GAS TURBINE DATA SHEET PGT5/2

CUSTOMER :	Varese Risorse S.p.A.
PLANT LOCATION :	Italy
PLANT:	Centrale di teleriscaldamento di Varese
SERIAL N°:	G09097

GE Oil & Gas	TITLE: GAS TURBINE PGT5/2 DATA SHEET			DOCUMENT CODE SOM6774796		REVISION 0
REVISION DESCRIPTION: **ISSUED**			REVISION DATE 22-Mar-16	APPROVED Electronically Stored CHECKED Electronically Stored EXECUTED P:E:S		SECURITY CODE N
	SCALE N/A	REPLACES/DERIVED FROM N/A	1st EXECUTION 22-Mar-16	ORIGINAL JOB 1731334	SIZE 4	LANGUAGE A

APPLICABLE TO : ○ PROPOSAL ● PURCHASE ○ AS BUILT

FOR **VARESE RISORSE S.P.A.** _____ UNIT _____

SITE **CENTRALE DI TELERISCALDAMENTO DI VARESE**_____ SERIAL NO. G09097 _____

SERVICE LP COMPRESSION _____ NO. REQUIRED 1_____

○ CONTINUOUS ● INTERMITTENT ○ STAND BY DRIVEN EQUIPMENT RECIPROCATING COMPRESSOR

MANUFACTURER NUOVO PIGNONE_____ ● MODEL **PGT5/2** ISO RATING 7241.5 (HP) @ 10290 RPM

NOTE: INFORMATION TO BE COMPLETED : ● BY PURCHASER ○ BY MANUFACTURER ◯ BY MFR IF NOT BY PURCHASER

GENERAL

CYCLE: ○ REGEN ● SIMPLE ○ EXHAUST HEAT RECOVERY TYPE: ◯ SINGLE SHAFT ● MULTI SHAFT (TWO)

DRIVEN EQUIPMENT: RECIPROCAING COMPRESSOR

OUTPUT SHAFT SPEED RANGE (2.1.5) ■ MIN 7203 ■ MAX 10804 RPM

● ENCLOSURE REQUIRED

OPERATION ○ ATTENDED ● UNATTENDED

EXPECTED PERFORMANCE (note A)

GAS TURBINE INCLUDING INLET & EXHAUST LOSSES

	SITE RATED (1.4.34)	NORMAL DUTY (1.4.16)	SITE Min. TEMP	SITE Max. TEMP
● DRY BULB TEMP. °C	59	91,4	130	23
● RELATIVE HUMIDITY %	60	90	90	90
● BAROMETER (PSI)	14.6	14.5	14.5	14.5
☒ OUTPUT, (HP)	7249	6077	4506	7776
☒ HEAT RATE,BTU HP-HR	9545	10048	11535	9519
☒ OUTPUT SHAFT SPEED, RPM	10290	10290	10290	10290
☒ AIR FLOW kg/SEC	56.56	50.59	44.36	59.36
☒ EXHAUST FLOW kg/SEC	59.64	50.90	44.60	59.81
☐ FIRING TEMP. °C				
☐ GAS GEN. EXHAUST TEMP. °C	____	____	____	____
☒ PT EXHAUST TEMP. °C	990	1009	1009	979
○ CERTIFIED POINT (1.4.16)	____	____	____	____

○ STEAM ○ WATER EFFECTS FOR ○ DLN

○ EMISSION CONTROL ○ AUGMENTATION (2.1.8)

☐ STEAM FLOW, kg/HR ◯	____	____	____	____
☐ WATER FLOW, m^3/HR	____	____	____	____

LOCATION (2.1.18)

○ GRADE ○ MEZZANINE

○ INDOOR ● OUTDOOR

○ HEATED ● UNDER ROOF

○ UNHEATED ○ PARTIAL SIDES

● NEWLY SUPPLIED INSTRUMENTATION ACCORDING ATEX 94/9/CE

● ELEC.AREA CLASSIFICATION (2.1.13)

○ NON-HAZARDOUS ● HAZARDOUS

		CL/ZONE/TEMP/GAS
GAS TURBINE AREA	●	Class 1 Zone 1
GAS TURBINE ENCLOSURE	●	Class 1 Zone 1
CONTROL PANEL	●	SAFE AREA

○ THIRD PARTY CERTIFICATION REQUIRED

○ WINTERIZATION REQD.

○ TROPICALIZATION REQD. (3.4.6.6)

UNUSUAL CONDITIONS: ○ DUST ○ FUMES

○ OTHER (2.10.1.6) (3.5.5.4)

NOISE SPECIFICATIONS: (2.1.9)

○ APPLICABLE TO MACHINE: (3.6.4.1)

APPLICABLE SPECIFICATIONS:

API 616 GAS TURBINES FOR REFINERY SERV.

● GOVERNING SPECIFICATION (IF DIFFERENT)
API616 & N.P.STANDARD EXCEPTIONS

○ VENDOR HAVING UNIT RESPONSIBILITY (2.7.1.7)

SHIPMENT: (4.4.1)

○ DOMESTIC ○ EXPORT ● EXPORT BOXING REQD.

○ OUTDOOR STORAGE MORE THAN 12 MONTHS (4.4.1)

○ DOMESTIC ○ EXPORT SHIPMENT

○ APPLICABLE TO NEIGHBORHOOD: (3.6.4.2)

ACOUSTIC ENCLOSURE: ● YES ○ NO

PAINTING:

● MAUNFACTURE'S SPEC.

○ OTHER _____

NOTE:

COMMENTS:

FUEL SYSTEM (3.7)

TYPE: ● GAS ○ LIQUID ○ DUAL (GAS/GAS) ○ DUAL (GAS/LIQUID) ○ DUAL (LIQUID/LIQUID)

DUAL SYSTEM REQMTS (3.7.1.7)

☒ SHUTDOWN TO TRANSFER

○ COMPLETE FUEL RECEIVING SYSTEM (3.7.1.1)

○ (MANUAL) (AUTO) TRANSFER UNDER LOAD

○ TRANSFER @ (RATED) (____% RATED) LOAD

○ MAX. TIME ALLOWED TO COMPLETE TRANSFER ____SEC.

GAS FUELS (3.7.2) (note 2)

● FUEL ANALYSIS - MOL % (3.7.2.1) (3.7.1.8)

COMPOSITION:	M.W.	NORMAL	STARTING	ALT
AIR				
OXIGEN				
NITROGEN				
WATER VAPOR				
CARBON MONOXIDE				
CARBON DIOXIDE				
HYDROGEN				
METHANE				
ETHYLENE				
ETHANE				
PROPYLENE				
PROPANE				
I-BUTANE				
A-BUTANE				
I-PENTANE				
A-PENTANE				
HEXANE PLUS				
EPTANE PLUS				
TOTAL				
AVG. MOL WT.				
CORROSIVE AGENTS				
CONTAMINANTS				
LHV MJ/m^3/HR (3.7.2.4				
FUEL PRESS. MAX./M				
(KPag)				
(PSIG)				
FUEL TEMP. MAX/MIN °C		284°	284°	284°
☒ FUEL PRESS REQD. MAX/MIN (PSIG)		290/232	290/232	290/232

LATER

FUEL TEMP. REQD. @ GT SKID EDGE MAX/MIN (°C) (note 1)

○ RATE OF CHANGE OF LHV (3.7.2.4)

REMARKS:_____

(1) FUEL GAS TEMPERATURE: MIN -5°C MAX +40 °C _____

_____

(2)GAS COMPOSITION ACCORDING TO THE CONTRACT AND DVGW ___ G260 STANDARD_____

_____

LIQUID FUELS (3.7.3)

FUEL GRADE (3.7.3.3)

ASTM D1655 JET ○ A ○ A-1 ○ B | ASTM ○ 0GT ○ 1 GT D2880 ○ 2GT ○ 3GT ○ 4GT

○ OTHER, INDICATE ANALYSIS BELOW

LIQUID FUEL TREATMENT REQUIRED ☒ YES ☒ NO

TREATMENT SYSTEM BY (3.7.1.5) ○ VENDOR ○ OTHER

____

HEATER REQD ☐ YES ☐ NO

☐ LIQ FUEL PRESS REQD, MAX/MIN, (kPaG) (BARG)

____/____

FUEL ANALYSIS DATA (3.7.3.3)

PROPERTY	ASTM METHOD	MEASURED VALUE
VISCOSITY CPU, 37,7 °C	D-445	____
DISTILLATION DATA	D-86	
50% RECOVERY °C MAX		____
END POINT °C MAX		____
SULFUR CONTENT % WT. MAX. (SELECT APPL. METHOD)		
BOMB METHOD	D-129	____
LAMP METHOD	D-1266	____
ON-TEMP METHOD	D-1552	____
CARBON RESIDUE (ON 10% BOTTOMS)	% WT. MAX.	____
CONRADSON	D-189	____
RAMSBOTTOM	D-524	____
COPPER STRIP CORROSION PLATE 3 HRS AT 100 °C MAX.	D-130	____
AROMATIC CONTENT	D-1319	____
ASH CONTENT	D-482	____
SPECIFIC GRAVITY 60	D-1298	____
FLASH POINT °C	D-56	____
POUR POINT °C	D-97	____
WATER	D-95	____
FILTERABLE DIRT. MG/100ML	D-2276	____
TRACE METALS (SATONIC ABSORPTION PREFERRED)	D-2788	
SODIUM		____
POTASSIUM		____
VANADIUM		____
CALCIUM		____
LEAD		____
OTHER METALS _____		____
LHV. MJ/kg	D-2382	

FUEL SYSTEM PIPING (Refer to Line Spec)

● BY PASS AND VENT VALVE (3.7.1.3)

○ EXTENT OF FURN. PIPING (SEE SKETCH) (3.5.4.1)

■ ISOLATION BLOCK VALVES ☐ ANSI FLANGE RATING _____

■ NACE MATERIAL STANDARDS (2.10.1.9)

CONSTRUCTION FEATURES (NOTE 1)

☐ SPEEDS:GG MAX.CONT. 11140 RPM / TRIP 12254 RPM

P.T.MAX. CONT. 10805 RPM TRIP 11320 RPM

☐ LATERAL CRITICAL SPEEDS (DAMPED) (GG/PT)

FIRST CRITICAL 2795 / 4923 RPM
SECOND CRITICAL 5639 / 8964 RPM
THIRD CRITICAL 11123/14513 RPM
FOURTH CRITICAL 13416 RPM

○ TRAIN LATERAL ANALYSIS REQUIRED (2.7.2.3)

○ UNDAMPED STIFFNESS MAP REQUIRED (2.7.2.4e)

● TRAIN TORSIONAL ANALYSIS REQUIRED (2.7.4.5)

☒ TORSIONAL CRITICAL SPEEDS: (note 1)

FIRST CRITICAL 1876 RPM
SECOND CRITICAL 6088 RPM
THIRD CRITICAL ____ RPM
FOURTH CRITICAL ____ RPM

☐ VIBRATION:

ALLOWABLE TEST LEVEL ____
(PEAK TO PEAK)

MATERIALS OF CONSTRUCTION (2.10)

COMPRESSOR ROTOR BLADES AISI 403
COMPRESSOR STATOR VANES AISI 403
SHAFT ASTM A471 TYPE 2

BLADE/VANE COATING

TURBINE STAGE	NOZZLES	BLADES	WHEELS OR DISCS
1	FSX414	INC792	ASTM A565
2	FSX414	INC738	ASTM A565

COMBUSTORS HASTELLOY X
COMPRESSOR CASING ASTM A395
COMBUSTOR CASING ASTM A 516-60
TURBINE CASING ASTM A395

☒ ROTATION, VIEWED FROM DRIVEN END ● CW ○ CCW

AIR COMPRESSOR:

STAGES 15 MAX. TIP SPEED 304 mps
TYPE AXIAL FLOW RATIO 8,6:1
CASING SPLIT (2.2.3) ☒ AXIAL ○ RADIAL
ROTOR ☒ SOLID ☐ BUILT UP

TURBINE:

STAGES 2 (H.P./L.P.) MAX. TIP SPEED 496 mps
CASING SPLIT (2.2.3) ☒ AXIAL ○ RADIAL
ROTOR ☒ SOLID ☐ BUILT UP

COMBUSTORS: (2.3.2)

☒ SINGLE ☐ MULTIPLE NUMBER ____

☒ GAS ☐ OIL ☐ DUAL FUEL

MAX. ALLOW TEMP. VARIATION 185 °C
APPLICABLE PLANE Turbine Exhaust
FUEL NOZZLES PER COMBUSTOR 1

MAINTENANCE INTERVALS, HOURS

☒ HOT GAS PATH INSPECTIONS 20000/10000
☒ MAJOR OVERHAULS 40000/80000
☐ OTHER (COMBUSTION INSPECTION) ____

GOVERNOR (3.4.3.1)

● MFR'S STD. ○ OTHER ○ MAKE ○ MODEL

○ CONSTANT SPEED ● VARIABLE SPEED
○ ISOCHRONOUS ○ DROOP

REMOTE SHUTDOWN SIGNAL ● ELECTRIC
○ PNEUMATIC ○ HYDRAULIC ○ NONE

MANUAL SPEED CHANGER RPM 7203 MAX.10804 MIN.

○ MAINTAIN TURBINE SPEED UPON FAILURE OF CONTROL SIGNAL OR ACTUATOR (3.4.4.7)

GAUGE BOARDS AND CONTROL PANELS

GAUGE BOARDS

☒ LOCATION ON BASE

CONTROL PANELS (3.4.5.1) ○ ON SKID ○ OFF SKID
LOCAL ● OFF SKID REMOTE

WEATHER PROTECTION REQUIRED ● YES ○ NO

○ SPECIFICATION ____

○ ANNUNCIATOR REQUIRED (3.4.4.8)

☒ VISUAL DISPLAY UNIT (VDU) ☒ KEYBOARD

○ TABLE MOUNT VDU (3.4.5.2)

CONTROL SYSTEMS

TYPE (3.4.1.5)

○ MECH ○ PNEU ○ HYDRA ○ ELECTRIC ● ELECTRONIC
● MICROPROCESSOR BASED ○ COMBINED ____

○ REDUNDANCY (3.4.1.5) SIMPLEX

○ SIGNAL SOURCE ____

○ SENSITIVITY ____ ○ RANGE ____ TO ____

○ TIME OF AC OUTAGE RIDEOUT ____ MIN.

○ SHUT OFF VALVES FOR SHUT DOWN SENSORS (3.4.4.10)

STARTING SYSTEM (3.4.2.1)

○ MANUAL ○ SEMI AUTOMATIC ● AUTOMATIC

○ PURGE (3.4.2.2) ____ MIN

NORMAL SHUTDOWN (3.4.4.2)

○ MANUAL ○ SEMI AUTOMATIC ● AUTOMATIC

○ SEPARATE SD VALVE TEST DURING OPERATION (3.4.4.3)

NOTE

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REVISION DESCRIPTION:		PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1731334 / SIZE 4	LANGUAGE A

CONSTRUCTION FEATURES CONTINUED (GAS GENERATOR) (NOTE 1)

BEARINGS AND BEARING HOUSINGS (2.8)

RADIAL (NOTES 2 AND 3)	INLET	EXHAUST
☒ TYPE	ELLIPTICAL	ELLIPTICAL
☒ MANUFACTURER	NP	NP
☒ LENGHT (mm)	1.64	2.52
☒ SHAFT DIA (mm)	3.94	3.94
☐ UNIT LOAD (ACT/ALLOW) (BAR)		
☒ BASE MATERIAL	FE430B	FE430B
☒ BABBIT THICKNESS (mm)	AS PER MFR	STANDARD
☐ NO. PADS		
☐ LOAD: BETWEEN/ON PAD		
☐ PIVOT: CENTER/OFFSET, %		
☐ DAMPER BEARING		
☐ _____		

THRUST (NOTE 3)	ACTIVE	INACTIVE
☒ TYPE	TILTING PADS	RING
☒ MANUFACTURER	BHV	NP
☐ UNIT LOAD (ULTIMATE-BAR)		
☒ UNIT LOAD (SITE RATED-BAR)	458.6	
☐ UNIT LOAD (MAX POTEN. BAR)		
☐ NO. OF PADS/AREA (mm^2)		
☐ BASE MATERIAL		
☐ BABBIT THICKNESS (mm)		
☐ PIVOT: CENTER/OFCSET, %	/	

LUBRICATION: ☐ FLOODED ☒ DIRECTED

THRUST COLLAR: ☒ INTEGRAL ◯ REPLACEABLE

BEARING MATERIAL ____

BEARING TEMPERATURE DEVICES (2.8.1.3) ◯ SEE ATTACHED API-670 DATA SHEET

◯ THERMISTORS

◯ TYPE _____ POS TEMP COEFF _____ NEG TEMP COEFF

◯ TEMP SWITCH & INDICATOR BY: _____ PURCH ____ MFR

● THERMOCOUPPLES

◯ SELECTOR SWITCH & IND. BY _____ PURCH ____ MFR

● LOCATION-JOURNAL BRG

◯ RESISTANCE TEMP DETECTORS

◯ RESISTANCE MAT'L _____ ☐ OHMS

◯ SELECTOR SWITCH & IND. BY _____ PURCH ____ MFR

NUMBER _____ EA PAD _____ EVERY OTH PAD 2__ PER BRG

OTHER TOTAL _____

● LOCATION-THRUST BRG

NO. (INACT) _____ EA PAD _____ EVERY OTH PAD 1_ PER BRG

OTHER _____

NO. (ACT) _____ EA PAD _____ EVERY OTH PAD 2_ PER BRG

OTHER TOTAL _____

◯ MONITOR SUPPLIED BY (3.4.7.5) _____

◯ LOCATION UCP _____

◯ MFR _____ ☐ MODEL _____

☐ SCALE RGE _____ ☐ ALARM SET @ __°C

● SHUTDWN ☐ SET @ ___°C ◯ TIME DEALY _____SEC

VIBRATION DETECTORS: ◯ SEE ATTACHED API-670 DATA SHEET

● TYPE No contact ☐ MODEL ____

☒ MFR Bently Nevada

NO. AT EA SHAFT BEARING _____ TOTAL NO. 2

● OSCILLATOR-DEMODULATOR SUPPLIED BY NP

● MFR Bently Nevada ☐ MODEL

● MONITOR SUPPLIED BY (3.4.7.8.2) NP

● LOCATION U.C.P. ENCLOSURE. _____

● MFR Bently Nevada ☐ MODEL

◯ SCALE RGE _____ ☐ ALARM SET @ ___uM

◯ SHTDWN ☐ SET @ °C ◯ TIME DELAY _____ SEC

AXIAL POSITION DETECTOR: ◯ SEE ATTACHED API-670 DATA SHEET

● TYPE No contact ☐ MODEL _____

☒ MFR Bently Nevada ◯ NO. REQUIRED ____

● OSCILLATOR-DEMODULATOR SUPPLIED BY NP

◯ MRF _____ ☐ MODEL _____

◯ MONITOR SUPPLIED BY (3.4.7.8.2) _____

◯ LOCATION U.C.P. _____ ENCLOSURE _____

◯ MFR _____ ☐ MODEL ____

☐ SCALE RGE _____ ☐ ALARM SET @ uM

◯ SHUTDWN ☐ SET @ _____ °C ◯ TIME DELAY ___SEC

SEISMIC TRANSDUCERS (VELOCITY TYPE) ◯ SEE ATTACHED API-678 DATA SHEET

● MFR METRIX _____ ☐ MODEL _____

● LOCATION ON CASING ☒ NUMBER 1

● MONITOR SUPPLIED BY (3.4.7.8.4) NP _____

● LOCATION UCP _____ ENCLOSURE _____ _____

◯ MFR BENTLY NEVADA ☐ MODEL _____

☐ SCALE RGE _____ ☐ ALARM SET @ _____ _____

◯ SHUTDWN ☐ SET @ _____ ◯ TIME DELAY __SEC

NOTES

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		ORIGINAL JOB 1731334 / SIZE 4	LANGUAGE A

CONSTRUCTION FEATURES CONTINUED (POWER TURBINE) (NOTE 1)

BEARINGS AND BEARING HOUSINGS (2.8)

RADIAL (NOTES 2 AND 3)	INLET	EXHAUST
☒ TYPE	ELLIPTICAL	ELLIPTICAL
☒ MANUFACTURER	NP	NP
☒ LENGHT (mm)	2.36	2.36
☒ SHAFT DIA (mm)	3.93	3.93
☐ UNIT LOAD (ACT/ALLOW) (BAR)		
☒ BASE MATERIAL	CS	CS
☐ BABBIT THICKNESS (mm)		
☐ NO. PADS		
☐ LOAD: BETWEEN/ON PAD		
☐ PIVOT: CENTER/OFFSET, %		
☐ PIVOT: CENTER/OFFSET, %		
☐ DAMPER BEARING		
☐ _____		

BEARING TEMPERATURE DEVICES (2.8.1.3) ○ SEE ATTACHED API-670 DATA SHEET

○ THERMISTORS

○ TYPE _____ POS TEMP COEFF _____ NEG TEMP COEFF

○ TEMP SWITCH & INDICATOR BY: _____ PURCH _____ MFR

○ THERMOCOUPPLES

○ SELECTOR SWITCH & IND. BY _____ PURCH _____ MFR

○ LOCATION-JOURNAL BRG

○ RESISTANCE TEMP DETECTORS

○ RESISTANCE MAT'L _____ ☐ OHMS

○ SELECTOR SWITCH & IND. BY _____ PURCH _____ MFR

NUMBER _____ EA PAD _____ EVERY OTH PAD 2 __ PER BRG

● LOCATION-THRUST BRG

NO. (INACT) _____ EA PAD _____ EVERY OTH PAD 1 PER BRG

OTHER _____

NO. (ACT) _____ EA PAD _____ EVERY OTH PAD 2 PER BRG

OTHER TOTAL 3 _____

○ MONITOR SUPPLIED BY (3.4.7.5) _____

○ LOCATION _____ ENCLOSUR _____

○ MFR _____ ☐ MODEL _____

☐ SCALE RGE _____ ☐ ALARM SET @ 115 °C

○ SHUTDWN ☐ SET @ ○ TIME DEALY _____ SEC

THRUST (NOTE 3)	ACTIVE	INACTIVE
☒ TYPE	TILTING PADS	RING
☒ MANUFACTURER	BHV	NP
☐ UNIT LOAD (ULTIMATE-BAR)		
☒ UNIT LOAD (SITE RATED-BAR)	458.6	
☐ UNIT LOAD (MAX POTEN. BAR)		
☐ NO. OF PADS/AREA (mm)		
☐ BASE MATERIAL		
☐ BABBIT THICKNESS (mm)		
☐ PIVOT: CENTER/OFCSET, %		

LUBRICATION: ☐ FLOODED ☒ DIRECTED

THRUST COLLAR: ☒ INTEGRAL ◯ REPLACEABLE

BEARING MATERIAL _____

VIBRATION DETECTORS: ○ SEE ATTACHED API-670 DATA SHEET

● TYPE No contact ☒ MODEL _____

☒ MFR Bently Nevada

● NO. AT EA SHAFT BEARING 2 @ bg #4 TOTAL NO. 2

○ OSCILLATOR-DEMODULATOR SUPPLIED BY NP _____

● MFR Bently Nevada _____ ☐ MODEL _____

○ MONITOR SUPPLIED BY (3.4.7.8.2) _____

○ LOCATION _____ ENCLOSURE. _____

○ MFR _____ ☐ MODEL _____

○ SCALE RGE _____ ☐ ALARM SET @ _____ uM

○ SHTDWN ☐ SET @ __ ○ TIME DELAY _____ SEC

AXIAL POSITION DETECTOR: ○ SEE ATTACHED API-670 DATA SHEET

● TYPE No contact ☐ MODEL _____

☒ MFR Bently Nevada ○ NO. REQUIRED _____

● OSCILLATOR-DEMODULATOR SUPPLIED BY NP

○ MRF _____ ☐ MODEL _____

○ MONITOR SUPPLIED BY (3.4.7.8.2) _____

○ LOCATION _____ ENCLOSURE _____

○ MFR _____ ☐ MODEL

☐ SCALE RGE _____ ☐ ALARM SET @ uM

○ SHUTDWN ☐ SET @ __ uM ○ TIME DELAY _____

(_____

SEISMIC TRANSDUCERS ○ SEE ATTACHED API-678 (VELOCITY TYPE) DATA SHEET

● MFR METRIX ☐ MODEL _____

● LOCATION ON CASING ☒ NUMBER 1

● MONITOR SUPPLIED BY (3.4.7.8.4) NP

● LOCATION UCP ENCLOSURE _____

● MFR BENTLY NEVADA ☐ MODEL _____

☐ SCALE RGE _____ ☐ ALARM SET @ _____

○ SHUTDWN ☐ SET @ _____ ○ TIME DELAY __ SEC

NOTES Please refer to proposal 5061612710 for applicable scope of supply. Information contained here are only for reference

UTILITIES: CONNECTIONS

○ UTILITY CONDITIONS : note (A)

STEAM:	AUX DRIVERS (kPaG) (BARG)	°C	HEATING (kPaG) (BARG)	°C
INLET MIN	_____ / _____		_____ / _____	
NORM	_____ / _____		_____ / _____	
MAX	_____ / _____		_____ / _____	
EXHAUST MIN.	_____ / _____		_____ / _____	
NORM	_____ / _____		_____ / _____	
MAX	_____ / _____		_____ / _____	
	STARTING		INJECTION	
INLET MIN	_____ / _____		_____ / _____	
NORM	_____ / _____		_____ / _____	
MAX	_____ / _____		_____ / _____	
EXHAUST MIN.	_____ / _____		_____ / _____	
NORM	_____ / _____		_____ / _____	
MAX	_____ / _____		_____ / _____	

ELECTRICITY: (3.4.6.1) note (B) ○ PILOT LIGHT INDICATORS

	MOTORS	HEATING	CONTROL	SHUTDOWN
VOLTAGE	_____	_____	_____	_____.
HERTZ	_____	_____	_____	_____.
PHASE	_____	_____	_____	_____.

COOLING WATER:

TEMP. INLET _____°C MAX RETURN _____°C

DESIGN _____ °C

PRESS. NORM _____ (kPaG) (BARG) MIN RETURN _____ (kPaG) (BARG)

DESIGN _____(kPaG) (BARG) MAX ALLOW Δ P _____BAR

WATER SOURCE _____

INSTRUMENT AIR PRESSURE, (kPaG) (BARG) _____

MAX _____ NORMAL _____ MIN _____

REMARKS: _____

☐ TOTAL UTILITY CONSUMPTION : note (A)

COOLING WATER _____ m^3/HR

STEAM LEVEL _____ (kPaG) (BARG) _____ (kPaG) (BARG) _____(kPaG) (BARG)

STEAM NORMAL _____ _____ _____kg/HR

STEAM, MAX _____ _____ _____kg/HR

INSTRUMENT AIR _____ m^3/HR

MOTOR (AUXILIARIES)_____KW

BATTERY CHARGES _____KW

HEATERS _____KW

PURGE (AIR OR N_2) _____ m^3/HR

_____ _____

_____ _____

_____ _____

TURBINE AIR EXTRACTION REQUIRED: (2.1.21)

○ SCFM @ _____ (BARG)

☐ MAXIMUM PRESSURE AVAILABLE

(kPaG) (BARG) _____ @ MINIMUM RPM _____ _____

☐ DISCHARGE TEMP. _____ ___ °C

☐ COMPRESSOR STAGE EXTRACTED

REMARKS: _____

_____ _____

_____

_____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

PURCHASER CONNECTIONS (

CONNECTION	○ DESIGN APPROVAL REQ'D (2.10.4.6.4)	☐ SIZE	☐ FACING & RATING	○ POSITION (2.4.1)	☐ FLANGED OR STUDDED (2.4.1)	○ MATING FLG & GASKET BY VENDOR (2.4.6.4)	☐ GAS VELOCITY m/SEC
INLET							
EXHAUST							
FUEL SUPPLY							
STEAM							
WATER							

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		ORIGINAL JOB 1731334 / SIZE 4	LANGUAGE A

ADDITIONAL INSTRUMENTS

DESCRIPTION	INSTRUMENT TYPE:		INSTRUMENT LOCATION			TRANSMITTERS FURNISHED BY		CONTROL ROOM RECEIVERS FURN BY	
	INDICATING	RECORDING	LOCAL	LOCAL PANEL	U.C.P.	VENDOR	OTHERS	VENDOR	OTHERS
GAS GENERATOR									
TACHOMETER	●	○	○	○	●	●	○	○	○
Δ P AIR INLET SYSTEM	●	○	●	○	●	●	○	○	○
COMPRESSOR DISCHARGE PRESSURE	●	○	●	○	●	●	○	○	○
FUEL FILTER Δ P	○	○	○	○	○	○	○	○	○
FUEL SUPPLY PRESSURE	●	○	●	○	●	●	○	○	○
STARTING GAS SUPPLY PRESSURE	○	○	○	○	○	○	○	○	○
STARTING GAS EXHAUST PRESSURE	○	○	○	○	○	○	○	○	○
TEMP COMBUSTOR MEASUREMENT (6 PTS MIN) (2.3.2)	●	○	○	○	○	○	○	○	○
TEMP GAS TURB CONTROL PLANE (6 PTS MIN)	●	○	○	○	○	○	○	○	○
INLET AIR TEMP	●	○	●	○	●	●	○	○	○
TEMP GG COMPRESSOR DISCHARGE	●	○	●	○	●	●	○	○	○
TEMP THRUST BEARING OIL DRAIN	●	○	●	○	●	●	○	○	○
TEMP EACH BEARING SUMP (ANTI FRICTION TYPE)	○	○	○	○	○	○	○	○	○
TEMP FUEL MANIFOLD	○	○	○	○	○	○	○	○	○
TEMP LUBE OIL RESERVOI R	●	○	●	○	●	●	○	○	○
FIRED HOUR METER)	○	○	○	○	●	○	○	○	○
A) NO. STARTS COUNTER	○	○	○	○	●	○	○	○	○
B) START SEQUENCE TIMER	○	○	○	○	●	○	○	○	○
LUBE OIL RESERVOIR LEVEL	●	○	●	○	●	●	○	○	○
LUBE OIL PUMP INDICATORS (NO. _____)	●	○	○	●	●	●	○	○	○
LUBE OIL COOLER OIL INLET TEMP	○	○	○	○	○	○	○	○	○
LUBE OIL COOLER OIL OUTLET TEMP	○	○	○	○	○	○	○	○	○
LUBE OIL COOLER COOLANT INLET TEMP	○	○	○	○	○	○	○	○	○
LUBE OIL COOLER COOLANT OUTLET TEMP	○	○	○	○	○	○	○	○	○
LUBE OIL FILTER Δ P	●	○	○	●	●	●	○	○	○
LUBE OIL PRESSURE EACH LEVEL (NO. _____)	●	○	○	●	●	●	○	○	○
CONTROL OIL PRESSURE	●	○	●	○	●	●	○	○	○
SITE FLOW INDICATOR EACH DRAIN (NO. _____)	○	○	●	○	○	○	○	○	○
INLET GUIDE VANE POSITION INDICATOR	●	○	●	○	●	●	○	○	○
EXHAUST DUCT Δ P INDICATOR	○	○	○	○	○	○	○	○	○
ENCLOSURE COOLING AIR EXHAUST TEMP	●	○	●	○	●	●	○	○	○
POWER TURBINE									
TACHOMETER	●	○	○	○	●	●	○	○	○
EXHAUST TEMP (2 PTS MIN)	●	○	●	○	●	●	○	○	○
JOURNAL BEARING TEMP	●	○	●	○	●	●	○	○	○
THRUST BEARING TEMP	●	○	●	○	●	●	○	○	○
BEARING DRAIN TEMP	●	○	●	○	○	●	○	○	○
SITE FLOW INDICATOR EACH DRAIN (NO. _____)	○	○	●	○	○	○	○	○	○
LUBE OIL INLET PRESSURE	●	○	○	●	●	●	○	○	○
LUBE OIL INLET TEMP	●	○	●	○	●	●	○	○	○

ADDITIONAL ALARMS AND SHUTDOWNS (3.4.4) (Refer to Gas Turbine P&I D SOM5082054)

DESCRIPTION	APPLIES TO:		(3.4.4.9.5) ANNUNCIATOR POINT IN VENDOR FURNISHED CONTROL PANEL (1)		SENSING DEVICES TO BE FURNISHED BY		INDICATING LIGHT ONLY
	AUX. AREA GAS GEN.	POWER TURBINE	ALARM	SHUT-DOWN	VENDOR	OTHERS	(2)
RADIAL SHAFT VIBRATION	●	●	○	○	●	○	☐
AXIAL THRUST POSITION	●	●	○	○	●	○	☐
OVERSPEED (1)	●	●	●	●	●	○	☐
CASING VIBRATION	●	●	●	●	●	○	☐
HIGH THRUST BEARING TEMP	●	●	●	●	●	○	☐
HIGH RADIAL BEARING TEMP	●	●	●	●	●	○	☐
LOW FUEL SUPPLY PRESSURE	●	○	●	○	●	○	☐
HIGH FUEL FILTER Δ P	○	○	○	○	○	○	☐
GAS TURBINE TEMPERATURE SPREAD HIGH	○	●	●	●	●	○	☐
EXHAUST OVER TEMP	○	●	●	●	●	○	☐
FAILURE OF OVER-TEMP SHUTDOWN DEVICE	●	●	●	●	●	○	☐
HIGH INLET AIR Δ P EACH FILTER	●	○	●	●	●	○	☐
COMBUSTOR FLAMEOUT (1)	●	○	○	●	●	○	☐
CHIP DETECTOR, ANTI FRICTION BEARING	○	○	○	○	○	○	☐
FAILURE STARTING CLUTCH TO ENGAGE OR DISENGAGE	●	○	●	○	●	○	☐
LOW OIL PRESSURE (NO. _____)	●	●	●	●	●	○	☐
HIGH LUBE OIL TEMP	●	●	●	●	●	○	☐
LOW LUBE OIL RESERVOIR LEVEL	●	○	●	●	●	○	☐
HIGH LUBE OIL RESERVOIR LEVEL	●	○	●	○	●	○	☐
HIGH OIL FILTER Δ P (NO. _____)	●	○	●	○	●	○	☐
LUBE OIL SPARE PUMP OPERATING	●	○	●	○	●	○	☐
LOW CONTROL OIL PRESSURE	●	○	●	○	●	○	☐
LOW STARTING GAS PRESSURE	○	○	○	○	○	○	☐
ANTI-ICING SYSTEM - NOT OPERATING	○	○	○	○	○	○	☐
LOW D.C. VOLTAGE	●	○	●	○	●	○	☐
EMERGENCY D.C. PUMP OPERATING	●	○	●	○	●	○	☐
RESERVOIR HEATER “ON”	●	○	●	○	●	○	☐
IMPLOSION DOOR OPEN	○	○	○	○	○	○	☐
EXTERNAL PERMISSIVE START SIGNAL			●	○	●	●	☐
EXTERNAL SHUTDOWN SIGNAL			○	●	●	●	☐
LOSS OF AUX COOLING AIR			○	○	○	○	☐
LAMP TEST PUSH BUTTON			○	○	○	○	☐
ENCLOSURE HIGH TEMPERATURE	●	●	●	●	●	○	☐
CONTROL SIGNAL FAILURE			●	○	●	○	☐
CONTROL SYSTEM ACTUATOR FAILURE			●	●	●	○	☐
GOVERNOR FAILURE			●	●	●	○	☐
VENTILATION FANS FAILURE (after 45 sec.)	●	○	○	●	●	○	☐
	○	○	○	○	○	○	☐
(1) VENDOR TO ADVISE METHOD OF ANNUNCIATION							
(2) VDU MAY USE MESSAGE INDICATOR							

INSPECTION AND TESTING (Refer to Gas turbine QCP), LUBRICATION, WEIGHTS

SHOP INSPECTION AND TESTS : (4.1.4) -
REFER TO QCP SOM6631784

	REQ'D	WIT-NESSED	OBSERVED
SHOP INSPECTION (4.1.4.1)	○		
CLEANLINESS (4.2.3.3)	○		
HYDROSTATIC (4.3.2)	○	○	○
MECHANICAL RUNNING TEST (4.3.3)	○	○	○
☒ CONTRACT COUPLING ☒ CONTRACT PROBES — ☒ IDLING ADAPTOR (S) ☒ SHOP PROBES			
TAPE RECORD VIB DATA (4.3.3.3.5)	○		
PRERFORMANCE TEST (4.3.4.1)	○	○	○
COMPLETE UNIT TEST (4.3.4.2)	○	○	○
LOAD GEAR TEST (4.3.4.3)	○	○	○
SOUND LEVEL TEST (4.3.4.4)	○	○	○
AUXILIARY EQUIPMENT (4.3.4.5)	○	○	○
POST TEST INSPECTION (4.3.4.6)	○	○	○
HYDRAULIC COUPLING INSP (4.3.4.7)	○	○	○
SPARE PARTS (4.3.4.9)	○	○	○
GOVERNOR RESPONSE TEST (4.3.4.8)	○	○	○
TORSIONAL VIBE MEAS (4.3.4.2)	○	○	○
FIRE PROTECTION (4.3.4.10)	○	○	○
OTHER (4.3.4.11) _____	○	○	○
_____	○	○	○

● **MATERIALS INSPECTION REQUIRMENTS (4.2.1.3)**

- ○ SPECIAL CHARPY TESTING (2.10.5)
- ● RADIOGRAPHY REQUIRED FOR **REFER TO QCP SOM6631784**
- ● MAGNETIC PARTICLE REQUIRED FOR **REF. TO QCP SOM6631784**
- ● LIQUID PENETRANT REQUIRED FOR **REFER TO QCP SOM6631784**
- ● ULTRASONIC REQUIRED FOR **REFER TO QCP SOM6631784**
- ● WELD INSPECTION (2.10.4.6.1) **REFER TO QCP SOM6631784**

MISCELLANEOUS:

- ○ VENDOR'S REVIEW & COMMENTS ON PURCHASER'S PIPING & FOUNDATION (2.1.17) (3.5.4.3)
- ○ FINAL ASSEMBLY CLEARANCES (4.2.1.1.e)
- ○ WELDING HARDNESS TESTING (4.2.3.4)
- ○ COORD. MEETING SITE (5.1.3) _____
- ○ SPEED-TORQUE CURVE (5.3.4-a)
- ○ INCREASE POWER FOR STEAM/WATER (5.3.4-b)
- ○ EFFECTS OF AMB. COND. ON EXHAUST FLOW (5.3.4-c)
- ○ SPECIAL TEST PROCEDURES (5.3.5-a)
- ○ PURCHASER REVIEW OF CAMP./GOODMAN DIAG. (5.3.5-b)
- ○ VENDOR WITNESS ALIGMENT (2.1.17)
- ○ TECHINICAL DATA MANUAL (5.2.7)
- ○ NO OF PROPOSAL MANUAL (5.3.1) _____
- ○ RUN DOWN CURVES (5.3.4-b)
- ○ _____

LUBRICATION SYSTEMS (2.9)

- ● SEE API 614 DATA SHEETS
- ● LUBE OIL VISCOSITY (2.9.8) VG32 _____
- ○ POWER TURBINE ○ LOAD GEAR
- ○ DRIVEN EQUIPMENT ○ AUXILIARIES
- ○ COMBINED LUBE OIL/SEAL SYSTEM (2.9.5)
- ○ SYSTEM DESIGNED FOR SYNTHETIC LUBRICANT (2.9.2)

LUBE SPECIFICATION _____

GAS GENERATOR	POWER TURBINE
☒ LOAD GEAR	☒ DRIVEN EQUIPMENT
☒	☒

☐ **OIL REQUIRMENTS**

	lt/min	barg	HEAT LOAD kW
G.T. TURBINE			
DRIVEN EQUIP.			
GEAR			
COUPLINGS			
TOTAL			

MOUNTING ARRANGEMENT

○ CONSOLE ○ COLONY ● BASEPLATE

☒ **WEIGHTS**

	DRY INSTALLED WT.(kg)	SHIPPING WT.(kg)	DIMEN $L_X W_X H(m)$
GG TURBINE	main skid/later		
G.G. TURB. ROTOR			
POWER TURB.	incl.main skid		
P.T. ROTOR			
LUBE SYSTEM	incl.main skid		
DRIVEN EQUIP			
FILTER			
INLET SILENCER			
EXHAUST SILENCER			
DUCTING			
_____			
_____			
_____			

MAX ERECTION WEIGHT (kg) later ITEM main skid G.T..

MAX MAINT. WEIGHT (kg) _ ITEM _____

REMARKS :

GE Oil & Gas	TITLE: GAS TURBINE PGT5/2 DATA SHEET	DOCUMENT CODE SOM6774796	REVISION 0
REVISION DESCRIPTION:		PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1731334 / SIZE 4	LANGUAGE A