Mechanical Data Sheet for Crude Oil Main Pumps P-6001 (option 2)

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 2)

APPLICABLE TO: ● PROPOSAL ○ PURCHASE ◙ AS BUILT

FOR **PETROLEUM ENGINEERING AND DEVELOPMENT COMPANY (PEDEC)** UNIT **8 - 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/F/G/H	●		○		○	1		
MOTOR	PM-1001 A/B/C/D/E/F/G/H	●		○		○	2		
GEAR		○		○		○	3		
TURBIN		○		○		○	4		

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

● OPERATING CONDITIONS (5.1.3)

FLOW NORMAL **1364** (m3/h) RATED **1500** (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)

● 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**

● DRIVE TYPE

● INDUCTION MOTOR ○ STEAM TURBINE ○ GEAR

○ OTHER

● 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

● 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)

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

◙ 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)

● 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)

Mechanical Data Sheet for Crude Oil Main Pumps(option 2)

Contract No.:	Proj. Code	Phase	Discipline	Type	Seq. No.	Rev.	Page 4 of 6
						0	

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)

18

☐ **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	

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 .(TOTAL 6 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 PETROLEUM ENGINEERING AND DEVELOPMENT COMPANY (PEDEC) UNIT 8 - 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