INDEX OF REVISIONS

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0	**ORIGINAL ISSUE**

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FORM OWNED TO PETROBRAS N-0381 REV. M.

PETROBRAS	DATA SHEET	No. I-FD-3A17.01-1231-341-1J5-001	REV. 0
	BS/ATP-IMI/OP-PMXL	SHEET 2 of 6	
	TITLE: GEARBOX FOR TURBOCOMPRESSOR – VV-UC-1231002	BS/PCM/PROJDP	
		INTERNAL	

APPLICABLE TO: ☒ PROPOSAL ☐ PURCHASE ☐ AS BUILT

FOR:	**E&P**	UNIT:	**Top deck - M04**
SITE:	**BS/ATP-IMI/OP-PMXL**	SERVICE:	**TURBOCOMPRESSOR TRANSMISSION**
No. REQ / TAG:	**SEE I-RM-3A17.01-1231-321-1J5-001**	MANUFACTURER:	
MODEL:		VENDOR:	
SIZE / TYPE:		DRIVER / DRIVEN:	**GAS TURBINE / COMPRESSOR**
SERIAL No..		MANUFACTURER No.:	

UNITS OF MEASUREMENT

☐ US CUSTOMARY UNITS
☒ SI UNITS

RATING REQUIREMENTS

DRIVEN EQUIP. kW: NORM. _____ MAX. _____
DRIVER kW: RATED _____ MAX. _____
NORMAL TRANSMITTED POWER _____ kW
GEAR UNIT RATED POWER _____ kW
TORQUE @ MAX CONT SPEED _____ kg m
MAX TORQUE _____ kg m @ _____ rpm
☐ REDUCER ☒ INCREASER
RATED SPEED, rpm:
INPUT _____ ☐ SPECIFIED ☐ NOMINAL
OUTPUT _____ ☐ SPECIFIED ☐ NOMINAL
ALLOW. VAR IN GEAR RATIO (+) (-) _____ %
MAX CONTINUOUS SPEED _____ rpm
TRIP SPEED _____ rpm
GEAR SERVICE FACTOR **1.6 /** _____ (MINIMUM / ACTUAL)
HARDNESS PINION _____ GEAR _____
SHAFT ASSEMBLY DESIGNATION _____
HS SHAFT ROT FAC'G CPL'G ☐ CW ☐ CCW
LS SHAFT ROT FAC'G CPL'G ☐ CW ☐ CCW
EXTERNAL LOADS _____
OTHER OPERATING CONDITIONS _____

INSTALLATION DATA *[NOTE 2]*

☐ INDOOR ☐ HEATED ☐ UNDER ROOF
☒ OUTDOOR ☒ UNHEATED ☐ PARTIAL SIDES
☐ GRADE ☐ MEZZANINE ☐ _____
☐ WINTERIZATION REQ'D ☒ TROPICALIZATION REQUIRED
ELEC. AREA CLASS _____ GRP _____ DIV _____
ELEC'L AREA CLASS _____ ZONE _____ TEMP _____
MAX ALLOW SPL _____ dBA @ _____ m
ELEVATION _____ m BAROMETER _____ kPa
RANGE OF AMBIENT TEMPERATURES:

	DRY BULB	WET BULB
NORMAL	_____ °C	_____ °C
MAXIMUM	_____ °C	_____ °C
MAXIMUM	_____ °C	_____ °C

RELATIVE HUMIDITY, %: _____
UNUSUAL CONDITIONS ☐ DUST ☐ FUMES
☒ MARINE ENVIRONMENT
☐ OTHER _____

BASIC GEAR DATA

☐ SINGLE STAGE ☐ SINGLE HELICAL
☐ DOUBLE STAGE ☒ DOUBLE HELICAL
☐ EPICYCLIC ☐ _____
MECHANICAL RATING kW _____ @ _____ rpm
GEAR SERVICE FACTOR _____ (ACTUAL)
FULL LOAD GEAR UNIT POWER LOSS _____ kW
GEAR UNIT MECHANICAL EFFICIENCY _____ %
RATING SPEED, RPM PINION _____ GEAR _____
HARDNESS USED FOR
RATING, (HB OR RC) PINION _____ GEAR _____
TOOTH PITTING INDEX. "K" MPa
ALLOWABLE _____ ACTUAL _____
MATERIAL INDEX NUMBER, MPa _____
BENDING STRESS NUMBER, "ST" MPa
PINION: ALLOWABLE _____ ACTUAL _____
GEAR: ALLOWABLE _____ ACTUAL _____
PITCH LINE VELOCITY _____ m/s
ANTICIPATED SPL _____ dBA @ _____ m
WR² REFERRED TO LS SHAFT _____ kg mm²
BREAKAWAY TORQUE _____ kg m
PINION TEETH HARDNESS RANGE _____
PINION TEETH HARDENING METHOD: _____
☐ HS SHAFT SEPARATE / HARDNESS RANGE _____
GEAR TEETH (RIM) HARDNESS RANGE _____
GEAR TEETH HARDENING METHOD: _____
GEAR HUB:
☐ FORGED CYLINDER ☐ FORGED & COPED ☐ FABRICATED
GEAR TO SHAFT FIT METHOD
☐ INTEGRAL ☐ KEYED INTERFERENCE ☐ KEYLESS INTERFERENCE
RIM ATTACHMENT _____
LS SHAFT HARDNESS RANGE _____
RESIDUAL UNBALANCE
PINION _____ N GEAR _____ N
JOURNAL STATIC WEIGHT LOADS
PINION _____ kg GEAR _____ kg
TOTAL GEAR UNIT ASSEMBLED WEIGHT _____ kg

REMARKS:

GEAR DATA

	PINION	GEAR
NUMBER OF TEETH		
GEAR RATIO		
TANGENTIAL LOAD, "Wt", N		
AGMA GEOMETRY FACTOR "J"		
PITCH DIAMETER, mm		
OUTSIDE DIAMETER, mm		
ROOT DIAMETER, mm		
LENGTH LINE OF ACTION, mm		
CENTER GROOVE DIAMETER, mm		
NORM. PRESS. ANGLE, DEGREES		
NORMAL DIAMETRAL PITCH		
HELIX ANGLE, DEGREES		
CENTER DISTANCE, mm		
BACKLASH, mm		
NET FACE WIDTH, "FW", mm		
PINION L/D		
FACE OVERLAP RATIO		
TRANSVERSE CONTACT RATIO		
AGMA 6011 SERVICE FACTOR		
RATINGS BASED ON ANSI / AGMA 6011 WITH SF=1.0		
DURABILITY POWER		
STRENGTH POWER		
POWER LOSS EA HS BEARING		kW
POWER LOSS EA LS BEARING		kW
POWER LOSS THRUST BEARING		kW
TOOTH SURFACE FINISH, µm RA		
TOOTH GENERATION PROCESS		
TOOTH FINISHING PROCESS		

LEAD MODIFICATION ☐ NOT REQ'D ☐ REQ'D

CALCULATED TOTAL LEAD MISMATCH, µm

SCUFFING DATA

SCUFFING DATA PER ANSI / AGMA 925-A03

SCUFFING RISK _____ CALCULATION METHOD _____

COMPOSITE SURFACE ROUGHNESS σ_x _____ µm

SPECIFIC FILM THICKNESS, EHL λ_{min} _____ µm

TOOTH TEMPERATURE, θ_M _____ °C

MAXIMUM CONTACT TEMPERATURE, $\theta_{B\,MAX}$ _____ °C

MATERIALS

GEAR CASING _____ OIL SEALS _____

PINION(S) _____

GEAR RIM(S) _____

HS SHAFT _____ LS SHAFT _____

RADIAL BEARINGS _____

THRUST BEARING(S) _____

COUPLINGS AND GUARDS

	PINION SHAFT	GEAR SHAFT
COUPLING FURNISHED BY	**PACKAGER**	**PACKAGER**
MOUNT COUPLING HALVES		
CPLG. GUARD ADAPTER BY		
CPLG. GUARD FURNISHED BY	**PACKAGER**	**PACKAGER**
COUPLING VENDOR		
VENDOR'S MODEL NUMBER		
COUPLING WEIGHT ON SHAFT END		
CG IN / OUTBOARD OF SHAFT END		
HUB DRILL TEMPLATE		

SHAFT END DETAIL

SHAFT END DETAIL SPECIFIED BY[a]: ☐PURCH. ☒GEAR

SHAFT END DETAIL IF "OTHERWISE" SPECIFIED:

	PINION	GEAR
TAPERED / KEYLESS	☐	☐
TAPERED / 1-KEY	☐	☐
TAPERED / 2-KEYS	☐	☐
CYLINDRICAL / 1-KEY	☐	☐
CYLINDRICAL / 2-KEYS	☐	☐
OTH _____	☐	☐

SHAFT DIAMETER, _____ _____

☐ GEAR ☐ PINION ☐ OTHER SHAFT END FOR COUP. _____

RADIAL BEARING

	PINION	GEAR
TYPE		
DIAMETER, mm		
LENGTH, mm		
JOURNAL VELOCITY, m/s		
LOADING, kPa		
CLEARANCE MIN/MAX, mm		
SPAN, mm		
POWER LOSS EA BRG., kW		
OIL FLOW EA BRG., m^3/h		

THRUST BEARING(S)

LOCATION		
MANUFACTURER		
TYPE		
SIZE		
AREA, mm^2		
LOADING, kPa		
RATING, kPa		
INT. THRUST LOAD, N (+)(-)		
EXT. THRUST LOAD, N (+)(-)		
POWER LOSS EACH, kW		
OIL FLOW EACH, m^3/h		

REMARKS:

[a] Integral, unless otherwise specified. If integral flange, use diameter immediately adjacent to flange.

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			INTERNAL

OIL SYSTEM REQUIREMENTS

☐ OIL SYSTEM FURNISHED BY: ☐ GEAR MFR
☒ OTHER PACKAGER
☐ OIL VISC.: _____ Pa.s@40°C _____ Pa.s@100°C
☐ ISO GRADE _____ LOAD STAGE _____
☒ SEE OIL SYSTEM DATA SHEET

MESH

MESH AND WINDAGE POWER _____ kW
OIL FLOW, MESH _____ m³/h

LUBRICATION REQUIREMENTS

MIN. START UP OIL _____ °C
NORMAL OIL INLET _____ °C
MAXIMUM OIL INLET _____ °C
UNIT OIL FLOW (TOTAL) _____ m³/h
UNIT OIL PRESSURE _____ kPa
☐ OIL _____ Pa.s@40°C _____ Pa.s@100°C
☐ ISO _____ LOAD STAGE _____

PIPING CONNECTIONS

SERVICE	No.	SIZE	TYPE
LUBE OIL INLET			
LUBE OIL OUTLET			
CASING DRAIN [a]			
VENT			
CASING PURGE			

MOUTING PLATES

☐ GEAR FURNISHED W/
☐ BASEPLATE ☐ SOLEPLATE ☐ SUBPLATE
☒ BASEPLATE(S) FURNISHED BY PACKAGER
☐ BASEPLATE LEVELING _____
☐ BASEPLATE WITH LEVELING PADS
☐ BASEPLATE SUITABLE FOR COLUMN MOUNTING
☐ VENDOR REVIEW OF PURCHASER'S FOUNDATION DWGS.
☐ GROUT TYPE: _____

CONTRACT DATA

☒ TEST DATA PRIOR TO _____
☒ PROGRESS REPORTS _____
☒ VENDOR SIGNOFF OF INSPECTOR CHECKLIST
☒ INFORMATION RETAINED FOR 20 YEARS
☒ TECHNICAL MANUAL

☒ PAINTING PACKAGER STANDARD
☒ PAINTING HOUSING INTERIOR NOT ALLOWED

SHIPMENT

☐ STEEL ROTOR STORAGE CONTAINER ☐ SHAFT COVERS

	CONTRACT UNIT	SPARES
EXPORT BOXING	☒	☐
DOMESTIC BOXING	☐	☐
OUTDOOR STORAGE OVER 12 MONTHS	☒	☐

VIBRATION DETECTORS

RADIAL
☐ MANUF. _____ ☐ TOTAL N° _____
☐ X-Y PROBES PINION BEAR ☐ COUPLING END ☐ BLIND END
☐ X-Y PROBES GEAR BEAR ☐ COUPLING END ☐ BLIND END
☐ OTHER _____
AXIAL
☐ MANUF. _____ ☐ TOTAL N° _____
☐ DUAL PROBES AT EACH THRUST BEARING
☐ SINGLE PROBE ANY SHAFT WITHOUT THRUST BEARING
☐ OTHER _____
ONE EVENT PER REVOLUTION PROBE
☐ MANUF. _____ ☐ TOTAL N° _____
☐ ONE ON INPUT SHAFT ☐ ONE ON OUTPUT SHAFT
☐ OTHER _____
ACCELEROMETER
☐ MANUF. _____ ☐ N° REQUIRED _____
☐ PINION COUPLING END ☐ GEAR COUPLING END
☐ OTHER _____
☒ SEE MACHINERY PROTECTION DATA SHEET

TEMPERATURE DETECTORS

☐ DIAL TYPE _____
☐ TYPE BRG. TEMP. SENSORS _____
☐ RTD ☐ THERMOCOUPLE / ☐ SIMPLEX ☐ DUPLEX
CALIBRATION _____
☐ HS/LS BEARING N° SENSORS EACH _____ / _____
☐ THRUST – No. OF SENSING ELEM EACH FACE _____
☒ SEE MACHINERY PROTECTION DATA SHEET

OTHER VIBRATION AND TEMPERATURE

OTHER GEAR
OSCILLATOR DEMODULATORS SUPPLIED BY ☐ ☐
VIBRATION MONITOR SUPPLIED BY ☐ ☐
VIBRATION SHUTDOWN DELAY TIME _____ SECONDS
TEMPERATURE MONITOR SUPPLIED BY ☐ ☐
OSCILLATOR DEMODULATOR J-BOX BY ☐ ☐
TEMP. SENSOR TERMINATION J-BOX BY ☐ ☐
J-BOX TYPE _____ MOUNT: _____
☒ SEE MACHINERY PROTECTION DATA SHEET

MISCELLANEOUS

☒ UNDAMPED CRITICAL ANALYSIS REPORT:
☐ W / DAMPED ROTOR RESPONS ANALYS REPORT
TORSIONAL ANALYSIS BY ☐ GEAR VENDOR ☒ OTHER
☒ SPARE SET OF GEAR ROTORS
☒ GEAR CASE FURNISHED WITH INLET PURGE CONNECTION
☒ ORIENTATION OF OIL INLET & DRAIN CONNECT _____
☒ FILTER BREATHER LOCATION _____
☐ TORSIONAL DEVICE PROVISIONS _____
☐ ROTOR VERTICAL STORAGE PROVISIONS _____
☐ ROTOR VERTICAL STORAGE FIXTURE(S) _____
☐ VENDOR SERVICE REP. ON SITE

REMARKS:
[a] Casing drain is "dead bottom" housing drain, not lube oil outlet

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		INTERNAL	

INSPECTIONS AND TESTS

☒ ADVANCE NOTICE OF WITNESS TESTING REQUIRED

	REQ	WIT	OBS	TEST LOG
SHOP INSPECTION	☒	☐	☐	
CLEANLINESS INSPECTION	☒	☐	☐	
HARDNESS VERIFICATION	☒	☐	☐	☒
DISMANTLE-REASSEMBLY	☒	☐	☒	☒
CONTACT CHECK	☒	☐	☒	☒
CONTACT CHECK TAPE LIFT	☒	☐	☐	☒
GEAR ACCURACY CHECK	☒	☐	☐	☒
DOUBLE HELICAL AXIAL STABILITY	☒	☐	☐	☒
SPECIAL TEST INTEGRAL FORGED GEARS	☐	☐	☐	☐
RESIDUAL UNBALANCE CHK.	☒	☐	☒	☒
MECHANICAL RUN TEST (MAIN)	☒	☒	☐	☒
MECHANICAL RUN TEST (SPARE)	☒	☐	☒	☐
ADD'L. MECHANICAL TEST	☐	☐	☐	☐
PART LOAD AND FULL SPEED TEST	☒	☐	☒	☒
FULL LOAD AND FULL SPEED TEST	☐	☐	☐	☐
FULL TORQUE, REDUCED SPEED	☐	☐	☐	☐
FULL TORQUE STATIC TEST	☐	☐	☐	☐
BACK-TO-BACK LOCKED TORQUE TEST	☐	☐	☐	☐
SOUND LEVEL TEST	☒	☒	☐	☒
ADDITIONAL GEAR TOOTH TEST	☐	☐	☐	☐
USE SHOP LUBE SYSTEM	☒			
USE JOB LUBE SYSTEM	☐			
USE SHOP VIBRATION PROBES, ETC.	☐			
USE JOB VIBRATION PROBES, ETC.	☒			
FINAL ASSEMBLY, MAINTENANCE & RUNNING CLEARANCE	☒	☐	☐	☒
OIL SYSTEM CLEANLINESS	☐	☐	☐	
OIL SYSTEM-CASING JOINT TIGHTNESS	☒	☐	☒	
WARNING AND PROTECTION DEVICES	☒	☐	☒	
SEISMIC VIBRATION DATA	☒			☒
VIBRATION, PHASE PLOTS	☒			☒
OIL INLET RANGE TEST	☒	☒	☐	☒
CD RECORDED VIBRATION DATA	☒			☒
	☒ PURCH. COPY			

NON-DESTRUCTIVE TESTING

	SURFACE	SUB-SURFACE	LOG
☐ CASING	☐	☐ _____	☐
☐ ROT. ELEMTS.	☐	☐ _____	☐
☐ BEARINGS	☐	☐ _____	☐
☐ OTHER:	☐	☐ _____	☐

(SPECIFY) _____

REMARKS:

NOTES

1. General

1.1. Gearbox for main equipment package shall be in accordance with API std 613, last edition.

1.2. PACKAGER shall fill in all blank spaces (fields) in these data sheet. All not applicable spaces shall be fill in with NA (NOT APPLICABLE).

2. Installation data

2.1. Site data:

The equipment supplied shall be suitable for the environment and range of ambient conditions including atmospheric pressure, relative humidity, rainfall, air temperature (dry bulb, see Obs.1), characteristics monthly values and wind motions defined at the document I-ET-3926.01-1000-941-PPC-001 - METOCEAN DATA.

Obs.1: For air temperature (dry bulb) of electric equipment, use the most critical conditions, between those defined by Classification Society and specific documentation of equipment.

2.2. For area classification, please see DE-3A17.01-5400-94A-1J5-001 - PLANTA DE CLASSIFICAÇÃO DE ÁREAS. Electrical equipment installed in external safe areas, that shall be kept operating during emergency shutdown ESD-3P and ESD-3T shall be certified for installation in hazardous areas Zone 2 Group IIA temperature T3.

2.3. For utility data, please see I-RL-3A17.01-1200-940-1J5-001 - GENERAL SPECIFICATION FOR AVAILABLE UTILITIES.

2.4. For noise requirements, please see I-ET-3A17.01-1231-321-1J5-001 – TURBOCOMPRESSOR.

3. Working group

REV. 0		
KEY	**DEPARTMENT**	**ROLE**
CL2R	BS/ATP-IMI/MIED	EXECUTION
DHG1	BS/PCM/PROJDP	EXECUTION
FBJW	BS/PCM/PROJDP	EXECUTION
FEU5	BS/PCM/PROJDP	EXECUTION
FZ35	BS/PCM/PROJDP	EXECUTION
RZA7	BS/PCM/PROJDP	EXECUTION
SGPL	SRGE/ESUP/PIES/PPP	EXECUTION
URS8	BS/PCM/PROJDP	EXECUTION
U32A	BS/PCM/PROJDP	CHECK
BEGS	BS/PCM/PROJDP	APPROVAL