAM CONTROL VALVE.
MOTIVE STEAM FROM 50 PSIG (SAT.) SYSTEM; EXHAUST TO VENT STACK, ASSUME
0.5 PSIG BACK PRESSURE.
GPM TO SEALS _____ SYSTEM DESIGN PRESS. _____
RELIEF VALVE SETTING _____ SCHEMATIC DIAGRAM _____
MAIN PUMP: Make _____ Type _____ Casing Material _____
Flanges _____ Speed _____ gpm _____
Driver _____ hp _____ Coupling _____
Location _____ Control _____

SEAL OIL SYSTEM--Continued

SPARE PUMP: Make Type Casing Material

Flanges Speed gpm.....

Driver hp Coup/Eng.....

Location Control.....

COOLERS: No. Make..... Type

Duty Surface..... Code

Shell: OD..... Thickness..... Design Press.....

Tubes: OD..... Length..... Dwg No.....

Material: Shell..... Channel..... Tubes.....

Switch Valve: Make..... Material.....

Water Temp: In..... Out..... Press..... gpm.....

FILTERS: No. Make..... Type

Casing Material..... Flanges

Design Press..... ΔP..... Micron.....

Switch Valve: Make..... Material.....

RESERVOIR: Location..... Size..... Material.....

Flanges Interior Coating.....

Heating Coil..... Insulation Supports.....

INSTRUMENTATION

PRESS. GAGES: Make..... Type and Size

TEMP GAGES: Make..... Type and Size

LEVEL GAGES: Make..... Type and Size.....

SIGHT FLOW: Make..... Type and Size.....

TACHOMETER: Make..... Type and Range.....

ALARMS: Type ELECTRICAL (EXP. PRE.) CONTACTS SHALL OPEN TO SOUND ALARM.

Setting: Lube Oil LOW PRESSURE..... Control Oil..... Seal Oil.....

Compressor Discharge Temp. HIGH..... Bearing Temp.....

Others AUX. OIL PUMP OPERATING.....

TRIPS: Type ELECTRICAL (EXP. PRE.) CONTACTS SHALL CLOSE TO SHUT DOWN.

Setting: Lube Oil LOW PRESSURE..... Control Oil..... Seal Oil.....

Compressor Discharge Temp..... Bearing Temp.....

Others.....

INSTRUMENT PANEL BY PURCHASER

INSPECTION AND TESTS

	Not Witnessed	Witnessed
SHOP INSPECTION		YES
HYDROSTATIC		YES
MECHANICAL RUN		YES
PERFORMANCE, AIR		QUOTE AS EXTRA PRICE
PERFORMANCE, GAS		
AUXILIARY EQUIPMENT		
DRIVER WITH COMPRESSOR		

PROCON, INCORPORATED

REQ'N NO. 1843-13.09-1

CENTRIFUGAL COMPRESSOR DATA SHEET NO. 60F10 Δ DATE 2-18-72 REV. BY EJM

WEIGHTS

ITEM No. 13.09-03

COMPRESSOR DRIVER GEAR BASE

OTONS: Compressor Driver

COMPRESSOR UPPER CASE AUXILIARIES (if separate)

TOTAL SHIPPING WEIGHT MAX FOR MAINTENANCE

INSTALLATION CONDITIONS

ENCLOSURE TYPE UNHEATED SHELTER WITH ROOF AND PARTIAL SIDES

SETTING: Grade X Balcony: Ft Above Grade

TEMP AT COMPRESSOR: Max 95°F Min -20°F

WINTERIZING (Outdoor Installations)

Item By PURCHASER

1.....

2.....

3.....

4.....

5.....

6.....

7.....

8.....

9.....

10.....

UTILITY CONDITIONS

	Driver	Auxiliaries
STEAM:		
Inlet, Min	psig F	psig F
Normal	250 psig 456 F	250 psig 456 F Δ
Max	psig F	psig F
Exhaust, Min	psig F	psig F
Normal	50 psig F	50 psig F
Max	psig F	psig F
Total lb per hour		

* Indicate by an asterisk (*) steam condition at which steam rate shall be guaranteed.

	Driver	MOTORS - Auxiliaries - CONTROL
ELECTRIC:		
Voltage		460 115 Δ
Cycle		60 60 Δ
Phase		3 1 Δ
Power factor		
Total kw		

COOLING WATER: Temp 85°F Press 65 PSIG Allowable Rise 25°F

Δ Fouling Factor 0.002 (WATER SIDE) Total ppm

OTHER

PROCON, INCORPORATED

REQ'N. NO. 1843-13.09-1

CENTRIFUGAL COMPRESSOR DATA SHEET NO. 7 OF 10 Δ

DATE 2-18-72 REV. 1 BY EJM

DRIVER

ITEM NO. 13.09-03

TYPE SPECIAL PURPOSE STEAM TURBOWEAKE

RATED hp..... RATED rpm..... SERIAL NO.....

DATA SHEET (SEE SHEETS 21, 22 & 23) FURNISHED BY COMP. MFR. MOUNTED BY COMP. MFR.

GEAR UNIT: Make and Type NONE - DIRECT DRIVE

Gear Ratio..... hp Rating..... AGMA Service Factor.....

Mechanical Efficiency..... Bearings, Diameter..... Length.....

Gears: Pitch Diameter..... Width..... Material.....

SUPPLEMENTAL SPECIFICATIONS AND DATA SHEETS

Δ COMPRESSOR API STD 617

Δ DRIVER API STD 612

OTHER _____

ADDITIONAL DATA

1. TORSIONAL VIBRATION ANALYSIS BY COMP. MFR. IS REQUIRED.

2. COMPRESSOR SHALL HAVE PROVISIONS FOR FUTURE INSTALLATION OF TWO VIBRATION DETECTORS (90° APART) AT EACH RADIAL BEARING. VENDOR SHALL FURNISH AND INSTALL ONE VIBRATION DETECTOR AT COUPLING END, ONE AXIAL MOVEMENT DETECTOR, CABLE & PROXIMETERS. (BENTLY-NEVADA) MONITORS BY PURCHASER.

3. ALL ELECTRICAL COMPONENTS SHALL BE SUITABLE FOR AREA CLASSIFICATION CLASS I, GROUP D, DIV. 2. ALL ELECTRICAL SWITCHES SHALL BE DPDT.

PROCON, INCORPORATED
SPECIAL-PURPOSE STEAM TURBINE DATA SHEET

JOB. NO. _____ ITEM NO. 13.09-03
PURCHASE ORDER NO. _____
REQUISITION NO. 1843-13.09-1
INQUIRY NO. _____
Sheet No. 8 OF 10 BY EJM
DATE 1-18-71 REVISION 1

APPLICABLE TO: <input checked="" type="checkbox"/> PROPOSALS <input type="checkbox"/> PURCHASE <input type="checkbox"/> AS BUILT FOR <u>IGT-HYGAS PLANT</u> UNIT <u>1300</u>																																																												
SITE _____ SERIAL NO. _____ RATED HP _____ SERVICE <u>RECYCLE INERT GAS COMPRESSOR DRIVE</u> NO. REQ'D <u>ONE</u> MANUFACTURER _____ OUTLINE DWG. _____ SECTION DWG. _____ MODEL _____ TURBINE _____ TYPE _____ DRIVEN EQUIPMENT <u>I.G. COMPRESSOR</u>																																																												
NOTE: <input type="checkbox"/> INDICATES INFORMATION TO BE COMPLETED BY PURCHASER; <input type="checkbox"/> BY MANUFACTURER PARAGRAPH NUMBERS WITHIN () REFER TO APPLICABLE PARTS OF THIS STANDARD																																																												
<p style="text-align: center;">OPERATING CONDITIONS</p> <p>INDICATE GUARANTEE POINT BY *</p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:25%;"></td> <td style="width:25%;">HOUSEPOWER</td> <td style="width:25%;">SPEED, RPM</td> <td style="width:25%;">STEAM RATE LB/HP/HR</td> </tr> <tr> <td>RATED</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>NORMAL</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </table> <p>1ST CRITICAL SPEED _____ RPM 2ND CRITICAL SPEED _____ RPM TRIP SPEED _____ RPM</p> <p>STEAM CONDITIONS</p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">HEAT STEAM</td> <td style="width:25%;">_____ PSIG</td> <td style="width:25%;">_____ FT</td> </tr> <tr> <td>NORMAL</td> <td><u>250</u></td> <td><u>456</u></td> </tr> <tr> <td>MAX. INITIAL</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>MIN. INITIAL</td> <td>_____</td> <td>_____</td> </tr> </table> <p>EXHAUST STEAM</p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">NORMAL</td> <td style="width:25%;">_____ PSIG</td> <td style="width:25%;">_____ FT</td> </tr> <tr> <td>MAX.</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>MIN.</td> <td>_____</td> <td>_____</td> </tr> </table> <p><input type="checkbox"/> EXTRACTION <input type="checkbox"/> ADMISSION <input type="checkbox"/> NONRETURN VALVE <input type="checkbox"/> CONTROLLED <input type="checkbox"/> UNCONTROLLED</p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:25%;">NORMAL</td> <td style="width:25%;">_____ PSIG</td> <td style="width:25%;">_____ FT</td> </tr> <tr> <td>MIN.</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>MAX.</td> <td>_____</td> <td>_____</td> </tr> </table> <p>PERFORMANCE CURVE NO. _____ MAX THROTTLE FLOW, LB/HR _____ MAX FLOW TO CONDENSER, LB/HR @ IN. HG _____</p> <p>DUTY <input checked="" type="checkbox"/> CONT <input type="checkbox"/> INTERMIT <input type="checkbox"/> STANDBY HR/YR _____ APPROX STEAM RATE DESIRED _____ LB/HP/HR STEAM COST _____ \$/MBTU PAYOUT PERIOD _____ YEARS (60)</p> <p>LOCATION</p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:33%;"><input type="checkbox"/> INDOOR</td> <td style="width:33%;"><input type="checkbox"/> HEATED</td> <td style="width:33%;"><input checked="" type="checkbox"/> UNDER ROOF</td> </tr> <tr> <td><input type="checkbox"/> OUTDOOR</td> <td><input checked="" type="checkbox"/> UNHEATED</td> <td><input type="checkbox"/> PARTIAL SIDES</td> </tr> <tr> <td><input checked="" type="checkbox"/> CANOPY</td> <td><input type="checkbox"/> MEZZANINE</td> <td></td> </tr> </table> <p>SITE ELEVATION _____ FT. BAR <u>14.3</u> PSIA/WIND _____ SITE TEMP. °F. _____ SUMMER _____ WINTER _____</p> <p><input checked="" type="checkbox"/> WINTERIZATION REQ'D <input type="checkbox"/> TROPICALIZATION REQ'D WINDIAL CONDITIONS: <input type="checkbox"/> BUILT <input type="checkbox"/> FURF'S <input type="checkbox"/> OTHER COOLING WATER SUPPLY TEMP. 85°F. PRESS. 65 PSIG, AP. _____</p>		HOUSEPOWER	SPEED, RPM	STEAM RATE LB/HP/HR	RATED	_____	_____	_____	NORMAL	_____	_____	_____	HEAT STEAM	_____ PSIG	_____ FT	NORMAL	<u>250</u>	<u>456</u>	MAX. INITIAL	_____	_____	MIN. INITIAL	_____	_____	NORMAL	_____ PSIG	_____ FT	MAX.	_____	_____	MIN.	_____	_____	NORMAL	_____ PSIG	_____ FT	MIN.	_____	_____	MAX.	_____	_____	<input type="checkbox"/> INDOOR	<input type="checkbox"/> HEATED	<input checked="" type="checkbox"/> UNDER ROOF	<input type="checkbox"/> OUTDOOR	<input checked="" type="checkbox"/> UNHEATED	<input type="checkbox"/> PARTIAL SIDES	<input checked="" type="checkbox"/> CANOPY	<input type="checkbox"/> MEZZANINE		<p style="text-align: center;">CONSTRUCTION FEATURES</p> <p>TYPE <input type="checkbox"/> VERTICAL <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/> NO. STAGES _____ CASING SPLIT <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/> VERTICAL ROTOR <input type="checkbox"/> SOLID <input type="checkbox"/> BUILT UP ROTATION (FROM GOV. END) <input type="checkbox"/> CW <input type="checkbox"/> CCW MAX. TIP SPEED _____ RPM</p> <p>GOVERNOR TYPE</p> <p><input type="checkbox"/> MECH <input type="checkbox"/> HYDR <input checked="" type="checkbox"/> OIL RELAY IEMA CLASS <u>D</u> (31a) GOVERNOR MFG. <u>WOODWARD</u> MODEL <u>PG</u> NO. AUTO VALVES _____ TYPE LIFT <input type="checkbox"/> CAM <input type="checkbox"/> BAR HAND VALVES <input type="checkbox"/> MIN. STEAM PRESS. <input checked="" type="checkbox"/> ECONOMY (31c) <input checked="" type="checkbox"/> AIR HEAD FOR INSTRUMENT CONTROL (31h) <input type="checkbox"/> JACKSCREW RAISE _____ RPM <input type="checkbox"/> _____ PSIG _____ RPM @ _____ PSIG HAND SPEED CHANGER: RPM _____ MAX _____ RPM (31b) SEPARATE TRIP THROTTLE VALVE: <input checked="" type="checkbox"/> HYD <input type="checkbox"/> MECH (32) <input type="checkbox"/> REMOTE TRIP <input type="checkbox"/> ACTUATION _____</p> <p>BEARINGS</p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">RADIAL TYPE _____</td> <td style="width:50%;">AREA _____ SQ IN.</td> </tr> <tr> <td>THRUST TYPE _____</td> <td>AREA _____ SQ IN.</td> </tr> <tr> <td>MAX. THRUST LOAD _____ LB</td> <td></td> </tr> <tr> <td>THRUST CAPACITY _____ LB</td> <td></td> </tr> </table> <p>PACKING TYPE _____ (16c) INTERSTAGE GLAND SEALS _____ END GLAND SEALS <u>LABYRINTH</u> NO. PER BOX _____ <input checked="" type="checkbox"/> INSULATION <input checked="" type="checkbox"/> JACKET MATL <u>STEEL</u> (20a)</p> <p>TACHOMETER <input type="checkbox"/> VIBR. REED <input type="checkbox"/> ELECTRIC <input checked="" type="checkbox"/> ELECTRONIC <input type="checkbox"/> NO SPEED INDICATOR REQ'D BY PURCHASER _____ (34c) LOCATION(S) _____ <input type="checkbox"/> TACHOMETER MFR _____ MODEL _____ <input checked="" type="checkbox"/> SENTINEL WARNING VALVE SET @ _____ PSIG (7c) <input type="checkbox"/> BASEPLATE BY <u>COMPR. MFR.</u> (21a) <input type="checkbox"/> UNDER TURBINE ONLY <input type="checkbox"/> UNDER TURBINE AND GEAR <input checked="" type="checkbox"/> UNDER TURBINE AND DRIVEN EQUIPMENT <input type="checkbox"/> SOLEPLATES BY _____</p> <p>GLAND SEALING SYSTEM</p> <p><input checked="" type="checkbox"/> STEAM EJECTOR REQ'D. <u>50</u> PSIG SAT. FT (16c) <input checked="" type="checkbox"/> GLAND CONDENSER REQ'D <input type="checkbox"/> VACUUM DEVICE _____ (14a) TYPE "C" _____ MATL _____ TUBE OD _____ IN. DWG _____</p> <p>ELECTRICAL AREA CLASS <u>CR D</u> DIV. <u>2</u> (64)</p>	RADIAL TYPE _____	AREA _____ SQ IN.	THRUST TYPE _____	AREA _____ SQ IN.	MAX. THRUST LOAD _____ LB		THRUST CAPACITY _____ LB	
	HOUSEPOWER	SPEED, RPM	STEAM RATE LB/HP/HR																																																									
RATED	_____	_____	_____																																																									
NORMAL	_____	_____	_____																																																									
HEAT STEAM	_____ PSIG	_____ FT																																																										
NORMAL	<u>250</u>	<u>456</u>																																																										
MAX. INITIAL	_____	_____																																																										
MIN. INITIAL	_____	_____																																																										
NORMAL	_____ PSIG	_____ FT																																																										
MAX.	_____	_____																																																										
MIN.	_____	_____																																																										
NORMAL	_____ PSIG	_____ FT																																																										
MIN.	_____	_____																																																										
MAX.	_____	_____																																																										
<input type="checkbox"/> INDOOR	<input type="checkbox"/> HEATED	<input checked="" type="checkbox"/> UNDER ROOF																																																										
<input type="checkbox"/> OUTDOOR	<input checked="" type="checkbox"/> UNHEATED	<input type="checkbox"/> PARTIAL SIDES																																																										
<input checked="" type="checkbox"/> CANOPY	<input type="checkbox"/> MEZZANINE																																																											
RADIAL TYPE _____	AREA _____ SQ IN.																																																											
THRUST TYPE _____	AREA _____ SQ IN.																																																											
MAX. THRUST LOAD _____ LB																																																												
THRUST CAPACITY _____ LB																																																												

<p>CONNECTIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>SIZE</th> <th>USE/RATING</th> <th>FACING</th> <th>POSITION</th> </tr> </thead> <tbody> <tr> <td>INLET</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>EXHAUST</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>EXTRACTION</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ADMISSION</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>ALLOWABLE FIRING FORCES AND MOMENTS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">INLET</th> <th colspan="2">EXHAUST</th> <th colspan="2">EXTRACTION</th> </tr> <tr> <th>FORCE LB</th> <th>MOMENT FT-LB</th> <th>FORCE LB</th> <th>MOMENT FT-LB</th> <th>FORCE LB</th> <th>MOMENT FT-LB</th> </tr> </thead> <tbody> <tr> <td>PARALLEL TO SHAFT</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>VERTICAL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>HORIZ. 90°</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>WEIGHTS AND DIMENSIONS</p> <p>NET WT _____ LB SHIPPING WT _____ LB MAX. LIFTING WT _____ LB MAX. MAINT. WT _____ LB APPROX. FLOOR SPACE: LENGTH _____ WIDTH _____ HEIGHT _____</p> <p><input type="checkbox"/> POTENTIAL MAX. FUTURE GHP _____ <input type="checkbox"/> MAX. STEAM THRU INLET VALVE _____ LB/HR <input type="checkbox"/> MAX. ALLOWABLE CASING PRESS. ON EXHAUST END _____ PSIG</p> <p>TURBINE MATERIALS</p> <p><input type="checkbox"/> HIGH PRESS. CASING _____ <input type="checkbox"/> STEAM CHEST _____ <input type="checkbox"/> EXHAUST CASING _____ <input type="checkbox"/> DIAPHRAGMS _____ <input type="checkbox"/> NOZZLES _____ <input type="checkbox"/> NOZZLE RINGS _____ <input type="checkbox"/> BLADES _____ <input type="checkbox"/> SHROUDES _____ <input type="checkbox"/> WHEEL _____ <input type="checkbox"/> GOV. VALVE TRIM _____ <input type="checkbox"/> SHAFT _____ <input type="checkbox"/> SHAFT MATERIAL UNDER SEALS _____ (14b) <input type="checkbox"/> APPLIED BY SPRAYING _____ <input type="checkbox"/> PLATING _____</p> <p>LUBE OIL</p> <p><input type="checkbox"/> SEPARATE _____ <input checked="" type="checkbox"/> COMMON <input type="checkbox"/> WITH DRIVER (26a) _____ <input checked="" type="checkbox"/> WITH DRIVER UNIT <input checked="" type="checkbox"/> MAIN OIL PUMP: <input type="checkbox"/> SHAFT DRIVEN <input checked="" type="checkbox"/> SEPARATELY DRIVEN <input type="checkbox"/> SS OIL DRAIN HEADER _____ (12b) <input type="checkbox"/> SS OIL SUPPLY HEADER _____ <input type="checkbox"/> OIL VISCOSITY _____ SUS @ 100 F. _____ SUS @ 210 F. <input type="checkbox"/> MAX. PERMISSIBLE OIL VISCOSITY @ STARTUP _____ SUS</p> <p>COUPLING</p> <p><input checked="" type="checkbox"/> MOUNT 1/2 COUPLING (17a) <input type="checkbox"/> TYPE _____ (17d) MFR _____ (17b-1) <input type="checkbox"/> SPECIAL REQ'D <input type="checkbox"/> COUPLING FURNISHED BY <u>COMPR. MER.</u> (17c) TURBINE SHAFT <input type="checkbox"/> TAPER <input type="checkbox"/> CYLINDRICAL DRIVER SHAFT <input type="checkbox"/> TAPER <input type="checkbox"/> CYLINDRICAL COUPLING GUARD <input type="checkbox"/> MFR STD <input type="checkbox"/> OTHER</p>		SIZE	USE/RATING	FACING	POSITION	INLET					EXHAUST					EXTRACTION					ADMISSION						INLET		EXHAUST		EXTRACTION		FORCE LB	MOMENT FT-LB	FORCE LB	MOMENT FT-LB	FORCE LB	MOMENT FT-LB	PARALLEL TO SHAFT							VERTICAL							HORIZ. 90°							<p>APPLICABLE SPECIFICATIONS API 612 SPECIAL-PURPOSE STEAM TURBINE</p> <hr/> <hr/> <hr/> <p>TORSIONAL AND LATERAL CRITICAL SPEED ANALYSIS BY <u>COMPR. MER.</u> (10b)</p> <p>SHOP TESTS</p> <table style="width: 100%;"> <thead> <tr> <th></th> <th>REQUIRED</th> <th>WITNESSED (30a)</th> </tr> </thead> <tbody> <tr> <td>SHOP INSPECTION</td> <td></td> <td></td> </tr> <tr> <td>HYDROSTATIC</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td>MECHANICAL RUN</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td>RUN SPARE ROTOR</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td>PERFORMANCE TEST</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td>AUXILIARY EQUIPMENT TEST</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td>DISMANTLE REASSEMBLY</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> </tbody> </table> <p>GEAR</p> <p><input type="checkbox"/> SPECIAL-PURPOSE GEAR REQ'D <input type="checkbox"/> GEAR FURNISHED BY _____</p> <p>CONTROL PANEL</p> <p>FURNISHED BY <input type="checkbox"/> VENDOR <input checked="" type="checkbox"/> OTHERS MOUNTING <input type="checkbox"/> ON TURBINE <input type="checkbox"/> FREE STANDING OFF GROUND</p> <p>ALARM CONTACTS SHALL (34a) <input type="checkbox"/> OPEN TO SOUND ALARM <input type="checkbox"/> CLOSE TO SOUND ALARM SHUTDOWN CONTACTS SHALL <input type="checkbox"/> OPEN TO SHUT DOWN <input type="checkbox"/> CLOSE TO SHUT DOWN CONTROL CURRENT _____ VOLTS _____ PHASE _____ HERTZ SWITCH ENCLOSURE <input type="checkbox"/> EXP. PROOF <input type="checkbox"/> WEATHERPROOF <input type="checkbox"/></p>		REQUIRED	WITNESSED (30a)	SHOP INSPECTION			HYDROSTATIC	X	X	MECHANICAL RUN	X	X	RUN SPARE ROTOR	X	X	PERFORMANCE TEST	X	X	AUXILIARY EQUIPMENT TEST	X	X	DISMANTLE REASSEMBLY	X	X
	SIZE	USE/RATING	FACING	POSITION																																																																																
INLET																																																																																				
EXHAUST																																																																																				
EXTRACTION																																																																																				
ADMISSION																																																																																				
	INLET		EXHAUST		EXTRACTION																																																																															
	FORCE LB	MOMENT FT-LB	FORCE LB	MOMENT FT-LB	FORCE LB	MOMENT FT-LB																																																																														
PARALLEL TO SHAFT																																																																																				
VERTICAL																																																																																				
HORIZ. 90°																																																																																				
	REQUIRED	WITNESSED (30a)																																																																																		
SHOP INSPECTION																																																																																				
HYDROSTATIC	X	X																																																																																		
MECHANICAL RUN	X	X																																																																																		
RUN SPARE ROTOR	X	X																																																																																		
PERFORMANCE TEST	X	X																																																																																		
AUXILIARY EQUIPMENT TEST	X	X																																																																																		
DISMANTLE REASSEMBLY	X	X																																																																																		

Reproduced from
 best available copy.

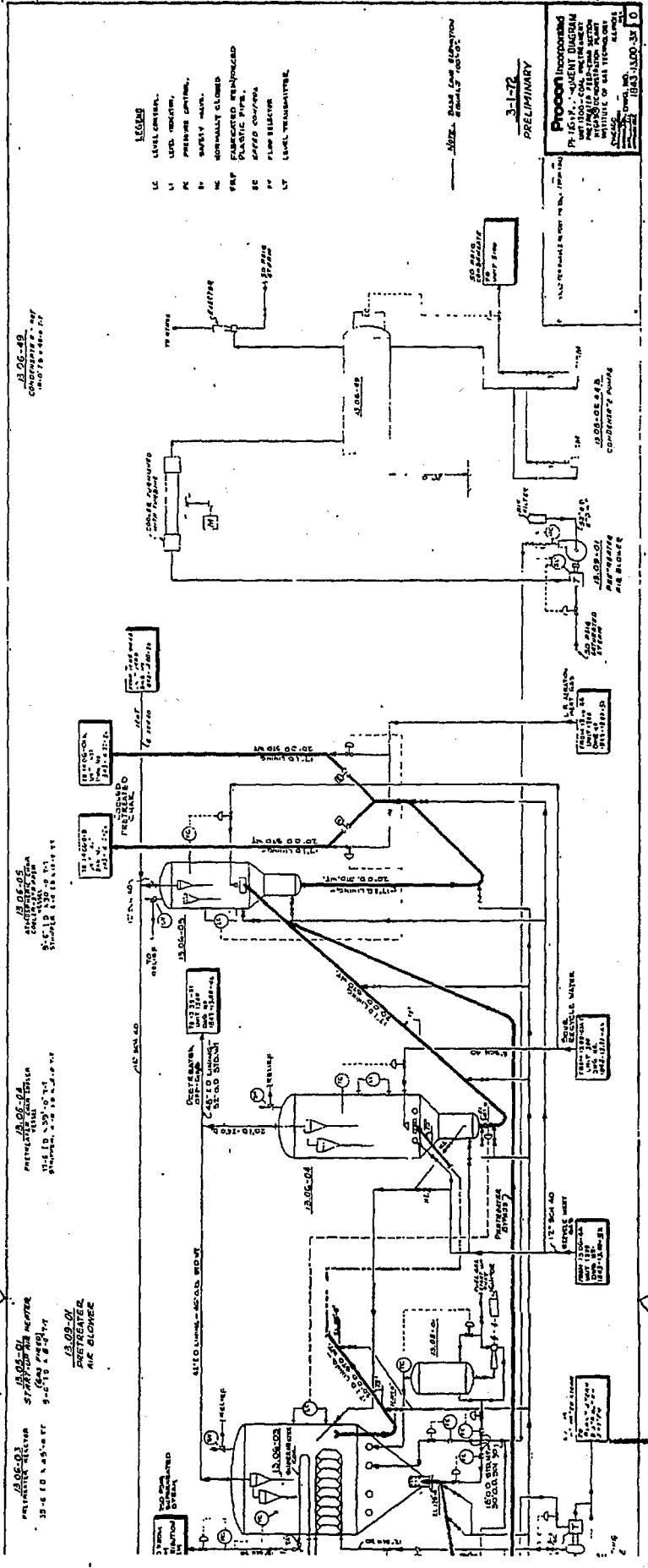
PROCON, INCORPORATED
SPECIAL-PURPOSE STEAM TURBINE DATA SHEET (Cont'd)

Req'n. No. 1843-13.09-1

JOB NO. _____ ITEM NO. 13.09-03

Sheet No. 10 of 10 BY EJM
DATE 2-18-72 REVISION 1

ALARMS AND SHUTDOWNS		(34)	INSTRUMENT PANEL		(33)
<p>(SEE SHEET 5 COMP. DATA)</p> <p><input type="checkbox"/> STANDBY LUBE OIL PUMP OPERATING <input type="radio"/> ALARM <input type="checkbox"/> SHUT-DOWN</p> <p><input type="checkbox"/> LOW OIL PRESSURE (PACH LEVEL) <input type="radio"/> <input type="checkbox"/></p> <p><input checked="" type="checkbox"/> OVERSPEED TRIP OPERATION <input type="radio"/> <input type="checkbox"/></p> <p><input type="checkbox"/> HIGH TURBINE EXTRACTION PRESSURE <input type="radio"/> <input type="checkbox"/></p> <p><input type="checkbox"/> HIGH EXHAUST PRESSURE <input type="radio"/> <input type="checkbox"/></p> <p><input type="checkbox"/> HIGH OIL FILTER ΔP <input type="radio"/> <input type="checkbox"/></p> <p><input type="checkbox"/> HIGH AND LOW OIL RESERVOIR LEVEL <input type="radio"/> <input type="checkbox"/></p> <p><input type="checkbox"/> HIGH OIL COOLER OUTLET TEMPERATURE <input type="radio"/> <input type="checkbox"/></p> <p><input type="checkbox"/> EXCESSIVE VIBRATION IN TURBINE <input type="radio"/> <input type="checkbox"/></p> <p><input type="checkbox"/> EXCESSIVE AXIAL DISPLACEMENT OF TURBINE <input type="radio"/> <input type="checkbox"/></p> <p><input checked="" type="checkbox"/> SEE NOTES 1 & 2 BELOW (34) <input type="radio"/> <input type="checkbox"/></p>			<p><input type="checkbox"/> STEAM INLET PRESSURE GAGE</p> <p><input type="checkbox"/> EXHAUST STEAM PRESSURE GAGE</p> <p><input type="checkbox"/> STEAM CHEST PRESSURE GAGE</p> <p><input type="checkbox"/> FIRST-STAGE PRESSURE GAGE</p> <p><input type="checkbox"/> EXTRACTION PRESSURE GAGE</p> <p><input type="checkbox"/> STEAM SEAL PRESSURE GAGE</p> <p><input type="checkbox"/> LUBE OIL PRESSURE GAGE</p> <p><input type="checkbox"/> CONTROL OIL PRESSURE GAGE</p> <p><input type="checkbox"/> SPEED INDICATOR</p> <p><input type="checkbox"/> GAGES FOR DRIVEN EQUIPMENT</p> <p><input type="checkbox"/> ALARM HOWLER</p> <p><input type="checkbox"/> ANNUNCIATOR</p>		
<p>VIBRATION DETECTORS * (SEE NOTE 3) (34c)</p> <p><input type="checkbox"/> TYPE _____ <input type="checkbox"/> MODEL _____</p> <p><input type="checkbox"/> NFR _____</p> <p><input type="checkbox"/> NO. _____ AT EACH SHAFT BEARING TOTAL NO _____</p> <p><input type="checkbox"/> NO. OF VIBRATION MONITORS BY PURCHASER _____</p> <p><input type="checkbox"/> ALARM <input type="checkbox"/> SHUTDOWN</p> <p><input type="checkbox"/> TIME DELAY _____ SEC</p> <p><input type="checkbox"/> MONITOR LOCATION _____</p> <p><input type="checkbox"/> MONITOR ENCLOSURE _____</p>			<p>NOTE 4 TURBINE SHALL BE EQUIPPED WITH A LABYRINTH SEAL RING HAVING PROVISION FOR PRESSURIZING WITH INSTRUMENT AIR, AT THE INBOARD SIDE OF EACH RADIAL BEARING.</p>		
<p>AXIAL MOVEMENT DETECTOR (SEE NOTE 3) (34e)</p> <p><input type="checkbox"/> TYPE _____</p> <p><input type="checkbox"/> NFR _____</p> <p><input type="checkbox"/> NO. REQUIRED _____</p> <p><input type="checkbox"/> NO. OF VIBRATION MONITORS BY PURCHASER _____</p> <p><input type="checkbox"/> ALARM <input type="checkbox"/> SHUTDOWN</p> <p><input type="checkbox"/> TIME DELAY _____ SEC</p> <p><input type="checkbox"/> MONITOR LOCATION _____</p> <p><input type="checkbox"/> MONITOR ENCLOSURE _____</p>					
<p><input type="checkbox"/> PROVISIONS FOR FIELD BALANCING (15e)</p>					
<p><input type="checkbox"/> VENDOR'S REVIEW AND COMMENT ON PURCHASER'S PIPING AND FOUNDATION DRAWINGS ARE REQUIRED (6d)</p>					
<p>* STEAM TURBINE SHALL HAVE PROVISIONS FOR FUTURE INSTALLATION OF TWO VIBRATION DETECTORS (90° APART) AT EACH RADIAL BEARING (BENTLY-NEVADA)</p> <p>NOTE 1 PROVIDE LIMIT SWITCH AT TRIP & THROTTLE VALVE.</p> <p>NOTE 2 ALL ELECTRICAL SWITCHES SHALL BE DUAL SPDT. Δ</p> <p>NOTE 3 VENDOR SHALL FURNISH AND INSTALL ONE VIBRATION DETECTOR AT COUPLING-END, ONE AXIAL MOVEMENT DETECTOR, CABLE AND PROXIMETERS. (BENTLY-NEVADA)</p>					



13.05-49
COMPRESSOR - 447
100 HP 1000 RPM

13.05-05
AIR COMPRESSOR
100 HP 1000 RPM

13.05-01
PREHEATER
100 HP 1000 RPM

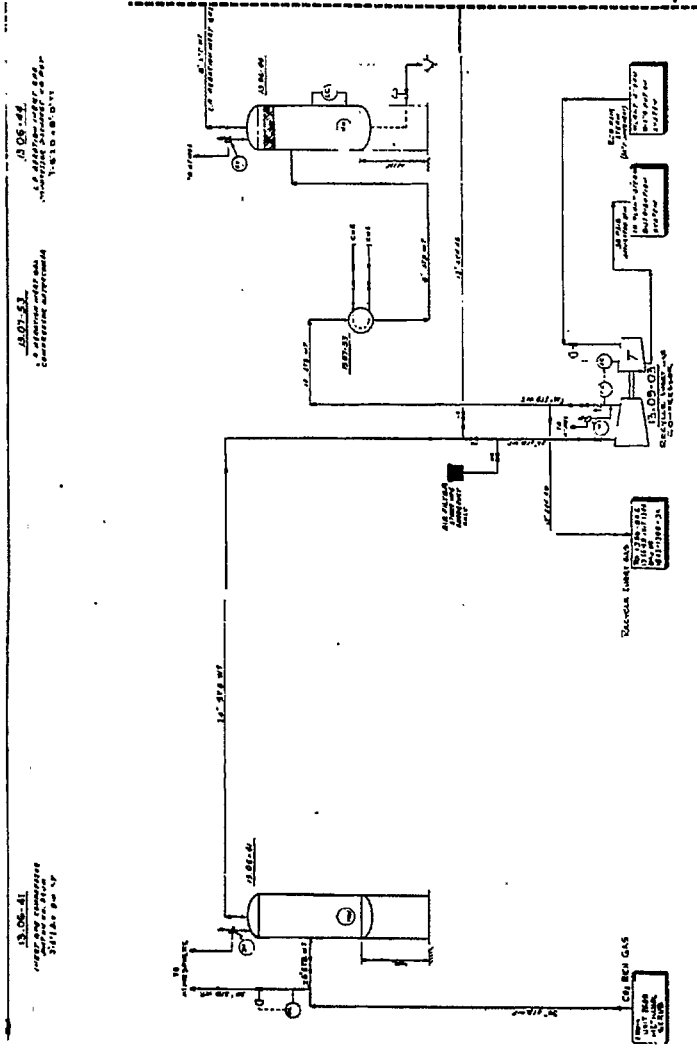
13.05-01
PROTECTOR
AIR BLOWER

- LEGEND**
- LC LEVEL CONTROL
 - LI LEVEL INDICATOR
 - PC PRESSURE CONTROLLER
 - PI PRESSURE INDICATOR
 - SC SPEED CONTROLLER
 - SI SPEED INDICATOR
 - TC TEMPERATURE CONTROLLER
 - TI TEMPERATURE INDICATOR
 - LT LEVEL TRANSMITTER

3-1-72
PRELIMINARY

Process Incorporated
PROJECT - GOVERNMENT
FOR THE DESIGN AND CONSTRUCTION
OF A CHEMICAL PLANT
AT THE SITE OF THE
ATOMIC ENERGY COMMISSION
BARODA

B



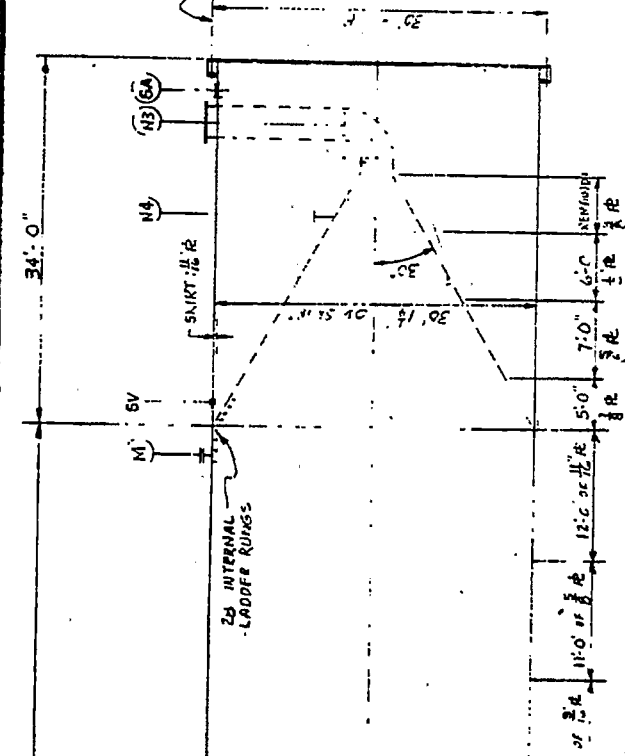
13.06-31
 CONTROL SYSTEM
 SERIAL NO. 1

13.06-32
 CONTROL SYSTEM
 SERIAL NO. 2

B

A

BASE RING: 16" DIA. X 8" WIDE



- ESTIMATED QUES.
- 12 REQ'D MK P-11
 - 20 REQ'D MK P-13
 - 6 REQ'D MK P-15
 - 6 REQ'D MK P-6
 - 4 REQ'D MK P-8

REVISION [date] [by] [init]

Procon Incorporated
 PRETREATED CHAR FEED
 HOPPER
 ITEM NO 14.06-01A#B UNIT 1400
 HYGAS CHICAGO, ILL.
 157

DRAWN BY [initials] DATE 1-7-72
 CHECKED [initials] REQ'N NO. 1043-14.06-1
 APPROVED [initials]

90'-0" TAN TO TAN

30'-0" L.D.

30'-0" RAD

4 SUPPORT RIBS IN HEAD: 6" x 4"

COMPRESSION RING 3 X 3 X 1/2"

NO.	REVISION	DATE	BY	INIT
SV	4			
SA	2			
N4	2			
N3	3			
N2	1			
N1	1			
M	1			

NO.	REVISION	DATE	BY	INIT
SV	4			
SA	2			
N4	2			
N3	3			
N2	1			
N1	1			
M	1			

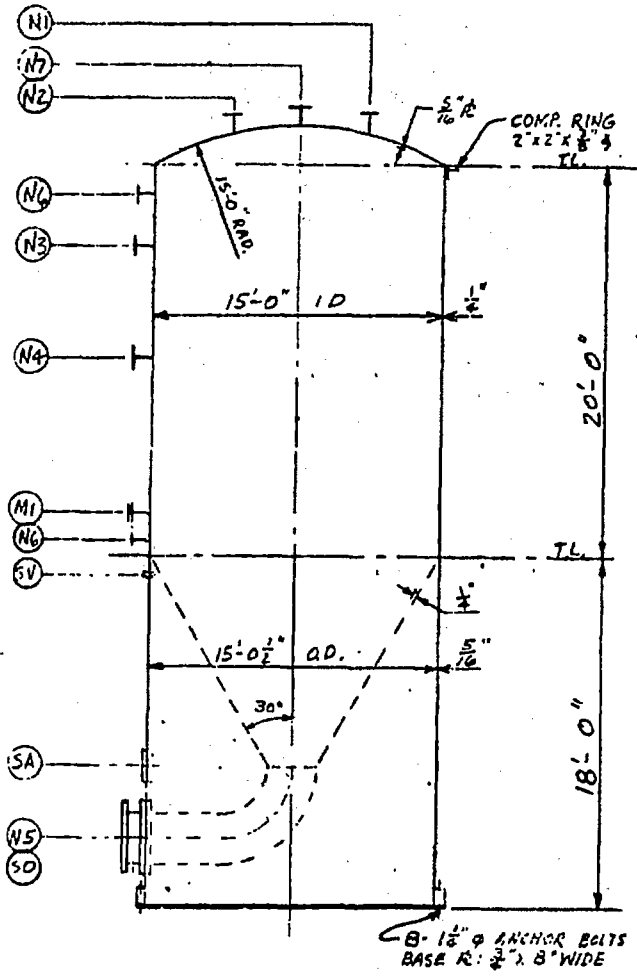
NO.	REVISION	DATE	BY	INIT
SV	4			
SA	2			
N4	2			
N3	3			
N2	1			
N1	1			
M	1			

DESIGN DATA	MATERIAL SPECIFICATIONS	ACCESSORIES TO BE SUPPLIED BY FABRICATOR
SHELL SA-285-C	LADDER AND PLATFORM CLIPS YES	LADDER AND PLATFORM CLIPS YES
HEADS SA-285-C	INSULATION CLIPS AND RINGS NO	INSULATION CLIPS AND RINGS NO
SUPPORT SA-36	DAWIT SUPPORTS NO	DAWIT SUPPORTS NO
NOZZLE NECKS SA-106 GR. A OR B	PIPE SUPPORT LUGS YES	PIPE SUPPORT LUGS YES
FLANGES SA-107-J	PIPE GUIDE LUGS YES	PIPE GUIDE LUGS YES
INTERIALS C.S.	FIREPROOFING YES	FIREPROOFING YES
MANWAY (HINDED)	INSULATION NO	INSULATION NO
NOTES & REF. DRGS.	PAINT DINE SHOP COAT PRIMER	PAINT DINE SHOP COAT PRIMER
CHAR DENSITY 35 lb/cu. ft.	NOZZLE NOTE	NOZZLE NOTE
	RADIAL NOZZLE AND MANHOLE PROJECTIONS ARE FROM OD OF VESSEL TO EXTERNAL FACE OF FLANGE EXCEPT FOR INTERNAL REINFORCED NOZZLES OR OTHERWISE SHOWN	RADIAL NOZZLE AND MANHOLE PROJECTIONS ARE FROM OD OF VESSEL TO EXTERNAL FACE OF FLANGE EXCEPT FOR INTERNAL REINFORCED NOZZLES OR OTHERWISE SHOWN
	SIZE PRODUCTION SIZE PRODUCTION	SIZE PRODUCTION SIZE PRODUCTION
	1. THRU 3" TO 7" 4 THRU 8" 20 THRU OVER	1. THRU 3" TO 7" 4 THRU 8" 20 THRU OVER

DESIGN DATA	
CODE	ASME SECT. VIII DIV. 1 1971
SPECS.	
CODE STAMP NOT REQ'D.	
DESIGN CONDITIONS	INT 5 PSIG @ 200°F
	EXT. PSIG @ °F
OPER. PRESS.	1 PSIG @ 155°F
RADIOGRAPHY	SPOT PER CODE
POST WELD HEAT TREAT	NO
JOINT EFF. SHELL	85% HEAD 85%
CORROSION ALLOWANCE	7/16"
NET WLL. WEIGHT	30,800#*
EMPTY WEIGHT	3
G.R. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-285-C
HEADS	SA-285-C
SUPPORT	SA-36
NOZZLE NECKS	SA-106-B
FLANGES	SA-181-1
INTERNALS	C.S.

MANWAY (WELDED)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM CLIPS	YES
DAVIT SLINGS	NO
PIPE SUPPORT LUGS	YES
PIPE GUIDE LUGS	YES
FIREPROOFING	YES
INSULATION	NO
PAINT	ONE SHOP COAT PRIMER

* DOES NOT INCLUDE WEIGHT OF MIXER



NO.	QTY	SIZE	TYPE	CLASS	RF	DESCRIPTION
SV	4	4"	PIPE SLEEVE			SKIRT VENT
SD	1	34"	PIPE SLEEVE			SKIRT OPENING
SA	1	18"	P.F. SLEEVE			SKIRT ACCESS
N7	1	30"	CLASS 125	RF		MIXER MOUNT
N6	2	2"	150#	RF		
N5	1	30"	CLASS 125	RF		
N4	1	12"	150#	RF		
N3	1	6"	150#	RF		
N2	1	30"	CLASS 125	RF		
N1	1	30"	CLASS 125	RF		
M1	1	18"	150#	RF		MANHOLE W/ COVER

SIZE	PROJECTION	SIZE	PROJECTION
1" THRU 3"	7"	4" THRU 8"	8"
10 THRU 18"	10"	20" THRU OVER	12"

NO.	REVISION	DATE	BY	CHKD.
Procon Incorporated CHAR OIL MIX TANKS ITEM #14.06-41 A#B UNIT 1400 HYGAS				
1GT		CHICAGO, ILL.		
DRIVEN / NEW / CHECKED / APPROVED		DATE 1-11-72		
		REQ. NO. 1843-14.06-41		

Procon Incorporated

EXCHANGER DATA SHEET

1	CUSTOMER		ICT HYGAS PLANT	REQ. No.	
2	ADDRESS			PAGE No.	
3	PLANT LOCATION			DATE	3-1-72
4	SERVICE OF UNIT		RECYCLE SEAL FLUSH OIL COOLER	REVISED	
5	SIZE		TYPE AES	ITEM NO.	14.07-51
6	SURFACE PER UNIT		700 Ft. ²	CONNECTED IN	
7	SHELLS PER UNIT		One	SURFACE PER SHELL	700 Ft. ²
8	PERFORMANCE OF ONE UNIT				
9		SHELL SIDE		TUBE SIDE	
10	FLUID CIRCULATED	Oil		Cooling Water	
11	TOTAL FLUID ENTERING	70,000		207,000	
12	VAPOR				
13	LIQUID	70,000		207,000	
14	STEAM				
15	NON-CONDENSABLES				
16	FLUID VAPORIZED OR CONDENSED				
17	STEAM CONDENSED				
18	GRAVITY—LIQUID	50 Lb/Ft. ³			
19	VISCOSITY—LIQUID				
20	MOLECULAR WEIGHT—VAPORS				
21	SPECIFIC HEAT—LIQUIDS	.45	B.T.U./#		B.T.U./#
22	LATENT HEAT—VAPORS		B.T.U./#		B.T.U./#
23	TEMPERATURE IN	200	°F	85	°F
24	TEMPERATURE OUT	100	°F	100	°F
25	OPERATING PRESSURE	50	#/SQ. IN.	65	#/SQ. IN.
26	NUMBER OF PASSES	1		2	
27	VELOCITY		FT./SEC.		FT./SEC.
28	PRESSURE DROP	10	#/SQ. IN.	10	#/SQ. IN.
29	FOULING FACTOR	0.001		0.002	
30	HEAT EXCHANGED—B.T.U./HL	3.1 x 10 ⁶		M.T.D. (Corrected)	
31	TRANSFER RATE—SERVICE			CLEAN	
32	CONSTRUCTION				
33	DESIGN PRESSURE	120	#/SQ. IN.	120	#/SQ. IN.
34	TEST PRESSURE		#/SQ. IN.		#/SQ. IN.
35	DESIGN TEMPERATURE	650	°F	650	°F
36	TUBES	C.S.	NO. 182	O.D. 3/4	S.W.G. 14
37	SHELL	C.S.	18"	I.D. O.D.	THICKNESS
38	SHELL COVER	FLOATING HEAD COVER			
39	CHANNEL	CHANNEL COVER			
40	TUBE SHEETS—STATIONARY	FLOATING			
41	BAFFLES—CROSS	TYPE		THICKNESS	
42	BAFFLE—LONG	TYPE		THICKNESS	
43	TUBE SUPPORTS	THICKNESS			
44	GASKETS				
45	CONNECTIONS—SHELL—IN	OUT	SERIES 150 # R.F.		
46	CHANNEL—IN	OUT	SERIES 150 # R.F.		
47	CORROSION ALLOWANCE—SHELL SIDE	1/8"	TUBE SIDE 1/8"		
48	CODE REQUIREMENTS	A.S.N.E. Sec. VIII; Code Stamp		TEMA CLASS R	
49	WINDS—EACH SHELL	BUNDLE	FULL OF WATER		
50	NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S.R.) AND WHETHER RADIOGRAPHED (R-B)				
51	REMARKS:				
52					

Procon Incorporated

EXCHANGER DATA SHEET

1	CUSTOMER IGT HYGAS PLANT	REQ. No. 1843-14.07-1
2	ADDRESS	PAGE No.
3	PLANT LOCATION	DATE 2/16/72
4	SERVICE OF UNIT Char-Oil Slurry Heater, No.1.	REVISED
5	SIZE 13'dia.x60' Tube l'th ¹ Special	ITEM NO. 14.07-52
6	SURFACE PER UNIT 9860 Ft. ²	CONNECTED IN -
7	SHELLS PER UNIT one	SURFACE FOR SHELL .9860 Ft. ²
8	PERFORMANCE OF ONE UNIT	
9	FLUID CIRCULATED	SHELL SIDE
10	TOTAL FLUID ENTERING lb/hr.	TUBE SIDE
11	VAPOR	Steam
12	LIQUID	Char Oil Slurry
13	STEAM	93,200
14	WATER Solids	1,105,700
15	FLUID VAPORIZED OR CONDENSED	H.C. Oil-739,000
16	STEAM CONDENSED	Coal Char-366,700
17	GRAVITY—LIQUID	93,200
18	VISCOSITY—LIQUID	0.963
19	MOLECULAR WEIGHT—VAPOES	0.672
20	SPECIFIC HEAT—LIQUIDS	B.T.U./#
21	XXXXXXXXXXXX Conductivity	0.45
22	TEMPERATURE IN	B.T.U./#
23	TEMPERATURE OUT	0.08
24	OPERATING PRESSURE	338 °F
25	NUMBER OF PASSES	155 °F
26	VELOCITY	320 °F
27	PRESSURE DROP	100 #/SQ. IN.
28	Fouling Factor	1210 #/SQ. IN.
29	HEAT EXCHANGED—B.T.U./HR. 82 x 10 ⁶	(see sketch)
30	TRANSFER RATE—SERVICE	M.T.D. (Corrected)
31	CONSTRUCTION	
32	DESIGN PRESSURE	CLEAN
33	TEST PRESSURE	140 #/SQ. IN.
34	DESIGN TEMPERATURE	1305 #/SQ. IN.
35	TUBES C.S. NO. 136 o.d. 4 1/2	550 °F
36	SHELL C.S. 13' I.D. 16 1/2	450 °F
37	SHELL COVER	NO. 80 LENGTH 60' PITCH
38	CHANNEL	THICKNESS
39	TUBE SHEETS—STATIONARY	FLOATING HEAD COVER
40	BAFFLES—CROSS	CHANNEL COVER
41	BAFFLES—LONG	FLOATING
42	TUBE SUPPORTS	TYPE THICKNESS
43	GASKETS	TYPE THICKNESS
44	CONNECTIONS—SHELL—IN (4) - 8"	THICKNESS
45	OUT (3) - 3"	TYPE THICKNESS
46	CHANNEL—IN (2) - 4"	SERIES 150# R.F.
47	OUT (8) - 4"	SERIES 600# R.F.
48	CORROSION ALLOWANCE—SHELL SIDE	TUBE SIDE
49	CODE REQUIREMENTS A.S.M.E. Sect. VIII	TEMA CLASS R
50	WEIGHTS—EACH SHELL	BUNDLE FULL OF WATER
51	NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S. R.) AND WHETHER RADIOGRAPHED (X-R)	
52	REMARKS: See attached sketch for arrangement drawing.	

BY	APP.		

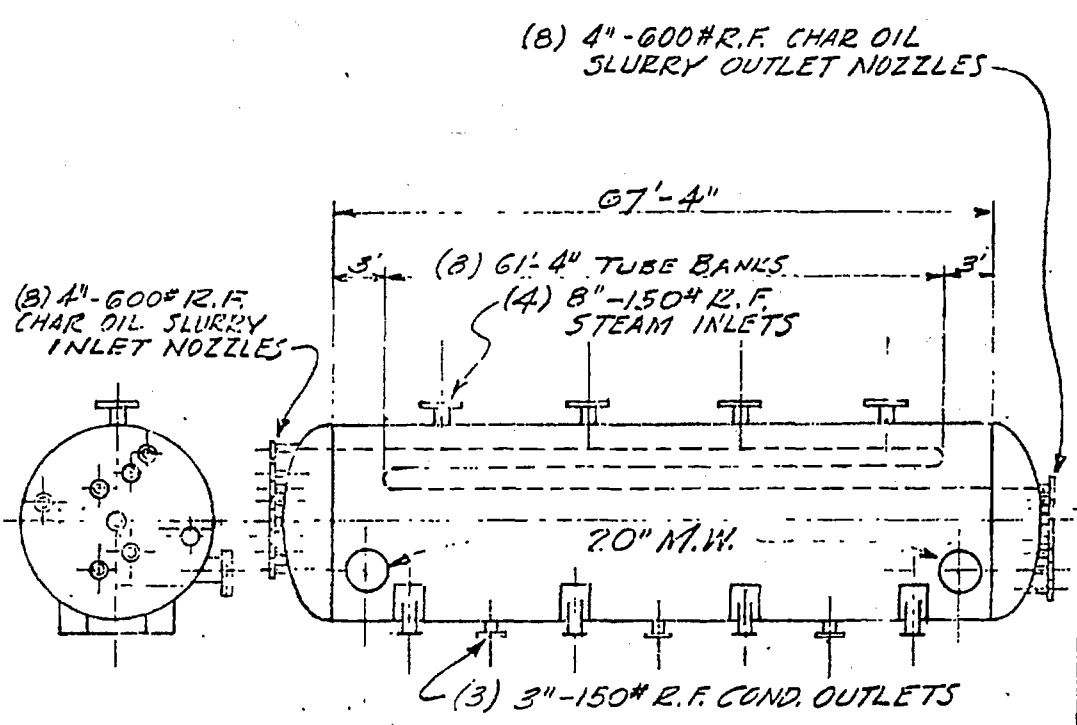
Procon Incorporated
 SHELL AND TUBE HEAT EXCHANGER
 CHAR FEED PREPARATION-UNIT-1400
 HY GAS DEMONSTRATION UNIT
 INSTITUTE OF GAS TECHNOLOGY-CHICAGO, ILL.

REQ. NO.	1843-14.07-1
SH. NO.	OF
BY	LENZ/06R
DATE	2/16/72
REV.	DATE

NO.	DATE	REVISION

BY	APP.		
REVISION			

NO.	DATE



13'-0" I.D. X 67'-4" T. - T.
CHAR OIL SLURRY HEATER NO. 1
ITEM 14.07-52

NOTE: 17-TUBES PER TUBE BANK,
 USE 180° L. R. RETURNS.

Procon Incorporated

EXCHANGER DATA SHEET

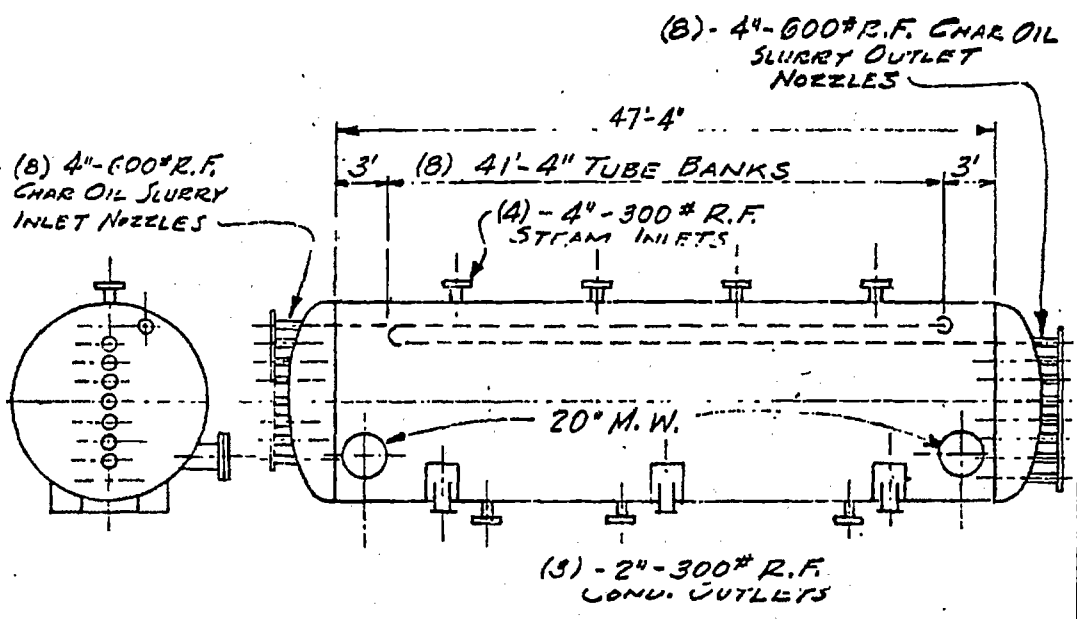
1	CUSTOMER IGT HYGAS PLANT		REG. No.	J843-14.07-1	
2	ADDRESS		PAGE No.		
3	PLANT LOCATION		DATE	2/18/72	
4	SERVICE OF UNIT Char-Oil Slurry Heater, No.2.		REVISID		
5	SIZE 9'dia.x40' Tube Length TYPE Special		ITEM NO.	14.07-53	
6	SURFACE PER UNIT 2730 Ft. ² SHELLS PER UNIT one		CONNECTED IN		
7			SURFACE PER SHELL	2730 Ft. ²	
8	PERFORMANCE OF ONE UNIT				
9		SHELL SIDE		TUBE SIDE	
10	FLUID CIRCULATED	Steam		Char Oil Slurry	
11	TOTAL FLUID ENTERING lb/hr.	24,100		1,105,700	
12					
13	LIQUID			H.C. Oil-739,000	
14	STEAM	24,100			
15	NON-CONDENSABLES Solids			Coal Char - 366,700	
16	FLUID VAPORIZED OR CONDENSED				
17	STEAM CONDENSED	24,100			
18	GRAVITY—LIQUID			0.963	
19	VISCOSITY—LIQUID			0.41	
20	MOLECULAR WEIGHT—VAPOES				
21	SPECIFIC HEAT—LIQUIDS			B.T.U./#	0.45
22	CONDUCTIVITY Conductivity			B.T.U./#	0.08
23	TEMPERATURE IN	404	°F	320	°F
24	TEMPERATURE OUT	404	°F	360	°F
25	OPERATING PRESSURE	245	#/SQ. IN.	1210	#/SQ. IN.
26	NUMBER OF PASSES	ONE		(see sketch)	
27	VELOCITY			FT./SEC.	
28	PRESSURE DROP	1	#/SQ. IN.	10	#/SQ. IN.
29	Fouling Factor	0.0005		0.0015	
30					
31	HEAT EXCHANGED—B.T.U./HR.	19.8 x 10 ⁶		M.T.D. (Corrected)	
32	TRANSFER RATE—SERVICE			CLEAN	
33	CONSTRUCTION				
34	DESIGN PRESSURE	300	#/SQ. IN.	1305	#/SQ. IN.
35	TEST PRESSURE		#/SQ. IN.		#/SQ. IN.
36	DESIGN TEMPERATURE	650	°F	450	°F
37	TUBES C.S.	NO. 56	O.D. 4 1/2	BWG Sch. 80	NO. 40' PITCH
38	SHELL C.S.	9' I.D.	THICKNESS		
39	SHELL COVER	FLOATING HEAD COVER			
40	CHANNEL	CHANNEL COVER			
41	TUBE SHEETS—STATIONARY.	FLOATING			
42	RAFFLES—CROSS	TYPE		THICKNESS	
43	BAFFLE—LONG	TYPE		THICKNESS	
44	TUBE SUPPORTS	THICKNESS			
45	GASKETS				
46	CONNECTIONS—SHELL—IN (4) - 4"	OUT (3) - 2"	SERIES 300# R.F.		
47	CHANNEL—IN (8) - 4"	OUT (8) - 4"	SERIES 600# R.F.		
48	CORROSION ALLOWANCE—SHELL SIDE				TUBE SIDE
49	CODE REQUIREMENTS A.S.M.E. Sect. VIII				TEMA CLASS R
50	WEIGHTS—EACH SHELL		BUNDLE	FULL OF WATER	
51	NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S.R.) AND WHETHER RADIOGRAPHED (X-R)				
52	REMARKS See attached sketch for arrangement drawing.				

BY	APP.

Procon Incorporated
 SHELL AND TUBE HEAT EXCHANGER,
 CHAR FEED PREPARATION - UNIT-1400
 HY GAS DEMONSTRATION PLANT
 INSTITUTE OF GAS TECHNOLOGY CHICAGO, ILL.

REQ. NO.	1843-14.07-1
SH. NO.	OF
BY	LENZ / CBR
DATE	2/16/72
REV.	DATE

NO.	DATE	REVISION



9'-0" I.D. x 47'-4" T.-T.
CHAR OIL SLURRY HEATER No. 2
ITEM 14.07-53

NOTE: 7 TUBES PER TUBE BANK
 Use 180° L.R. RETURNS.

BY	APP.	
NO.	DATE	REVISION

NO.	DATE

Procon Incorporated

EXCHANGER DATA SHEET

W-1843

1	CUSTOMER IGT Hygas Plant		REQ. No.	
2	ADDRESS		PAGE No.	
3	PLANT LOCATION		DATE 1/26/72	
4	SERVICE OF UNIT Mix Tank Vent Cooler		REVISED	
5	SIZE 4-1/2" O.D. x 240" long.		ITEM NO. 14-07-54	
6	TYPE Double Pipe		CONNECTED IN Series	
7	SURFACE PER UNIT 520		SHELLS PER UNIT 2 Sections	
8			SURFACE PER SHELL 260	
PERFORMANCE OF ONE UNIT				
9			SHELL SIDE	
10	FLUID CIRCULATED		TUBE SIDE	
11	TOTAL FLUID ENTERING #/hr.		Vent Gas	
12	VAPOR #/hr.		5,046	
13	LIQUID #/hr.		26,605	
14	STEAM			
15	NON-CONDENSABLES			
16	FLUID VAPORIZED OR CONDENSED			
17	STEAM CONDENSED			
18	GRAVITY—LIQUID			
19	VISCOSITY—LIQUID			
20	MOLECULAR WEIGHT—VAPORS		35	
21	SPECIFIC HEAT—LIQUIDS		B.T.U./#	
22	LATENT HEAT—VAPORS		B.T.U./#	
23	TEMPERATURE IN		85 °F	
24	TEMPERATURE OUT		100 °F	
25	OPERATING PRESSURE		65 #/SQ. IN.	
26	NUMBER OF PASSES		20 #/SQ. IN.	
27	VELOCITY		FT./SEC.	
28	PRESSURE DROP		10 #/SQ. IN.	
29	Fouling Factor		0.002	
30				
31	HEAT EXCHANGED—B.T.U./HR.		0.4 M ² A.T.D. (Corrected)	
32	TRANSFER RATE—SERVICE		CLEAN	
CONSTRUCTION				
33	DESIGN PRESSURE		150 #/SQ. IN.	
34	TEST PRESSURE		150 #/SQ. IN.	
35	DESIGN TEMPERATURE		650 °F	
36	TUBES		NO. O.D. BWG. LENGTH FITCH	
37	SHELL		C.S. I.D. O.D. THICKNESS	
38	SHELL COVER		C.S. FLOATING HEAD COVER	
39	TUBE ADAPTER		C.S. CHANNEL COVER	
40	TUBE SHEETS—STATIONARY		C.S. FLOATING	
41	BAFFLES—CROSS		C.S. TYPE THICKNESS	
42	BAFFLE—LONG		TYPE THICKNESS	
43	TUBE SUPPORTS		THICKNESS	
44	GASKETS			
45	CONNECTIONS—SHELL—IN		OUT SERIES	
46	CHANNEL—IN		OUT SERIES	
47	CORROSION ALLOWANCE—SHELL SIDE		1/8" TUBE SIDE 1/8"	
48	CODE REQUIREMENTS		ASME VIII TEMA CLASS	
49	WEIGHTS—EACH SHELL		BUNDLE FULL OF WATER	
50	NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S. R.) AND WHETHER RADIOGRAPHED (X-R)			
51	REMARKS:			
52				

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-14.08-1
 SHEET NO. 1
 TOTAL SHEETS 3
 DATE 2-9-72 EJM
 APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 14.08-01A,B,C
 SITE _____ UNIT 1400
 SERVICE SLURRY TRANSFER MOTOR DRIVE 3 TURBINE DRIVE _____
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 3

OPERATING CONDITIONS				PERFORMANCE	
LIQUID <u>SLURRY (20% CHL)</u>	U.S. RPM at PT. NO. <u>1380</u>	DESIGN <u>1500</u>	PROPOSAL CURVE NO. _____	NPSH REQ'D (WATER), ft. _____	
<u>MESH CHAK IN BENZENE</u>	DISCH PRESS., psig <u>60</u>	SUCT PRESS., psig MAX <u>1/2</u> DES <u>0</u>	NO. OF STAGES _____	RPM _____	
PTF <u>155</u>	DIFF PRESS., (ft) _____	DIFF HEAD, ft <u>60</u>	DES EFF _____	DHP _____	
SP GR at PT. <u>0.945</u>	NPSH AVAIL., ft <u>~26</u>	MAX BHP DES IMP _____	MAX HEAD DES IMP, ft _____		
VAP PRESS at PT. psia <u>12</u>		MIN CONTINUOUS, gpm (BY MFR) <u>①</u>	ROTATION FACING COUPLING END _____		
VIS at PT. CFS <u>2.0 cb</u>			WATER COOLING _____		
CODE/STOS covered by <u>3270 CHAK BY UNIT</u>			BEARINGS _____		

CONSTRUCTION AND MATERIALS				
CASING-MOUNTING (CENTERLINE X) (FOOT) (BRACKET) (VERTICAL)				
SPLIT (AXIAL) (RADIAL X)				
TYPE (SINGLE VOLUTE X) (DOUBLE VOLUTE) (DIFFUSER)				
① TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE CONNS.)				
NOZZLES	SIZE	ASA RATING	FACING	POSITION
SUCTION				
DISCHARGE				
IMPELLER DIAM DES _____	MAX _____	TYPE <u>OPEN</u>		
MFR'S BEARING NO RADIAL _____	THRUST _____			
COUPLING and GUARD <u>THOMAS</u>	<u>/YES</u> BASE PLATE <u>DRAIN RIM</u>			
PACKING _____				
MECH SEAL <u>YES-3AL</u>	CLASS. CODE _____	MFR _____		

MATERIAL CODE—EXTERNAL CASING <u>S</u> ①		INTERNAL PARTS <u>S</u> ②					SHOP TESTS	REQUIRED	WITNESSED
1—CAST IRON	IMPELLER	I	B	B	O				
2—BRONZE	INNER CASE PARTS	I	B	R	O		X		
3—STEEL	SLEEVE (PACKED)	Ch	Ch	Al	Al				
4—11-12% CHROME	SLEEVE (REAL)	O	O	O	O				
A—ALLOY	WEAR PARTS	I	B	Ch	Ch				
B—HARDENED	SHAFT	B	B	B	B				
I—FACED									
X—									

MOTOR DRIVER BY <u>PUMP MFR</u>		TURBINE DRIVER BY _____		MFR FINAL DATA (AS BUILT)		
ITEM NO. <u>AB&C</u>	MTD BY <u>PUMP MFR</u>	ITEM NO. _____	MTD BY _____	ACTUAL IMPELLER DIAM _____		
RPM _____	FRAME _____	RPM _____	MAT'L _____	TEST CURVE NO. _____		
MFR _____		MFR and TYPE _____		OUTLINE DWG NO. _____		
TYPE <u>SCI</u>	INSUL. <u>B</u>	INLET STEAM, psig _____	TEMP F _____	PUMP SECT. DWG NO. _____		
ENC <u>TEFC</u>	TEMP RISE C. <u>80</u>	EXHAUST _____		SEAL DIAM DWG NO. _____		
VOLTS/PHASE/CYCLES <u>460/3/60</u>	BEARINGS <u>BALL</u>	STEAM RATE, FL _____	lb/BHP/Hr _____	PUMP SERIAL NO. _____		
FULL LOAD AMPS _____	LUBE <u>GRS</u>	NOZZLES	SIZE	ASA RATING	FACING	POSITION
		INLET				
		EXHAUST				

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
 EXCEPTIONS (ITEMIZE): ① PLS. ADVISE. ② ADVISE COMPLETE DETAILS ON RECOMMENDED EROSION RESISTANT LININGS OR COATINGS.

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED

PROCON

RECIPROCATING PUMP DATA SHEET

LOCATION <u>IGT-HYGAS PLANT</u>	JOB NO. <u>1843-14.08-1</u>
OPERATING UNIT <u>1400</u>	SHEET NO. <u>2 OF 3</u> ITEM NO. <u>1408-02ABC</u>
SERVICE <u>SLURRY FEED</u>	BY <u>EJM</u>
NO. REQUIRED <u>3</u>	DATE <u>2-10-72</u>
	REV. _____

OPERATING CONDITIONS

PRODUCT HANDLED <u>BENZENE & CHAR SLURRY</u>	DISCHARGE PRESSURE <u>1300</u> PSIG
EROSIVE DUE TO <u>20080 MESH QUAR, 33% BY WEIGHT</u>	SUCTION PRESSURE <u>50</u> PSIG
PUMPING TEMPERATURE <u>155 °F</u>	DIFFERENTIAL PRESSURE <u>1250</u> PSI
SP. GR. - AT 60 DEG. F. _____ AT PUMP TEMP. <u>0.945</u>	VAPOR PRESSURE AT PUMP TEMP. <u>12</u> PSIA
A.P.I. GRAVITY AT 60 DEG. F. _____	*NPSH AVAIL <u>~110</u> FT. NPSH REQUIRED _____ FT.
VISCOSITY <u>2 cp.</u> AT <u>155</u> DEG. F.	NPSH INCLUDES <u>0</u> FT. STATIC HEAD: LIFT _____
CAPACITY - B. P. D. AT 60 DEG. F. - NORMAL _____	STEAM PRESSURE _____ PSIG
DESIGN _____	SATUR. OR TOTAL TEMP. _____
G.P.M. AT PUMP TEMP. - NORMAL <u>1200</u>	EXHAUST STEAM PRESSURE _____
DESIGN _____	MOTOR CHARACTERISTICS <u>4160</u> VOLTS <u>3</u> PHASE <u>60</u> CYCLE ^①

SPECIFICATIONS

MANUFACTURER _____	PISTON SPEED FT. MIN - NORMAL _____ DESIGN _____
TYPE <u>PLUNGER</u>	R. P. M. - NORMAL _____ DESIGN _____
SIZE _____	VALVE AREA SQ. IN. 1" SUCTION _____ DISCHARGE _____
SUC. FLANGE SIZE _____	VEL. THRU SUCT. VALVES FT. MIN. - NORMAL _____ DESIGN _____
DIS. FLANGE SIZE _____	MAXIMUM STALLING PRESSURE _____ PSIG
STEAM IN. FLANGE SIZE _____	LIQUID END DESIGN PRESSURE _____ PSIG
EXHAUST FLANGE SIZE _____	HYD. H. P. - NORMAL _____ DESIGN _____
	STEAM REQUIRED - LB. H.H.P./HR. _____
	TOTAL STEAM LB. HR. - NORMAL _____ DESIGN _____

MATERIALS AND DETAILS ^②

MATERIAL FOR LIQUID END:	STEAM END PACKING - TYPE _____
CASE <u>STAINL</u>	SIZE _____
LINER _____	LIQUID END:
PISTON _____	PACKING BOX - TYPE _____
PISTON RINGS _____	SIZE - I.D. _____ O.D. _____ LENGTH _____
PISTON ROD _____	PACKING - TYPE <u>LIP TYPE TEFLO</u>
PLUNGER <u>HARD COATED</u>	PACKING ARRANGEMENT _____
VALVES <u>SPHERICAL TYPE</u>	SPARE PACKING <u>YES - 100%</u>
VALVE SEATS <u>HARDENED</u>	PACKING GLAND _____
VALVE SPRINGS _____	GLAND STUDS _____

GENERAL INFORMATION

SPACE REQUIRED TO REMOVE RODS _____	DIMEN. PRINT NO. _____ SERIAL NO. _____
COOLING WATER REQUIRED _____ DEG. F. _____ G.P.M.	NET WEIGHT - PUMP AND BASE _____
COOLING OIL LANTERN RINGS _____ DEG. F. _____ G.P.M.	INSPECTION - HYDRO. TEST <u>X</u>
FUSHING OIL <u>(BENZENE, 100°F, 100 PSIG)</u> _____ G.P.M. ^②	PERFORM TEST <u>X</u>
LUBRICATOR <u>YES</u>	SPECIAL TESTS _____
REVOLUTION COUNTER _____	FOUNDATION BOLTS - TO BE FURNISHED BY <u>PURCHASER</u>
INSULATION - STA. END BY _____ LIQ. END BY _____	FLANGE STUDS - TO BE FURNISHED BY PUMP MFR.

*NPSH AVAILABLE MEASURED TO TOP OF PUMP FOUNDATION

REMARKS: ^① DRIVERS SHALL BE INDUCTION TYPE MOTORS, WP-II ENCLOSURE, CLASS B INSULATION
 90°C TEMPERATURE SILURE SLIDING BEARINGS. ADVISE DETAILS ON SPEED REDUCTION GEAR.
^② PUMP MFR. TO ADVISE COMPLETE DETAILS AND RECOMMENDED MATERIALS.

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-14.08-1
 SHEET NO. 3
 TOTAL SHEETS 3
 DATE 2-11-72 EJM
 APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 14.08-03A, B & C
 SITE UNIT 1400
 SERVICE SEAL OIL CHARGE MOTOR DRIVE 3 TURBINE DRIVE _____
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 3

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>BENZENE</u>	U.S. gpm at PT. NO. <u>108</u>	DISC. PRES., psig <u>1450</u>	DISC. PRES., psig MAX <u>FLOODED</u>	PROPOSAL CURVE NO. _____	NO. OF STAGES _____	DES EFF. _____	BHP _____
PT. <u>100</u>	SUCT. PRESS., psig <u>0</u>	DIFF. PRESS., psig <u>1450</u>	DIFF. HEAD, ft. <u>3810</u>	MAX BHP DES IMP. _____	MAX HEAD DES IMP., ft. _____	MIN CONTINUOUS, gpm (BY MFR.) <u>(3)</u>	ROTATION FACING COUPLING END _____
BP OR at PT. <u>0.88</u>	VAP. PRESS. at PT. psig <u>3.2</u>	WIG at PT. <u>0.5</u>	NSPH AVAIL., ft. <u>25</u>	WATER COOLING <u>YES</u>	BEARINGS _____	STUFF. BOX _____	PEDESTAL _____
GASK/LUB. caused by _____				TOTAL WATER REQ'D, gpm <u>(2)</u>			

CONSTRUCTION AND MATERIALS								
CASING-MOUNTING (CENTERLINE) (FOOT) (BRACKET) (VERTICAL X)	IN-LINE							
SPLIT (AXIAL) (RADIAL X)	TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE) (DIFFUSER)							
TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE CONNS.)	NOZZLES SIZE ASA RATING FACING POSITION							
SUCTION	DISCHARGE							
IMPELLER DIAM. DES. _____	MAX _____	TYPE <u>STD W/INDUCER</u>	MFR'S BEARING NO. RADIAL _____					THRUST _____
COUPLING and GUARD <u>MFR. STD. ARRANGEMENT</u>		BASE PLATE <u>INCL. MTG. PLATE</u>						
PACKING _____								
MOTOR SEAL <u>YES, BAL.</u> CLASS. CODE _____ MFR. _____								
AUX PIPING <u>BY PUMP MFR.</u>								

MATERIAL CODE-EXTERNAL CASING		INTERNAL PARTS		API SEAL PIPING PLAN 31 (WITH INTEGRAL CENT. SEPARATOR)		
I-OAST IRON	INTERNAL CODE	I	B	S	O	X
B-BRONZE	IMPELLER	I	B	S	O	
S-STEEL	INNER CASE PARTS	I	I	B	O	
O-11-12% CHROME	BLEEVE (PACKED)	CH	CH	AI	AI	
A-ALLOY	BLEEVE (SEAL)	O	O	O	O	
H-HARDENED	WEAR PARTS	I	B	CH	CH	
F-FACED	SHAFT	S	S	S	S	
X-						
SHOP TESTS REQUIRED WITNESSED						
RUNNING PERFORM. <u>X</u>						
HYDROSTATIC PSIG _____						
MAX ALLOW. WP PSIG _____						
WEIGHTS: PUMP _____ DASH _____						
MOTOR _____ TURBINE _____						

MOTOR DRIVER BY <u>PUMP MFR.</u>				TURBINE DRIVER BY _____				MFR FINAL DATA (AS BUILT)			
ITEM NO. <u>A, B + C</u>	MTD BY <u>PUMP MFR.</u>	ITEM NO. _____	MTD BY _____	ACTUAL IMPELLER DIAM. _____							
HP _____	RPM _____	HP _____	RPM _____	TEST CURVE NO. _____							
MFR _____	FRAME _____	MFR and TYPE _____	MATL. _____	OUTLINE DWG NO. _____							
TYPE <u>SCI</u>	INSUL. <u>B</u>	INLET STEAM, psig _____	TEMP. F. _____	PUMP SECT. DWG NO. _____							
ENC. <u>TFFC</u>	TEMP RISE C. <u>20</u>	EXHAUST _____	STEAM RATE, FL. _____	REAL DIAM DWG NO. _____							
VOLTS/PHASE/CYCLES <u>460/3/60</u>	BEARINGS _____	BEARINGS _____	LUBE _____	PUMP SERIAL NO. _____							
FULL LOAD AMPS _____	NOZZLES SIZE ASA RATING FACING POSITION	NOZZLES _____	INLET _____								
	EXHAUST _____	EXHAUST _____									

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
 EXCEPTIONS (ITEMIZE): (1) FURNISH SUNDYNE (2) PLS. ADVISE (3) PUMP MFR. TO ADVISE ALL SPECIAL REQUIREMENTS FOR SUPPORTING MOTOR.

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED

PROCON *Incorporated*

SHEET NO. 1 OF 2 REV. _____
 DATE 2-24-72
 BY EJM
 JOB NO. 1843
 REQ. NO. 14.09-1

DATA SHEET FOR ROTARY COMPRESSORS

PURCHASER IGT-HYGAS PLANT MANUFACTURER _____
 DESTINATION _____ TYPE AND SIZE ③
 UNIT 1400 JOB NO. _____
 ITEM NO. 14.09-01 A & B NO. REQUIRED 2 SERIAL NO. _____
 SERVICE MIX TANK VENT BLOWER QUOTE NO. _____ DATE _____
 TYPE DRIVER INDUCTION MOTORS ④ PURCHASER ORDER NO. _____ DATE _____

OPERATING CONDITIONS

GAS HANDLED <u>MIX TANK VENT GAS</u>		GAS ANALYSIS		MOL/HR	M.W.
CAPACITY: MOI/HOUR <u>144.26</u>	SCFM <u>917</u>	N ₂	<u>43.66</u>	<u>28</u>	
TEMPERATURE °F, INLET <u>155</u>	DISCHARGE ° _____	O ₂	<u>0.55</u>	<u>32</u>	
INLET: PRESSURE, PSIG <u>1.0</u>	COMPRESSIBILITY, Z ₁ _____	CO	<u>2.88</u>	<u>28</u>	
DISCHARGE: PRESSURE, PSIG <u>15.7</u>	COMPRESSIBILITY, Z ₂ _____	CO ₂	<u>13.81</u>	<u>44</u>	
BAROMETRIC PRESSURE, PSIA <u>14.3</u>	REL. HUMIDITY, % <u>50</u>	H ₂ O	<u>43.53</u>	<u>18</u>	
COOLING WATER, °F (IN) <u>85</u>	°F (OUT) _____	ARGON	<u>0.55</u>	<u>40</u>	
COMPRESSOR °, GPM _____	OTHER GPM _____	CH ₄	<u>0.71</u>	<u>16</u>	
INTERCOOLERS °, GPM _____	OIL COOLER, GPM * _____	C ₂ H ₆	<u>0.84</u>	<u>30</u>	
DRIVER INFORMATION ②		C ₃ H ₈	<u>0.33</u>	<u>44</u>	
STEAM PRESS.: MAX. _____ NORMAL _____ MIN. _____	PSIG.	C ₆ H ₆	<u>19.14</u>	<u>78</u>	
STEAM TEMP.: MAX. _____ NORMAL _____ MIN. _____	°F	C ₇ H ₈	<u>1.9</u>	<u>92</u>	
EXHAUST PRESS.: MAX. _____ NORMAL _____ MIN. _____	PSIG.	H ₂ S	<u>9.37</u>	<u>34</u>	
AMPERES ° _____ VOLTS <u>460</u>	PHASE <u>3</u>	OTHER ①	<u>6.99</u>	<u>~ 60</u>	
	CYCLES <u>60</u>	SP. GR.	"K" VALUE	M.W.	
			<u>~ 1.22</u>	<u>~ 35</u>	

② MOTORS SHALL BE TEFC, CLASS B INSULATION, 80°C RISE, BALL BEARING, GREASE LUBE.

① INCL. HCN, COS, CS₂, H₂, NH₃

PERFORMANCE

SPEED, RPM ° DESIGN _____ MAX. _____ MIN. _____
 ADIABATIC H.P. ° _____
 COMPRESSOR EFFICIENCY, % ° _____
 B.H.P. REQUIRED ° _____
 DRIVER HP ° _____

STAGES	FIRST	SECOND
INLET TEMPERATURE, °F °		
INLET PRESSURE, PSIA °		
DISCHARGE TEMPERATURE, °F °		
DISCHARGE PRESSURE, PSIA °		

REMARKS ON PERFORMANCE ° _____

④ FURNISH DRY TYPE HELICAL ROTORS COMPRESSORS.

④ FURNISH SPEED CHANGE GEAR, IF REQUIRED.

° VENDOR TO SUPPLY INFORMATION OR SELECTION

FORM NO.
RC-2

PROCON *Incorporated*

DATA SHEET FOR ROTARY COMPRESSORS

SHEET NO. 2QE2 REV. _____
DATE 2-24-72 _____
BY EJM _____
JOB NO. 1843 _____
REQ. NO. 14-09-1 _____

CONSTRUCTION DATA

COMPRESSOR CASING	STAGES	FIRST	SECOND
DESIGN PRESSURE, PSIG*			
TEST PRESSURE, PSIG*			
RELIEF VALVE SETTING, PSIG*			
CASING & JACKET MATERIAL*			
HEAD MATERIAL*			
CASING THICKNESS, INCHES*			
COMPRESSOR ROTOR			
MATERIAL*			
SIZE*			
BLADE MATERIAL			
PACKING BOXES			
MATERIAL*			
SEAL			
TYPE* <u>PURGED LABYRINTH</u>			
MANUFACTURER*			
(INSTRUMENT AIR FOR PURGE)			
BEARINGS			
TYPE* <u>ANTI-FRICTION</u>			
SIZE			
COMPRESSOR PIPING CONNECTIONS			
SUCTION* SIZE/RATING/FACING/LOCATION			
DISCHARGE* SIZE/RATING/FACING/LOCATION			

COUPLINGS OR CONNECTIONS WITH DRIVER
TYPE* THOMAS / SS DISC
DETAILS* _____
ROTATION WHEN VIEWED FROM DRIVE END _____

BASEPLATE
MATERIAL* STRUCTURAL STEEL
COMMON WITH DRIVER OR SEPARATOR* YES

LUBRICATION* FORCE FEED OIL SYSTEM WITH CHAFT DRIVEN PUMP AND FULL FLOW FILTER. INCLUDE RELIEF VALVE, PRESSURE GAGE, OIL PRESSURE FAILURE SWITCH AND SCREEN STRAINER.

SAFETY FEATURES* FURNISH COUPLING GUARDS.

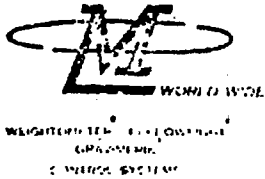
REGULATION & CONTROL* FURNISH HIGH DISCHARGE TEMPERATURE SHUTDOWN SWITCH. THE SWITCH SHALL CONSIST OF 2 ELECTRICALLY SEPARATE SPDT SWITCHES WITH INDIVIDUALLY ADJUSTABLE CONTACTS. RATING SHALL BE MIN. 10 AMPS AT 115 VOLTS. FURNISH DISCHARGE RELIEF VALVE, ADVISE RECOMMENDED SETTING.

COOLERS* ADVISE IF OIL COOLER IS REQUIRED.

ACCESSORIES* FURNISH SUCTION AND DISCHARGE EXPANSION JOINTS AND SILENCERS.

WEIGHT* _____ FLOOR SPACE* _____
COMPRESSOR: _____ LENGTH: _____
DRIVER: _____ WIDTH: _____
TOTAL: _____ HEIGHT: _____

* VENDOR TO SUPPLY INFORMATION OR SELECTION.



MERRICK SCALE MFG. COMPANY

100 PINE AVE. (MAIN STREET) PASSAIC, N.J. JERSEY 07055 U.S.A. - CAULE WEIGHTOMETER
 TELEPHONE: N.J. AREA CODE 201-261-1200 TELETYPE: N.J. AREA CODE 201-261-7066
 FAX: 201-261-1200

TO:

DATE: October 1, 1971
 PROPOSAL NO.: P-5591
 YOUR REFERENCE: Coal Gasification Project

WE PROPOSE TO FURNISH THE EQUIPMENT LISTED BELOW, AT THE PRICES SHOWN, F.O.B. FACTORY, PASSAIC, NEW JERSEY, SUBJECT TO THE TERMS AND CONDITIONS INCLUDED HEREIN AND PRINTED ON THE REVERSE SIDE OF THIS PAGE.
 PROPOSAL SUBJECT TO ACCEPTANCE WITHIN 90 DAYS.

ITEM NUMBER	QUAN.	DESCRIPTION	UNIT PRICE	TOTAL PRICE
1	2	<p>48" MERRICK MODEL WLP-441 WEIGHTOMETER Feeder with Dual Idler Suspension.</p> <p>DESIGNED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS</p> <p>CAPACITY: 225 STPH MATERIAL: Pulverized Coal DENSITY: 35#/cu. ft. SIZE: 10 to 100 mesh. MOISTURE: Unknown. TEMPERATURE: 200 degrees F. CHARACTERISTICS: Gate controllable and free flowing. FEEDER LENGTH: Standard. DRIVE: 5 horse power D.C. motor with SCR ACCESS SIDE: To be advised. POWER REQUIRED: 115/208/230/460 single & triple phase/60 cycle.</p> <p>STANDARD EQUIPMENT</p> <p>EQUIPMENT SUPPLIED BY OTHERS</p> <p>REFER TO: Enclosed Blue-Line Drawing and 440 Bulletin.</p> <p>ACCURACY: The Self-Contained Model 441 electronic load cell WEIGHTOMETER scale is guaranteed to weigh with an accuracy of plus or minus .5% of full scale over a 10:1 range when installed and maintained in accordance with our instructions and recommendations.</p>		

Shipment

Drawings ~~2/3 weeks~~ After receipt of complete data.
 Equipment ~~2/14 weeks~~ After receipt of approved drawings.
 c.c.

TERMS: NET 30 DAYS

MERRICK SCALE MFG. COMPANY

[Signature]

MERRICK SCALE MFG. COMPANY

REFERENCE: Coal Gasification
PROPOSAL # P-5591
DATE: October 1, 1971

- 2 -

ITEM NUMBER	QUAN.	DESCRIPTION	UNIT PRICE	TOTAL PRICE
2	2	5 horse power D.C. totally enclosed non-ventilated motor with SCR for above weigh-feeder.		
3	2	SC-4 speed compensation.		
4	4	30" rotary valves, SPROUT-WALDRON Type II cast iron with hardened tips plus motor and drive.		
5	2	Special infeed repose plate required for flushy materials.		
6	4	3 horse power A.C. motors, reducers, mounting base, sprockets, chain and chain guard (required for above proposed rotary valve).		
7	2	Weather tight enclosures for gas purging for proposed feeder, 4" X 4" X 1/4" angle structure with 3/16 (7 ga.) walls and doors, gasketing 1/4", load cell neoprene doors, with sufficient latches and handles.		
8	2	48" conveyor with 50' pulley centers with enclosure as above.		
9	2	5 horse power A.C. motor, with reducer, sprocket, etc., for above proposed conveyor.		

PAGE 2 OF 4

MERRICK SCALE MFG. COMPANY

- 3 -

REFERENCE: Coal Gasification
 PROPOSAL: P-5591
 DATE: October 1, 1971

ITEM NUMBER	QUAN.	DESCRIPTION	UNIT PRICE	TOTAL PRICE
		<u>INSTRUMENTATION:</u>		
10	2	<p>SPC-1 set point controllers (Refer to Specification Sheet 850-1).</p> <p>Merrick model SPC-1 set point controller is for operation on 0-1V D.C. input signal. Basic controller includes:</p> <ol style="list-style-type: none"> 1. Vertical scale rate indicator. 2. Current output indicator. 3. Graduated set point adjustment dial. 4. Proportioning band and reset adjustments. 5. Current adjusting type control with 0-5 milliamperes output. 6. Deviation alarm card model 516 includes high-low alarm lights, percent deviation indicator, and high-low output signals, 115V/230V A.C. at 1/2 amp. 7. General purpose housing with transparent door for panel mounting. <p>Power Required: 115/230V $\pm 10\%$/50-60 cycle.</p>		
11	2	<p>WRVM-1 TAYLOR Series 800J TRANSCOPE electronic recorders, 4" strip chart driven at 1" per hour by 115V/1/60 motor, 0-1V input, single pen, with vertical indicator, chart roll, spare pen and ink supply, for panel mounting.</p>		
12	2	<p>WIC-1 API model 561 indicators, 4" X 2-1/2" rectangular face; for panel mounting.</p>		
13	2	<p>WD-1 DURANT Totalizers, Model 6-Y-1-RMF, 6 digits, thumbwheel reset, for operation on 115V/1/25-60 Hz., for surface or panel mounting.</p>		

PAGE 3 OF 4

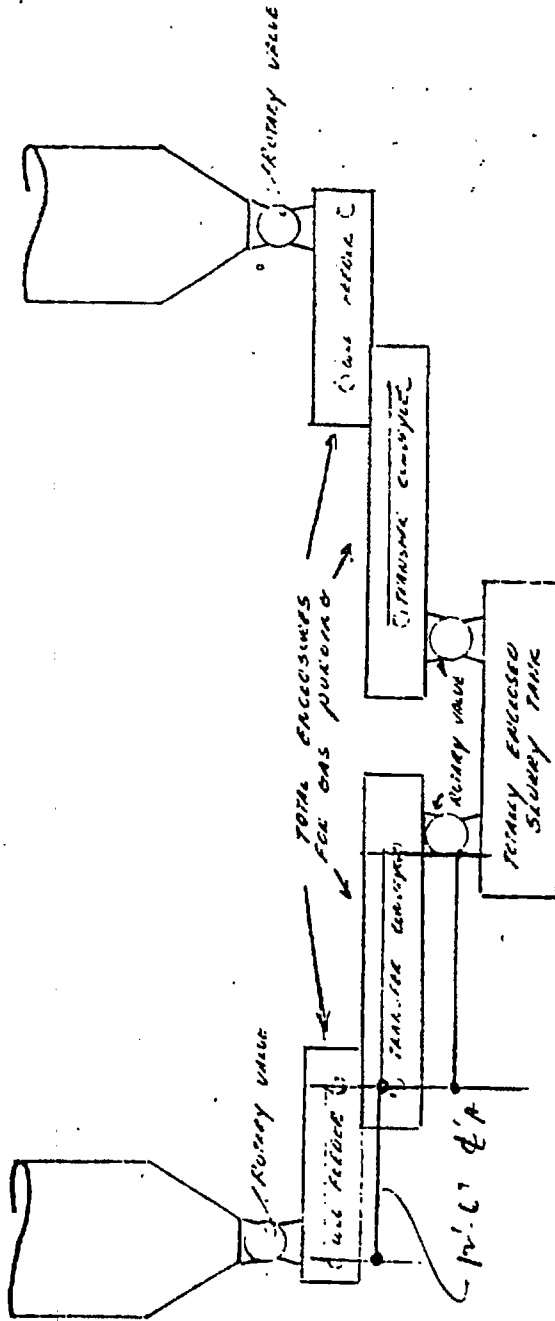
MERRICK SCALE MFG. COMPANY

REFERENCE: Coal Gasification
PROPOSAL: P-5591
DATE: October 1, 1971

- 4 -

ITEM NUMBER	QUAN.	DESCRIPTION	UNIT PRICE	TOTAL PRICE
14	2	Solid state interrators without light emitting diodes. For more complete description, refer to enclosed Bulletin 440. TOTAL PRICE FOR ALL THE ABOVE F.O.B. FACTORY, PASSAIC, NEW JERSEY:		

MERRICK SCHEMATIC CO.
9/28/71



- NOTE: (1) ALL UNIT FITTINGS WILL BE STANDARD LENGTH (12" O" PNEUMATIC CENTER)
- (2) TRANSFER CONVEYORS WILL HAVE 50' PNEUMATIC CENTERS.
 - (3) EACH PNEUMATIC SYSTEM WILL BE INDEPENDENT OF THE OTHER
 - (4) PRESS NOT STATION WILL BE OUTSIDE TOWER PRESSURE

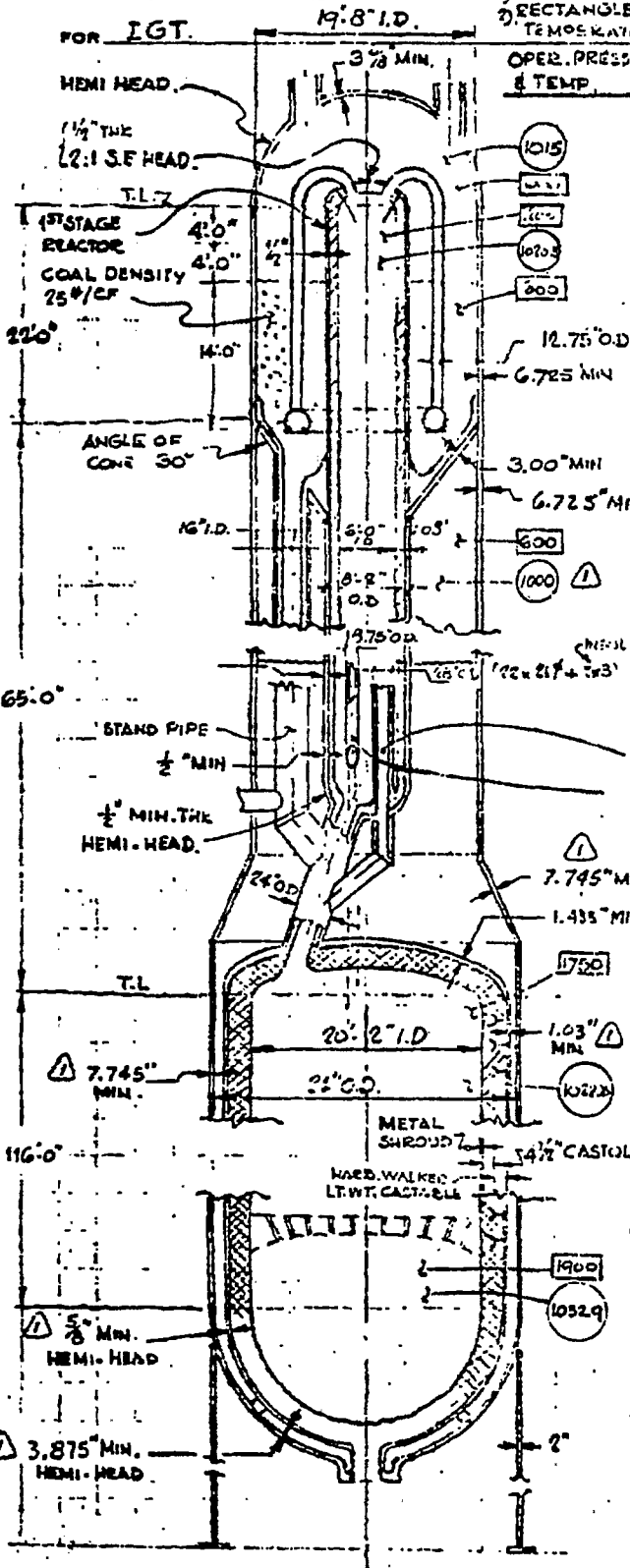
Procon Incorporated

SUBJECT: Gasification Reactor
FOR IGT.

OPERATING CONDITIONS:
CIRCLES INDICATE PRESS.
RECTANGLES INDICATE TEMPERATURES

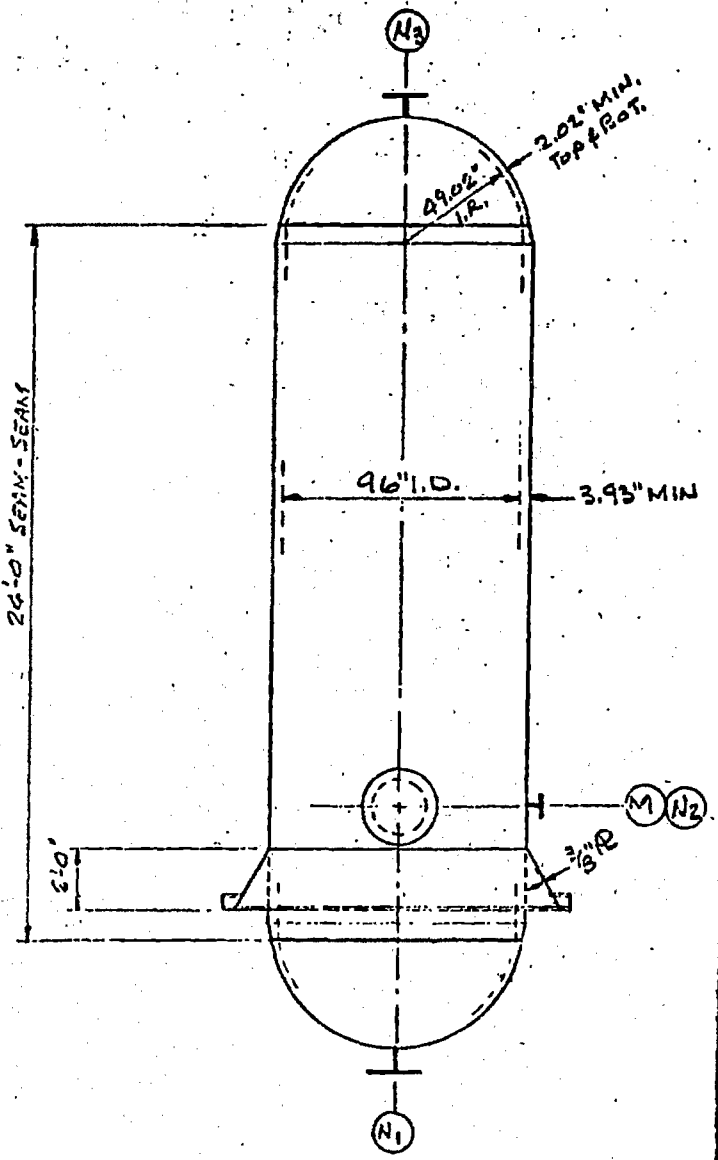
SKETCH NR 1943-15.06-1
DATE 12-17-71 Rev. DATE

BY WN Van Riet / GEM



OPER. PRESS & TEMP	MAT'L	PART.	C.A	DRAIN PRESS & T
	A-204 GR B (C-1/4 No)	HEMI-HEAD	1/8"	1200 PSI @ 650°F
	A-204 GR B (C-1/4 No)	HEAD 1ST STAGE REACTOR	-	150 PSI @ 650°F
	SF. 163 GR 2 (INCOLOY-2)	CYCLONE DIPLEG	-	-
	A-204 GR B	OUTER SHELL	1/8"	1200 PSI @ 650°F
	A-204 GR B	CONE	1/8" Δ	150 PSI @ 650°F
	A-204 GR B	SHELL - 1ST STG REACTOR	1/8" Δ	150 PSI @ 650°F
	A-204 GR B	OUTER SHELL WATER JACKET	1/8"	1200 PSI @ 650°F
	A-204 GR B	STAND PIPE	1/8"	1200 PSI @ 650°F
	SF. 163 GR 2	RECYCLE DIPLEG	-	1200 PSI @ 650°F
	SF. 163 GR 2	2ND STAGE REACTOR FEED DIPLEG	-	1250°F
	A-204 GR B	INNER HEAD 2:1 S.F.	1/8" Δ	150 PSI @ 650°F
	A-204 GR B	INNER SHELL ABOVE GRID	1/8"	-
	HARBISON-WALKER REFRACTORY	REFRACTORY SUPPORTED BY ANCHORS	-	-
	A-204 GR B	INNER-SHELL BELOW GRID	1/8" Δ	150 PSI @ 650°F
	A-204 GR B	OUTER SHELL	1/8" Δ	200 PSI @ 650°F
	A-204 GR B	INNER HEMI-HEAD	1/8" Δ	150 PSI @ 650°F
	A-204 GR B	OUTER HEMI-HEAD	1/8" Δ	1200 PSI @ 650°F
	A-204 GR B	SKIRT	-	AMBIENT

DESIGN DATA	
CODE ASME B71 SECT. 5 "D" DIV. 1	
SPEC.	
DESIGN CONDITIONS	INT. 1320 PSIG @ 650°F
	EXT. PSIG @ °F
OPER. PRESS.	1200 PSIG @ 563°F
RADIOGRAPHY	100%
POST WELD HEAT TREAT	YES
JOINT EFF.	100%
CORROSION ALLOWANCE	1/8"
NET FAB. WEIGHT	135100#
EMPTY WEIGHT	
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-515-70
HEADS	SA-515-70
SUPPORT	SA-285-C
NOZZLE NECKS	SA-105-B
FLANGES	SA-105-B
INTERNAL	C.S.
CONTR.	CONTR. C.S.
MANWAY (DIMED OR DIMED)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM GRIPS	NO
DAVIT SUPPORTS	NO
PIPE SUPPORT LUGS	YES
PIPE GUIDE LUGS	YES
FIREPROOFING	2" I.S.F.O.S.
INSULATION	1 1/2" BY OTHERS
PAINT	NONE



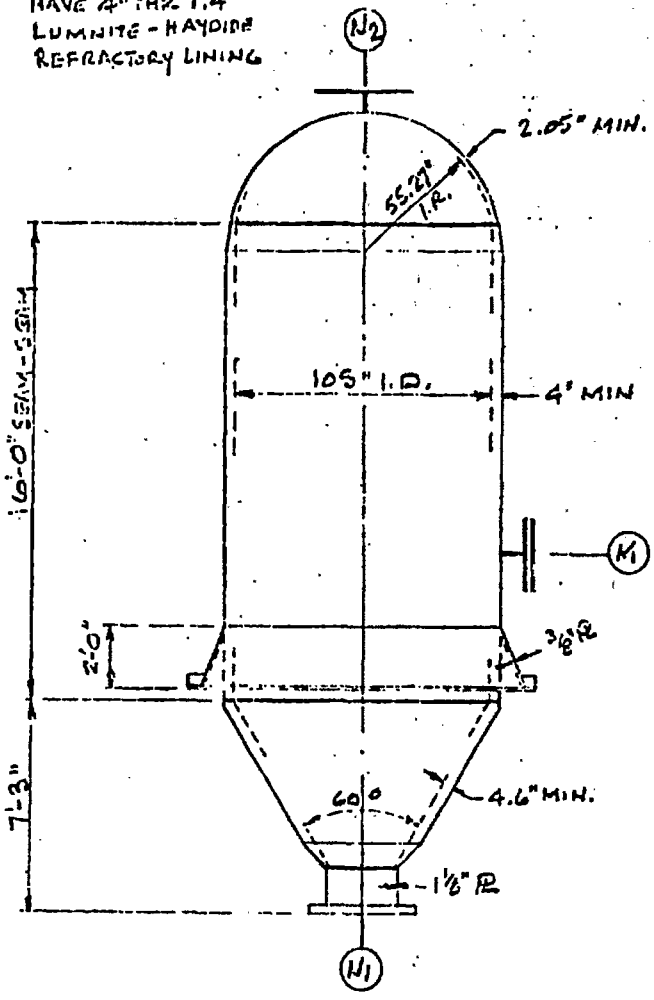
NO.	SIZE	PROJ.	TYPE	L.C.
N2	2"	900°	RTJ	L.C.
N1	1 1/2"	900°	RTJ	INLET
M	1"	900°	RTJ	MANWAY
NOZZLE SCHEDULE				
RADIUS NOZZLE AND PIPE END PROJECTIONS ARE FROM OD OF VESSEL TO EXTREME FACE OF FLANGE EXCEPT FOR INTERNAL REINFORCED NOZZLES OR OTHERWISE NOTED				
SIZE	PROJECTION	SIZE	PROJECTION	
THRU		THRU		
THRU		THRU		

NO.	REVISION	DATE	BY	C.
Procon Incorporated				
ITEM No. 15-00-02 UNIT No. 1500				
167 HYGAS				
CHICAGO, ILL.				
DRAWN BY	DATE	1-13-1972		
CHECKED				
APPROVED BY	DWG. NO			A

Reproduced from best available copy.

DESIGN DATA	
CODE	WIRE 1971 SECT. 22 DIV. 1
SPECS.	
DESIGN CONDITIONS	INT. 1320 PSIG @ 650°F
	EXT. PSIG @ °F
OPER. PRESS.	1200 PSIG @ 1220°F
RADIATION	100%
POST WELD HEAT TREAT	YES
JOINT EFF.	100%
CORROSION ALLOWANCE	1/8"
NET FKG. WEIGHT	1293.00"
EMPTY WEIGHT	
OPER. WEIGHT	
TOT. WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-204 C
HEADS	SA-204 C
SUPPORT	SA-285 C
NOZZLE NECKS	SA-182-F1
FLANGES	SA-182-F1
INTERIALS	C-1/2 Mo.
GRIT. COATING	C-1/2 Mo.
MANWAY (MIN. 24" DIA.)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LATCH AND PLATFORM CLIPS	No
DAVIT SUPPORTS	No
PIPE SUPPORT LUGS	No
PIPE ORCE LUGS	No
FIRE PROOFING	2" I.S. S.P.S.
INSULATION	None
MANY I-SIDE COAT 316C CHROMIUM	

* INSIDE VES. & NOZ. HAVE 4" THK 1:4 LUMINITE-HAYDIDE REFRACTORARY LINING



NO.	QTY	SIZE	TYPE	REMARKS
N2	1	26"	200#	RTN INLET
N2	1	18"	100#	RTN WALK OUT
N1	1	16"	800#	RTN OUTLET
M	1	24"	200#	MANWAY W/RT. SILEN. MUFFLER

NOZZLE SCHEDULES

HANDL. NOZZLE AND HANDLE PROJECTIONS ARE FROM OD. OF VESSEL TO EXTREME FACE OF FLANGE EXCEPT FOR INTERNAL REINFORCED NOZZLE OR OTHERWISE NOTED

SIZE	PROJECTION	SIZE	PROJECTION
THRU		THRU	
THRU		THRU	

NO.	REVISION	DATE	BY

Procon Incorporated

ITEM No. 15.06-03 UNIT No. 1500
HYGAS

10T. CHARGE 30,000

DRAWN JLF
CHECKED
APPROVED R. DWG. NO. A

DATE 1-13-1953

Reproduced from best available copy.

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-15.08-1
 SHEET NO. 1
 TOTAL SHEETS 1
 DATE 2-11-72 EJM
 APPROVED _____

FOR IGT - HYGAS PLANT ITEM NO. 15.08-01 A & B
 SITE _____ UNIT 1500
 SERVICE REACTOR STEAM SEPARATOR FEED MOTOR DRIVE _____ TURBINE DRIVE 1
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQD. 2

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>WATER</u>	U.S. gpm at PT. NOR <u>210</u>	MIN <u>230</u>	PROPOSAL CURVE NO. _____				
	DISCH PRESS., psig <u>1300</u>		NPSH REQ'D (WATER), ft. _____				
FTY <u>180</u>	SUOT PRESS., psig MAX _____		NO. OF STAGES _____ RPM _____				
SP GR at PT. <u>0.97</u>	DIFF PRESS., psig <u>1200</u>		DES EFF _____ BHP _____				
VAP PRESS. at PT. psia <u>7.5</u>	DIFF HEAD, ft. <u>2860</u>		MAX BRP DES RMP _____				
VIS at PT. <u>0.35 cp.</u>	NPSH AVAIL., ft. <u>25+</u>		MAX HEAD DES IMP., ft. _____				
CORR/EROS caused by _____				MIN CONTINUOUS, rpm (BY MFR) _____ (2)			

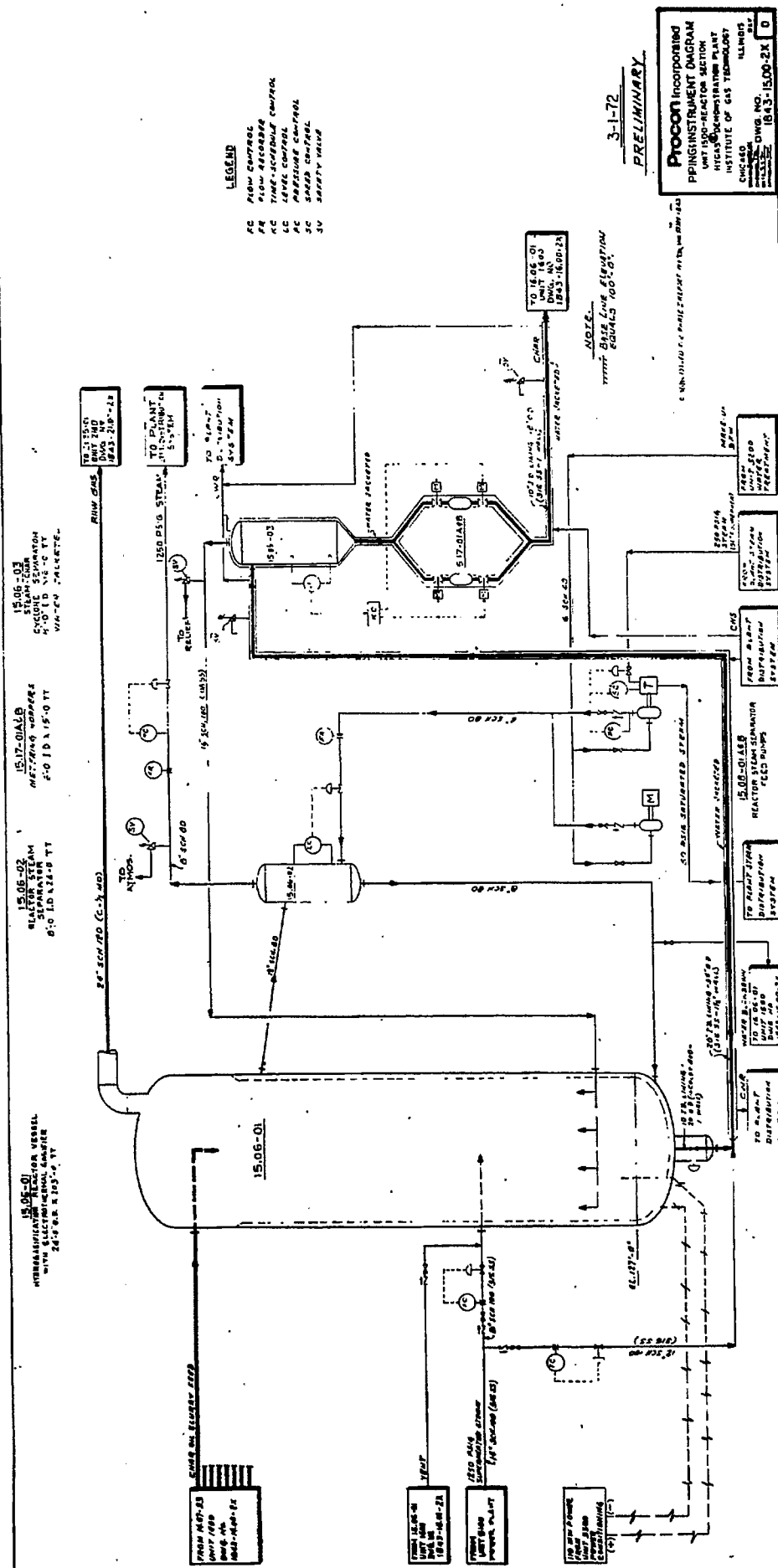
CONSTRUCTION AND MATERIALS						PERFORMANCE	
CASING-MOUNTING (CENTERLINE) (FOOT) (BRACKET) (VERTICAL X)						ROTATION FACING COUPLING END _____	
SPLIT (AXIAL) (RADIAL X) IN-LINE (5)						WATER COOLING <u>YES</u>	
TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE) (DIFFUSED)						BEARINGS _____	
TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE CONNS.)						STUFF BOX _____	
NOZZLES SIZE ASA RATING FACING POSITION						REPAIR _____	
SUCTION						GEAR BOX COOLER _____ (2)	
DISCHARGE						TOTAL WATER REQD. gpm _____ (2)	
IMPELLER DIAM DES MAX TYPE <u>STD. W/INDUCER</u>						PACKING COOLING _____	
MFR'S DRAWING NO. RADIAL THRUPT.						FLUSHING _____	
COUPLING and GUARD <u>MFR. STD. ARRANGEMENT</u> BASE PLATE INCL. MTG. PLATE						AUX PIPING <u>BY PUMP MFR.</u>	
PACKING _____							
SHAFT SEAL <u>VCC, DIL.</u> CLASS. CODE _____ MFR _____							

MATERIAL CODE—EXTERNAL CASING <u>S</u> INTERNAL PARTS <u>(3)</u>						API SEAL PIPING PLAN 31 (WITH INTEGRAL CENT. SEPARATOR)			
1—CAST IRON	INTERNAL CODE	I	B	E	O	II	SECT TESTS	REQUIRED	WITNESSED
2—BRONZE	IMPELLER	I	B	B	O		RUNNING TEST	X	
3—STEEL	INNER CASE PARTS	2	1	6	O		NPSH		
4—11-1/2% CHROME	BLEEVE (PACKED)	CH	CH	AI	AI				
5—ALLOY	BLEEVE (SEAL)	C	O	O	O				
6—HARDENED	WEAR PARTS	I	B	CH	CH		HYDROSTATIC	PSIG	
7—FACED	SHAFT	E	B	B	S		MAX ALLOW. WT	PSIG	F
X—							WEIGHTS: PUMP	BASE	
							MOTOR	TURBINE	

MOTOR DRIVER BY (3) PUMP MFR				TURBINE DRIVER BY (3) PUMP MFR				MFR FINAL DATA (AS BUILT)			
ITEM NO. <u>A</u>	MTD BY <u>PUMP MFR</u>	ITEM NO. <u>B</u>	MTD BY <u>PUMP MFR</u>	ACTUAL IMPELLER DIAM _____							
RPM _____	FRAME _____	RPM _____	MATL _____	TEST CURVE NO. _____							
MFR _____	INSUL <u>B</u>	MFR and TYPE (4) _____		OUTLINE DWG NO. _____							
TYPE <u>SCI</u>	TEMP RISK C <u>80</u>	INLET STEAM, psig <u>250</u>	TEMP <u>456</u>	PUMP SECT. DWG NO. _____							
EXC. <u>WP-II</u>		EXHAUST <u>50 PSIG</u>		SEAL DIAM DWG NO. _____							
VOLTS/PHASE/CYCLES <u>4160/3/60</u>		STEAM RATE, FL _____	W/DEP/HR _____	PUMP SERIAL NO. _____							
(2) BEARINGS _____	LUBE _____	BEARINGS _____	LUBE _____								
FULL LOAD ANPS _____		NOZZLES SIZE ASA RATING FACING POSITION									
		INLET									
		EXHAUST									

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
 EXCEPTIONS (ITEMIZE): (1) FURNISH SUNDYNE (2) PLS. ADVISE. (3) PUMP MFR. TO ADVISE ALL SPECIAL REQUIREMENTS FOR SUPPORTING DRIVERS. (4) API 611 GENERAL PURPOSE.
 (5) QUOTE HORIZONTAL SUNDYNE ARRANGEMENT (COMMON BASE PLATE) AS ALTERNATE.

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED



- LEGEND**
- FC FLOW CONTROL
 - PC PRESSURE CONTROL
 - CC TIME-SEQUENCE CONTROL
 - LC LEVEL CONTROL
 - AC POSITIONING CONTROL
 - SC SPEED CONTROL
 - SV SAFETY VALVE

3-1-72
PRELIMINARY

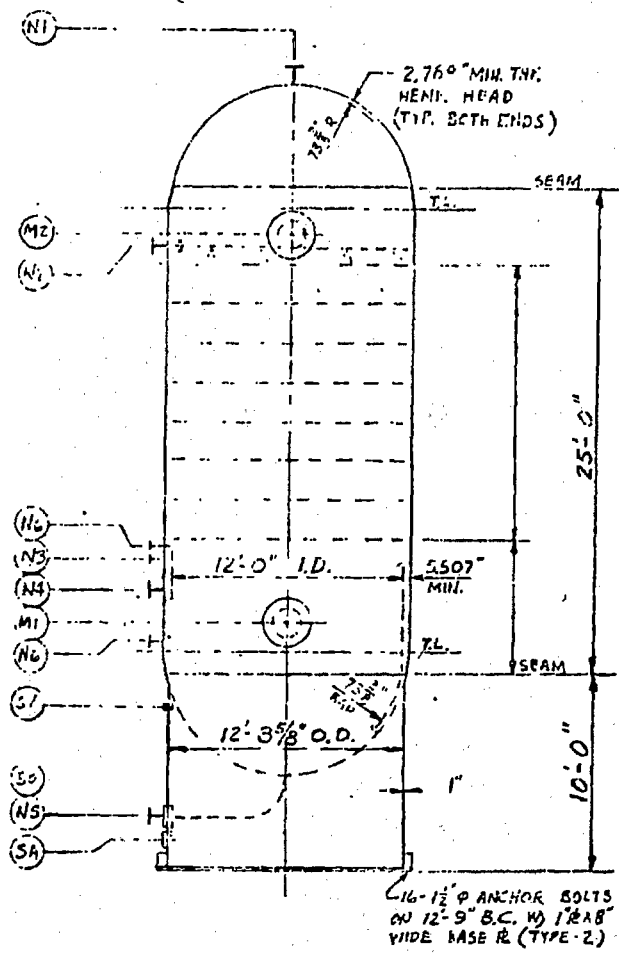
Procon Incorporated
 PIPING INSTRUMENT DIAGRAM
 UNIT 1000 DISTRIBUTION SYSTEM
 CHICAGO, ILLINOIS
 PROJECT NO. 1500-2X
 DRAWING NO. 8-B-100

D

8-B-100

K

DESIGN DATA	
CODE ASME SECT VIII DIV. I 1972	
SPLCS. -	
DESIGN CONDITIONS	INT. 1250 PSIG @ 550°F
	EXT. - PSIG @ - °F
OPER. PRESS.	1200 PSIG @ 550°F
RADIOGRAPHY	FULL
POST WELD HEAT TREAT	YES
JOINT EFF.	100%
CORROSION ALLOWANCE	1/8"
NET FAB. WEIGHT	279,800 #
EMPTY WEIGHT	331,300 #
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-515-70
HEADS	SA-515-70
SUPPORT	SA-36
NOZZLE NECKS	SA-106-B
FLANGES	SA-105-II
INTERNALS	C.S.
MAINTENANCE (HINGED OR LIMITED)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER AND PLATFORM CLIPS	YES
DAVIT SUPPORTS	YES
PIPE SUPPORT LUGS	YES
PIPE GUIDE LUGS	YES
FIRPROOFING	YES
INSULATION	1" THK.
PAINT	ONE SHOP COAT PRIMER



SV	4	4"	TYPE	-	SKIRT VENT
SO	1	18"	TYPE	-	SKIRT OPENING
SA	1	18"	TYPE	-	SKIRT ACCESS
N6	2	2"	900#	RF	
N5	1	14"			
N4	1	6"			
N3	1	16"			
N2	1	6"			INLET W/ TYPE XRY DIST.
N1	1	3"			
M1,2	2	18"	900#	RF	MANHOLE W/ COVER
MARK NO.	NO.	SIZE	W/ FACE		SERVICE

NOZZLE SCHEDULE

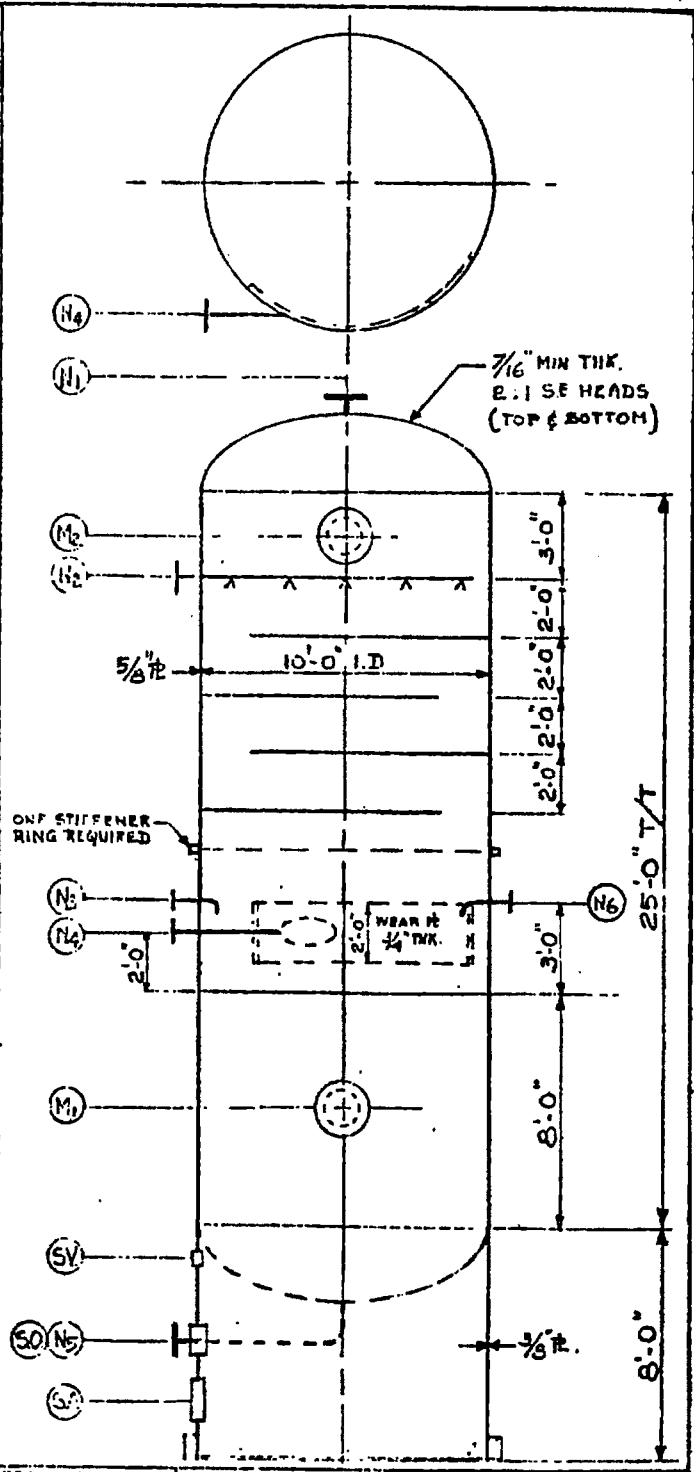
RADIAL NOZZLE AND MANHOLE PROJECTIONS ARE FROM O.D. OF VESSEL TO EXTREME FACE OF FLANGE EXCEPT FOR INTERNAL REINFORCED NOZZLES OR OTHERWISE NOTED

SIZE	PROJECTION	SIZE	PROJECTION
1" THRU 2"	7"	2 1/2" THRU 4"	8"
5" THRU 8"	10"	10" THRU 12"	12"

NO.	REVISION	DATE	BY	CHK.
Procon Incorporated SPENT CHAR-WATER SLURRY MIX TANK ITEM NO. 16-06-01 UNIT 1600 HYGAS CHICAGO, ILL. 165T				
DRAWN <i>sem</i>		DATE 1-11-72		
CHECKED		REQ. NO. 1843-16.06-1		
APPROVED <i>R.</i>				

Reproduced from best available copy. 

DESIGN DATA			
CODE ASME	SECTION VIII, DIV. 1	STAMP	YES
PER SPEC.			
DESIGN PRESSURE TEMP.	25 PSI @	260 °F	
OPER. PRESSURE TEMP.	0 PSI @	212 °F	
POST WELD HEAT TREAT	NO		
RADIOGRAPHING	SPOT		
JOINT EFFICIENCY	SHELL 85%	HEADS 100%	
CORR. ALLOWANCE	SHELL 1/16"	HEADS 1/32"	
NET FABR. WT. (LESS TRAYS)	31,500	lbs.	
EMPTY WEIGHT		lbs.	
OPERATING WT.		lbs.	
TEST WEIGHT		lbs.	
SHELL	A-285-C		
HEADS	A-285-C		
SUPPORT (SKIRT)	A-285-C, LASTER SA-36		
NOZZLE NECKS	A-53-B or A-106-B		
FLANGES	A-181-J		
GASKETS	COMP. ASP.		
INTERNALS			
COUPLINGS			
LINING			
WIND	M _w =	FT. LBS.	
EARTHQUAKE	M _e =	FT. LBS.	
MANWAY HING'D OR	BLIND W/BF, STUDS, NUTS & GSKT		
FIREPROOFING	THK		
INSULATION	THK		
WEAR PLATE	A-285-C		
TRAY SUPPORT RINGS	C.S.		
SA 1	18" ID		SKIRT ACCESS
SV 2	4"		SKIRT VENT
S.O. 1	14"		SKIRT OPENING
N6	1 8"		
N5	1 12"		
N4	1 10"		
N3	1 3"		
N2	1 4"		
N1	1 20"		
M6	1 18" ID		MANWAY W/BLIND
M1	1 18" ID	150° R.F.	MANWAY W/BLIND
NO.	NO.	SIZE	RTG. FCC. SERVICE
NOZZLE SCHEDULE			
ACCESSORIES TO BE SUPPLIED BY FABRICATOR			
LADDER & PLATFORM CLIPS	YES		
DAVIT SUPPORTS	-		
PIPE SUPPORT LUGS	-		
PIPE GUIDE LUGS	YES		
FIREPROOFING ATTACHMENTS	-		
INSUL. CLIPS & RINGS	YES		
LIFTING LUGS	2 - REQ'D		
PAINT	YES, ONE SHOP COAT PRIMER		



Procon Incorporated
 CENTRIFUGE FEED TANK
 16.06-02. UNIT 1600
 IGT. HYGAS
 REQ. NO. 1013-16.06-02.

DESIGN DATA			
CODE	ASME SECT. VIII, DIV. 1 - STAMP: YES		
PER SPEC.			
DESIGN PRESS & TEMP.	60	PSIG	230 °F
OPCR. PRESS & TEMP.	30	PSIG	230 °F
POST WELD HEAT TREAT	NO		
RADIOGRAPHING	SPOT, RT CORN		
JOINT EFFICIENCY	SHELL 95%	HEADS	100%
CORR. ALLOWANCE	SHELL 1/8"	HEADS	1/8"

NET FAHR. WT. (LESS TRAYS)	23,000	lbs.
EMPTY WEIGHT		lbs.
OPERATING WT.		lbs.
TEST WEIGHT		lbs.

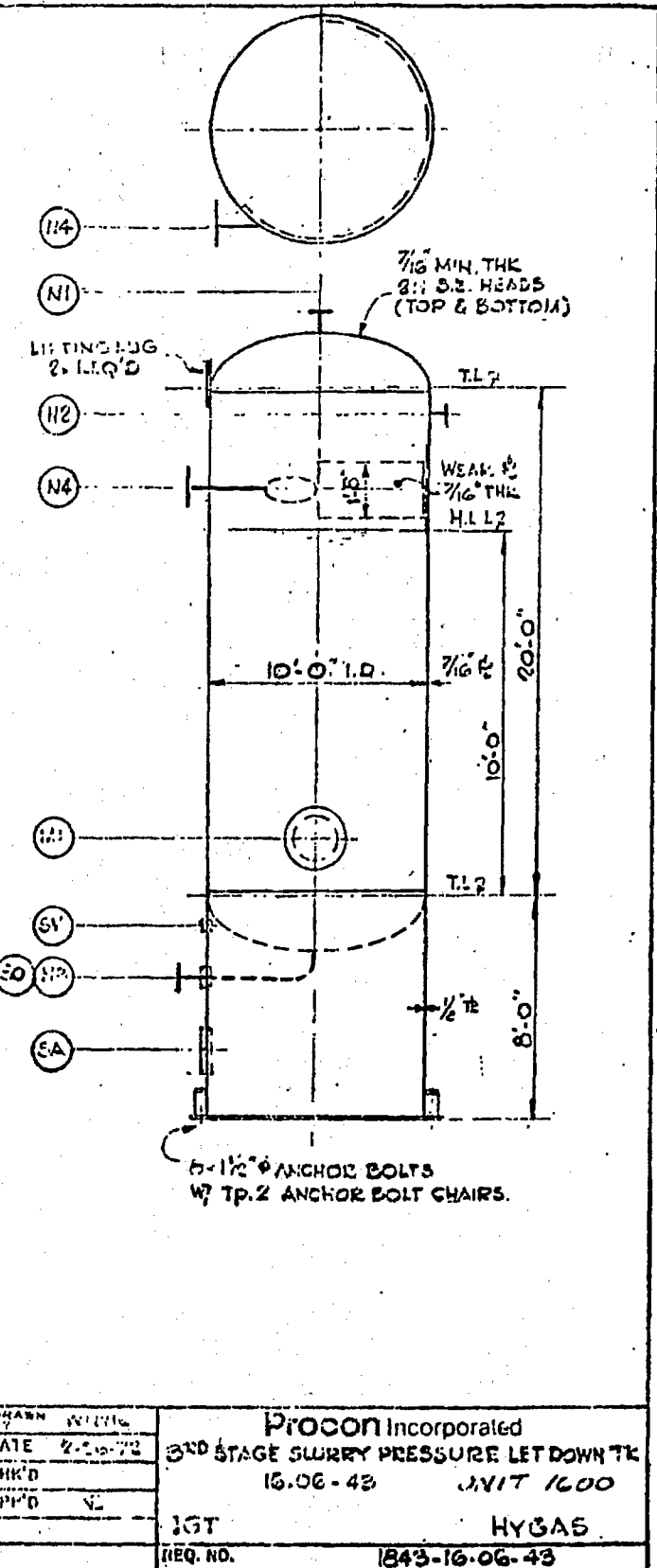
SHELL	SA-285 C
HEADS	SA-285 C
SUPPORT	SA-285 C
NOZZLE NECKS	SA-285 OR E
FLANGES	SA-181-I
GASKETS	COMPRESSED ASBESTOS
INTERNALS	WEAR R SA-285 C
COUPLINGS	
LINING	
WIND	M _w = FT. LBS.
EARTHQUAKE	M _E = FT. LBS.
MANWAY RING'D OR DAVIT'D W/UF, STUDS, NUTS & GSKT	
FIREPROOFING	- THK
INSULATION	YES THK (BY OTHERS)

SO	1	10"	-	-	SKIRT CLEVE
SV	1	4"	-	-	SKIRT VENT
SA	1	18" D	-	-	SKIRT ACCESS
MI	1	15" D	-	RF	MANWAY

N5	2	2"		RF	LC
N4	1	10"		RF	INLET-TANGENTIAL
N3	1	8"		RF	OUTLET
N2	1	6"		RF	
N1	1	12"	150°	RF	

MK.	NO.	NO.	SIZE	RTG.	FCG.	SERVICE
NOZZLE SCHEDULE						

ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADDER & PLATFORM CLIPS	YES
DAVIT SUPPORTS	NO
PIPE SUPPORT LUGS	NO
PIPE GUIDE LUGS	YES
FIREPROOFING ATTACHMENTS	NO
INSUL. CLIPS & RINGS	YES
LIFTING LUGS	YES
PAINT ONE SHOP COST MINIMUM	



Procon Incorporated
3RD STAGE SLURRY PRESSURE LET DOWN TK
15.06-43 UNIT 1600
1GT HYGAS
REQ. NO. 1843-16-06-43

Reproduced from
best available copy.

**AIR-COOLED EXCHANGER
SPECIFICATION**

Procon Incorporated

2	Customer IGT-HYGAS PLANT		Date 3/6/72		Eng. GSD	Item No. 16-07-01
5	Service STEAM CONDENSER					
6	Units	Model	Induced Draft	No. of Fans	1	
7	Surface Per. External	33,000	ft ² (approx)	Tube	Sq. Ft.	
8	Heat Exchanged	BTU Hr	32,300,000	Effective FTD	F	
9	Transfer Rate	External Surface	Tube Surface	BTU Hr. Sq. Ft. F.		
PERFORMANCE DATA						
TUBE SIDE						
13	Fluid Circulated	STEAM, WATER & N₂H₄			Temperature In	280 F
14	Total Fluid Entering	Lbs. Hr	68,000	Temperature Out	280 F	
15	Vapor	"		Inlet Pressure	35 WORK PSI	
16	Liquid	"	33,000	Gravity Liquid		
17	Steam	"	34,924	Viscosity Liq. @ 280 F	0.22 C.P.	
18	Non Condensibles	"	76 (NH₃)	Latent Ht. @ 280 F	924 Btu/lb	
19	Vapor Condensed	"		Molecular Weight	18	
20	Steam Condensed	"		Allowable Press. Drop	2 PSI	
21	Fouling Res. IS	hr Sq. Ft. °F BTU	0.001	Design Pressure Drop	2 PSI	
AIR SIDE						
23	Air Quantity Item	Lbs. Hr		Temperature In	95 F	
24	Air Quantity Fan	ACFM		Temperature Out	95 F	
25				Altitude	FL	
CONSTRUCTION						
28	Design Pressure	70 PSI	Tube Pressure	ASME Code	Design Temperature	350 F
29	SECTION		HEADER		TUBE	
30	Size		Type	Plug	Material	C.S.
31	No. Items	1	Material	C.S.	OD	1.0 in. 0.085" Min. Wall
32	Tube Support	on Al Filled Bunks		No. Rows	Passes	No. Section
33	STRUCTURE	Carbon Steel		Flange No. In.	ASME	Material C.S.
34	Surface Prep	As specified		Length	30 Ft	
35	Grade Mounted			Pitch	in. Δ	
36	Finish	On C. Primer		Corrosion Allowance	1/8 in	FIN
37				Size Inlet Flange	in	Material Aluminum
38	<input checked="" type="checkbox"/> Fan Guard			Size Outlet Flange	in	Height
39	<input checked="" type="checkbox"/> Belt Guards			Series	150# R.F.	
40	<input type="checkbox"/> Coupling Guard			Vent & Drain Code	Type	
41	MECHANICAL EQUIPMENT					
42	FAN MFR.		DRIVER		SPEED REDUCER	
43	Model		Type	Elec. Motor		Type V-Belt
44	No. Bay 2	No. Item 2	No. Item 2	HP Driver 30	No. Item 2	
45	BHP Each	BHP Total	BHP			Model
46	Da. cter ft	RPM	Enclosure			AGMA HP Rating
47	No. Blades	Pitch	Volt 460	Phase 3	Cycle 60	Ratio
48	Blade Material		Mfr. Vendor	Optim. HTA		Mfr.
49	Hub Material				Support	
50	Man. Adj.	Auto Variable	Vib. Switch Not Req'd.			
51	Notes					
52						
53						
54	Plot Size: 11' x 30'					
55						
56	Dimensions: Width	Length	Height	Shipping Weight		Lbs.

Reproduced from best available copy.

**AIR-COOLED EXCHANGER
SPECIFICATION**

Procon Incorporated


1	Customer: IGT-HYGAS PLANT			
2	Date: 3/6/72	Eng: GSD	Item No: 16.07-02	
3	Service: Water Cooler			
4	Units: Mod 1	Index of Forward Unit:	No. of Units: 1	
5	Surface Area: External 33,000 FL² (approx)	Plate Area:	Sq. Ft.	
6	Heat Exchanger: RTU H	13,000,000	Effectiveness: ETC	F
7	Transfer Rate: External Surface	Plate Surface:	BTU/Hr Sq. Ft. F	
8	PERFORMANCE DATA			
9	TURF SIDE			
10	Fluid Condensed:	Water, NH₃ & Phenol (1)	Temperature In:	290 F
11	Total Fluid Entering:	92,900 lbs/hr	Temperature Out:	150 F
12	Vapor:		Inlet Pressure:	50 psia, psig
13	Liquid:	92,900	Gravity - Liquid:	0.96 @ 220°F
14	Steam:		Viscosity:	0.28 Cps @ 220 F
15	Non-Condensables:		Sp. Ht.:	0.95 B/# GXX F
16	Vapor Condensed:		Molecular Weight:	18
17	Steam Condensed:		Allowable Press. Drop:	10 psi
18	Fouling Res.: S	0.001	Design Pressure Drop:	psi
19	AIR SIDE			
20	Air Quantity Item:	ACIM	Temperature In:	95 F
21	Air Quantity Fan:		Temperature Out:	F
22			Altitude:	Ft.
23	CONSTRUCTION			
24	Design Pressure:	70 psi	Test Pressure:	ASME Code
25	Design Temperature:	400 F		
26	SECTION		HEADER	
27	Size:		Type:	Plug
28	No. Item:	1	Material:	C.S.
29	Tube Support:	Zn Al Filled Panel	No. Rows:	Passes
30	STRUCTURE - Carbon Steel		Design: Standard ASME	Material: C.S.
31	Surface Prep:	Anti-Rust	Length:	30 Ft.
32	Grade Mounted	Corrosion Allowance:	1/8"	In.
33	Finish - One Coat Primer	Size Inlet Nozzle:	In.	Material: Aluminum
34		Size Outlet Nozzle:	In.	Height:
35	<input checked="" type="checkbox"/> Fan Guards	Series:	150# RF	No. In.:
36	<input checked="" type="checkbox"/> Belt Guards	Vert. & Horiz. Curve:		Type:
37	<input type="checkbox"/> Coupling Guards	Code:	ASME XX	Strip Read:
38	MECHANICAL EQUIPMENT			
39	FAN MOTOR		DRIVER	
40	Model:		Type:	Elect. Motor
41	No. Bay: 2	No. Items: 2	No. Item:	HP Driver 30
42	BHP Each:	BHP Total:	RPM:	
43	Diameter:	In. RPM:	Enclosure:	ACMA HP-Rating
44	No. Blades:	Pitch:	Volt: 460 Phase: 3 Cycle: 60	Ratio:
45	Blade Material: Cast. Al.	Mfg. Vendor Option: NEMA		Mfg.:
46	Hub Material:			Support:
47	Max. Ad.:	Auto Variable:	Vib. Switch Not Req'd:	
48	Notes: (1) Traces of NH₃ & Phenol			
49	Plot Size: 11'x30'			
50	Dimensions: Width	Length	Height	Shipping Weight

Reproduced from best available copy.

**AIR-COOLED EXCHANGER
SPECIFICATION**

Procon Incorporated

Customer	IGT - HYGAS PLANT		Item No.	16.07-03
Date	3/6/72	Engr.	GSD	
Service	VENT COOLER-CONDENSER			
Units	Mod. 1	Ind. or Forced Draft	No. of Bays	1
Surface Area	External	114,000 Ft ² (approx)	Internal	
Heat Exchanged	BTU Hr	47,300,000	Effective MTID	
Transfer Rate	External Surface		Internal Surface	
PERFORMANCE DATA				
TUBE SIDE				
Fluid Circulated	Steam & Ammonia (1)		Temperature In	212 F
Total Fluid Entering	Lbs/Hr	46,370	Temperature Out	160 F
Vapor			Inlet Pressure	14.7 psia, psig
Liquid			Gravity - Liquid	
Steam		46,260	Viscosity	Cps @ F
Non Condensables		110	Lat. Ht.	970.3 B/8s. F
Vapor Condensed			Molecular Weight	18.01
Steam Condensed			Allowable Press Drop	2 psi
Finning Res. IS	Hr Sq. Ft. F Btu	0.001	Design Pressure Drop	psi
AIR SIDE				
Air Quantity Item	Lbs/Hr		Temperature In	95 F
Air Quantity Fan	AC FPM		Temperature Out	F
			Altitude	Ft.
CONSTRUCTION				
Design Pressure	50	PSI	Design Temperature	350 F
SECTION		HEADER	TUBE	
Size		Type	Material	
No. Item		Plug	C.S.	
Tube Support	Zn Al. Electro Coat	Material	OD 1.0" In. 0.085" Min. Wall	
STRUCTURE	Carbon Steel	Plugs	No. Section	
Surface Finish	Asm. Finish	Material	Length	
Grade Mounted		ASME Material	Pitch	
Finish - One Coat Epoxy		Code	In Δ	
		Constr. Allowance	FIN	
		Size Inlet Nozzle	Material	
		Size Outlet Nozzle	Aluminum	
		Series	Height	
X Fan Guards		150# R.F.	No. In	
X Belt Guards		Vendor Option	Type	
Coating System		Code	ASME VV Stamp Req'd	
MECHANICAL EQUIPMENT				
FAN MOTOR		DRIVER		SPEED REDUCER
Model		Type	Type	
No. Bay	4	No. Item	V-Belt	
HP Each		HP Driver	25	
Dimensions	H RPM	KPM	Model	
No. Wires	Pitch	Enclosure	AGMA HP Rating	
Blade Material		Volt 460 Phase 3 Cycle 60	Ratio	
Hub Material		Mfg. Vendor Option - NEMA	Mfg.	
Plan Adj.	Auto Variable	Vib. Switch Not Req'd	Support	
Notes (1) Traces of Ammonia				
Plot Size: 24' x 30'				
Drawings	Sheet	Length	Height	Shipping Weight
				Lbs.

Reproduced from best available copy. 

Procon Incorporated

EXCHANGER DATA SHEET

CUSTOMER IGT - Hygas Plant	REQ. No. 16-07-51	
ADDRESS	PAGE No.	
PLANT LOCATION	DATE 3/6/72	
SERVICE OF UNIT Steam Condenser	REVISED	
SIZE 20 X 240	ITEM NO. 16-07-51	
SURFACE PER UNIT 664	CONNECTED IN	
SHKLS PER UNIT 1	SURFACE PER SHELL 664	
PERFORMANCE OF ONE UNIT		
	SHELL SIDE	TUBE SIDE
FLUID CIRCULATED	Steam & Ammonia (1)	Water, Ammonia & Phenol (2)
TOTAL FLUID ENTERING #/hr	25,740	334,900
VAPOR		
LIQUID		334,900
STEAM	25,705	
NON-CONDENSABLES	35	
FLUID VAPORIZED OR CONDENSED #/hr		
STEAM CONDENSED	25,705	
GRAVITY—LIQUID		0.85 @ 410°F
VISCOSITY—LIQUID		0.12 @ 410°F
MOLECULAR WEIGHT—VAPORS	18	
SPECIFIC HEAT—LIQUIDS		0.9 @ 410°F
LATENT HEAT—VAPORS	673	
TEMPERATURE IN	530 °F	383 °F
TEMPERATURE OUT	530 °F	435 °F
OPERATING PRESSURE	870 #/SQ. IN.	1270 #/SQ. IN.
NUMBER OF PASSES	1	2
VELOCITY		
	FT./SEC.	FT./SEC.
PRESSURE DROP	1 #/SQ. IN.	10 #/SQ. IN.
Fouling Resistance	.001	.001
HEAT EXCHANGED—B.T.U./HR.	17,300,000	M.T.D. (Corrected)
TRANSFER RATE—SERVICE		CLEAN
CONSTRUCTION		
DESIGN PRESSURE	1000 #/SQ. IN.	1,400 #/SQ. IN.
TEST PRESSURE		
DESIGN TEMPERATURE	650 °F	650 °F
TUBES	C.S. NO. 176	o.n. 3/4" b.w.g. 14 NITRON 2 0' PITCH 1" ◊
SHELL	C.S.	XN o.d. 24" THICKNESS
SHELL COVER	C.S.	FLOATING HEAD COVER C.S.
CHANNEL	C.S.	CHANNEL COVER C.S.
TUBE SHEETS—STATIONARY	C.S.	FLOATING C.S.
BAFFLES—CRUSS		TYPE THICKNESS
BAFFLES—LONG		TYPE THICKNESS
TUBE SUPPORTS	C.S.	THICKNESS
GASKETS		
CONNECTIONS—SHELL—IN	OUT	SERIES 600# RF
CHANNEL—IN	OUT	SERIES 900# RF
CORROSION ALLOWANCE—SHELL SIDE	1/8"	TUBE SIDE 1/8"
CODE REQUIREMENTS	ASME VIII	TEMA CLASS R
WEIGHTS—EACH SHELL	MIDDLE	FULL OF WATER
NOTE: INDICATE AFTER EACH PART WHETHER STRESS CORROSION RESISTANT (S.C.R.) AND WHETHER RADIOGRAPHED (X-R)		
REMARKS: (1) Traces of Ammonia (2) Traces on Ammonia & Phenol		

Procon Incorporated

EXCHANGER DATA SHEET

CUSTOMER IGT - Hygas Plant		REQ. No. 16.07-52	
ADDRESS		PAGE No.	
PLANT LOCATION		DATE 3-6-72	
SERVICE OF UNIT Steam Condenser		REVISED	
SIZE 29 X 240		ITEM NO. 16.07-52	
TYPE AET		CONNECTED IN	
SURFACE PER UNIT 1933		SHELLS PER UNIT 1	
		SURFACE PER SHELL 1933	
PERFORMANCE OF ONE UNIT			
FLUID CIRCULATED		SHELL SIDE	
TOTAL FLUID ENTERING #/hr.		Water, Ammonia & Phenol (2)	
VAPOUR "		47,870	
LIQUID "		334,900	
STEAM "		47,810	
NON-CONDENSABLES "		60	
FLUID VAPORIZED OR CONDENSED #/hr.			
STEAM CONDENSED			
GRAVITY—LIQUID		0.9 @ 330°F	
VISCOSITY—LIQUID		0.17 @ 330°F	
MOLECULAR WEIGHT—VAPORS		18	
SPECIFIC HEAT—LIQUIDS		B.T.U./#	
LATENT HEAT—VAPORS		789 B.T.U./#	
TEMPERATURE IN		436 °F	
TEMPERATURE OUT		436 °F	
OPERATING PRESSURE		350 #/SQ. IN.	
NUMBER OF PASSES		1	
VELOCITY		FT./SEC.	
PRESSURE DROP		1 #/SQ. IN.	
Fouling Resistance		0.001	
HEAT EXCHANGED—B.T.U./HR.		37,700,000	
TRANSFER RATE—SERVICE		M.T.D. (Corrected)	
		CLEAN	
CONSTRUCTION			
DESIGN PRESSURE		400 #/SQ. IN.	
TEST PRESSURE		1,400 #/SQ. IN.	
DESIGN TEMPERATURE		650 °F	
TUBES C.S. NO. 502		O.D. 3/4" #WOL 14Min ID/OD 20' PITCH 1" ◊	
SHELL C.S.		I.D. X W. 33" THICKNESS	
SHELL COVER C.S.		FLOATING HEAD COVER C.S.	
CHANNEL C.S.		CHANNEL COVER C.S.	
TUBE SHEETS—STATIONARY C.S.		FLOATING C.S.	
BAFFLE—CROSS		TYPE THICKNESS	
BAFFLE—LONG		TYPE THICKNESS	
TUBE SUPPORTS C.S.		THICKNESS	
GASKETS			
CONNECTIONS—SHELL—IN		OUT SERIES 300 # RF	
CHANNEL—IN		OUT SERIES 900 # RF	
CORROSION ALLOWANCE—SHELL SIDE 1/8"		TUBE SIDE 1/8"	
CODE REQUIREMENTS ASME VIII		TEMA CLASS R	
WEIGHTS—EACH SHELL		BUNDLE PART OF WATER	
NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S.R.) AND WHETHER RADIOGRAPHED (R-2)			
REMARKS: (1) Traces of Ammonia (2) Traces of Ammonia & Phenol			

Procon Incorporated

EXCHANGER DATA SHEET

1	CUSTOMER IGT - Hygas Plant.		REQ. No. 16.07-53
2	ADDRESS		PAGE No.
3	PLANT LOCATION		DATE 3-6-72
4	SERVICE OF UNIT Steam Condenser (Partial)		REVISED
5	SIZE 33 X 240	TYPE ART	ITEM NO. 16.07-53
6	SURFACE FOR UNIT 2358	SHELL FOR UNIT 1	CONNECTED IN -
7			SURFACE FOR SHELL 2358
8	PERFORMANCE OF ONE UNIT		
9	FLUID CIRCULATED	SHELL SIDE	TUBE SIDE
10	TOTAL FLUID ENTERING #/hr	Steam & Ammonia (1)	Water, Ammonia & Phenol (2)
11	VAPOR "	68,000	334,900
12	LIQUID "		
13	STEAM "	67,924	334,900
14	NON-CONDENSIBLES #/hr.	76	
15	FLUID VAPORIZED OR CONDENSED "		
16	STEAM CONDENSED "	33,000	
17	GRAVITY—LIQUID		0.97 @ 200°F
18	VISCOSITY—LIQUID		0.3 @ 200°F
19	MOLECULAR WEIGHT—VAPOUR		
20	SPECIFIC HEAT—LIQUIDS		0.95 @ 200°F
21	LATENT HEAT—VAPOUR	924	
22	TEMPERATURE IN	280 °F	166 °F
23	TEMPERATURE OUT	280 °F	256 °F
24	OPERATING PRESSURE	35	1300
25	NUMBER OF PASSES	One	Four
26	VELOCITY		
27	PRESSURE DROP	1	10
28	Fouling Resistance	.001	.001
29	HEAT EXCHANGED—B.T.U./HR. 30,500,000		M.T.D. (Corrected)
30	TRANSFER RATE—SERVICE		CLEAN
31	CONSTRUCTION		
32	DESIGN PRESSURE	50	1450
33	TEST PRESSURE		
34	DESIGN TEMPERATURE	650	650
35	TUBES	C.S. NO. 613 O.D. 3/4" L.W.G. 14	LENGTH 20' PITCH 1" ◊
36	SHELL	C.S. I.D. X D. 43"	THICKNESS
37	SHELL COVER	C.S.	FLOATING HEAD COVER C.S.
38	CHANNEL	C.S.	CHANNEL COVER C.S.
39	TUBE SHEETS—STATIONARY	C.S.	FLOATING C.S.
40	RAFFLES—CROSS		TYPE THICKNESS
41	RAFFLE—LONG		TYPE THICKNESS
42	TUBE SUPPORTS	C.S.	THICKNESS
43	CASSETS		
44	CONNECTIONS—SHELL—IN	OUT	SERIES 150 # RF
45	CHANNEL—IN	OUT	SERIES 900 # RF
46	CORROSION ALLOWANCE—SHELL SIDE		TUBE SIDE 1/8"
47	CODE REQUIREMENTS	1/8"	TEMP CLASS R
48	WEIGHTS—EACH SHELL	BUNDLE	FULL OF WATER
49	NOTE: INDICATE AFTER EACH PART WHETHER STRESS BELIEVED IS E.) AND WHETHER RADIOGRAPHED (X-R)		
50	REMARKS: (1) Traces of Ammonia (2) Traces of NH ₃ & Phenol		

Procon Incorporated

EXCHANGER DATA SHEET

CUSTOMER IGT - Hygas Plant	SIO. No. 16.07-53	PAGE No.
ADDRESS	DATE 3-6-72	REVISED
PLANT LOCATION	SERVICE OF UNIT Phenolic Foul Water Cooler	ITEM NO. 16.07-54
SIZE 21-240	TYPE AET	CONNECTED IN
SURFACE PER UNIT 659	SHELLS PER UNIT 1	SURFACE PER SHELL 659
PERFORMANCE OF ONE UNIT		
	SHELL SIDE	TUBE SIDE
FLUID CIRCULATED	Water, Ammonia & Phenol (1)	Water, Ammonia & Phenol (1)
TOTAL FLUID ENTERING #/hr	92,900	334,900
VAPOR "		
LIQUID "	92,900	334,900
STEAM "		
NON-CONDENSABLES "		
FLUID VAPORIZED OR CONDENSED #/hr		
STEAM CONDENSED "		
DENSITY—LIQUID	0.9 @ 310°F	0.94 @ 260°F
VISCOSITY—LIQUID	0.18 @ 310°F	0.22 @ 260°F
MOLECULAR WEIGHT—VAPORS		
SPECIFIC HEAT—LIQUIDS	0.9 @ 310°F B.T.U./#	0.92 @ 260°F B.T.U./#
LATENT HEAT—VAPORS	B.T.U./#	B.T.U./#
TEMPERATURE IN	340 °F	256 °F
TEMPERATURE OUT	290 °F	270 °F
OPERATING PRESSURE	1120 #/SQ. IN.	1290 #/SQ. IN.
NUMBER OF PASSES	ONE	TWO
VELOCITY	FT./SEC.	FT./SEC.
PRESSURE DROP	10 #/SQ. IN.	12 #/SQ. IN.
Fouling Resistance	.003	.001
HEAT EXCHANGED—B.T.U./HR. 4,700,000	M.T.D. (Corrected)	
TRANSFER RATE—SERVICE	CLEAN	
CONSTRUCTION		
DESIGN PRESSURE	1300 #/SQ. IN.	1500 #/SQ. IN.
TEST PRESSURE	#/SQ. IN.	#/SQ. IN.
DESIGN TEMPERATURE	450 °F	650 °F
TUBES C.S. NO. 117 O.D. 3/4" SWD. 14Min LENGTH 20" PITCH 1" ◊		
SHELL C.S. I.D. 28X 21" THICKNESS		
SHELL COVER C.S. FLOATING HEAD COVER		
CHANNEL C.S. CHANNEL COVER		
TUBE SHEETS—STATIONARY C.S. FLOATING		
BAFFLES—CROSS C.S. TYPE Seg. THICKNESS		
BAFFLES—LONG TYPE THICKNESS		
TUBE SUPPORTS THICKNESS		
GASKETS		
CONNECTIONS—SHELL—IN OUT SERIES 600 # RF		
CHANNEL—IN OUT SERIES 900 # RF		
CORROSION ALLOWANCE—SHELL SIDE 1/8" TUBE SIDE 4R"		
CODE REQUIREMENTS ASME VIII TEMA CLASS R		
WEIGHTS—EACH SHELL BUNDLE FULL OF WATER		
NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S. R.) AND WHETHER RADIOGRAPHED (R-R)		
REMARKS: (1) Traces of Ammonia & Phenol		

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-16.08-1
 SHEET NO. 1
 TOTAL SHEETS 7
 DATE 2-23-72 EJM
 APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 16.08-01 A, B & C
 SITE UNIT 1600
 SERVICE PHENOLIC WATER FEED MOTOR DRIVE 2 TURBINE DRIVE 1
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 3

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>WATER W/ TRACES OF AMMONIA</u>	U.S. GPM at PT. NO. <u>395</u>	DES. <u>400</u>	PROPOSAL CURVE NO. _____	NPSE REQ'D (WATER), ft _____	NO. OF STAGES _____	RPM _____	DES EFF. _____
PT. <u>166</u>	SUCT PRESS. <u>1300</u>	DIS. <u>6</u>	MAX DEP DES IMP. _____	MAX HEAD DES IMP. ft _____	MIN CONTINUOUS, gpm (BY MFR) <u>0</u>	ROTATION <u>FACING COUPLING END</u>	WATER COOLING _____
SP GR at PT. <u>0.975</u>	DIFF PRESS. <u>1294</u>	DIFF HEAD, ft. <u>3055</u>	BEARINGS _____	STUFF. BOX _____	PEDESTAL _____	GLAND _____	TOTAL WATER REQ'D, GPM _____
VAP PRESS. at PT. <u>5.5</u>	DIFF HEAD, ft. <u>18</u>	NPSE AVAIL., ft. _____	PACKING COOLING _____	FLUSHING <u>EXTERNAL CLEAN WATER</u>	AUT TYPING <u>API PLAN 5A</u>	BY <u>PUMP MFR.</u>	
VIS at PT. <u>0.4 cp.</u>							

CONSTRUCTION AND MATERIALS

① CASING-MOUNTING (CENTERLINE) (FOOT) (BRACKET) (VERTICAL)

② SPLIT (AXIAL) (RADIAL)

③ TYPE (MINOLE VOLUTE) (DOUBT VOLUTE) (DIFFUSER)

TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE CONNS)

NOZZLES	SIZE	ASA RATING	FACING	POSITION
SUCTION				
DISCHARGE				

IMPELLER DIAM DES. _____ MAX _____ TYPE CLOSED

MFR'S BEARING NO. RADIAL _____ THRUST _____

COUPLING AND GUARD THOMAS /YES, BASE PLATE, DRAIN RIM

PACKING _____

MACH SEAL YES P.A.L. GLASS CODE _____ MFR _____

MATERIAL CODE - EXTERNAL CASING		INTERNAL PARTS				
S		I				
I - CAST IRON	IMPELLER	I	B	R	O	X
B - BRONZE	INNER CASE PARTS	I	B	R	O	
S - STEEL	SLEEVE (PACKED)	Ch	Ch	Al	Al	
C - 11-12% CHROME	SLEEVE (SEAL)	C	C	C	O	
A - ALLOY	WEAR PARTS	X	H	Ch	Ch	
H - HARDENED	BEATT	R	R	R	R	
P - FACED						
X -						

SHOP TESTS	REQUIRED	WITNESSED
RUNNING PERFORM	X	
NPSH		
HYDROSTATIC	PSIG	
MAX ALLOW. WP	PSIG	P
WEIGHTS: PUMP	BASE	
	MOTOR	TURBINE

MOTOR DRIVER BY PUMP MFR		TURBINE DRIVER BY PUMP MFR		MFR FINAL DATA (AS BUILT)	
ITEM NO. <u>A & B</u>	MFD BY <u>PUMP MFR</u>	ITEM NO. <u>C</u>	MFD BY <u>PUMP MFR</u>	ACTUAL IMPELLER DIAM _____	TEST CURVE NO. _____
HP _____	FRAME _____	HP _____	RPM _____	MAT'L _____	OUTLINE DWG NO. _____
MFR _____	TYPE <u>SCI</u>	MFR and TYPE <u>2</u>	INLET STRAM, GPG _____	TEMP <u>456</u>	PUMP SECT. DWG NO. _____
EXHAUST _____	TEMP RISE C. <u>80</u>	EXHAUST _____	STEAM RATE, PL _____	M/SRP/HR _____	SEAL DIAM DWG NO. _____
BEARINGS <u>SLV</u>	LUBE OIL _____	BEARINGS _____	LUBE _____		PUMP SERIAL NO. _____
PULL LOAD AMPS _____		NOZZLES _____	SIZE _____	ASA RATING _____	
		INLET _____			
		EXHAUST _____			

API STD 610 GOVERNS UNLESS OTHERWISE STATED.
 RECEPTIONS (ITEMIZE): ① PLS. ADVISE ② GEN. PURPOSE API 611

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-16.08-1
SHEET NO. 2
TOTAL SHEETS 7
DATE 2-23-72 EJM
APPROVED _____

FOR IGT-HYGAS PLANT ITEM NO. 16.08-02 A & B
SITE UNIT 1600
SERVICE SPENT CHAR SLURRY CIRCULATION MOTOR DRIVE 2 TURBINE DRIVE
PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 2

OPERATING CONDITIONS

LIQUID SLURRY (20X50 MESH) U.S. GPM AT PT. NO. 1250 DES. 1450
CHAR IN WATER) TRACEL. 1043 DISCH. PRESS., PSIG 1270
PT. 57.3 SUCT. PRESS., PSIG MAX 1250 DES. 1240
HP OR AT PT. 0.743 DIFF. PRESS., PSI 30
VAP. PRESS. AT PT., PSIA 12.55 DIFF. HEAD, FT. 94
VIS AT PT., CEN 0.156 NPSH AVAIL., FT. 14

CONSTR. / MFG. BY 21% CHAR BY VOLUVE
CONSTRUCTION AND MATERIALS

CASING MOUNTING (CENTRIFUGAL X) (PORT) (BRACKET) (VERTICAL)
SPLIT (AXIAL) (RADIAL X)
TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE X) (DIFFUSED)
TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE CONNE.)
NOZZLES SIZE _____ ASA RATING _____ FACING _____ POSITION _____
SUCTION _____
DISCHARGE _____
IMPELLER DIAM. DES. _____ MAX _____ TYPE OPEN 0
KFM'S BEARING NO. RADIAL _____ THRUST _____
COUPLING and GUARD THOMAS / YES BASE PLATE DRAWN KOM
PACKING _____
MFR. OR. YES EAL CLASS. CODE _____ VFL _____

PERFORMANCE

PROPOSAL CURVE NO. _____
NPSH REQ'D (WATER), FT. _____
NO. OF STAGES _____ RPM _____
DES. EFF. _____ BHP _____
MAX BHP DES. IMP. _____
MAX HEAD DES. IMP., FT. _____
MIN. CONTINUOUS, GPM (BY MFR.) _____ 1
ROTATION (FACING COUPLING END) _____
WATER COOLING YES
BEARINGS X
STUFF BOX X
PEDESTAL _____
GLAND _____
TOTAL WATER REQ'D, GPM _____ 1
PACKING COOLING _____
FLUSHING CLEAN WATER
AUX. PIPING API PLAN 32
BY PUMP MFR

MATERIAL CODE—EXTERNAL CASING 5% CR INTERNAL PARTS C 6

I—CAST IRON D—BRONZE S—STEEL O—11-12% CHROME A—ALLOY H—HARDENED F—FACED X—	INTERIALS CODE	I R R C X					SHOT TESTS	REQUIRED	WITNESSED
		I	R	R	C	X			
	IMPELLER	J	R	R	C				
	INNER CASE PARTS	J	I	R	D				
	SLIWE (PACKED)	Ch	Ch	AI	AI				
	SLEVE (SEAL)	O	O	C	O				
	WEAR PARTS	I	R	Ch	Ch				
	SHAFT	S	R	R	S				

RUNNING PERFORM X
NPSH _____
DYNOROTATIO _____ PRIG _____
MAX ALLOW. WP _____ PSIG _____ F
WEIGHTS: PUMP _____ BASE _____
MOTOR _____ TURBINE _____

MOTOR DRIVER BY PUMP MFR TURBINE DRIVER BY _____
ITEM NO. A & B MTD BY PUMP MFR ITEM NO. _____ MTD BY _____
HP _____ RPM _____ FRAME _____ HP _____ RPM _____ MAT'L _____
MFR _____ MFR and TYPE _____
TYPE SCI INSUL B INLET STEAM, PSI _____ TEMP F _____
ENG. TEFC TEMP RISE C 80 EXHAUST _____
VOLT/PHASE/OVOLS 460/3/60 STEAM RATE, FL _____ LB/HP/HR _____
BEARINGS BALL LUBE GES BEARINGS _____ LUBE _____
FULL LOAD AMPS _____ NOZZLES SIZE _____ ASA RATING _____ FACING _____ POSITION _____
INLET _____
EXHAUST _____

MFR FINAL DATA (AS BUILT)

ACTUAL IMPELLER DIAM. _____
TEST CURVE NO. _____
OUTLINE DWG NO. _____
PUMP SECT. DWG NO. _____
SEAL DIAM DWG NO. _____
PUMP SERIAL NO. _____

API STD. 610 GOVERN'S UNLESS OTHERWISE STATED.
EXCEPTIONS (IF ANY): 1. PLS. ADVISE 2. ADVISE COMPLETE DETAILS ON RECOMMENDED EROSION RESISTANT LININGS OR COATINGS.

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-16.08-1
SHEET NO. 4
TOTAL SHEETS 7
DATE 2-23-72 EJM
APPROVED _____

FOR IGT - HYGAS PLANT ITEM NO. 16.08-04 A & B
SITE _____ UNIT 16.00
SERVICE FINES SLURRY RECYCLE MOTOR DRIVE 2 TURBINE DRIVE _____
PUMP MFR _____ SIZE AND TYPE _____ NO. REQD 2

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>SLURRY (20% SOLIDS)</u>	U.S. GPM @ FT. HD. <u>60</u>	DISCH. PRESS. <u>70</u>	PROPOSAL CURVE NO. _____	MIN. HEAD DES. IMP. _____	NO. OF STAGES _____	RPM _____	DES. EFF. _____
CHAR. IN WATER _____	DIFF. PRESS. <u>40</u>	DIFF. HEAD, FT. <u>38</u>	MAX. HEAD DES. IMP. _____	MIN. CONTINUOUS, RPM (BY MFR) _____	ROTATION FACING COUPLING END _____	WATER COOLING _____	BEARINGS _____
SP. GR. <u>80</u>	DIFF. PRESS. @ MAX. <u>5</u>	DIFF. HEAD, FT. <u>90</u>	MAX. HEAD DES. IMP. _____	ROTATION FACING COUPLING END _____	WATER COOLING _____	BEARINGS _____	STUFF. BOX _____
SP. GR. @ FT. HD. <u>0.974</u>	DIFF. PRESS. @ MAX. <u>5</u>	DIFF. HEAD, FT. <u>90</u>	MAX. HEAD DES. IMP. _____	ROTATION FACING COUPLING END _____	WATER COOLING _____	BEARINGS _____	STUFF. BOX _____
VAP. PRESS. @ FT. HD. <u>0.5</u>	DIFF. PRESS. @ MAX. <u>5</u>	DIFF. HEAD, FT. <u>90</u>	MAX. HEAD DES. IMP. _____	ROTATION FACING COUPLING END _____	WATER COOLING _____	BEARINGS _____	STUFF. BOX _____
VISC. @ FT. HD. <u>2.125 cP</u>	DIFF. PRESS. @ MAX. <u>5</u>	DIFF. HEAD, FT. <u>90</u>	MAX. HEAD DES. IMP. _____	ROTATION FACING COUPLING END _____	WATER COOLING _____	BEARINGS _____	STUFF. BOX _____
COND. / TENS. caused by _____	DIFF. PRESS. @ MAX. <u>5</u>	DIFF. HEAD, FT. <u>90</u>	MAX. HEAD DES. IMP. _____	ROTATION FACING COUPLING END _____	WATER COOLING _____	BEARINGS _____	STUFF. BOX _____
CONSTRUCTION AND MATERIALS				TOTAL WATER REQ'D, GPM _____			
CASING MOUNTING (CENTERLINE X) (FOOT) (PACKET) (VERTICAL)				PACKING COOLING _____			
SPLIT (AXIAL) (RADIAL X)				FLUSHING <u>CLEAN WATER</u>			
TYPE (SINGLE VOLUME) (DOUBLE VOLUME) (DIFFERENTIAL)				ACT. PUMPING <u>API PLAN 32</u>			
TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE CONNS)				BY <u>PUMP MFR</u>			
NOZZLES SIZE ASA RATING PACING POSITION							
DISCHARGE							
IMPELLER DIAM. DFR _____ MAX _____ TYPE <u>OPEN</u>							
MFR'S BEARING NO. RADIAL _____ TERNARY _____							
COUPLING END GUARD <u>THOMAS</u> YES/NO PLATE <u>DRAIN RIM</u>							
FACEING _____							
MOUNT. BEARING <u>YES</u> S.A.L. CLASS. CODE _____							

MATERIAL CODE - EXTERNAL CASING		INTERNAL PARTS		SHOP TESTS	HYDROSTATIC	PSIO	PSIO	WEIGHTS	PUMP	BASE	MOTOR	TURBINE
1 - CAST IRON	INTERNAL CODES	I	H	R	O	X						
2 - BRONZE	IMPELLER	I	B	R	O							
3 - STEEL	INNER CASE PARTS	I	I	B	O							
4 - 11-10% CHROME	SLEEVE (PACKED)	Ch	Ch	Al	Al							
5 - ALLOY	SLEEVE (BRAS)	O	O	O	O							
6 - HARDENED	WEAR PARTS	X	B	Ch	Ch							
7 - FACED	SHAFT	P	S	P	S							
X -												

MOTOR DRIVER BY PUMP MFR				TURBINE DRIVER BY _____				MFR FINAL DATA (AS BUILT)					
ITEM NO. <u>A & B</u>	MTD BY <u>PUMP MFR</u>	ITEM NO. _____	MTD BY _____	ACTUAL IMPELLER DIAM. _____	TEST CURVE NO. _____	OUTLINE DWO NO. _____	PUMP SROT. DWO NO. _____	SEAL DIAM. DWO NO. _____	PUMP SERIAL NO. _____				
HP _____ RPM _____	NAME _____	HP _____	BPM _____	MAT'L _____									
MFR _____	TYPE <u>KCI</u>	INSUL. <u>B</u>	INLET STRAN. MFR _____	TEMP. F. _____									
③ ENG. <u>TEEC-XP</u>	TEMP. RISE C. <u>80</u>	EXHAUST _____	STEAM RATE, FT. _____	W/DHP/HR _____									
VOLTS/PHASE/CTILES <u>460-3-60</u>	BEARINGS <u>BALL</u>	LUBE <u>GRS</u>	BEARINGS _____	LUBE _____									
FULL LOAD AMPS _____	NOZZLES _____	SIZE _____	ASA RATING _____	PACING _____	POSITION _____								
	INLET _____												
	EXHAUST _____												

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
EXCEPTIONS (IF ANY): ① PLS. ADVISE ② ADVISE COMPLETE DETAILS ON RECOMMENDED EROSION RESISTANT LININGS OR COATINGS. ③ PUMPS MAY BE INSTALLED BELOW GRADE.

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-16.08-1
 SHEET NO. 5
 TOTAL SHEETS 7
 DATE 2-23-72 EJM
 APPROVED _____

FOR IGT - HYGAS PLANT ITEM NO. 16.08-05 A & B
 SITE _____ UNIT 1600
 SERVICE SEAL WATER CHARGE MOTOR DRIVE 2 TURBINE DRIVE _____
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 2

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>WATER</u>	U.S. GPM at FT. HOK. <u>10</u>	DES. <u>20</u>	DISCH PRESS., psig <u>1300</u>	PROPOSAL CURVE NO. _____	NPSH REQ'D (WATER), ft. _____	NO. OF STAGES _____	RPM _____
PTF <u>180</u>	SUCT PRESS., psig MAX <u>100</u>	DES. <u>80</u>	DIFF PRESS., psi <u>1220</u>	DES EFF _____	BHP _____	MAX SHUT OFF IMP _____	MAX HEAD DES IMP, ft. _____
SP OR at FT. <u>0.912</u>	DIFF HEAD, ft. <u>2900</u>	NPSH AVAIL., ft. <u>20+</u>	CONV/EROS caused by _____	MIN CONTINUOUS, GPM (BY MFR) _____	ROTATION FACING COUPLING END _____	WATER COOLING <u>YES</u>	BEARINGS _____
VAP PRESS. at FT. psig <u>7.5</u>							STUFF BOX _____
VIS at FT. Wm <u>0.33 cp.</u>							FOOTSTAL _____

CONSTRUCTION AND MATERIALS				
CASING MOUNTING (CENTERLINE) (FOOT) (BRACKET) (VERTICAL X)				
SPLIT (AXIAL) (RADIAL X)	IN LINE			
① TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE) (DIFFUSER X)				
TAPPED OPENINGS (VENT X) (DRAIN X) (GAGE COONN.)				
NOZZLES	SIZE	ASA RATING	PACING	POSITION
SUCTION				
DISCHARGE				
IMPELLER DIAM DES _____	MAX _____	TYPE <u>STD</u>		
MFR'S BEARING NO. RADIAL _____	THURST _____			
COUPLING and GUAGE <u>MER. STD.</u>	BASE PLATE <u>SUPLY MTG. PLATE</u>			
PACKING _____				
MECH SEAL <u>YES - BAL.</u>	CLASS. CODE _____	MFR _____		

FLUMING _____
AUX PIPING <u>API PLAN 12</u>
<u>BY PUMP MFR.</u>
TOTAL WATER REQ'D, GPM _____
PACKING COOLING _____

MATERIAL CODE - EXTERNAL CASING <u>5</u>		INTERNAL PARTS ①				
I - CAST IRON	IMPELLER	I	B	B	C	X
B - BRONZE	INNER CASE PARTS	I	B	B	C	
S - STEEL	SLEEVE (PACKED)	C	U	A	A	
C - 11-12% CHROME	SLEEVE (REAL)	O	O	O	O	
A - ALLOY	WEAR PARTS	I	B	C	C	
H - HARDENED	SHAFT	B	B	B	B	
F - PACKED						
X -						

SHOP TESTS	REQUIRED	WITNESSED
LENNING PERFORM	<u>X</u>	
NPSH		
HYDROSTATIC	PSIG	
MAX ALLOW. WP	PSIG	P
WEIGHTS: PUMP _____	BASE _____	
MOTOR _____	TURBINE _____	

MOTOR DRIVER BY PUMP MFR		TURBINE DRIVER BY _____		MFR FINAL DATA (AS BUILT)	
ITEM NO. <u>A & B</u>	MFR BY <u>PUMP MFR</u>	ITEM NO. _____	MFR BY _____	ACTUAL IMPELLER DIAM _____	
HP _____	RPM _____	HP _____	RPM _____	TEST CURVE NO. _____	
MFR _____	TYPE <u>SCI</u>	MFR and TYPE _____	INLET STEAM, psig _____	OUTLINE DWG NO. _____	
TEMP RISE C <u>80</u>	TEMP RISE C <u>80</u>	EXHAUST _____	STEAM RATE, PL _____	PUMP SPOT. DWG NO. _____	
VOLTS/PHASE/CYCLES <u>460-3-60</u>	BEARINGS <u>BALL</u>	BEARINGS _____	LUBE _____	SEAL DIAM DWG NO. _____	
LUBE <u>GES</u>	FULL LOAD AMPS _____	NOZZLES	SIZE	ASA RATING	PACING
		INLET			POSITION
		EXHAUST			

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.
 EXCEPTIONS (ITEMIZE): ① PLS. ADVISE ② SUNDYNE TYPE PUMP W/GEAR BOX, REQ'D.

REV.	DATE	APPROVED	REV.	DATE	APPROVED

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1043-16.08-1
 SHEET NO. 6
 TOTAL SHEETS 7
 DATE 2-23-72 EJM
 APPROVED: _____

FOR IGT-HYGAS PLANT ITEM NO. 16.08-06 A & B
 SITE _____ UNIT 16.22
 SERVICE W/AC PHENOLIC WATER TRANSFER MOTOR DRIVE 2 TURBINE DRIVE _____
 PUMP-MFR _____ SIZE AND TYPE _____ NO. REQ'D 2

OPERATING CONDITIONS				PERFORMANCE			
LIQUID <u>WATER - TRACC. 1143</u>	U.S. GPM at PT. NOM.	<u>850</u>	DES	<u>980</u>	PROPOSAL CURVE NO.		
FT F. <u>80</u>	DISCH PRESS., PSI	<u>40</u>			NPSH REQ'D (WATER), FT		
SP OR at PT. <u>0.996</u>	SUCT PRESS., PSI MAX	<u>3.9</u>	DES	<u>1.0</u>	NO. OF STAGES	<u>1750</u>	
VAP PRESS. at PT., PSI	DIFF PRESS., PSI	<u>37</u>			DER F.F.	<u>DNF</u>	
VIS at PT., Cps	DIFT HEAD, FT	<u>91</u>			MAX BHP DES IMP		
COND/EROS caused by <u>SOME COAL FINES</u>	SPED AVAIL., FT	<u>14</u>			MAX HEAD DES IMP, FT		
CONSTRUCTION AND MATERIALS				MIN CONTINUOUS, GPM (MT MFR)			
CASING-MOUNTING (CENTERLINE) (FOOT X) (BRACKET) (VERTICAL)				NOTATION PACKING COUPLING END			
SPLIT (AXIAL) (RADIAL X)				WATER COOLING			
② TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE X) (DIFFUSER)				BEARINGS			
TAPPED OPENINGS (VENT X) (DRAIN X) (FACE CORN.)				STUFF BOX			
NOZZLES SIZE ASA RATING PACING POSITION				PEDESTAL			
SUCTION				CLAMP			
DISCHARGE				TOTAL WATER REQ'D, GPM			
IMPELLER DIAM DES MAX				PACKING COOLING			
MFR'S BEARING NO. RADIAL				FLUSHING <u>EXTERNAL, CLEAN WATER</u>			
COUPLING and GUARD <u>THOMAS</u> YES BASE PLANT <u>PLAIN</u> RIM				AUX PIPING <u>API PLAN 32</u>			
PAURING				BY <u>PUMP GCR</u>			
MECH SEAL <u>YES - BAL</u> CLASS CODE							

MATERIAL CODE-EXTERNAL CASING		INTERNAL PARTS	
I-CAST IRON	IMPELLER	I	B A O X
B-BRONZE	INNER CASE PARTS	I	B R O
B-STEEL	FLERVE (PACKED)	I	I R O
C-11.1% CHROME	FLERVE (SEAL)	C	C A C
A-ALLOY	WEAR PARTS	X	H C C
D-HARDENED	SHAFT	B	R S B
I-FACED			
Z-			

MOTOR DRIVER BY Pump MFR	TURBINE DRIVER BY	MFR FINAL DATA (AS BUILT)
ITEM NO. <u>A & B</u> MTD BY <u>PUMP MFR</u>	ITEM NO. _____ MTD BY _____	ACTUAL IMPELLER DIAM _____
HP _____ RPM <u>1800</u> FRAME _____	HP _____ RPM _____ MAT'L _____	TEST CURVE NO. _____
MFR _____	MFR and TYPE _____	OUTLINE DWG NO. _____
TYPE <u>SC</u> INST'L <u>B</u>	INLET STRAM, INCH _____ TEMP F. _____	PUMP SROT. DWG NO. _____
END <u>TEFC</u> TEMP RISE C. <u>80</u>	EXHAUST _____	REAL DIAM DWG NO. _____
VOLTS/PHASE/OTOLNS <u>460-3-60</u>	STEAM RATE, FT _____	PUMP SERIAL NO. _____
BEARINGS <u>PALL</u> LUBE <u>GRS</u>	DRABINGS _____ LUBE _____	
FULL LOAD AMPS _____	NOZZLES (SIZE ASA RATING PACING POSITION)	
	INLET _____	
	EXHAUST _____	

API STD. 610 COVERED UNLESS OTHERWISE STATED.
 RECEPTIONS (IF ANY): (1) PLS. ADVISE. (2) AVS PUMP ACCEPTIBLE.

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED

PROCON

STANDARD DATA SHEET FOR CENTRIFUGAL PUMPS

NO. 1843-16.08-1
 SHEET NO. 7
 TOTAL SHEETS 7
 DATE 2-23-72 EJM
 APPROVED _____

FOR IGT - HYGAS PLANT ITEM NO. 16.08-07 A & B
 SITE _____ UNIT 16.00
 SERVICE CONDENSATE RECYCLE MOTOR DRIVE 2 TURBINE DRIVE _____
 PUMP MFR _____ SIZE AND TYPE _____ NO. REQ'D 2

OPERATING CONDITIONS				PERFORMANCE	
LIQUID <u>WATER - TRACE NH₃</u>	U.S. GPM at FT. NOM.	<u>95</u>	DES	<u>115</u>	PROPOSAL CURVE NO.
FT. <u>160</u>	DIFF. PRESS., PSI	<u>20</u>			NETG REQ'D (WATER), R
SP GR at FT. <u>0.978</u>	SUCT PRESS., PSI MAX	<u>2</u>	DES	<u>0</u>	NO. OF STAGES
VAP PRESS. at FT. <u>4.74</u>	DIFF. HEAD, FT.	<u>20</u>			HP
VIS at FT. <u>0.4 cp.</u>	DIFF. HEAD, FT.	<u>48</u>			DES EFF
	NETG AVAIL., R	<u>8</u>			MAX SHP DES IMP
					MAX HEAD DES IMP, FT.

CONSTRUCTION AND MATERIALS

CASING-MOUNTING (CENTERLINE) (FOOT) (BRACKET) (VERTICAL) (SPLIT) (AXIAL) (RADIAL)

TYPE (SINGLE VOLUTE) (DOUBLE VOLUTE) (DIFFUSER)

TAPPED OPENINGS (VENT) (DRAIN) (GAUGE CONNS.)

NOZZLES	SIZE	ASA RATING	FACING	POSITION
SUCTION				
DISCHARGE				

IMPELLER DIAM DES _____ MAX _____ TYPE OPEN

MFR'S BEARING NO. RADIAL _____ THRUST _____

COUPLING and GUARD THOMAS /YES BANK PLATE DRAIN RIGHT

PACKING _____

MECH SEAL YES, BAL. CLASS. CODE _____ MFR _____

MIN CONTINGUOUS, GPM (BY MFR) (1)

ROTATION FACING COUPL'NG END _____

WATER COOLING _____

BEARINGS _____

STUFF. BOX _____

PEDESTAL _____

GLAND _____

TOTAL WATER REQ'D, GPM _____

PACKING COOLING _____

FLUSHING _____

AUX PIPING API PLAN 12
BY PUMP MFR.

MATERIAL CODE - EXTERNAL CASING		INTERNAL PARTS					PROP TESTS	REQUIRED	WITNESSED
I - CAST IRON	IMPELLER	I	B	S	O				
B - BRONZE	INNER CASE PARTS	I	I	B	O				
S - STEEL	SLEEVE (PACKED)	Ch	Ch	At	At				
C - 11-10% CHROME	SLEEVE (SEAL)	O	O	O	O				
A - ALLOY	WEAR PARTS	I	B	Ch	Ch				
H - HARDENED	SHAFT	S	S	S	S				
F - FACED									
X -									

MOTOR DRIVER BY PUMP MFR

ITEM NO. A & B MTD BY PUMP MFR

HP _____ RPM 1800 FRAME _____

MFR _____

TYPE SCI INSUL. B

ENC T&FC TEMP RISE, C 80

VOLTS/PHASE/CYCLES 460-3-60

BEARINGS BALL LUBE GRS

FULL LOAD AMPS _____

TURBINE DRIVER BY _____

ITEM NO. _____ MTD BY _____

HP _____ RPM _____ MAT'L _____

MFR and TYPE _____

INLET STRAM, PSI _____ TEMP F _____

EXHAUST _____

STEAM RATE, FL _____ lb/HP/HR

BEARINGS _____ LUBE _____

NOZZLES SIZE ASA RATING FACING POSITION

INLET _____

EXHAUST _____

MFR FINAL DATA (AS BUILT)

ACTUAL IMPELLER DIAM _____

TEST CURVE NO. _____

OUTLINE DWG NO. _____

PUMP SECT. DWG NO. _____

SEAL DIAM DWG NO. _____

PUMP SERIAL NO. _____

API STD. 610 GOVERNS UNLESS OTHERWISE STATED.

EXCEPTIONS (ITEMIZE): (1) PLS. ADVISE (2) AYS PUMP ACCEPTABLE.

REV.	DATE	APPROVED	REV.	DATE	APPROVED	REV.	DATE	APPROVED

3-1-72
PRELIMINARY

Procon Incorporated
 PIPING & INSTRUMENT DIAGRAM
 UNIT 100 - OIL REFINERY
 1605 INDUSTRIAL PARK
 HOUSTON, TEXAS 77058
 PHONE: 281-261-1100
 TELETYPE: 281-261-1100
 FAX: 281-261-1100

LEGEND
 DC DENSITY CONTROL
 FC FLOW CONTROL
 FY FLOW RELAY
 NO HIGH DENSITY
 LC LEVEL CONTROL
 LI LEVEL INDICATOR
 PY PRESSURE RELAY
 SY SILENT VALVE
 TC TEMPERATURE CONTROL
 TI TEMPERATURE INDICATOR
 CWS COILING WATER SUPPLY
 CWF COILING WATER RETURN

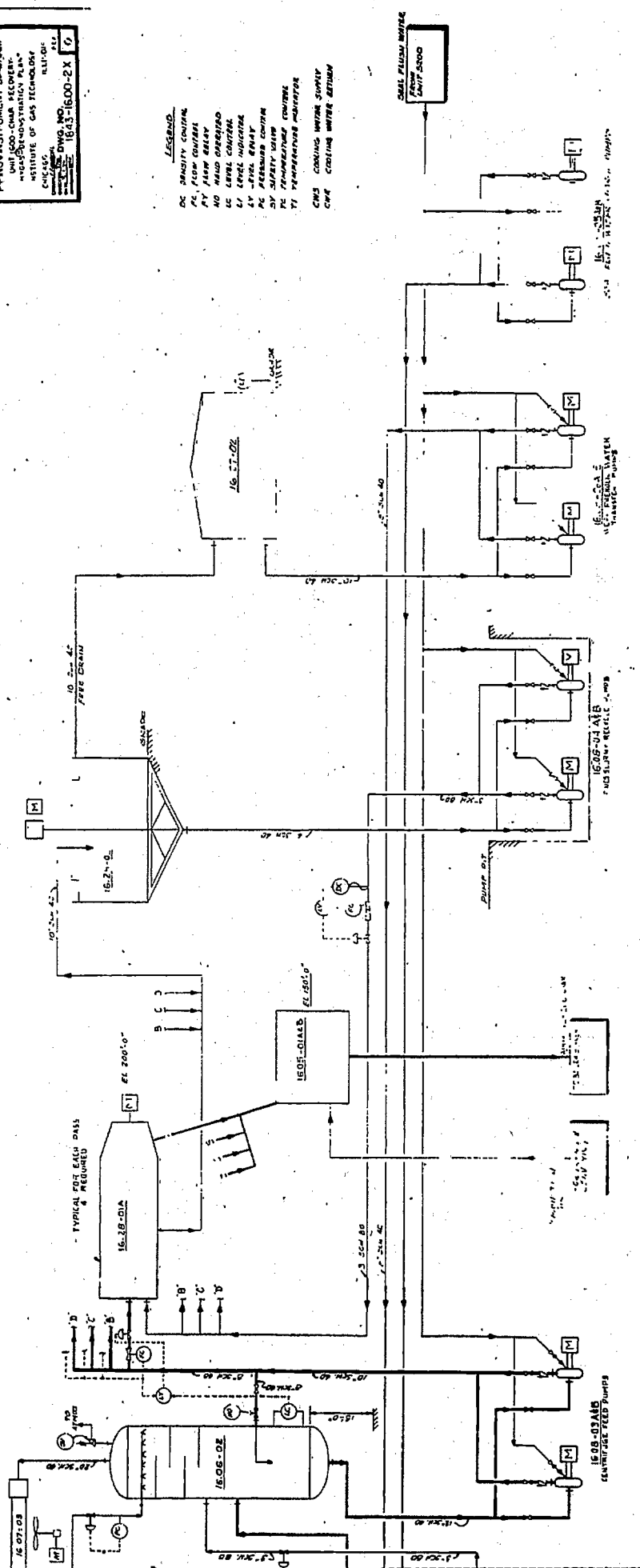
MOORE: 16-05-01A-01
 EQUIP. 1605-01A-01

15-37-02
 16-05-01A-01

16-05-01A-01
 16-05-01A-01

16-05-01A-01
 16-05-01A-01

16-05-01A-01
 16-05-01A-01



D

C

8-B123

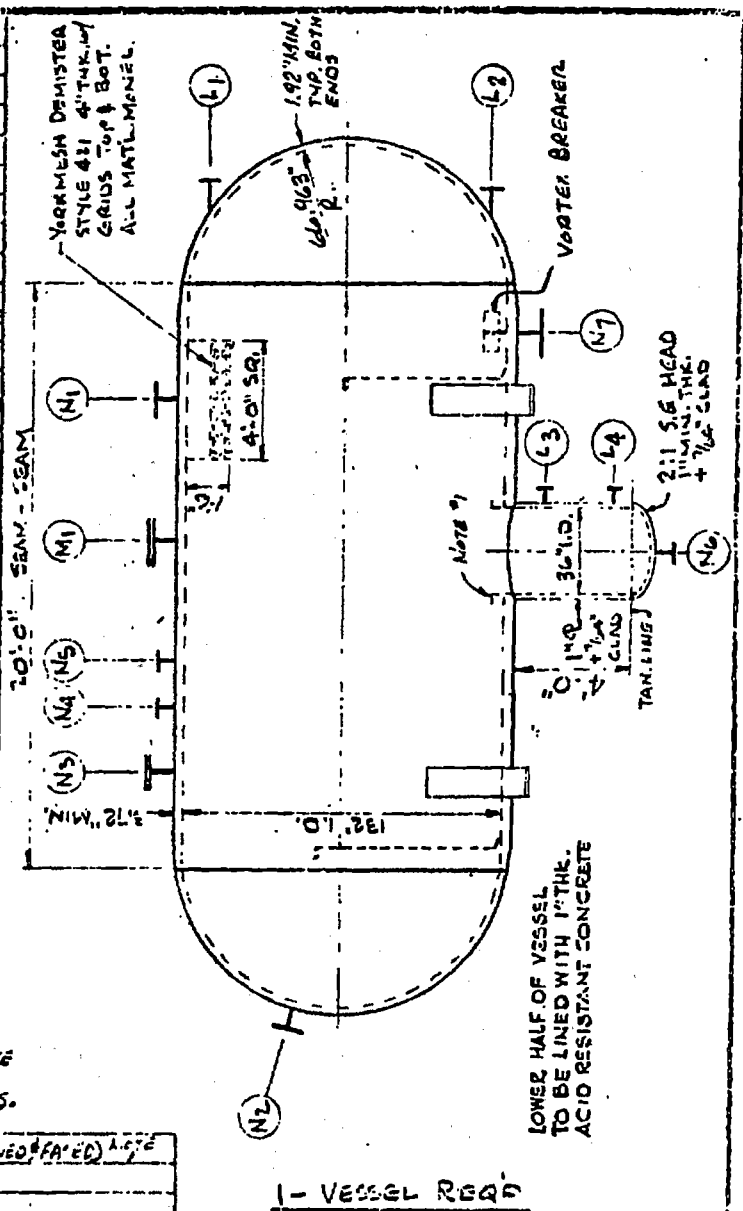
DESIGN DATA	
CODE ASME 1971 SECT. VIII DIV 2 STAMP REQ.	
SPECS.	
DESIGN CONDITIONS	INT. 13.20 PSIG @ 400 °F
	EXT. PSIG @ °F
OPER. PRESS.	PSIG @ 175 °F
RADIOGRAPHY	100% U.T. YES
POST WELD HEAT TREAT	YES
JOINT EFF.	100% (SHELL, NDS, #BOOTS)
CORROSION ALLOWANCE	C.S. SECT. 8 CLASS
NET FAB. WEIGHT	167700*
EMPTY WEIGHT	
OPER. WEIGHT	
TEST WEIGHT	
MATERIAL SPECIFICATIONS	
SHELL	SA-204C RPT. SA-204C/SA-205
HEADS	SA-204C RPT. SA-204C/SA-205
SUPPORT	A-285-C
NOZZLE NECK	SA-182 F1
FLANGES	SA-182 F1
INTERNAL	A-285-C
GASKET	C.S. OCTAGONAL RING
BOLTING NUTS	SA-193 B7 / SA-193 B7
MANUALLY (UNLESS OTHERWISE NOTED)	
ACCESSORIES TO BE SUPPLIED BY FABRICATOR	
LADLER AND PLATFORM SLIPS	YES
DAVIT SUPPORTS	No.
PIPE SUPPORT LUGS	No.
PIPE GUIDE LUGS	No.
FIRE PROOFING	No.
INSULATION	No.
PAINT 1-SHOP COAT ZINC CHROMATE	

NOTE
 1. ALL NDS IN LINED SECT. SHALL HAVE MONEL LINERS PROTRUDING THRU CONCRETE LINING. ALL SA-193 NUTS SHALL BE INSTALLED ON END OF PROTRUSION LINERS.

NO.	SIZE	TYPE	LOCATION	REMARKS	
L1	3"	600°	RTJ	LC (MONEL LINED FACED)	
L2	1"	2"	600°	ITJ	LC
N1	1"	6"	600°	RTJ	OUTLET (MONEL LINED FACED)
N6	1"	4"	600°	RTJ	OUTLET (MONEL LINED FACED)
N5	1"	2"	600°	RTJ	VENT
N4	1"	4"	600°	RTJ	RELIEF VALVE
N3	1"	15"	600°	RTJ	VENT W/EF. STUDS NUTS & GASKET
N2	1"	16"	600°	RTJ	INLET
N1	1"	14"	600°	RTJ	VAPE OUTLET
M1	1"	16"	600°	RTJ	MANHOLE W/EF. STUDS NUTS & GASKET

NOZZLE SCHEDULE			
SIZE	PROJECTION	SIZE	PROJECTION
THRU		THRU	
THRU		THRU	

FACING NOZZLE AND MANHOLE PROJECTIONS ARE FROM OD OF VESSEL TO EXTREME FACE OF FLANGE EXCEPT FOR INTEGRAL REINFORCED NOZZLES OR OTHERWISE NOTED



1 - VESSEL REAR

LOWER HALF OF VESSEL TO BE LINED WITH 1" THK. ACID RESISTANT CONCRETE

NO.	REVISION	DATE	BY
1	REVISED NOZZLE SIZES		

Procon Incorporated
 SECOND QUENCH DRUM
 ITEM NO. 2106-42 UNIT 2100
 HYGAS

167 CHICAGO, ILL

DRAWN JET
 CHECKED
 APPROVED W. DATE 2-3-72.
 REQ. NO 1843-21.06-42

8-8125

**AIR-COOLED EXCHANGER
SPECIFICATION**

Procon Incorporated

1	Customer IGT - HYGAS PLANT			
2	Date 2/24/72	Engr GSD	Item No 21.07-01	
3	Service Main Gas Condenser			
4	Units Model	Induced Forced Draft		No. of Bays 1
5	Surface Item External	114,000 (approx)	Bare Tube	Sq Ft.
6	Heat Exchanged	74,300,000	BTU Hr	Effective MTD °F
7	Transfer Rate	4.5	External Surface	Bare Tube Surface BTU/Hr. Sq Ft. °F
8	PERFORMANCE DATA			
9	TUBE SIDE			
10	Fluid Circulated	HC+H₂O + H₂S + CO₂		Temperature In 400 °F
11	Total Fluid Entering	433,785	Lbs Hr	Temperature Out 175 °F
12	Vapor	182,698		Inlet Pressure 1195 psia, psig
13	Liquid			Gravity - Liquid
14	Steam	48,781		Viscosity 0.015 Cps # °F
15	Non Condensables	202,306		Viscosity Cps # °F
16	Vapor Condensed	129,080		Molecular Weight 21.9
17	Steam Condensed	47,219		Allowable Press Drop 5 psi
18	Fouling Res. I.S.	.003	Hr Sq Ft. °F BTU	Design Pressure Drop psi
19	AIR SIDE			
20	Air Quantity Item	Lbs Hr		Temperature In 95 °F
21	Air Quantity Fan	ACFM		Temperature Out 214.8 °F
22				Altitude Ft.
23	CONSTRUCTION			
24	Design Pressure 1350	PSI	Test Pressure ASME Code	Design Temperature 600 °F
25	SECTION		HEADER	TUBE
26	Size		Type Plug	Material 304 SS
27	No. Item 1		Material SA-240	OD 1.0 In 0.085" Min. Wall
28	Tube Support - Zn-Al Filled Bands	No	Rows Passes	No. Section
29	STRUCTURE - Carbon Steel	Plugs - Shoulder ASME Material SA-182		Length 30 Ft.
30	Surface Prep - Wire Brush	Casket Material		Pitch In Δ
31	Grade Mounted	Corrosion Allowance 1/8 In		FIN
32	Finish - One Coat Primer	Size Inlet Nozzle	In.	Material Aluminum
33		Size Outlet Nozzle	In.	Height
34	<input checked="" type="checkbox"/> Fan Guards	Series 900 RF		No. In
35	<input checked="" type="checkbox"/> Belt Guards	Vent & Drain Conn		Type
36	<input checked="" type="checkbox"/> Coupling Guards	Code - ASME XX	Stamp Req'd	
37	MECHANICAL EQUIPMENT			
38	FAN MFR.		DRIVER	SPEED REDUCER
39	Model		Type Electric Motor	Type V-Belt
40	No. Bay 4	No. Item 4	No. Item HP Driver 25	No. Item 4
41	BHP Each	BHP Total	RPM 1750	Model
42	Diameter ft.	RPM	Enclosure TEFC	AGMA HP Rating
43	No. Blades	Pitch	Volt 460 Phase 3 Cycle 60	Ratio
44	Blade Material Cast. Alum.	Mfr. Vendor Option - NEMA		Mfr
45	Hub Material			Support
46	Min Adj	Auto Variable	Vib. Switch Not Req'd	
47	Notes: Please refer to attached fluid phase enthalpy curve.			
48	Provide steam coil & external recirculation.			
49	Plot Size: 24' x 30'			
50	Dimensions: Width	Length	Height	Shipping Weight