VENTECH

RECIPROCATING COMPRESSOR

U.S. CUSTOMARY UNITS

JOB NO. 4777-010 ITEM NO. PK-592

PURCHASE ORDER NO.

SPECIFICATION NO.

REVISION NO. 1 DATE 10/23/2014

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APPLICABLE TO: ○ PROPOSALS ● PURCHASE ○ AS BUILT

FOR/USER GTL Joint Venture, LLC SITE/LOCATION : Oklahoma City, OK SERVICE: Tail Gas Recycle Compressor Package No. Req'd 1

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

COMPR. MFGR **TPC / ARIEL** TYPE MODEL NO(S) SERIAL NO(S) 1

COMPR.THROWS: TOTAL NO. NO. WITH CYLS. NOMINAL FRAME RATING BHP @ RATED RPM OF

☐ MAX/MIN ALLOWABLE SPEED / RPM

DRIVER MFGR. **Hyundai** DRIVER NAMEPLATE HP/OPERATING RPM **250** / 1

DRIVE SYSTEM: ● DIRECT COUPLED ○ GEARED & COUPLED ○ V-BELT

TYPE OF DRIVER: ● IND. MOTOR ○ SYN. MOTOR ○ STEAM TURBINE ○ GAS TURBINE ○ ENGINE ● **Inverter Duty Rated** 1

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.	CASE 1	CASE 2	WAX REMOVAL	REGEN/ACT		
○ STAGE						
○ NORM. OR ALT. CONDITION	NORMAL 1	NORMAL 2	ALTERNATE 1	ALTERNATE 2		
○ CERTIFIED PT. (X) MARK ONE						
○ MOLECULAR WEIGHT	31.752	31.771	2.487	2.147		
○ Cp/Cv (K) @ 150°F OR 100 °F	1.39	1.39	1.4	1.41		

INLET CONDITIONS: AT INLET TO: ● PULSE DEVICES ○ COMPRESSOR CYLINDER FLANGES

NOTE: ○ SIDE STREAM TO STAGE(S), THESE INLET PRESS. ARE FIXED

○ PRESSURE (PSIA) @ PUL. SUPP. INLET	301.11	301.11	154.11	144.11		
◎ PRESSURE (PSIA) @ CYL. FLANGE						
○ TEMPERATURE (°F)	97.4	97.4	100	100		
○ REF: SIDE STREAM TEMPS (°F)						
☐ COMPRESSIBILITY (Z_S)						

INTERSTAGE: INTERSTAGE Δ P INCL: ○ 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						
○ PRESS. (PSIA) @ PUL. SUPP. OUTLET	399.11	399.11	214.11	214.11		
☐ TEMP., ADIABATIC, °F	148.4	148.2	173.2	189.8		
☐ TEMP., PREDICTED, °F						
☐ COMPRESSIBILITY (Z_2) OR (Z_{AVG})						

*** REQUIRED CAPACITY,** RATED FOR PROCESS, AT INLET TO COMPRESSOR, NO NEGATIVE TOLERANCE (-0%)

○ LBS/HR CAPACITY SPECIFIED	20,379	20,307	1,442	1,245		
IS ○ WET ○ DRY	WET	WET	DRY	DRY		
○ MMSCFD/SCFM (14.7 PSIA & 60°F)	5.8452	5.8212	5.2817	5.2826		

*** MFGR.'S RATED CAPACITY** (AT INLET TO COMPRESSSOR) & BHP @ CERTIFIED TOLERANCE OF ±3% FOR CAP. & ±3% FOR BHP

◎ LBS/HR CAPACITY SPECIFIED						
IS ○ WET ○ DRY						
◎ ICFM						
◎ MMSCFD/SCFM (14.7 PSIA & 60°F)						
☐ BHP/STAGE						
☐ TOTAL BHP @ COMPRESSOR SHAFT						
☐ TOTAL HP INCLUDING V-BELT & GEAR LOSSES						

*** CAPACITY FOR NNT**

MANUFACTURER'S = REQUIRED ÷ 0.97

THEREFORE REQUIRED = MFR'S x 0.97

REMARKS: 1. Suction bottles, scrubber, recycle valve and tubeside of recycle cooler shall have material of construction of 304 stainless steel including interconnecting piping. 1

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GAS ANALYSIS AT OPERATING CONDITIONS
MOLE % (BY VOLUME) ONLY

○ SERVICE/ITEM NO.			PK-592	PK-592	PK-592	PK-592
○ STAGE			1	1	1	1
○ NORMAL OR ALT			NORM. 1	NORM. 2	ALT. WR	ALT. R
		M.W.				
WATER VAPOR		18.015	0.332	0.331	0.000	0.000
HYDROGEN	H_2	2.016	8.065	7.227	97.398	99.494
NITROGEN	N_2	28.013	22.427	22.096	0.512	0.506
CARBON MONOX.	CO	28.010	6.558	9.498	0.000	
ARBON	Ar	39.948	0.960	0.943	0.000	
OXYGEN	O_2	31.999	0.000	0.000	0.000	
METHANE	CH_4	16.042	14.000	15.421	1.920	
ETHYLENE	C_2H_4	28.053	0.013	0.015	0.000	
ETHANE	C_2H_6	30.069	0.235	0.265	0.060	
CARBON DIOXIDE	CO_2	44.010	42.849	42.635	0.000	
PROPYLENE	C_3H_6	42.08	0.179	0.166	0.000	
PROPANE	C_3H_8	44.096	0.235	2.170	0.070	
I-BUTANE	C_4H_{10}	58.122	0.000	0.000	0.000	
1-BUTENE	C_4H_8	56.106	0.158	0.169	0.000	
n-BUTANE	C_4H_{10}	58.122	0.243	0.259	0.040	
I-PENTANE	C_5H_{12}	72.149	0.000	0.000		
1-PENTENE	C_5H_{10}	70.133	0.123	0.127		
n-PENTANE	C_5H_{12}	72.149	0.226	0.232		
HEXANE PLUS	C_6+		0.353	0.400		
ALCOHOLS			0.043	0.048		
ORGANIC ACIDS			0.001	0.001		
TOTAL			100.000	100.000	100.000	100.000
☐ CALCULATED MOL WT.			31.752	31.771	2.487	2.147
☐ Cp/Cv (K) @ 150° OR 100 °F			1.390	1.390	1.400	1.410

NOTE: IF WATER VAPOR AND/OR CHLORIDES ARE PRESENT, EVEN MINUTE TRACES, IN THE GAS BEING COMPRESS'D, IT MUST BE INCLU'D ABOVE.

REMARKS

APPLICABLE SPECIFICATIONS

- ○ API-618-RECIPROCATING COMPRESSORS FOR PETROLEUM, CHEMICAL AND GAS INDUSTRY SERVICES
- ○ NACE MR-O175 (2.14.1.10)
- ○
- ○
- ○
- ○
- ○
- ○
- ○
- ○

○ SITE/LOCATION CONDITIONS

ELEVATION 1155 FT. BAROMETER 14.11 PSIA AMBIENT TEMPS: MAX 100 °F MIN 0 °F

○ MIN DESIGN METAL TEMP -20 °F (2.14.8) RELATIVE HUMIDITY: MAX 100 % MIN 30 %

COMPRESSOR LOCATION: ○ INDOOR ○ HEATED ○ UNHEATED ○ AT GRADE LEVEL ○ ELEVATED: FT.

● OUTDOOR ○ NO ROOF ○ UNDER ROOF ○ PARTIAL SIDES ○ PLATFORM: ○ ON-SHORE

○ OFF-SHORE ○ WEATHER PROTECTION REQ. ○ TROPICALIZATION REQ.

○ WINTERIZATION REQUIRED

UNUSUAL CONDITIONS: ○ CORROSIVES ○ DUST ○ FUMES ● OTHER ORGANIC ACIDS

ELECTRICAL CLASSIFICATIONS

	HAZARDOUS						NON-HAZRDOUS
MAIN UNIT	●	CLASS 1	GROUP C & D	DIVISION 2			○
L.O. CONSOLE	○	CLASS	GROUP	DIVISION			○
CW CONSOLE	○	CLASS	GROUP	DIVISION			○

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PART LOAD OPERATING CONDITIONS

CAPACITY CONTROL BY: ● MFG'S CAP. CONTROL ○ PURCHASERS BY-PASS ○ BOTH ● OTHER **AUTO RECYCLE VALVE** — 1
FOR: ○ PART LOAD COND. ○ START-UP ONLY ● BOTH
WITH: ○ AUTO LOADING DELAY INTERLOCK (3.6.2.2) ○ AUTO IMMEDIATE UNLOADING
USING: ○ FIXED VOLUME POCK. ● SUCTION VALVE UNLOADERS: ○ FINGER ○ PLUG ○ OTHER — 1
ACTION: ○ DIRECT (AIR-TO-UNLOAD) ○ REVERSE (AIR-TO-LOAD/FAIL SAFE)
NUMBER OF STEPS: ○ ONE ○ THREE ○ FIVE ○ OTHER _____
○ RAIN COVER REQUIRED OVER UNLOADERS

ALL UNLOADING STEPS BASIS MANUFACTURERS CAPACITY SHOWN ON PAGE 1.

INLET AND DISCHARGE PRESSURE ARE ○ **AT CYLINDER FLANGES** ○ **PULSATION SUPPRESSOR FLANGES**

○ SERVICE OR ITEM NO.						
◎ STAGE						
◎ NORMAL OR ALTERNATE CONDITION						
○ PERCENT CAPACITY						
○ WEIGHT FLOW, LBS/HR						
◎ MMSCFD/SCFM (14.7 PSIA & 60°F)						
☐ POCKETS/VALVES OPERATION *						
☐ POCKET CLEARANCE ADDED %						
☐ TYPE UNLOADERS, PLUG/FINGER						
◎ INLET TEMPERATURE, °F						
◎ INLET PRESSURE, PSIA						
◎ DISCHARGE PRESSURE, PSIA						
☐ DISCHARGE TEMP., ADIABATIC °F						
☐ DISCHARGE TEMP., PREDICTED °F						
☐ VOLUMETRIC EFF.,%HE/%CE	/	/	/	/	/	/
☐ CALC. GAS ROD LOAD, LBS, C **						
☐ CALC. GAS ROD LOAD, LBS, T **						
◇ COMB. ROD LOAD, LBS C (GAS & INERTIA)						
◇ COMB. ROD LOAD, LBS T (GAS & INERTIA)						
◇ ROD REV., DEGREES MIN @ X-HD PIN ***						
☐ BHP/STAGE						
☐ TOTAL BHP @ COMPRESSOR SHAFT						
☐ TOTAL HP INCL. V-BELT & GEAR LOSSES						

* SHOW OPERATION WITH THE FOLLOWING SYMBOLS:

HEAD END = HE
OR } PLUS
CRANK END = CE

SUCTION VALVE(S) UNLOADED = S
OR
FIXED POCKET OPEN = F
OR
VARIABLE POCKET OPEN = V

EXAMPLE: HE-F/CE-S = HEAD END FIXED POCKET OPEN / CRANK END SUCTION VALVE(S) UNLOADED.

* * C = COMPRESSION T = TENSION *** X - HD = CROSSHEAD

☐ MINIMUM PRESSURE REQUIRED TO OPERATE CYLINDER UNLOADING DEVICES, _____ PSIG

CYLINDER UNLOADING MEDIUM: ● AIR ○ NITROGEN ○ OTHER _____

○ PRESSURE AVAILABLE FOR CYLINDER UNLOADING DEVICES, MAX/MIN _____ / _____ PSIG

REMARKS, SPECIAL REQUIREMENTS, AND/OR SKETCH

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SCOPE OF BASIC SUPPLY

PURCHASER TO FILL IN (☐ ○ ⬡) AFTER COMMODITY TO INDICATE: ☐ BY COMPR. MFR. ○ BY PURCH. ⬡ BY OTHERS

● DRIVER (■ ○ ⬡): VARIABLE SPEED SPEED RANGE _____ RPM TO _____ RPM _____
● INDUCTION MOTOR ○ SYNCHRONOUS MOTOR ○ STEAM TURBINE ○ ENGINE ○ OTHER _____
○ API-541 ○ API-546 ○ API-611 ○ API-612
○ OUTBOARD BEARING ○ PROVISION FOR DRY AIR PURGE FOR OUTBOARD BEARING.
○ SLIDE BASE FOR DRIVER (☐ ○ ⬡) ● SOLE PLATE FOR DRIVER (■ ○ ⬡)
● MOTOR STARTING EQUIPMENT (☐ ● ⬡); DEFINE _____
○ GEAR (☐ ○ ⬡): ○ BASEPLATE FOR GEAR ○ API-613 ○ API-677
● COUPLING(S) (■ ○ ⬡): ○ LOW SPD. ○ HI-SPD. ○ QUILL SHAFT ○ KEY-LESS DRV. ○ KEY'D DRV. ○ OTHER _____
○ API 671
○ V-BELT DRIVE (☐ ○ ⬡): ○ SHEAVES & V-BELTS (☐ ○ ⬡) ○ STATIC CONDUCTING V-BELTS ○ BANDED V-BELTS
● DRIVE GUARD(S) (☐ ○ ⬡): ○ MANUFACTURER'S STD. ● NON-SPARKING ○ CALIF CODE ○ API-671 APPENDIX C
○ OTHER _____

● PULSATION SUPPRESSORS WITH INTERNALS (■ ○ ⬡): ● INITIAL INLET & FINAL DISCHARGE ● SUPPORTS (■ ○ ⬡)
○ INTERSTAGE ○ SUPPORTS (☐ ○ ⬡)
○ PULSATION SUPPRESSORS WITHOUT INTRNL (☐ ○ ⬡): ○ INITIAL INLET & FINAL DISCHARGE ○ SUPPORTS (☐ ○ ⬡)
○ INTERSTAGE ○ SUPPORTS (☐ ○ ⬡)
● SUPPRESSOR(S) TO HAVE MOISTURE REMOVAL SECTION: ● INITIAL INLET ONLY ○ ALL INLET SUPPI _____
● ACOUSTICAL SIMUL. STUDY (■ ○ ⬡): DESIGN APPROACH (Check Only One)
● DIGITAL ⊘ ANALOG
○ 1, W/SIMPLIFIED ANALYSIS OF PIPING SYSTEM
○ 2, SEE 3.9.2.1 AND APPENDIX M
○ 3, SEE 3.9.2.1 AND APPENDIX M
NOTE: SEE APPENDIX N FOR INFORMATION REQUIRED FOR STUDY
STUDY TO CONSIDER: ALL SPECIFIED LOAD COND., INCL. ○ SINGLE ACT., PLUS
○ COMP.OPER.IN PARALLEL ○ ALTERNATE GASES
○ WITH EXISTING COMP. AND PIPING SYSTEMS
○ STUDY TO BE WITNESSED ● COMPRESSOR VALVE DYNAMIC RESPONSE
● VENDOR REVIEW OF PURCHASER'S PIPING ARRANGEMENT ○ PULSATION SUPRESS'N DEVICE LOW CYCLE FATIGUE ANALYSIS
● PIPING SYSTEM FLEXIBILITY

PACKAGED: ○ NO ● YES (■ ○ ⬡) DEFINE BASIC SCOPE OF PACKAGING IN REMARKS SECTION, PAGE 5
● SKID ○ SOLEPLT. ○ BASEPLT. ○ BOLTS OR STUDS FOR SOLEPLT. TO FRAME ○ RAILS ○ CHOCK BLOCKS ○ SHIMS
○ SUITABLE FOR COLUMN MOUNTING (UNDER SKID AND/OR BASEPLATE)
● LEVELING SCREWS ○ NON-SKID DECKING ○ SUB SOLEPLATES
○ DIRECT GROUTED ● CEMENTED/MORTAR GROUT ○ EPOXY GROUT; MFG/TYPE _____ / _____
● BYPASS CLR(S) (■ ○ ⬡) ● SEPARATOR(S) (■ ○ ⬡) ○ AFTERCLR(S) (☐ ○ ⬡) **BY-PASS COOLER:**
○ INTERSTAGE PIP. (☐ ○ ⬡): ○ PIPING MATCHMARKED ○ SHOP FITTED ● MACHINE MTD.
○ CONDENSATE SEPARATION & COLLECTION FACILITY SYSTEM PER 3.8.12 ○ OFF MOUNTED
● INLET STRAINER(S) (■ ○ ⬡): ● INITIAL INLET ○ SIDESTREAM INLET ● SPOOL PIECE FOR INLET STRAINERS
● MANIFOLD PIPING; ● DRAINS ● VENTS ○ RELIEF VALVES ● AIR/GAS SUPPLY **FLANGE FINISH**
● RELIEF VALVE(S) (☐ ● ⬡): ○ INITIAL INLET ○ INTERSTAGE ● FINAL DISCHARGE ○ API-618 FLANGE FINISH 1
○ RUPTURE DISC(S) (☐ ○ ⬡) ○ THRU STUDS IN PIPING FLANGES REF 3.9.3.15 > 125 < 250
● CRANKCASE RAPID PRESSURE RELIEF DEVICE(S) (■ ○ ⬡) ○ FLANGE _____
○ SPECIAL PIPING REQUIREMENTS PER 3.7.1.12.24. (DEFINE IN REMARKS SECTION NEXT PAGE) ○ SPECIAL FINISH _____

○ INITIAL INLET, ○ INTERSTAGE SUCTION PIPING ARR'D FOR: ○ INSULATION (☐ ○ ⬡) ○ HEAT TRACING (☐ ○ ⬡)
○ FOR ATMOSPHERIC INLET AIR COMPR. ONLY: ○ INLET AIR FILTER (☐ ○ ⬡) ○ INLET FILTER -SILENCER (☐ ○ ⬡)
○ PREFERRED TYPE OF CYLINDER COOLING (☐ ○ ⬡): ○ FORCED ○ THERMOSYPHON _____ STAGE CYL'(S) 1
NOTE: MANUFACTURER SHALL RECOMMEND BEST TYPE OF COOLING AFTER FINAL ENGINEERING REVIEW OF ALL OPERATING CONDITIONS
○ STATIC (STAND-PIPE) _____ STAGE CYL'(S)
○ CYL. COOLING WATER PIPING (☐ ○ ⬡) ○ MATCH M'RKED 1
○ SINGLE INLET/OUTLET MANIFOLD & VALVES ○ SIGHT GL'SS(ES) 1
○ INDIVIDUAL INLET/ OUTLET PER CYL. ○ VALVE(S)
○ CLOSED SYS. WITH WATER PUMP, C00LER, SURGE TANK, & PIPING
○ SHOP RUN ○ ARR'D FOR HEATING JACKET AS WELL AS COOLING

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○ **SCOPE OF BASIC SUPPLY (Con't)**

○ SEPARATE COOLING CONSOLE (□ ○ ⬡): ○ ONE FOR EA. UNIT ○ ONE CMMN TO ALL UNITS ○ DUAL PUMPS (AUX .& MAIN)
○ ARRANGED FOR HEATING JACKET WATER AS WELL AS COOLING

● FRAME LUBE OIL SYSTEM (■ ○ ⬡): ● AUX. PUMP ● DUAL FILTERS WITH TRANSFER VALVE ● SHOP RUN
● CONTINUOUS FLOW IN SENSING LINE TO PRESSURE SWITCHES

○ SEPARATE LUBE OIL CONSOLE (□ ○ ⬡): ○ EXTENDED TO MOTOR OUTBOARD BEARING ○ SHOP RUN
API 614 APPLIES (REFER TO NOTE OF 2.12.2) ○ NO ○ YES

NOTE: PIPING BETWEEN ALL CONSOLES AND COMPRESSOR UNIT BY PURCHASER

● CAPACITY CONTROL (■ ○ ⬡): ○ SEE DATA SHEET PAGE 3 FOR DETAILS ● IN INSTRUMENT & CONTROL PANEL
○ SEPARATE MACHINE MOUNTED PANEL ○ SEPARATE FREE STANDING PANEL 1
○ PNEUMATIC ● ELECTRIC ○ ELECTRONIC ○ HYDRAULIC
● PROGRAMMABLE CONTROLLER

● INSTRUMENT & CONTROL PANEL (■ ○ ⬡): ● ONE FOR EACH UNIT ○ ONE COMMON TO ALL UNITS
● MACHINE MOUNTED ○ FREE STANDING (OFF UNIT) 1

SEE INSTRUMENTATION DATA SHEETS FOR DETAILS OF PANEL, ADDITIONAL REMARKS, AND INSTRUMENTATION.

NOTE: ~~ALL TUBING, WIRING, & CONNECTIONS BETWEEN OFF-UNIT FREE STANDING PANELS AND COMPRESSOR UNIT BY PURCHASER.~~ 1

1

● HEATERS (■ ○ ⬡): ● FRAME LUBE OIL ○ CYL. LUBRICATORS ○ COOLING WATER ● DRIVER(S) ○ GEAR OIL
● ELECTRIC ○ STEAM

● BARRING DEVICE (■ ○ ⬡): ● MANUAL ○ PNEUMATIC ○ ELECTRIC ● FLYWHEEL LOCKING DEVICE (■ ○ ⬡)
○ ROD PRESSURE PACKING COOLING SYSTEM (□ ○ ⬡): ○ SEPARATE CONSOLE ○ FILTERS
○ SPECIAL CORROSION PROTECTION: ○ NO ○ YES ○ MFR'S STANDARD ○ OTHER
○ HYDRAULIC TENSIONING TOOLS ○ NO ○ YES
● MECHANICAL RUN TEST: ○ NO ○ YES ● MFG'S STANDARD ● OTHER **MANUAL BAR-OVER TEST**
○ COMPLETE SHOP RUN TEST OF ALL MACHINE MOUNTED EQUIPMENT, PIPING & APPURT.'(S)

PAINTING: ● MANUFACTURER'S STANDARD ○ SPECIAL
NAMEPLATES: ● U.S. CUSTOMARY UNITS ○ SI UNITS
SHIPMENT: ● DOMESTIC ○ EXPORT ○ EXPORT BOXING REQUIRED (□ ○ ⬡)
● STANDARD 6 MONTH STORAGE PREPARATION (■ ○ ⬡), PER SPEC
○ OUTDOOR STORAGE FOR OVER 6 MONTHS (□ ○ ⬡), PER SPEC
● INITIAL INSTALLATION AND OPERATING TEMP ALIGNMENT CHECK AT JOBSITE BY VENDOR REPRESENTATIVE

○ COMPRESSOR MANUFACTURER'S USER'S LIST FOR SIMILAR SERVICE
● PERFORMANCE DATA REQUIRED PER 5.3.3: ● BHP VS. SUCTION PRESSURE CURVES
● ROD LOAD/GAS LOAD CHARTS
● VALVE FAILURE DATA CHARTED
○ SPEED/TORQUE CURVE DATA
● BHP VS. CAPACITY PERFORMANCE CURVES OR TABLES REQUIRED FOR UNLOADING STEPS AND/OR VARIABLE SUCTION/DISCHARGE PRESSURES

REMARKS:

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UTILITY CONDITIONS

	AC VOLTS	PHASE	HERTZ	DC VOLTS		AC VOLTS	PHASE	HERTZ	DC VOLTS	Revision
MAIN DRIVER	460	3	60		INSTRUMENT					1
AUXILIARY MOTORS	460	3	60		ALARM & SHTDWN					1
HEATERS	120	3	60							

INSTRUMENT AIR: NORMAL PRESSURE ____ PSIG MAX/MIN 125 / 70 PSIG

STEAM FOR: DRIVERS

INLET: PRESS ____ PSIG MAX/MIN ____ / ____ PSIG

(NORM.) TEMP ____ °F MAX/MIN ____ / ____ °F

EXH'ST: PRESS ____ PSIG MAX/MIN ____ / ____ PSIG

(NORM.) TEMP ____ °F MAX/MIN ____ / ____ °F

HEATERS

INLET: PRESS ____ PSIG MAX/MIN ____ / ____ PSIG

(NORM.) TEMP ____ °F MAX/MIN ____ / ____ °F

EXH'ST:PRESS ____ PSIG MAX/MIN ____ / ____ PSIG

(NORM.) TEMP ____ °F MAX/MIN ____ / ____ °F

COOLING WATER **COMPRESSOR CYLINDERS**

TYPE WATER ____

SUPP.: PRESS ____ PSIG MAX/MIN ____ / ____ PSIG

(NORM.) TEMP ____ °F MAX/MIN ____ / ____ °F

R'T'RN: PRESS ____ PSIG MAX/MIN ____ / ____ PSIG

(NORM.) TEMP ____ °F MAX/MIN ____ / ____ °F

COOLERS

TYPE WATER ____

SUPP.: PRESS 50 PSIG MAX/MIN ____ PSIG

(NORM.) TEMP 85 °F MAX/MIN ____ / ____ °F

R'T'RN: PRESS 40 PSIG MAX/MIN ____ / ____ PSIG

(NORM.) TEMP ____ °F MAX/MIN 110 / ____ °F

COOLING FOR ROD PACKING:

TYPE FLUID ____ SUPPLY PRESS ____ PSIG @ ____ °F RETURN ____ PSIG @ ____ °F

FUEL GAS: NORMAL PRESSURE ____ PSIG MAX/MIN ____ / ____ PSIG LHV ____ BTU/FT ^{3}

COMPOSITION ____

REMARKS/SPECIAL REQUIREMENTS: **Nitrogen: 125 psig Max. / 70 psig Min.**

TURBINE, PUMP AND COMPRESSOR

3203 LILAC ST., PASADENA, TX 77505

RECIPROCATING COMPRESSOR (API 618-4TH) DATA SHEET U.S. CUSTOMARY UNITS

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1	○ CYLINDER DATA AT FULL LOAD CONDITION							
2	SERVICE/ITEM NO.		CASE 1	CASE 2	ALT 1	ALT 2		
3	STAGE							
4	INLET PRESSURE, PSIA	@ CYLINDER	301.11	301.11	164.11	144.11		
5	DISCHARGE PRESSURE, PSIA	FLANGES	399.11	399.11	214.11	214.11		
6	CYLINDERS PER STAGE		2	2	2	2		
7	SINGLE OR DOUBLE ACTING (SA OR DA)		DA	DA	DA	DA		
8	BORE, INCHES		9.75	9.75	9.75	9.75		
9	STROKE, INCHES		3.5	3.5	3.5	3.5		
10	RPM:	RATED / MAX ALLOW	891 / 1800					
11	PISTON SPEED, FT/MIN:	RATED / MAX ALLOW	520 / 1050					
12	CYLINDER LINER, YES/NO		NO	NO	NO	NO		
13	LINER NOMINAL THICKNESS, INCHES		N/A	N/A	N/A	N/A		
14	PISTON DISPLACEMENT, CFM		263.2	263.2	263.2	263.2		
15	CYLINDER DESIGN CLEARANCE, % AVERAGE		20.36	20.36	20.36	20.36		
16	VOLUMETRIC EFFICIENCY, % AVERAGE		90.7	90.7	91.6	88.8		
17	VALVES, INLET/DISCHARGE, QTY PER CYL.		4 / 4	4 / 4	4 / 4	4 / 4	/	/
18	TYPE OF VALVES		PLATE	PLATE	PLATE	PLATE		
19	VALVE LIFT, INLET/DISCHARGE, INCHES		0.047	0.047	0.047	0.047	/	/
20	VALVE VELOCITY, API 4TH EDITION, FT/MIN							
21	SUCTION VALVE(S)							
22	DISCHARGE VALVE(S)							
23	ROD DIAMETER, INCHES		1.5	1.5	1.5	1.5		
24	MAX ALLOW. COMBINED ROD LOADING, LBS, C *		23000	23000	23000	23000		
25	MAX ALLOW. COMBINED ROD LOADING, LBS, T *		21000	21000	21000	21000		
26	CALCULATED GAS ROD LOAD, LBS, C *		3680	3726	4876	6279		
27	CALCULATED GAS ROD LOAD, LBS, T *		11403	11424	4263	5691		
28	COMBINED ROD LOAD (GAS + INERTIA), LBS, C *		7881	7961	7141	8025		
29	COMBINED ROD LOAD (GAS + INERTIA), LBS, T *		15997	16063	6218	6849		
30	ROD REV., DEGREES MIN @ X-HD PIN**		123	123	156	176		
31	RECIP WT. (PISTON, ROD, X-HD & NUTS), LBS**		107.28	107.28	107.28	107.28		
32	MAX ALLOW. WORKING PRESSURE, PSIG		635	635	635	635		
33	MAX ALLOW. WORKING TEMPERATURE, °F		350	350	350	350		
34	HYDROSTATIC TEST PRESSURE, PSIG		952.5	952.5	952.5	952.5		
35	HELIUM TEST PRESSURE, PSIG		635	635	635	635		
36	INLET FLANGE SIZE/RATING		6 / 300	6 / 300	6 / 300	6 / 300	/	/
37	FACING		FF	FF	FF	FF		
38	DISCHARGE FLANGE SIZE/RATING		6 / 300	6 / 300	6 / 300	6 / 300	/	/
39	FACING		FF	FF	FF	FF		
40	DISCHARGE RELIEF VALVE SETTING DATA AT INLET PRESSURES GIVEN ABOVE:							
41	RECOMMENDED SETTING, PSIA		400	400	240	240		
42	GAS ROD LOAD, LBS, C *		3,680	3703	6831	8211		
43	GAS ROD LOAD, LBS, T *		14,595	14637	6174	7581		
44	COMBINED ROD LOAD, LBS, C *		7,841	7657	8697	9466		
45	COMBINED ROD LOAD, LBS, T *		19,234	19073	7404	8,092		
46	ROD REVERSAL, °MIN @ X-HD PIN**		116	116	175	175		
47	NOTE: CALCULATED AT INLET PRESSURES							
48	GIVEN ABOVE & RECOMMENDED SETTING.							
49	○ SETTLE-OUT GAS PRESSURE							
50	(DATA REQUIRED FOR STARTING)							
51	* C = COMPRESSION * T = TENSION		**X-HD = CROSSHEAD					
52	**NOTES/REMARKS:**							

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◯ CONSTRUCTION FEATURES

SERVICE ITEM NO.						
STAGE						
CYLINDER SIZE (BORE DIA), INCHES						
ROD RUN-OUT: NORMAL COLD VERTICAL (per appendix C)						

MATERIALS OF CONSTRUCTION

CYLINDER(S)						
CYLINDER LINER(S)						
PISTON(S)						
PISTON RINGS						
WEAR BANDS ○ REQUIRED						
PISTON ROD(S): MATERIAL/YIELD, PSI	/	/	/	/	/	/
THREAD ROOT STRESS @ MACRL * @ X-HD END						
PISTON ROD HARDNESS, BASE MATERIAL, Rc						
PISTON ROD COATING ⊗ REQUIRED						
COATING HARDNESS, Rc						
VALVE SEATS / SEAT PLATE						
VALVE SEAT MIN HARDNESS, Rc						
VALVE GUARDS (STOPS)						
VALVE DISCS						
VALVE SPRINGS						
ROD PRESSURE PACKING RINGS						
ROD PRESSURE PACKING CASE						
ROD PRESSURE PACKING SPRINGS						
SEAL / BUFFER PACKING, DISTANCE PIECE						
SEAL / BUFFER PACKING, INTERMEDIATE						
WIPER PACKING RINGS						
MAIN JOURNAL BEARINGS, CRANKSHAFT						
CONNECTING ROD BEARING, CRANKPIN						
CONNECTING ROD BUSHING, X-HD END						
CROSSHEAD (X-HD) PIN BUSHING						
CROSSHEAD PIN						
CROSSHEAD						
CROSSHEAD SHOES						
CYLINDER INDICATOR VALVES (X)						
INDICATOR CONNECTIONS ABOVE 5000 PSI						
FLUOROCARBON SPRAYED CYLINDER (X)						
INSTRUMENTATION IN (X) COLD SIDE						
CONTACT W/PROCESS GAS (X) HOT SIDE						

* MAXIMUM ALLOWABLE COMBINED ROD LOAD

USE (X) IN APPROPRIATE COLUMN WHERE APPLICABLE

● COMPRESSOR CYLINDER ROD PACKING

- ● FULL FLOATING PACKING
- ● VENTED TO: ● FLARE @ _____ PSIG ○ ATMOS.
  - ○ SUCTION PRESSURE @ _____ PSIG
- ○ FORCED LUBRICATED ○ NON-LUBE ○ TFE
- ● WATER COOLED, _____ STAGE(S), _____ GPM REQ'D
- ◯ OIL COOLED, _____ STAGE(S), _____ GPM REQ'D
- ○ WATER FILTER PROV.FUTURE WATER/OIL COOLING
- ● VENT/BUFFER GAS SEAL PACKING ARR. (Ref: Appndx I FIG I-1)
  - ● CONSTANT OR ○ VARIABLE DISPOSAL SYSTEM
  - ○ BUFFER GAS PRESSURE, _____ PSIG
- ○ SPLASH GUARDS FOR WIPER PACKING

DISTANCE PIECE(S): ○ TYPE A ○ TYPE B ● TYPE C ○ TYPE D

Ref: Appendix G, Fig. G-3

COVERS: ● SOLID METAL ○ SCREEN ○ LOUVERED

CYLINDER COMPARTMENT: (Outboard Distance Piece)
- ● VENTED TO _____ PSIG
- ● PURGED AT _____ PSIG
- ○ PRESSURIZED TO _____ PSIG
- ○ WITH RELIEF VALVE

FRAME COMPARTMENT: (Inboard Distance Piece)
- ● VENTED TO _____ PSIG
- ● PURGED AT _____ PSIG
- ○ PRESSURIZED TO _____ PSIG
- ○ WITH RELIEF VALVE

■ DISTANCE PIECE MAWP _____ PSIG

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CONSTRUCTION FEATURES (CONTINUED)

○ FABRICATED CYLINDER, HEADS, & CONNECTION SKETCHES FOR DESIGN REVIEW BY PURCHASER. (2.14.5.2.8)

● COUPLING(S) ○ LOW-SPEED ○ HI-SPEED

	Between Compressor & Driver or Gear	Between Driver & Gear
◇ BY MANUFACTURER		
◇ MODEL		
◇ TYPE		

API-671 APPLIES ○ YES ○ NO

● INSPECTION AND SHOP TESTS (REF. 4.1.3)

	REQ'D	WITN.	OBSER.
*SHOP INSPECTION	●	○	○
ACTUAL RUNNING CLEARANCES AND RECORDS	●	○	○
MFG STANDARD SHOP TESTS	●	○	○
CYLINDER HYDROSTATIC TEST	●	○	○
CYLINDER PNEUMATIC TEST	○	○	○
CYLINDER HELIUM LEAK TEST	●	○	○
CYL. JACKET WATER HYDRO TEST	●	○	○
*MECHANICAL RUN TEST (4 HR)	○	○	○
BAR-OVER TO CHECK ROD RUNOUT	●	○	○
*LUBE OIL CONSOLE RUN/TEST (4 HR)	●	○	○
*COOLING H_2O CONSOLE RUN/TEST	○	○	○
RADIOGRAPHY BUTT WELDS	●	○	○
● GAS ● OIL ○ FAB CYLS. MAG PARTICLE/LIQUID PENETRANT OF WELDS SPECIFY ADDITIONAL REQUIREMENTS (4.2.1.3)	○	○	○
FRAME AND MOVING PARTS	●	○	○
QC OF INACCESSIBLE WELDS (2.14.5.2.4)	○		
SHOP FIT-UP OF PULSATION SUPPL. DEVICES & ALL ASSOCIATED GAS PIPING	●	○	○
*CLEANLINESS OF EQUIP., PIPING, & APPURTENANCES	●	○	○
*HARDNESS OF PARTS, WELDS & HEAT AFFECTED ZONES	○	○	○
*NOTIFICATION TO PURCHASER OF ANY REPAIRS TO MAJOR COMPONENTS	●		
	○	○	○
	○	○	○

*SPECIFIC REQUIREMENTS TO BE DEFINED, FOR EXAMPLE, DISMANTLING, AUX EQUIPMENT OPERATIONAL & RUN TESTS.

APPENDIX K COMPLIANCE: ● VENDOR ○ PURCHASER

● BUFFER GAS PACKING ARR. Ref: Appendix I
○ OIL WIPER PACKING PURGE Figures I-1, I-2 &I-3
○ INTERMEDIATE PARTITION PURGE
INERT BUFFER PURGE GAS: ● N_2 ○ OTHER
● VENT, DRAIN, PURGE PIPING BY MFG'R ○ NO ● YES

☐ V-BELT DRIVE

	DRIVEN SHEAVE (Compressor Shaft)	DRIVE SHEAVE (Driver Shaft)
RPM (EXPECTED)		
PITCH DIA. (Inches)		
◇ QTY & GROOVE X-SEC.		
POWER TRANSMITT'D		Incl. Belt Losses

DRIVER NAMEPLATE HP RATING
◇ CENTER DISTANCE (INCHES)
◇ QTY, TYPE, X-SEC., & LENGTH BELTS
◇ BELT SERVICE FACTOR (RELATIVE TO DRIVER NAMEPLATE HP RATING)

● CYLINDER LUBRICATION
○ NON-LUBE STAGE(S)/SERVICE
● LUBRICATED STAGE(S)/SERVICE
TYPE OF LUBE OIL: ○ SYNTHETIC ○ HYDROCARBON
LUBRICATOR DRIVE BY: ■ COMP. CRANKSHAFT, DIRECT ☐ CHAIN, FROM CRANKSHAFT ◎ ELECTRIC MOTOR ◎ OTHER
◇ LUBRICATOR MFR ◇ MODEL
TYPE LUBRICATOR: (2.13) ○ SINGLE PLUNGER PER POINT ○ DIVIDER BLOCKS
◈ COMPARTM'T, TOTAL QTY.
◈ PLUNGERS (PUMPS), TOTAL QTY.
◈ SPARE PLUNGERS, QTY.
◈ SPARE COMPARTM'T W/OUT PLUNGERS
○ HEATERS: ○ ELECTRIC W/THERM.(S) ○ STEAM

■ ESTIMATED WEIGHTS AND NOMINAL DIMENSI

■ TOTAL COMPR. WT, LESS DRIVER & GEAR			LBS
◇ WT, OF COMPLETE UNIT, (LESS CONSOLES)			LBS
◇ MAXIMUM ERECTION WEIGHT			LBS
◇ MAXIMUM MAINTENANCE WEIGHT			LBS
◇ DRIVER WEIGHT/GEAR WEIGHT		/	LBS
◇ LUBE OIL/COOLING H_2O CONS.		/	LBS
◇ FREE STANDING PANEL			

SPACE REQUIREMENTS-FEET:	LENGTH	WIDTH	HEIGHT
◇ COMPLETE UNIT			
◇ LUBE OIL CONSOLE			
◇ COOLING H_2O CONSOLE			
◇ FREE STANDING PANEL			

■ PISTON ROD REMOVAL DIST.

OTHER EQUIPMENT SHIPPED LOOSE (DEFINE)
◇ PULSATION SUPP., WEIGHT LBS
◇ PIPING LBS
◇ INTERSTAGE EQUIPMENT LBS

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☐ **UTILITY CONSUMPTION**

ELECTRIC MOTORS

	NAMEPLATE HP	LOCKED ROTOR AMPS	FULL LOAD STEADY STATE AMPS	MAIN DRIVER NON-STEADY STATE AMPS AT COMPRESSOR RATED HORSEPOWER (Induction Motors Only)
◇ MAIN DRIVER (For Induction Motors See Note of 3.1.2.5 and Motor Data Sheet)				AMPS
◇ MAIN LUBE OIL PUMP				@ COMPRESSOR RATED HP OF
◇ AUX LUBE OIL PUMP				
◇ MAIN COOLING WATER PUMP				@ CURRENT PULSATIONS OF %
◇ AUX COOLING WATER PUMP				
◇ ROD PACKING COOLING PUMP				
◇ CYLINDER LUBRICATOR				

ELECTRIC HEATERS

	WATTS	VOLTS	HERTZ
◇ FRAME OIL HEATER(S)			
◇ COOLING WATER HEATER(S)			
◇ CYL. LUBRICATOR HEATER(S)			
◇ **MAIN DRIVER**			

1

STEAM

	FLOW		PRESSURE		TEMPERATURE		BACK PRESSURE	
◇ MAIN DRIVER		LBS/HR @		PSIG		°FTT TO		PSIG
◇ FRAME OIL HEATER(S)		LBS/HR @		PSIG		°FTT TO		PSIG
◇ CYL. LUB. HEATER(S)		LBS/HR @		PSIG		°FTT TO		PSIG
		LBS/HR @		PSIG		°FTT TO		PSIG
		LBS/HR @		PSIG		°FTT TO		PSIG

COOLING WATER REQUIREMENTS

	FLOW GPM	INLET TEMP °F	OUTLET TEMP °F	INLET PRESS PSIG	OUTLET PRESS PSIG	MAX PRESS PSIG
☐ CYLINDER JACKETS						
◇ INTERCOOLER(S)						
◇ AFTERCOOLER						
◇ FRAME LUBE OIL COOLER						
◇ ROD PRESSURE PACKING*						
◇ TOTAL QUANTITY, GPM						

1

REMARKS/SPECIAL REQUIREMENTS:

*ROD PACKING COOLANT MAY BE OTHER THAN WATER

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○ **FRAME LUBE OIL SYSTEM**

● **BASIC LUBE OIL SYSTEM FOR FRAME:** ○ SPLASH ● PRESSURE (FORCED) ● HEATERS REQUIRED:
☐ REF: TYPE MAIN BEARINGS: ○ TAP'RD ROLL'R ○ PRECISION SL'VE ● ELEC. W/THERMOSTAT(S) ○ STEAM
● **PRESSURE SYSTEM:** ● MAIN OIL PUMP DRIVEN BY: ● COMP. CRANKSHAFT ○ ELEC. MOTOR ○ OTHER _____
☐ PSV FOR MAIN PUMP EXTERNAL TO CRANKCASE _____
● AUX OIL PUMP DRIVEN BY: ● ELEC. MOTOR ○ OTHER _____
☐ HAND OPERATED PRE-LUBE PUMP FOR STARTING ○ OPERATIONAL TEST & 4 HOUR MECH RUN TEST
○ API-614 LUBE SYSTEM: ○ NO ○ YES (See Note of 2.12.2) ○ CHECK VALVE ON MAIN PUMP (FIG G-5)
○ CONTINUOUS FLOW THROUGH OIL (3.7.2.7)

○ **SEP. CONSOLE FOR PRESS. LUBE SYS:** ○ ONE CONSOLE FOR EA. COMP. ○ ONE CONSOLE FOR _____ COMPRESSORS
Note: Instrumentation to be listed on Instrumentation Data Sheets.
○ CONSOLE TO BE OF DECK PLATE TYPE CONSTRUCTION SUITABLE FOR MULTI-POINT SUPPORT AND GROUTING WITH GROUT & VENT HOLES.
○ ELECTRICAL CLASSIFICATION : CLASS _____, GROUP _____, DIV _____ ○ NON-HAZARDOUS

● **BASIC SYS. REQ'MTS (NORM. OIL FLOWS & VOLUMES)**

☐ LUBE OIL	FLOW GPM	PRESSURE PSIG	VISCOSITY SSU @ 100°F	VISCOSITY SSU @ 210°F	SUMP VOLUME GALLONS
☐ COMPRESSOR FRAME					
◇ DRIVER					
◇ GEAR					

☐ SYSTEM PRESSURES: ☐ DESIGN _____ PSIG ☐ HYDROTEST _____ PSIG
☐ PRESSURE CONTROL VALVE SETTING _____ PSIG ☐ PUMP REL'F VALVE(S) SET _____ PSIG

● **PIPING MATERIALS:**

	CARBON STEEL	STAINLESS STEEL WITH SS FLANGES	STAINLESS STEEL WITH CARBON STEEL FLANGES
● UPSTREAM OF PUMPS & FILTERS	●	○	○
● DOWNSTREAM OF FILTERS	○	●	○
○ _____	○	○	○
○ _____	○	○	○

● **PUMPS** (Gear or Screw Type Only)

	◇ RAT'D FL'W GPM	◇ PRESSURE PSIG	◇ COLD START REQ'D BHP	◇ DRIVER HP	◇ SPEED RPM	COUPLING REQ'D	MECH. SEAL REQ'D
MAIN						○	○
AUXILIARY						○	○

☐ PUMP CASING MATERIAL (Ref. 2.12.3.1): MAIN PUMP _____ AUX PUMP _____
● GUARD(S) REQ. FOR COUPLING(S): ○ MAIN PUMP ● AUX PUMP ● GUARD TYPE OR CODE **Non-spark**
● AUXILIARY PUMP CONTROL: ○ MANUAL ● AUTOMATIC ● ON-OFF-AUTO SEL. SWITCH: ○ BY PURCH. ● BY MFR.
● WIRING TO TERMINAL BOX: ○ BY PURCH. ● BY MFR.
● SWITCHES ○ RTD'S/THERMOCOUPLES

● **COOLERS:** ● SHELL & TUBE ○ SINGLE ○ DUAL W/TRANSFER VALVE ○ MFG'S STD. ○ TEMA C ○ TEMA R (API-660 Data Shts Attached)
○ REMOVABLE BUNDLE ● WATER COOLED ○ AIR COOLED W/AUTO TEMP CONTROL (API-661 Data Shts - Attached)
● W/BYPASS & TEMP CONTROL VALVE: ○ MANUAL ● AUTO ○ SEE SEPARATE HEAT EXCHANGER DATA SHT
FOR DETAILS SPECIFY % GLYCOL ON COOLING

● **FILTER(S)** ○ SINGLE ● DUAL W/TRANSFER VALVE ○ ASME CODE DESIGN ○ ASME CODE STAMPED
☐ DESIGN PRESSURE, _____ PSIG ☐ Δ P CLEAN, _____ PSI ☐ Δ P COLLAPSE, _____ PSI
☐ MICRON RATING, _____ ☐ CARTRIDGE MATERIAL, _____ ◇ CARTRIDGE P/N _____
☐ BONNET MATERIAL, _____ ☐ CASING MATERIAL, _____ ● FURN.SPARE CARTR.,QTY _____

● **SYS. COMPONENT SUPP.**

	MANUFACTURER	MODEL		MANUFACTURER	MODEL
◇ MAIN PUMP			◇ OIL COOLER(S)		
◇ AUXILIARY PUMP			◇ TRANSFER VALVE(S)		
◇ MECHANICAL SEALS			◇ PUMP COUPLING(S)		
◇ ELECTRIC MOTORS			◇ SUCTION STRAINER(S)		
◇ STEAM TURBINES			◇ CHECK VALVE(S)		
◇ OIL FILTER(S)			◇		

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COOLING WATER SYSTEM

BASIC COOLING SYS. FOR: ○ COMPRESSOR CYL.(S) ● BY-PASS COOLER(S) ○ AFTERCOOLER ● OIL COOLER(S) — 1
○ HEATERS REQ.'D FOR PRE-HEATING: ○ ELEC.,W/ THERMOSTAT(S) ○ STEAM

PRESSURE FORCED CIRCULATING SYS: ● OPEN, PIPING BY: ● PURCH. ○ MFR ○ CLOSED, PIPING BY MFR.

MAIN WATER PUMP DRIVEN BY: ○ ELEC. MOTOR ○ STEAM TURBINE ○ OTHER _____

AUX WATER PUMP DRIVEN BY: ○ ELEC. MOTOR ○ STEAM TURBINE ○ OTHER _____

○ **SEP. CONSOLE FOR COOLING WATER SYS.:** ○ ONE CONSOLE FOR EA. COMP. ○ ONE CONSOLE FOR _____ COMP'RS

NOTE: Instrumentation to be Listed on Instrumentation Data Sheets

○ CONSOLE TO BE OF DECK PLATE TYPE CONSTRUCTION SUITABLE FOR MULTI-POINT SUPPORT AND GROUTING WITH GROUT & VENT HOLES.

● ELECTRICAL CLASSIFICATION : CLASS 1 , GROUP C & D , DIV 2 ○ NON-HAZARDOUS

● **BASIC SYS. REQ'MTS (NORM. COOLING WATER FLOW DATA)** ○ COOL'G WATER TO BE _____ % ETHYL'NE GLYC'L

	FORCED COOL'G	THERMO SYPHON	STAND PIPE	FLOW GPM	PRESSURE PSIG	INLET TEMP °F	OUTLET TEMP °F	SITE FLOW IND'TR	
CYLINDER(S), ___ STAGE	○	○	○					○	1
CYLINDER(S), ___ STAGE	○	○	○					○	
CYLINDER(S), ___ STAGE	○	○	○					○	
CYLINDER(S), ___ STAGE	○	○	○					○	
CYLINDER(S), ___ STAGE	○	○	○					○	
CYLINDER(S), ___ STAGE	○	○	○					○	
PISTON ROD PACK'G TOTAL	○							○	
INTERCOOLER(S) TOTAL	○							○	
AFTERCOOLER	○							○	
OIL COOLER(S)	●							●	
BY-PASS COOLER	●							●	
TOTAL FLOW									

□ **SYS. PRESSURES:** □ DESIGN, _____ PSIG □ HYDROTEST, _____ PSIG ○ RELIEF VALVE(S), SETTING _____ PSIG

○ **WATER RESERVOIR:** ◇ SIZE, _____ FT IN DIA X _____ FT IN HT. ◇ CAPACITY _____ GALLONS @ Normal Operating Level

◇ RESERVOIR MATERIAL ◇ INTERNAL COATING, TYPE _____

○ LEVEL GAUGE ○ LEVEL SWITCH ○ DRAIN VALVE ○ INSPECTION & CLEAN-OUT OPENINGS

□ **PUMPS: (Centrifugal Only)**

	◇ RAT'D FL'W GPM	◇ PRESS. PSIG.	◇ REQ'D BHP	◇ DRIVER HP	◇ SPEED RPM	COUPLING REQ'D	MECH.SEAL REQ'D
MAIN						○	○
AUXILIARY						○	○

□ PUMP CASING MATERIAL (Ref 2.12.3.1): MAIN PUMP _____ AUX PUMP _____

○ GUARD(S) REQ.'D FOR COUP'G(S) ○ MAIN PUMP ○ AUX PUMP ○ GUARD TYPE OR CODE _____

○ AUX.PUMP CONTROL: ○ MANUAL ○ AUTO ○ ON-OFF-AUTO SEL. SWITCH: ○ BY PURCH. ○ BY I _____

○ WIRING TO TERMINAL BOX: ○ BY PURCH. ○ BY MANUFACTURER

○ **COOLING WATER HEAT EXCH.:** ○ SHELL & TUBE ○ SINGLE ○ DUAL W/TRANSFER VALVE ○ TEMA C ○ _____ Data Shts Attached)

○ AIR COOLED EXCHANGER W/AUTO TEMP CONTROL (API-661 Data Sheets Attached)

○ W/BYPASS & TEM. CONTROL VALVE ○ MANUAL ○ AUTO ○ LOUVERS FOR AIR EXCH.

○ SEE SEPARATE COOLER DATA SHEET FOR DETAILS; SPECIFY % GLYCOL ON BOTH SIDES OF SHELL & TUBE

SYS. COMPONENT SUPP.

	MANUFACTURER	MODEL		MANUFACTURER	MODEL
◇ MAIN PUMP			◇ TEMP CONTROL VALVE(S)		
◇ AUXILIARY PUMP			◇ TRANSFER VALVE(S)		
◇ MECHANICAL SEALS			◇ PUMP COUPLING(S)		
◇ ELECTRIC MOTORS			◇		
◇ STEAM TURBINES			◇		
◇			◇		
◇			◇		

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PULSATION SUPPRESSION DEVICES FOR RECIPROCATING COMPRESSORS

THESE SHEETS TO BE FILLED OUT FOR EACH SERVICE AND/OR STAGE OF COMPRESSION

APPLICABLE TO: ○ PROPOSALS ● PURCHASE ○ AS BUILT

FOR/USER **GTL Joint Venture, LLC**

SITE/LOCATION **Oklahoma City, OK** AMBIENT TEMPERATURE MIN/MAX **0** / **100** °F

COMPRESSOR SERVICE **Tail Gas Recycle Compressor Package** NUMBER OF COMPRESSORS **1**

COMPRESSOR MFG. MODEL/TYPE

SUPPRESSOR MFG.

NOTE: ○ Ind.Data Comp.'d Purch. ☐ By Compr/Supp.Mfg.w/Proposal ◇ By Mfg(s) after order ◎ By Mfg(s)/Purchaser as Applicable

GENERAL INFORMATION APPLICABLE TO ALL SUPPRESSORS

TOTAL NUMBER OF SERVICES AND/OR STAGES

TOTAL NUMBER OF COMPRESSOR CYL. TOTAL NUMBER OF CRANKTHROWS STROKE IN. RPM

● ASME CODE STAMP ○ GOVERNMENTAL CODES OF CODE REGULATIONS APPLY

○ OTHER APPLICABLE PRESSURE VESSEL SPEC. OR CODE

● LUBE SERVICE ○ NON-LUBE SERV. ○ NO OIL ALLOWED INTERNALLY DRY TYPE INTER.CORR.COATING ○ ● NO

RADIOGRAPHY (X-RAY OF WELDS): ○ NONE ○ SPOT ● 100% ○ IMPACT TEST ○ SPECIAL WELDIN

● SHOP INSPECTION ○ WITNESS HYDROTEST ○ OUTDOOR STORAGE OVER 6 MONTHS ○ SPECIAL PAINT SPEC

○ WITNESSED ○ OBSERVED

CYLINDER, GAS, OPERATING, AND SUPPRESSOR DESIGN DATA

SERVICE STAGE NO.

☐ COMPRESSOR MANUFACTURER'S RATED CAPACITY	LBS/HR SCFM MMSCFD	
◎ LINE SIDE OPERATING PRESSURE	INLET, PSIA	DISCHARGE, PSIA
◎ OPERATING TEMP. WITHIN SUPPRESSORS	INLET, °F	DISCHARGE, °F
○ ALLOWABLE PRESSURE DROP THROUGH SUPPRESSORS	Δ P PSI / %	Δ P PSI / %
	INLET SUPPRESSOR	DISCHARGE SUPPRESSOR
○ SUPRESSOR TAG NUMBER		
● COMBINATION INLET SUPP SEPARATOR/INTERNALS	● YES ○ NO / ● YES ○ NO	/ ○ YES ○ NO
◎ NO. (QTY) OF INLET & DISCH. SUPP. PER STAGE		
○ ALLOWABLE PEAK-PEAK PULSE @ LINE SIDE NOZZLE	PSI / %	PSI / %
○ ALLOWABLE PEAK-PEAK PULSE @ CYL FLANGE NOZZLE	PSI / %	PSI / %
● DESIGN FOR FULL VACUUM CAPABILITY	○ YES ● NO	○ YES ● NO
○ MIN. REQ'D WORKING PRESSURE & TEMPERATURE		
NOTE: After design, the actual Mawp & temp are to be determined based on the weakest component and stamped on the vessel. The actual Mawp is to be shown on pg.14 line 12 and on the U1A Forms.	PSIG, @ °F	PSIG, @ °F
○ INITIAL SIZING VOL. PER FORMULA OF 3.9.2.2.2		
NOTE: This is a Reference	FT³	FT³
◇ AS BUILT VOLUME (FT³)	FT³	FT³

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PULSATION SUPPRESSION DEVICES FOR RECIPROCATING COMPRESSORS (CONT'D) SERVICE
THESE SHEETS TO BE FILLED OUT FOR EACH SERVICE AND/OR STAGE OF COMPRESSION STAGE NO.

CONSTRUCTION REQUIREMENTS & DATA	INLET SUPPRESSOR	DISCHARGE SUPPRESSOR	Rev
○ SUPRESSOR TAG NUMBER			
● BASIC MATERIAL REQUIRED, CS, SS, ETC.	304 Stainless Steel	Carbon Steel	1
◇ ACTUAL MATERIAL DESIGNATION SHELL/HEAD	/	/	
○ SPECIAL HARDNESS LIMITATIONS, Rc ○ YES ○ NO	SHELL & HEADS WELDS	SHELL & HEADS WELDS	
● CORROSION ALLOWANCE., IN. ● REQUIRED	0.0625 IN.	0.125 IN.	1
◇ WALL THICKNESS, IN. SHELL/HEAD	IN./ IN.	IN./ IN.	
□ NOM. SHELL DIA X OVERALL LGTH. (INCH/VOL.FT³)	x IN./ FT³	x IN./ FT³	
■ PIPE OR ROLLED PLATE CONSTRUCTION	■ PIPE □ ROLLED PLATE	■ PIPE □ ROLLED PLATE	
◇ ACT. MAX ALLOW. WORKING PRESS. AND TEMPERATURE	PSI @ °F	PSI @ °F	
● MINIMUM DESIGN METAL TEMP (2.14.8)	-20 °F	-20 °F	
● INLET SUPRESS. TO BE SAME MAWP AS DISCH'RGE SUPPRESS.	○ YES ● NO		
◇ MAX EXPECTED PRESSURE DROP(Δ P, PSI / %) LINE PRESS	Δ P PSI/ %	Δ P PSI/ %	
◇ WEIGHT (LBS EACH)	LBS	LBS	
○ INSUL NUTS & ALLOW. FOR INSULATION REQUIRED (X)			
◇ EXPECTED P-P PULSE @ LINE SIDE/CYL FLG, % LINE PRESS BASED ON FINAL SUPPRESSOR DESIGN	%/ %	%/ %	
● SUPPORTS, TYPE/QUANTITY			

CONNECTION REQUIREMENTS & DATA			
○ LINE SIDE FLANGE. SIZE/RATING/FACING/TYPE			
○ COMP CYL FLANGE(S), QTY/SIZE/RATING/FACING/TYPE			
○ FLANGE FINISH, ○ PER 3.9.3.15 ○ SPECIAL (SPECIFY) >125 <250 ○ PER ANSI 16.5			
● INSPECTION OPENINGS REQUIRED	● YES ○ NO ● BLINDED	● YES ○ NO ● BLINDED	
○ SPEC. QTY. SIZE, 6000 LB NPT CPLG./FLG TYPE & RATING			
◇ * QTY. SIZE, /FLG TYPE & RATING			
● VENT CONNECTIONS REQUIRED	● YES ○ NO	● YES ○ NO	
○ SPEC. QTY. SIZE, 6000 LB NPT CPLG./FLG TYPE & RATING			
◇ * QTY. SIZE, /FLG TYPE & RATING			
● DRAIN CONNECTIONS REQUIRED	● YES ○ NO	● YES ○ NO	
○ SPEC. QTY. SIZE, 6000 LB NPT CPLG./FLG TYPE & RATING			
◇ * QTY. SIZE, /FLG TYPE & RATING			
● PRESSURE CONNECTIONS REQUIRED	● YES ○ NO	● YES ○ NO	
○ SPEC. QTY. SIZE, 6000 LB NPT CPLG./FLG TYPE & RATING			
◇ * QTY. SIZE, /FLG TYPE & RATING			
● TEMPERATURE CONNECTIONS REQUIRED	● YES ○ NO	● YES ○ NO	
○ SPEC. QTY. SIZE, 6000 LB NPT CPLG./FLG TYPE & RATING			
○ CYL NOZZLE ○ MAIN BODY			
◇ * QTY. SIZE, /FLG TYPE & RATING			

OTHER DATA AND NOTES			
◇ COMPRESSOR MFG'S SUPP. OUTLINE OR DRAWING NO.			
◇ SUPP. MFG'S OUTLINE OR DRAWING NO.			

NOTES * = AS BUILT

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INSTRUMENTATION

PURCHASER TO FILL IN (☐ ○ ⬡) AFTER COMMODITY TO INDICATE: ☐ BY COMP. MFR. ○ BY PURCH. ⬡ BY OTHERS

INSTRUMENT & CONTROL PANEL (■ ○ ⬡):
- ● ONE FOR EA. UNIT ○ ONE COMMON TO ALL UNITS
- ● MACHINE MT'ED ○ FREE STANDING (OFF UNIT) ● LOCAL ● REMOTE ● OUTDOORS
- ○ PNEUMATIC ● ELEC. ○ ELECTRONIC ○ HYDRAULIC ○ PROGRAMMABLE CONTL'R
- ○ NEMA 7, CLASS _____ , GROUP _____ , DIVISION _____ ○ INTRINSICALLY SAFE
- ○ I/S BARRIERS (☐ ○ ⬡)
- ○ NEMA 4, WATERTIGHT & DUSTTIGHT ○ PURGED TO NFPA 496 TYPE ○ X ○ Y ○ Z
- ○ OTHER NEMA _____ LOW PURGE PRESS. ○ ALARM ○ SHUTDOWN
- ○ VIB, ISOLATORS ○ STRIP HEATERS ○ PURGE CONN. ○ EXTRA CUTOUTS
- ● ANNUNCIATOR W/FIRST-OUT INDICATION LOCATED ON CONTROL PANEL
- ● PURCHASER'S CONN. BROUGHT OUT TO TERMINAL BOX BY VENDOR

ADDITIONAL PANEL REMARKS: **PLC shall be Allen Bradley make.**

● INSTRUMENTATION SUITABLE FOR: ○ INDOORS ● OUTDOORS ● OTHER **-20 °F Ambient Temperature**

● PREFERRED INSTRUMENT SUPPLIERS, (TO BE COMPLETED BY PURCHASER), OTHERWISE MFR'S STANDARD APPLIES

PRESSURE GAUGES	MFR		SIZE & TYPE		MTL	
TEMPERATURE GAUGES	MFR		SIZE & TYPE		MTL	
LIQUID LEVEL GAUGES	MFR		TYPE		MTL	
DIFF. PRESSURE GAUGES	MFR		SIZE & TYPE		MTL	
PRESS. TRANSMITTERS	MFR		TYPE		MTL	
LIQUID LEV. TRANSMITTER	MFR		TYPE		MTL	
PRESSURE SWITCHES	MFR		TYPE		MTL	
TEMPERATURE SWITCHES	MFR		TYPE		MTL	
LIQUID LEVEL SWITCHES	MFR		TYPE		MTL	
DIFF. PRESSURE SWITCHES	MFR		TYPE		MTL	
CONTROL VALVES	MFR		TYPE		MTL	
PRESSURE SAFETY VALVES	MFR		TYPE		MTL	
SIGHT FLOW INDICATORS	MFR		TYPE		MTL	
VIBRATION MONITORS & EQUIP.	MFR		TYPE		MTL	
THERMOCOUPLES	MFR		TYPE		MTL	
RTD'S	MFR		TYPE		MTL	
SOLENOID VALVES	MFR		TYPE		MTL	
ANNUNCIATOR	MFR		MODEL & (QTY SPARE POINTS)		( )	
PROGRAMMABLE CONTROLLER	MFR		TYPE		MTL	
	MFR		TYPE		MTL	
	MFR		TYPE		MTL	

● PRESSURE GAUGE REQUIREMENTS ○ LIQUID FILLED PRESSURE GAUGES: ○ YES ○ NO

FUNCTION	LOCALLY MOUNTED	PANEL MOUNTED
LUBE OIL MAIN PUMP DISCHAR.	(■ ○ ⬡)	(☐ ○ ⬡)
LUBE OIL AUX. PUMP DISCHARG.	(■ ○ ⬡)	(☐ ○ ⬡)
LUBE OIL PRESS. AT FRAME HEADER	(■ ○ ⬡)	(☐ ○ ⬡)
LUBE OIL FILTER ΔP	(■ ○ ⬡)	(☐ ○ ⬡)
COOLING H_2O INLET HEADER	(☐ ○ ⬡)	(☐ ○ ⬡)
	(☐ ○ ⬡)	(☐ ○ ⬡)
	(☐ ○ ⬡)	(☐ ○ ⬡)

	LOCALLY MOUNTED	PANEL MOUNTED
PROCESS GAS: INLET PRESS.	(■ ○ ⬡)	(☐ ○ ⬡)
@ EA. STAGE	(☐ ○ ⬡)	☐ ○ ⬡)
DISCH. PRESS.	(■ ○ ⬡)	(☐ ○ ⬡)
@ EA. STAGE	(☐ ○ ⬡)	(☐ ○ ⬡)
	(☐ ○ ⬡)	(☐ ○ ⬡)
	(☐ ○ ⬡)	(☐ ○ ⬡)
	(☐ ○ ⬡)	(☐ ○ ⬡)

REMARKS:

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TEMPERATURE MEASUREMENT REQUIREMENTS

FUNCTION	LOCALLY MOUNTED	PANEL MOUNTED	GAUGE W/ CAPIL'RY	THERMO CPL SYS	RTD SYS	I/S SYS
LUBE OIL ○ INLET TO ● OUT OF FRAME	●	☐	○	○	○	○
LUBE OIL ○ INLET TO ● OUT OF COOLER	●	☐	○	○	○	○
MAIN JRNL BEARINGS (THERMOCOUPLES OR RTD'S ONLY)	●	☐	○	○	○	○
MOTOR BEARING(S) (THERMOCOUPLES OR RTD'S ONLY)	●	☐	○	○	○	○
COOLING WATER HEADER: ● INLET ○ OUTLET	●	☐	○	○	○	○
CYL. COOLING WATER: ○ INLET ○ OUTLET ○ EA CYL	☐	☐	○	○	○	○
PROCESS GAS: ● INLET ● DISCH. ○ EACH CYL	●	☐	○	○	○	○
INTERCOOLER(S) ○ INLET ○ GAS ○ WATER	☐	☐	○	○	○	○
○ INLET ○ GAS ○ WATER	☐	☐	○	○	○	○
AFTERCOOLER: ○ INLET ○ GAS ○ WATER	☐	☐	○	○	○	○
○ INLET ○ GAS ○ WATER	☐	☐	○	○	○	○
COOLING WATER ○ INLET ○ OUTLET/COOLED PKG CASE(S)	☐	☐	○	○	○	○
PRESS. PGK CASE, CYL PIST ROD (THRM'CPLS OR RTD'S ONLY)	☐	☐		○	○	○
COMPRESSOR VALVES ○ SUCT. ○ DISCH. TC'S OR RTD'S ONLY	☐	☐	○	○	○	○
BY-PASS COOLER	●	☐	○	○	○	○
	☐	☐	○	○	○	○

ALARM & SHUTDOWN REQ'MTS

NOTE: CONTROL & SHUTDOWN SHALL BE INDIVIDUALLY SEPARATE ANNUNCIATION POINTS

FUNCTION	ALARM	SHUT DOWN	ALARM IN PNL BY MFR	ALARM IN CTL ROOM PANEL OTH'RS	SHUTDOWN IN PNL BY MFR	SHUTDOWN IN CTL ROOM PANEL OTH'RS	TOTAL NO. OF POINTS
LOW LUBE OIL PRESS. @ BEARING HEADER	●	●	●	○	●	○	
HIGH LUBE OIL Δ P A P ACROSS FILTER	●	☐	●	○	○	○	
LOW LUBE OIL LEVEL, FRAME	●	☐	●	○	○	○	
AUX LUBE OIL PUMP, FAIL TO START	●	☐	●	○	○	○	
CYL LUBE SYSTEM PROTECTION	●	☐	●	○	○	○	
COMPR. VIBRATION, SHUTDOWN ONLY		●	○	○	●	○	
VIBRATION, W/ CONTINUOUS MONITORING	☐	☐	○	○	○	○	
ROD DROP DETECTOR, CONTACT TYPE(1/CYL)	☐	☐	○	○	○	○	
ROD DROP PROXIMITY PROBE (1/CYL)	☐	☐	○	○	○	○	
OIL TEMP OUT OF FRAME	●	●	●	○	●	○	
HIGH GAS DISCH. TEMP EACH CYLINDER	●	●	●	○	●	○	
HIGH JACKET WATER TEMP., EA. CYL	☐	☐	○	○	○	○	
LOW SUCTION PRESS., FIRST STG INLET	●	●	●	○	●	○	
HI DISCH. PRESS. ○ FINAL ○ EA STG	●	☐	●	○	○	○	
HI CYL. GAS Δ P, EACH STAGE	☐	☐	○	○	○	○	
HI LIQ. LEV., EA. MOISTURE SEPARATOR	●	☐	●	○	○	○	
LOW PURGE GAS PRESS, DISTANCE PIECE(S)	●	☐	●	○	○	○	
HI X-HD PIN TEMP	☐	☐	○	○	○	○	
PRESS PKG CASE (PISTON ROD TEMP)	☐	☐	○	○	○	○	
	☐	☐	○	○	○	○	

TOTAL NUMBER OF ANNUNCIATION POINTS

SWITCH CONTACT OPERATION

NOTE: EACH SWITCH SHALL BE MINIMUM SPDT ARRANGEMENT

ALARM CONTACTS SHALL:
○ OPEN (DE-ENER.) TO SOUND ALARM & BE ENERGIZED WHEN COMPR. IS IN OPERATION
○ CLOSE (ENERGIZE) TO SOUND ALARM & BE DE-ENERGIZED WHEN COMPR. IS IN OPERATION

SHUTDOWN CONTACTS SHALL:
○ OPEN (DE-ENERGIZED) TO SHUTDOWN & BE ENERGIZE WHEN COMPR. IS IN OPERATION
○ CLOSE (ENERGIZE) TO SHUTDOWN & BE DE-ENERGIZE WHEN COMPR. IS IN OPERATION

REF: 3.6.5.1 FOR MINIMUM RECOMMENDED PROTECTION REQUIREMENTS

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MISCELLANEOUS INSTRUMENTATION

INTERCLR(S) AFTERCLR OIL CLR H_2O CLR

SIGHT FLOW IND. (COOLING H_2O ONLY)	(■ ○ ⬡)	FOR:	CYL JACKET WATER ROD PRESS. PKG CASES
PNEUMATIC PRESSURE TRANSMITTERS	(□ ○ ⬡)	FOR:	
PRESSURE TRANSMITTERS (ELEC. OUTP.)	(■ ○ ⬡)	FOR:	
PNEUMATIC LEVEL TRANSMITTERS	(□ ○ ⬡)		
ALARM HORN & ACKN'LMT TEST BUTTON	(■ ○ ⬡)		
CONDUIT & WIRING W/JUNCT. BOXES (CON-SOLES)	(■ ○ ⬡)		
TEST VALVES	(□ ○ ⬡)	FOR:	
DRAIN VALVES	(□ ○ ⬡)	FOR:	
GAUGE GLASS(ES)	(□ ○ ⬡)	FOR:	
TACHOMETER	(□ ○ ⬡)		SPEED RANGE TO RPM
CRANKSHAFT KEY PHASER AND TRANSDUCER	(□ ○ ⬡)	FOR:	
LEVEL SWITCHES	(■ ○ ⬡)		
AUTOMATIC BY-PASS VALVE	(■ ○ ⬡)		1

○ SEPARATE LUBE OIL CONSOLE INSTRUMENTATION: PURCH. TO LIST REQ'MTS IN ADDITION TO ANY ABOVE REQ'MTS

(□ ○ ⬡)

○ SEPARATE COOLING WATER CONSOLE INSTRUMENT: PURCH. TO LIST REQ'MTS IN ADDITION TO ANY ABOVE REQ'MTS

(□ ○ ⬡)

■ RELIEF VALVES

LOCATION	BY	MANUFACTURER	TYPE	◇ SIZE	◇ SETTING	
PROCESS GAS LINE	(□ ■ ⬡)					1
FRAME LUBE MAIN OIL PUMP DISCHARGE	(■ ○ ⬡)					
FRAME LUBE AUX OIL PUMP DISCHARGE	(■ ○ ⬡)					
CRANKCASE	(■ ○ ⬡)					
	(□ ○ ⬡)					
	(□ ○ ⬡)					
	(□ ○ ⬡)					
	(□ ○ ⬡)					
	(□ ○ ⬡)					
	(□ ○ ⬡)					

NOTES: SEE MOTOR DATA SHEET FOR ADDITIONAL MOTOR INSTRUMENTATION REQUIREMENTS
~~FOR TURBINE DRIVERS USE APPLICABLE API DATA SHEETS~~
~~FOR GEAR REDUCERS USE APPLICABLE API DATA SHEETS~~

ADDITIONAL INSTRUMENTATION REMARKS/SPECIAL REQUIREMENTS: