**PROCUREMENT (SUPPLY), CONSTRUCTION, INSTALLATION/ERECTION, PRE-COMMISSIONING, & COMMISSIONING ASSISTANCE FOR NEW CENTRIFUGAL COMPRESSORS AND MODIFICATION WORKS OF EXISTING TURBO COMPRESSOR TRAINS FOR QADIRPUR COMPRESSION PROJECT**

**TENDER ENQUIRY NO. PROC-FC/CB/PROJ/QP-4369/2019**

**POST-BID CLARIFICATION No. OGDCL-QP-4369-001**

| Sr. No. | Bidder Query | OGDCL/ENAR Response (07-Oct-2019) |
|---|---|---|
| 1 | One of the bidder has asked the quiry as follows:<br>you are requested to provide us the data sheets of following produce water pumps:<br>• P- 2501 A/B<br>• P- 2502 A/B<br>• P- 2051 A/B (0220-DS-1706)<br>• P- 2052 A/B (0220-DS-1707) | Please note that Produced water Pumps tag mentioned as P-2501 A/B and P-2501 A/B in BOQ (PS-301B) are typo error & must be read as P-2051 A/B & P-2052 A/B respectively.<br>Futhermore data sheets of Produced water Pumps No. P- 2051 A/B (0220-DS-1706)<br>& P- 2052 A/B (0220-DS-1707) are also attached. |
| | | |

OGDCL PAKISTAN:
OIL & GAS DEVELOPMENT
COMPANY LIMITED

# QADIRPUR COMPRESSION PROJECT

ISSUE FOR APPROVAL

| REV | DATE | DESCRIPTION | ORIG | CHKD | LE | QA | PM | LOCAL REPR. | PROJ. MAN |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| A | 29-Mar-19 | ISSUE FOR APPROVAL | SHK | JAY | JAY | MPM | TUH | | |

ENAR

ENAR Petrotech Services (Pvt.) Limited , 7-B , Sector 7-A , Korangi Industrial Area , Karachi Pakistan

CONTRACT NO. 14-0220

**DOCUMENT TITLE:**
DATA SHEET FOR PRODUCED WATER PUMPS
P-2051 A/B

| | 0220 | DS | 1706 | A | |
|---|---|---|---|---|---|
| | CODE | TYPE | SEQ NO. | REV | . |

# DATA SHEET FOR PRODUCED WATER PUMPS
## P-2051 A/B

| | |
|---|---|
| Doc No. | 0220-DS-1706 |
| Prep. By | SHK — Check By JAY |
| Date | March 29, 2019 |
| Sheet | 2 of 8 — Rev. A |

APPLICABLE TO: **PROPOSAL** — APPLICABLE NTL/INTNTL STANDARD: **API-610**

FOR: **OGDCL** — UNIT:

SITE: **Qadirpur Plant** — SERVICE: **Produced Water**

NO. REQ: **2 x 100%** — PUMP SIZE: — TYPE: — No. STAGES:

MANUFACTURER: — MODEL: — SERIAL NO.:

### LIQUID CHARACTERISTICS

| | Units | Maximum | Minimum |
|---|---|---|---|
| LIQUID TYPE OR NAME : | PRODUCED WATER / OIL | | |
| VAPOR PRESSURE : | psia | 114.7 | 17.6 |
| RELATIVE DENSITY : | | 0.984 | 0.765 |
| SPECIFIC HEAT : | Btu/(lbm-°F) | 1.032 | 0.491 |
| VISCOSITY : | cP | 0.967 | 0.544 |

**SERVICE :** **CONTINUOUS**

PUMPS OPERATE IN: **PARALLEL**

CORROSION DUE TO : (6.12.1.9) CO2 & H2S

EROSION DUE TO : (6.12.1.9)

H2S CONCENTRATION (ppm) : (6.12.1.12) 100

CHLORIDE CONCENTRATION (ppm) : 22628

PARTICULATE SIZE (DIA IN MICRONS)

PARTICULATE CONCENTRATION (PPM)

LIQUID PH 5.62

### OPERATING CONDITIONS (6.1.2)

| | Units | Maximum | Rated | Normal | Minimum |
|---|---|---|---|---|---|
| NPSHa Datum: | | Top of Foundation | | | |
| PUMPING TEMPERATURE : | °F | | 122 | 122 | 41 |
| FLOW : | gpm | | 165 | 150 | |
| DISCHARGE PRESSURE : (6.3.2) | psia | 180 | 165.0 | 165.00 | |
| SUCTION PRESSURE : | psia | 115 | 80 | 83.000 | |
| DIFFERENTIAL PRESSURE : | psi | 65.0 | 85.0 | 82.0 | |
| DIFFERENTIAL HEAD : | ft | 153 | 200 | 193 | |
| $NPSH_A$ : | ft | | -13.5 | | |
| HYDRAULIC POWER : | HP | | 8.0 | | |

### SITE AND UTILITY DATA

**LOCATION:** **OUTDOOR** **UNHEATED**

**MOUNTED AT :** **GRADE** ○ TROPICALISATION REQD

**ELECTRIC AREA CLASSIFICATION:** 6.1.22 ZONE **2**

GROUP **Group IIA** TEMP CLASS **T3**

**SITE DATA :**

**ELEVATION (MSL) :** **223** ft **BAROMETER :** in Hg

RANGE OF AMBIENT TEMPS: MIN / MAX **41** / **121** °F

RELATIVE HUMIDITY: MIN / MAX **20** / **77** %

**UNUSUAL CONDITIONS:** **DUST**

**UTILITY CONDITIONS :**

| ELECTRICITY : | DRIVERS | HEATING | CONTROL | SHUTDOWN |
|---|---|---|---|---|
| VOLTAGE | 415 | | | |
| PHASE | 3 | | | |
| HERTZ | 50 | | | |

**COOLING WATER :**

| | INLET | RETURN | DESIGN | |
|---|---|---|---|---|
| TEMP °C | | MAX | | |
| PRESS. kg/cm²g | | MIN | | |

SOURCE

COOLING WATER CHLORIDE CONCENTRATION: ppm

**INSTRUMENT AIR :** MAX **135** psia MIN **85** psia

**STEAM**

| | | DRIVERS | HEATING |
|---|---|---|---|
| TEMP °C | Max | | |
| | Nor | | |
| | Min | | |
| PRESS. kg/cm²g | Max | | |
| | Nor | | |
| | Min | | |

### PERFORMANCE

PROPOSAL CURVE NO. — RPM

As Tested Curve No.

IMPELLER DIA.: RATED — MAX. — MIN. — in.

RATED POWER — HP EFFICIENCY — (%)

RATED CURVE BEP FLOW (at rated impeller dia) — gpm

MIN FLOW : THERMAL — gpm STABLE — gpm

PREFERRED OPERATING REGION (6.1.11) — to — gpm

ALLOWABLE OPERATING REGION — to — gpm

MAX HEAD @ RATED IMPELLER — ft

MAX POWER @ RATED IMPELLER (6.8.9) — HP

NPSHR AT RATED FLOW : — ft

CL PUMP TO U/S BASEPLATE — ft

NPSH MARGIN AT RATED FLOW : — ft

SPECIFIC SPEED (6.1.9) gpm,rpm,ft

SUCTION SPECIFIC SPEED LIMIT

SUCTION SPECIFIC SPEED gpm,rpm,ft

MAX. ALLOW. SOUND PRESS. LEVEL REQD (6.1.14) 85 (dBA)

EST MAX SOUND PRESS. LEVEL (dBA)

MAX. SOUND POWER LEVEL REQ'D (6.1.14)

EST MAX SOUND POWER LEVEL

### DRIVER (7.1.5)

Driver Type: **MOTOR**

GEAR

VARIABLE SPEED REQUIRED

SOURCE OF VARIABLE SPEED

OTHER

MANUFACTURER

NAMEPLATE POWER HP

Nominal RPM

RATED LOAD RPM

FRAME OR MODEL

ORIENTATION

LUBE

BEARING TYPE:

RADIAL /

THRUST /

STARTING METHOD

SEE DRIVER DATA SHEET **REFER NOTE- 10 & 11**

# DATA SHEET FOR PRODUCED WATER PUMPS
## P-2051 A/B

| | | | |
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**CONSTRUCTION**

**API PUMP TYPE:** VS6/ VS7 **[Based on API 610 definitions]**

**SEE ALSO PAGE 6**

**NOZZLE CONNECTIONS:** (6.5.5)

| | Size | Facing | Rating | Position |
|---|---|---|---|---|
| SUCTION | 6" | RF | 300 | SIDE |
| DISCHARGE | 4" | RF | 300 | SIDE |

**PRESSURE CASING AUX. CONNECTIONS: (6.4.3.2) NOTE-12**

| | No. | Size | Type | Facing | Rating | Posn. |
|---|---|---|---|---|---|---|
| BALANCE/LEAK OFF | 1 | | | | | |
| DRAIN | 1 | | | | | |
| VENT | 1 | | | | | |
| PRESSURE GAGE | | | | | | |
| TEMP GAGE | | | | | | |
| WARM-UP LINE | | | | | | |

Drain Valve Supplied By: **SUPPLIER**
DRAINS MANIFOLDED: **YES**
VENT Valve Supplied By: **SUPPLIER**
VENTS MANIFOLDED: **YES**
THREADED CONS FOR PIPELINE SERVICE & < 50°C (6.4.3.2): **YES**
SPECIAL FITTINGS FOR TRANSITIONING (6.4.3.3):
CYLINDRICAL THREADS REQUIRED (6.4.3.8):
GUSSET SUPPORT REQUIRED:
MACHINED AND STUDDED CONNECTIONS (6.4.3.12):
VS 6 DRAIN:
DRAIN TO SKID EDGE: **YES**

**MATERIAL (6.12.1.1) Note-9**

APPENDIX H CLASS: **D-1**
MIN DESIGN METAL TEMP (6.12.4.1): °F
REDUCED-HARDNESS MATERIALS REQ'D (6.12.1.12.1):
Applicable Hardness Standard (6.12.1.12.3):
BARREL :
BOWL :
DIFFUSERS
IMPELLER :
IMPELLER WEAR RING :
CASE WEAR RING :
SHAFT:
Bowl (if VS-type)
Inspection Class
**Remarks:**

**BEARINGS AND LUBRICATION (6.10.1.1)**

BEARING (TYPE / NUMBER): (6.11.4)
RADIAL / 
THRUST /
REVIEW AND APPROVE THRUST BEARING SIZE : (9.2.5.2.4)

LUBRICATION : (6.10.2.2) (6.11.3) (9.6.1)
PRESSURE LUBE SYSTEM TO ISO 10438- (9.2.6.5)
ISO 10438 DATA SHEETS ATTACHED
Pressurized Lube Oil System mtd on pump baseplate
Location of Pressurized Lube Oil System mounted on baseplate :
INTERCONNECTING PIPING PROVIDED BY
OIL VISC. ISO GRADE VG
CONSTANT LEVEL OILER :

**CASING MOUNTING:**
**CASING TYPE:** (6.3.10)
OH3 BACKPULLOUT LIFTING DEVICE REQD. (9.1.2.6)

**CASE PRESSURE RATING:**
MAWP : (6.3.6) psig @ °F
HYDROTEST : psig @ °F

**HYDROTEST OH PUMP AS ASSEMBLY:** **YES**
SUCT'N PRESS. REGIONS DESIGNED FOR MAWP: **YES**
**ROTATION:** (VIEWED FROM COUPLING END)
- IMPELLERS INDIVIDUALLY SECURED :
- BOLT OH 3/4/5 PUMP TO PAD / FOUNDATION :
- PROVIDE SOLEPLATE FOR OH 3/4/5 PUMPS

**ROTOR:**
SHAFT FLEXIBILITY INDEX (SFI) (9.1.1.3)
First Critical Speed Wet (Multi stage pumps only)
COMPONENT BALANCE TO ISO 1940 G1.0: **YES**
SHRINK FIT -LIMITED MOVEMENT IMPELLERS (9.2.2.3)

**COUPLING:(7.2.3)** **(7.2.13.f)**
MANUFACTURER
MODEL
RATING (POWER/100 RPM)
SPACER LENGTH in.
SERVICE FACTOR
RIGID
COUPLING WITH HYDRAULIC FIT (7.2.10)
COUPLING BALANCED TO ISO 1940-1 G6.3 (7.2.3)
COUPLING WITH PROPRIETARY CLAMPING DEVICE (7.2.11)
COUPLING IN COMPLIANCE WITH (7.2.4)
COUPLING GUARD STANDARD PER (7.2.13.a)
Window on Coupling Guard

**BASEPLATE**

API BASEPLATE NUMBER :
BASEPLATE CONSTRUCTION (7.3.14)
BASEPLATE DRAINAGE (7.3.1): **Entire Baseplate Drain Rim**
MOUNTING : **GROUTED**
NON-GROUT CONSTRUCTION : (7.3.13) **NOT REQUIRED**
VERTICAL LEVELING SCREWS : **REQUIRED**
LONGITUDINAL DRIVER POSITIONING SCREWS : **REQUIRED**
SUPPLIED WITH :
- GROUT AND VENT HOLES: **YES**
- DRAIN CONNECTION: **YES**

MOUNTING PADS SIZED FOR BASEPLATE LEVELING (7.3.5)
MOUNTING PADS TO BE MACHINED (7.3.6)
PROVIDE SPACER PLATE UNDER ALL EQUIPMENT FEET
OTHER

**REMARKS :**
Suction Type: Single
Impeller Type: Closed

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# DATA SHEET FOR PRODUCED WATER PUMPS
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| Note | INSTRUMENTATION | | SEAL SUPPORT SYSTEM MOUNTING | | Rev |
|---|---|---|---|---|---|
| | SEE ATTACHED API-670 DATA SHEET | | SEAL SUPPORT SYSTEM MOUNTED ON PUMP BASEPLATE (7.5.1.4) | YES | |
| | ACCELEROMETER (7.4.2.1) | | IDENTIFY LOCATION ON BASEPLATE | | |
| | Number of Accelerometers | | | | |
| | Mounting Location of Accelerometers | | INTERCONNECTING PIPING BY | Supplier | |
| | PROVISION FOR MTG ONLY (6.10.2.10) | | **MECHANICAL SEAL (6.8.1)** | | |
| | Number of Accelerometers | | SEE ATTACHED ISO 21049/API 682 DATA SHEET | YES | |
| | Mounting Location of Accelerometers | | ADDITIONAL CENTRAL FLUSH PORT (6.8.9) | | |
| | FLAT SURFACE REQUIRED (6.10.2.11) | YES | HEATING JACKET REQ'D. (6.8.11) | | |
| | Number of Accelerometers | | **HEATING AND COOLING (6.1.17)** | | |
| | Mounting Location of Accelerometers | | COOLING REQ'D | | |
| | VIBRATION PROBES (7.4.2.2) | | COOLING WATER PIPING PLAN | | |
| | PROVISIONS FOR VIB. PROBES | | COOLING WATER PIPING FITTINGS | | |
| | NUMBER PER RADIAL BEARING | | COOLING WATER PIPING MATERIALS | | |
| | NUMBER PER AXIAL BEARING | | COOLING WATER REQUIREMENTS: | | |
| | MONITORS AND CABLES SUPPLIED BY (7.4.2.4) | | BEARING HOUSING | gpm | |
| | TEMPERATURE (7.4.2.3) | | HEAT EXCHANGER | gpm | |
| | PROVISIONS FOR TEMP PROBES | | TOTAL COOLING WATER | gpm | |
| | RADIAL BEARING TEMP. | | HEATING MEDIUM | | |
| | NUMBER PER RADIAL BEARING | | OTHER | | |
| | THRUST BEARING TEMP. | | HEATING PIPING | | |
| | NUMBER PER THRUST BEARING ACTIVE SIDE | | **PIPING & APPURTENANCES** | | |
| | NUMBER PER THRUST BEARING INACTIVE SIDE | | MANIFOLD PIPING FOR PURCHASER CONNECTION (7.5.1.6) | | |
| | TEMP. GAUGES (WITH THERMOWELLS) (9.1.3.6) | | VENT | | |
| | PRESSURE GAUGE TYPE | | DRAIN | | |
| | | | COOLING WATER | | |
| | **Remarks** | | TAG ALL ORIFICES (7.5.2.4) | | |
| | | | SOCKET WELD CONN ON SEAL GLAND (7.5.2.8) | | |

# DATA SHEET FOR PRODUCED WATER PUMPS
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| Note | SURFACE PREPARATION AND PAINT | | TEST | | | Rev |
|---|---|---|---|---|---|---|
| | MANUFACTURER'S STANDARD | | SHOP INSPECTION (8.1.1) | | | |
| | OTHER (SEE BELOW) | | PERFORMANCE CURVE | | | |
| | SPECIFICATION NO. | | & DATA APPROVAL PRIOR TO SHIPMENT. | | YES | |
| | | | TEST WITH SUBSTITUTE SEAL (8.3.3.2.b) | | | |
| | **PUMP:** | | MATERIAL CERTIFICATION REQUIRED | CASING | YES | |
| | PUMP SURFACE PREPARATION | **Manufacturer's standard** | (6.12.1.8) | IMPELLER | YES | |
| | PRIMER | **Minimum 3 Coat System** | | SHAFT | YES | |
| | FINISH COAT | | | OTHER | YES | |
| | | | CASTING REPAIR WELD PROCEDURE APPR REQD | | | |
| | **BASEPLATE:** | | (6.12.2.5) (6.12.3.1) | | | |
| | BASEPLATE SURFACE PREPARATION | **Manufacturer's standard** | INSPECTION REQUIRED FOR CONNECTION WELDS (6.12.3.4.d) | | | |
| | PRIMER: | **Minimum 3 Coat System** | (6.12.3.4.e) | MAG PARTICLE | YES | |
| | FINISH COAT | | | RADIOGRAPHY | | |
| | DETAILS OF LIFTING DEVICES | | | LIQUID PENETRANT | YES | |
| | | | | ULTRASONIC | | |
| | **SHIPMENT: (8.4.1)** | | INSPECTION REQUIRED FOR CASTINGS | | | |
| | EXPORT BOXING REQUIRED | | | MAG PARTICLE | | |
| | OUTDOOR STORAGE MORE THAN 6 MONTHS | | | RADIOGRAPHY | YES | |
| | | | | LIQUID PENETRANT | YES | |
| | **SPARE ROTOR ASSEMBLY PACKAGED FOR:** | | | ULTRASONIC | | |
| | ROTOR STORAGE ORIENTATION (9.2.8.2) | | HARDNESS TEST REQUIRED (8.2.2.7) | | | |
| | SHIPPING & STORAGE CONTAINER FOR VERT STORAGE (9.2.8.3) | | ADDNL SUBSURFACE EXAMINATION (6.12.1.5) (8.2.1.3) | | | |
| | | | | FOR | | |
| | N2 PURGE (9.2.8.4) | | | METHOD | | |
| | **SPARE PARTS** | | PMI TESTING REQUIRED (8.2.2.8) | | YES | |
| | START-UP | YES | COMPONENTS TO BE TESTED | | | |
| | NORMAL MAINTENANCE | | | | | |
| | **WEIGHTS** lb | | RESIDUAL UNBALANCE TEST (J.4.1.2) | | | |
| | NOTIFICATION OF SUCCESSFUL SHOP | | | | | |
| | PERFORMANCE TEST (8.1.1.c) (8.3.3.5) | | | | | |
| | BASEPLATE TEST (7.3.21) | | | | | |
| | HYDROSTATIC | NON-WIT | | | | |
| | HYDROSTATIC TEST OF BOWLS & COLUMN (9.3.13.2) | | | | | |
| | PERFORMANCE TEST | NON-WIT | | | | |
| | TEST IN COMPLIANCE WITH (8.3.3.2) | 8.3.3.2 | | | | |
| | TEST DATA POINTS TO (8.3.3.3) | 8.3.3.3 | | | | |
| | TEST TOLERANCES TO (8.3.3.4) | | | | | |
| | NPSH (8.3.4.3.1) (8.3.4.3.4) | | | | | |
| | NPSH-1ST STG ONLY (8.3.4.3.2) | | | | | |
| | NPSH TESTING TO HI 1.6 OR ISO 9906 (8.3.4.3.3) | | | | | |
| | TEST NPSHA LIMITED TO 110% SITE NPSHA (8.3.3.6) | | | | | |
| | RETEST ON SEAL LEAKAGE (8.3.3.2.d) | NON-WIT | | | | |
| | RETEST REQUIRED AFTER FINAL HEAD ADJ (8.3.3.7.b) | | | | | |
| | COMPLETE UNIT TEST (8.3.4.4.1) | | | | | |
| | SOUND LEVEL TEST (8.3.4.5) | NON-WIT | | | | |
| | CLEANLINESS PRIOR TO FINAL ASSEMBLY (8.2.2.6) | NON-WIT | | | | |
| | LOCATION OF CLEANLINESS INSPECTION | @ SUPPLIER'S | | | | |
| | NOZZLE LOAD TEST | | | | | |
| | CHECK FOR CO-PLANAR MOUNTING PAD SURFACES | | | | | |
| | MECHANICAL RUN TEST UNTIL OIL TEMP STABLE | | | | | |
| | MECH RUN AFTER OIL TEMP STABLE (8.3.4.2.1) | NON-WIT | | | | |
| | 4 HR. MECH RUN TEST (8.3.4.2.2) | NON-WIT | | | | |
| | FINAL INSPECTION BEFORE SHIP | WIT | | | | |
| | STRUCTURAL RESONANCE TEST (9.3.9.2) | | | | | |
| | REMOVE / INSPECT HYDRODYNAMIC BEARINGS AFTER TEST | | | | | |
| | (9.2.7.5) | | | | | |
| | AUXILIARY EQUIPMENT TEST (8.3.4.6) | | | | | |
| | EQUIPMENT TO BE INCLUDED IN AUXILLIARY TESTS | | | | | |
| | LOCATION OF AUXILIARY EQUIPENT TEST | | | | | |
| | IMPACT TEST (6.12.4.3) | PER EN 13445 | | | | |
| | | PER ASME SECTION VIII | | | | |
| | REMOVE CASING AFTER TEST | | | | | |

| ITEM No | PUMP | DRIVER | GEAR | BASE | TOTAL |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

| OTHER PURCHASER REQUIREMENTS | |
|---|---|
| COORDINATION MEETING REQUIRED (10.1.3) | |
| MAXIMUM DISCHARGE PRESSURE TO INCLUDE | |
| MAX RELATIVE DENSITY | |
| OPERATION TO TRIP SPEED | |
| MAX DIA. IMPELLERS AND/OR NO OF STAGES | |
| CONNECTION DESIGN APPROVAL (9.2.1.4) | |
| TORSIONAL ANALYSIS / REPORT (6.9.2.10) | |
| PROGRESS REPORTS | |
| OUTLINE OF PROC FOR OPTIONAL TESTS (10.2.5) | |
| ADDITIONNAL DATA REQUIRING 20 YEARS RETENTION (8.2.1.1) | |
| | |
| LATERAL ANALYSIS REQUIRED (9.1.3.4) (9.2.4.1.3) | |
| MODAL ANALYSIS REQUIRED (9.3.9.2) | |
| DYNAMIC BALANCE ROTOR (6.9.4.4) | |
| INSTALLATION LIST IN PROPOSAL (10.2.3.l) | |
| VFD STEADY STATE DAMPED RESPONSE ANALYSIS (6.9.2.3) | |
| | |
| TRANSIENT TORSIONAL RESPONSE (6.9.2.4) | |
| BEARING LIFE CALCULATIONS REQUIRED (6.10.1.6) | |
| IGNITION HAZARD ASSMT TO EN 13463-1 (7.2.13.e) | |
| CASING RETIREMENT THICKNESS DRAWING (10.3.2.3) | |
| FLANGES RQD IN PLACE OF SKT WELD UNIONS (7.5.2.8) | |
| INCLUDE PLOTTED VIBRATION SPECTRA (6.9.3.3) | |
| CONNECTION BOLTING (7.5.1.7) | |
| CADMIUM PLATED BOLTS PROHIBITED | |
| VENDOR TO KEEP REPAIR AND HT RCDS (8.2.1.1.c) | |
| VENDOR SUBMIT TEST PROCEDURES (8.3.1.1) | |
| SUBMIT INSPECTION CHECK LIST (8.1.5) | |

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VERTICAL TYPE (FIG 1.1) **VS2**

REMARKS

## VERTICAL PUMPS

| | (+) UP | (-) DOWN |
|---|---|---|
| **PUMP THRUST:** | | |
| STATIC THRUST | lbf | lbf |
| AT MIN FLOW | lbf | lbf |
| AT RATED FLOW | lbf | lbf |
| AT MAX FLOW | lbf | lbf |
| MAX THRUST | lbf | lbf |
| SOLEPLATE REQUIRED | | |
| SOLEPLATE Length x Width | ft X | ft |
| SOLEPLATE THICKNESS | | in. |
| MOUNTING FLANGE REQUIRED | | |
| **COLUMN PIPE:** | | |
| DIAMETER | | in. |
| LENGTH | | ft |
| NUMBER | | |
| SPACING | | ft |
| **GUIDE BUSHINGS:** | | |
| NUMBER | | |
| LINE SHAFT BEARING SPACING | | in. |
| GUIDE BUSHING LUBE: | | |

## VERTICAL PUMPS (CONT'D)

**LINE SHAFT:**
- LINE SHAFT DIAMETER ___ in.
- TUBE DIAMETER ___ in.

**LINE SHAFT COUPLING:**
- LINESHAFT CONNECTION
- • SUCTION STRAINER TYPE
- • LEVEL CONTROL
- IMPELLER COLLETS ACCEPTABLE
- HARDENED SLEEVES UNDER BEARINGS (9.3.10.5)
- RESONANCE TEST
- STRUCTURAL ANALYSIS (9.3.5)
- DRIVER ALIGNMENT SCREWS

**SUCTION CAN**
- SUCTION CAN — THICKNESS ___ in.; LENGTH ___ ft; DIAMETER ___ in.
- SEPARATE MOUNTING PLATE (9.3.8.3.1)
- PROVIDE SEPARATE SOLEPLATE (9.3.8.3.3)
- DRAIN PIPED TO SURFACE (9.3.13.5)
- BOWL HEAD CALCULATION REQUIRED

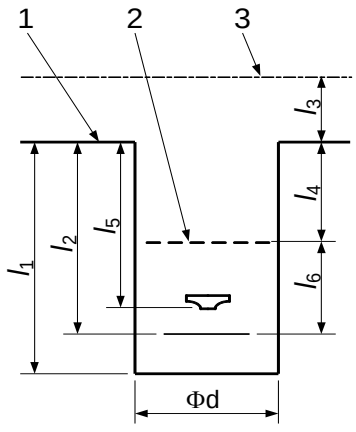
## MATERIALS (additional)

| | | | |
|---|---|---|---|
| SUCTION CAN / BARREL: | | LINESHAFT SLEEVES : | |
| DISCHARGE HEAD • | | BEARING RETAINER : | |
| BOWL SHAFT : | | SHAFT ENCLOSING TUBE : | |
| LINESHAFT : | | DISCHARGE COLUMN : | |
| LINESHAFT HARDFACING : | | **PRESSURE RATING:** | **MAWP** / **HYDRO** |
| BELLMOUTH : | | HEAD | |
| BOWL BEARING : | | COLUMN PIPE | |
| LINESHAFT BEARING : | | BOWL | |

## SUMP ARRANGEMENT

SUMP DIMENSIONS :

| | | |
|---|---|---|
| GRADE ELEVATION | 1 | ft |
| LOW LIQUID LEVEL | 2 | ft |
| C.L. OF DISCHARGE | 3 | ft |
| SUMP DEPTH | $l_1$ | ft |
| PUMP LENGTH | $l_2$ | ft |
| GRADE TO DISCH. | $l_3$ | ft |
| GRADE TO LOW LIQUID LVL | $l_4$ | ft |
| GRADE TO 1ST STG IMPL'R. | $l_5$ | ft |
| SUBMERGENCE REQ'D | $l_6$ | ft |
| SUMP DIAMETER | $\Phi d$ | ft |



## PRESSURE VESSEL DESIGN CODE REFERENCES

THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER

CASTING FACTORS USED IN DESIGN ( TABLE 3) _____

SOURCE OF MATERIAL PROPERTIES _____

## WELDING AND REPAIRS

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

ALTERNATE WELDING CODES AND STANDARDS _____

WELDING REQUIREMENT (APPLICABLE CODE OR STANDARD) _____

WELDER/OPERATOR QUALIFICATION _____

WELDING PROCEDURE QUALIFICATION _____

NON-PRESSURE RETAINING STRUCTURAL WELDING SUCH AS BASEPLATES OR SUPPORTS _____

MAGNETIC PARTICLE OR LIQUID PENETRANT EXAMINATION OF PLATE EDGES _____

POSTWELD HEAT TREATMENT _____

POSTWELD HEAT TREATMENT OF CASING FABRICATION WELDS _____

## MATERIAL INSPECTION

THESE REFERENCES MUST BE LISTED BY THE PURCHASER DEFAULT TO TABLE 14 _____

ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 14) (8.2.2.5)

| TYPE OF INSPECTION | METHOD | FOR FABRICATIONS | FOR CASTINGS |
|---|---|---|---|
| RADIOGRAPHY | | | |
| ULTRASONIC INSPECTION | | | |
| MAGNETIC PARTICLE INSPECTION | | | |
| LIQUID PENETRANT INSPECTION | | | |
| VISUAL INSPECTION (all surfaces) | | | |

**REMARKS :**

## NOTES

| Note | | Rev |
|---|---|---|
| 1 | VTC = VENDOR TO CONFIRM | |
| 2 | VTA = VENDOR TO ADVISE | |
| 3 | THIRD PARTY INSPECTION AND TEST SHALL BE WITNESSED AT MANUFACTURER SHOP. | |
| 4 | PRE-SHIPMENT INSPECTION SHALL BE REQUIRED. | |
| 5 | DATA SHEET BASED ON THE PRELIMINARY ESTIMATES/INFORMATION, HOWEVER CONTRACTOR/VENDOR WILL UPDATE THE | |
| | DATS SHEET. | |
| 6 | COMBINED PERFORMANCE AND COMPLETE UNIT TEST | |
| 7 | VENDOR TO SPECIFY PUMP SUCTION AND DISCHARGE NOZZLE SIZES AND TO PROVIDE CONNECTING FLANGES AND REDUCERS | |
| | ACCORDINGLY. | |
| 8 | VENDOR SHALL FILL THIS DATASHEET COMPLETELY AS PER HIS OFFER. | |
| 9 | REFER TABLE G-1 AND H-1 OF API-610 (LATEST EDITION) | |
| 10 | VENDOR TO PROVIDE MOTOR MANUFACTURER'S DATA SHEET. | |
| 11 | FOR MOTOR SPECIFICATION REFER DOCUMENT # 0220-ELA-6500 | |
| 12 | BALANCE/LEAK OFF LINE FROM DISCHARGED CASING TO SUCTION NOZZLE SHALL BE PROVIDED BY PUMP VENDOR AND SHALL | |
| | DESIGN WITH PROPER ENGINEERING (e.g INSTALLATION OF RESTRICTED ORIFICE) IN ALL ASPECTS. | |

OGDCL PAKISTAN:
OIL & GAS DEVELOPMENT
COMPANY LIMITED

# QADIRPUR COMPRESSION PROJECT

ISSUE FOR APPROVAL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| A | 29-Mar-19 | ISSUE FOR APPROVAL | SHK | JAY | JAY | MPM | TUH | | |
| REV | DATE | DESCRIPTION | ORIG | CHKD | LE | QA | PM | LOCAL REPR. | PROJ. MAN |

ENAR

ENAR Petrotech Services (Pvt.) Limited , 7-B , Sector 7-A , Korangi Industrial Area , Karachi Pakistan

CONTRACT NO. 14-0220

**DOCUMENT TITLE:**
DATA SHEET FOR PRODUCED WATER PUMPS
P-2052 A/B

| | | | | | |
|---|---|---|---|---|---|
| | 0220 | DS | 1707 | A | |
| | CODE | TYPE | SEQ NO. | REV | . |

# DATA SHEET FOR PRODUCED WATER PUMPS
## P-2052 A/B

| | |
|---|---|
| Doc No. | 0220-DS-1707 |
| Prep. By | SHK |
| Check By | JAY |
| Date | March 29, 2019 |
| Sheet | 2 of 8 |
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APPLICABLE TO: **PROPOSAL** APPLICABLE NTL/INTNTL STANDARD: **API-610**

FOR: **OGDCL** UNIT:

SITE: **Qadirpur Plant** SERVICE: **Produced Water**

NO. REQ: **2X100%** PUMP SIZE: TYPE: No. STAGES:

MANUFACTURER: MODEL: SERIAL NO.:

### LIQUID CHARACTERISTICS

| | Units | Maximum | Minimum |
|---|---|---|---|
| LIQUID TYPE OR NAME : | PRODUCED WATER / OIL | | |
| VAPOR PRESSURE : | psia | 114.7 | 17.6 |
| RELATIVE DENSITY : | | 0.984 | 0.765 |
| SPECIFIC HEAT : | Btu/(lbm-°F) | 1.032 | 0.491 |
| VISCOSITY : | cP | 0.967 | 0.544 |

**SERVICE :** **CONTINUOUS**

PUMPS OPERATE IN: **PARALLEL**

CORROSION DUE TO : (6.12.1.9) CO2 & H2S

EROSION DUE TO : (6.12.1.9)

H2S CONCENTRATION (ppm) : (6.12.1.12) 100

CHLORIDE CONCENTRATION (ppm) : 22628

PARTICULATE SIZE (DIA IN MICRONS)

PARTICULATE CONCENTRATION (PPM)

LIQUID PH 5.62

### OPERATING CONDITIONS (6.1.2)

| | Units | Maximum | Rated | Normal | Minimum |
|---|---|---|---|---|---|
| NPSHa Datum: | | Top of Foundation | | | |
| PUMPING TEMPERATURE : | °F | | 122 | 122 | 41 |
| FLOW : | gpm | | 165 | 150 | |
| DISCHARGE PRESSURE : (6.3.2) | psia | 180 | 165.0 | 165.00 | |
| SUCTION PRESSURE : | psia | 115 | 80 | 83.000 | |
| DIFFERENTIAL PRESSURE : | psi | 65.0 | 85.0 | 82.0 | |
| DIFFERENTIAL HEAD : | ft | 153 | 200 | 193 | |
| $NPSH_A$ : | ft | | -2.3 | | |
| HYDRAULIC POWER : | HP | | 8.0 | | |

### SITE AND UTILITY DATA

**LOCATION:** **OUTDOOR** **UNHEATED**

**MOUNTED AT :** **GRADE** ○ TROPICALISATION REQD

**ELECTRIC AREA CLASSIFICATION:** 6.1.22 ZONE **2**

GROUP **Group IIA** TEMP CLASS **T3**

**SITE DATA :**

**ELEVATION (MSL) :** **223** ft **BAROMETER :** in Hg

RANGE OF AMBIENT TEMPS: MIN / MAX **41** / **121** °F

RELATIVE HUMIDITY: MIN / MAX **20** / **77** %

**UNUSUAL CONDITIONS:** **DUST**

**UTILITY CONDITIONS :**

| **ELECTRICITY :** | DRIVERS | HEATING | CONTROL | SHUTDOWN |
|---|---|---|---|---|
| VOLTAGE | 415 | | | |
| PHASE | 3 | | | |
| HERTZ | 50 | | | |

**COOLING WATER :**

| | INLET | RETURN | DESIGN | |
|---|---|---|---|---|
| TEMP °C | | MAX | | |
| PRESS. kg/cm²g | | MIN | | |

SOURCE

COOLING WATER CHLORIDE CONCENTRATION: ppm

**INSTRUMENT AIR :** MAX **135** psia MIN **85** psia

**STEAM**

| | | DRIVERS | HEATING |
|---|---|---|---|
| TEMP °C | Max | | |
| | Nor | | |
| | Min | | |
| PRESS. kg/cm²g | Max | | |
| | Nor | | |
| | Min | | |

### PERFORMANCE

PROPOSAL CURVE NO. RPM

As Tested Curve No.

IMPELLER DIA.: RATED MAX. MIN. in.

RATED POWER HP EFFICIENCY (%)

RATED CURVE BEP FLOW (at rated impeller dia) gpm

MIN FLOW : THERMAL gpm STABLE gpm

PREFERRED OPERATING REGION (6.1.11) to gpm

ALLOWABLE OPERATING REGION to gpm

MAX HEAD @ RATED IMPELLER ft

MAX POWER @ RATED IMPELLER (6.8.9) HP

NPSHR AT RATED FLOW : ft

CL PUMP TO U/S BASEPLATE ft

NPSH MARGIN AT RATED FLOW : ft

SPECIFIC SPEED (6.1.9) gpm,rpm,ft

SUCTION SPECIFIC SPEED LIMIT

SUCTION SPECIFIC SPEED gpm,rpm,ft

MAX. ALLOW. SOUND PRESS. LEVEL REQD (6.1.14) 85 (dBA)

EST MAX SOUND PRESS. LEVEL (dBA)

MAX. SOUND POWER LEVEL REQ'D (6.1.14)

EST MAX SOUND POWER LEVEL

### DRIVER (7.1.5)

Driver Type **MOTOR**

GEAR

VARIABLE SPEED REQUIRED

SOURCE OF VARIABLE SPEED

OTHER

MANUFACTURER

NAMEPLATE POWER HP

Nominal RPM

RATED LOAD RPM

FRAME OR MODEL

ORIENTATION

LUBE

BEARING TYPE:

RADIAL /

THRUST /

STARTING METHOD

SEE DRIVER DATA SHEET REFER NOTE- 10 & 11

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**CONSTRUCTION**

**API PUMP TYPE:** VS6/ VS7 **[Based on API 610 definitions]**

**SEE ALSO PAGE 6**

**NOZZLE CONNECTIONS:** (6.5.5)

| | Size | Facing | Rating | Position |
|---|---|---|---|---|
| SUCTION | *6"* | RF | 300 | SIDE |
| DISCHARGE | *4"* | RF | 300 | SIDE |

**PRESSURE CASING AUX. CONNECTIONS: (6.4.3.2) NOTE-12**

| | No. | Size | Type | Facing | Rating | Posn. |
|---|---|---|---|---|---|---|
| BALANCE/LEAK OFF | 1 | | | | | |
| DRAIN | 1 | | | | | |
| VENT | 1 | | | | | |
| PRESSURE GAGE | | | | | | |
| TEMP GAGE | | | | | | |
| WARM-UP LINE | | | | | | |

Drain Valve Supplied By: **SUPPLIER**
DRAINS MANIFOLDED: **YES**
VENT Valve Supplied By: **SUPPLIER**
VENTS MANIFOLDED: **YES**
THREADED CONS FOR PIPELINE SERVICE & < 50°C (6.4.3.2): **YES**
SPECIAL FITTINGS FOR TRANSITIONING (6.4.3.3):
CYLINDRICAL THREADS REQUIRED (6.4.3.8):
GUSSET SUPPORT REQUIRED:
MACHINED AND STUDDED CONNECTIONS (6.4.3.12):
VS 6 DRAIN:
DRAIN TO SKID EDGE: **YES**

**MATERIAL (6.12.1.1) Note-9**

APPENDIX H CLASS: **D-1**
MIN DESIGN METAL TEMP (6.12.4.1): °F
REDUCED-HARDNESS MATERIALS REQ'D (6.12.1.12.1):
Applicable Hardness Standard (6.12.1.12.3):
BARREL :
BOWL :
DIFFUSERS
IMPELLER :
IMPELLER WEAR RING :
CASE WEAR RING :
SHAFT:
Bowl (if VS-type)
Inspection Class
**Remarks:**

**BEARINGS AND LUBRICATION (6.10.1.1)**

BEARING (TYPE / NUMBER): (6.11.4)
RADIAL / 
THRUST /
REVIEW AND APPROVE THRUST BEARING SIZE : (9.2.5.2.4)
LUBRICATION : (6.10.2.2) (6.11.3) (9.6.1)
PRESSURE LUBE SYSTEM TO ISO 10438- (9.2.6.5)
ISO 10438 DATA SHEETS ATTACHED
Pressurized Lube Oil System mtd on pump baseplate
Location of Pressurized Lube Oil System mounted on baseplate :
INTERCONNECTING PIPING PROVIDED BY
OIL VISC. ISO GRADE VG
CONSTANT LEVEL OILER :

**CASING MOUNTING:**
**CASING TYPE:** (6.3.10)
OH3 BACKPULLOUT LIFTING DEVICE REQD. (9.1.2.6)

**CASE PRESSURE RATING:**
MAWP : (6.3.6) psig @ °F
HYDROTEST : psig @ °F

**HYDROTEST OH PUMP AS ASSEMBLY:** **YES**
SUCT'N PRESS. REGIONS DESIGNED FOR MAWP: **YES**
**ROTATION:** (VIEWED FROM COUPLING END)
- IMPELLERS INDIVIDUALLY SECURED :
- BOLT OH 3/4/5 PUMP TO PAD / FOUNDATION :
- PROVIDE SOLEPLATE FOR OH 3/4/5 PUMPS

**ROTOR:**
SHAFT FLEXIBILITY INDEX (SFI) (9.1.1.3)
First Critical Speed Wet (Multi stage pumps only)
COMPONENT BALANCE TO ISO 1940 G1.0: **YES**
SHRINK FIT -LIMITED MOVEMENT IMPELLERS (9.2.2.3)

**COUPLING:(7.2.3)** **(7.2.13.f)**
MANUFACTURER
MODEL
RATING (POWER/100 RPM)
SPACER LENGTH in.
SERVICE FACTOR
RIGID
COUPLING WITH HYDRAULIC FIT (7.2.10)
COUPLING BALANCED TO ISO 1940-1 G6.3 (7.2.3)
COUPLING WITH PROPRIETARY CLAMPING DEVICE (7.2.11)
COUPLING IN COMPLIANCE WITH (7.2.4)
COUPLING GUARD STANDARD PER (7.2.13.a)
Window on Coupling Guard

**BASEPLATE**

API BASEPLATE NUMBER :
BASEPLATE CONSTRUCTION (7.3.14)
BASEPLATE DRAINAGE (7.3.1): **Entire Baseplate Drain Rim**
MOUNTING : **GROUTED**
NON-GROUT CONSTRUCTION : (7.3.13) **NOT REQUIRED**
VERTICAL LEVELING SCREWS : **REQUIRED**
LONGITUDINAL DRIVER POSITIONING SCREWS : **REQUIRED**
SUPPLIED WITH : ● GROUT AND VENT HOLES: **YES**
● DRAIN CONNECTION: **YES**
MOUNTING PADS SIZED FOR BASEPLATE LEVELING (7.3.5)
MOUNTING PADS TO BE MACHINED (7.3.6)
PROVIDE SPACER PLATE UNDER ALL EQUIPMENT FEET
OTHER

**REMARKS :**
Suction Type: Single
Impeller Type: Closed

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| Note | INSTRUMENTATION | |
|---|---|---|
| | SEE ATTACHED API-670 DATA SHEET | |
| | ACCELEROMETER (7.4.2.1) | |
| | Number of Accelerometers | |
| | Mounting Location of Accelerometers | |
| | PROVISION FOR MTG ONLY (6.10.2.10) | |
| | Number of Accelerometers | |
| | Mounting Location of Accelerometers | |
| | FLAT SURFACE REQUIRED (6.10.2.11) | YES |
| | Number of Accelerometers | |
| | Mounting Location of Accelerometers | |
| | VIBRATION PROBES (7.4.2.2) | |
| | PROVISIONS FOR VIB. PROBES | |
| | NUMBER PER RADIAL BEARING | |
| | NUMBER PER AXIAL BEARING | |
| | MONITORS AND CABLES SUPPLIED BY (7.4.2.4) | |
| | TEMPERATURE (7.4.2.3) | |
| | PROVISIONS FOR TEMP PROBES | |
| | RADIAL BEARING TEMP. | |
| | NUMBER PER RADIAL BEARING | |
| | THRUST BEARING TEMP. | |
| | NUMBER PER THRUST BEARING ACTIVE SIDE | |
| | NUMBER PER THRUST BEARING INACTIVE SIDE | |
| | TEMP. GAUGES (WITH THERMOWELLS) (9.1.3.6) | |
| | PRESSURE GAUGE TYPE | |
| | **Remarks** | |

**SEAL SUPPORT SYSTEM MOUNTING**

SEAL SUPPORT SYSTEM MOUNTED ON PUMP BASEPLATE (7.5.1.4) **YES**

IDENTIFY LOCATION ON BASEPLATE

INTERCONNECTING PIPING BY **Supplier**

**MECHANICAL SEAL (6.8.1)**

SEE ATTACHED ISO 21049/API 682 DATA SHEET **YES**

ADDITIONAL CENTRAL FLUSH PORT (6.8.9)

HEATING JACKET REQ'D. (6.8.11)

**HEATING AND COOLING (6.1.17)**

COOLING REQ'D

COOLING WATER PIPING PLAN

COOLING WATER PIPING FITTINGS

COOLING WATER PIPING MATERIALS

COOLING WATER REQUIREMENTS:

BEARING HOUSING gpm

HEAT EXCHANGER gpm

TOTAL COOLING WATER gpm

HEATING MEDIUM

OTHER

HEATING PIPING

**PIPING & APPURTENANCES**

MANIFOLD PIPING FOR PURCHASER CONNECTION (7.5.1.6)

VENT

DRAIN

COOLING WATER

TAG ALL ORIFICES (7.5.2.4)

SOCKET WELD CONN ON SEAL GLAND (7.5.2.8)

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| Note | SURFACE PREPARATION AND PAINT | | TEST | | | Rev |
|---|---|---|---|---|---|---|
| | MANUFACTURER'S STANDARD | | SHOP INSPECTION (8.1.1) | | | |
| | OTHER (SEE BELOW) | | PERFORMANCE CURVE | | | |
| | SPECIFICATION NO. | | & DATA APPROVAL PRIOR TO SHIPMENT. | | YES | |
| | | | TEST WITH SUBSTITUTE SEAL (8.3.3.2.b) | | | |
| | **PUMP:** | | MATERIAL CERTIFICATION REQUIRED | CASING | YES | |
| | PUMP SURFACE PREPARATION | **Manufacturer's standard** | (6.12.1.8) | IMPELLER | YES | |
| | PRIMER | **Minimum 3 Coat System** | | SHAFT | YES | |
| | FINISH COAT | | | OTHER | YES | |
| | | | CASTING REPAIR WELD PROCEDURE APPR REQD | | | |
| | **BASEPLATE:** | | (6.12.2.5) (6.12.3.1) | | | |
| | BASEPLATE SURFACE PREPARATION | **Manufacturer's standard** | INSPECTION REQUIRED FOR CONNECTION WELDS (6.12.3.4.d) | | | |
| | PRIMER: | **Minimum 3 Coat System** | (6.12.3.4.e) | MAG PARTICLE | YES | |
| | FINISH COAT | | | RADIOGRAPHY | | |
| | DETAILS OF LIFTING DEVICES | | | LIQUID PENETRANT | YES | |
| | | | | ULTRASONIC | | |
| | **SHIPMENT: (8.4.1)** | | INSPECTION REQUIRED FOR CASTINGS | | | |
| | EXPORT BOXING REQUIRED | | | MAG PARTICLE | | |
| | OUTDOOR STORAGE MORE THAN 6 MONTHS | | | RADIOGRAPHY | YES | |
| | | | | LIQUID PENETRANT | YES | |
| | **SPARE ROTOR ASSEMBLY PACKAGED FOR:** | | | ULTRASONIC | | |
| | ROTOR STORAGE ORIENTATION (9.2.8.2) | | HARDNESS TEST REQUIRED (8.2.2.7) | | | |
| | SHIPPING & STORAGE CONTAINER FOR VERT STORAGE (9.2.8.3) | | ADDNL SUBSURFACE EXAMINATION (6.12.1.5) (8.2.1.3) | | | |
| | | | | FOR | | |
| | N2 PURGE (9.2.8.4) | | | METHOD | | |
| | **SPARE PARTS** | | PMI TESTING REQUIRED (8.2.2.8) | | YES | |
| | START-UP | YES | COMPONENTS TO BE TESTED | | | |
| | NORMAL MAINTENANCE | | | | | |
| | **WEIGHTS** lb | | RESIDUAL UNBALANCE TEST (J.4.1.2) | | | |
| | NOTIFICATION OF SUCCESSFUL SHOP | | | | | |
| | PERFORMANCE TEST (8.1.1.c) (8.3.3.5) | | | | | |
| | BASEPLATE TEST (7.3.21) | | | | | |
| | HYDROSTATIC | NON-WIT | | | | |
| | HYDROSTATIC TEST OF BOWLS & COLUMN (9.3.13.2) | | | | | |
| | PERFORMANCE TEST | NON-WIT | | | | |
| | TEST IN COMPLIANCE WITH (8.3.3.2) | 8.3.3.2 | | | | |
| | TEST DATA POINTS TO (8.3.3.3) | 8.3.3.3 | | | | |
| | TEST TOLERANCES TO (8.3.3.4) | | | | | |
| | NPSH (8.3.4.3.1) (8.3.4.3.4) | | | | | |
| | NPSH-1ST STG ONLY (8.3.4.3.2) | | | | | |
| | NPSH TESTING TO HI 1.6 OR ISO 9906 (8.3.4.3.3) | | | | | |
| | TEST NPSHA LIMITED TO 110% SITE NPSHA (8.3.3.6) | | | | | |
| | RETEST ON SEAL LEAKAGE (8.3.3.2.d) | NON-WIT | | | | |
| | RETEST REQUIRED AFTER FINAL HEAD ADJ (8.3.3.7.b) | | | | | |
| | COMPLETE UNIT TEST (8.3.4.4.1) | | | | | |
| | SOUND LEVEL TEST (8.3.4.5) | NON-WIT | | | | |
| | CLEANLINESS PRIOR TO FINAL ASSEMBLY (8.2.2.6) | NON-WIT | | | | |
| | LOCATION OF CLEANLINESS INSPECTION | @ SUPPLIER'S | | | | |
| | NOZZLE LOAD TEST | | | | | |
| | CHECK FOR CO-PLANAR MOUNTING PAD SURFACES | | | | | |
| | MECHANICAL RUN TEST UNTIL OIL TEMP STABLE | | | | | |
| | MECH RUN AFTER OIL TEMP STABLE (8.3.4.2.1) | NON-WIT | | | | |
| | 4 HR. MECH RUN TEST (8.3.4.2.2) | NON-WIT | | | | |
| | FINAL INSPECTION BEFORE SHIP | WIT | | | | |
| | STRUCTURAL RESONANCE TEST (9.3.9.2) | | | | | |
| | REMOVE / INSPECT HYDRODYNAMIC BEARINGS AFTER TEST | | | | | |
| | (9.2.7.5) | | | | | |
| | AUXILIARY EQUIPMENT TEST (8.3.4.6) | | | | | |
| | EQUIPMENT TO BE INCLUDED IN AUXILLIARY TESTS | | | | | |
| | LOCATION OF AUXILIARY EQUIPENT TEST | | | | | |
| | IMPACT TEST (6.12.4.3) | PER EN 13445 | | | | |
| | | PER ASME SECTION VIII | | | | |
| | REMOVE CASING AFTER TEST | | | | | |

| ITEM No | PUMP | DRIVER | GEAR | BASE | TOTAL |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

| | OTHER PURCHASER REQUIREMENTS | |
|---|---|---|
| | COORDINATION MEETING REQUIRED (10.1.3) | |
| | MAXIMUM DISCHARGE PRESSURE TO INCLUDE | |
| | MAX RELATIVE DENSITY | |
| | OPERATION TO TRIP SPEED | |
| | MAX DIA. IMPELLERS AND/OR NO OF STAGES | |
| | CONNECTION DESIGN APPROVAL (9.2.1.4) | |
| | TORSIONAL ANALYSIS / REPORT (6.9.2.10) | |
| | PROGRESS REPORTS | |
| | OUTLINE OF PROC FOR OPTIONAL TESTS (10.2.5) | |
| | ADDITIONNAL DATA REQUIRING 20 YEARS RETENTION (8.2.1.1) | |
| | | |
| | LATERAL ANALYSIS REQUIRED (9.1.3.4) (9.2.4.1.3) | |
| | MODAL ANALYSIS REQUIRED (9.3.9.2) | |
| | DYNAMIC BALANCE ROTOR (6.9.4.4) | |
| | INSTALLATION LIST IN PROPOSAL (10.2.3.l) | |
| | VFD STEADY STATE DAMPED RESPONSE ANALYSIS (6.9.2.3) | |
| | | |
| | TRANSIENT TORSIONAL RESPONSE (6.9.2.4) | |
| | BEARING LIFE CALCULATIONS REQUIRED (6.10.1.6) | |
| | IGNITION HAZARD ASSMT TO EN 13463-1 (7.2.13.e) | |
| | CASING RETIREMENT THICKNESS DRAWING (10.3.2.3) | |
| | FLANGES RQD IN PLACE OF SKT WELD UNIONS (7.5.2.8) | |
| | INCLUDE PLOTTED VIBRATION SPECTRA (6.9.3.3) | |
| | CONNECTION BOLTING (7.5.1.7) | |
| | CADMIUM PLATED BOLTS PROHIBITED | |
| | VENDOR TO KEEP REPAIR AND HT RCDS (8.2.1.1.c) | |
| | VENDOR SUBMIT TEST PROCEDURES (8.3.1.1) | |
| | SUBMIT INSPECTION CHECK LIST (8.1.5) | |

# DATA SHEET FOR PRODUCED WATER PUMPS
# P-2052 A/B

| | |
|---|---|
| Doc No. | 0220-DS-1707 |
| Prep. By | SHK — Check By JAY |
| Date | March 29, 2019 |
| Sheet | 6 of 8 — Rev. A |

VERTICAL TYPE (FIG 1.1) **VS2**

REMARKS

## VERTICAL PUMPS

| | | |
|---|---|---|
| **PUMP THRUST:** | (+) UP | (-) DOWN |
| STATIC THRUST | lbf | lbf |
| AT MIN FLOW | lbf | lbf |
| AT RATED FLOW | lbf | lbf |
| AT MAX FLOW | lbf | lbf |
| MAX THRUST | lbf | lbf |
| SOLEPLATE REQUIRED | | |
| SOLEPLATE Length x Width | ft X | ft |
| SOLEPLATE THICKNESS | | in. |
| MOUNTING FLANGE REQUIRED | | |
| **COLUMN PIPE:** | | |
| DIAMETER | | in. |
| LENGTH | | ft |
| NUMBER | | |
| SPACING | | ft |
| **GUIDE BUSHINGS:** | | |
| NUMBER | | |
| LINE SHAFT BEARING SPACING | | in. |
| GUIDE BUSHING LUBE: | | |

## VERTICAL PUMPS (CONT'D)

**LINE SHAFT:**
- LINE SHAFT DIAMETER — in.
- TUBE DIAMETER — in.

**LINE SHAFT COUPLING:**
- LINESHAFT CONNECTION
- • SUCTION STRAINER TYPE
- • LEVEL CONTROL
- IMPELLER COLLETS ACCEPTABLE
- HARDENED SLEEVES UNDER BEARINGS (9.3.10.5)
- RESONANCE TEST
- STRUCTURAL ANALYSIS (9.3.5)
- DRIVER ALIGNMENT SCREWS

**SUCTION CAN**
- SUCTION CAN — THICKNESS — in.
- LENGTH — ft
- DIAMETER — in.
- SEPARTATE MOUNTING PLATE (9.3.8.3.1)
- PROVIDE SEPARATE SOLEPLATE (9.3.8.3.3)
- DRAIN PIPED TO SURFACE (9.3.13.5)
- BOWL HEAD CALCULATION REQUIRED

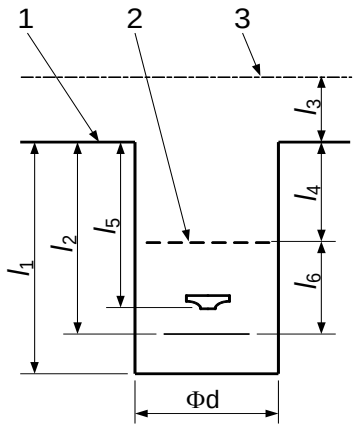
## MATERIALS (additional)

| | | | |
|---|---|---|---|
| SUCTION CAN / BARREL: | | LINESHAFT SLEEVES : | |
| DISCHARGE HEAD • | | BEARING RETAINER : | |
| BOWL SHAFT : | | SHAFT ENCLOSING TUBE : | |
| LINESHAFT : | | DISCHARGE COLUMN : | |
| LINESHAFT HARDFACING : | | **PRESSURE RATING:** | **MAWP** / **HYDRO** |
| BELLMOUTH : | | HEAD | |
| BOWL BEARING : | | COLUMN PIPE | |
| LINESHAFT BEARING : | | BOWL | |

## SUMP ARRANGEMENT

SUMP DIMENSIONS :

| | | |
|---|---|---|
| GRADE ELEVATION | 1 | ft |
| LOW LIQUID LEVEL | 2 | ft |
| C.L. OF DISCHARGE | 3 | ft |
| SUMP DEPTH | $l_1$ | ft |
| PUMP LENGTH | $l_2$ | ft |
| GRADE TO DISCH. | $l_3$ | ft |
| GRADE TO LOW LIQUID LVL | $l_4$ | ft |
| GRADE TO 1ST STG IMPL'R. | $l_5$ | ft |
| SUBMERGENCE REQ'D | $l_6$ | ft |
| SUMP DIAMETER | $\Phi d$ | ft |



| Note | PRESSURE VESSEL DESIGN CODE REFERENCES | Rev |
|---|---|---|
| | THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER | |
| | CASTING FACTORS USED IN DESIGN ( TABLE 3) _____ | |
| | SOURCE OF MATERIAL PROPERTIES _____ | |
| | **WELDING AND REPAIRS** | |
| | THESE REFERENCES MUST BE LISTED BY THE PURCHASER. (DEFAULT TO TABLE 10 IF NO PURCHASER PREFERENCE IS STATED) | |
| | ALTERNATE WELDING CODES AND STANDARDS _____ | |
| | WELDING REQUIREMENT (APPLICABLE CODE OR STANDARD) _____ | |
| | WELDER/OPERATOR QUALIFICATION _____ | |
| | WELDING PROCEDURE QUALIFICATION _____ | |
| | NON-PRESSURE RETAINING STRUCTURAL WELDING SUCH AS BASEPLATES OR SUPPORTS _____ | |
| | MAGNETIC PARTICLE OR LIQUID PENETRANT EXAMINATION OF PLATE EDGES _____ | |
| | POSTWELD HEAT TREATMENT _____ | |
| | POSTWELD HEAT TREATMENT OF CASING FABRICATION WELDS _____ | |
| | **MATERIAL INSPECTION** | |
| | THESE REFERENCES MUST BE LISTED BY THE PURCHASER DEFAULT TO TABLE 14 _____ | |
| | ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 14) (8.2.2.5) | |

| TYPE OF INSPECTION | METHOD | FOR FABRICATIONS | FOR CASTINGS |
|---|---|---|---|
| RADIOGRAPHY | | | |
| ULTRASONIC INSPECTION | | | |
| MAGNETIC PARTICLE INSPECTION | | | |
| LIQUID PENETRANT INSPECTION | | | |
| VISUAL INSPECTION (all surfaces) | | | |

**REMARKS :**

## NOTES

| Note | | Rev |
|---|---|---|
| 1 | VTC = VENDOR TO CONFIRM | |
| 2 | VTA = VENDOR TO ADVISE | |
| 3 | THIRD PARTY INSPECTION AND TEST SHALL BE WITNESSED AT MANUFACTURER SHOP. | |
| 4 | PRE-SHIPMENT INSPECTION SHALL BE REQUIRED. | |
| 5 | DATA SHEET BASED ON THE PRELIMINARY ESTIMATES/INFORMATION, HOWEVER CONTRACTOR/VENDOR WILL UPDATE THE DATS SHEET. | |
| 6 | COMBINED PERFORMANCE AND COMPLETE UNIT TEST | |
| 7 | VENDOR TO SPECIFY PUMP SUCTION AND DISCHARGE NOZZLE SIZES AND TO PROVIDE CONNECTING FLANGES AND REDUCERS ACCORDINGLY. | |
| 8 | VENDOR SHALL FILL THIS DATASHEET COMPLETELY AS PER HIS OFFER. | |
| 9 | REFER TABLE G-1 AND H-1 OF API-610 (LATEST EDITION) | |
| 10 | VENDOR TO PROVIDE MOTOR MANUFACTURER'S DATA SHEET. | |
| 11 | FOR MOTOR SPECIFICATION REFER DOCUMENT # 0220-ELA-6500 | |
| 12 | BALANCE/LEAK OFF LINE FROM DISCHARGED CASING TO SUCTION NOZZLE SHALL BE PROVIDED BY PUMP VENDOR AND SHALL DESIGN WITH PROPER ENGINEERING (e.g INSTALLATION OF RESTRICTED ORIFICE) IN ALL ASPECTS. | |