

FLUOR

Steam Turbine Data Sheet
General Information
Data Sheet 1

 BOC NO. A4AN00-0-DS-4-TG-01 ITEM NO. T-0522 / G-0041

 PO / REQ NUMBER A4AN-4-0302-01

 SPECIFICATION NO. A4AN00-0-SP-4-TG-01

 REVISION NO. 3 DATE 06-FEB-09

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General Site Data

 APPLICABLE TO: PROPOSAL PURCHASE **AS-BUILT / DESIGN** (Proprietary Data)
 FOR Tesoro UNIT LAR Cogeneration & Boiler Replacement // C-33306
 SITE Wilmington, CA SERIAL NO. D6397
 SERVICE Steam Turbine Generator NO. REQUIRED One (1)
 MANUFACTURER Dresser-Rand MODEL 1THB3H02 DRIVEN EQUIP. ITEM NO. _____
 DRIVEN EQUIPMENT TYPE: GENERATOR OTHER
 NOTE: INFORMATION TO BE COMPLETED BY: PURCHASER MANUFACTURER PURCHASER OR MANUFACTURER

Steam Turbine Type

 Flows
 Arrangement: Back Pressure Condensing
 Controlled Extraction Uncontrolled Extraction
 Partial Ans: (Yes) (No)

Performance

<input checked="" type="checkbox"/> GUARANTEE	SHAFT			INLET			EXTRACTION			EXHAUST		
	POWER kW	SPEED RPM	FLOW lbm/s	PRESS. PSIG	TEMP. °F	FLOW lbm/s	PRESS. PSIG	TEMP. °F	PRESS. PSIG	TEMP. °F	ENTHALPY Btu/lb	
ZERO EXTRACT CASE	10928	3600/4500	500/650	925	749	ZERO			235	476.67	1248.8	

Steam Conditions

<input checked="" type="checkbox"/> INLET	Design Pressure	<input type="radio"/> (Yes) <input type="radio"/> (No)		<input checked="" type="checkbox"/> EXHAUST	
		Normal	Maximum		
NORMAL	925 psig	749	F	NORMAL	235 (psig)
MAXIMUM	925 (See Note 3) psig	775	F	MAXIMUM	240 (psig)
MINIMUM	925 psig	725	F	MINIMUM	200 (psig)

Site and Utility

LOCATION:
 INDOOR HEATED UNDER ROOF OUTDOOR
 UNHEATED PARTIAL SIDES GRADE MEZZANINE
 TEMPERATURE Low _____ °F High _____ °F
 WINTERIZATION REQ'D TROPICALIZATION REQ'D
 CORROSIVE AGENTS
 ELECT. AREA CLASSIFICATION: CL _____ GP _____ DIV _____

SITE DATA:
 ELEVATION 57 FT PRESSURE 14.67 psia
 WINTER TEMP 41 (Note 1) °F SUMMER TEMP 90 (Note 2) °F
 REL. HUMIDITY _____ % DESIGN WET BULB 69 °F
 SEISMIC CONDITIONS _____
 UNUSUAL CONDITIONS DUST PUMES
 OTHER _____

ADJ. STEAM: MAX NORM MIN
 INLET PRESSURE (psia) 240 225 200
 INLET TEMP. (°F) 475 468 463
 EXH. PRESS. (psia) _____
 INST. AIR (psig) NORM 60 MIN 40 MAX 125
 INSTRUMENT AIR DEW POINT -40 °F

ELECTRIC: DRIVERS HEATING INSTR. ALARM
 (See Spec. No. A4AN00-SP-6-TG-04) CONTROL SHUTDOWN
 VOLTS _____
 PHASE _____
 HERTZ _____
 KW AVAIL _____

COOLING WATER:
 TEMP. INLET 120 °F MAX. RETURN 140 °F
 PRESS. NORM. 45 (psig) DESIGN 100 (psig)
 MAX. RETURN PRESS. 40 (psig)
 MAX. ALLOWABLE PRESS. DROP 15 (psig)
 WATER SOURCE Closed Fin-Fan System
 VELOCITY FTS. MIN 5
 FOULING FACTOR 0.0005

UTILITY CONSUMPTION:
 COOLING WATER: _____ GPM
 AUX. STEAM. NORMAL _____ lb/hr
 AUX. DRIVERS. ELEC _____ KW STEAM
 HEATER(S) _____ KW OTHER

Remarks

- Green indicates buyer supplied data.
 - Red indicates seller supplied data.
 - Blue indicates shared responsibility
1. Winter extreme = 36°F
 2. Summer extreme = 103°F, Average ambient = 63°F
 3. Maximum Design Pressure is 1060 psig

AW - PROCEED WITH COMMENTS
FLUOR

Notification to proceed does not constitute acceptance nor relieve Contractor/Seller of any liability. Acceptance is accomplished under the terms of the Contractor/Purchase Order.

A4AN-4-0302-01-00025-3
TAG NO.: T-0522

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STEAM TURBINE DATA SHEET
Heat Balance (3) - Maximum Extraction
Data Sheet 5

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Turbine Heat Balance - Maximum Extraction

<input checked="" type="checkbox"/> Main Steam Flow	<u>500,000</u> lb/hr	<input type="checkbox"/> Extraction #5	_____ lb/hr
Pressure	<u>925</u> psig	Pressure	_____ psig
Temperature	<u>746</u> F	Temperature	_____ F
Enthalpy	_____ btu/lb	Enthalpy	_____ btu/lb
<input type="checkbox"/> Reheat Steam Flow	_____ lb/hr	<input type="checkbox"/> Extraction #6	_____ lb/hr
Pressure	_____ PSIA	Pressure	_____ psig
Temperature	<u>F</u>	Temperature	<u>F</u>
Enthalpy	_____ btu/lb	Enthalpy	_____ btu/lb
<input checked="" type="checkbox"/> Extraction #1	<u>31,800</u> lb/hr	<input type="checkbox"/> Extraction #7	_____ lb/hr
Pressure	<u>351.7</u> psig	Pressure	_____ psig
Temperature	<u>543.43</u> F	Temperature	<u>F</u>
Enthalpy	<u>1276.85</u> btu/lb	Enthalpy	_____ btu/lb
<input type="checkbox"/> Extraction #2	_____ lb/hr	<input type="checkbox"/> Extraction #8	_____ lb/hr
Pressure	_____ psig	Pressure	_____ psig
Temperature	<u>F</u>	Temperature	<u>F</u>
Enthalpy	_____ btu/lb	Enthalpy	_____ btu/lb
<input type="checkbox"/> Extraction #3	_____ lb/hr	<input checked="" type="checkbox"/> Exhaust	<u>463,750</u> lb/hr
Pressure	_____ psig	Pressure	<u>235</u> psig
Temperature	<u>F</u>	Temperature	<u>474.1</u> F
Enthalpy	_____ btu/lb	Enthalpy	<u>1247.3</u> btu/lb
<input type="checkbox"/> Extraction #4	_____ lb/hr	<input type="checkbox"/> Feedwater	<u>F</u>
Pressure	_____ psig	<input type="checkbox"/> Deaerator in Cycle? (Yes/No)	_____
Temperature	<u>F</u>	as Heater # _____	
Enthalpy	_____ btu/lb		

Performance Curves

- Steam Flow vs. First Stage Pressure
- Steam Flow vs. MW
- Steam Rate Corrections Factors of Off Design Steam Pressure, Temperature, and Exhaust Pressure
- LP Efficiency vs. Exhaust Velocity
- HP Efficiency vs. Control Valve Position
- Heat Rate vs. Steam Flow

Remarks

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STEAM TURBINE DATA SHEET
Design Data
 Data Sheet 6

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Design

- Number of Flows _____
- Number of Stages _____ 6
- Number of Extractions _____ 2 with 1 PCV and 2 NRV's
- Seal Type - Shaft and Interstage _____ Labyrinth
- Nozzle Type _____ Stationary PRV
- Shaft type: Integral/Built Up/Combination _____ Integral
- Inlet (steam chest) Mechanical Design Pressure (psig) _____ 1060⁽¹⁾
- Inlet (steam chest) Hydrostatic Test Pressure (psig) _____ 1637
- Inlet (steam chest) Mechanical Design Temperature ("F) _____ 850⁽¹⁾

Materials of Construction

- Casing _____ ASTM A217, Gr WC6 Cr-1/2 Mo and ASTM A216 Gr WCB
- Nozzle Vane _____ A276, Typ 410
- Cap Nuts, Studs, Fasteners _____
- Seals, Interstage _____ A346, TP3
- Seals, Shaft _____ A346, TP3
- Diaphragm/Blade Carriers _____ ASTM A668, CL BH
- Shaft Material _____ ASTM A470 CL4 Ni-Mo-V

Rotor Elements

- Shaft Materials in way of seals _____ ASTM A470, CL4
- Max Tip Speed Ft/s _____ 619
- Coupling Integral Flange Shrunk On
- Spray Plating? Yes No If yes, submit spray application method
- Balance Ring Location _____ None
- Interstage Seal Type _____ Laby

Shaft Seals (Inlet and Exhaust)

- Steam Leakage (Lb/hr) _____ flow to gland cond. = 1480 lb/hr, basis 200% of new clearance
- Max Steam Pressure (psig) _____ max 1st stage press. = 722.5 psig
- Air Leakage (Lb/hr) _____ 112 scfm basis 200% of new clear

ROTATING ELEMENTS

<input type="checkbox"/> Blade Root Type (Dbl Dove Tail)	Stg 1	Stg 2	Stg 3	Stg 4	Stg 5	Stg 6	Stg
<input type="checkbox"/> Pitch Diameter (in)	32	32	32	32	32	32	
<input type="checkbox"/> Blade Height (in)	0.899	1.228	1.398	1.608	1.908	2.168	
<input type="checkbox"/> Wheel Material	Integral Rotor ASTM 470 CL4 Ni-Mo-V ----->						
<input type="checkbox"/> Blade Material	ASTM A276 TP 403 SS ----->						
<input type="checkbox"/> Shroud Material	ASTM A176 TP 403 SS ----->						
<input type="checkbox"/> Blade Type	IMPULSE ----->						

Nozzle

- Full Arc or Partial Arc PARTIAL ARC Nozzle Ring _____

REMARKS:

(1) Max operating steam condition at the inlet is 925 psig / 775°F

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STEAM TURBINE DATA SHEET
Turbine Valves
Data Sheet 7

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STOP VALVE

Design		Inspection	
<input type="checkbox"/> Size	<u>12 in</u>	<input type="checkbox"/> NDE Certification	<u>various VI, MT, RT & PT Reports</u>
<input type="checkbox"/> Number of Valves	<u>1</u>	<input type="checkbox"/> Dimensions	_____
<input type="checkbox"/> Packing Leakoff	<u>Yes</u>	<input type="checkbox"/> Forging Doc	_____
Material		<input type="checkbox"/> Assembly Doc	<u>Hydro, operational & seat leakage tests</u>
<input type="checkbox"/> Stem	<u>ASTM A355 CLA</u>	Operator	
<input type="checkbox"/> Seat	<u>ASTM A182 Gr F11 w/ stellited seat</u>	<input type="checkbox"/> System pressure	<u>120 #G</u>
<input type="checkbox"/> Sealing steam flow (lb/hr)	<u>≈ 200 throttling/ 0 F.O.</u>	<input type="checkbox"/> Description	<u>Oil cylinder</u>

CONTROL VALVES

Design		Inspection	
<input type="checkbox"/> Number of Valve	<u>6</u>	<input type="checkbox"/> NDE Certification	_____
<input type="checkbox"/> Leak off rate (lb/hr)	<u>283 total 6 vlvs</u>	<input type="checkbox"/> Dimensions	_____
<input type="checkbox"/> Location	<input checked="" type="checkbox"/> Shell mounted <input type="checkbox"/> Separate	<input type="checkbox"/> Forging Doc	_____
<input type="checkbox"/> Operation	<input checked="" type="checkbox"/> Cam <input type="checkbox"/> Direct	<input type="checkbox"/> Assembly Doc	_____
Material		Operator	
<input type="checkbox"/> Stem Material	<u>ASTM A182 Gr F6a Cl4</u>	<input type="checkbox"/> System pressure	<u>120</u>
<input type="checkbox"/> Seal Material	<u>ASTM A739 Gr B11</u>	<input type="checkbox"/> Description	<u>Oil cylinder</u>
<input type="checkbox"/> Body Material	<u>ASTM A217, GR WC6 Cr-1/2 Mo</u>		

EXTRACTION NON-RETURN VALVE

Design		Inspection	
<input type="checkbox"/> Number of Valves	<u>2</u>	<input type="checkbox"/> NDE Certification	<u>VI</u>
<input type="checkbox"/> Leak off rate (lb/hr)	<u>Negligible (soft packing)</u>	<input type="checkbox"/> Dimensions	_____
Material		<input type="checkbox"/> Forging Doc	<u>Hydro & seat leakage</u>
<input type="checkbox"/> Stem Material	<u>SST A479 410 CL3</u>	<input type="checkbox"/> Assembly Doc	_____
<input type="checkbox"/> Seat Material	<u>Stainless Steel</u>	Operator	
<input type="checkbox"/> Body Material	<u>A216 WCB</u>	<input type="checkbox"/> System pressure	<u>40-125 psig</u>
		<input type="checkbox"/> Description	<u>Air cylinder</u>

EXHAUST NON-RETURN VALVE

Design		Inspection	
<input type="checkbox"/> Number of Valves	<u>BY BUYER</u>	<input type="checkbox"/> NDE Certification	_____
<input type="checkbox"/> Leak off rate (lb/hr)	_____	<input type="checkbox"/> Dimensions	_____
Material		<input type="checkbox"/> Forging Doc	_____
<input type="checkbox"/> Stem Material	_____	<input type="checkbox"/> Assembly Doc	_____
<input type="checkbox"/> Seat Material	_____	Operator	
<input type="checkbox"/> Body Material	_____	<input type="checkbox"/> System pressure	_____
		<input type="checkbox"/> Description	_____

Remarks

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STEAM TURBINE DATA
Oil System and Bearings
 Data Sheet 8

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OIL SYSTEM**Lubrication Oil**

Design

- Temperature (F) 135 F
 Pressure (psig) 20
 Oil Type ISO VG 32
 Viscosity (SSU) 130-180 @ 100°F
 Filtration (Microns) 10
 Flow (GPM) 102.5 (turb, gear, gen)
 Retention Time 5 min

Control Oil

Design

- Temperature (F) 135 F
 Pressure (psig) 120
 Oil Type ISO VG 32
 Viscosity (SSU) 130-180 @ 100°F
 Filtration (Microns) 10
 ISO cleanliness levels ISO 4406 = 15/13/10
 Flow (GPM) 4.25 steady / 69 transient
 Retention Time 5 min

Seal Lubrication Oil (if applicable)

Design

- Temperature (F) _____
 Pressure (psig) _____
 Oil Type _____
 Viscosity (SSU) _____
 Filtration (Microns) _____
 ISO cleanliness levels _____
 Flow (GPM) _____
 Retention Time _____

BEARINGS**Main Bearings (Radial)**

Design

- Number of Bearings 2
 Type Tilt-Pad
 Manufacture RMT
 Base Material Steel
 Diameter in Stm. End = 6.00"
Exh End = 8.00"
 Babbitt Thickness (in) 1/16"
 Temperature Device RTD

Vibration Detector

- Manufacture Bently Nevada
 Type proximity
 Total Number 4 (2 each bearing)
 Location slightly inboard of bearings

Alarms

- Temperature (F) 230°F
 Vibration (Mils) 2.3 mils

Trust Bearing

Design

- Type Tilt-pad
 Manufacture RMT
 Size (in)² ≈ 68
 Base Material Steel
 Diameter (in) 12"
 Babbitt Thickness (in) 1/16"
 Temperature Device RTD

Axial Position Detector

- Manufacture Bently Nevada
 Type proximity
 Total Number 2
 Location at rotor thrust end

Alarms

- Temperature (F) 230°F
 Thrust (Mils) ± 0.017"

Remarks

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STEAM TURBINE DATA SHEET

Casing Connections

Data Sheet 9

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CASING

CONNECTION NORMAL	DESIGN APPROVAL REQD	SIZE	FACING	POSITION	FLANGED OR STUDDED	MATING FLG. & GASKET BY VENDOR	MAX STEAM FLOW Lbs/hr	MIN STEAM FLOW Lbs/hr
INLET		12" 200 LB	RF	Left	Flanged	No	50000	26000
EXTRACTION		1" 600 LB	RF	Down	Flanged	No	3100	0
EXHAUST		24" 200 LB	RF	Up	Flanged	No	49500	25800

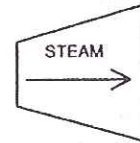
ALLOWABLE FORCES & MOMENTS

	INLET		EXHAUST			
	FORCE	MOMENT	FORCE	MOMENT	FORCE	MOMENT
	Lb	Ft-Lb	Lb	Ft-Lb	Lb	Ft-Lb
PARALLEL TO SHAFT	See outline drawing 6070955					
VERTICAL						
HORZ 90°						

ROTATION: (VIEWED FROM INLET END)

CW CCW

VIEW →



Remarks



**STEAM TURBINE DATA
GOVERNOR**
Data Sheet 10

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SERVICE REQUIREMENTS

Control Requirements

- | | |
|---|--|
| <input checked="" type="radio"/> DROOP CONTROL | <input type="radio"/> LOAD SHEDDING |
| <input checked="" type="radio"/> FREQ CONTROL | <input checked="" type="radio"/> AUTO SYNCHRONIZATION |
| <input checked="" type="radio"/> EXHAUST HEADER CONTROL | <input checked="" type="radio"/> AUTO VOLTAGE REGULATION |
| <input checked="" type="radio"/> KW CONTROL | <input type="radio"/> TURBINE INLET PRESSURE LIMITING |
| <input type="radio"/> KW IMPORT/EXPORT CONTROL | <input type="radio"/> INLET PRESSURE LIMITER |

Governor

Type Electronic
 Manufacture Triconex
 Model Trident

CONTROL INPUT/OUTPUT REQUIREMENTS

DISCRETE INPUTS

- START OR RESET
- NORMAL STOP
- EMERGENCY TRIP
- NORMAL
- LOWER SPEED
- ENABLE/DISABLE REMOTE SPEED SETPOINT
- RAMP TO MINIMUM CONTINUOUS
- OVERSPEED TEST ENABLE
- ENABLE PRESSURE CONTROL
- ENABLE ALARM CLEAR/ACKNOWLEDGE
- REMOTE ALARM CLEAR/ACKNOWLEDGE
- ENABLE AUTO SYNCH
- CASCADE RAISE/LOWER
- OTHER _____

ANALOG INPUTS (4-20mA)

- REMOTE SET POINT
- PROCESS PRESSURE (EXHAUST HEADER)
- EXTRACTION PRESSURE FLOW
- KW IND LOAD PRESSURE FLOW
- KW IMPORT/EXPORT
- Other _____

DISCRETE OUTPUTS

- COMMON SHUTDOWN
- COMMON ALARM
- OVERSPEED TRIP 3959 RPM
- REMOTE SPEED SETPOINT ENABLED
- PRESSURE CONTROL ENABLED
- FLOW CONTROL ENABLED
- EXTRACTION CONTROL ENABLED
- SPEED PICKUP ALARM
- OTHER _____

ANALOG ACCESSORY OUTPUTS (4-20mA)

- 1st STAGE PRESSURE
- SPEED SETPOINT
- REMOTE SPEED SETPOINT
- EXTRACTION PRESSURE
- EXTRACTION PRESSURE SETPOINT
- ACTUATOR POSITION
- PROCESS PRESSURE SETPOINT
- KW
- KW IMPORT/EXPORT

Governor Installation Requirements

- | | | | |
|------------------|--|---------------------|--|
| LOCATION | <input type="radio"/> LOCAL (AT TURBINE) | MOUNTING | <input checked="" type="radio"/> FLUSH MOUNT IN PANEL |
| | <input checked="" type="radio"/> REMOTE (CONTROL ROOM) | | <input type="radio"/> SURFACE MOUNT |
| | <input type="radio"/> OTHER _____ | | <input type="radio"/> VERTICAL RACK |
| ENCLOSURE | <input checked="" type="radio"/> GENERAL PURPOSE | POWER SOURCE | SINGLE DUAL |
| | <input type="radio"/> NEMA 4 | 120 VAC | <input type="radio"/> <input type="radio"/> |
| | <input type="radio"/> NEMA 4X | 220 VAC | <input type="radio"/> <input type="radio"/> |
| | <input type="radio"/> NEMA PURGE TYPE | 125 VDC | <input type="radio"/> <input type="radio"/> |
| | <input type="radio"/> EXPLOSION PROOF | 24 VDC | <input checked="" type="radio"/> <input type="radio"/> |

Locally Mounted Accessories

- ACTUATOR: SUPPLIED BY Turbine Vendor MANUFACTURER Voith MODEL _____
- ACTUATOR TYPE: HYDRAULIC PNEUMATIC SINGLE COIL MULTI COIL OTHER _____
- TACHOMETER: MANUFACTURER Airpax MODEL Tachrol 30 NO REED 1
- LOCATION(S): Local Gauge Board

FLUOR**STEAM TURBINE DATA****Buyer's Material and Testing Standards
Data Sheet 11**DOC. NO. A4AN00-0-DS-4-TG-01 ITEM NO. T-0522 / G-0041PO / RFQ NUMBER A4AN-4-0302-01SPECIFICATION NO. A4AN00-0-SP-4-TG-01REVISION NO. 3 DATE 06-FEB-09PAGE 11 OF 14DescriptionUniversal Standards

Standard for SS bars and shapes	ASTM A276
Standard for SS billets for forging	ASTM A314
Standard for Mechanical Test	ASTM A370
Standard for Vacuum Treated Carbon/Alloy Steel forgings for rotors and shafts	ASTM A470-01
Standards test method for heat stability for steam turbine rotor shafts and rotor forging	ASTM A472-98
Standard for specification for SS forgings	ASTM A473-01
Standard for spec for general reqt (psig)	ASTM A484
Standard spec for machining SS bars	ASTM A582
Standard test method, practices and terminology for chemical analysis of steel products	ASTM A751-96
Standard for vacuum treated 12% chromium turbine rotors and shafts	ASTM A768-95
Standard test methods for chemical analysis of SS, heat resisting and other Cr-Ni-Fe Alloys	ASTM E353-93
Standard method of microtech testing steel bars, billets, blooms, and forgings.	ASTM E381-01
Turbine performance – American Society of Mechanical Engineers	ASME – PTC 6
Cast iron pipe flanges and fittings	ASME B16.1
Unified screw threads	ASME B1.1
Piping	ASME B31.1
Boiler and pressure vessel code	ASME SECT VIII
Generator performance and tests	ANSI C50.13
Environmental Noise	ISO 1996-1
Sound Power Levels of Noise Sources	ANSI S12.36
Technical Drawings	ISO 1101
Quality Management Systems	ISO 9001
Excitation system performance and tests	IEEE 421
Static Excitation Systems	IEC 60034
Rotating Electrical Machines	IEC 60034
AC and DC Motors	NEMA MG1/IEEE 122
Mechanical Vibration-Balance and quality requirements of rotors	ISO 1940
Petroleum Lubricants	ISO 8068
National Electric Code	NFPA 70

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STEAM TURBINE DATA

Accessories Data Sheet 12

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MOUNTING PLATES

BASEPLATES FURNISHED BY: D-R
 UNDER TURBINE GEAR
 OPEN NON-SKID DECKING
 NORMAL LEVELING PADS
 COLUMN MOUNTING SUB PLATES REQ'D
 LEVELING (CHOCK) BLOCKS REQ'D
FURNISHED BY: _____SOLEPLATES FURNISHED BY: VENDOR
THICKNESS _____
 SUB PLATES REQ'D
 HOLD-DOWN BOLTS FURNISHED BY _____
 EPOXY PRIMER VENDOR _____
FIXATORS ARE REQUIRED
 ANCHOR BOLTS FURNISHED BY: BUYER

PROTECTIVE DEVICES

	EXHAUST RELIEF VALVE	NON-RETURN VALVE EXHAUST	NON-RETURN VALVE EXTRACTION	
MOUNTING LOCATION		PIPING	PIPING	(See Note 1)
SET RELIEF PRESS. (PSIG)	250, Fully open 275		351.7	
CAPACITY, LHR STEAM	539500		31600	
VALVE MANUFACTURER			WEIR	
VALVE TYPE			Swing Check	
VALVE SIZE/RATING			4" - 600 LB	
FLANGE FACING			Weld Prep.	
FURNISHED BY	BUYER	BUYER	VENDOR	
QUANTITY			Two	

TURNING GEAR

 TURNING GEAR REQUIRED
 FURNISHED BY Lufkin / Gear Vendor
 TYPE motor driven SPEED 1800 motor / 17 output RPM
 AUTO MANUAL
 MFR KOENIG MODEL KE70-44T-5
 MOUNTED BY Lufkin / Gear Vendor
 DRIVER: REF. SPEC: _____
TYPE: ELEC. OTHER
 OPERATOR STATION LOCAL REMOTE

VARIOUS

 START-UP ASSISTANCE
 VENDOR'S REVIEW & COMMENTS ON PURCHASER'S PIPING AND FOUNDATION DRAWINGS
 VENDOR WITNESS INITIAL ALIGNMENT

SPECIAL TOOLS

 Alignment Mandrel
 Hydraulic tensioners for horizontal joint
 Rotor and casing lifting beams and rigging
 Bolt heaters
 Other _____

INSULATION & JACKETING

 BLANKET OTHER _____
 JACKETING
 CARBON STEEL STAINLESS STEEL
 EXTENT
 WIND SPEED 70 MPH
 AMBIENT TEMP. 90 °F
 SURFACE TEMP. _____ °F

Remarks

1. NRV shaft to have positive means to prevent blowing out of housing in event of shaft failure.

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STEAM TURBINE DATA

Seller Material and Testing Standards
Data Sheet 14

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<u>Component</u>	<u>Design</u>	<u>Material</u>	<u>Test</u>
Steam turbine	Extr. Back Pressure	Various	Mechanical Run
Gland steam Condenser	Shell and Tube	Various	Hydrotest
Oil coolers	Shell and Tube	Various	Operational
Oil pumps	Positive Displacement	Various	Operational
Oil reservoir	Welded	304 SS	Operational
Oil conditioner	Connections only		
Vapor extractor	Blower	Various	Operational
Gland condenser fans	Blower	Various	Spin Test
Control system	Triconex Trident	Various	
Panel	Ewing Controls	304 SS	
Piping and valves	See P&I Dwg.		
Instruments	See P&I Dwg.		
Fasteners			
Electrical Cables & Connections	See Elec. Dwg.		
Motors	TEFC	Various	Operational
Exciters	Brushless	Various	ANSI C50.13
Generator	4 Pole Synchronous	Various	ANSI C50.13
Protection Devices	See Elec. Dwg.		

304 SS

STG & GTG
PANELS WILL BE
MOUNTED INDOORS
AND DO NOT
TO BE
PAINTED
NEED
304SS
WILL BE
THESE TWO
PANELS

Remarks
