**ANNEXURE: I**

**SCOPE OF WORK:**

**Fabrication/ Installation and Commissioning of New Portable Vacuum Pumping System** IN BLIII **AND Installation and Commissioning of new Booster Vacuum Pump of 3900 m3/hr. capacity with motor in Existing Vacuum Pumping System in NTB**.**BL-III**

PLANT CONFIGURATION - Pumping system shall consist of vecuum pumps, intermediate & exhaust condenser & water cooling system mounted on a portable frame for easy movement of the system. Necessary interconnection pipeline & control valves are part of the system. Complete vacuum pumping system should be mounted on steel frame structure with wheels and mechanical jacks.

1) Fabrication of Steel base Frame Structure

Fabrication of Steel base Frame Structure with Wheels and Mechanical Jacks/Stoppers. The entire system can be lifted by overhead crane for which lifting hooks will be provided at the top of the pumping system. Portable frame structure shall take full load of pumping system on ground in order to avoid vibration.

Trolley to be fitted with 2 fixed & 2 swivel castors wheels

2) Installation, Erection and commission of Vacuum Pumping system Components.

2.1) Marking out of positions, considering the distance of various items

Fabrication of mounting stands and proper support structure

Placing of fastenings and supporting structures and metal-works.

2.2) Installation, erection and commissioning of following items

Vacuum Pump

Roots Vacuum Pump

Motors for Vacuum Pumps and Roots Vacuum Pump.

Primary Condenser

Exhaust condenser

Cooling Water circulation system consisting of water storage tank, pump, valves, radiators, interconnecting pipelines etc

Interconnecting Pipelines and valves

2.3) Adopting a suitable planetary mechanism (tyre coupling, belts, pulleys etc.) for requisite amount of power and speed transmission. Fabrication of vibration less power transmission mechanism from motor to pump.

2.4) Executing the alignment of coupling between drive motor and vacuum and roots pump to minimize the unbalanced forces. Checking and correcting the alignment of pump motor set. Determine if there is an excessive amount of shaft "freeplay”, piping stress on the pump and "soft foot" problems. Check for vibrations on operation. Repair the above problems.

3) Installation of new Vacuum Pipelines

3.1) Fabrication of 200NB vacuum pipeline and fittings as per valve size required. Length= 50 meters

3.2) Installation and commissioning of 01 No. of 200Nb New Actuator Vacuum Valve at Position.

3.3) Laying of air pipeline for operation of pneumatically operated Main valve and other control valves. Length =25 meters

3.4) Provision of Vacuum Measurement Points in system

3.5) Testing of complete modify pipeline system with vacuum test.

4) Provision and Installation of water extraction system in system

4.1) Installation of measuring jar with valves for measurement of rate of water discharge (liter/hr.) from exhaust condenser

5) Fabrication of control panel complete with electrical wiring.

Designing electrical control circuit for operation, interlocking and control of motor, pumps.

Fabrication, installation, testing and commissioning of 01 Nos of M.V. cubicle type totally enclosed, free standing type Control Panel complete with MCCB for incoming Power Supply, all contactors, relays, starters, timer, single phasing preventer, MCCBS & HRC fuses, step down transformer for control voltage, Indicating lamps to indicate the position of pumps and automatic valves, motor .The panel shall be fabricated with 2.5 mm thick sheet and bolted with M10 bolts in 50 x 50 angle

6) Fabrication/Erection of water circulation system for vapour Condensers.

6.1) Fabrication of Water Tank

Material: SS 304

Capacity -500 Liters

6.2) Shifting of MS tank Material from another location to Blk-III

6.3) Cutting of MS plate as required size for Fabrication of MS Tank.

6.4) Fabrication, Erection of MS water collecting tank by MS plate, channel, angle etc. with necessary provisions.

Tank Size: 1800mm (L) X 1800mm (W) x 2000MM (H) X 5MM (THK)

6.5) Hydraulic Testing of Newly fabricated Tank.

6.6) Complete painting of Newly Fabricated tank

6.7) Installation of Radiator with Fan to cool the water after circulating through the Vapor Condenser.

6.8) Installation and commissioning of 2 HP water circulation pumps.

7) Fabrication, laying and jointing of Cooling Water Pipeline

7.1)Fabrication/Erection/jointing of 50NB/25NB Pipeline connection of cooling water Inlet pipeline, Outlet Pipeline with condenser etc. Galvanized ERW Steel Pipes for Water as per IS-3589/1991, with Flanges on both ends. Flanged ends drilled to IS 1538, PN 1.0 F.F drilled, flat face complete with bolts, nuts, CAF Gaskets. Total Quantity=10 metres.Number of Flanges=5.

7.2) Erection of new Outlet water pipeline 50 NB, Total length=10 meters. Gaskets must fit without warping, twisting, or bending.

7.3) Installation of following fittings of water pipelines:-

1) Flanges, size 150 NB, Qty=10 nos

2) Bend 90 degrees 150 NB, Qty=3

3) Sluice valves 150 NB, qty=04 nos

4) Painting and testing of new water pipelines, size 150 NB

5) Fabrication of suitable reducers to fit the inlet and outlet port of condensers.

6) The fixing of these water pipelines by support structures shall be in scope of contractor.

7) Fabrication, installation and commissioning of drain line from primary and exhaust condenser with valves.

8) Laying, Dressing and Clamping of Power and Control Cables.

8.1)Laying, dressing and clamping of 1100 Volt Grade, 1C X 300 sq.mm Aluminium conductor (FRLS) armored, LT Power Cables. Total quantity=50 meters.

8.2) Termination of 1100 Volt-grade 1C x 300-sq.mm Aluminium Conductor (FRLS/ AYWY) Armoured LT Power cable. Quantity=6 Nos

8.3) Laying dressing and clamping of 1100 Volt-grade Conductor (FRLS / AYWY) Armoured Control Cable 4C x 2.5 sq.mm =500 meters.

8.4) Termination of control cable with numbering ferules & cu lugs of required size proper dressing & binding with tape etc. 4C x 2.5 sq.mm =200 nos.

9) Supply of Exhaust Condenser 3 mm2 capacity, suitable for above application.

10) Testing of Vacuum Leak for complete system. . The Contractor has to ensure that pipeline after fabrication is leakage free. The work has to be done by highly skilled and Trained Welders. Load Trial and final commissioning.

11) Installation and Commissioning of new Booster Vacuum Pump of 3900 m3/hr. capacity with motor in Existing Vacuum Pumping System in NTB.

10.1) Fabrication of support structure for mounting of Booster Pump.

10.2) Fabrication of support structure for mounting of Drive motor for Booster Pump.

10.3) Make new Arrangements for Coupling of pump with motor, maintaining the requisite height.

10.4) Alignment of Pump Motor Set

10.5) Fabrication of support structure to provide rigidity to ensure vibration levels are within acceptable limits.

10.6) Ensure no leakages. Load Trial and handing over.

**11) All Material required for fabrication such as angles, channels, etc. shall be provided by BHEL.**

**12. BHEL Scope of Supply :-**

1. All the MS Plate, Channel & angles,water Pipes required will be provided by BHEL.
2. BHEL will provide welding m/c, welding rod for the fabrication work.
3. Paints and Primers will be provided by BHEL.
4. All other facilities like Power supply, water, cotton waste, kerosene etc., are provided by BHEL.

13). **(B) SCOPE OF SUPPLY OF MATERIAL :**

**1. Contractor Scope of Supply :-**

|  |  |  |
| --- | --- | --- |
| **Sr. No.** | **Description of Item** | **Qty.** |
| 1). | **Supply of Exhaust Condenser 3 mm2 capacity** | 01 NO |
| 2) | **Water Pump** | 01 NO |
| 3) | **Heavy Duty Wheel** | 04 NOS |

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