Mechanical Data Sheet for Crude Oil Main Pumps P-6001 (Option 3)

Rev.	Date	Description	Prepared by	Checked by	Approved by
0		Issued For Proposal			

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Document Revision

Mechanical Data Sheet for Crude Oil Main Pumps(option 3)

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APPLICABLE TO: ● PROPOSAL ○ PURCHASE ◎ AS BUILT

FOR **PETROLEUM ENGINEERING AND DEVELOPMENT COMPANY (PEDEC)** UNIT **5 - Crude oil Storage & Transfer Unit**

SITE **JASK CRUDE OIL STORAGE TANKS PROJECT** SERVICE **Light & Heavy Crude Oil Transfer Pump**

INFORMATION BELOW TO BE COMPLETED: ○ BY PURCHASER □ BY MANUFACTURER ◎ BY MANUFACTURER OR PURCHASER

	ITEM NO.	ATTACHED	ITEM NO.	ATTACHED	ITEM NO.	ATTACHED	NO.	DATE	BY
PUMP	P-6001 A/B/C/D/E	●		○		○	1		
MOTOR	PM-1001 A/B/C/D/E	●		○		○	2		
GEAR		○		○		○	3		
TURBIN		○		○		○	4		

APPLICABLE OVERALL STANDARD(S): API P610 10th Edition 5

● OPERATING CONDITIONS (5.1.3)

FLOW NORMAL **2300** (m3/h) RATED **2530** (m3/h)

OTHER

SUCTION PRESSURE MAX./ MIN **7.9** ./ **0.23** ./ (barg)

DISCHARGE PRESSURE RATED **14.93** (barg)

DIFFERENTIAL PRESSURE **14.7** (bar)

DIFF. HEAD **170.5** (m) NPSHA **6** (m)

PROCESS VARIATION (5.1.4)

STARTING CONDITIONS (5.1.4)

SERVICE: ○ CONT ● INTERMITTENT (STARTS/DAY)

● PARALLEL OPERATION REQ'D (5.1.13)

● LIQUID (5.1.3) (Remark7)

LIQUID TYPE OR NAME Crude Oil

● HAZARDOUS ● FLAMMABLE (5.1.5)

	Max.	Min.
PUMPING TEMP (°C)	40	15
VAPOR PRESSURE (bara)	0.6	
RELATIVE DENSITY (SG)	0.88	
VISCOSITY (mPa. s)	27	
SPECIFIC HEAT kJ/(kg-K)	1.964	2

● CHLORIDE CONCENTRATION (6.5.2.4) **<50** (ppm)

● H2S CONCENTRATION **<60** (ppm) WET (5.12.1.12c)

CORROSIVE / EROSIVE AGENT (5.12.1.9)

● SITE DATA (5.1.3)

LOCATION: (5.1.30)

○ INDOOR ○ HEATED ● OUTDOOR ● UNHEATED

● UNDER ROOF

● ELECTRICAL AREA CLASSIFICATION **ZONE 1 Exd-IIA-T3 for Motor and Terminal Box**

○ WINTERIZATION REQ'D ● TROPICALIZATION REQ'D

SITE DATA (5.1.30)

● ALTITUDE **5.0** (m) BAROMETER **760** (mmHgr)

● RANGE OF AMBIENT TEMPS: MIN / MAX **6** ./ **50** (°C)

● RELATIVE HUMIDITY: MIN / MAX **35% / 93%**

UNUSUAL CONDITIONS: (5.1.30) ● DUST ○ FUME

● OTHER **Remark7**

MATERIALS (5.12.1.1) (Remark 1)

● ANNEX H CLASS (5.12.1.1) **S6 (complying with NACE MR-0175)**

● MIN DESIGN METAL TEMP (5.12.4.1) **6** (°C)

● REDUCED HARDNESS MATERIALS REQ'D (5.12.1.12) **for NACE compliant Material**

□ BARREL/CASE **A216 Gr.WCB** IMPELLER **A 487 Ca 15C**

□ CASE / IMPELLER WEAR RINGS **A747 Cb7 Cu-1**

■ SHAFT **A479 UNS S4100 / AISI 4140**

□ DIFFUSERS

● DRIVE TYPE

● INDUCTION MOTOR ○ STEAM TURBINE ○ GEAR

○ OTHER

◎ PERFORMANCE:

PROPOSAL CURVE NO. □

□ IMPELLER DIA. RATED MAX. MIN. (mm)

□ IMPELLER TYPE

□ RATED POWER (KW) EFFICIENCY (%)

□ MINIMUM CONTINUOUS FLOW:

THERMAL (m3/h) STABLE (m3/h)

□ PREFERRED OPER REGION TO (m3/h)

□ ALLOWABLE OPER REGION TO (m3/h)

□ MAX HEAD @ RATED IMPELLER (m)

□ MAX POWER @ RATED IMPELLER (kw)

□ NPSHR AT RATED FLOW (m) (5.1.10)

● MAX SUCTION SPECIFIC SPEED **<213** (5.1.11)

● MAX SOUND PRESS. REQ'D **85dB at 1 meter from the equipment surface** (dBA)

◎ EST MAX SOUND PRESS. LEVEL (dBA)

◎ EST MAX SOUND POWER LEVEL (dBA)

● MOTOR DRIVER (6.1.1 / 6.1.4)(Remark 4)

● MANUFACTURER

□ (kw) □ (r/min)

□ FRAME ● ENCLOSURE

● HORIZONTAL ○ VERTICAL ○ SERVICE FACTOR

● VOLTS/PHASE/HERTZ **6KV±10%** **3ph** **50 Hz±2%**

○ TYPE **Squirrel Cage Induction Motor**

● MINIMUM STARTING VOLTAGE **85%**

● INSULATION **Class F** ● TEMP RISE **Class B**

◎ FULL LOAD AMPS

◎ LOCKED ROTOR AMPS

● STARTING METHOD **DOL**

◎ LUBE

● DEGREE OF PROTECTION **IP55W for Motor**
IP56 for Terminal Box

BEARING (TYPE/NUMBER):

□ RADIAL ./

□ THRUST ./

□ VERTICAL THRUST CAPACITY

UP (N) DOWN (N)

AUXILAIRIES: RTD BOX AND CT BOX SHALL BE PROVIDED

● UTILITY CONDITIONS (5.1.3)

ELECTRICITY	VOLTAGE	PHASE	HERTZ
DRIVERS	6KV±10%	3 ph	50 hz
HEATING	400/230V±10%	3/1 ph	50 hz

SYSTEM VOLTAGE DIP ● 85% ○ OTHER (6.1.5)

STEAM	MAX. PRESS	MAX TEMP	MIN. PRESS	MIN TEMP.
DRIVERS				
HEATING				

COOLING WATER: (5.1.19) SOURCE **None**

SUPPLY TEMP (°C) MAX RETURN TEMP. (°C)

NORM PRESS (Mpa) DESIGN PRESS (Mpa)

MIN RET PRESS (Mpa) MAX ALLOW D P (Mpa)

CHLORIDE CONCENTRATION: (mg/kg)

CONSTRUCTION

ROTATION: (VIEWED FROM COUPLING END) ☐ CW ☐ CCW

PUMP TYPE: (4.1) **REMARK 6**

● BB1 ○ BB2 ○ BB3 ○ BB5

CASING MOUNTING:

☐ CENTERLINE ☐ NEAR CENTERLINE ☐ FOOT

CASING SPLIT:

● AXIAL ○ RADIAL

CASING TYPE:

☐ SINGLE VOLUTE ☐ MULTIPLE VOLUTE ☐ DIFFUSER

☐ BETWEEN BEARINGS ○ BARREL

CASE PRESSURE RATING:

☐ MAX. ALLOWABLE WORKING PRESSURE 40 (bar g)

15 @ ..... (°C)

☐ HYDROTEST PRESSURE **1.5 x MAWP** (Mpa)

● SUCTION PRESSURE REGION MUST BE DESIGNED FOR MAWP (5.3.6)

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☐ **NOZZLE CONNECTIONS: (5.4.2)**

20	SIZE (DN)	FLANGE RATING	FACING	POSITION
21				
SUCTION	*	300	R.F	
DISCHARGE	*	300	R.F	
BALANCE DRUI				

25 **PRESSURE CASING AUX. CONNECTIONS: (5.4.3)**

26	NO.	SIZE (DN)	TYPE
● DRAIN	1		
● VENT	1		
○ PRESS GAUGE			
○ TEMP GAUGE			
○ WARM-UP			
○ BALANCE/LEAK-OFF			

○ MACHINED AND STUDDED CONNECTIONS (5.4 3.8)

○ CYLINDRICAL THREADS REQUIRED (5.4.3.3)

ROTOR:

● COMPONENT BALANCE TO ISO 1940 G1 0 (5.9.4.4)

○ SHRINK FIT LIMITED ,OVEMENT IMPELLERS (8.2.2.3)

COUPLING: (6.2.2)

● MANUFACTURER **Acc. to Vendor List** ● MODEL **Meta Stream***

☐ RATING (kw per 100 r/min)

○ SPACER LENGTH ..... (mm) ● SERVICE FACTOR **at least 1.5**

DRIVER HALF-COUPLING MOUNTED BY:

43 ● PUMP MFR ○ DRIVER MFR ○ PURCHASER

○ COUPLING WITH HYDRAULIC FIT (6.2.10)

● COUPLING BALANCED TO ISO 1940-1 G6 3 (6.2.3)

○ COUPLING PER ISO 14691 (5.2.4)

○ COUPLING PER ISO 10441 (6.2.4)

● COUPLING PER API 671 (6.2.4)

● NON-SPARK COUPLING GUARD (6.2.14c)

● COUPLING GUARD STANDARD PER **ISO 14120 for less than 3800 RPM** (6.2.14a)

BASEPLATES:

☐ API BASEPLATE NUMBER ..... (ANNEX D)

○ NON-GROUT CONSTRUCTION (6.3.13)

○ OTHER .....

MECHANICAL SEAL: (5.8.1) Double Mechanical Seal is required (note 9)

○ SEE ATTACHED ISO 21049/API 682 DATA SHEET (shall be submitted by vendor)

57 **"Vendor shall submit this datasheet with his proposal"**

58 **MECH. SEAL MANUFACTURER: ACCORDING TO PROJECT VENDOR LIST**

59 **PREFERRED MANUFACTURER: BURGMAN/JOHN CRANE/FLOWSERVE**

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SURFACE PREPARATION AND PAINT

○ MANUFACTURER'S STANDARD ○ OTHER (SEE BELOW)

○ SPECIFICATION NO.: .....

PUMP:

● PUMP SURFACE PREPARATION .....

● PRIMER .....

● FINISH COAT .....

BASEPLATE: (6.3.17)

● BASEPLATE SURFACE PREPARATION

● PRIMER

● FINISH COAT

● DETAILS OF LIFTING DEVICES (6.3.20)

SHIPMENT: (7.4.1)

○ DOMESTIC ● EXPORT ● EXPORT BOXING REQUIRED

● OUTDOOR STORAGE MORE THAN 6 MONTH

SPACE ROTOR ASSEMBLY PACKED FOR:

○ SHIPPING CONTAINER (8.2.8.3) ○ VERTICAL STORAGE (8.2.8.2)

○ TYPE OF SHIPPING PREPARATION ○ N2 PURGE (8.2.8.4)

HEATING AND COOLING

○ HEATING JACKET REQ'D (5.8.9) ○ COOLING REQ'D

○ COOLING WATER (C W) PIPING PLAN (6.5.3.1) .....

C.W PIPING:

○ PIPE ○ TUBING ○ FITTINGS .....

C.W. PIPING MATERIALS:

○ S STEEL ○ C STEEL ○ GALVANIZED

COOLING WATER REQUIREMENTS:

☐ BEARING HOUSING ..... (m3/h) @ ..... (Mpa)

☐ HEAT EXCHANGER ..... (m3/h) @ ..... (Mpa)

STEAM PIPING: ○ TUBING ○ PIPE

BEARING AND LUBRICATION

BEARING (TYPE/NUMBER) (5.10.1):

■ RADIAL **SLEEVE** / **REMARK 2**

■ THRUST **TILTING PAD**

LUBRICATION (5.11.3 5.11.4):

● RING OIL ○ HYDRODYNAMIC ○ PURGE OIL MIST ○ PURE OIL MIST

● CONSTANT LEVEL OILER PREFERENCE (5.10.2.2): .....

○ PRESSURE LUBE SYS ISO 10438-3 ○ ISO 10438-2 (8.2.6.1/8.2.6.5)

○ OIL VISC ISO GRADE .....

○ OIL PRESS TO BE GREATER THAN COOLANT PRESSURE

○ REVIEW AND APPROVE THRUST BEARING SIZE (8.2.5.2d)

○ OIL HEATER REQUIRED: ○ STEAM ○ ELECTRIC

INSTRUMENTATION (6.4.2)

○ SEE ATTACHED API 670 DATA SHEET (shall be submitted by vendor)

○ ACCELEROMETER(S) (6.4.2.1) .....

○ PROVISION FOR VIBRATION PROBES (6.4.2.2)

○ RADIAL ..... PER BRG ○ AXIAL ..... PER BRG

○ PROVISION FOR MOUNTING ONLY (5.10.2.11)

● FLAT SURFACE REQ'D (5.10.2.12)

● RADIAL BEARING METAL TEMP. ● THRUST BRG METAL TEMP

○ TEMP GAUGE (WITH THERMOWELLS) .....

○ MONITORS AND CABLES SUPPLIED BY (6.4.2.4) .....

REMARKS

MASSES (kg)

PUMP	BASEPLATE
DRIVER	TOTAL
GEAR	

Mechanical Data Sheet for Crude Oil Main Pumps(option 3)

Contract No.:	Proj. Code	Phase	Discipline	Type	Seq. No.	Rev.	Page 5 of 6
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SPARE PARTS (TABLE 18)

- ● START-UP ● NORMAL MAINTENANCE
- ● SPECIFY Two Years Operation

OTHER PURCHASER REQUIREMENTS

- ● COORDINATION MEETING REQUIRED (9.1.3)
- ● MAXIMUM DISCHARGE PRESSURE TO INCLUDE (5.3.2)
  - ● MAX RELATIVE DENSITY
  - ○ MAX DIA IMPELLER AND/OR NO. OF STAGES
  - ○ OPERATION TO TRIP SPEED
- ○ CONNECTION DESIGN APPROVAL (5.12.3.4/8.2.1.4)
- ○ INERT GAS INHIBITED STORAGE- SPARE CARTRIDGE (8.2.6.4)
- ○ TORSIONAL ANALYSIS REQUIRED (5.9.2.1)
- ○ TORSIONAL ANALYSIS REPORT (5.9.2.6)
- ● PROGRESS REPORTS (9.3.3)
- ○ OUTLINE OF PROCEDURES FOR OPTIONAL TESTS (9.2.5)
- ○ ADDITIONAL DATA REQUIRING 20 YEARS RETENTION (7.2.2.1f)
- ○ LATERAL ANALYSIS REQUIRED (8.2.4.1/8.2.4.1.3)
- ● DYNAMIC BALANCE ROTOR (8.2.4.2)
- MANIFOLD PIPING TO SINGLE CONNECTION (6.5.1.6)
  - ○ VENT ○ DRAIN ○ COOLING WATER
- ○ MOUNT SEAL RESERVOIR OFF BASEPLATE (6.5.1.4)
- ● FLANGES REQ'D IN PLACE OF SOCKET WELD UNIONS (6.5.2.8)

CONNECTION BOLTING

- ○ PTFE COATING ○ ASTM A153 GALVANIZED
- ○ PAINTED ● SS
- ● INSTALLATION LIST IN PROPOSAL (9.2.3L)

QA INSPECTION AND TESTING

- ● SHOP INSPECTION (7.1.4)
- ● PERFORMANCE CURVE APPR.
- ○ TEST WITH SUBSTITUTE SEAL (7.3.3.2)
- ● MATERIAL CERTIFICATION REQUIRED (5.12.1.8)
  - ● CASING ● IMPELLER ● SHAFT
  - ● OTHER WEAR RINGS AND MECHANICAL SEAL
- ● CASING REPAIR PROCEDURE APPROVAL REQ'D (5.12.2.5)
- ● INSPECTION REQUIRED FOR CONNECTION WELDS (5.12.3.4e) **REMARK 3**
  - ● MAG PARTICLE ● LIQUID PENETRATE
  - ● RADIOGRAPHIC ○ UL TRANSONIC
- ● INSPECTION REQUIRED FOR CASTINGS (7.2.1.3)(5.12.1.5) **REMARK 3**
  - ● MAGI PARTICLE ● LIQUID PENETRATE
  - ● RADIOGRAPHIC ○ UL TRANSONIC
- ● HARDNESS TEST REQUIRED: **WEAR RINGS** (7.2.2.3)
- ● ADDITIONAL SURFACE/SUBSURFACE EXAMINATION (7.2.1.3)

FOR NACE Compliant Material

METHOD

QA INSPECTION AND TESTING (CONT.)

TEST	NON-WIT	WIT	OBSERVE
● HYDROSTATIC (7.3.2)	○	●	○
● PERFORMANCE (7.3.3)	○	●	○
● NPSH (7.3.4.2)	○	●	○
● RESET ON SEAL L'KGE (7.3.3.2d)	○	●	○
○ RESET REQUIRED AFTER FINAL HEAD ADJUSTMENT (7.3.3.5b)	○	○	○
● COMPLETE UNIT TEST (7.3.4.3)	○	●	○
● SOUND LEVEL TEST (7.3.4.4)	●	○	○
● CLEANLINESS PRIOR TO FINAL ASSEMBLY (7.2.2.2)	●	○	○
● NOZZLE LOAD TEST (6.3.6)	●	○	○
○ CHECK FOR VO-PLANAR MOUNTING PAD SURFACES (6.3.3)	○	○	○
○ MECHANICAL RUN UNITE OIL TEMP STABLE (7.3.4.7.1)	○	○	○
● 4 h MECHANICAL RUN AFTER OIL TEMP STABLE (7.3.4.7.3)	○	●	○
○ 4 h MECH RUN TEST (7.3.4.7.2)	○	○	○
○ TRUE PEAK VELOCITY DATA (7.3.3.4d)	○	○	○
○ BRG HSG RESONANCE TEST (7.3.4.6)	○	○	○
○ REMOVE/INSPECT HYDRODYNAMIC BEARING AFTER TEST (8.2.7.5)	○	○	○
○ AUXILIARY EQUIPMENT TEST (7.3.4.5)	○	○	○
○ CHARPY TEST (EN 13445/ASME VIII)	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

- ○ VENDOR KEEP REPAIR AND HT RECORDS(7.2.1.1c)
- ● VENDOR SUBMIT TEST PROCEDURE (7.3.1.2 / 9.2.5)
- ○ VENDOR SUBMIT TEST DATA WITHIN 24 h (7.3.3.3e)
- ○ INCLUDE PLOTTED VIBRATION SPECTRA (5.9.3.3)
- ● RECORD FINAL ASSEMBLY RUNNING CLEARANCES
- ● COMPLETION OF INSPECTION CHECK LIST (7.1.6)

Note:

REMARKS

1. VENDOR SHALL SUBMIT ALL PUMP PART MATERIALS IN HIS PROPOSAL.
2. VENDOR SHALL SUBMIT BEARING LUBRICATION TYPE IN HIS PROPOSAL.
3. VENDOR SHALL SELECT ONE OF MENTIONED INSPECTION BASE ON HIS EXPERIENCE.
4. MOTORS FOR CENTRIFUGAL PUMPS SHALL HAVE POWER RATING ≥ THE FOLLOWING PERCENTAGE OF PUMP DESIGN BHP:
   - MOTOR RATING ≤ 18.5 KW 125%
   - MOTOR RATING ≥ 22 KW ≤ 55KW 115%
   - MOTOR RATING ≥ 75 KW 110%
5. PUMP SHALL BE SIZED FOR OPEN VALVE STARTING CONDITION.
6. PUMP TYPE SHALL BE FINALIZED BY VENDOR
7. MOTOR SHALL BE EQUIPPED WITH 2 RTD'S PER PHASE IN THE STATOR WINDING PLUS 1 RTD PER EACH SLEEVE BEARINGS.(TOTAL 8 NO.)
8. VENDOR SHALL FOLLOW AND SUPPLY TABLE 20 OF API 610, 11TH EDITION FOR START-UP AND NORMAL MAINTENANCE (TYPICALLY TWO YEARS).
9. PLAN 13+53B IS RECOMMENDED. AIR-COOLED HEAT EXCHANGER SHALL APPLY IN PLAN 53B.
10. FOR ANY SORT OF COOLING PURPOSES, AIR COOLED SYSTEM SHALL APPLY.

APPLICABLE TO: ● PROPOSAL ○ PURCHASE ◎ AS BUILT

FOR PE TR UNIT 5 - Crude oil Storage & Transfer Unit

SITE JASK CRUDE OIL STORAGE TANKS PROJECT SERVICE Light & Heavy Crude Oil Transfer Pump

NOTE: INFORMATION BELOW TO BE COMPLETED: ○ BY PURCHASER □ BY MANUFACTURER ◎ BY MANUFACTURER OR PURCHASER

PRESSURE VESSEL DESIGN CODE REFERENCE.

□ THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER	
CASING FACTORS USED IN DESIGN (5.3.4) (TABLE 3)	□
SOURCE OF MATERIAL PROPERTIES	□

WELDING AND REPAIRS (5.12.3)

THESE REFERENCES MUST BE LISTED BY THE PURCHASER (DEFAULT TO TABLE 10 IF NO PURCHASER REFERENCE IS STATED)

● ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 13)

Welding Requirement (Applicable Code or Standard)	purchaser-defined	Default per Table 10
Welder/operator qualification	○	●
Welding procedure qualification	● as per ASME section IX	○
Non-pressure-retaining structural welding such as baseplates or supports	○	●
Magnetic particle or liquid penetrate examination of the plate edges	○	●
Postweld heat treatment	○	●
postweld heat treatment of casing fabrication welds	○	●

MATERIAL INSPECTION (7.2.2.1) (7.2.1.3)

THESE REFERENCES MUST BE LISTED BY THE PURCHASER (DEFAULT TO TABLE 10 IF NO PURCHASER REFERENCE IS STATED)

○ ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 13)

Type of inspection	Methods	For fabrication	Casings
Radiography	○	○	○
Ultrasonic inspection	○	○	○
Magnetic Particle Inspection	○	○	○
Liquid penetrate inspection	○	○	○

REMARKS