

**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR WESTERN REGION, NAGPUR**

ENQUIRY NO. 13040 E

DT.12.08.2013

DUE DATE: 02.09.2013

ANNEXURE-I

Technical Specifications

1. APPLICATION:

The machine is required for feeding high pressure oil to Gun of tensioning / breaking of the special lock bolts required in ESP of the thermal power plant. The application is also similar to that found in the Railways. The special lock bolt has got a bush which is pushed by the special gun and the bolt is pulled, simultaneously. After the desired axial movement and clamping of the sheet metal parts together, the extra portion of the bolt is broken for which a weakening grooves is provided in the bolt.

2. WORK / JOB DETAILS:

As describe above, the sheets of ESPs are to be fastened together. The special bolt has got the controlled dimensions and comes with a bush which is loose in the start and after pushing fits snugly on the bolt to result into a proper fastening as good as riveting.

The bolt has got different diameters so that desired force fit is obtained. The extra length piece gets broken after the fastening operation and tightening of the bush over the bolt takes place with proper interference.

3. PHYSICAL CONSTRUCTION:

The machine consists of a hydraulic oil tank, pump, electric motor, pressure relief valves, pressure switches and other items. Also 2 numbers of slender hoses are connected to the gun tool for forward and return oil supply.

A small electrical panel is also enclosed so that solenoid can be actuated by pressing of the switch and pressure control also can be ensured.

The details are enclosed in the hydraulic circuit diagram enclosed which is typical and actual needs to be made to suit the application. Similarly, electrical circuit diagram is made typical and actual detailed should be made to suit the application. Small amount of redundancy to be kept

4. CAPACITY / RATING:

Overall weight of the system should be in vicinity of 100 Kg.

4.1 Hydraulic Power pack:

Working Pressure: 550 bar min forward

Return pressure: 210 bar min

Max system pressure 20% above the working (i.e. 660 bars)

Discharge: 3 lit/min (approx.)

Type of pump: Suitable

Pressure switch: for return pressure control and unloading to the tank

Tank capacity: Max. 25 to 30 liters

Pressure relief valve:

Solenoid D.C. valves: As per circuit

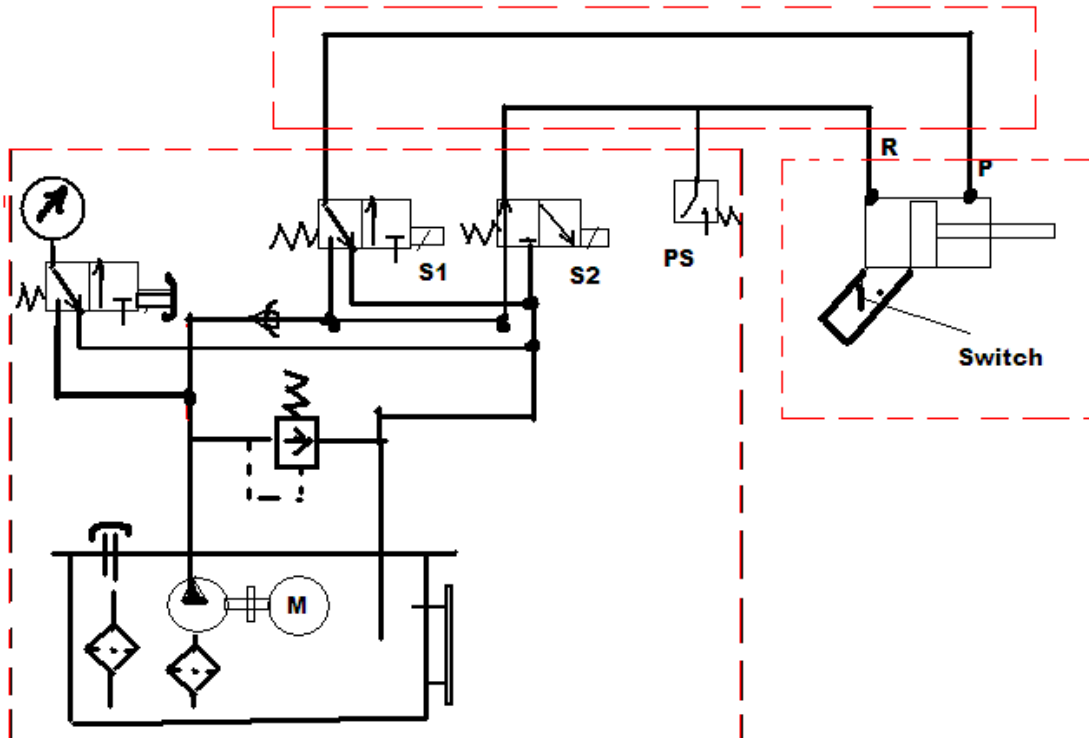
Voltage of solenoid valve: 24 VDC

Pressure gauge to show pressure with gauge isolator

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Reservoir : Inlet with Filter, Breather; Drain Plug; Oil Level Sight Glass Gauge; Suction Strainer; Outlet fitted with filter.



S1& S2 can be replaced by 1 number 4-way directional control valve

Fig: Hydraulic Circuit Diagram

4.2 Electrical Motor:

Suitable Capacity, 3phase, 440V, 50Hz along with starter (Siemens/Compton/L & T/ABB/ KEC)

4.3 Electrical:

Supply: 3 phase, 415 VAC, +/- 10 %

Rectifier to suit the application, 24 VDC+/- 5 %

Motor Contactor, Timer Relay, Emergency stop, Amps Overload Trip, Oil Temperature/Level, 24V DC Electrical Connector, Sleep Mode (Motor should switch off after some time if not in use), Electrical Power Cable Surge arrestor & pressure switch etc to be included.

4.4 Gun

Max weight: 5 Kg Arrangement to hold the bolt of sizes: (a) 1/2" (b) 5/8 "(c) 12 mm (d) 16 mm

Grippers: suitable exchangeable and replaceable serrated pieces to hold the bolt tightly. All the range can be covered in one or more than one guns or with suitable front adopter

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4.5 Connecting Hydraulic hoses:

To suit the application: 15 m long:

- (1) Should be able to withstand 1.5 x Max. Working pressure of Power pack.
- (2) fitted with Hydraulic Quick Coupler- 3/8" typical
- (3) Both for forward and return paths

4.6 Connecting electrical wire:

To suit the application: 15 m long (mechanically strong)

5. CAPABILITIES AND FEATURES:

The trigger at the gun will actuate the hydraulic cylinder (inbuilt for push pull action and after pushing of the bush and fitting it, will break the extra portion of lock bolt and as soon as the trigger is released, the direction of gun gets reversed (with reduced pressure setting so that at the end of the stroke the glands is not shocked. (This shall be set on the pressure switch)

The gun shall be connected with the hydraulic power pack by 2 hoses (armoured and mechanically strong) and an electrical wire (mechanically strong) for easy actuation.

The Gun should be lightweight and compact so that there is no fatigue to the operator, with a built in electrical trigger switch (sufficiently rugged)

6. CONTROL PANNELS:

The panel should take 3 phase input and should drive the 3 phase main pump motor but for controls and solenoids etc 24 VDC should be made available through the transformer rectifier package or through electronic control.

The provision of motor safety, isolation switches should be there.

The control box should be very compact

There should be provision of thermal over load relay (TOL) for setting current, Timer and pressure switch also apart from fuses to save the solenoids, emergency stop switch & oil temperature and level switch.

All the items should be of reputed make and should be easily available from the market.

Principal of operation: -

- (1) When both hoses and control cord are connected to the Power pack, the pull and return cycles of the tool are controlled by the trigger switch located in the tool.
- (2) When the trigger switch is depressed the solenoid valve located in the Power pack is energized and directs the pressurized oil flow to the pull side. This also allows the oil in the return side of the tool to return to the tank.
- (3) When the trigger switch is released the solenoid valve gets de-energized, reversing the oil flow.
- (4) At the end of cycle the Power pack will move to idle mode.

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- (5) The electric motor will automatically switch off if the trigger switch is not operated for certain period of time (adjustable).
- (6) The power pack will automatically start up on pressing of trigger switch.

7. INPUT CONDITIONS:

Only electrical supply shall be given

8. ENVIRONMENTAL CONDITIONS:

Machine will be normally used in open atmospheric condition.

9. SCOPE OF SUPPLY:

The bolt tensioning machine along with other relevant items as described below:

Sl. No	description	Quantity	Remarks
1	Bolt tensioning machine: Hydraulic power pack with electrical control	One set	As per this specifications
2	Tensioning gun tool along with necessary adopters		Two or more gun system is acceptable. In case of single gun, adopters shall be required
3	Hydraulic hoses along with quick coupling for forward and return liquid path: Length 15 m		
4	Grippers (Jaw Set) for holding the bolts : size 1/2"	50 set	Additional Spares
5	Grippers (Jaw set) for holding the bolts : size 5/8"	20 set	
6	Seal kit for Hydraulic Power Pack & Tensioning gun tool	10 sets	
7	Fuses for solenoid protection	10 Nos.	

10. PREDISPATCH INSPECTION / TESTING (AT SUPPLIER WORKS):

The HPP shall be inspected before dispatch at the works of Vendor.

11. Tooling:

Guns and grippers for different sizes as described earlier

12. SPARES:

Seal kit for repairs of Hydraulic Power Pack & Tensioning gun tool (10 sets), as mentioned in scope of supply for all valves, pumps and pressure switch are to be included. List of other spares recommended, if any, to be given and their prices should be mentioned in the price bid.

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13. FINAL INSPECTION (TESTING):

All the machines shall be tested for No load operation. Few machines shall be tested for full load operation and for proving of the application. Mock loads shall be created, if actual load / jobs are not available.

The machine shall be tested for:

- (a) Functioning
- (b) Health of various sub systems
- (c) Operation of trigger and pressure switch
- (d) Proper gripping

14. ERECTION AND COMMISSIONING BY SUPPLIER:

As the machines shall be small and stand alone type, no erection as such is necessary but supplier or their representative to commission and establish load testing on few machines using BHEL people on actual or mock up jobs. No load test on all machines should be demonstrated. As the machines shall be at different sites, commissioning to be done on at least 2 sites.

15. GUARANTEE CLAUSE:

Machine should be guaranteed for a period of 12 months after commissioning.

16. TRAINING AT SUPPLIER'S WORKS & BHEL SITE:

Vendor to impart training to BHEL' 02 engineers for operation as well as maintenance for a period of 2 days at his works and 02 days at BHEL site (max 2 sites)

17. SAFETY AND ENVIRONMENT:

Suitable safety arrangements should be built in the HPPs for the safety of the operator as well as safety of other people working near by. No effluent of any kind or material of any kind harmful to working people or the environment should be used on the machine.

18. DOCUMENTATION REQUIRED BY BHEL ALONG WITH SUPPLY OF MACHINE :

- (A) Operation manual
- (B) Spare parts manual
- (C) Maintenance manual
- (D) Manuals of B.O. components used

19. EXPERIENCE CLAUSE / PERFORMANCE CERTIFICATE:

Internal performance test & quality check certificate is to be submitted.

20. CUSTOMER LIST AND REFERENCE:

Vendor to enclose the customer list to whom these machines have been supplied earlier with full address and telephone no., web address and email details along with model number of machine supplied.

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21. DOCUMENTATION AND WRITEUP TO ILLUSTRATE VARIOUS CAPABILITIES, RELATED DIAGRAMS, PICTURES, MOVIES ETC. AND ITS CD (SOFTCOPY), ETC.

Vendor to give full catalogues PowerPoint presentation, pictures, circuits, video clips of the machines which they are offering along with the technical offer.

22. PACKING:

Sea worthy packing is to be used while dispatching the machine.

23. PAINTING:

Machines should be painted with green color and guns should be painted with orange color of 2 coats of Primers and 2 coats of finish paints films. Total thickness of paint approx 120 microns.

24. TRANSPORTABILITY:

This machine shall be transported from one location to another site and therefore should have a very rugged shock proof control panel etc so that no damage occurs during the transportation. Features included for achieving this is to be mentioned. No parts should be protruding and wherever feasible, guards are to be put.

25. LIFTING PROVISIONS:

Machine should have lifting provisions for use with cranes.

26. EASE OF HANDLING:

The machine should be wheel mounted with towing capability so that one person can move it very easily on the floor. The castor wheel size should be approx 6" and should be strong.

Note: Technical specification could change without prior notice.

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ANNEXURE-III

Delivery Destination

Sl. No.	Name of Site**	Quantity (in Nos)
1.	BHEL SITE OFFICE –SOLAPUR 2X660 MW NTPC SOLAPUR STPP, VILLAGE – FATATEWADI, TALUKA – SOUTH SOLAPUR, DIST. - SOLAPUR PIN CODE – 413215, MAHARASTRA, INDIA	4
2.	BHEL SITE OFFICE-MAUDA 2X660 MW STPS, NTPC LIMITED TEHSIL-MAUDA, DIST: NAGPUR MAHARASHTRA-441104, INDIA	4
3.	BHEL SITE OFFICE –VINDHYACHAL VINDHYACHAL STPP 2X500 MW , STAGE-IV, P.O. VINDHYANAGAR-486885, DIST: SIDHI, MADHYA PRADHESH, INDIA	2
	TOTAL	10

**Delivery destination is tentative.

Engineer/Pur