TECHNICAL SPECIFICATION FOR JACKING OIL PUMP SET (A.C.)

1.0 INTENT OF SPECIFICATION:-

THIS SPECIFICATION IS INTENDED TO COVER DESIGN, MANUFACTURE, ASSEMBLY, TESTING AND SUPPLY OF COMPLETE PUMPING SET WITH BASE PLATE, LIFTING LUGS, COUPLING, SUCTION PIPE, DISCHARGE PIPE AND STARTUP VALVE (IF REQUIRED BY VENDOR FROM PUMP SAFETY POINT OF VIEW). OTHER ACCESSORIES INCLUDING MOTOR AND THEIR COMMISSIONING AT POWER STATION.

THE PUMPING SETS ARE INTENDED FOR OPERATION IN CONJUNCTION WITH STEAM TURBINES AND SHOULD BE SUITABLE FOR CONTINUOUS OPERATION AT AN AMBIENT TEMPERATURE OF 50°C + 90% HUMIDITY.

2.0 FUNCTION:-

JACKING OIL PUMP COMES IN OPERATION IN CONJUNCTION WITH THE BARRING OPERATION OF THE TURBINE.

3.0 APPLICABLE CODE/STANDARD:-

IS:4722,IS:325, IS:2253, IS:2254, IS:3202
IS:4029, VDI:2056, VDMA 24284 .

4.0 OIL SPECIFICATION:-

THE MEDIUM HANDLED IS TURBINE OIL OF VISCOSITY CLASS ISO VG46. THE OIL CAN BE SERVO PRIME 46 OF INDIAN OIL CORPORATION OR TURBOL 46 OF BHARAT PETROLEUM OR SHELL TURBOL 46 OF BHARAT SHELL LTD.

KINEMATIC VISCOSITY AT 65°C/20°c	: 16 cs/100 cs
SPECIFIC GRAVITY AT 65°c	: 0.8488
FLASH POINT	: 200°c (min)
OPERATIONAL TEMPERATURE	: 65°c
POUR POINT	: -6.6°c (max.)

5.0 PUMP SPECIFICATION:-

5.1 IDENTIFICATION NO. TO BE MENTIONED ON NAME PLATE AS FOLLOWS:-
: MAV 31 AP 001 AND MAV 32 AP 001

				नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
CIE	Nirbhay Kumar	Nirbhay 10/2/14	अनुवादक TRANSLATED BY	-	
QAX	Vibhuti Shah	Vibhuti 10/2/14	निर्माणकर्ता WORKED BY	HIMANSHU GUPTA	8/2/14
TSX	B.Choudhary	10/2/14	जांचकर्ता CHECKED BY	HIMANSHU GUPTA	8/2/14
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	ANUJ JAIN	8/2/14
			स्वीकृति APPROVED :	(A.B.GUPTA) AGM	4.10
REV.NO. 13	SUPERSEDES		निर्माण PREPARED :	जारी ISSUED : TSX	दिनांक DATE : 2/1/1959
Dt. 28.01.14					

हस्ताक्षर एवं दिनांक SIGN & DATE 10/2/14

सामग्री सूची संख्या INVENTORY NO. P.5134

5.2 TYPE :-SCREW OR VANE TYPE POSITIVE DISPLACEMENT

DESIGN TEMPERATURE = 100°C , OPERATING TEMPERATURE = 65°C

VARIANT NUMBER	NORMAL DISCHARGE CAPACITY (Litre/Sec.)	NORMAL DISCHARGE PRESSURE (Bar)
VAR. 1	1.26	120
VAR. 2	1.80	140
VAR. 3	1.68	189
VAR. 4	1.25	182
VAR. 5	2.25	182
VAR. 6	1.53	178
VAR. 7	1.33	182
VAR. 8	1.27	182
VAR. 9	1.84	178

VARIANT NUMBER	NORMAL DISCHARGE CAPACITY (Litre/Sec.)	NORMAL DISCHARGE PRESSURE (Bar)
VAR. 10	1.70	175
VAR. 11	1.30	155

PUMP SHALL BE SUITABLE FOR MOUNTING VERTICALLY ON THE MAIN OIL TANK. BASE PLATE OF PUMP SHALL MATCH THE COUNTER FLANGE PROVIDED ON THE TANK AS PER SKETCH ON PAGE 13. SMOOTH FUNCTIONING IS ENSURED BY MAINTAINING OIL LEVELS AS DEPICTED IN THE ARRANGEMENT ON PAGE NO. 12.

5.3 DURING INITIAL START UP IN WINTER, OIL TEMPERATURE MAY GO AS BELOW AS 20°C.

6.0 MOTOR:-

A SUITABLE MOTOR CONFORMING TO THE PUMP REQUIREMENTS SHALL BE SUPPLIED. FOR DETAILS ON MOTOR, REFER ANNEXURE-I ON PAGE NO. 7.

7.0 DESIGN AND CONSTRUCTION OF PUMP:-

ALL MATERIALS USED IN THE CONSTRUCTION OF THE PUMPS SHALL BE SELECTED FROM THE RANGE OF MATERIAL MOST APPROPRIATELY SUITABLE FOR THE PURPOSE AND SERVICE CONDITIONS. THE BIDDER SHALL FURNISH ALONG WITH THE OFFER, MATERIAL SPECIFICATION FOR ALL THE COMPONENTS TO BHEL FOR THEIR REVIEW AND ACCEPTANCE BY BHEL/ITS CUSTOMER. BHEL/ITS CUSTOMER RESERVES THE RIGHT TO ASK FOR CHANGES IN MATERIAL. THE SIZE SHALL BE STANDARDIZED SO AS TO ENSURE INTERCHANGEABILITY.

THE SUCTION, DISCHARGE AND DRAINAGE SIZES AND TYPE OF CONNECTIONS SHALL BE AS FOLLOWS.

SUCTION- Ø60.3X4 TYPE OF CONNECTION BUTT WELDED.
DISCHARGE- Ø33.4X4.5 TYPE OF CONNECTION BUTT WELDED.
DRAINAGE INLET- Ø33.4X3.4 TYPE OF CONNECTION BUTT WELDED.
DRAINAGE OUTLET- Ø33.4X3.4 TYPE OF CONNECTION BUTT WELDED (FLANGED CONNECTION DIN: 2633 IS TO BE SUPPLIED WITH COUNTER FLANGE, O-RING, BOLTS, NUTS, AND WASHER).

7.1 SPECIAL TOOLS AND TACKLES

ONE SET OF TOOLS REQUIRED FOR ERECTION, OPERATION AND MAINTENANCE OF THE PUMPING SETS SHALL BE SUPPLIED TOGETHER WITH EACH PUMP. LIST OF THESE TOOLS SHALL BE SUBMITTED ALONG WITH THE OFFER.

7.2 THE MATERIALS OF CONSTRUCTION OF THE PUMPS SHALL BE SUCH AS TO RESIST CORROSION AND EROSION AND SHALL GIVE LONG TROUBLE FREE SERVICE.

7.3 THE SUPPLIER SHALL ALSO FURNISH THE METHOD AND FREQUENCY OF LUBRICATION OF THE BEARINGS AND QUANTITY AND TYPE OF LUBRICANT REQUIRED FOR NORMAL OPERATION. BUT LUBRICATION OF BEARING WITH THE OIL BEING HANDLED IS PREFERRED.

7.4 THE DESIGN SHALL BE SUCH AS TO KEEP THE FRICTIONAL LOSS AND WEAR CAUSED BY END THRUST TO THE MINIMUM. IT WILL ALSO ENSURE MINIMUM WEAR AND CAVITATION IN MECHANICAL SEALS AND BEARINGS. LONG AND TROUBLE FREE SERVICE SHALL BE ENSURED. THE ROTORS OF THE PUMP SHOULD BE DESIGNED IN SUCH A WAY SO THAT MINIMUM VIBRATIONS ARE EXPERIENCED. THE SOUND PRESSURE LEVEL OF PUMP MOTOR SET SHOULD NOT BE GREATER THAN 85 dBA TO A REFERENCE OF 0.0002 MICRO BAR WHEN MEASURED AT A DISTANCE OF 1.5 METERS ABOVE FLOOR LEVEL AND ONE METERS HORIZONTALLY FROM THE BASE OF THE EQUIPMENT AND VIBRATIONS ARE IN THE PERMISSIBLE RANGE AS PER VDI 2056.

7.5 SEALS MUST COMPLY WITH THE FOLLOWING PROPERTIES:-

(a) READY ACCESS AND AMENABILITY FOR MAINTENANCE WORK.
(b) NO CONTAMINATION OF THE MEDIUM FROM MATERIAL ABRADED FROM THE SEALS.
(c) NO SEEPAGE OF LUBRICANTS INTO THE FLOW MEDIUM.
(d) MINIMUM LEAKAGE LOSSES WITH THEIR CONTROLLED REMOVAL.

7.6 TO FACILITATE TRANSPORT AND ERECTION, LIFTING HOOKS OR ERECTION EYES SHALL BE FITTED AT SUITABLE POINTS ON THE COMPONENTS. THEIR LOCATIONS MUST BE SHOWN ON THE DIMENSIONAL DRAWING.

7.7 PUMP BEARINGS SHALL BE DESIGNED SO AS TO ASSURE 50,000 hrs CONTINUOUS SERVICE FOR FRICTION BEARINGS AND 30,000 hrs FOR BALL AND ROLLER BEARINGS.

7.8 MECHANICAL DESIGN SHALL ALLOW EASY ACCESS TO VARIOUS PARTS FOR CARRYING OUT MAINTENANCE WORK.

7.9 THE DISCHARGE BRANCH OF THE PUMP SHALL BE TAKEN OUT 100 MM ABOVE THE BASE PLATE BY THE SUPPLIER.

7.10 THE PUMPS SHALL BE PROVIDED WITH DRAINAGE AND VENTING DEVICES.

7.11 ALL SYSTEM PARTS CARRYING OIL SHALL BE OF OIL TIGHT CONSTRUCTION, COMPRESSION-TYPE FITTINGS ARE NOT PERMISSIBLE.

7.12 FOR PUMPS RUNNING AT SUBCRITICAL SPEEDS, IT SHALL BE ENSURED THAT THE CRITICAL SPEED LIES ABOVE THE MAXIMUM SPEED ATTAINABLE DURING OPERATION WITH A MINIMUM MARGIN ON 15% OF RATED SPEED. FOR PUMPS RUNNING AT SUPER CRITICAL SPEEDS, IT SHALL BE ENSURED THAT THERE IS A DIFFERENCE OF SUFFICIENT MAGNITUDE (NOT LESS THAN 20%) BETWEEN THE OPERATING SPEED AND THE BORDER IN CRITICAL SPEEDS. ALLOWANCES SHALL BE MADE FOR THE TYPE OF COUPLING BETWEEN THE PUMP AND MOTOR WHILE CALCULATING THE CRITICAL SPEEDS.

7.13 COUPLING

SUITABLE COUPLING WITH GUARDS SHALL BE PROVIDED FOR COUPLING PUMP WITH MOTOR. IT SHALL BE DESIGNED TO FACILITATE EASY ALIGNMENT. ONE SET OF COUPLING BOLTS SHALL BE SUPPLIED IN SPARE. COUPLING BETWEEN PUMP AND MOTOR SHOULD BE SUITABLE FOR LIFTING THE MOTOR WITH OR WITHOUT LIFTING COMPLETE ASSEMBLY.

7.14 FOUNDATION

THE PUMP SHALL BE MOUNTED ON THE MAIN OIL TANK AND HUNG FROM BED PLATE AT THE TANK TOP INTO THE TANK. FOR FURTHER DETAILS REFER PAGE NO. 12 & 13. ALL THE SEATING MACHINED SURFACES OF BED PLATE TO BE MAINTAINED FOR 0.5 mm FLATNESS.

8.0 QUALITY ASSURANCE, INSPECTION AND TESTING

(a) THE MANUFACTURER SHALL CONDUCT ALL TESTS REQUIRED TO ENSURE ALL THE COMPONENTS/ PART OF THE JACKING OIL PUMP OFFERED, CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND IN COMPLIANCE WITH REQUIREMENTS OF APPLICABLE CODES AND STANDARDS.

(b) THE BIDDER SHALL SUBMIT QUALITY PLAN ALONG WITH HIS OFFER.

8.0.1 THE TESTING MEDIUM SHALL BE TURBINE OIL (AS SPECIFIED IN POINT NO.4 AT PAGE NO.1).

8.1 THE PARTICULARS OF THE PROPOSED SHOP TESTS AND PROCEDURES FOR THE TESTS SHALL BE SUBMITTED TO BHEL / ITS CUSTOMER FOR APPROVAL ALONG WITH QUALITY PLAN.

8.2 THE MATERIAL SHALL BE DISPATCHED ONLY AFTER INSPECTION AND CLEARANCE OF MATERIAL BY BHEL OR ITS CUSTOMER AND APPROVAL OF TEST CERTIFICATE BY BHEL / ITS CUSTOMER.

8.3 THE MINIMUM TESTS/CHECKS TO BE CARRIED OUT ON THE JACKING OIL PUMP AS ENVISAGED BY BHEL ARE GIVEN BELOW. THIS IS, HOWEVER, NOT INTENDED TO FORM A COMPREHENSIVE TESTING PROGRAMME AS IT IS SUPPLIERS RESPONSIBILITY TO PREPARE THE DETAILED QUALITY PLAN, WHICH SHOULD ALSO INCLUDE TESTS/CHECKS, CARRIED OUT BY SUPPLIER AS A PART OF THEIR NORMAL PRACTICE. THIS QUALITY PLAN IS SUBJECT TO THE APPROVAL OF BHEL / ITS CUSTOMER. BHEL / ITS CUSTOMER RESERVES THE RIGHT TO ASK FOR ANY MORE CHECKS AT THE TIME OF QUALITY PLAN FINALIZATION.

8.3.1 TESTING OF MATERIALS

THE MATERIAL OF EACH COMPONENT SHALL BE TESTED AS PER RELEVANT SPECIFICATION FOR ITS CHEMICAL COMPOSITION AND MECHANICAL PROPERTIES, VIZ. YS, UTS, IMPACT, % ELONGATION % RA Etc. TO ENSURE FREEDOM FROM SURFACE AND SUB-SURFACE DEFECTS, NDT & UT SHALL BE CARRIED OUT ON SHAFT, NDT, MPI ON SCREWS/VANES AND CASING ALSO BE CARRIED OUT. THE WHOLE RESPONSIBILITY LIES WITH VENDOR OF TESTING THE MATERIAL AS PER RELEVANT STANDARD.

8.3.2 FOLLOWING TESTS SHALL BE CARRIED OUT DURING VARIOUS STAGES OF MANUFACTURE AT MANUFACTURER WORKS.

(a) CHECK FOR DIMENSIONS OF ALL COMPONENT PARTS INCLUDING SURFACE FINISH, AXIAL AND RADIAL RUN-OUT OF SHAFT ETC.

(b) NON-DESTRUCTIVE EXAMINATION: - UT FOR SCREW/VANE BLANKS AND DPT/MPI ON SCREWS/VANES TO BE CARRIED OUT TO ENSURE SURFACE/SUB-SURFACE DEFECTS.

(c) CHECK THE CONDITION OF THE OIL SEALS AND ANY SEEPAGE OF OIL THROUGH SEALS ETC.

(d) HYDRAULIC TESTING OF THE CASING AND OTHER PRESSURE PARTS SHALL BE AS PER VDMA 24284.

(e) PERFORMANCE TEST WITH RESPECTIVE INDIVIDUAL JOB MOTOR FOR VERIFICATION OF PUMP CHARACTERISTICS, VIZ. DISCHARGE AT THE GIVEN PRESSURE, SCHEDULE OF POWER CONSUMPTION AS PER VDMA 24284, NOISE AND VIBRATION LEVEL AS PER VDI 2056.

(f) STRIP DOWN TEST TO CHECK THE CONDITION OF BEARING, MECHANICAL CLEARANCES, AND AXIAL PLAY OF SHAFT ETC.

8.3.3 AFTER TESTING THE PUMP, ALL THE SURFACES AND INTERNALS SHALL BE THOROUGHLY CLEANED, DRIED AND CONSERVED. ALL METALLIC SURFACES EXCEPT BRIGHT PARTS EXPOSED TO WEATHER SHALL BE GIVEN A SUITABLE PRIMING COAT AND THEN TWO COATS OF APPROVED PAINTS. ENSURE ASSEMBLY OF ALL THE COMPONENTS OF PUMP AS ONE UNIT AND PACK IN WATER AND DUST PROOF PACKAGE. THE PACKAGES SHOULD BE SUFFICIENTLY STRONG TO SAFEGUARD AGAINST ANY DAMAGE DURING TRANSIT AND IS SAFE FOR TWO YEARS IN A VERY DAMP ATMOSPHERE.

8.3.4 TEST CERTIFICATES INDICATING THE ACTUAL TEST RESULTS OF MATERIAL TESTING, NDT, HYDRAULIC TEST, PERFORMANCE TEST, STRIP DOWN EXAMINATION Etc. SHALL BE FURNISHED FOR BHEL INFORMATION.

9.0 PRE-APPROVAL DOCUMENTS AT THE TIME OF OFFER

9.1 ASSEMBLY DRAWING WITH PART LISTS, NOZZLE SIZES AND THEIR COORDINATES, BASE PLATE DETAILS AND CROSS SECTION ARRANGEMENT ALONG WITH STATIC LOADING.

9.2 CALCULATIONS WITH NECESSARY DRAWINGS (TORQUE/SPEED CHARACTERISTICS Etc), POWER REQUIREMENTS, TORQUE SETTING VALUE FOR MOTOR TRIP, PERMISSIBLE TORQUE VALUE FOR KEY AND POWER SHAFT.

9.3 MAXIMUM MAGNETIC AND NON-MAGNETIC PARTICLE SIZE, WHICH CAN PASS THOROUGH PUMP SCREW/VANE CLEARANCE WITHOUT DAMAGING THE PUMP SHALL BE SPECIFIED IN THE OFFER.

9.4 QUALITY PLAN WITH DETAILS OF QUALITY LEVELS AND MANUFACTURING TOLERANCES. THIS SHOULD GENERALLY CONFORM TO VDMA 24284. GENERALLY ACCEPTED ENGINEERING PRACTICES, IN PARTICULAR VDMA CODES AND STANDARDS OR EQUIVALENT SHALL BE APPLIED AND TAKEN INTO ACCOUNT FOR DESIGN OF SCREW/VANE PUMPS. THE CODES OF STANDARDS APPLIED IN EACH CASE SHALL BE SPECIFIED IN THE OFFER.

9.5 FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE-I. EXAMINATION OF THE PRE-APPROVED DOCUMENTS BY BHEL SHALL NOT RELIEVE THE MANUFACTURER AND HIS SUBCONTRACTORS OF THEIR RESPONSIBILITIES.

9.6 THE PRE-APPROVED DOCUMENTS SHALL FORM THE BASIS FOR THE ORDER. NO CHANGES SHALL BE MADE WITHOUT APPROVAL FROM BHEL.

10.0 DOCUMENTS TO BE SUPPLIED AFTER THE PLACEMENT OF ORDER:

THESE SHALL BE SUPPLIED IN SOFT COPY VIA MAIL OR BY CD AS PER FOLLOWING SCHEDULE:

10.1 CONTRACTUAL DRAWINGS - 4 WEEKS

10.2 OVERHAUL AND SPARE PARTS LISTS - 4 WEEKS

10.3 EQUIPMENT DESCRIPTION - 4 WEEKS

10.4 TEST CERTIFICATE OF ALL TESTS AS PER QUALITY PLAN, DRAWINGS DURING VARIOUS STAGES OF MANUFACTURE. ALSO REFER CLAUSE 8.2 AND 8.3.4 ABOVE. - BEFORE DISPATCH

10.5 LIST OF TOOLS AND TACKLES - 4 WEEKS

10.6 THE STATIC AND DYNAMIC LOADING DETAILS ON SUPPORT/FOUNDATION SHOULD BE FURNISHED. - 4 WEEKS

10.7 FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE I.

10.8 O & M MANUALS (10 HARD COPIES+2CD)

11.0 NAME PLATE IDENTIFICATION MARKINGS SHOULD BE AS FOLLOWS:

11.1 TYPE / DESIGNATION
11.2 MANUFACTURER
11.3 MANUFACTURER'S WORKS NO.
11.4 YEAR OF MANUFACTURING
11.5 PURCHASER'S ORDER NO.
11.6 VOLUMETRIC FLOW (l/min)
11.7 DISCHARGE PRESSURE (Bar/MWC)
11.8 OPERATING TEMPERATURE (°C)
11.9 FLOW MEDIUM.
11.10 SPEED.
11.11 BILINGUAL IN HINDI AND ENGLISH LANGUAGES.
11.12 THE PUMP DATA SHEETS, GA DRAWING, CHARACTERISTIC CURVES, AND CROSS SECTIONAL DRAWING SHALL BE REQUIRED TO BE APPROVED BY BHEL/BHEL's CUSTOMER/CUSTOMER'S CONSULTANT.
11.13 KKS IDENTIFICATION i.e. MAV31AP001 & MAV32AP001.

12.0 CLEANING, PAINTING, CONSERVATION & PACKING:

THE SURFACE SHALL BE CLEANED & PREPARED FOR APPLICATION OF THE COATINGS BY BLASTING WITH NON-SILICATIC ABRASIVE AGENTS. THE PROTECTIVE COATING SHOULD BE OIL RESISTANT TO PREVENT CONTAMINATION OF OIL SPECIFIED TO PREVENT THE DETERIORATION OF THE COATING ITSELF. THE SUPPLIER SHALL GIVE EXACT AND PRECISE DETAILS ABOUT THE MEASURES ENVISAGED BY HIM FOR SURFACE PROTECTION, WHICH SHALL BE CHECKED AND APPROVED BY BHEL.

INSTRUCTIONS SHOULD BE ISSUED REGARDING RECONSERVATION, DECONSERVATION ALONG WITH SPECIFICATION OF MATERIAL TO BE USED FOR ABOVE PURPOSE. 100% QUANTITY OF COATING MATERIAL SHALL BE SUPPLIED ALONG WITH THE PUMP FOR RECONSERVATION AND DECONSERVATION AT SITE DURING STORAGE. ANY SPECIFIC INSTRUCTION TO BE FOLLOWED DURING STORAGE AT SITE TO AVOID ANY SEIZING ETC. SHALL ALSO BE INTIMATED. ALL SUCH INSTRUCTIONS SHALL BE MADE AVAILABLE TO SITE INCHARGE IN A SEPARATE COVER (NOT PACKED WITH PUMP PACKAGE).

THE SUPPLIER SHALL BE RESPONSIBLE FOR ALL LOSS OR DAMAGE DURING TRANSPORTATION, HANDLING AND STORAGE DUE TO IMPROPER PACKING.

13.0 GENERAL

SUPPLIER TO CLEARLY MENTION THE DEVIATION TAKEN AGAINST SPECIFICATION IN THEIR OFFER. SUPPLIER SHALL ALSO FILL IN THE BLANK DATA SHEET AS PER ANNEXURE-II AND SUBMIT THE SAME ALONG WITH THE OFFER. THE OFFER MAY NOT BE CONSIDERED IF ALL THE TECHNICAL PARTICULARS AND INFORMATION CALLED FOR IN THE SPECIFICATION ARE NOT SUBMITTED ALONG WITH THE OFFER.

13.1 SUPPLIER TO PERFORM TWO VISIT AT SITE:-

SUPERVISION OF VENDER REQUIRED DURING ERECTION AND COMMISSIONING AT SITE.

13.1.1 FIRST VISIT TO CHECK AND REPLACE MOTOR'S BEARINGS, PUMP'S SUCTION AND DISCHARGE O-RING (IF REQUIRED) AND TO CHECK THE CONDITION OF THE PUMP SET BEFORE INSTALLATION OF PUMP/MOT OIL FILLING.

13.1.2 SECOND VISIT TO SUPERVISE THE COMMISSIONING OF PUMP SET.

14.0 GUARANTEE

14.0.1 THE SUPPLIER SHALL GUARANTEE TROUBLE FREE AND SATISFACTORY OPERATION OF THE EQUIPMENT FOR A PERIOD OF 12 MONTHS AFTER THE INSTALLATION AND COMMISSIONING OR FOR A PERIOD OF 18 MONTHS FROM THE DAY THE EQUIPMENT LEAVES THE SUPPLIER'S WORKS WHICHEVER IS EARLIER.

14.0.2 THE SUPPLIER SHALL GUARANTEE THE CAPACITY, HEAD AND EFFICIENCY OF THE PUMP AS PER THE TESTED CHARACTERISTIC WITH OIL.

14.0.3 IF DURING ERECTION AT SITE ANY DEFICIENCY IN A PART IS DETECTED, BHEL SITE REPRESENTATIVE SHALL PREPARE THE ASSESSMENT REPORT AND A COPY OF THE SAME SHALL BE FORWARDED TO THE SUPPLIER. THE SUPPLIER SHALL REPLACE/ RECTIFY THE CONCERNED ITEMS FREE OF CHARGE. THE SUPPLIER IF HE SO DESIRE MAY DEPUTE HIS REPRESENTATIVE TO SITE OTHERWISE THE FINDING OF BHEL REPRESENTATIVE SHALL BE FINAL AND BINDING ON THE SUPPLIER OF PUMPING SET.

14.0.4 THE SUPPLIER SHALL REPAIR /REPLACE THE DEFECTIVE PARTS AT HIS OWN COST DURING THE GUARANTEE PERIOD.

15.0 SPARES

THE SUPPLIER SHALL QUOTE ITEM WISE PRICE OF RECOMMENDED SPARES FOR 3 YEARS AND 5 YEARS OPERATION RESPECTIVELY.

ANNEXURE – I
SPECIFICATION OF A.C. MOTOR FOR JACKING OIL PUMP

M1.0 A SUITABLE MOTOR CONFORMING TO THE JACKING OIL PUMP REQUIREMENT SHALL BE SUPPLIED. THE MOTOR SHALL CONFORM TO IS:325, IS:2253, IS:2254, IS: 3202, IS: 4029, IS 12615:2011 AND IS: 4722 OR EQUIVALENT BS SPECIFICATION. THE MOTOR SHALL MATCH THE REQUIREMENTS OF DRIVEN EQUIPMENT IN ALL RESPECTS. THE MOTOR SHALL ALSO MEET THE FOLLOWING REQUIREMENTS BROADLY. THE MOTOR SHALL MEET ALL INDIAN STATUTORY REQUIREMENTS.

M2.0 APPLICATION

TO DRIVE JACKING OIL PUMP FOR SUPPLYING HIGH PRESSURE OIL TO TURBINE BEARINGS.

M3.0 TYPE OF MOTOR: SQUIRREL CAGE, INDUCTION MOTOR.

M3.1 KW RATING

IT SHALL HAVE AT LEAST 15% RESERVE CAPACITY OVER AND ABOVE REQUIRED POWER TO DRIVE THE PUMP WHEN IT IS DISCHARGING MAX. QUANTITY.

M3.2 KW ACTUALLY REQUIRED BY DRIVEN EQUIPMENT : PUMP CAPACITY UNDER SPECIFIED OPERATING /START UP

M3.3 RATED VOLTAGE : 415V
FREQUENCY : 50HZ

M3.4 PERMISSIBLE VOLTAGE & FREQUENCY : ±10% VOLT
VARIATION UNDER NORMAL RUNNING : ±5% FREQUENCY
CONDITIONS COMBINED VARIATION. :10% (SUM OF ABSOLUTE VALUES)

M3.5 MINIMUM VOLTAGE REQUIRED UNDER STARTING CONDITIONS TO BRING DRIVEN EQUIPMENT UPTO RATED SPEED. : 80% RATED

M3.6 NO. OF PHASES : 3 PHASE

M3.7 TYPE OF DUTY : CONTINUOUS

M3.8 FULL LOAD SPEED : IT SHALL BE COMMENSURATE WITH PUMP SPEED AS PER DESIGN.

M3.9 FULL LOAD CURRENT : AS PER DESIGN

M3.10 STARTING CURRENT : NOT TO EXCEED 600% OF RATED (EXCLUSIVE OF IS: TOLERANCES)

M3.11 STARTING TORQUE : 1.3 TIMES (min.) OF RATED TORQUE.

M3.12 BREAK DOWN TORQUE : 2.05 TIMES (min.) OF RATED VALUE.

M3.13 EFFICIENCY AT FULL LOAD : IE2 AS PER IS 12615:2011

M3.14 POWER FACTOR AT FULL LOAD : 0.85 (min.)

M3.15 MOTOR SHALL BE DESIGNED TO WITHSTAND THE VOLTAGE AND TORQUE STRESSES DEVELOPED DUE TO THE DIFFERENCE BETWEEN THE MOTOR RESIDUAL VOLTAGE AND INCOMING SUPPLY VOLTAGE EQUAL TO 150% OF THE RATED MOTOR VOLTAGE DURING FAST CHANGEOVER OF BUSES.

M4.0 <u>STARTING DATA</u>

M4.1 STARTING:DOL START AS WELL AS STAR DELTA.

M4.2 ACCELERATION TIME WITH FULL LOAD CONNECTED : 3.5±0.5 SECONDS

M4.3. LOCKED ROTOR WITHSTAND TIME UNDER HOT CONDITIONS AT RATED VOLTAGE 2.5 SECONDS MORE THAN STARTING TIME.

M4.4 PERMISSIBLE STARTING DUTY : 3 STARTS EQUALLY SPREAD OVER AN HOUR & 2 CONSECUTIVE STARTS FROM HOT CONDITION WITHOUT ANY INJURIOUS HEATING TO WINDINGS.

M4.5 OVERLOAD (% OF FULL LOAD) THAT CAN BE CARRIED BY MOTOR WITHOUT IMPAIRING OVERALL PERFORMANCE AND PERIOD FOR WHICH THIS OVERLOAD IS APPLICABLE. : MOTOR SHALL BE CAPABLE OF RUNNING AT FULL LOAD AT 80% OF RATED VOLTAGE FOR FIVE MINUTES AND 70% OF RATED VOLTAGE FOR 1 SEC.

M4.6 LOCATION : INDOOR

M4.7 CLASS OF INSULATION : CLASS F, FUNGUS RESISTANT, TROPICALISED AS PER IS: 3202, WITH TEMP. RISE LIMITED TO THAT OF CLASS B.

M4.8 <u>MECHANICAL CONSTRUCTION</u>

M4.8.1 SHAFT DISPOSITION MOUNTING : VERTICAL/FLANGE MOUNTED

M4.8.2 METHOD OF CONNECTION TO DRIVEN EQUIPMENT. : FLANGE FLEXIBLE COUPLING.

M4.8.3 DIRECTION OF ROTATION AND CORRESPONDING TERMINAL DESIGNATION. : TO SUIT PUMP

M4.8.4 ENCLOSURE AND VENTILATION : TOTALLY ENCLOSED FAN COOLED IP-55.

M4.8.5 BEARING : THRUST BEARING, MIN. STANDARD LIFE NOT LESS THAN 30,000 WORKING HOURS.

M4.8.6 GROUNDING DEVICE : SUITABLE ARRANGEMENT SHALL BE PROVIDED FOR EARTHING THE MOTOR AT TWO SEPARATE AND DISTINCT CONNECTION POINTS. DESIGN OF EARTHING CONDUCTOR SHALL BE AS PER IS: 4722.

M4.8.7 TERMINAL CONNECTORS FOR STATOR LEADS TYPE AND NUMBER. : 6, NEUTRAL SHALL BE CONNECTED EXTERNALLY IN THE TERMINAL BOX.

M4.9 TERMINAL BOX : TERMINAL BOX SHALL BE PROVIDED WITH DOUBLE COMPRESSION TYPE BRASS CABLE GLANDS (Nickel Chromium PLATED HEAVY DUTY, CONFIRMING TO BS:6121) AND COPPER CABLE LUGS TO MATCH OWNER'S ALUMINUM CABLES, THE SIZE OF WITCH SHALL BE INTIMATED LATER. TERMINAL BOX SHALL BE CAPABLE OF BEING ROTATED THROUGH 180° IN STEPS OF 90°. IT SHALL HAVE A DEGREE OF PROTECTION OF IP-55. IT SHALL ALSO BE SUITABLE TO WITHSTAND THE FAULT LEVEL OF 50 KA FOR 0.25 SECONDS.

M4.10 WHETHER PHASES SEGREGATED : NO.

M4.11 SPACE HEATERS : TO BE PROVIDED.

M4.12 RATED VOLTAGE FOR SPACE HEATERS : 240 VOLTS

M5.0 <u>SPECIAL REQUIREMENTS:</u>

M5.01 THE MOTOR SHALL BE RE-WOUNDABLE.

M5.02 THE MOTOR SHALL HAVE ON LINE GREASING FACILITY.

M5.03 THE MOTOR CONSTRUCTION SHALL BE SUITABLE FOR EASY DISASSEMBLY AND REASSEMBLY.

M5.04 THE MOTOR SHALL BE SUITABLE FOR WORKING IN AN ENVIRONMENT OF OIL FUMES WITHOUT ANY HAZARD.

M5.05 SEPARATE TERMINAL BOX FOR SPACE HEATERS SHALL BE PROVIDED.

M5.06 MOTOR SHALL BE PAINTED WITH PAINT SUITABLE FOR WORKING CONDITION AND ITS COLOR SHALL BE INTIMATED LATER ON.

M5.07 THE MOTOR SHALL BE THOROUGHLY DEGREASED AND SHARP EDGES AND SCALES REMOVED AND TREATED WITH ONE COAT OF PRIMER AND TWO COATS OF ENAMEL PAINT. MOTOR FAN ALSO BE PAINTED TO WITHSTAND CORROSION.

M5.08 MOTOR BEARINGS (DE & NDE) SHALL BE SEALED TYPE TO AVOID FREQUENT RE-GREASING.

M5.09 LIMITS OF MECHANICAL VIBRATIONS SEVERITY SHALL BE LIMITED TO VIBRATION GRADE "R" (REDUCED) AS PER IS: 12075.

M6.00 TESTS AT MANUFACTURER'S WORKS:-

(i) BOTH TYPE & ROUTINE TEST ARE TO BE PERFORMED ON COMPLETE PUMP MOTOR ASSEMBLY AS PER IS: 4722. TYPE TEST SHOULD NOT BE MORE THAN 5 YEARS OLD w.r.t. DATE OF ORDERING.

(ii) IN ADDITION THE FOLLOWING TESTS SHALL ALSO BE CARRIED OUT:

(a) ADDITIONAL TYPE TESTS:

DEGREE OF PROTECTION TEST TO CONFORM TO THE SPECIFIED DEGREE OF PROTECTION. IN CASE THE TEST IS ALREADY CARRIED ON THE SAME FRAME SIZE OF MACHINE, THEN TEST REPORT SHOULD BE FURNISHED.

(b) ADDITIONAL ROUTINE TESTS:

i. 20% OVER SPEED TEST FOR 2 MINUTES.
ii. MEASUREMENT OF VIBRATION AS PER IS: 12075.
iii. MEASUREMENT OF NOISE AS PER IS: 12065. MOTOR NOISE LEVEL SHALL BE LIMITED SO AS TO ACHIEVE PUMP-MOTOR SET NOISE LEVEL AS GIVEN IN CLAUSE 7.4 ON PAGE-3.

M7.0 DATASHEET/CHARACTERISTICS DOCUMENTS AS PER FOLLOWING DATA TO BE SUPPLIED WITH OFFER:-

THE OFFER SHOULD BE ACCOMPANIED WITH FOLLOWING DOCUMENTS IN TWO COPIES. THE OFFER WILL NOT BE CONSIDERED IF ALL THESE DOCUMENTS ARE NOT SUPPLIED.

M7.1 CHARACTERISTICS AT 80% , 100% AND 110% VOLTAGES:
M7.1.1 STARTING CURRENT V/S TIME.
M7.1.2 TORQUE V/S SLIP.
M7.1.3 THERMAL WITHSTANDS CHARACTERISTIC FOR HOT AND COLD CONDITION.
M7.2 TYPE AND FRAME SIZE.
M7.3 STARTING TIME.
M7.3.1 WITH 100% VOLTAGE AT TERMINAL.
M7.3.2 WITH 85 % VOLTAGE AT TERMINAL.
M7.3.3 WITH 80 % VOLTAGE AT TERMINAL.
M7.4 SAFE STALL TIME AT 100 % RATED VOLTAGE UNDER HOT CONDITION.
M7.5 POWER (KW) RATING CALCULATION w.r.t. PUMP REQUIREMENT.
M7.6 EXPECTED LIFE OF BEARING.
M7.7 DATA IN RESPECT OF ALL ITEMS MENTIONED AT PARA M1.0 TO M5.0 OF ANNEXURE I.

M8.0 DOCUMENTS TO BE FURNISHED WITHIN FOUR WEEKS OF PLACEMENT OF ORDER (FOR BHEL OR THEIR CUSTOMER'S APPROVAL):-

M8.1 SIX HARD COPIES AND ONE SOFT COPY (IN PDF FORMAT) OF MOTOR DATA SHEET AND G.A. DRAWING.
M8.2 DRAWING SHOWING TERMINAL DETAIL OF ALL TERMINALS AND LOCATION AND DIMENSION OF TERMINAL BOXES.
M8.3 ROTOR WEIGHT AND TOTAL MOTOR WEIGHT.

M8.4 CHARACTERISTIC CURVES OF THE MOTOR.

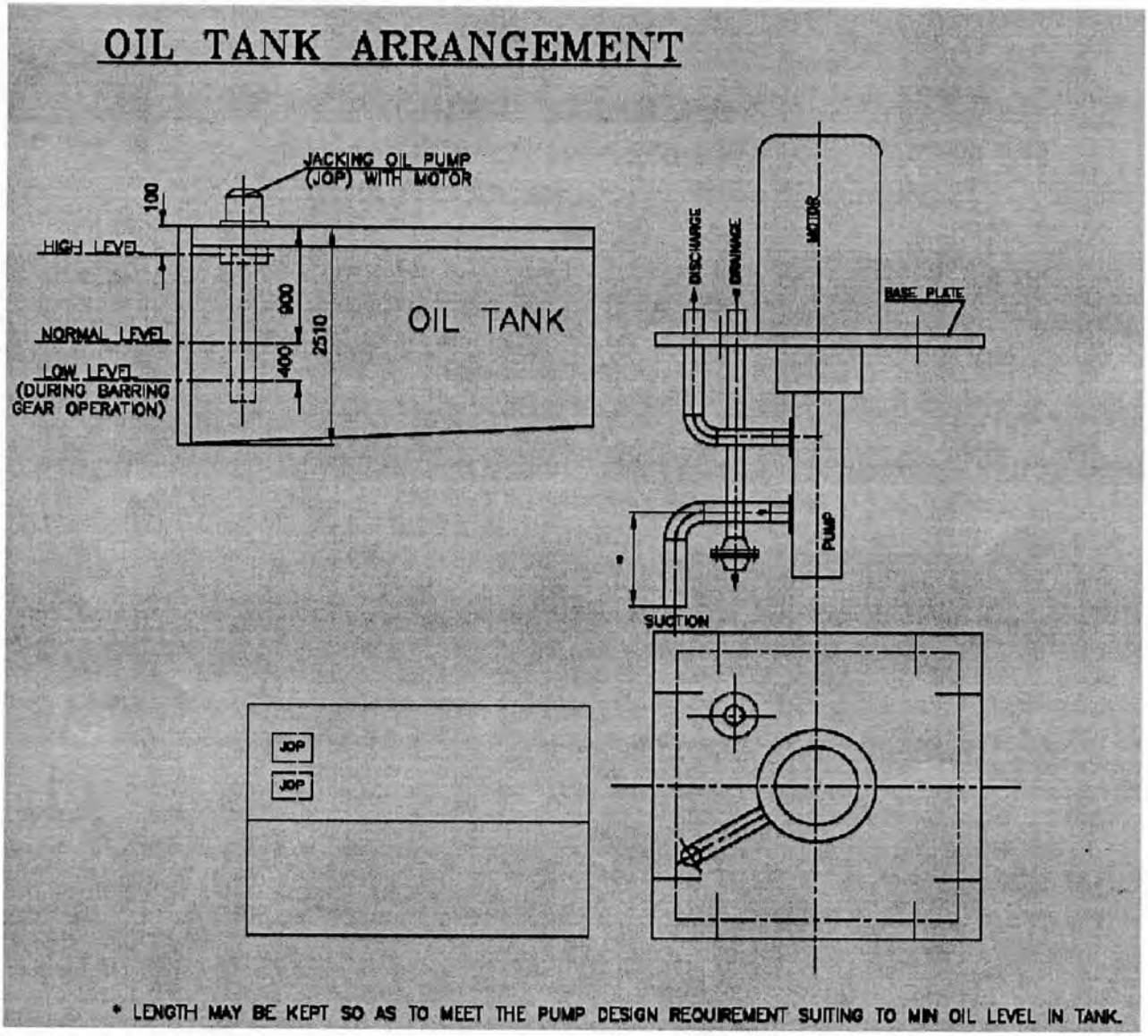
M9.0 SIX COPIES OF TESTS CARRIED OUT AS PER CLAUSE NO. 6.0 ON EACH MOTOR SHALL BE FURNISHED TO BHEL FOR SCRUTINY AND APPROVAL. ONLY ON ACCEPTANCE FROM BHEL SIDE, MOTOR CAN BE CONSIDERED SUITABLE FOR DISPATCH.

ANNEXURE-II
DATA TO BE FURNISHED BY BIDDER ALONG WITH OFFER FOR JACKING OIL PUMP

A1.0	**EQUIPMENT AND SERVICES OFFERED** PLEASE STATE WHETHER THE FOLLOWING EQUIPMENT SERVICE AS SPECIFIED IN THE DATA SHEETS ARE OFFERED OR NOT.	
A1.1	PUMP AS PER SPECIFICATION	YES/NO
A1.2	MOTOR/MAKE	YES/NO
A1.3	NECESSARY INSTRUMENTS, TEST CONNECTIONS.	YES/NO
A1.4	BASE PLATE AS PER DRAWING.	YES/NO
A1.5	COMPANION FLANGES	YES/NO
A1.6	SPARE PARTS	YES/NO
A1.7	MAINTENANCE AND SPECIAL ERECTION TOOLS.	YES/NO
A1.8	COMMISSIONING OF THE SET.	YES/NO
A1.9	NO. OF PUMPS OFFERED.	
A2.0	**DESIGN AND PERFORMANCE.**	
A2.1	DESIGNED CAPACITY OF EACH PUMP.	M^3 /hour
A2.2	NORMAL DISCHARGE PRESSURE	
A2.3	EFFICIENCY	
A2.4	RATED SPEED	
A2.5	PERFORMANCE GUARANTEED WHEN INSTALLED AS PER GIVEN ARRANGEMENT.	YES/NO
A2.6	PUMP b.h.p./Kw AT RATED CAPACITY	
A2.7	MAXIMUM ALLOWABLE SUCTION LIFT (FOR MINIMUM NPSH REQUIRED)	
A2.8	MAXIMUM DISCHARGE PRESSURE FOR WHICH PUMP IS SUITABLE.	
A2.9	PARTY SHALL INFORM THE FILTRATION LEVEL OF THE FLOW MEDIA FOR PROPER FUNCTIONING OF PUMP.	
A3.0	**MATERIAL OF CONSTRUCTION**	
A3.1	CASING	
A3.2	DRIVING AND DRIVEN SPINDLE SCREW	
A3.3	BASE PLATE	
A3.4	WEARING RINGS	
A3.5	TYPE OF BEARINGS USED	
A3.6	TYPE OF COUPLING	
A3.7	PACKING	
A4.0	**CONNECTIONS**	
A4.1	SUCTION SIZE	
A4.2	DISCHARGE SIZE	
A5.0	**DRAWINGS**	
A5.1	GENERAL ARRANGEMENT AND SECTIONAL DRAWING ENCLOSED WITH OFFER.	YES/NO

A6.0 WEIGHT SCHEDULE
A6.1 WEIGHT OF PUMP
A6.2 WEIGHT OF MOTOR
A6.3 WEIGHT OF PUMP WITH MOTOR AND BASE FRAME.
A7.0 CHARACTERISTIC CURVES
A7.1 POWER CONSUMPTION / DISCHARGE PRESSURE
A7.2 DISCHARGE QUANTITY / DISCHARGE PRESSURE
A7.3 DISCHARGE QUANTITY / EFFICIENCY
A8.0 ANY DEVIATION TAKEN AGAINST SPECIFICATION. YES/NO
A9.0 DEVIATIONS TAKEN AS MENTIONED HERE
A10.0 HYDRAULIC TEST PRESSURE

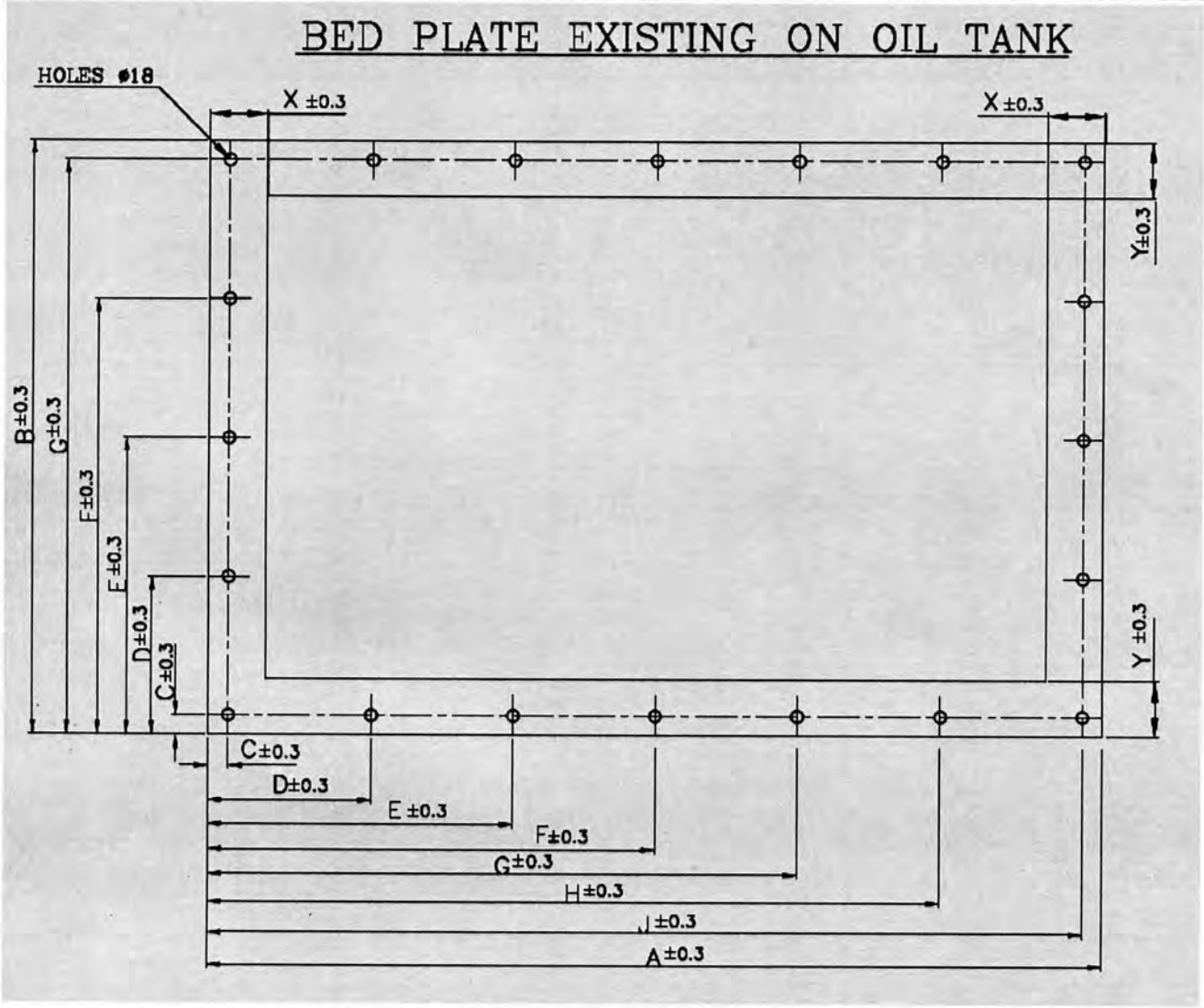
OIL TANK ARRANGEMENT



हस्ताक्षर एवं दिनांक SIGN & DATE 18/2/14

सामग्री सूची संख्या INVENTORY NO. P-5134

BED PLATE EXISTING ON OIL TANK



BED PLATE TYPE	A±0.3	B±0.3	C±0.3	D±0.3	E±0.3	F±0.3	G±0.3	H±0.3	J±0.3	X±0.3	Y±0.3	NO. OFF HOLES
AA	700	700	50	250	450	650	-	-	-	80	80	12
BB	700	700	35	245	455	665	-	-	-	60	60	12
CC	1320	900	30	240	450	660	870	1080	1290	85	85	20

Note:- Bed Plate type "AA" to be supplied unless otherwise specified in tender.

CROSS REFERRED STANDARDS: IS:325 , IS:2253 , IS:2254 , IS:3202 , IS:4027 , IS 12615:2011 IS:4722 , IS:12065 , IS:12075 , VDMA:24284.

REV. NO. 13

निर्माणकर्ता WORKED BY	H. GUPTA	Hgupta	8/2/14
जांचकर्ता CHECKED BY	ANUJ JAIN	Anuj	8/2/14

TECHNICAL SPECIFICATION FOR JACKING OIL PUMP SET (D.C.)

1.0 INTENT OF SPECIFICATION:-

THIS SPECIFICATION IS INTENDED TO COVER DESIGN, MANUFACTURE, ASSEMBLY, TESTING AND SUPPLY OF COMPLETE PUMPING SETS ALONG WITH BASE PLATE, ANCHOR BOLTS, LIFTING LUGS, COUPLING, SUCTION PIPE, SUCTION FILTER, STARTUP VALVE (IF REQUIRED BY VENDOR FROM PUMP SAFETY POINT OF VIEW) AND OTHER ACCESSORIES INCLUDING MOTOR AND THEIR COMMISSIONING AT POWER STATION.

THE PUMPING SETS ARE INTENDED FOR OPERATION IN CONJUNCTION WITH STEAM TURBINES AND SHOULD BE SUITABLE FOR CONTINUOUS OPERATION AT AN AMBIENT TEMPERATURE OF 50°C + 90% HUMIDITY.

2.0 FUNCTION:-

JACKING OIL PUMP COMES IN OPERATION IN CONJUNCTION WITH THE BARRING OPERATION OF THE TURBINE.

3.0 APPLICABLE CODE/STANDARD:-

IS:4722, VDMA 24284, IS: 2253, IS: 2254, IS: 3202
IS:12075

4.0 OIL SPECIFICATION:-

THE MEDIUM HANDELED IS TURBINE OIL OF VISCOSITY CLASS ISO VG46. THE OIL CAN BE SERVO PRIME 46 OF INDIAN OIL CORPORATION OR TURBOL 46 OF BHARAT PETROLEUM OR SHELL TURBOL 46 OF BHARAT SHELL LTD.

KINEMATIC VISCOSITY AT 65°C/20°c	: 16 cs/100 cs
SPECIFIC GRAVITY AT 65°c	: 0.8488
FLASH POINT	: 200°c (min)
OPERATIONAL TEMPERATURE	: 65°c
POUR POINT	: -6.6°c (max.)

5.0 PUMP SPECIFICATION:-

5.1 IDENTIFICATION NO. TO BE MENTIONED ON NAME PLATE AS FOLLOWS:-
· **MAV 32 AP001**

				नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
CIE	Nirbhay Kumar	Nirbhay Kumar 10/02/14	अनुवादक TRANSLATED BY	-	
QAX	Vibhuti Shah	Vibhuti 08/02/14	निर्मोणकर्ता WORKED BY	HIMANSHU GUPTA	Himanshu 8/2/14
TSX	B.Choudhary	B.Choudhary 10/02/14	जांचकर्ता CHECKED BY	HIMANSHU GUPTA	Himanshu 8/2/14
सहमत विभाग AGREED DEPTT	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	ANUJ JAIN	Anuj 8/2/14

स्वीकृति APPROVED : (A.B.GUPTA) AGM

GPNC 4.10

REV.NO. 12 SUPERSEDES
Dt. 28-01-14

निर्माण PREPARED : PED

जारी ISSUED : TSX

दिनांक DATE 28/01/2014

हस्ताक्षर एवं दिनांक SIGN & DATE 10/2/14

सामग्री सूची संख्या INVENTORY NO P-5474

5.2 TYPE :SCREW/VANE TYPE POSITIVE DISPLACEMENT

DESIGN TEMPERATURE = 100°C , OPERATING TEMPERATURE = 65°C

VARIANT NUMBER	NORMAL DISCHARGE CAPACITY (Litre/Min.)	NORMAL DISCHARGE PRESSURE (Bar)
VAR. 1	1.26	120
VAR. 2	1.80	140
VAR. 3	1.68	189
VAR. 4	1.25	182
VAR. 5	2.25	182
VAR. 6	1.53	178
VAR. 7	1.33	182
VAR. 8	1.27	182
VAR. 9	1.84	178

VARIANT NUMBER	NORMAL DISCHARGE CAPACITY (Litre/Min.)	NORMAL DISCHARGE PRESSURE (Bar)
VAR. 10	1.70	175
VAR. 11	1.30	155

PUMP SHALL BE SUITABLE FOR MOUNTING VERTICALLY ON THE OIL TANK. BASE PLATE OF PUMP SHALL MATCH THE COUNTER FLANGE PROVIDED ON THE TANK AS PER SKETCH ON PAGE 14. SMOOTH FUNCTIONING IS ENSURED BY MAINTAINING OIL LEVELS AS DEPICTED IN THE ARRANGEMENT ON PAGE NO. 13.

5.3 DURING INITIAL START UP IN WINTER, OIL TEMPERATURE MAY GO AS BELOW AS 20°C.

6.0 MOTOR:-

A SUITABLE MOTOR CONFORMING TO THE PUMP REQUIREMENTS SHALL BE SUPPLIED. FOR DETAILS ON MOTOR, REFER ANNEXURE-I ON PAGE NO.8.

7.0 DESIGN AND CONSTRUCTION OF PUMP:-

ALL MATERIALS USED IN THE CONSTRUCTION OF THE PUMPS SHALL BE SELECTED FROM THE RANGE OF MATERIAL MOST APPROPRIATELY SUITABLE FOR THE PURPOSE AND SERVICE CONDITIONS. THE BIDDER SHALL FURNISH MATERIAL SPECIFICATION FOR ALL THE COMPONENTS ALONG WITH THE OFFER TO BHEL FOR THEIR REVIEW AND ACCEPTANCE BY BHEL/ITS CUSTOMER. BHEL/ITS CUSTOMER RESERVES THE RIGHT TO ASK FOR CHANGES IN MATERIAL. THE SIZE SHALL BE STANDARDISED SO AS TO ENSURE INTERCHANGEABILITY.

THE SUCTION, DISCHARGE AND DRAINAGE SIZES AND TYPE OF CONNECTIONS.
SUCTION- Ø60.3X4 TYPE OF CONNECTION BUTT WELDED.
DISCHARGE- Ø33.4X4.5 TYPE OF CONNECTION BUTT WELDED.
DRAINAGE INLET- Ø33.4X3.4 TYPE OF CONNECTION BUTT WELDED.
DRAINAGE OUTLET- Ø33.4X3.4 TYPE OF CONNECTION BUTT WELDED (FLANGED CONNECTION DIN: 2633 IS TO BE SUPPLIED WITH COUNTER FLANGE, O'RING, BOLTS, NUTS AND WASHER).

7.1 SPECIAL TOOLS AND TACKLES

ONE SET OF TOOLS REQUIRED FOR ERECTION, OPERATION AND MAINTENANCE OF THE PUMPING SETS SHALL BE SUPPLIED TOGETHER WITH EACH PUMP. LIST OF THESE TOOLS SHALL BE SUBMITTED ALONG WITH THE OFFER.

7.2 THE MATERIALS OF CONSTRUCTION OF THE PUMPS SHALL BE SUCH AS TO RESIST CORROSION AND EROSION AND SHALL GIVE A LONG TROUBLE FREE SERVICE.

7.3 THE SUPPLIER SHALL ALSO FURNISH THE METHOD AND FREQUENCY OF LUBRICATION OF THE BEARINGS AND QUANTITY AND TYPE OF LUBRICANT REQUIRED FOR NORMAL OPERATION. BUT LUBRICATION OF BEARINGS WITH THE OIL BEING HANDLED IS PREFERRED.

7.4 THE DESIGN SHALL BE SUCH AS TO KEEP THE FRICTIONAL LOSS AND WEAR CAUSED BY END THRUST TO THE MINIMUM. IT WILL ALSO ENSURE MINIMUM WEAR AND CAVITATION IN MECHANICAL SEALS AND BEARINGS. LONG AND TROUBLE FREE SERVICE SHALL BE ENSURED. THE ROTORS OF THE PUMP SHOULD BE DESIGNED IN SUCH A WAY SO THAT MINIMUM VIBRATIONS ARE EXPERIENCED. THE SOUND PRESSURE LEVEL OF PUMP MOTOR SET SHOULD NOT BE GREATER THAN 85 dBA TO A REFERENCE OF 0.0002 MICRO BAR WHEN MEASURED AT A DISTANCE OF 1.5 METERS ABOVE FLOOR LEVEL AND ONE METERS HORIZONTALLY FROM THE BASE OF THE EQUIPMENT AND VIBRATIONS ARE IN THE PERMISSIBLE RANGE AS PER VDI 2056.

7.5 SEALS MUST COMPLY WITH THE FOLLOWING PROPERTIES:

(a) READY ACCESS AND AMENABILITY FOR MAINTENANCE WORK.
(b) NO CONTAMINATION OF THE MEDIUM FROM MATERIAL ABRADED FROM THE SEALS.
(c) NO SEEPAGE OF LUBRICANTS INTO THE FLOW MEDIUM.
(d) MINIMUM LEAKAGE LOSSES WITH THEIR CONTROLLED REMOVAL.

7.6 TO FACILITATE TRANSPORT AND ERECTION, LIFTING HOOKS OR ERECTION EYES SHALL BE FITTED AT SUITABLE POINTS ON THE COMPONENTS. THEIR LOCATIONS MUST BE SHOWN ON THE DIMENSIONAL DRAWING.

7.7 PUMP BEARINGS SHALL BE DESIGNED SO AS TO ASSURE 50,000 hrs CONTINUOUS SERVICE FOR FRICTION BEARINGS AND 30,000 hrs FOR BALL AND ROLLER BEARINGS.

7.8 THE MECHANICAL DESIGN SHALL ALLOW EASY ACCESS TO VARIOUS PARTS FOR CARRYING OUT MAINTENANCE WORK.

7.9 THE DISCHARGE BRANCH OF THE PUMP SHALL BE TAKEN OUT 100 MM ABOVE THE BASE PLATE BY THE SUPPLIER.

7.10 THE PUMPS SHALL BE PROVIDED WITH DRAINAGE AND VENTING DEVICES.

7.11 ALL SYSTEM PARTS CARRYING OIL SHALL BE OF OIL TIGHT CONSTRUCTION, COMPRESSION-TYPE FITTINGS ARE NOT PERMISSIBLE.

7.12 FOR SCREW/VANE PUMPS RUNNING AT SUBCRITICAL SPEEDS, IT SHALL BE ENSURED THAT THE CRITICAL SPEED LIES ABOVE THE MAXIMUM SPEED ATTAINABLE DURING OPERATION WITH A MINIMUM MARGIN ON 15% OF RATED SPEED. FOR PUMPS RUNNING AT SUPER CRITICAL SPEEDS, IT SHALL BE ENSURED THAT THERE IS A DIFFERENCE OF SUFFICIENT MAGNITUDE (NOT LESS THAN 20%) BETWEEN THE OPERATING SPEED AND THE BORDER IN CRITICAL SPEEDS. ALLOWANCES SHALL BE MADE FOR THE TYPE OF COUPLING BETWEEN THE PUMP AND MOTOR WHILE CALCULATING THE CRITICAL SPEEDS.

7.13 COUPLING

SUITABLE COUPLING WITH GUARDS SHALL BE PROVIDED FOR COUPLING PUMP WITH MOTOR. IT SHALL BE DESIGNED TO FACILITATE EASY ALIGNMENT. ONE SET OF COUPLING BOLTS SHALL BE SUPPLIED IN SPARE. COUPLING BETWEEN PUMP AND MOTOR SHOULD BE SUITABLE FOR LIFTING THE MOTOR WITH OR WITHOUT LIFTING COMPLETE ASSEMBLY WITH PUMP.

7.14 FOUNDATION

THE PUMP SHALL BE MOUNTED ON THE OIL TANK AND HUNG FROM BED PLATE AT THE TANK TOP INTO THE TANK. FOR FURTHER DETAILS REFER PAGE NO. 13 & 14. ALL THE SEATING MACHINED SURFACES OF BED PLATE TO BE MAINTAINED FOR 0.5 mm FLATNESS.

8.0 QUALITY ASSURANCE, INSPECTION AND TESTING

(a) THE MANUFACTURER SHALL CONDUCT ALL TESTS REQUIRED TO ENSURE ALL THE COMPONENTS/PART OF THE JACKING OIL PUMP OFFERED, CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND IN COMPLIANCE WITH REQUIREMENTS OF APPLICABLE CODES AND STANDARDS.

(b) THE BIDDER SHALL SUBMIT ALONG WITH HIS OFFER QUALITY PLAN.

8.0.1 THE TESTING MEDIUM SHALL BE TURBINE OIL (AS SPECIFIED IN POINT NO.4 AT PAGE NO.1).

8.1 THE PARTICULARS OF THE PROPOSED SHOP TESTS AND PROCEDURES FOR THE TESTS SHALL BE SUBMITTED TO BHEL / ITS CUSTOMER FOR APPROVAL ALONGWITH QUALITY PLAN.

8.2 THE MATERIAL SHALL BE DISPATCHED ONLY AFTER INSPECTION AND CLEARANCE OF MATERIAL BY BHEL OR ITS CUSTOMER AND APPROVAL OF TEST CERTIFICATE BY BHEL / ITS CUSTOMER.

8.3 THE MINIMUM TESTS/ CHECKS TO BE CARRIED OUT ON THE JACKING OIL PUMP AS ENVISAGED BY BHEL ARE GIVEN BELOW. THIS IS, HOWEVER, NOT INTENDED TO FORM A COMPREHENSIVE TESTING PROGRAMME AS IT IS SUPPLIERS RESPONSIBLITY TO PREPARE THE DETAILED QUALITY PLAN, WHICH SHOULD ALSO INCLUDE TESTS/CHECKS CARRIED OUT BY SUPPLIER AS A PART OF THEIR NORMAL PRACTICE. THIS QUALITY PLAN IS SUBJECT TO THE APPROVAL OF BHEL / ITS CUSTOMER AND BHEL / ITS CUSTOMER RESERVES THE RIGHT TO ASK FOR ANY MORE CHECKS AT THE TIME OF QUALITY PLAN FINALIZATION.

8.3.1 TESTING OF MATERIALS

THE MATERIAL OF EACH COMPONENT SHALL BE TESTED AS PER RELEVANT SPECIFICATION FOR ITS CHEMICAL COMPOSITION AND MECHNICAL PROPERTIES, VIZ. YS, UTS, IMPACT, % ELONGATION % RA ETC. NDT, UT ON SHAFT, MPI ON SCREW/VANES & CASING SHALL BE CARRIED OUT TO ENSURE FREEDOM FROM SURFACE AND SUB-SURFACE DEFECTS.

8.3.2 FOLLOWING TESTS SHALL BE CARRIED OUT DURING VARIOUS STAGES OF MANUFACTURE AT MANUFACTURER WORKS.

(a) CHECK FOR DIMENSIONS OF ALL COMPONENT PARTS INCLUDING SURFACE FINISH, AXIAL AND RADIAL RUN OUT OF SHAFT ETC.

(b) NON-DESTRUCTIVE EXAMINATION: UT FOR SCREW /VANES BLANKS AND DPT/MPI ON SCREWS/VANES TO BE CARRIED OUT TO ENSURE SURFACE/SUB-SURFACE DEFECTS.

(c) CHECK THE CONDITION OF THE OIL SEALS AND ANY SEEPAGE OF OIL THROUGH SEALS ETC.

(d) HYDRAULIC TESTING OF THE CASING AND OTHER PRESSURE PARTS SHALL BE AS PER VDMA 24284.

(e) PERFORMANCE TEST WITH CALIBRATED TEST BED MOTOR FOR VERIFICATION OF PUMP CHARACTERISTICS, VIZ. DISCHARGE AT THE GIVEN PRESSURE SCHEDULE OF POWER CONSUMPTION AS PER VDMA 24284, NOISE AND VIBRATION LEVEL AS PER VDI 2056.

(f) STRIP DOWN TEST TO CHECK THE CONDITION OF BEARING, MECHANICAL CLEARANCES, AND AXIAL PLAY OF SHAFT ETC.

8.3.3 AFTER TESTING THE PUMP, ALL THE SURFACES AND INTERNALS SHALL BE THOROUGHLY CLEANED, DRIED AND CONSERVED. ALL METALLIC SURFACES EXCEPT BRIGHT PARTS EXPOSED TO WEATHER SHALL BE GIVEN A SUITABLE PRIMING COAT AND THEN TWO COATS OF APPROVED PAINTS. ENSURE ASSEMBLY OF ALL THE COMPONENTS OF PUMP AS ONE UNIT AND PACK IN WATER AND DUST PROOF PACKAGE. THE PACKAGES SHOULD BE SUFFICIENTLY STRONG TO SAFEGAURD AGAINST ANY DAMAGE DURING TRANSIT AND IS SAFE FOR TWO YEARS IN A VERY DAMP ATMOSPHERE.

8.3.4 TEST CERTIFICATES INDICATING THE ACTUAL TEST RESULTS OF MATERIAL TESTING, NDT, HYDRAULIC TEST, PERFORMANCE TEST, STRIP DOWN EXAMINATION Etc. SHALL BE FURNISHED.

9.0 PRE-APPROVAL DOCUMENTS AT THE TIME OF OFFER

9.1 ASSEMBLY DRAWING WITH PART LISTS, NOZZLE SIZES AND THEIR COORDINATES, BASE PLATE DETAILS AND CROSS SECTION ARRANGEMENT ALONG WITH STATIC LOADING.

9.2 CALCULATIONS WITH NECESSARY DRAWINGS (TORQUE/SPEED CHARACTERISTICS Etc), POWER REQUIREMENTS, TORQUE SETTING VALUE FOR MOTOR TRIP, PERMISSIBLE TORQUE VALUE FOR KEY AND POWER SHAFT.

9.3 MAXIMUM MAGNETIC AND NON-MAGNETIC PARTICLE SIZE, WHICH CAN PASS THOROUGH PUMP SCREW/VANE LY CLEARANCE WITHOUT DAMAGING THE PUMP SHALL BE SPECIFIED IN THE OFFER.

9.4 QUALITY PLAN WITH DETAILS OF QUALITY LEVELS AND MANUFACTURING TOLERANCES. THIS SHOULD GENERALLY CONFORM TO VDMA 24284. GENERALLY ACCELTED PRACTICES, IN PARTICULAR VDMA CODES AND STANDARDS OR EQUIVALENT SHALL BE APPLIED AND TAKEN INTO ACCOUNT FOR DESIGN OF SCREW/VANE PUMPS. THE CODES OF STANDARDS APPLIED IN EACH CASE SHALL BE SPCIFIED IN THE OFFER.

9.5 FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE-I. EXAMINATION OF THE PRE-APPROVED DOCUMENTS BY BHEL SHALL NOT RELIEVE THE MANUFACTURER AND HIS SUBCONTRACTORS OF THEIR RESPONSIBLITIES. THE PRE-APPROVED DOCUMENTS SHALL FORM THE BASIS FOR THE ORDER. NO CHANGES SHALL BE MADE WITHOUT APPROVAL FROM BHEL.

10.0 DOCUMENTS TO BE SUPPLIED AFTER THE PLACEMENT OF ORDER:

THESE SHALL BE SUPPLIED IN SOFT COPY VIA MAIL OR BY CD AS PER FOLLOWING SCHEDULE:

10.1	CONTRACTUAL DRAWINGS	- 4 WEEKS
10.2	OVERHAUL AND SPARE PARTS LISTS	- 4 WEEKS
10.3	EQUIPMENT DESCRIPTION	- 4 WEEKS
10.4	TEST CERTIFICATE OF ALL TESTS AS PER QUALITY PLAN, DRAWINGS DURING VARIOUS STAGES OF MANUFACTURE. ALSO REFER CLAUSE 8.2 AND 8.3.4 ABOVE.	- BEFORE DESPATCH
10.5	LIST OF TOOLS AND TACKLES	- 4 WEEKS
10.6	THE STATIC AND DYNAMIC LOADING DETAILS ON SUPPORT/FOUNDATION SHOULD BE FURNISHED.	- 4 WEEKS

10.7 FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE I ON PAGE NO.8.

10.8 O & M MANUALS (10 HARD COPIES+2CD) - 8 WEEKS

11.0 NAME PLATE IDENTIFICATION MARKINGS SHOULD BE AS FOLLOWS:

11.1 TYPE / DESIGNATION

11.2 MANUFACTURER

11.3 MANUFACTURER'S WORKS NO.

11.4 YEAR OF MANUFACTURING

11.5 PURCHASER'S ORDER NO.

11.6 VOLUMETRIC FLOW (l/m)

11.7 DISCHARGE PRESSURE (Bar/MWC)

11.8 OPERATING TEMPERATURE (°C)

11.9 FLOW MEDIUM.

11.10 SPEED.

11.11 BILINGUAL IN HINDI AND ENGLISH LANGUAGES.

11.12 THE PUMP DATA SHEETS, GA DRAWING, CHARACTERISTIC CURVES, AND CROSS SECTIONAL DRAWING SHALL BE REQUIRED TO BE APPROVED BY BHEL/BHEL's CUSTOMER/ CUSTOMER'S CONSULTANT.

11.13 KKS IDENTIFICATION i.e. MAV32AP001.

12.0 CLEANING, PAINTING, CONSERVATION & PACKING:

THE SURFACE SHALL BE CLEANED & PREPARED FOR APPLICATION OF THE COATINGS BY BLASTING WITH NON-SILICATIC ABBRASIVE AGENTS. THE PROTECTIVE COATING SHOULD BE OIL RESISTANT TO PREVENT COTAMINATION OF OIL SPECIFIED TO PREVENT THE DETERIORATION OF THE COATING ITSELF. THE SUPPLIER SHALL GIVE EXACT AND PRECISE DETAILS ABOUT THE MEASURES ENVISAGED BY HIM FOR SURFACE PROTECTION, WHICH SHALL BE CHECKD AND APPROVED BY BHEL.

INSTRUCTIONS SHOULD BE ISSUED REGARDING RECONSERVATION, DECONSERVATION ALONGWITH SPECIFICATION OF MATERIAL TO BE USED FOR ABOVE PURPOSE. 100% QUANTITY OF COATING MATERIAL SHALL BE SUPPLIED ALONG WITH THE PUMP FOR RECONSERVATION AND DECONSERVATION AT SITE DURING STORAGE. ANY SPECIFIC INSTRUCTION TO BE FOLLOWED DURING STORAGE AT SITE TO AVOID ANY SEIZING ETC SHALL ALSO BE INTIMATED. ALL SUCH INSTRUCTIONS SHALL BE MADE AVAILABLE TO SITE INCHARGE IN A SEPARATE COVER (NOT PACKED WITH PUMP PACKAGE).
THE SUPPLIER SHALL BE RESPONSIBLE FOR ALL LOSS OR DAMAGE DURING TRANSPORTATION, HANDLING AND STORAGE DUE TO IMPROPER PACKING.

13.0 GENERAL

SUPPLIER TO CLEARLY MENTION THE DEVIATION TAKEN AGAINST SPECIFICATION IN THEIR OFFER. SUPPLIER SHALL ALSO FILL IN THE BLANK DATA SHEET AS PER ANNEXURE-II AND SUBMIT THE SAME ALONGWITH THE OFFER. THE OFFER MAY NOT BE CONSIDERED IF ALL THE TECHNICAL PARTICULARS AND INFORMATIONS CALLED FOR IN THE SPECIFICATION ARE NOT SUBMITTED ALONG WITH THE OFFER.

13.1 SUPPLIER TO PERFORM TWO VISIT AT SITE

SUPERVISION OF VENDER REQUIRED DURING ERECTION AND COMMISSIONING AT SITE.

13.1.1 FIRST VISIT TO CHECK AND REPLACE MOTOR'S BEARINGS, IF REQUIRED PUMP'S SUCTION AND DISCHARGE O-RINGS AND TO CHECK THE CONDITION OF THE PUMP SET BEFORE INSTALLATION OF PUMP/MOT OIL FILLING.

13.1.2 SECOND VISIT TO SUPERVISE THE COMMISSIONING OF PUMP SET ALONG WITH FTR.

14.0 GUARANTEE

14.0.1 THE SUPPLIER SHALL GUARANTEE TROUBLE FREE AND SATISFACTORY OPERATION OF THE EQUIPMENT FOR A PERIOD OF 12 MONTHS AFTER THE INSTALLATION AND COMMISSIONING OR FOR A PERIOD OF 18 MONTHS FROM THE DAY THE EQUIPMENT LEAVES THE SUPPLIER'S WORKS WHICHEVER IS EARLIER.

14.0.2 THE SUPPLIER SHALL GUARANTEE THE CAPACITY, HEAD AND EFFICIENCY OF THE PUMP AS PER THE TESTED CHARACTERISTIC WITH OIL.

14.0.3 IF DURING ERECTION AT SITE ANY DEFICIENCY IN A PART IS DETECTED. BHEL SITE REPRESENTATIVE SHALL PREPARE THE ASSESSMENT REPORT AND A COPY OF THE SAME SHALL BE FORWARDED TO THE SUPPLIER. THE SUPPLIER SHALL REPLACE/ RECTIFY THE CONCERNED ITEMS FREE OF CHARGE. THE SUPPLIER IF HE SO DESIRE MAY DEPUTE HIS REPRESENTATIVE TO SITE OTHERWISE THE FINDING OF BHEL REPRESENTATIVE SHALL BE FINAL AND BINDING ON THE SUPPLIER OF PUMPING SET.

14.0.4 THE SUPPLIER SHALL REPAIR / REPLACE THE DEFECTIVE PARTS AT HIS OWN COST DURING THE GUARANTEE PERIOD.

15.0 SPARES

THE SUPPLIER SHALL QUOTE ITEM WISE PRICE OF RECOMMENDED SPARES FOR 3 EARS AND 5 YEARS OPERATION RESPECTIVELY.

ANNEXURE – I
SPECIFICATION OF D.C. MOTOR FOR JACKING OIL PUMP

M1.0 A SUITABLE MOTOR CONFORMING TO THE JACKING OIL PUMP REQUIREMENT SHALL BE SUPPLIED. THE MOTOR SHALL CONFORM TO IS: 4722, IS: 2253, IS: 2254, IS:3202, EQUIVALENT. BS SPECIFICATION. THE MOTOR SHALL MEET ALL INDIAN STATUTORY REQUIREMENTS.

M2.0 APPLICATION

TO DRIVE OIL PUMP FOR SUPPLYING OIL FOR LIFTING THE SHAFT IN THE BEARINGS.

M2.0 TYPE OF MOTOR: SEPARATELY EXCITED OR COMPOUND MOTOR WITH 10% COMPOUNDING.

M3.1 KW RATING: IT SHALL HAVE AT LEAST 15% RESERVE CAPACITY THAN REQUIRED TO DRIVE THE PUMP WHEN IT IS DISCHARGING MAXIMUM QUANTITY.

M3.2	KW ACTUALLY REQUIRED BY DRIVE EQUIPMENT UNDER SPECIFIED OPERATING AND START UP CONDITIONS.	: PUMP CAPACITY
M3.3	RATED VOLTAGE	: 220 V D.C. : 220 V D.C. FIELD
M3.4	PERMISSIBLE VOLTAGE VARIATIONS UNDER NORMAL RUNNING CONDITIONS.	: -15% +10%
M3.5	MINIMUM VOLTAGE REQUIRED UNDER STARTING CONDITIONS TO BRING DRIVEN EQUIPMENT UPTO RATED SPEED.	: 80% RATED
M3.6	TYPE OF DUTY	: CONTINUOUS
M3.7	FULL LOAD SPEED	: IT SHALL BE COMMENSURAT WITH PUMP SPEED AS PER DESIGN.
M3.8	FULL LOAD CURRENT	: AS PER DESIGN
M3.9	STARTING CURRENT	: 2 TIMES CURRENT AT RATED VOLTS.
M3.10	STARTING TORQUE	: 2 TIMES TORQUE AT RATED VOLTS.
M3.11	EFFICIENCY AT FULL LOAD	: 85% (minimum)

M4.0 STARTING DATA

M4.1 STARTING: SUITABLE FOR 3 STEPS STARTING. STARTING RESISTANCES OF PUNCHED STEEL SHALL BE ENCLOSED IN A SUITABLE HOUSING DESIGNED FOR NATURAL VENTILATION. CABLE ENTRY SHALL BE PROVIDED AT THE BOTOM. ARRANGEMENT SHALL BE PROVIDED TO MOUNT THE HOUSING ON RACKS. G.A. DRAWING OF THE HOUSING, VALUES OF STARTING RESISTANCES AND REQUIRED TIME INTERVAL AT THE STEPS SHALL BE PROVIDED IN THE OFFER. STARTING RESISTANCE HOUSING SHALL HAVE IP21 (MIN.) DEGREE OF PROTECTION.

M4.2	PERMISSIBLE STARTING DUTY CYCLE/ NO. OF STARTS.	: 3 STARTS SPREAD OVER AN HOUR TWO CONSECUTIVE STARTS.
M4.3	STARTING RESISTANCE BOX/PANEL SHALL BE IN VENDOR'S SCOPE OF SUPPLY AND SHALL BE SOURCED FROM THE MOTOR SUPPLIER.	
M4.4	OVERLOAD (% OF FULL LOAD) THAT CAN BE CARRIED BY MOTOR IMPAIRING, OVERALL PERFORMANCE AND PERIOD FOR WHICH THIS OVERLOAD IS APPLICABLE.	: 25% FOR 5 MINUTES.
M4.5	LOCATION	: TURBINE HALL-INDOOR
M4.6	CLASS OF INSULATION	: CLASS F, FUNGUS RESISTANT, TROPICALISED AS PER IS:3202, WITH TEMPERATURE RISE LIMITED TO THAT OF CLASS B.
M4.7	WINDING TEMP. DETECTORS	: TO BE PROVIDED.

M4.8 MECHANICAL CONSTRUCTION:-

M4.8.1	SHAFT DISPOSITION/MOUNTING	: VERTICAL/FLANGE MOUNTED
M4.8.2	METHOD OF CONNECTION TO DRIVEN EQUIPMENT.	: FLANGE FLEXIBLE COUPLING.
M4.8.3	DIRECTION OF ROTATION AND CORRESPONDING TERMINAL DESIGNATION.	:TO SUIT PUMP
M4.8.4	ENCLOSURE AND VENTILATION	: TOTALLY ENCLOSED FAN COOLED IP-55.
M4.8.5	BEARING	: THRUST BEARING, MINIMUM STANDARD LIFE NOT LESS THAN 30000 WORKING HOURS.
M4.8.6	GROUNDING DEVICE	: SUITABLE ARRANGEMENT SHALL BE PROVIDED FOR EARTHING THE MOTOR AT TWO SEPARATE AND DISTINCT CONNECTION POINTS. DESIGN OF EARTHING CONDUCTOR SHALL BE AS PER IS: 4722.
M4.8.7	TERMINAL CONNECTORS	: 2 FOR ARMATURE, 2 FOR FIELD.
M4.9	TERMINAL BOX	: TERMINAL BOX SHALL BE PROVIDED WITH DOUBLE COMPRESSION TYPE BRASS CABLE GLANDS (Nickel Chromium PLATED HEAVY DUTY, CONFIRMING TO BS:6121) AND COPPER CABLE LUGS TO MATCH OWNER'S ALUMINUM CABLES, THE SIZE OF WITCH SHALL BE INTIMATED LATER. TERMINAL BOX SHALL BE CAPABLE OF BEING ROTATED THROUGH 180° IN STEPS OF 90°. IT SHALL HAVE A DEGREE OF PROTECTION OF IP-55. IT SHALL ALSO BE SUITABLE TO WITHSTAND THE FAULT LEVEL OF 50 KA FOR 0.25 SECONDS.
M4.10	SPACE HEATERS	: TO BE PROVIDED AS PER DESIGN
M4.11	VOLTAGE	: 240 VOLTS A.C.

M5.0 SPECIAL REQUIREMENTS:

M5.1 SEPARATE TERMINAL BOX FOR WINDING (ARMATURE AND FIELD) AND SPACE HEATERS SHALL BE PROVIDED. THE MOTOR WOULD OPERATE IN AN ENVIRONMENT OF OIL FUMES.

M5.2 THE MOTOR SHALL BE RE-WOUNDABLE.

M5.3 THE MOTOR SHALL HAVE ON LINE GREASING FACILITY.

M5.4 THE MOTOR CONSTRUCTION SHALL BE SUITABLE FOR EASY DISASSEMBLY AND REASSEMBLY.

M5.5 MOTOR SHALL BE PAINTED WITH PAINT SUITABLE FOR WORKING CONDITION AND ITS COLOUR SHALL BE INTIMATED LATER ON.

M5.6 THE MOTOR SHALL BE THOROUGHLY DEGREASED AND SHARP EDGES AND SCALES REMOVED AND TREATED WITH ONE COAT OF PRIMER AND TWO COATS OF ENAMEL PAINT. FAN SHALL ALSO BE PAINTED TO WITHSTAND CORROSION.

M5.7 MOTOR BEARINGS (DE & NDE) SHALL BE SEALED TYPE TO AVOID FREQUENT RE-GREASING.

M5.8 LIMITS OF MECHANICAL VIBRATIONS SEVERITY SHALL BE LIMITED TO VIBRATION GRADE "R" (REDUCED) AS PER IS: 12075.

M6.0 TESTS AT MANUFACTURER'S WORKS:-

(i) MOTOR AFTER COMPLETE ASSEMBLY SHALL BE SUBJECTED TO BOTH TYPE AND ROUTINE TESTS AS PER IS: 4722. TYPE TEST SHOULD NOT BE MORE THAN 5 YEARS OLD w.r.t. DATE OF ORDERING.

(ii) IN ADDITION THE FOLLOWING TESTS SHALL ALSO BE CARRIED OUT.

(a) DEGREE OF PROTECTION TEST TO CONFORM TO THE SPECIFIED DEGREE OF PROTECTION (TYPE TEST).

(b) 20% OVERSPEED TEST FOR 2 MINUTES (ROUTINE TEST).

(c) MEASUREMENT OF VIBRATION (ROUTINE TEST) AS PER IS: 12075.

(d) MEASUREMENT OF NOISE AS PER IS: 12065. MOTOR NOISE LEVEL SHALL BE LIMITED SO AS TO ACHIEVE PUMP-MOTOR SET NOISE LEVEL AS GIVEN IN CLAUSE 7.4 ON PAGE-3.

M7.0 DATASHEET WITH FOLLOWING POINTS TO BE FURNISHED BY BIDDER ALONG WITH OFFER:-

THESE SHALL BE SUPPLIED IN TWO COPIES EACH.

M7.1 TYPE AND FRAME SIZE.

M7.2 STARTING TIME IN SECONDS:

M7.2.1 WITH 100% VOLTAGE AT TERMINALS.

M7.2.2 WITH 85% VOLTAGE AT TERMINALS.

M7.2.3 WITH 80% VOLTAGE AT TERMINALS.

M7.3 SAFE STALL TIME AT 100% RATED VOLTAGE UNDER HOT CONDITION.

M7.4 MOTOR GD VALUE.

M7.5 WEIGHT OF MOTOR / ROTOR

M7.6 EXPECTED LIFE OF BEARING.

M7.7 TYPE AND SIZE OF CABLE FOR WHICH GLAND IS PROVIDED IN THE TERMINAL BOX.

M7.8 MOTOR KW RATING CALCULATION. W.R.T PUMP REQUIREMENT.

M7.9 VALUE OF STARTING RESISTANCE / RESISTANCES.

M7.10 DATA IN RESPECT OF ALL ITEMS MENTIONED AT PARA M1.0 TO M5.0 OF ANNEXURE-I.

M8.0 DOCUMENTS TO BE FURNISHED WITHIN FOUR WEEKS OF PLACEMENT OF ORDER.

M8.1 SIX HARD COPIES AND ONE SOFT COPY (IN PDF FORMAT) OF MOTOR DATA SHEET AND G.A. DRAWING.

M8.2 DRAWING SHOWING TERMINAL DETAIL OF ALL TERMINALS AND LOCATION AND DIMENSION OF TERMINAL BOXES.
M8.3 ROTOR WEIGHT AND TOTAL MOTOR WEIGHT.
M8.4 CHARACTERISTIC CURVES OF THE MOTOR.
M9.0 SIX COPIES OF TESTS CARRIED OUT AS PER CLAUSE NO. 6.0 ON EACH MOTOR SHALL BE FURNISHED TO BHEL FOR SCRUTINY AND APPROVAL. ONLY ON ACCEPTANCE FROM BHEL SIDE, MOTOR CAN BE CONSIDERED SUITABLE FOR DISPATCH.

ANNEXURE-II

DATA TO BE FURNISHED BY BIDDER ALONG WITH OFFER FOR JACKING OIL PUMP

A1.0 EQUIPMENT AND SERVICES OFFERED

PLEASE STATE WHETHER THE FOLLOWING EQUIPMENT SERVICE AS SPECIFIED IN THE DATA SHEETS ARE OFFERED OR NOT.

A1.1	PUMP AS PER SPECIFICATION	YES/NO
A1.2	MOTOR/MAKE	YES/NO
A1.3	NECESSARY INSTRUMENTS, TEST CONNECTIONS.	YES/NO
A1.4	BASE PLATE AS PER DRAWING.	YES/NO
A1.5	COMPANION FLANGES	YES/NO
A1.6	SPARE PARTS	YES/NO
A1.7	MAINTENANCE AND SPECIAL ERECTION TOOLS.	YES/NO
A1.8	COMMISSIONING OF THE SET.	YES/NO
A1.9	NO. OF PUMPS OFFERED.	

A2.0 DESIGN AND PERFORMANCE.

A2.1	DESIGNED CAPACITY OF EACH PUMP.	M^3 /hour
A2.2	NORMAL DISCHARGE PRESSURE	
A2.3	EFFICIENCY	
A2.4	RATED SPEED	
A2.5	PERFORMANCE GUARANTEED WHEN INSTALLED AS PER GIVEN ARRANGEMENT.	YES/NO
A2.6	PUMP b.h.p./Kw AT RATED CAPACITY	
A2.7	MAXIMUM ALLOWABLE SUCTION LIFT (FOR MINIMUM NPSH REQUIRED)	
A2.8	MAXIMUM DISCHARGE PRESSURE FOR WHICH PUMP IS SUITABLE	

A2.9 PARTY SHALL INFORM THE FILTERATION LEVEL OF THE FLOW MEDIA FOR PROPER FUNCTIONING OF PUMP.

A3.0 MATERIAL OF CONSTRUCTION

A3.1 CASING
A3.2 DRIVING AND DRIVEN SPINDLE SCREW
A3.3 BASE PLATE
A3.4 WEARING RINGS

A3.5 TYPE OF BEARINGS USED
A3.6 TYPE OF COUPLING
A3.7 PACKING

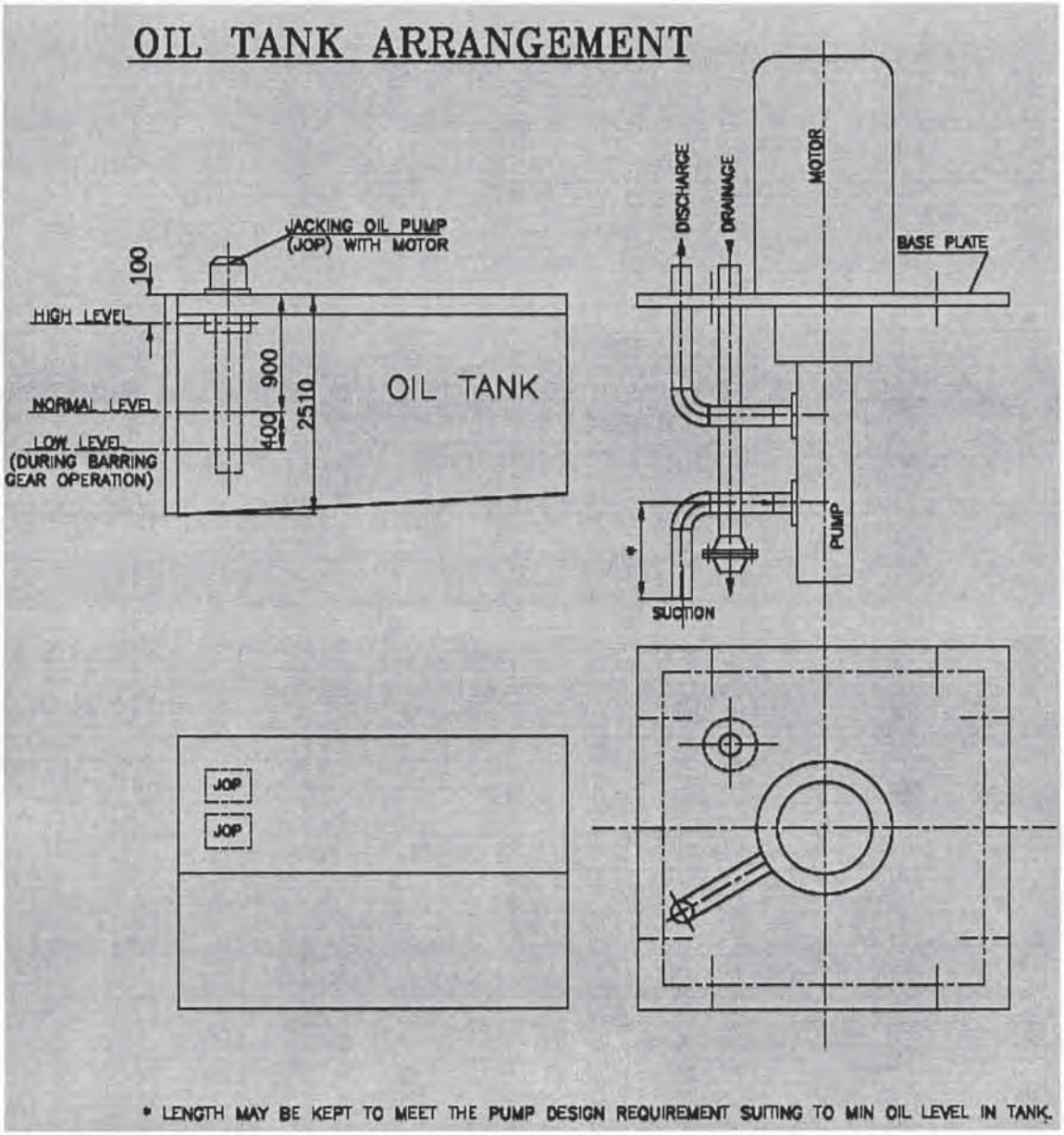
A4.0 CONNECTIONS
A4.1 SUCTION SIZE
A4.2 DISCHARGE SIZE

A5.0 DRAWINGS
A5.1 GENERAL ARRANGEMENT AND SECTIONAL DRAWING ENCLOSED WITH OFFER. YES/NO

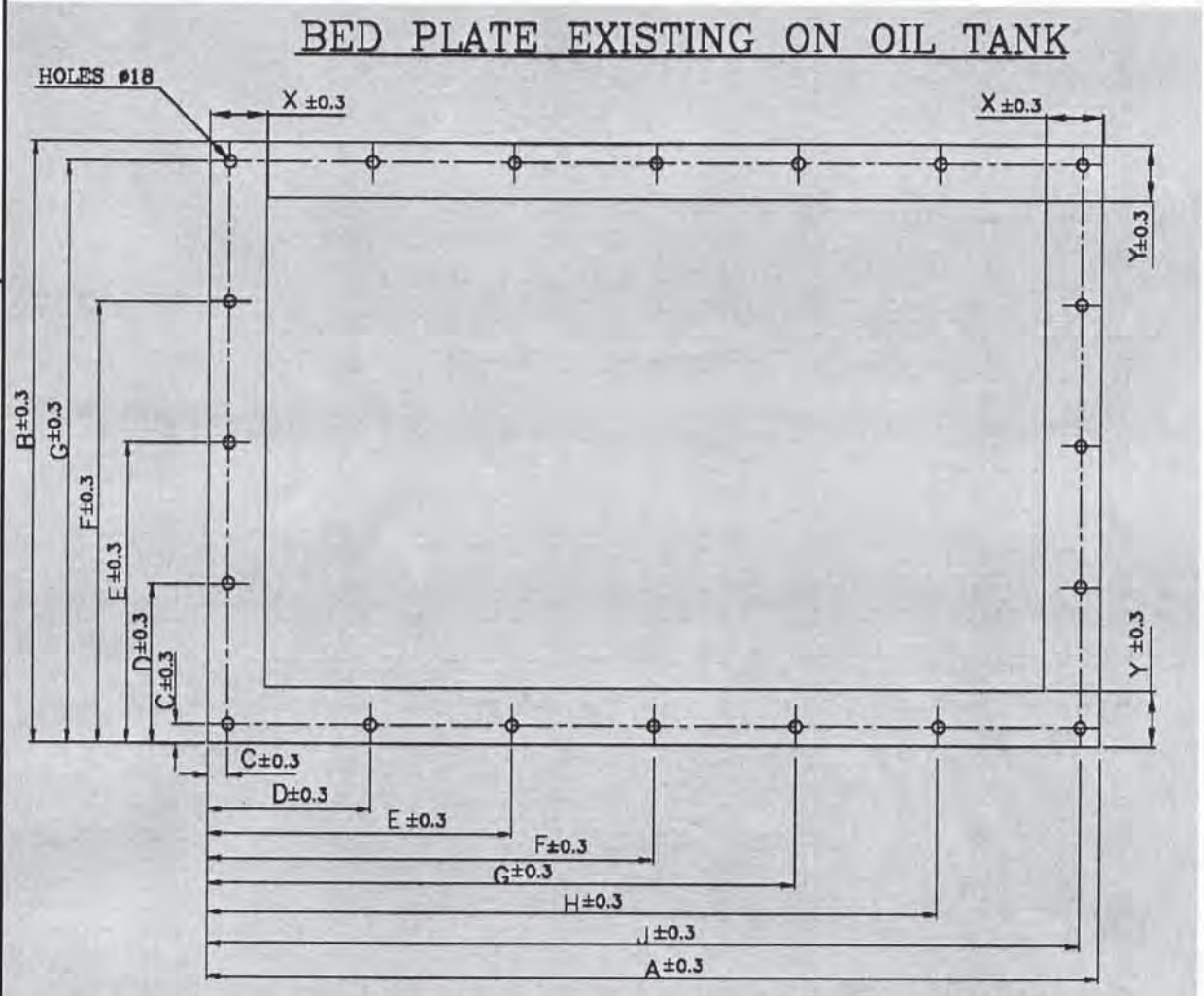
A6.0 WEIGHT SCHEDULE
A6.1 WEIGHT OF PUMP
A6.2 WEIGHT OF MOTOR

A7.0 CHARACTERISTIC CURVES
A7.1 POWER CONSUMPTION / DISCHARGE PRESSURE
A7.2 DISCHARGE QUANTITY / DISCHARGE PRESSURE
A7.3 DISCHARGE QUANTITY / EFFICIENCY
A8.0 ANY DEVIATION TAKEN AGAINST SPECIFICATION. YES/NO
A9.0 DEVIATIONS TAKEN AS MENTIONED HERE
A10.0 HYDRAULIC TEST PRESSURE

CROSS REFERRED STANDARDS: IS:5 , IS:2253 , IS:2254 , IS:3202 , IS: 4722, IS: 12075, VDMA: 24284.



BED PLATE EXISTING ON OIL TANK



BED PLATE TYPE	A±0.3	B±0.3	C±0.3	D±0.3	E±0.3	F±0.3	G±0.3	H±0.3	J±0.3	X±0.3	Y±0.3	NO. OFF HOLES
AA	700	700	50	250	450	650	-	-	-	80	80	12
BB	700	700	35	245	455	665	-	-	-	60	60	12
CC	1320	900	30	240	450	660	870	1080	1290	85	85	20

Note:- Bed Plate type "AA" to be supplied unless otherwise specified in tender.