DOC.:	

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0	PAULO	SES	05/12/2023	FOR APPROVAL

ROTARY-TYPE POSITIVE DISPLACEMENT COMPRESSOR (API 619) DATA SHEET SI UNITS

APPLICABLE TO: ○ PROPOSAL ○ PURCHASE ○ AS BUILT -

CLIENT: ***Zanjan Urea Project*** UNIT ***Oil Flooded Screw Compressor***

PROJECT: ***Fertilizer*** ITEM NO. - SERIAL NO. -

SERVICE: ***AMMONIA REFRIGERATION PACKAGE*** NO. REQUIRED ***2***

LOCATION: **Zanjan** MODEL **N2016MSC-LBM** DRIVER ***MOTOR***

NOTE: ○ INDICATES INFORMATION TO BE COMPLETED BY PURCHASER ☐ BY MANUFACTURER

OPERATING CONDITIONS

(ALL DATA ON PER UNIT BASIS)
ALL DATA ARE FOR **EACH** COMPRESSOR

		1 stage (3.1.24 & 4.1.3)	2 stage (4.1.4)	OTHER CONDITIONS A	B	C	D
●	●	●	●				
		SUCTION	***SUCTION***				
●	GAS HANDLED (ALSO SEE P. 2) ( )	***AMMONIA***	***AMMONIA***				
●	Nm³/HR	-					
●	WEIGHT FLOW, kg/h (WET)(DRY)	***645***	***820***				
	INLET CONDITIONS:						
●	PRESSURE (BarA) @ Package Inlet **NOTE 1**	***0.86***	***3.02***				
●	TEMPERATURE (°C) @ Package inlet **NOTE 1**	***-36.65***	***59.17***				
○	RELATIVE HUMIDITY (%)						
●	MOLECULAR WEIGHT (M)	***17.031***	***17.031***				
■	Cp/Cv (K_1) OR (K_{AVG})						
■	COMPRESSIBILITY (Z_1) OR (Z_{AVG})						
■	INLET VOLUME, (Am³/HR-WET)						
	DISCHARGE CONDITIONS:						
●	PRESSURE (BarA) ~~@ Package outlet~~ **NOTE 1**	***3.02***	***21***				
■	TEMPERATURE (°C) ~~@ **Package outlet**~~ **NOTE 1**	***59.3***	***83.3***				
	Cp/Cv (K_2) OR (K_{AVG})	***1.3415***	***1.3171***				
■	COMPRESSIBILITY (Z_2) OR (Z_{AVG})						
●	OUTLET VOLUME, (Am³/HR-WET)						
■	kW REQUIRED (ALL LOSSES INCL)	***54.7***	***98.1***				
■	SPEED (RPM)	***2,950***	***2,950***				
■	PRESSURE RATIO (R)						
■	VOLUMETRIC EFFICIENCY (%)						
■	ADIABATIC EFFICIENCY (%)						
●							
■	PERFORMANCE CURVE NO.						

PROCESS CONTROL:

METHOD: ● BYPASS FROM ***DISCHARGE VIA SLIDE VALVE*** TO

● BYPASS: ○ MANUAL ● AUTO ***VIA UCP***

○ SPEED VARIATION FROM TO

● OTHER ***SLIDE VALVE 30-100% (NORMAL),***

SIGNAL: ● SOURCE ***COMPRESSOR SUCTION PRESSURE***

● TYPE ***4-20 mA***

○ RANGE: FOR PNEUMATIC CONTROL RPM @ PSIG & (kPa) RPM @ PSIG (kPa)

○ OTHER

SERVICE: ○ SPECIAL PURPOSE ● GENERAL PURPOSE

● CONTINUOUS ○ INTERMITTENT ○ STANDBY ○ DRY ● FLOODED SCREW ● SEPARATOR

REMARKS: **NOTE 1 CONDITION @ COMPRESSOR INLET AND OUTLET NOZZLES**

NOTE 2 2x50% compressor in opeartion

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	GAS ANALYSIS ● MOL % ○	M.W.	NOR-MAL	RAT- ED	OTHER CONDITIONS A	B	C	D	REMARKS
3		M.W.							
4	AIR	28.966							**FOR GAS COMPOSITION REFER TO MAYEKAWA**
5	OXYGEN	32.000							**HYSYS SIMULATION**
6	NITROGEN	28.016							
7	WATER VAPOR	18.016							
8	CARBON MONOXIDE	28.010							
9	CARBON DIOXIDE	44.010							
10	HYDROGEN SULFIDE	34.076							
11	HYDROGEN	2.016							
12	METHANE	16.042							
13	ETHYLENE	28.052							
14	ETHANE	30.068							
15	PROPYLENE	42.078							
16	PROPANE	44.094							
17	I-BUTANE	58.120							
18	n-BUTANE	58.120							
19	I-PENTANE	72.146							
20	n-PENTANE	72.146							
21	n-HEXANE	86.178							
22	n-HEPTANE	100.205							
23	n-OCTANE	114.232							
24	AMMONIA (max)								
25	CARBONYL SULPHIDE								
26	SULPHER								
27	Non-Saturated Hydrocar								
28	TOTAL		0.00%						
29	AVG. MOL. WT.		0.00						

LOCATION:

○ INDOOR ○ HEATED ● UNDER ROOF
● OUTDOOR ● UNHEATED ○ PARTIAL SIDES
○ GRADE ○ MEZZANINE ○
● ELECTRICAL AREA CLASS ***2 / T3*** GR ***IIB*** DIV. **1**
○ WINTERIZATION REQ'D. ○ TROPICALIZATION REQ'D.

SITE DATA:

● ELEVATION ***xxx*** m BAROMETER ***1.0*** kg/cm2
● RANGE OF AMBIENT TEMPS.:

	DRY BULB	WET BULB
SITE RATED °C	**x**	
NORMAL °C	**x**	
MAXIMUM °C	**x**	
MINIMUM °C	**x**	

UNUSUAL CONDITIONS:

● OTHER **DUST**
FUME
SEA SALT
Chemical plat
Oil & Gas Plant,

REMARKS:

NOISE SPECIFICATIONS:

● APPLICABLE TO MACHINE ***85*** ***dBA + 0 @ 1.0 m from skid***
SEE SPECIFICATION ***layout***
○ APPLICABLE TO NEIGHBORHOOD
SEE SPECIFICATION
ACOUSTIC HOUSING: YES NO
SOUND LEVEL ***<85*** dB @ ***1*** m ***0***
dB RE: 0.0002 MICROBAR

APPLICABLE SPECIFICATIONS:

● ***MAYEKAWA STANDARD COMPRESSOR***
● ***Enclosure:***

PAINTING:

● MANUFACTURER'S STD.
○ OTHERS
Primer ***Epoxy Base (MYK STD)***
Intermediate ***N/A***
Final ***Urethane (MYK STD)***

SHIPMENT:

○ DOMESTIC ● EXPORT ○ EXPORT BOXING REQ'D
○ LONG TERM STORAGE FOR MONTHS
○ PROVIDE N2 PURGE EQUIPMENT DURING SHIPMENT

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SPEEDS:
MAX. CONT. ***3,600*** RPM TRIP ***N/A*** RPM
MIN. TIP SPEEDS: ***xxx*** m/s @ RATED SPEED
MAX. TIP SPEEDS: ***xxx*** m/s @ MAX. CONT. SPEED
LATERAL CRITICAL SPEEDS:
FIRST CRITICAL ***TBA*** RPM
DAMPED UNDAMPED
MODE SHAPE
LATERAL CRITICAL SPEED - BASIS:
☐ DAMPED UNBALANCE RESPONSE ANALYSIS
☐ SHOP TEST
☐ OTHER TYPE ANALYSIS:
(SPECIFY)

TORSIONAL CRITICAL SPEEDS:
FIRST CRITICAL ***xxx*** RPM
SECOND CRITICAL --- RPM
THIRD CRITICAL --- RPM

VIBRATION: ***AS PER MAYEKAWA EXCEPTION TO API-619***
ALLOWABLE LEVEL ***0.3*** ***in/s*** ***8.0*** ***mm/s*** ***RMS*** TEST
(PEAK TO PEAK) ***0.5*** ***in/s*** ***12.0*** ***mm/s*** ***RMS*** SITE

ROTATION, VIEWED FROM DRIVEN END:

CASING:
MODEL
CASING SPLIT ***Radial (vertical)***
MATERIAL ***FC300 JIS A48-93A*** ***Note1***
OPERATION: ☐ DRY ☒ FLOODED, w/ ***Oil*** LIQUID
THICKNESS (") ***Varies*** CORR. ALLOW (") ***None***
MAX. WORK PRESS. ***xx*** kg/cm2 G (***xx***) Bar G
RELIEF VALVE SETTING ***23.1*** kg/cm2 ***22.7*** BarG
MARGIN FOR ACCUMULATION ***N/A*** kg/cm2
TEST PRESS.(BarG~~kg/cm2G~~) **AIR** ***27.8*** HYDRO ***38.0*** ***Note3***
MAX. ALLOW. TEMI ***120*** °C MIN. OPER. TEMP. ***-28.89*** °C
MAX. CASING CAPACITY (Inlet m3/h) ***4,710***
RADIOGRAPH QUALITY ○ YES ● NO

☒ **ROTORS:**
DIAMETER (mm): ***321.30***
NO. LOBES: MALE ***4*** FEMALE ***6***
TYPE: ***Unsymmetric***
TYPE FABRICATION ***xxxx***
MATERIAL ***FCD 600 JIS*** ***Note2***
MAX. YIELD STRENGTH (N/mm2) ***> 705***
BRINELL HARDNESS. MAX. MIN. ***269***
ROTOR LENGTH TO DIAMETER RATIO (L/D) ***xxx***
ROTOR CLEARANCE (mm) ***Not Applicable to Oil Flooded Screw***
MAX. DEFLECTION (mm) ***4.60E-02***
MAX. MACHINE MACH NO. @ LOBES
INTERNALLY COOLED ***N/A*** UNCOOLED ***N/A***

SHAFT: **The Shaft is Integral with the Rotor (One Piece)**
MATERIAL ***Same as Rotor***
DIA @ ROTORS (mm) ***N/A*** DIA @ COUPLING (mm) ***xxx***
SHAFT END. TAPERED ☐ CYLINDRICAL *With Key* ☒

SHAFT SLEEVES: ***This Section is Not Applicable***
AT SHAFT SEALS ☐ MATL.

TIMING GEARS: ***This Section is Not Applicable***
SIZE (mm) TYPE
MATERIAL

SHAFT SEALS:
TYPE ***Double*** ***Oil Flooded*** ***MAYEKAWA STD***
SEAL SYSTEM TYPE ***Flushing: Internal*** ***Compressor Oil***
☐ INNER OIL LEAKAGE GUAR. (GAL/DAY/SEAL)
☐ TYPE BUFFER GAS
☐ BUFFER GAS FLOW (PER SEAL)
NORMAL: m^3/min @ kg/cm2
MAX.: m^3/min @ kg/cm2

BEARING HOUSING CONSTRUCTION:
TYPE (SEPARATE), (INTEGRAL) ***Integral*** SPLIT ***Axial***
MATERIAL ***Same as Casing***

RADIAL BEARINGS: ***(Main Bearing / Side Bearing)***
TYPE ***TBA*** SPAN (mm) ***xx*** / ***xx***
AREA (cm^2) ***xx*** /CENTER LOAD (kgf/cm2): ACT. ALLOW.
PIVOT ***N/A*** OFFSET PIVOT ***N/A***
% OFFSET FROM LEADING EDGE ***N/A***
NO. PADS ***N/A*** ROTOR ON OR BETWEEN PADS
PAD MATERIAL
THICKNESS ***1.0*** (mm)
TYPE BABBITT ***will be finalized after order***

THRUST BEARING: ***Male Side / Female Side***
LOCATION ***At the driven end*** TYPE ***TBA***
MFR. ***TBA*** AREA (mm^2) M/F ***xxx*** / ***xxx***
LOAD (kg/cm2): M/F ALL. / ALLOW. / CPLG.
GAS LOADING (N) --- SLIP LOAD (N) ---
CPLG. COEFF. FRICT. --- CPLG. GEAR PITCH DIA. (mm) ---
BAL. PISTON COMPENSATING LOAD kgf
CENTER PIVOT ***xx*** OFFSET PIVOT
% OFFSET FROM LEADING EDGE
NUMBER OF PADS M/F: ***xxxx***
PAD MATERIAL ***xxx***
TYPE BABBITT xxxx THICKNESS ***xx*** (mm)
A ***xxxx***
B ***xxxx***

REMARKS:
Note 1: Equal To: ASTM A 48-93A
Note 2: Equal To: ASTM A536 Gr84
Note 3: Based on System Design Pressure

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MAIN CONNECTIONS: All Flanges are per ANSI B31.3

		SIZE	ANSI RATING	FACING	POSI-TION
INLET	*in*	***TBA***	***' TBA#***	***RF***	***Top***
DISCHARGE	*in*	***TBA***	***" TBA#***	***RF***	***END***

ALLOWABLE PIPING FORCES AND MOMENTS:

	INLET		DISCHARGE			
	FORCE N	MOMT N-m	FORCE kg	MOMT N-m	FORCE kg	MOMT N-m
AXIAL						
VERTICAL						
HORIZ. 90°						

	FORCE N	MOMT N-m	FORCE kg	MOMT N-m	FORCE kg	MOMT N-m
AXIAL						
VERTICAL						
HORIZ. 90°						

OTHER CONNECTIONS:

SERVICE:	NO	SIZE(")	TYPE
Bearing Lube Oil	***1***		***FLG***
Injection Lube Oil	***1***		***FLG***
Casing Drain	***1***		***PT***
Economizer Port			
Load Oil	***1***		***PT***
Unload Oil	***1***		***NPT***
TPTB (if equipped)			
Seal Oil (if TPTB)	***0***		***xx***
TEMPERATURE			
PURGE FOR:			
BRG. HOUSING			
BETWEEN BRG. & SEAL			
BETWEEN SEAL & GAS			
VIBRATION SENSOR			
AXIAL SENSOR			

VIBRATION DETECTORS:

- ○ IN ACCORDANCE WITH: API670 ___ N/A ***xx***
- ● OTHER (SPECIFY) ***xxxxx***
- ● TYPE ___ MODEL ___
- ● MFR. ___
- ○ NO. AT EACH SHAFT BEARING ___
- ○ OSCILLATOR-DETECTORS SUPPLIED BY: ___
  - ○ MFR. ___ MODEL ___
- ○ MONITOR SUPPLIED BY ***None***
  - ○ LOCATION ___ ENCLOSURE ___
  - ○ MFR. ___ MODEL - ___
  - RANGE * ALARM: SET @ ___
  - TIME DELAY ___ SEC TRIP: SET @ ***See Drawing***

* ***RANGE*** ___ to ___ in/s ___ to ___ mm/s

AXIAL POSITION DETECTOR:

- ○ IN ACCORDANCE WITH: API 670
- OTHER (SPECIFY)
- ○ TYPE ___ MODEL ___
- ○ MFR. ___ NO. RE
- ○ OSCILLATOR-DETECTORS SUPPLIED BY ___
  - ○ MFI ___ MODEL ___
- ○ MONITOR SUPPLIED BY ***None***
  - ○ LOCATION ___ ENCLOSURE ___
  - ○ MFI ___ MODEL ___
  - RANGE * ALARM: SET @ ___ mils
  - TIME DELAY ___ SEC TRIP: SET @ ___ mils

* ***RANGE*** ___ to ___ **mm**

COUPLINGS:

IN ACCORDANCE WITH:

OTHER (SPECIFY)

	DRIVER-COMP OR DRIVER	GEAR-COMP
● MAKE ***FLEXIBLE DISCS***	***TBA***	***N/A***
MODEL		***N/A***
○ LUBRICATION	***N/A***	***N/A***
● MOUNT CPLG. HALVES	***YES***	***N/A***
● SPACE REQUIRED (mm)		***N/A***
○ LIMITED END FLOAT REQ'D	***N/A***	***N/A***
○ IDLING ADAPTOR REQ'D	***N/A***	***N/A***
CPLG. RATING (kW/100 RPM)	***TBA***	***N/A***
KEYED (1) OR (2) OR HYDR. FIT	***KEYED***	***N/A***

BASEPLATE & SOLEPLATES:

SOLE PLATES FOR: ○ COMPRESSOR ○ GEAR ○ DRIVER

BASEPLATE: ○ EPOXY GROUT/EPOXY PRIMER ○ LEVELING PADS

- ● COMMON (UNDER COMP. ~~GEAR~~ & DRIVER) ***Open Structure***
- ○ UNDER COMP. ONLY ○ OTHER ***MOTOR***
- ○ DECKED WITH NON-SKID DECK PLATES ○ OPEN CONSTR.
- ○ DRIP RIM ○ WITH OPEN DRAIN
- ● HORIZONTAL ADJUSTING SCREWS FOR EQUIPMENT (***DRIVER ONLY***)
- ○ SUITABLE FOR POINT SUPPORT
- ○ SUITABLE FOR PERIMETER 3-POINT SUPPO ***Open Structure***
- ● SUITABLE FOR FULL SUPPORT UNDER ALL MEMBERS

LUBE OIL SYSTEM

614 LUBE OIL SYSTEM

MAYEKAWA STD

○ COMMON ● DEDICATED SYSTEM

- ○ ALTERNATIVE LUBE SYSTEM (4.10.5)
  - ○ OIL COOLER ___
  - ○ OIL FILTER ___
  - ○ HEATER ___
- ● OIL SEPARATOR (4.10.5.8) ___
  - ● 1st SEPARATOR ___ CARRYOVER
  - ○ 2nd SEPARATOR ___ CARRYOVER
  - ● INSTRUMENTS ***PER MAYEKAWA P&ID***

NOTE: ___

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UTILITY CONDITIONS:

		DRIVERS		HEATING	
STEAM					
INLET	MIN.	kg/cm²	°C	kg/cm²	°C
	NORM	kg/cm²	°C	kg/cm²	°C
	MAX.	kg/cm²	°C	kg/cm²	°C
EXHAUST	MIN.	kg/cm²	°C	kg/cm²	°C
	NORM	kg/cm²	°C	kg/cm²	°C
	MAX.	kg/cm²	°C	kg/cm²	°C

ELECTRICITY:

	DRIVERS	HEATING	CONTROL	SHUT-DOWN
VOLTAGE	*6,000*	*220*	*24*	*24*
HERTZ	*50*	*50*	*VDC*	*VDC*
PHASE	*3*	*1*	*1*	

COOLING WATER

TEMP. INLET *TBA* °C MAX. RETURN °C °C

PRESS. NORM *TBA* kg/cm2G DESIGN kg/cm2G

MIN. RETURN kg/cm2G Max Allow. Δ P kg/cm2G

WATER SOURCE *-*

INSTRUMENT AIR:

MAX PRESS *7.0* (kg/cm²G) MIN. *6.0* (kg/cm²G)

TOTAL UTILITY CONSUMPTION:

COOLING WATER				LPM
STEAM, NORMAL	*N/A*			kg/h
STEAM, MAX	*N/A*			kg/h
INSTRUMENT AIR				Sm³/h
DRIVER	*1*	*150*	*BY MAIN MOTOR*	kW
AUXILIARIES:	*2*	*TBA*	*BY OIL PUMP*	kW
	1	*TBA*	*Oil Heater*	kW
	1	*3.0*	*CONTROL PANEL*	kW

SHOP INSPECTION AND TESTS:	REQ'D	WITNESS
SHOP INSPECTION	○	○
HYDROSTATIC		○
HELIUM LEAK	○	○
MECHANICAL RUN		○
MECHANICAL RUN SPARE ROTORS		○
FIT IN SPARE ROTORS	○	○
PERFORMANCE TEST (~~GAS~~)(AIR)		○
COMP. WITH DRIVER	○	○
COMP. LESS DRIVER		○
USE SHOP LUBE & SEAL SYSTEM		○
USE JOB LUBE & SEAL SYSTEM	○	○
USE SHOP VIBRATION PROBES, ETC.		○
USE JOB VIB. & AXIAL DISP. PROBES,	○	○
OSCILLATOR-DETECTORS & MONITOR		
PRESSURE COMP. TO FULL OPER. PRESS.	○	○
DISASSSEMBLE-REASSEMBLE COMP.	○	○
AFTER TEST		
CHECK BRGS. & SEALS AFTER TEST	○	○
NOISE LEVEL TEST	○	○
DIMENSIONAL	○	○
CASING LEAK TEST	○	○
AUX. EQUIPMENT	○	○

WEIGHTS (KILOGRAMS): *REFER TO GA*

COMPR. GEAR *N/A* DRIVER BASE

ROTORS: COMPR. DRIVER GEAR

COMPR. SKID

VESSEL SKID AIR COOLER

MAX. FOR MAINTENANCE (IDENTIFY)

TOTAL SHIPPING WEIGHT *REFER TO GA:*

SPACE REQUIREMENTS (METERS):

COMPRESSOR PACKAGE L W H

VESSEL SKID L W H

AIR COOLER L W H

REFER TO GA:

MISCELLANEOUS:

○ RECOMMEND STRAIGHT RUN OF PIPE DIA. BEFORE SUCTION

○ VENDOR REPRESENTATIVE OBSERVATION AT SITE

○ VENDOR'S REVIEW & COMMENTS ON PURCHASER'S PIPING & FOUNDATION

● OPTICAL ALIGNMENT FLATS REQUIRED ON COMPRESSOR, GEAR & DRIVER

○ PROVISION FOR WATER WASHING BEFORE OPENING CASING

BY

LATERAL ANALYSIS REPORT REQUIRED

TORSIONAL ANALYSIS REPORT REQUIRED

○ PROVISIONS FOR TORSIONAL PICKUP ON CASE

○ CONDENSATE REMOVAL EQUIPMENT REQUIRED

○ ○ YES ○ NO

○ SILENCERS FURNISHED BY *NOT REQUIRED*

VENDOR REPRESENTATIVE SHALL:

○ OBSERVE FLANGE PARTING

● CHECK ALIGNEMENT AT TEMEPRATURE *DURING COMMISSIONING*

● BE PRESENT AT INITIAL ALIGNEMENT *DURING COMMISSIONING*

REMARKS:

NOTE 1: REFER TO MAYEKAWA QA PLAN FOR MORE INFORMATION REGARDING THE APPLICABLE TESTING PROCEDURES DOCUMENT NO. AS PER AGREED ITP in the bid stage