

TENDER DOCUMENT

FOR


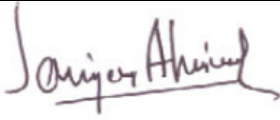
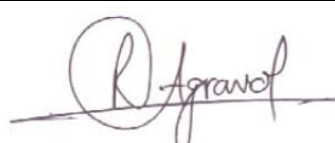
**3rd MUD PUMP VFD DRIVES AND AMPHION
CONTROL SYSTEM**

FOR

EV2000-1 RIG ONGC RAJAMUNDHARY



SPECIFICATION NO:	OR12587
REVISION NO:	00
DATE:	29.8.2016

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ISSUED BY:

**CONTROL EQUIPMENT ENGINEING DIVISION
BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL-462022 (INDIA)**

SECTION – I

(GENERAL CONDITIONS)

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GENERAL CONDITIONS

01. GENERAL:

This section covers the general terms and conditions applicable for procurement & installation, integration and commissioning of 3rd Mud pump VFD drives and Amphion Control system in EV2000-1 rig of ONGC Rajamundhary (NOV Job No. 8487) meeting technical requirements as per section-II of this tender document.

02. SCOPE OF SUPPLY & SERVICES :

As per technical details in Section-II of this specifications and quantity mentioned in tender enquiry.

03. DELIVERY:

Supplier to submit delivery schedule with the offer.

04. OFFERS & PRICES:

Offer should be given in two-bid system as per BHEL standard purchase procedures. **(Refer Document No-BP4255 for detailed General Terms & Conditions).**

- 1) Part-A: Technical & Commercial bid
- 2) Part-B: Price bid

Prices to be quoted on CIF basis upto Mumbai port (India) and break-up to be given for Ex-works, FOB and CIF charges for material portion.

05. INSTALLATION, INTEGRATION & COMMISSIONING AT ONGC SITE

Supplier to quote on lump sum basis for services for modification and commissioning of existing Main AC VFD house & Remote I/O Box in MCC House along with integration and commissioning of newly supplied 3rd Mud pump VFD drives and Amphion Controls in EV2000-1 rig at ONGC Rajamundhary Site (A.P. India). All charges towards journey from supplier place to ONGC base office, lodging and boarding, local journeys from nearest city/town to site etc shall be in supplier scope for the scope of work as per this specifications including any visits required during warranty period.

06. PAYMENT & OTHER GENERAL TERMS & CONDITIONS

Refer Document No-BP4255 for payment & other BHEL commercial terms & conditions.

i. **Job completion period** :

Integration and commissioning of AC VFD drives and controls system as per this specification is to be completed within 4 weeks from date of intimation by BHEL.

ii. **Payment terms** :

a. **Material** : 90% payment for material supply part shall be released against satisfactory inspection at vendors works, subject to proof of dispatch (Bill of Lading, BOL) within 90 days of date of dispatch (BOL).

b. **Integration and commissioning** :

100% payment towards Installation, commissioning & testing alongwith 10% balance payment towards supplies shall be released after acceptance by ONGC.

iii. Duly sealed and signed copy of BHEL standard terms and conditions BP 4255 to be submitted with offer.

iv. Following documents shall be required for payment processing (Refer Clause 11 (B) of BHEL standard terms BP 4255:

- Certificate of country of origin.
- Test certificate
- Guarantee certificate
- Packing list
- Invoice (in original)
- Bill of lading
- Bank account details including SWIFT code

v. Permanent Establishment Business Connection (*PEBC*) declaration. Format for this declaration is attached herewith in the form of two annexures. One of the two annexure shall be applicable. Duly sealed and signed copy of the applicable annexure for the relevant period will have to be provided. This is as per the guidelines issued by Government of India in order to determine income tax liability. This is a **mandatory** requirement.

07. WARRANTY

The items supplied shall be guaranteed for a period of twelve (12) months from date of commissioning of goods or twenty four (24) months from date of dispatch by supplier, whichever is earlier.

08. PACKING

Material should be packed suitably in all for normal transport by Sea to India and subsequently by Rail/Road to the destination point in India. It should be suitably protected against the effects of tropical salt laden climate. Timber in packing should be free from bark, insects and fungi. Special packing should be provided wherever required in addition to above. Damage to the consignment on account of poor/inferior packing shall be to the account of supplier of their representative.

INSTRUCTION FOR PACKING :

- (i) A broad red band about 100 mm (4") wide all round and case just below top for easy identification of BHEL package at the docks, should be painted.
- (ii) All marking for safety, handling, storage and protection etc. are to be clearly marked on the cases as per international practice.
- (iii) A special care should be taken in packing of hazardous material with all precautions for safety.
- (iv) Proper care should be taken to ensure correct case marking and packing should be in accordance with the details in Advice Note/Packing list. Any delay in clearance because of wrong case marking will be to the account of supplier or their representative. Similarly, for any reason whatsoever discrepancies are noticed prejudicing our claim with underwriters/carriers with consequential loss will also be to the account of supplier or their representative.

09. LIST OF DOCUMENTS TO BE SUBMITTED WITH OFFER / BID

Following document shall be submitted by the supplier alongwith their offer.:

- i) Technical offer in line with Section - II of Tender Document .
- ii) Commercial offer with terms & conditions in line with tender document and document no-BP4255 (With details filled up)
- iii) Un-Priced bid Techno-Commercial Offer.
- iv) Sealed Priced bid (in a Separate Envelope)
- v) Outline drawings for 3rd Mud Pump House.
- vi) Single line diagram.
- vii) List of items under supplier scope of supply.
- viii) HVAC Calculations for 3rd Mud Pump House

10. SPECIAL CONDITION OF PURCHASE

This item is exempted from Customs Duty in case of import to India as per NIL duty licence applicable for this specific project for ONGC EV 2000-1 rig project. This is for the information of supplier.

SECTION – II

(TECHNICAL SPECIFICATION & REQUIREMENTS)

SECTION - II

TECHNICAL SPECIFICATIONS & REQUIREMENTS FOR INCLUSION OF 3RD MUD PUMP ELECTRICS IN EV2000-1 RIG

1. INTRODUCTION :

BHEL has supplied to ONGC six Nos 2000HP AC VFD rigs in association with NOV USA against MOU and rate contract for rig equipment package. ONGC has deployed ACVFD rigs in various ONGC assets having 2 Nos AC motor driven mud pumps of 1700HP capacity. In order to go for higher drilling depths provision of standby 3rd Mud pump pump is planned by ONGC Rajamundhary EV 2000-1 rig having NOV supplied equipment as per NOV Job No 8487.

2. SCOPE OF SUPPLY :

2.1. 3rd Mud pump VFD house (New)

Supplier to provide the following equipment inside 3rd MP VFD house :

Item	QTY	Description
1	1	RECTIFIER CABINET
2	2	900KW INVERTER CABINETS FOR THE MP3A & MP3B
3	1	TRANSFORMER SECTION
4	1	600V FEEDER SECTION
5	1	415V MCC SECTION
6	1	POWER CONTROL HOUSE WITH HVAC
7	1	SET OF PLUG PANEL

2.1.1 RECTIFIER CUBICLE :

Supplier to provide one (1) rectifier cubicle in 3rd MP VFD House containing the following items :

Item	Qty.	Description
1	1	WITHDRAW ABLE 3200AF, 85KA CIRCUIT BREAKER WITH PEAK INTERRUPT RATING (LU) OF 220KA
2	1	FIXED MOUNT 3150A 2 POLE MANUAL DISCONNECT SWITCH
3	1	AC INPUT LINE REACTOR-2500A
4	1	DIGITAL MULTIFUNCTION PANEL METER
5	1	PANEL DC VOLTMETER
6	1	3200ADC, 6 PULSE AIR-COOLED DIODE BRIDGE
7	6	HIGH SPEED SEMICONDUCTOR FUSES WITH INDICATOR SWITCHES
8	3	HEAT SINK MOUNTED TEMPERATURE RTDS
9	3	HEAT SINK MOUNTED TEMPERATURE SWITCHES
10	1	8 CHANNEL DIGITAL INPUT MODULE FOR PLC INTERFACE

11	3	RTD I/O MODULE FOR INTERFACE
12	1	PROFIBUS COMMUNICATION MODULE
13	1	200W CABINET HEATER WITH THERMOSTAT
14	1	CABINET LIGHT
15	1	POWER OUTLET RECEPTACLE
16	1	24V DC 5A POWER SUPPLY
17	3	CURRENT TRANSFORMERS
18	1	EMERGENCY STOP CIRCUIT
19	6	OPERATION AND MAINTENANCE MANUAL INCLUDING SPARE PARTS LIST
20	6	COMPLETE SET OF ELECTRICAL AND MECHANICAL DRAWINGS

2.1.2 MUD PUMP INVERTER CUBCLES FOR MP3A & MP3B :

Supplier to provide two (2) air-cooled inverter cubicles in 3rd Mud pump VFD house for MP3A & MP3B AC motors each containing following items :

Item	QTY	Description
1	2	450KW 690V 486A ABB ACS800 INVERTERS
2	1	1600A MANUAL DISCONNECT SWITCH RATED AT 50KA WITH STAND FOR 3 CYCLES
3	4	1000A SEMICONDUCTOR FUSES WITH INDICATOR SWITCHES
4	4	COMMON MODE DC LINK FILTERS
5	1	RDCU INVERTER CONTROL MODULE
6	1	RTAC ENCODER FEEDBACK CARD
7	1	RPBA PROFIBUS COMMUNICATION MODULE
8	1	4 CHANNEL APBU FIBER OPTIC BRANCHING UNIT
9	1	DRIVE CONTROL PUSH BUTTON LCD OPERATOR PANEL
10	1	NOV STANDARD INVERTER FIRMWARE PACKAGE
11	1	AUTOMATIC PRECHARGE KIT
12	1	DISCONNECT SWITCH LOCKOUT AND CONTROL KIT
13	1	EMERGENCY STOP SAFETY RELAY
14	1	200W CABINET HEATER WITH THERMOSTAT
15	1	CABINET LIGHT
16	1	MOTOR HEATER CONTROL CIRCUIT
17	1	24 VDC 2A POWER SUPPLY
18	1	DIRECT TORQUE CONTROL WITH PROFIBUS COMMUNICATION CARD. THE CONTROL MODULE WILL CONTROL AND DISPLAY THE FOLLOWING PARAMETERS : DC BUS VOLTS INVERTER OUTPUT CURRENT MOTOR SPEED

		<p>MOTOR TORQUE MOTOR POWER INVERTER TEMPERATURE MOTOR VOLTAGE</p> <p>ALSO INCLUDED ARE THE FOLLOWING PRE- PROGRAMMED FAULTS:</p> <p>OVERCURRENT DC OVERVOLTAGE DC UNDER VOLTAGE DRIVE TEMPERATURE SHORT CIRCUIT (MOTOR PROTECTION) AMBIENT TEMPERATURE OVER FREQUENCY INTERNAL FAULT EARTH FAULT COMMUNICATION FAULT</p> <p>INPUT/ OUTPUT 3 PROGRAMMABLE ANALOG OUTPUTS 2 PROGRAMMABLE ANALOG INPUTS 6 PROGRAMMABLE DIGITAL INPUTS 3 PROGRAMMABLE RELAY OUTPUTS</p>
19	1	INVERTER EXTRACTION RAMP
20	2	MOTOR TERMINAL PLUG KITS
21	1	DC BUS INDICATOR LAMP
22	1	DC INVERTER FUSE INDICATOR LAMP
23	1	PROFIBUS COMMUNICATION CARD FOR PLC INTERFACE
24	1	8 CHANNEL DIGITAL INPUT MODULE FOR PLC INTERFACE
25	6	OPERATION AND MAINTENANCE MANUAL INCLUDING SPARE PARTS LIST
26	6	COMPLETE SET OF ELECTRICAL AND MECHANICAL DRAWINGS

2.1.3 TRANSFORMER SECTION

Supplier to provide following in 3rd MP VFD house :

Item	QTY	Description
1	1	600V:415 V/230V:132V DUAL SECONDARY TRANSFORMER. (Supplier to decide rating and indicate in bid)

2.1.4 600V FEEDER SECTION

Supplier to provide a feeder section in 3rd MP VFD house containing the following items :

Item	QTY	Description
1	1	2000A, 75KAIC, 600VAC 3P,50HZ, WITHDRAWABLE, ABB INCOMER BREAKER TO RECEIVE POWER FROM MAIN VFD HOUSE.
2	1	250AF 3P 600VAC BREAKER IN ONE OF THE 600V FEEDER CUBICLE.

2.1.5 MOTOR CONTROL CENTER – 415 V

Supplier to provide one (1) vertical section of 415 VAC MCC to power the HVAC and feed the Local 415VAC / 230VAC loads and 415V bus in the main house. The horizontal bus will be copper and suitably rated. The vertical bus will be copper and suitably rated. A copper ground bus will run the full length of the MCC line up.

2.1.6 POWER CONTROL HOUSE

Supplier to provide a Power Control House for AC-VFD Lineup cubicles designed for transportation by an oilfield trailer as well as for bottom lifting. The house size will be maximum 10' W X 22' L X 10' 6" H excluding projections due to door handles, lifting lugs and rain water canopies etc (Supplier to submit the GA drg with offer).

The house columns and ceiling frame will be constructed from structural steel seam welded. The outside shall be fabricated from 12 gauge sheet steel. All corners are to be formed by bending leaving no sheet edge exposed. Lighting pole brackets shall be provided at the corner of the house.

Three of the walls will be insulated with three- inch thick polystyrene block insulation. The floor and the wall with the receptacles and plugs will be un-insulated. The inside surface of the walls will be finished with a sandwich style insulating board 3/8" thick with white pebble coating on the interior side and aluminum foil on the exterior side. A rubber neoprene mat will run the full length of the interior aisle of the house.

One (1) steel door with panic hardware will be supplied at one end of the house. The door shall be designed to open to the outside by pushing down on the opening bar.

One (1) lighting panel 230V/132V 3 phase 4 wire will be mounted on an interior wall for lighting and other required needs. Two (2) fluorescent lighting fixtures will be supplied for aisle lighting. Two (2) 230 volt duplex receptacles will be included, one at each end of the house. Emergency lighting fixture with EXIT sign shall be also provided in the house.

The skid mounted two (2) HVAC units properly rated will be provided for the house (One running and one standby). The hot air generated by the drives will be discharged out the top of the cubicles and contained within the dead air space between the ceiling and the roof. This air will then be ducted to the return airside of the evaporator sections of the units. Supplier to submit HVAC Calculations with the offer.

The incoming power connections will be located in a recessed box located on one side of the house. The receptacles for the outgoing power and rig AC loads are to be installed in panels which slant downward to relieve stress on the outgoing cables, except for the receptacles located at the very bottom of the plug panel, which will not be slanted downward because of the physical limitations of their location. The matching plugs for the receptacles will be supplied with the house.

The exterior of the house will be cleaned with a sweep blast of sand to remove scale and oxidation. The exterior coating will consist of a sub-coat of primer and a topcoat of urethane linear white. The interior floor will be painted ANSI gray enamel.

Supplier to provide four runner skid for the house.

2.2 UPGRADES TO MAIN POWER HOUSE

2.2.1 Supplier to provide the following materials (broad scope) to retrofit into the existing main VFD Power House. The new plugs are to be installed in the existing plug panel.

1. One 2000AF, 75KAAIC. 600v AC, 50Hz, draw-out, ABB circuit breakers with shunt trip and necessary auxiliary contacts to feed the 3rd MP House
2. One set of suitably rated plugs & sockets for 2000A feeder.
3. One lot of suitably rated cable to run within the existing main VFD house from the 2000A circuit breakers to the plug panel and one lot of suitably rated cable to run within the existing main VFD house from the plug panel to 415V MCC in main VFD house.
4. One lot of suitably rated plugs to receive 415V power from 3rd MP VFD house/MCC house.
5. Any other item(s) required for completion of supplier designed system should be taken care by supplier in the scope of supply.

2.2.2 3rd MP Control System Upgrade

Supplier to provide following:

1. One mud pump remote I/O J-box for installation on 3rd Mud Pump (Mud pump is not in scope of supply of supplier).
2. Remote I/O modules as required to integrate the auxiliary motors for the third mud pump into Amphion system in the remote I/O box in MCC house.
3. One OLM to be installed in the Main Power House to allow a Profibus connection to the new 3rd MP VFD house. One fiber cable to run inside the main VFD house to the plug panel.
4. One No. 150 feet long fiber cable with suitable mating connectors to run from the VFD House to the third mud pump remote I/O.
5. Three Nos each 100 feet long fiber cables with suitable mating connectors to run from the Main Power House to the Third Mud Pump House for network connections.
6. One network enclosure to be installed in the 3rd mud pump house for integration with Amphion network.
7. Modification and up-gradation of Amphion software to include a 3rd mud pump control and the network components in the third mud pump house.
8. Update Amphion drawings for Job No 8487.

2.3 UPGRADES TO EXISTING MCC HOUSE REMOTE I/O BOX

Existing remote I/O box in MCC house to be modified by Supplier to include I/Os and relays for operation of 3rd MP.

Control wiring from modified remote I/O box in MCC house upto auxiliary motor starters in MCC house for HOA operation shall be done by BHEL.

3.0 INSTALLATION, INTEGRATION & COMMISSIONING AT ONGC SITE

Supplier shall be fully responsible for all the jobs related to installation of items in existing VFD house, integration, commissioning & testing of 3rd MP drives and controls at EV2000-1 rig presently operating at ONGC Rajamundhary (approx. 150 Kms from base office). Supplier being OEM has to access the complete scope of work for the required job not limited to as defined in this specification.

4.0 BHEL SCOPE OF MATERIAL AND SERVICES

Following shall be in BHEL scope for completion of the work at site :

- i) BHEL shall supply & lay all external cables (Between Main VFD house to 3rd Mud Pump house and from 3rd Mud Pump house to 3rd Mud Pump Motor and I/O box) excluding fiber optic cables which are in supplier scope.
- ii) BHEL shall do the wiring from Remote I/O box in MCC house to respective starters in MCC house.
- iii) BHEL shall install Remote I/O box on 3rd MP and will do the wiring on mudpump auxiliary motors & sensors.

Note : Supplier is fully responsible for the complete system design as per requirement explained in above broad specifications and hence supplier has to access the requirement of all the items for modification of existing VFD & Amphion Control system and should be included in the scope of supply if not covered above.