NEUMAN & ESSER
Maschinenfabrik Wurzen GmbH

RWV

PER 4/11/2000 FAX TO STEFAN PAMA

FOR JOB 992009

2.2 Operating data

Medium: 65% H2, 12% H20, 15% Cl, 8% C2+

Humidity: 100 %

Delivery volume: 385 Nm^3/h 230 SCFM

Operating condition		1st stage	2nd stage	3rd stage
Suction pressure	~~bar abs~~ PSIA	19	42	146
Final pressure	~~bar abs~~ PSIA, ca.	46	149	320
Gas temperature suction side [1]	~~°C~~ °F, ca.	140	104	104
Gas temperature delivery side [2]	~~°C~~ °F, ca.	293	315	226
Ambient temperature	~~°C~~ °F, ca.	90°F		
Safety valve set pressure	~~bar (g)~~ PSIG	75	250	375
Cooling water pressure	bar (g), max.			
Cooling water inlet temperature	°C, ca.		25	

1) specified in Contract

2) Theoretically computed value. Deviations from this value are possible.
Temperatures may vary depending on the cooling water or ambient temperatures.

2.3 Machine data

Type:	3V1 - 370/260/120	
Model:	V	
No. of stages:	3	
No. of cranks:	1	
Max. compressor capacity:	140	kW
Motor rating:	-	kW
Stroke:	100	mm
Drive:	electric motor via V-belts	
Compressor speed.	~~980~~ 840	r.p.m.
Motor speed:	- 1500	r.p.m.
Total weight, ca.: (per compressor unit)	3650	kg

		1st stage	2nd stage	3rd stage
Cylinder dia.	mm	370	260	120
Cylinder action		SINGLE ACTING ~~double acting~~	single acting	single acting
Cylinder liner		no	no	yes
Valve type		133	117	89
No. of valves /suction/pressure *)		4 / 4	2 / 2	1 / 1
No. of piston rings		3	4	4
No. of guide rings		1	1	1

*) per cylinder side
only by double-acting

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NOV #

RECIPROCATING COMPRESSOR DATA SHEET—CUSTOMARY UNITS

JOB NO. UK-1420/99 PAGE 1 OF 2
ITEM NO. #1
PURCH. ORDER NO. _____ DATE 10/27/99
INQUIRY NO. _____ BY RWV
REVISION _____ DATE _____

APPLICABLE TO: ○ PROPOSAL ○ PURCHASE ○ AS BUILT
FOR/USER BRYAN RESEARCH SITE/LOCATION BRYAN, TX SERVICE #1 NO. REQ'D. ONE

NOTE: ○ INDICATES INFO. TO BE COMPLETED BY PURCH. ☐ BY MANUFACTURER WITH PROPOSAL ◇ BY MANUFACTURER AFTER ORDER ☑ BY MANUFACTURER OR PURCHASER AS APPLICABLE

COMPR. MFGR. NORMAN / ORSOR TYPE MODEL NO(S) 3TV1 SERIAL NO(S) _____
COMPR. THROWS: TOTAL NO. TWO NO. WITH CYLS. TWO NOMINAL FRAME RATING 266 BHP @ RATED RPM OF 1000
☐ MAX/MIN ALLOWABLE SPEED _____ / _____ RPM
DRIVER MFGR. _____ DRIVER NAMEPLATE HP/OPERATING RPM ~~125~~ 125 / 1800
DRIVE SYSTEM: ○ DIRECT COUPLED ○ GEARED & COUPLED ☒ V-BELT
TYPE OF DRIVER: ☒ IND. MOTOR ○ SYN. MOTOR ○ STEAM TURBINE ○ GAS TURBINE ○ ENGINE ○ OTHER _____
NO NEGATIVE TOLERANCE APPLIES: ○ YES - PURCHASER TO FILL IN "REQUIRED CAPACITY" LINES. CYLINDERS: ○ LUBE
(NNT) ○ NO - PURCHASER TO FILL IN "MFGR.'S RATED CAP." LINES ☒ NON-LUBE
○ MAX ACCEPTABLE AVG PISTON SPEED _____ FT/MIN

OPERATING CONDITIONS (EACH MACHINE)

○ SERVICE OR ITEM NO.	DESIGN				LOW	HIGH
○ STAGE	1	2	3		SUCTION	SUCTION
○ NORM. OR ALT. CONDITION						
○ CERTIFIED PT. (√) CHECK ONE						
○ MOLECULAR WEIGHT	8					
○ Cp/Cv (K) @150 °F OR _____ °F	1.34					
INLET CONDITIONS AT INLET TO:	○ PULSE DEVICES ○ COMPRESSOR CYLINDER FLANGES					
	NOTE: ○ SIDE STREAM TO _____ STAGE(S). THESE INLET PRESSURES ARE FIXED					
○ PRESSURE (PSIA) @ PUL. SUPP. INLET						
☑ PRESSURE (PSIA) @ CYL. FLANGE	18.9	42	146		14.5	~30
○ TEMPERATURE (°F)	140	104	104			
○ REF: SIDE STREAM TEMPS (°F)						
☐ COMPRESSIBILITY (Z_s)						
INTERSTAGE: INTERSTAGE Δ P INCLUDES: ○ PULSE DEVICES ○ PIPING ○ COOLERS ○ SEPARATORS ○ OTHER _____						
☑ Δ P BETWEEN STAGES, %/psi	/	/	/	/	/	
DISCHARGE CONDITIONS: AT OUTLET FROM: ○ PULSE DEVICE ○ COMP CYL FLANGES ○ OTHER _____						
☑ PRESSURE (PSIA) @ CYL. FLANGE	46	149	320		320	320
○ PRESSURE (PSIA) @ PUL. SUPP OUTLET						
☐ TEMPERATURE, ADIABATIC, °F	293	315	226			
☐ TEMPERATURE, PREDICTED, °F						
☐ COMPRESSIBILITY (Z_s) OR (Z_{avg})						
*REQUIRED CAPACITY, RATED FOR PROCESS, AT INLET TO COMPRESSOR, NO NEGATIVE TOLERANCE (-0%)						
○ LBS/HR CAPACITY SPECIFIED						
IS ○ WET ○ DRY						
○ MMSCFD/SCFM (14.7 PSIA & 60°F) DRY	230	230	230		160	320
MGFR.'S RATED CAPACITY (AT INLET TO COMPRESSOR) & BHP @ CERTIFIED TOLERANCE OF ± 3% FOR CAP. & ± 3% FOR BHP						
☑ LBS/HR CAPACITY SPECIFIED						
IS ○ WET ○ DRY						
☑ ICFM	245	88	25			
☑ MMSCFD/SCFM (14.7 PSIA & 60°F)						
☐ BHP/STAGE						
☐ TOTAL BHP @ COMPRESSOR SHAFT	82				60	102
☐ TOTAL HP INCLUDING V-BELT & GEAR LOSSES						

*CAPACITY FOR NNT
MANUFACTURER'S = REQUIRED ÷ 0.97
REQUIRED = MANUFACTURER'S X 0.97

REMARKS/SPECIAL REQUIREMENTS _____

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RECIPROCATING COMPRESSOR DATA SHEET—CUSTOMARY UNITS

NOA #

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REVISION ____ ITEM NO. # 1

DATE 10/27/99

BY RWV

	☑ CYLINDER DATA AT FULL LOAD CONDITION						
2	SERVICE ITEM NO.						
3	STAGE	1	2	3			
4	INLET PRESSURE, PSIA } @ CYLINDER FLANGES	18.9	42	146			
5	DISCHARGE PRESSURE, PSIA } @ CYLINDER FLANGES	46	149	320			
6	CYLINDERS PER STAGE	ONE	ONE	ONE			
7	SINGLE OR DOUBLE ACTING (SA OR DA)	SAGE	SAGE	SAGE			
8	BORE, INCHES	14 1/2	10 1/4	4 3/4			
9	STROKE, INCHES	4"	4"	4"			
10	RPM: RATED/MAX ALLOW	800	/ 1000		/		
11	PISTON SPEED, FT/MIN: RATED/MAX ALLOW	530	/ 670		/		
12	CYLINDER LINER, YES/NO	NO	NO	YES			
13	LINER NOMINAL THICKNESS, INCHES						
14	PISTON DISPLACEMENT, CFM						
15	CYLINDER DESIGN CLEARANCE, % AVERAGE	12	20	20			
16	VOLUMETRIC EFFICIENCY, % AVERAGE	81	60	75			
17	VALVES, INLET/DISCHARGE, QTY PER CYL.	/	/	/	/	/	/
18	TYPE OF VALVES	HOR	BIGOR	PLATE			
19	VALVE LIFT, INLET/DISCHARGE, INCHES	/	/	/	/	/	/
20	VALVE VELOCITY, API 4TH EDITION, FT/MIN						
21	SUCTION VALVE(S)						
22	DISCHARGE VALVE(S)						
23	ROD DIAMETER, INCHES	2"	2"	~~2~~			
24	MAX ALLOW. COMBINED ROD LOADING, LBS, C *	12,100					
25	MAX ALLOW. COMBINED ROD LOADING, LBS, T *						
26	CALCULATED GAS ROD LOAD, LBS, C *	0	5000				
27	CALCULATED GAS ROD LOAD, LBS, T *	4900	6800				
28	COMBINED ROD LOAD (GAS+INERTIA), LBS, C *						
29	COMBINED ROD LOAD (GAS+INERTIA), LBS, T *						
30	ROD REV., DEGREES MIN @ X-HD PIN **						
31	RECIP WT. (PISTON, ROD, X-HD & NUTS), LBS **						
32	MAX ALLOW. WORKING PRESSURE, PSIG						
33	MAX ALLOW. WORKING TEMPERATURE, °F						
34	HYDROSATIC TEST PRESSURE, PSIG						
35	HELIUM TEST PRESSURE, PSIG						
36	INLET FLANGE SIZE/RATING	/	/	/	/	/	/
37	FACING						
38	DISCHARGE FLANGE SIZE/RATING	/	/	/	/	/	/
39	FACING						
40	DISCHARGE RELIEF VALVE SETTING BASED ON DATA FOR INLET PRESSURES GIVEN ABOVE:						
41	RECOMMENDED SETTING, PSIG	~~[illegible]~~					
42	GAS ROD LOAD, LBS, C *						
43	GAS ROD LOAD, LBS, T *						
44	COMBINED ROD LOAD, LBS, C *						
45	COMBINED ROD LOAD, LBS, T *						
46	ROD REVERSAL, DEGREE MIN. @ X-HD PIN **						
47	NOTE: CALCULATED AT INLET PRESSURES GIVEN ABOVE & RECOMMENDED PSV SETTING						
48							
49	○ SETTLE-OUT GAS PRESSURE (DATA REQUIRED FOR STARTING)						
50	*C = COMPRESSION *T = TENSION	** X-HD = CROSSHEAD					
51							

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NEUMAN & ESSER GROUP

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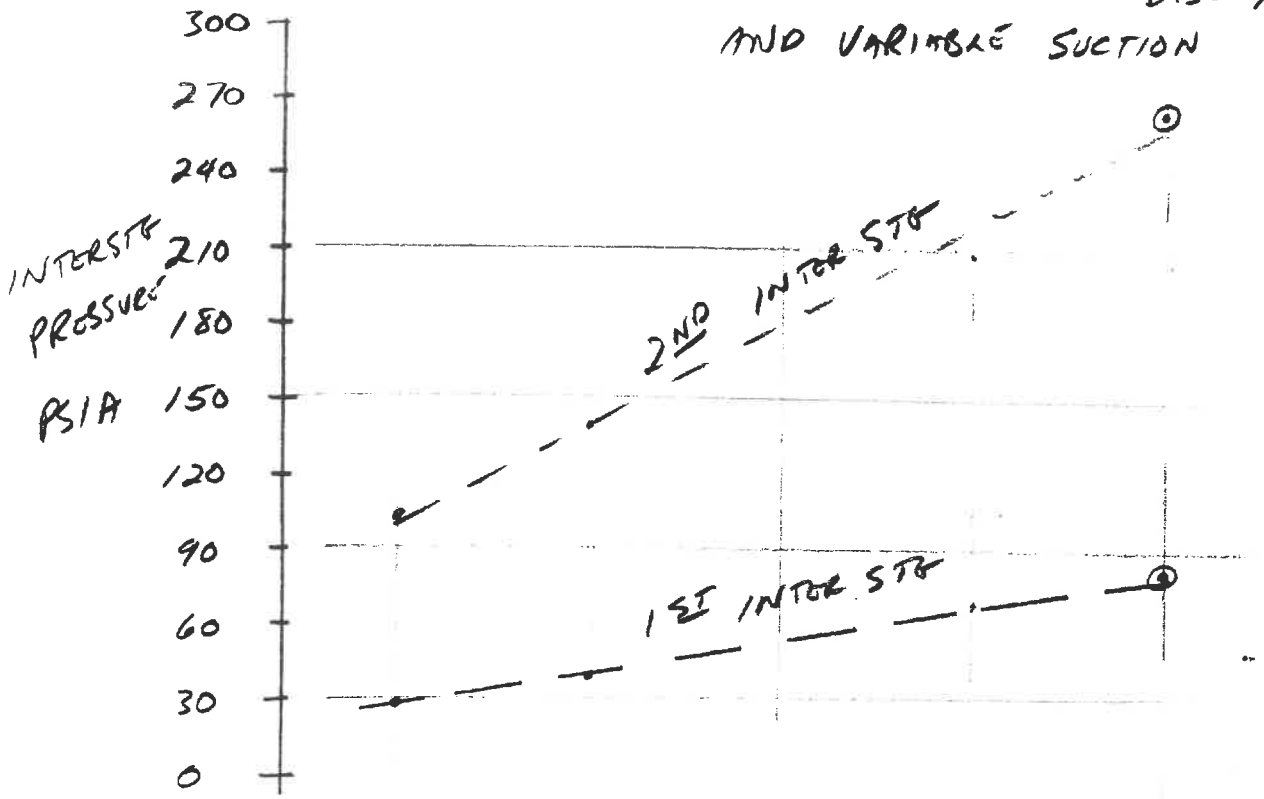
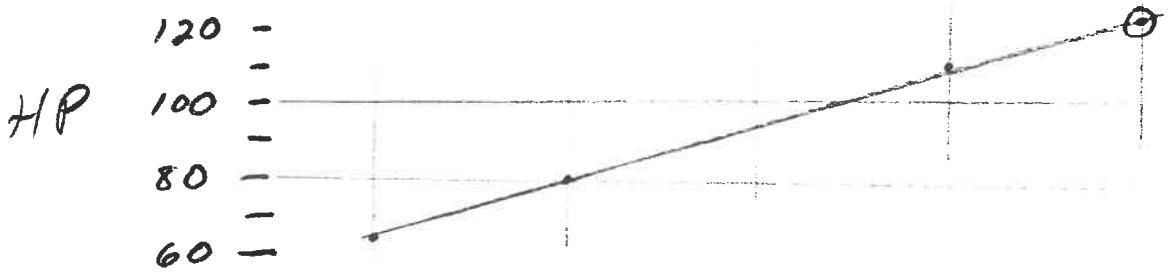
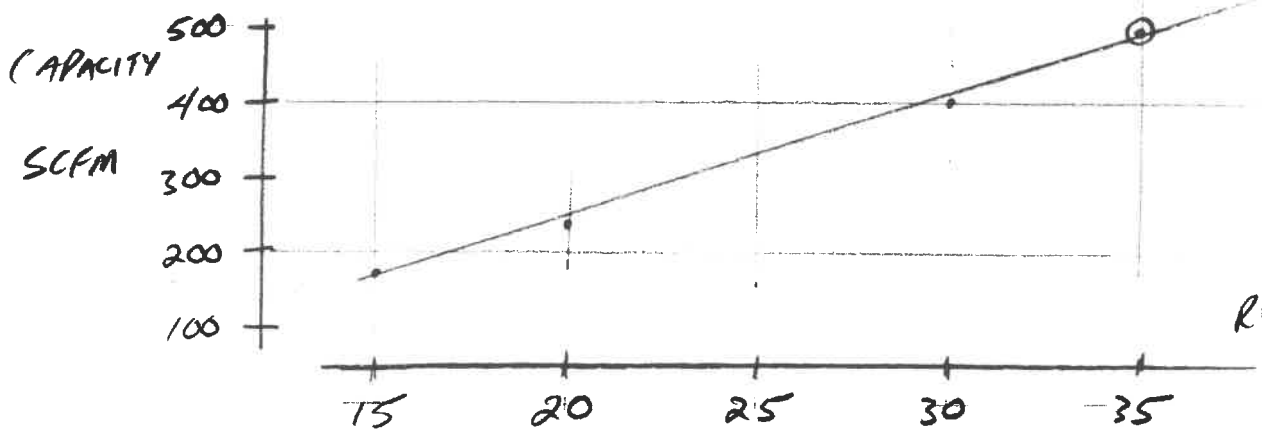
NEA # 992009

MEMBRANE COMPRESSOR

3TV1 PERFORMANCE @ 320 PSIA DISCHARGE AND VARIABLE SUCTION







RWV

8/11/c