

DAP

Universal Hydro Test Rig.

Date: January, 2022

CUSTOMER

**NMDC 3.0 MTPA INTEGRATED STEEL PLANT AT
NAGARNAR, CHHATTISHGARH**

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1.0 GENERAL

Hydraulic test lab shall be set up at NMDC Limited for testing of the hydraulic equipments / components installed under 3.0 MTPA Integrated Steel Plant, Nagarnar, Chhattisgarh.

The hydraulic test lab shall be located in a dust - free air-conditioned room of size 15m(l) x 09m(w) x 7 m (h) approx. The hydraulic lab shall have test rig / test units for testing the hydraulic system equipments /components. The room shall be equipped with handling facilities (under slung crane (not in bidder's scope)) to handle the different testing units of hydraulic system components.

The tenderer shall provide evidences to the Purchaser/Consultant that he possesses necessary technical know-how to execute the work.

2.0 SCOPE OF WORK UNDER NEOMETRIX

- 2.1 The scope of work of the tender covers design, manufacture, assembly, functional testing at manufacturer's works, painting, delivery F.O.R. site, storage, supervision of erection as per approved layout drawings, testing and commissioning of equipment as specified in contents item bearing serial no. 4 inclusive of associated control, electrical and all accessories required for 3.0 MTPA Integrated Steel Plant, Nagarnar, Chhattisgarh. The test lab shall meet the specified performance as per technical parameters of TS and approved drawings & documents.
- 2.2 The tenderer shall include in its scope all accessories and auxiliaries, interconnecting piping, electrical controls, measuring and control instruments, all internal and interconnecting cables and wires, safety devices and materials which are not specifically mentioned here but are otherwise required to complete the functioning of the equipment offered in every respect for its satisfactory performance and safe operation.
- 2.3 The erection of Hydraulic test lab shall be carried out by the successful tenderer and under direct supervision and total responsibility of the Bidder. The Bidder shall carry out the erection of mechanical equipment, electrical equipment, piping and cabling employing best erection procedures conforming to Indian / International standards. All civil work related to foundation and erection shall be carried out by client as per the foundation & erection drawings of Bidder. Total civil works for the project shall be in the scope of client.
- 2.4 The supervision of commissioning and performance test of Hydraulic test lab shall be undertaken by original equipment manufacturer (OEM).
- 2.5 Hydraulic system shall be supplied with all spares required up to handing over to client. Along with the offer tenderer shall furnish the list of such commissioning spares indicating item description, quantity, make/ model No. of bought outs etc. The List of commissioning spares shall be vetted by Purchaser/MECON after finalization of offer. Any further spares required during

3.0 SPECIAL INSTRUCTIONS TO THE MACHINE

3.1 Applicable Codes and standards

All materials used and equipment supplied shall be new and the best of their respective kinds and shall comply with the latest versions of the relevant Indian Standard Specifications.

3.2 The tenderer shall clearly specify the assumptions and parameters regarding the tender. Deviations if any, from this technical specification, shall be clearly listed out by the tenderer.

3.3 Tenderer shall also submit QAP, particulars of proposed tests and their procedures along with offer. However, QAP shall be finalized with the successful tenderer after placement of order.

3.4 Delivery schedule (Refer clause 7.0)

3.5 Inspection and Performance test

The tenderer shall offer the Hydraulic lab equipments for inspection & testing by Purchaser /MECON LIMITED.

3.5.1 Testing and inspection at manufacturer's works

1. All Hydraulic lab equipments shall be inspected and tested according to the relevant standards/codes of practice & Quality Assurance Plan (QAP) approved by Purchaser/MECON to ensure that the equipment conforms to specification requirements. In absence of standards, procedure for inspection/testing shall be mutually agreed between the Purchaser/Consultant and the tenderer. All electrical equipment shall also be tested as per relevant IS codes or equivalent and the approved QAP.
2. The particulars of proposed tests and their procedures shall be submitted by the Contractor to the Purchaser /MECON for approval. Clearance for dispatch shall be based on satisfactory & acceptable outcome of the tests at the manufacturer's works. The manufacturer shall also give details of the measuring tools and instruments (calibrated) used during testing.

3.5.2 Test at site

After installation, Bidder shall demonstrate the testing operation of Hydraulic lab equipments in accordance with Quality Assurance Plan & proposed tests and their procedures duly approved by Purchaser/MECON. Manufacturer shall supply all requisite test tools (in valid calibrated status) required during testing of lab equipment. Necessary catalogues / documents of tools shall also be provided by the Bidder.

3.5.3 Inspection by the Purchaser/Consultant shall not absolve the Bidder from his responsibility to fulfill the requirements and performance detailed in this specification.

3.5.4 Accessibility and safety

All equipment offered shall allow adequate and easy access to its parts to facilitate operation and maintenance.

Design and selection of equipment shall be made with the following, in view of:

1. Safety of personnel (All moving parts shall be well guarded and protected)
2. Uninterrupted operation
3. Long life of equipment
4. Ease of maintenance at optimized cost.

3.5.5 Painting

All equipment shall be suitably cleaned, painted and protected against corrosion and damage. The color of the equipment will be as per IS: 5-1994 (or as confirmed by Purchaser/Consultant) at the time of placement of order.

Necessary guidelines for types of paint, coats and surface finish are given below:

1. Surface preparation: Blast cleaning to near white metal.
2. Painting scheme :
 - i) Requisite grade of primer and intermediate paint at shop.
 - ii) Final finish paint at manufacturer's works after inspection and testing.

3.6 Two (2) years operation spares

The tenderer shall furnish along with the tender a detailed list of essential spares required for two years of smooth and satisfactory operation of the equipment. Item-wise prices for spares shall be indicated separately in the price bid.

3.7 Name plate

Anodized Plate of schematic shall be provided on test lab & major technical detail of the component shall also be provided with anodized name plate. Each part on test lab shall have same item No. tagging as that mentioned in schematic drawing.

3.8 Systems of units and language

Calibration of all instruments, dimensions in drawings, technical data, weights and quantities shall be in metric units. All drawings, nameplates of equipment and operation and maintenance manuals shall be in English language.

3.9 Performance and guarantee

All equipment shall be guaranteed for workmanship / materials and satisfactory performance in accordance with the relevant clauses and technical specification of the Test rig / test unit as furnished in the tender as specified in commercial part of contract. The guarantee for performance shall cover individual equipments of test rig as well as in assembled condition including electrics / instruments and controls for their rated inputs / output.

3.10 Any defect developed and / or detected during the guarantee period shall be made good by the Bidder at his own cost to the satisfaction of the Purchaser

and if necessary, any modification / rectification or replacement shall be carried out by the Bidder.

3.11 Training

The manufacturer shall have good infrastructure for offering training in the areas of operation and carrying out maintenance of the test rig. Detailed training manual (Hard Copy & Soft copy CD) minimum five (5) sets shall be made available.

The bidder shall provide training to Employer's personnel (Operation – 3 persons, Mechanical Maintenance – 3 persons, Electrical maintenance – 3 persons) for five (05) days after commissioning at NMDC site.

3.12 The tender shall be complete in all respects inclusive of complete data as demanded under clause 5.0 of this specification. Incomplete tender will be liable to be rejected.

3.13 The Purchaser/Consultant reserves the right to accept or reject any tender without assigning any reasons.

4.0 TECHNICAL SPECIFICATION

4.1 Hydraulics & components

The technical specification is a part of the composite specification and shall be read along with the General Technical Specification (GTS) and other tender documents.

4.1.1 The test rig shall have the required facilities for testing of the different functions viz. flow, leakages (internal), pressure check / adjustment / settings & continuity of the following hydraulic equipment / components.

1. Fixed / variable Displacement Piston pumps.
2. Single / tandem Gear / Vane pumps.
3. Gear / Vane/ Piston Hydraulic Motors.
4. Pressure control valves.
5. Flow control valves.
6. Direction control valves.
7. Solenoid or DC valves.
8. Proportional Control valves.
9. Hydraulic Cylinders.
10. Check Valves.

4.1.2 The brief details of components being tested are mentioned below, however for further detail of individual components, Annexure-I (enclosed) is to be referred.

1. High pressure pump (Fixed/ variable Displacement Piston pump): –

The test rig shall be designed to test the pump for maximum capacity (flow) of 200 cc/ rev, at 215 bar and internal leakage at rated pressure. Maximum rpm shall be 1450. The test rig shall be designed to test all the piston pumps listed in Annexure –IA, at their rated flow @ 1450

and internal leakage at rated pressure with optimum flow. Arrangement shall be provided to ensure flooded suction at pump (under test) inlet.

Type of motor - VFD shall be used

2. Single / Tandem Gear / Vane pump: –

The test rig shall be designed to test the pump for maximum capacity (flow) of 200 cc/ rev, at 215 bar and internal leakage at rated pressure. Maximum rpm shall be 1450. The test rig shall be designed to test all the pumps listed in Annexure –I, at their rated flow @ 1450 RPM with optimum pressure, at rated pressure or maximum test pressure – 315 bar with optimum RPM (VFD to be used) and internal leakage at rated pressure with optimum flow. Arrangement shall be provided to ensure flooded suction at pump (under test) inlet.

Type of motor -VFD shall be used

3. Gear / Vane / Piston Hydraulic Motor: –

The test rig shall be designed to test the Hydraulic motors listed in annexure-I , at max pressure 315 bar with optimum flow and at max flow 180 lpm @ 150 bar through power control pump motor station or any other arrangement, Internal Leakage at rated pressure. Maximum rpm shall be 1450.

Suitable mounting / clamping for hydraulic motor shall be in scope of bidder.

4. Pressure control valve: –

The test rig shall be designed to test the Pressure control valve of sizes NG 6 to NG 30 at rated pressure but maximum pressure limited to 315bars with optimum flow for functional test and internal leakage.

Test rig shall be capable of testing valves sizes from NG6 to NG 30 being supplied in hydraulic systems (by hydraulic OEMs) using all permutation and combination of conversion plates.

5. Flow control valve: –

The test rig shall be designed to test the flow control valves of sizes NG 6 to NG 22 at rated pressure but maximum pressure limited to 315 bar with optimum flow, and the functional test shall be also carried out.

Test rig shall be capable of testing valves sizes from NG6 to NG 22 being supplied in hydraulic systems (by hydraulic OEMs) using all permutation and combination of conversion plates.

6. D. C. Valve: –

The DC valve of sizes NG 6 to NG 32 at rated pressure but maximum pressure limited to 315 Bar with optimum flow shall be tested for Function, Internal leakage etc.

Test rig shall be capable of testing valves sizes from NG6 to NG32 being supplied in hydraulic systems (by hydraulic OEMs) using all permutation and combination of conversion plates.

7. Solenoid of DC valve: –
The solenoid of rating 24 V DC shall be tested for function and continuity.
8. Proportional control valves: –
The valve of sizes NG 6 to NG 32 shall be tested for Flow & pressure at varying voltage / Current input.
Refer annexure – I for Make & Model nos.
One test kit for proportional valve shall also be supplied. Input supply to proportional valve test kit shall be provided through control panel
9. Hydraulic Cylinders: –
The leakage test, rated pressure test, cushioning test etc. shall be carried out for hydraulic cylinders listed in annexure-I at maximum 315 bar pressure and at max flow 180 lpm @ 150 bar through power control pump motor station or any other arrangement
Internal leakage test shall be carried out for multi positions (Rod end- Cylinder retracted, Cap end – cylinder extended, rod end – mid/intermediate stroke, cap end – mid/intermediate stroke, etc.).
Test Rig shall be capable to test cylinder with a maximum stroke of 4.6 meter.
10. Check valve: –
Check valve shall be tested for cracking pressure and leakage in reverse flow.
Test rig shall be capable of testing valves sizes from NG6 to NG32 except line mounted & cartridge valves being supplied in hydraulic systems (by hydraulic OEMs) using all permutation and combination of conversion plates.

4.1.3 Major components of Hydraulic test Unit

The hydraulic test unit shall consist of the following major components:

1. Stainless Steel Tank unit with all accessories
2. High Pressure pumps
3. Pressure filter
4. Return filter
5. Plate type heat exchanger (Plate material – Stainless Steel)
6. Recirculation pumps & filter unit.
7. Leak Oil pumps
8. Flow & temperature (with alarm) measuring devices.
9. Protection Hood for operators
10. Interconnecting piping of the test rig shall be of stainless steel
11. Indicating, Measuring & Controlling instruments as required.

12. Electrics & Electronics for test rig units including cable & electrical controls.
13. Jig & fixtures for mounting & securing arrangement of elements under test.
14. Clamping devices.
15. On board cleaning facilities.
16. Any Pneumatic arrangements(If required)
17. Name plate for all components, standard symbols & item nos same as that of drawing.
18. Earthing shall be provided wherever applicable.
19. Eight port Ethernet hub for data transfer.

4.1.4

The test rig shall be equipped with following features:

1. PC/Laptop with Printer shall be considered by bidder for data storage.
2. HMI to be considered along with Control Panel for graphical display.
3. Proportional relief valve for conducting test at varying pressure.
4. VFD for Pump testing and Power control. Pump-motor station for Hydro motor testing.
5. Regenerative circuit may be used in case of testing of hydraulic motors to take care of various sizes of hydraulic motors.
6. Real time on line measurement of all parameters e.g. Flow, Temperature, Pressure, RPM etc. with digital read out.
7. Test conducted should have high degree of safety.
8. Piston pumps shall be variable delivery, pressure compensated type having hydraulic control mounted on pumping unit itself.
9. Provision of alarm & possible fault display in case of trip.
10. Proportional pressure control valves for pressure regulation in pressure line .The regulation same through PLC / Operator Touch Screen.
11. Single, two and even more units in tandem can be tested simultaneously.

4.1.5

Miscellaneous

1. Initial fill
- Initial filling
- Requirement during the startup commissioning & PG Test.

ISO VG 46 hydraulic oil shall be used for the test rig. Quantity of initial fill to be supplied by the successful tenderer shall be furnished by the tenderer. However tenderer shall note the following regarding supply of initial fill

“After the startup of the facilities has been commenced by the successful contractor, and the contractor is not able to attain

successful commissioning within sixty (60) days from the date of startup due to reasons attributable to the client, cost of supply of oils, grease & lubricants beyond aforesaid period will be reimbursed by the client".

2. Consumables
 - Items along with ordering specification shall also be furnished by the tenderer for all consumables viz. flushing filters, seals, etc.
3. Tools & tackles- A list of special tools and tackles, required for operation / maintenance of the equipment shall also be furnished & supplied by the bidder.
4. Sump pump
 - One submersible type Sump shall be located inside the test room. One sump pump of 10 m³/Hr flow capacity & 16 Meter head (suitable for contaminated water/oil/water oil mixture) with level switch assembly shall be provided by the successful tenderer for draining out of the sump pit at the outlet of sump of test rig room.
5. Filling pump
 - One porta filter assembly for filling of the hydraulic reservoir shall be provided.
6. Washing bay facility to be provided with Hot and cold water high pressure jet arrangement for cleaning the hydraulic components before taking the sub assembly to test lab.

4.1.6 General Notes

1. High pressure pump shall be variable flow, pressure compensated, and axial piston pump. There shall be no standby pump.
2. Recirculation and leak oil pump shall be of gear type. There shall be no standby pump.
3. Pressure filter at the discharge of the high pressure pump shall be of simplex type without bypass.

Recirculation and return line filters shall be of duplex type with changeover valve.

Filter micron rating selection for all the three types of filters shall be governed by cleanliness level required for testing of proportional valves & hydraulic component.
4. All filters shall be equipped with mechanical and electrical clogging indicator. Filtration efficiency of all the filters shall be $\beta \geq 200$.
5. The unit may be equipped with all necessary measuring indicating and control devices, electronic cards and potentiometers for set values and monitoring devices for set and actual values.
6. The unit shall be pre wired for providing supply and control voltage.
7. The unit shall be completely assembled, piped, flushed and corrosion protected.
8. All the units shall be equipped with oil drip tray.

9. Necessary flange, fittings, hoses, clamps and Quick disconnect coupling, etc. required for testing operation.
10. Commissioning spares shall be supplied along with Main test rig unit. However, a list of spares (commissioning as well as operating spares) shall be supplied with offer.
11. Electrical power cable 415 V, 50 Hz, 3 Phase AC shall be provided at battery limit at one place at room inlet by the purchaser. All required control supply for successful operation of hydraulic Lab & its components shall be taken care by successful tenderer.
12. Industrial water (supply & return) for heat exchanger shall be provided at one place at room inlet by the purchaser. Water shall be supplied at 35°C.
13. The material used in construction of test rig shall be new and the workmanship shall be of very high standard with regard to accuracy, rigidity, power, safety, material, electrical, control, ergonomics, aesthetics etc.
14. All equipment shall be so packed as to avoid any damage to finished surfaces. Finished surface shall be coated with corrosion preventive compound and covered by oil paper.
15. The components of all equipment shall be designed, assembled and tested in accordance with Bureau of Indian Standards, wherever available. In case where suitable Indian Standards are not available / not specifically indicated, the equipment shall conform to other applicable international standards such as BS, ASME, ISO and DIN.
16. Foundation bolts, nuts & washers shall be part of supply. The individual unit shall be provided with lifting lug for erection.
17. The make of the equipments / components including bought out items of test rigs shall be as per GTS.
18. The equipment offered shall be suitable for smooth, efficient and trouble-free service in climate prevailing at the site of erection. Site conditions are indicated in GTS.
19. Cooling water requirement for heat exchanger and space requirement shall be clearly spelled out by the tenderer during submission of quotation.
20. All electrical items shall conform to electrical specifications enclosed.
21. Tender to furnish deviation list with respect to TS, if any, or otherwise to confirm his acceptance of all the points of the TS.
22. Any Additional information (if required) for the components mentioned in Annexure I shall be provided during detail engineering.

4.2 **Electrical (General)**

4.2.1 Scope of work

The scope of work involves supply, testing, commissioning of all electrical equipment (viz. drives & controls) coming as part of equipment specified in 4.0 above.

4.2.2 Design criteria: All electrical equipment and cable shall be designed/ used and tropicalized for following Indian conditions.

a)	Site condition			
i)	Installation	:	Indoor	
ii)	Altitude	:	Less than 1000m MSL	
iii)	Ambient temperature	:	45°C	Not occurring simultaneously
iv)	Relative humidity	:	100%	
b)	Systems data			
i)	Supply voltage	:	415V +/- 10%	
ii)	Rated frequency	:	50 Hz +/- 5%	
iii)	Combined voltage and frequency variation	:	± 10%	
iv)	Phase and wires	:	3 phase 4 wire	
v)	System grounding	:	Solidly grounded	

The equipment shall be designed for connection of Aluminum power cables of adequate size.

Each unit and component shall be clearly labelled in accordance with the relevant wiring diagrams and control scheme.

Special attention shall be given to provide danger boards, guards, rubber mats in front of open type of panel boards and switch boards and all other relevant safety devices.

Wherever multiple interlocks are used, a selector switch and lamp shall be provided for checking the state of each interlock circuit. Provision shall be made for out of sequence operation for testing.

4.2.3

a) Motor:

- i) The motor shall be squirrel cage induction motor, totally enclosed, fan cooled (TEFC) type and with IP: 54 degree of protection as per IS: 4691-1985 or applicable international standard.
- ii) The motor shall conform to IS: 12615:2018 / IEC 60034& IEC 60072 or applicable international standard and shall comply with IEC frame size.
- iii) Motor shall have class "F" insulation with maximum temperature rise permissible as per standard, above an ambient of 45°C, by resistance measurement method.
- iv) Preferred make of motors: Siemens / Kirloskar / Crompton Greaves (for

- i) Motor starter shall be DOL, sheet steel enclosed with IP:54 enclosure of a reputed make like Siemens / L&T / Yule and chosen correctly taking into account motor rating, duty and cable termination size and conform to IS:8544 (Part-I) 1977 or applicable international standard.
- ii) Starter shall consist of :
 - Air break contactor
 - Thermal overload relay with single phase prevention feature
 - Push buttons – start / stop / O/L Reset indicative lamps ON/OFF / Trip on O/L
 - Incoming and outgoing terminals.

4.2.4 Cables

- a) All power cables shall be 650V / 1100V grade PVC armored aluminum cables as per IS: 1554: 1988 or applicable international standard.
- b) All control cables shall be 650V/1100V grade PVC armored 1.5 sq.mm copper cables.

4.2.5 **A single source of power shall be provided outside the room to connect the test rig. Distribution of power to the different drives of test rig shall be the integral part of the equipment.**

4.2.6 Protective Measures

Short circuit protection-Every test rig shall be provided with short circuit protective device at the point of entry of the main supply cables to the equipment.

Over load and single phase preventer –Each motor shall be independently protected against overload. A three phase motor shall also be protected against single phasing. Overload relay with limit in single phase protection may be used.

No voltage protection- No voltage protection shall be provided and arranged so that the test unit will not start up again of itself when, following an interruption the supply is restored.

4.2.7 Control circuit

The control circuit shall be fail safe. Every Endeavour shall be made to arrange the control circuits so as to ensure in all circumstances the safety of personnel, even in the event of faulty operation, and to protect effectively the test unit and the equipment to be tested, irrespective of a failure of the apparatus or faulty maneuvers of the operation.

A test rig / unit shall be provided with devices enabling:

- a) **To stop the test unit as fast as possible in case of emergency and**
- b) **To disconnect the whole equipment from the supply voltages.**

4.2.8 **Protection shall be provided to prevent contact being made accidentally with live parts at a voltage of more than 50V.**

4.2.9 Earthing

All metal parts of the test rig and accessories in which electrical equipment is

independently mounted, shall be connected together electrically so that entire test rig is effectively earthed.

A three phase test units will be provided with 2 earthing terminals. Cross-sectional area of the earthing terminal shall be 16 sq. mm or 50 percent of that of the main supply conductor whichever is higher.

4.2.10 **All electrical equipment shall be legibly and indelibly marked in such a way as to be readily visible when the equipment is installed.**

There shall be at least one name plate with following details:

- a) Name of the manufacturer of the electrical equipment, or his trade mark.
- b) Nominal voltage with indication of DC or AC and the frequency.

4.2.11 Manual

The equipment manual (operation & maintenance) shall contain the following data:

- a) Installation drawing
- b) Circuit or schematic diagram
- c) Sequence of operation
- d) Wiring diagram
- e) List of units in the equipment
- f) Maintenance instructions, if any.

4.2.12 The following tests shall be conducted on all test units:

- a) Insulation resistance test
- b) Voltage test
- c) Resistance to earth test
- d) No load operating test

4.2.13 Additional details to be furnished along with Tender

- a) Supply voltage and frequency with upper and lower limits and number of phases required by the equipment.
- b) Type, number, KW rating of drives
- c) Power and control circuit diagrams.

5.0 **DATA TO BE FURNISHED ALONGWITH THIS MACHINE**

5.1 The following important technical details of the equipment offered shall be furnished along with the tender:

Proposed scheme & write-up for testing various components mentioned in clause 4.0 of technical specification. Tentative requirement of power and other services viz. air, water etc.

Proposed equipment disposition of hydraulic test lab shall be furnished within

5.2 Questionnaire given below shall be filled up to ensure completeness of data and submitted along with the tender:

5.2.1 General :

- i) Registered name and address :
- ii) Name and address of representative to whom all references can be made for expeditious coordination :
- iii) Manufacturer's company profile and reference list of similar equipment supplied in the last ten years in India indicating the following
 - a) Description :
 - b) Year of supply :
 - c) User's address :

5.2.2 Technological

- i) Make :
- ii) Model :
- iii) Overall dimensions of the test units – L x W x H, mm :
- iv) Weight of single largest piece to be handled during maintenance, kg :
- v) Max. weight of job, kg :
- vi) Weight of test rigs with standard accessories, kg :
- vii) Type of foundation (isolated floor mounting, etc) :
- viii) Accuracy standard followed (please enclose copy of test chart of test rigs or similar test units already delivered) :
- ix) After sales service :
- x) List of standard accessories :
- xi) List of optional accessories :
- xii) Safety features available :
- xiv) Instruction manuals (standard supply) :
- xv) Reference list :
- xvi) Blank price bid along with techno-commercial bid (to be enclosed) :

5.2.3 Electrical

- i) Motor :

- a) Make :
- b) Type :
- c) Rating :
- d) Voltage :
- e) Current :
- f) Rpm :
- g) Degree of protection :
- h) Class of insulation :
- i) Temperature rise over 47°C ambient :
- j) Starting current :
- k) Starting torque / pullout torque :
- ii) Starter
 - a) Make :
 - b) Type :
 - c) Enclosure :
 - d) Degree of protection :
 - e) Make and rating of contactor :
 - f) Make and range of O/L relays :
 - g) Whether O/L relay is with single phase prevention feature :
 - h) Provision of ON / OFF / O/L reset buttons :
 - i) Provision of tripped on O/L Lamp :
- iii) Cables
 - a) Make :
 - b) Type :
 - c) Size :
 - d) Schematic electrical diagram :

- 5.3 List of recommended spares for two years operation, equipment-wise
- 5.4 List of special tools and tackles
- 5.5 Size of Door (width and height) required for entry of biggest size of consignment into the shop.
- 5.6 Guaranteed technical parameters
- 5.7 Detailed testing procedures.

6.0 **DATA TO BE FURNISHED BY THE SUCCESSFUL AFTER
PLACEMENT OF ORDER**

6.1 The following documents / drawings shall be furnished by the successful tenderer within four weeks from the placement of order

6.2 Drawings:

1. Scheme of drawing of Hydraulic, Electrical/Instrumentation. - Five (5) sets minimum (Hard & soft copy).
2. General arrangement drawing of the equipment (hydraulic & electrical) indicating overall dimensions, technical parameters, etc. –Five (5) sets minimum (Hard & soft copy).
3. Layout drgs.
Foundation drawing with load data for the equipment with all accessories. These drawings shall indicate the location and details of anchor bolts, inserts, cable trenches / conduits, etc., to be built in the civil work. - Five (5) sets minimum (Hard & soft copy).
4. Size of Door (width and height) required for entry of biggest size consignment into the shop.
5. Earthing requirement.

6.3 Proposed tests & their procedures, Tools& tackles list, commissioning spare list, 2 year operation spare list etc.for equipment under scope of supply.

6.4 Requirement of services and utilities like power, air, water, crane facility etc. for commissioning and operation of machine.

6.5 Confirmation of technical parameters furnished in the tender and agreed upon during discussions.

6.6 The following documents shall be furnished during inspection of the equipment:

1. All approved drawing & documents.
2. Particulars of proposed tests and their procedures
3. Test certificates
4. Complete spare parts lists with ordering information.

After getting inspection clearance party shall submit minimum five (5) copies of duly signed & stamped Test& inspection certificates, compliance report if any, along with soft copy CD.

6.7 After inspection & dispatch clearance five (5) copies of Operation, maintenance and service manual shall be submitted to MECON/NMDC, along with soft copy CD.

The lists of equivalent and alternative makes for those spare parts which are not of manufacturer's own product shall also be furnished.

7.0 Note - Customized as per user requirement

Pumps/Hydraulic Motors/Hydraulic Cylinders List

Sl. No	ITEM	MODEL NO / Parameters	MAKE
1	High pressure pump (Fixed/ variable Displacement Piston pump)	A10VSO 45DR	REXROTH
		A4VSO 250DR	REXROTH
		A4VSO 180DR	REXROTH
		P2GF2/006+GF2/006RJ20+20U2	REXROTH
		PVM074ER09GS02AAA2800000A0A	EATON
		PVM018 EATON	EATON
		PVM045	EATON
		PVH131R13AF30A25	EATON
		A3H100 FR01KK 10	YUKEN
		A3H16	YUKEN
		A10VSO45DR/32R-VPB12N00	REXROTH
		A10VSO71DR/31R-VPA12N00	REXROTH
		A10VSO28DR/31R-PPA12N00	REXROTH
		PV080R1K1T1NMMC	PARKER
		A4VSO 71DR	REXROTH
		P1140PS02SRM5AC00S1000000	PARKER
		PV140R1K1T1NFPV	PARKER
A4VSO 125DR/30R-VPB13N00	REXROTH		
PVH098R01AJ30A250000002001AB010A	EATON		
2	Gear Pumps	GEAR REXROTH GPP2 C1C125AHN80AIR 113	REXROTH
		ACNAR01ADA003000000000000000A	EATON
		GEAR PGP511A0140CS1D4NJ9J8B1B1	Imported MAKE - VOORTMAN
3	Vane Pumps	VANE F3 45V42A 1A22R 180LPM@10BAR	EATON
		PVV-IX082RA15UMC -	REXROTH
		DOUBLE VANE - T6CC017 010 1R**C100(024-25709-0) PARKER	PARKER
4	Hydraulic Cylinders	Cyl - 125/90 C 480	
		Cyl - 150/140 C 10 120/60 C 90 40/20 C 140	
		Cyl - 100/50 C 220	
		160/110 - 1850	
		320/220-2400	

		140 DIA 2800 ST	
		100/70 X 3100	
		DIA 80 X DIA 45 - STROKE 630 X 310	
		100X70 – 1900	
		280X200 – 450	
		CYL 180X125X1600	
		CYL 125X90X1600	
		CYL 140X90X500	
		CYL 63X45X1100	
		CYL 125X90X1600	
		100X70X3100	
		CYL 140X90X1000	
		CYL 125 X56X630	
		100X56 - 650	
		140X90-60	

		MOTOR 6500CC/REV 102.8N-m/BAR 1.2RPM 180 BAR WORKING	
		MOTOR MODEL CA210 DISPLACEMENT 13200 CC/REV MAX TORQUE - 12100KGM MAX SPEED- 27.41 RPM MAX FLOW- 1141LPM @ 83 BAR	HAGGLUNDS (Radial Piston Motor)
		MOTOR MODEL CA210 160 DISPLACEMENT 10051 CC/REV TORQUE ON EACH MOTOR - 23308Nm (4 HYDRO MOTOR WORKING)	HAGGLUNDS (Radial Piston Motor)
		General Hydraulic Motors Low RPM	
		General Hydraulic Motors High RPM	
		MOTOR - HAGGLUNDS 84 -38000 - 0.3 RPM - 1.2 RPM	HAGGLUNDS
		MOTOR NHM3 400	

Sl. No.	Term Code	Model Code	Make
1	PROPORTIONAL DIRECTIONAL VALVE	4WREE 6 E08- 2X/G24K31/F1V	REXROTH
2	PROPORTIONAL DIRECTIONAL VALVE	4WREE 6 V1-08- 2X/G24K31/F1V	REXROTH
3	PROPORTIONAL DIRECTIONAL VALVE	4WREE 6 V1-32- 2X/G24K31/F1V	REXROTH
4	PROPORTIONAL DIRECTIONAL VALVE	4WREE 6 W16- 2X/G24K31/F1V	REXROTH
5	PROPORTIONAL DIRECTIONAL VALVE	4WREE 6 W1-32- 2X/G24K31/F1V	REXROTH
6	PROPORTIONAL DIRECTIONAL VALVE	4WREE 6 W32- 2X/G24K31/F1V	REXROTH
7	PROPORTIONAL DIRECTIONAL VALVE	4WREE 10 V1-75- 2X/G24K31/F1V	REXROTH

8	PROPORTIONAL DIRECTIONAL VALVE	4WREE 10 W1-75-2X/G24K31/F1V	REXROTH
9	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 10 W6-100L-3X/6EG24EK31/F1D3M	REXROTH
10	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 10 W8-100L-3X/6EG24EK31/F1D3M	REXROTH
11	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 16 W6-125L-3X/6EG24EK31/F1D3M	REXROTH
12	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 16 W6-200L-3X/6EG24EK31/F1D3M	REXROTH
13	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 16 W8-125L-3X/6EG24EK31/F1D3M	REXROTH
14	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 16 W8-200L-3X/6EG24EK31/F1D3M	REXROTH
15	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 25 W8-220L-3X/6EG24EK31/F1D3M	REXROTH
16	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 25 W8-350L-3X/6EG24EK31/F1D3M	REXROTH
17	PROPORTIONAL DIRECTIONAL VALVE	4WRKE 27 W8-500L-3X/6EG24EK31/F1D3M	REXROTH
18	PROPORTIONAL DIRECTIONAL VALVE	4WRTE 25 V350L-4X/6EG24EK31/F1M	REXROTH
19	CONTROL VALVE	4WRPEH 6 C4B40L-2X/G24K0/C6V	REXROTH
20	CONTROL VALVE	4WRPEH 6 CB04L-2X/G24K0/C6V	REXROTH
21	PROPORTIONAL DIRECTIONAL VALVE	4WRDE 10 V50L-5X/6L24K9/C6VR-972	REXROTH
22	PROPORTIONAL DIRECTIONAL VALVE	4WRDE 16 V200P-5X/6L24K9/C6VR-972	REXROTH
23	PROPORTIONAL DIRECTIONAL VALVE	4WRDE 25 V220L-5X/6L24K9/C6VR-972	REXROTH
24	PROPORTIONAL PRESSURE RELIEF VALVE	DBEME 20-7X/315YG24K31A1M	REXROTH
25	PROP PRESSURE CONTROL VALVE -Z	ZDREE 10 VP2-2X/200XLMG24K31F1M	REXROTH
26	PROP PRESSURE CONTROL VALVE -Z	ZDREE 6 VP2-1X/210MG24N9K24F1M	REXROTH