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SPECIAL PURPOSE STEAM TURBINE DATA SHEET

1	Unit: **UREA**	**SERVICE:**	ITEM No.
2	Supplier;	**DRIVER FOR CO2 COMPRESSOR**	KT06101
3	Quantity: 1		

4 Applicable to:

5 Type: Extraction-induction Condensate Turbine Model: Serial No.:

6 Driven equipment: CO2 COMPRESSOR ●Direct drive ○Gear

7 Note : ○Indicates information to be completed by purchaser ☐By manufacturer

8 PERFORMANCE

9	OPERATING POINTS	SHAFT		INLET（saturated steam）			EXTRACTION/INJECTION			EXHAUST
10	○☐(As applicable)	Power kW	Speed RPM	Flow Kg/h	Press. MPa A	Temp. ℃	Flow Kg/h	Press. Bar A	Temp. ℃	Press/temp Bar A /℃
11	Rated									
12	Normal									0.15
13	Minimum									
14	Piping design									

15	☐Steam rate	Normal:	Kg/kW.h	Rated:	Kg/kW.h	Extraction	●Controlled	○Uncontrolled
16	☐Heat rate	Normal:	MJ/kW.h	Rated:	MJ/kW.h	Injection	●Controlled	○Uncontrolled

17

18 ● STEAM CONDITIONS(1)

19	Location	Inlet		Extraction(controlled)			Injection(saturated)			Exhaust(condensed)	
20	Range	Bar A	℃	Bar A	℃	Kg/h	MPaA	℃	Kg/h	Bar A	℃
21	Min.	34	365	23.0		0					
22	Normal	39	370	24.7	320（4）	57950	4.4	160	0~28	0.15	
23	Max.	41	375	26.5		63750					
	Piping design										

24 ○ SITE AND AVAILABLE UTILITY DATA

25	SITE DATA: **see attachment “design basis”**	LOCATION:
26	●Elevation m, Bar: mBar / mm Hga	●Indoor ○Heated ○Unheated
27	●Temp. ℃,Summer ℃ Winter: ℃	○Outdoor ○Under roof ○Partial sides
28	●Relative humidity: %,Design wet bulb: ℃	○Grade ●Mezzanine
29	UNUSUAL CONDITIONS:	○Winterization req'd ●Tropicallization req'd
30	○Dust ○Fumes ●Chem. plant	○Low temperature: ●Corrosive agents:
31	AREA CLASSIFICATION: dIIC T3 ○Non hazardous	●Hazardous Group of gas: d IIC T3

32	ELECTRIC	DRIVERS	HEAT&CONTROL	INSTR. & TRIP	ALARM	Water	Nor.	Max.
33	Neutral	TNC	TNC/UPS			Bar g in	4	
34	Volts	**400**	**400/230**	**24DC**	**24DC**	Bar g out	2	
35	Phase	**3**	**3 / Single**			℃ in	34	
36	Cycles	**50**	**50**			℃ out	43	
37	kW Avail.					Velocity	M/s:	
38						Fouling factor	0.0006m^2.℃h/kcal	

39 Water source: Allowable temp. rise: 6 ℃ Max. △P bar

40	Auxiliary steam conditions	Maximum	Normal	Minimum
41	Initial pressure /Temp. Bar g / ℃			
42	Exhausting pressure Bar g			

43 Instrument air pressure: 7.0 MPa g, Max: 11 MPa g, Min: 5 MPa g, Normal dew pt: - 25 ℃

Remarks: 1. The premiliary condensate dischcharge pressure at the boundary shall be 7barg. the final data shall be determined at kick-off meeting.

2. Surface condenser **will be water-Cooled** with river water(see” design basis”)

3. Final data shall be furnished by turbine vendor.

4. Estimated data, to be confirmed by vendor.

5. the extraction flow in normal operation has been calculated in order to have a total enthalpic content equal to 57950XHsteam(t.p)=49280kW. Therefore, if the extraction temperature is different from estimated one the total flow will be recalculated by the mfr. in order to maintain the same enthalpic content.

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○ SITE AND AVAILABLE UTILITY DATA (Cont'd)

☐Auxiliary systems-Utility requirements

Cooling water:	Normal(GP)/	Rated	m^3/h	Aux. Drivers (Elec.):	kW
Aux. Steam normal			kg/h	Aux. Drivers (steam):	kW
Aux. Steam max.			kg/h		kW
Instrument air	7Bar (G)		m^3/h		

TURBINE CONSTRUCTION GENERAL

REFERENCE SPECIFICATION

●API 612 special purpose steam turbine	●complete supply and responsibility by the vendor
○Other	●noise level: API615
Type: ○Backpressure	●Condensing ● Extraction ● Admission
Rotation (viewed from inlet end):	○CCW ○CW

CASINGS, NOZZLES & DIAPHRAGMS

☐Mawp	Inlet section:	Bar g,	Exhaust section:	Bar g,	Other
☐Max.temp.	Inlet	℃	Exhaust:	℃	
☐Hydrostatic test press:					
☐HP casing	Bar g,	Mid casing:	Bar g,	Exhaust casing:	Bar g,
☐Nozzle ring:	%,	Admission		●Welded nozzle ring	
Diaphragm blade attachment		☐Integrally cast		☐Welded	☐Other
Diaphragm axial location		☐Individually		☐Staked	

○ ☐ CASING CONNECTIONS

CONNECTION	○DESIGN Approval req'd	☐Size	☐Facing	○Position	●Flanged ☐or studded	●Matching Flg & Gasket by vendor
Inlet						
Exhaust						
Extraction						
Admission						

ALLOWABLE PIPING FORCES AND MOMENTS

	INLET		EXHAUST		EXTR./ADM.		REMARKS
	N	N-m	N	N-m	N	N-m	
☐Parallel to shaft							
☐Vertical							
☐Horiz.90°							

MATERIALS-CASING & APPURTENANCES

○Steam contaminants:

○Steam path component hardness less than Rc 22 req'd

○Special low temp. material requirements

☐HP casing:	☐Nozzle ring	☐
☐Mid casing	☐Diaphragms	☐
☐Exhaust casing	☐Diaphragms nozzles	☐
☐Steam chest		

Remarks:

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3	ROTATING ELEMENTS										
4	Speed ☐Max allowable:		RPM,	Trip:		RPM,					
5	☐Lateral critical	1st	RPM	2nd		RPM,	Max.Continuous:		RPM		
6	Shaft type:						☐Shaft ends: DIA. @ CPLG:		mm		
7	☐Integral wheels	☐Built up	☐Combination				○Straight	○Taper	mm/m		
8	☐Double extended						○Keyed	○Single	○Double		
9	☐No. stages	Bearing span	Mm				○Hydraulic fit	○Integral flange			
10	☐Shaft material						○Field balancing ring req'd				
11	☐Shaft material under seals						☐No.	☐Location			
12	Applied by: ☐Plate	☐Sleeve	☐Spray Method				REMARKS				
13	BLADES(Buckets):										
14	☐Max tip speed:	m/s									
15	☐Final stg blade Lgt:	mm	Max. Lgt:	Mm							
16	Materials	STG 1	STG 2	STG 3	STG 4	STG 5					
17	☐Wheel mat'l										
18	☐Blade mat'l										
19	☐Blade mat'l										
20	☐Blade attach.										
21	☐TIE wire mat'l										
22	☐Shroud mat'l										
23	☐Shroud attach.l										
24	SHAFT SEALS		END SEALS				INTERSTAGE SEALS				
25	☐Type:	●Labyrinth	○Carbon ring				☐Type:	●Labyrinth	○Carbon ring		
26		Inlet	Exhaust				Material:				
27	☐Max seal press	Bar g	Bar g				Notes:				
28	☐Steam leakage	kg/h	Kg/h								
29	☐Air leakage	m3/h	m3/h								
30	☐Shaft dia & seal	mm	Mm								
31	☐No.ring per seal										
32	☐Diff.press per ring	Bar g	Bar g								
33	☐Stat.laby type										
34	☐Rotat laby type										
35	☐Material										
36	BEARINGS AND BEARING HOUSINGS										
37	Radial	Inlet	Exhaust				Radial	Inlet	Exhaust		
38	☐Type/MFR						☐Babbit thickness				
29	☐Lenght	mm	Mm				☐No.pads				
40	☐Shaft diameter	mm	Mm				☐Load B'twn/on pad				
41	☐Unit loading	N	N				☐Pivot:ctr/offset %				
42	☐Base material						☐				
43	Thrust	Active	Inactive				Thrust	Active	Inactive		
44	☐Type/MFR						☐Pivot:ctr/offset %				
45	☐Unit loading Max.	bar	Bar				☐Pad base mat'l				
46	☐Unit load(Ult)						Lubrication	●forced	○Directed		
47	☐Area	mm^2	Mm^2				Thrust collar	○Integral	●Replaceable		
48	☐No.pads						Material				

Remarks:

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1	**SERVICE: DRIVER FOR CO2 COMPRESSOR**	ITEM No.		
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3	LUBRICATIN AND CONTROL OIL SYSTEMS			
4	Reference specs: **API614**	Oil requirements:	Control oil	Lube oil
5	Furnished by ○Turbine MFR ●Compr. MFR	☐Normal flow m^3/h		
6	○Separate for turbine only	☐Transient flow m^3/h		
7	●Common oil system with compressor	☐Pressure bar g		
8		☐Temperature ℃		
9	Turbine MFR to supply:	☐Total heat rejected MJ/h		
10	●Control oil accumulator	☐Oil type mineral/syn		
11	●Stainless steel oil supply header piping	☐Viscosity ssu at 40 ℃		
12	●Oil drain header piping	☐Filtration microns		
13	●Stainless steel ○Carbon steel	☐		
14	●Sight flow indicators	☐		
15	ACCESSORIES			
16	COUPLINGS AND GUARDS			
17	Note: See rotating elements shaft ends	○See attached API 671 data sheet		
18	Coupling furnished by: ●compressor MFR	○turbine MFR		
19	Manufacturer: Type: **Flexible disc** Model:			
20	Coupling guard furnished by: ●vendor			
21	Type: ●Fully enclosed ○Semi open ○Other			
22	Coupling details	○Vendor mount half coupling		
23	☐Max. O.D. mm	○Idling adapter/solo plate req'd		
24	☐Hub weight kg	Lubrication requirements		
25	☐Spacer length mm	○Grease ○Cont oil lube ●oil free		
26	☐Spacer weight kg	Quantity per hub: g or l		
27	MOUNTING PLATES			
28	Base plates: Furnished by: **VENDOR**	Sole plates : Furnished by: VENDOR		
29	○Under turbine only ○Other	Thickness: mm		
30	○Open ○Non skid decking	○Subsole plates req'd		
31	○Drip rim ○Leveling pads	●Hold down bolts furnished by: **VENDOR**		
32	○Column mounting	○Primer for epoxy grout req'd Type:		
33	●Sub sole plates req'd	●Anchor bolts furnished by: **VENDOR**		
34	○Common for turbine and driven equipment	●Leveling chock blocks req'd		
35		Furnished by: **VENDOR**		
36	GEAR UNIT			
37	Furnished by : vendor (if any)	See data sheet:		
38	●Reference **API 613** ○Other			
39				
40				

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1	**SERVICE: DRIVER FOR CO2 COMPRESSOR**	ITEM No.
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3	CONTROLS AND INSTRUMENTATION:	
4	Instrument and control panel specifications and scope of	Additional requirements:
5	Supply shall be in accordance with the following the	
6	Attached data sheets	
7	○API 614 appendix B pages:	
8	○Purchasers data sheets:	
9	○API 670 appendix D pages	
10	○Other: refer to specification	
11	○	

12	PROTECTIVE DEVICES						
13	Protective devices	Exhaust relief valve	Extractions relief valve	Sentinel warning valve	Vacuum breaker	Non return valve	
14	Mounting location						
15	Relief press. Bar g						
16	Capacity steam kg/h						
17	Valve type/MFR						
18	Valve size/rating						
19	Flange facing						
20	Furnished by						

21	TRIP AND THROTTLE VALVES:			
22	Location:	●Main inlet	○Admission	☐Strainer: Opening size : mm, Mat'l:
23	Provided by:	●Vendor	○Purchaser	☐Stam mat'l: Hardness: Rc
24	☐Manufacturer:		Model:	☐Seat mat'l: Hardness: Rc
25	☐Size:	Rating:	Facing:	☐Packing mat'l: Leakoff: kg/h
26	Construction features			
27	Action:	○Pull to seat	○Push to seat	☐Spring support of valve req'd
28	Reset:	●Manual	●Hydraulic	●By Vendor ○By Purchaser
29	Trip:	●Local (manual)	●Remote	
30	Exerciser:	●Local (manual)	○Remote	

31	CONTROL VALVES				
32	Location	Main inlet(Govenor)	Admission	Extraction	Exhaust
33	Trip position (open/closed)				
34	Number of valves				
35	Provided by				
36	Manufacturer				
37	Connection size				
38	Rating/Facing				
39	Action				
40	Stem material				
41	Stem mat'l hardness Rc				
42	Seeat material				
43	Seat mat'l hardness Rc				
44	Packing material				
45	Packing leakoff kg/h				
46					

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3	TURNING GEAR	MISCELLANEOUS
4	●Turning gear req'd	○Start up assistance: Days:
5	●Furnished by : VENDOR	●Vendor's review & comments on purchaser's
6	○Type: Barring speed: RPM	●Piping & foundation drawings
7	●Engagement ●Auto ○Manual	●Vendor witness initial alignment
8	○MFR: Model:	●"Y" type strainer
9	●Mounted by: Vendor	●Water washing connections
10	○Driver ref.spec:	●Optical alignment flats
11	Type ●Elec ○Other	○
12	☐Utility requirements:	○
13		
14	Remarks:	
15	GOVERNOR:	Governor speed pick up No. Req'd
16	Furnished by: VENDOR	Furnished by :
17	MFR: Model	○Direct ○60 tooth wheel
18	○Mechanical driven application	Other:
19	●Speed control ○Other	
20	Specify:	○Hand valves No. req'd
22		○Manual ○Automatic
23	○Generator drive application:	○Operator type:
24	○Isochronous control ○Speed droop control	Overspeed trip
25	○Combinasion (specify):	☐Mechanical set point RPM
26		☐Type:
27	○Local speed changer type:	●Electrical set point: RPM
28	●Remote control device type:	●Furnished by : VENDOR
29	Furnished by: VENDOR	○MFR ○Model
30		○No.speed pick up:

Controlled variable	Operating range	Control signal range	
Speed	to RPM	to Bar/mA	
Pressure	to RPM	to Bar/mA	
	to	to	

31		Type ○Direct ○60 tooth wheel
32		○Other
33		●No. of Speed prove: 2 out of 3
34		○Locate apart form gov. Pick up
35	GLAND SEALING AND VACUUM SYSTEM	
36	System per:API612 ○AppendixB-1 ○Appendix B-2	Vacuum system: Furnished by:
37	○Other	○Ship loose ○Skid mounted
38	☐Sealing stm: Press. Bar g Flow: Kg/h	○Other
39	☐Sealing stm relief Valve,set press.: Bar g	○Gland condenser, see spec.:
40	Furnished by:	○Steam ejector ☐Steam press. Bar g
41	☐Flow adjusting valves type:	☐Steam flow Kg/h
42	Furnished by:	○Vacuum pump see spec:
43		○Condensate receiver
44		○Loop seal height: m
45	INSULATION AND JACKETING	SPECIAL TOOLS
46	●Insulation	○Idling adapter / solo plate
47	Type:	○Cplg ring and plug gauge
48	○Insulation	○Hydraulic Cplg mtg / removal kit
49	Type:	○Other
50		

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3	INSPECTION AND TESTING							MECHANICAL RUNNING TEST		
4	GENERAL								Req'd	Wit'n
5	●Shop inspection							●Contract rotor	●	●
6	Extent: Turbine + auxiliaries							●Spare rotor	●	●
7								●Test w/job coupling	●	○
8	INSPECTION AND MATERIAL TESTING							●Test tape recording requered	●	○
9	●Final assembly records req'd							●Test tapes given to purchaser	●	○
10	Special mat'l inspection & testing requirements:							●Use job vib./disp.	●	○
11	Component	Marg part	Dye pene	Radio graph	Ultra sonic	Req'd	Wit'n	OPTIONAL TESTS	Req'd	Wit'n
12	T&t valve	yes	yes		yes	●	○	○Performance	○	○
13	Stm chest	yes				●	○	○Complete unit	○	○
14	Casing	yes				●	○	●Torsional measurements	●	○
15	Piping			yes		●	○	●Sound level	●	○
16	Rotor	yes	yes	yes	yes	●	○	Aux. Equipment		
17	●Heat stability					●	○	●T & t valve	●	○
18	●Cleanliness					●	○	●Gland sealing system	●	○
19	●Hardness					●	○	○Gland vacuum system	○	○
20	●Hydrostatic tests					●	○	●Lube oil system	●	○
21	●Blade shaker (static)					●	○	●relief valves	●	○
22	Rotor balance							●Casing internal insp.	●	○
23	○Standard					○	○	●Cplg to shaft fit	●	○
24	●High speed					●	○	●Turning gear	●	○
25	●Final surface insp.					●	○	Additional test or insp.		
26	●Crating insp.					●	○	●Bearing inspection	●	●
27	●Spare rotor fit					●	○	●Overspeed and trip	●	●
28	PAINTING							WEIGHTS		
29	●manufacturer's standard		○Other:					☐Turbine		kg
30	SHIPMENT							☐Rotor		kg
31	○Domestic		●Export					☐Turb. Upper casing		kg
32	●Exp boxing req'd		●Out door stor over 6 mo's					☐Max for maint. (identify)		kg
33	●Water proof boxing required							☐T & t valve		kg
34	●Spare rotor assembly packaged for : (separate container)							☐Misc.		kg
35	○Horiz'l storage		○Vert'l storage					☐Total shipping weight		kg
36	SPACE REQUIRMENTS							VENDOR DWG & DATA REQ'MTS:		
37	☐Complete unit	L:	m,W	m, H	m			○Appendix		
38	☐Control panel	L:	m,W	m, H	m			●Progress reports req'd		

SUPPLY BY VENDOR (●INCLUDING)

39	●Turbine	●heat resistant paint	●instrument device and local panel
40	●separate trip & throttle valve	●baseplate and foundation bolt	●shaft vibration monitor system
41	●extraction non return valve with control	●water-cooled surface condenser	●axial position monitor system
42	○injection strip & control valve	●expansion joint	●bearing temp. monitor system
43	● electronic speed governor (if any)	● vac. System(2x100%) & start ejector& inter/after condenser	●spare parts
44	●sealing system with control	●level control system for hot well	●fitting attachment for installation
45	●gland condenser with accessories (if any)	●steam trap package	●special tools for assemble & maint.
46	○separate lube and control oil system	○ interstage piping between turb.& accessories	●information & drawing by vendor
47	●all drains and valved drains	●all necessary aux. Equip. for turbine	●manual for install. Oper. & maint.
48	●heat insulation under jacket	○all instrument on interstage piping	
49	●condensate pumps	●atm. relief valve	

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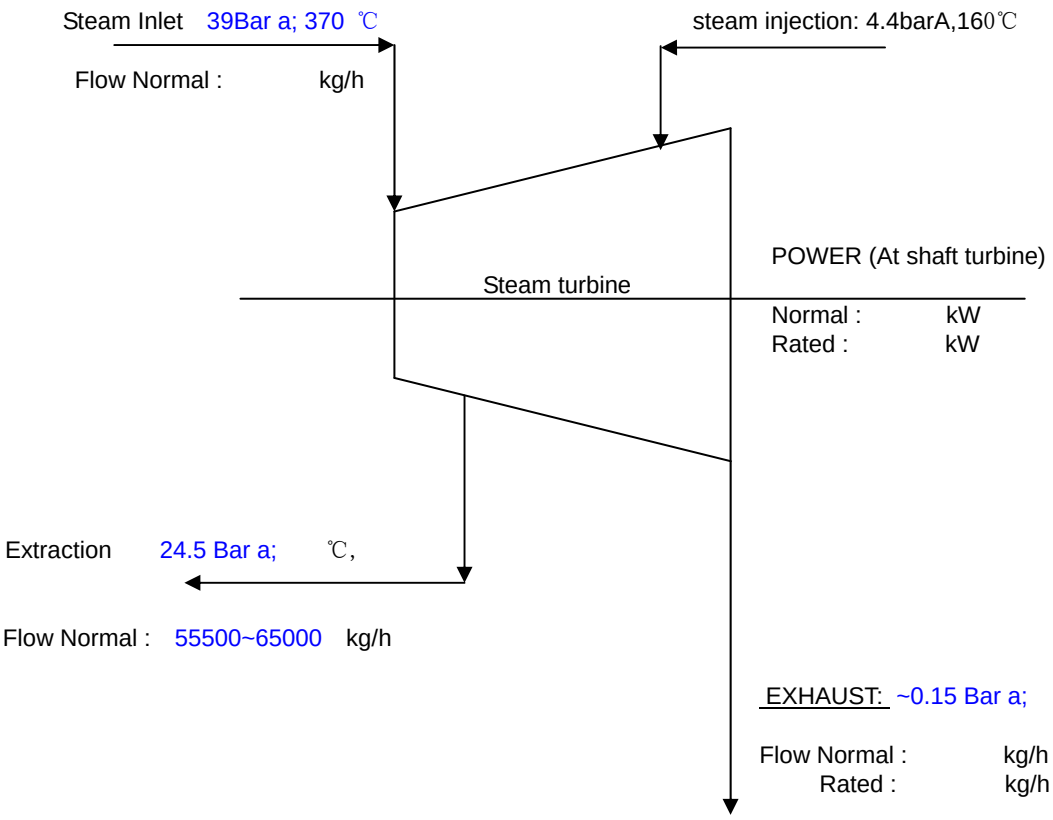

Remark:

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