

**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR - WESTERN REGION – NAGPUR**

Purchase Enquiry No. XI055 E dt.16.12.2011

Annexure-I

Specification of Strand Jack for Heavy Lifting

1.0 APPLICATION:

Complete Strand Jack system along with its sub-assemblies and accessories like strand, controller, supporting structure, strand guide, strand dispenser & power system to power the strand jack suitable for lifting below mentioned item & can also lift the various heavy jobs of power plant such as Generator Stator, Various types of beams etc within its rated capacity.

2.0 WORK / JOB DETAILS:

The work / job detail are as per Tables enclosed & annexure II (detail drawing enclosed):- The jobs are various power plant items as mentioned, such as Boiler drums, cat head beams etc.

Boiler Drum weight and elevation details (Table-I)

S. No.	Description	For 250MW	For 500MW	For 600MW
1	Boiler Drum outer diameter	2.1m(approx.)	2.3m(approx)	2.1m(approx)
2	Boiler Drum length	16.2m(approx)	24.22m(approx)	28.36m(approx)
3	Boiler Drum weight	133MT	230MT	260MT
4	Weight of suspension rod on which Boiler Drum hangs	9.64MT	14MT	14 MT
5	Lifting lug pin hole diameter	154mm	154mm	154mm
6	Centre to centre distance b/w 2 lugs	7.51m	15.545m	13.64m
7	Boiler Drum centre line elevation	58.606m	72.183m	80.6m
8	Elevation of structure top on which supporting structure will be placed	65.6m	83.425m	95.15m
Arrangement – I.	Dimension of Cat head beam (mounting arrangement no. I) (Length x Breadth)	4m x 0.625m	4m x 0.625m	4m x 0.625m
	Centre to centre distance b/w cat head beam (*).The CAT head beam will rest on WB.	0.416m	0.416m	0.416m
Arrangement – II	Dimension of Cat head beam (mounting arrangement no. II). (Length x breadth)(**)	2.973m x 0.680m	2.973m x 0.680m	2.973m x 0.680m
	Centre to centre distance b/w cat head beam (**).The CAT head beam will rest on drum suspension RB.	0.470m	0.470m	0.470m

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Strand Jack has to lift boiler drum along with the suspension rod. It will be mounted on cat head beam placed on structure where the boiler drum will be supported by suspension rod (U-rod).

3.0 STANDARD:

As per DIN/ JIS /SI /ANSI / ASME/ European Standard (Standard- to be specified by the Vendor).

4.0 CAPACITY / RATING:

S.No	Description	Specification	Remarks
1	Strand Jack	a) 185MT (each)	(a)Speed: 15-25m/hr (b)Capable of holding load Min 12 Hrs (c)Stroke: 450mm to 500mm
2	Power Pack	(a)3 phase 50Hz, 380-440 VAC, 30 kW Motor or suitable to operate jack (b)Pump Capacity - suitable to operate jack, (40 litres / min – nominal) (c)Reservoir – suitable capacity (350 litres app.) (d)Hose – 15 mtrs (min) with quick release couplings. (e)Data cable – 25 mtrs (f)Air blast / Oil cooled system.	All hydraulic and electrical components should be of Bosch/ Yuken/ Vickers
3	Control System	(a)Smart computer control system to control multiple jacks. (b)Load, lift and stroke reading on each cylinder (c)Over load / Load detection alarm on each cylinder (d)Synchronization of all jacks to any value (e)Provision for variable speed operation and / or fine movement at elevation shall be possible. (f)System should be capable of performing automatic lifting & lowering cycle.	
4	Grips	Extra long life	
5	Strand Dispenser	(a)Capacity suitable for storing & holding the strands-coil. (b)Should have PVC cover	
6	Strand Guide	Suitable Strand Guide.	
7	Strand	130 metres for each strand	
8	Accessories	All accessories required for operation and	Detailed list to be

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		commissioning of the equipment shall be a part of supply.	submitted with the offer.
9	Lifting Pin	Lifting pin of 200 MT capacity suitable for 154 mm dia. hole in boiler drum lifting lugs.	
10	Strand recoiler	Suitable size and capacity	
11	Fixed Anchor Block	As per attached Boiler Drawings. Ref: sheet Annexure II High yield hardened steel 42CrMo4V or medium carbon heat treatable high strength material generally used for grips.	
12	DG Set	90 kw (400V 50 Hz) suitable to operate 2 Strand jack power packs simultaneously. Automatic switch over and cut-off with power supply.	As a Standby uninterrupted operation
13	ICTPN Box	Suitable to operate Power Pack	
14	Copper Bus bar (Junction Box)	As required for the application	Vendor to give details
15	Power Cable	(a) From Power Pack to ICTPN box (b) From ICTPN box to Junction box – (2 mtrs) (c) From Junction box to DG Set – (20 mtrs)	

Note: Evaluation for item no 12 will be intimated before price bid opening.

5.0 PHYSICAL CONSTRUCTION, CAPABILITIES & FEATURES:-

5.01 Strand Jack:

- Safe working load of jacks should be set at 40% of the minimum breaking load of strand, (i.e. factor of safety = 2.5).
- Strand patterns used and arrangement of top & bottom anchors should be designed for ease of access to service the grips. All grips can be fully serviced in the middle of the lift with jacks fully stranded.
- Main cylinder pressure tested and certified to 150% of working pressure.
- Complete strand jack load tested and certified to 125% of safe working load.
- Double acting mini jacks used for opening and closing the grips in the top and bottom anchors, which can be fully replaced in the middle of the lift if necessary without dismantling the strand anchors or cutting the strand.
- Pilot operated over center valve fitted to the extension port block for controlled and synchronized load lowering.
- Load holding valve fitted to the extension port block for safe holding of the load in the event of a hose burst.

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- Pressure compensated bleed valve fitted to extension port block for very slow final lowering for precise alignment of load, smooth alignment of load and smooth transfer of load to supports.
- During lifting operation the strand jack can be fully dismantled for repair with load held in bottom anchor.
- Fitted with quick release couplings.
- Telescopic strand guide tubes through the full height of strand jack to prevent buckling and “birds nesting” of strands inside of the jack.
- Corrosion protection to all exposed and running surfaces for long life and suitable for use in marine environment (of jacks and other components).
- Single strand tensioning of plate fitted to the jack.
- Strong guide plate above the top anchor to align the strand before entering the top grips, and through machined recesses around each strand to take grips sets for single strand tensioning operations.
- Large diameter, rigid anchor blocks to be used for reliable performance and long grip life. Material 42CrMo4V quenched and tempered for high strength and through thickness hardness.
- Robust anti-rotation bar to prevent rotation of top anchor relative to bottom anchor.

5.02 Fixed anchor block: To attach to the load. Grips in the fixed anchor should be retained by a bolted steel plate and neoprene pad for secure holding of each strand under all load condition.

5.03 Sensors:

- **Different types of sensors:** To sense the end position of jack/mini jack, to measure the stroke, to detect the load, to sense the Hydraulic fluid temperature (the motors should stop if hydraulic fluid temperature is high and if temperature is too low it should be indicated accordingly), etc. to be incorporated.

5.04 Strands:

- Suitable diameter, to BS 5896 / 3-1980 or suitable international standard.
- Minimum breaking load for each strand = 2.5 times the normal setup.
- Safe working load for each strand: Suitable, to be specified by vendor.

5.05 Hydraulic Power Pack:

- Should be pressure tested and certified to 125%-150% of working pressure.
- High quality piston or ball check pumps should be used for jack extend/retract circuit for maximum reliability and minimum variation in flow with changing jack loads.
- The secondary hydraulic circuit for opening and closing of jack grips should be designed in such a way so as to allow the grips to close under the action of grip springs in the event that there is a loss of hydraulic oil pressure due to component failure or power failure.
- All electric components should be weatherproof to IP 55 or better.
- Suitable for use with both mineral and biodegradable hydraulic oils.
- Visual oil level & temperature indicator and automatic shutdown system in event of low oil level.
- Pressure gauges to maintain extend/retract p-line and mini-jack p-line.
- Separate pressure relief valves for cylinder extend, cylinder retracts and mini-jack open/close.

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- All power pack should have a fixed control panel for manual operation of the connected jacks during set up, and a local remote switch for selecting between this control panel, computer control system and central control system.
- Power pack mounted in steel crash frame with fork lift truck points and lifting eyes.
- Components arranged for easy access for inspection and servicing.
- Overall size to suit transport in standard shipping containers.
- Fitted with quick release hose couplings
- All exposed surfaces should be corrosion protected and suitable for use in marine environment.
- Tank should be generous. Suitable filters at appropriate places to be incorporated. Flow control valves, pressure relief valves, return line filters, pressure switches, solenoid valves, coolers, check valves, gauges, breathers, manifolds, etc. to be incorporated to makes the hydraulic power pack complete.
- Make Bosch- Rexroth / Eaton (Vickers Sperry) or Yuken or equivalent from a reputed manufacturer. (Details to be submitted).
- Failure indication.
- Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, and gearbox oil, etc. at a temperature not exceeding 40 deg C irrespective of the ambient conditions. Complete details should be submitted.
- Hydraulic pump capacity (flow / pressure).
- Hydraulic Motor capacities.
- Hydraulic, Pneumatic & oil pipings should be preferably metallic except places where flexible pipings are essential. All the pipes required for the same shall be included in the standard scope of the machine.
- First filling of all required Oils & Grease etc. to be supplied by vendor. Indigenous (Indian) source or Indian equivalent and specifications of oils / greases are also to be provided by the vendor.

5.06 Strand Guide: Suitable for the application.

5.07 Grips: Extra long life, hardened, tempered and coated.

5.08 Hydraulic Hoses/connectors: With Quick release couplings.

5.09 Strand Dispenser: Suitable

5.10 Strand Recoiler: Suitable.

5.11 Oil Level Gauges: Electrical level gauge will be preferred together with sight gauges.

5.12 Transportability: (Easy assembly and Removal of different sub assemblies):

For easy transportation of the whole Strand Jack System from one site / location (after the work is over) to the new site or location, it is necessary to dismantle the whole Strand Jack System and again rig up it at the new location. Suitable provisions are to be made for easy assembly and dismantling of the Strand Jack System parts / subassemblies so that it takes minimum time to rig it up. Suitable location pins / identifier and with name plates at appropriate places are to be put there for this.

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It is also necessary to provide the dismantling plan and assembly plan and also drawings of the various supports and fixtures and necessary tooling to properly support the parts / sub-assemblies during transportation. Based on these drawings, BHEL will get the tools / fixtures made in India for proper supports and these things will move with the whole convoy so that the Strand Jack System parts/ sub-assemblies do not get damaged during the transportation.

It is also necessary to include the shipping plan and include drawings for the same along with trailer / trucks so that the above work can be got done easily.

Without the concurrence, for giving these drawings, offer shall not be considered.

6.0 OPERATION, CONTROL, MEASURING AND DISPLAY SYSTEMS

- 6.1** Over load / Load detection alarm on each cylinder (adjustable to any value).
- 6.2** Provision for variable speed operation and / or fine movement at elevation shall be possible.
- 6.3** The wiring & junction boxes on jacks and power packs should be same for both the manual control through operating panel and computer control system with a very quick changeover from one system to the other, allowing operating panel to be used as a back up to computer control system.
- 6.4** All sensors, wiring and nodes should be weatherproof to IP 55 or better.
- 6.5** Computer control system: Should possess following features:
 - Use of latest network communication protocol for fast & ultra reliable communication with the jacking system, even over distances up to 1000 m.
 - User friendly interface, designed to give clear view of all essential data during a heavy lifting operation
 - The software should be user friendly and a demo version of this system, which could be installed on any desktop PC or portable computer with a USB2 port and running Windows XP, 2000 or latest versions, should be made available for learning before actual use.
 - No limit on number of installations, no password required and no expiry date.
 - Fully automatic control and monitoring of any number of strand jacks from a single computer.
 - Fully functional simulation mode for training and demonstration purposes.
 - Inbuilt safety features to prevent unsafe operation of jacking system.
 - Automatic synchronization of all jack extensions, to within limits set by operator.
 - Automatic stop of operation if any jack goes outside a load range set by the operator for each jack.
 - Provision to input expected load and continuous monitoring and comparison of expected load with input load.
 - Easy set up of system at start of operation. The system should automatically detect all connected jacks and power packs.
 - Any combination of jacks can be selected for simultaneous operation.
 - Automatic creation of log file in Excel file format, recording all operator actions and jack sensor data at 2 second intervals.
 - Tested and certified to European Electro Magnetic Conformance standards.
 - 3 operating modes:- Auto-lift, auto-lower & manual. Each mode operates all the selected jacks together. Auto-lift and auto-lower automatically control all jack operations to lift and

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lower the load, maintaining jack extensions to within limits set by operator. Manual should provide full manual control of all jack operations to allow very slow lowering of the load for final level adjustment, to within +/- 1.0 mm, or for lowering the load into its permanent supports.

Various measuring and display system. Vendor to furnish detailed description of the system along with offer.

7.0 ACCESSORIES / ATTACHMENTS:

To suit the application, if any further accessories required apart from what has been mentioned in the scope of supply, the same may kindly be indicated as optional. BHEL may consider the procurement on merit. Detail list to be submitted with offer

8.0 INPUT CONDITIONS:

Only Diesel as fuel and oil & Grease as lubricant shall be filled as consumable. The Strand Jack system shall be self sufficient in all other respects. Any other consumable required has to be clearly specified. Strand Jack system must have self lubrication system.

9.0 ENVIRONMENTAL PERFORMANCE:

The Strand Jack System shall conform to following factors related to environment:

- 9.1 Maximum noise level shall be 85 dB (A) at normal load condition, 1 M away from the Strand Jack System or it's subassemblies, with correction factor for back ground noise, if necessary.
- 9.2 There should not be any effluent from the System. In case there are any effluents from the Strand Jack System, requisite effluent treatment system or pollution control device should be in-built.
- 9.3 No hazardous chemicals shall be required to be used.
- 9.4 If any safety / environmental protection enclosure is required it should be built in the System by the vendor.
- 9.5 Paint of the Strand Jack System should be oil / coolant resistant and should not peel off and mix up with coolants / lubricants.

10.0 ENVIRONMENTAL OPERATING CONDITIONS:

OPERATING CONDITIONS:

Total Strand Jack System including Electronic Control system and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies.

***Ambient Conditions: Temperature = 5 to 50 degree Celsius
Relative Humidity = 95% max.***

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(Vendor to confirm that Strand Jack System is suitable for above and details of provisions on the Strand Jack System for the same are to be furnished by Vendor)

Weather conditions are tropical, Atmosphere may be dust laden during some part of the year.
Strand Jack System shall be working in the open condition.

Max. Temperature variation is up to 25 deg Celsius in 24 hours.

(Vendor to confirm that Strand Jack System is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)

The Strand Jack System, including attachments and accessories, should be suitable for 24 hrs.
Continuous operation to its full capacity for 24 hour a day and 7 days a week throughout.
Vendor to ensure and confirm the same.

11.0 SCOPE OF SUPPLY

Sl No	Description	Qty	Remarks
1	Strand Jack (along with grips)	2 sets	
2	Fixed Anchors (along with grips)	2 nos.	
3	Strand jack hose sets, including quick release coupling (15m long min.)-	2 sets	
4	Hydraulic Power Pack	2 nos.	for normal operation
5	Hydraulic Power Pack	1 nos.	as a standby
6	Control System (along with ICTPN box, copper bus bar/junction box, power cable, etc.)	1 set.	
7	Data cables (25m long)	1 set.	
8	Strands	2 sets	
9	Lifting pin	2 nos.	
10	Fixed anchor block	2 nos.	
11	DG set	1 nos.	
12	Strand Dispenser	1 nos.	
13	Strand Guide	2 nos.	
14	Grease sticks for lubrication	36 nos.	
15	Toolbox and tools set	1 set.	

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16	Any other accessories required for operation, installation, commissioning & maintenance.		
17	Spares:		
17.1	Seal kits of main & auxiliary cylinder, solenoid valves, pumps, other valves	2 sets	
17.2	Grips (over and above grips mentioned in Sl. No: 1& 2)	10 usable sets	Eg: In one use if 36 nos. are required then total should be 360 nos.
17.3	Strand jack hose sets, including quick release coupling (15m long min.)	2 sets	
17.4	Switches and relay sets (one spare of each type)	1 set	
17.5	Control/data cables (25 m long) –	2 sets.	
17.6	Main circuit hydraulic pump –	1 nos.	
17.7	Auxiliary circuit hydraulic pump-	1 nos.	
17.8	Valve set – to include 01 nos. of each type of valve used in power pack / jacks.	1 set	
17.9	Filter set –	1 nos.	
17.10	Complete set of sensors to be mounted on strand jack-	1 set.	
17.11	Recommended spares for Electronic -	1 set.	
17.12	Recommended spares for Electrical -	1 set.	
17.13	Strands	2 sets	
18	Operation, maintenance and spare parts Manuals	4 sets	
19	Training at supplier's works:	2 weeks.	
20	Pre-dispatch inspection at supplier's works	01 Month notice period	
21	One set of full Hardware	1set.	

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22	Sea worthy Packing	As required.	
23	Erection and commissioning:	As required.	
24	Drawings of tools and fixtures for transportation	As required.	
25	Final inspection At site	As required.	
26	Load Test at site and prove out of BHEL Job	As required.	
27	First fill of Oils and Grease and other lubricants	As required.	
28	Guarantee 24 months from the date of acceptance of Strand Jack System.	As required.	
29	Touch up paint- as required.	As required.	
30	Service and support after sales for 2 years from the date of commissioning.	As required.	

Note: Evaluation items (11 and 12) shall be intimated before the price bid opening.

12.0 PREDISPATCH INSPECTION / TESTING (AT SUPPLIER WORKS)

12.1 The ordered Strand Jack System shall be inspected and load tested at manufacturers works as per international norms and mutually accepted quality plan as per Annexure-III and according to the load charts supplied along with the offer.

12.2 During inspection at the OEM works documentation and correlation of all the major components including bought out items of Strand Jack System (Make, Manufacturer's certificate etc.) shall be checked and set of such documents shall be handed over to BHEL inspector. In absence of these documents inspection will be treated as incomplete.

12.3 Various tests to be carried out.

- (a) Load Testing up to 100% (Full Load) and 125% (Over Load) to be performed in presence of BHEL Inspection Engineer.
- (b) Dynamic Overload Testing up to 110% and Static Overload Testing up to 125% to be performed in presence of BHEL Inspection Engineer.
- (c) 12 hrs of retention at load.
- (d) Operation for continuous 2 hrs (full system)
- (e) Visual checks of strands
- (f) Visual and dimensional checks of collets/grips
- (g) Test & material certificates of strands and collets/grips to be submitted during pre dispatch inspection.
- (h) Workmanship

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- (i) Different makes of the components
- (j) Suitable load to be arranged by the vendor

13.0 SPARES:

Itemized breakup of mechanical, diesel engine(in case diesel engine is opted for), hydraulic, electrical and electronic spares used on the Strand Jack System in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on continuous running basis should be offered by vendor.

The list to include following, in addition to other recommended spares: (Unit Price of each item of spare should be offered):

- **Mechanical & Hydraulic Spares:** All types of pumps, all types of Valves, all types of pressure switches / transducers, all types of filters, all types of seals for motors and other items.
- **Electrical / Electronic / Spares:** All applicable types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Operator's panel with Display Unit, , I / O Cards for PLC / other control modules / computer modules as applicable.
- All types of spares for total Strand Jack System and accessories should be available for atleast ten years after supply of the Strand Jack System. If Strand Jack System or it's controls are likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required.
- Recommended set of spares for all attachments are to be offered with details
- Vendor to confirm that complete list of spares for Strand Jack System and accessories, along with specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the system upon delivery

14.0 BHEL JOB / APPLICATION PROVING:

PROVEOUT OF BHEL COMPONENTS:

Drawing of prove out component is enclosed. Vendor to submit suitability along with the offer. Vendor shall be fully responsible for proveout of BHEL Job as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by vendor, regarding requirements for the proveout job, whether specified or not, should be discussed and cleared by vendor during initial technical discussions

During proveout, all tools / tackles / hook blocks shall be set by using supplied items, by the vendor.

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15.0 FINAL INSPECTION (TESTING):

- On receipt of all packages at BHEL sites same shall be verified jointly with respect to dispatch documents for any shortages.
- The Strand Jack System shall be inspected and load tested at BHEL site as per international norms and mutually accepted quality plan, according to the load charts supplied along with the offer. At site load test shall be carried out with available loads.
- Demonstration of all features of the Strand Jack System, Control system & all accessories to the satisfaction of BHEL for their efficient and effective use.
- Demonstration by actual use of all supplied attachments and accessories to their full capacity.
- Load tests as per stipulated quality plan such as (a) 125 % overload test (b) full load test for BHEL supplied job, to be demonstrated to establish the capacity of the system.
- Two weeks supervision of independent operation of the Strand Jack System by BHEL / BHEL's agency after job / Application proveout.

16.0 EQUIPMENT ACCEPTANCE:

The Strand Jack System shall be finally accepted after completion of the above mentioned inspection as well as satisfaction of all points of contract and supply of all items as per full scope of PO.

17.0 ERECTION AND COMMISSIONING BY SUPPLIER:

- 17.00** Supplier shall be fully responsible for carrying out the erection, start up, testing of Strand Jack System, its control system & all types of other supplied equipment, etc.
- 17.01** Other requirements like helping personnel shall be provided by BHEL. Details of these requirements should be informed by vendor in advance.
- 17.02** Successful proving of BHEL Load by the supplier shall be considered as part of commissioning.
- 17.03** All tests, as mentioned at clause 17 (Strand Jack System Acceptance) shall form part of the commissioning activity.
- 17.04** Tools, Tackles, instruments and other necessary equipment including alignment equipment required to carry out all above activities should be brought by the supplier.

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17.05 Commissioning spares, required for commissioning of the Strand Jack System within stipulated time, shall be brought by the supplier on returnable basis.

17.06 All Covers / guards required for the Strand Jack System and its accessories, if any, shall be supplied and installed by the vendor. Portion, if any, of the Strand Jack System, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colors of paints used.

Schedule of Erection and Commissioning shall be submitted with the offer. Charges, duration, terms & conditions for E&C should be furnished in detail

18.0 TOOLS FOR ERECTION, OPERATION & MAINTENANCE

Special tools and equipment required for erection of the Strand Jack System shall be brought by the vendor. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc. for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer.

19.0 GUARANTEE:

24 Months from the date of acceptance of the Strand Jack System.

20.0 TRAINING IN OPERATION AND MAINTENANCE AT SUPPLIER'S WORKS:

- For the Strand Jack System, necessary training for operation & maintenance shall be given to two BHEL personnel free of charge for 2 weeks at manufacturer's works.
- Air-fare, boarding & lodging for the trainees shall be borne by BHEL.
- Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.
- Vendor to quote for training on man / week basis.

21.0 TRAINING AT BHEL SITE

- For the Strand Jack System, necessary training for operation & maintenance shall be given to two BHEL personnel or BHEL's sub contractor, free of charge for 2 weeks duration at site during commissioning.
- Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training.

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- Vendor to quote for training on man / week basis.

22.0 SAFETY:

Following safety features in addition to other standard safety features should be provided on the machine:

- 22.01** Strand Jack System should have adequate and reliable safety interlocks / devices to avoid damage to the Strand Jack System, job and the operator due to the malfunctioning or mistakes. Strand Jack System functions should be continuously monitored and alarm / warning indications through lights / alarm number with messages (on display and panels) should be available.
- 22.02** A detailed list of all alarms / indications provided on Strand Jack System should be submitted by the supplier.
- 22.03** All the pipes, cables etc. on the Strand Jack System should be well supported and protected.
- 22.04** All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.
- 22.05** Emergency Switches at suitable locations as per International Norms are to be provided.
- 22.06** Oil & water / coolant pipe lines should not run with electrical cable in the same tray / trench.
- 22.07** Safety flashing Lights should be provided while Strand Jack System is making movement.
- 22.08** Cut off devices with exceeding the permissible loads to be provided. Indicators, displaying Safe load, maximum allowed load, gross load, net load on jack, etc., and other faults, to be provided.
- 22.09** Limit switches.
- 22.10** Wire rope / Strands: Strand Jack System shall be supplied with sufficient length of wire ropes / strands.

23.0 ELECTRICAL SYSTEM:

- 23.1** 24 VDC systems are to be used for various Strand Jack System controls. All types of cables, connections, circuit breakers etc. required must be incorporated.
- 23.2 Tropicalisation:** All electrical / electronic equipment shall be tropicalized.
- 23.3** All electrical & electronic control cabinets & panels should be dust and vermin proof.
- 23.4** All electrical / electronic components in the cabinets should be mounted on DIN/ std Rail.

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23.5 All electrical and electronic panels including operator's panel should be provided with fluorescent lamps for sufficient illumination.

24.0 COOLING SYSTEM FOR VARIOUS SUB-UNITS:

- Cooling System for all main systems, Diesel engine and Electrical panels and wherever required, with all accessories should be provided.
- Coolant collection and recirculation system should be leak proof & perfect to avoid any spillage etc.
- Coolant Filtration System if required needs to be provided.
- Coolant Flow Diagram showing filters, pumps, valves, tanks etc. to be submitted with the offer.

25.0 LUBRICATING SYSTEM / LUBRICATING ARRANGEMENT:

- Lubricating system / lubricating arrangement for all main systems items / joints, Diesel engine and locations wherever required, with all accessories should be provided.
- Lubricant collection and recirculation system should be leak proof & perfect to avoid any spillage etc.
- Lubricant Filtration System, if required, needs to be provided.
- Lubricant Flow Diagram showing filters, pumps, valves, tanks etc. to be submitted with the offer.

26.0 DOCUMENTATION REQUIRED BY BHEL OFFER SUPPLY OF STRAND JACK SYSTEM:

Five sets of following documents (Hard copies) in English language should be supplied along with the machine:

26.01 Operating manuals of Strand Jack System.

26.02 Detailed Maintenance manual of Strand Jack System with all drawings of assemblies / sub-assemblies / parts including Electrical / Coolant / Lubrication / Hydraulic circuit diagrams. All Assembly / Sub Assembly Drawings shall be supplied with the part list also.

26.03 Maintenance, Interface & commissioning manuals for Control system, drives.

26.04 Manufacturing drawings for all supplied accessories, connections, etc.

26.05 Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.

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- 26.06** Detailed specification of all rubber items and hydraulic / lube fittings.
- 26.07** Operating Manuals, Maintenance Manuals & Catalogues for supplied Measuring and Display Systems, Sensors and all supplied Accessories.
- 26.08** Complete Master List of parts used in the Strand Jack System shall be submitted by the vendor.
- 26.09** One additional set of all the above documentation on CD ROM, wherever possible.
- 26.10** All test certificates to be submitted.

27.0 EXPERIENCE CLAUSE / PERFORMANCE CERTIFICATE:

- 27.1** The bidder should have been manufacturing Strand Jack System of same or higher capacity at least for last five year.
- 27.2** The bidder should have supplied at least 10 units of Strand Jack System of quoted or higher capacity anywhere in world during last five year (Starting from the year of manufacturing of first Strand Jack System of this capacity) out of which at least five numbers should have been supplied to outside, other than the country of origin. (Details shall be as per Annexure enclosed in the Tender).
- 27.3** Offered Strand Jack System model as per specification must be in current manufacturing range.
- 27.4** Performance certificates (As per Annexure enclosed in the Tender) of at least three Strand Jack System of the same capacity or above capacity, from three different customers, located anywhere in the world other than country of manufacturing are to be furnished by Bidder. The certificates shall be in English duly signed and stamped by the concerned customer.
 - Name of the customer / company where similar Strand Jack System is installed.
 - Complete postal address of the customer.
 - Month & Year of commissioning.
 - Parameters of Strand Jack System(s) supplied (Safe load, Reach, Clearance with base) & application for which the Strand Jack System is supplied.
 - Name and designation of the contact person of the customer.
 - Phone, FAX no. and email address of the contact person of the customer.
 - Performance certificate from the customers regarding satisfactory performance of the Strand Jack System supplied to them (original certificate or Through E-mail directly from customer). The Original may be returned after verification by BHEL, if required.
- 27.5** BHEL reserves the right to verify the information provided by vendor. In case the information is found to be false / incorrect, the offer shall be rejected.

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28.0 GENERAL INFORMATION / DOCUMENTATION REQUIRED TO BE SUBMITTED WITH OFFER:

GENERAL: The vendor should submit the following information:

- 28.01** Strand Jack System Model being offered.
- 28.02** Min / Max Load capacity: In Tons.
- 28.03** Space required (Length, Width, and Height) for complete Strand Jack System & accessories.
- 28.04** Painting of Strand Jack System / Electrical Panels: Total weight of the Strand Jack System.
- 28.05** Weight of heaviest part of Strand Jack System.
- 28.06** Weight of the heaviest assembly / subassembly of the Strand Jack System.
- 28.07** Dimensions of largest part / subassembly / assembly of the Strand Jack System.
- 28.08** Vendor to submit, along with offer, the reference list of customers where similar Strand Jack System have been supplied mentioning the customer, Strand Jack System Model, major specifications of the supplied Strand Jack System, Controller System, Year of Supply etc.
- 28.09** Detailed catalogues, sketch / photographs of the Strand Jack System and accessories / attachments should be submitted with the offer. Video images on CD including hard copy explaining the technical features / Literature with photographs, drawings explaining the technical features should be enclosed with the offer.
- 28.10** Point to point confirmation of this specification.

29.0 PACKING:

Sea worthy & rigid packing for all items of complete Strand Jack System, Control System, all Accessories and other supplied items to avoid any damage / loss in transit, to be provided. When Strand Jack System is dispatched in containers, all small loose items shall be suitably packed in boxes.

The drawings of all suitable fixtures should be provided so that these can be manufactured here for frequent Transportation without causing damage to Strand Jack System parts.

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30.0 AFTER SALES SERVICE FACILITIES:

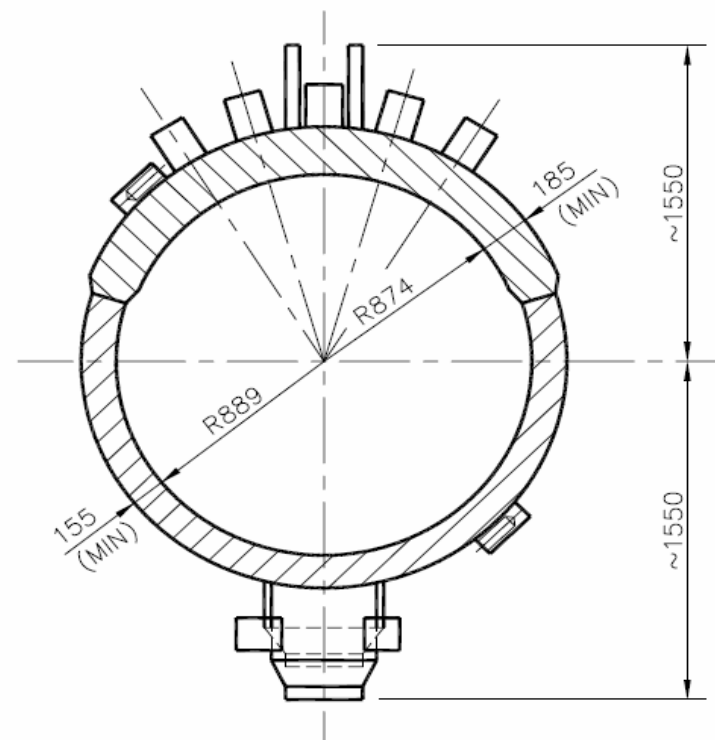
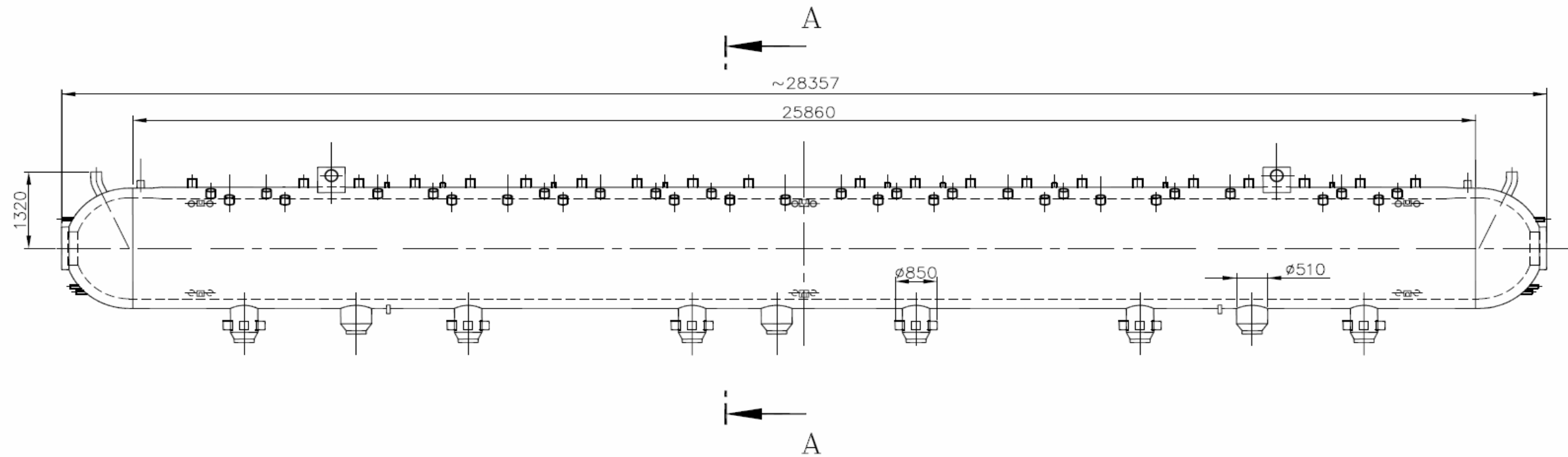
The manufacturer or his authorized service provider shall have suitable infrastructure in India to adequately take care of after sales servicing / repairs of the Strand Jack System. 6 periodic service visits each of 2 days duration shall be provided by the Service Engineer of the Indian Agent & 3 visits shall be provided by the manufacturer service engineer during warranty period. Performance BG shall be suitably deducted on prorata basis in the absence of this.

31.0 Painting:

Standard red and white. Touch up paint to be provided at site at the time of commissioning to touch up the scratched paint wherever necessary.

1. Boiler Dimensions

ALL DIMENSIONS ARE IN MM



SECTION-AA

TOTAL WEIGHT ~ 260 T

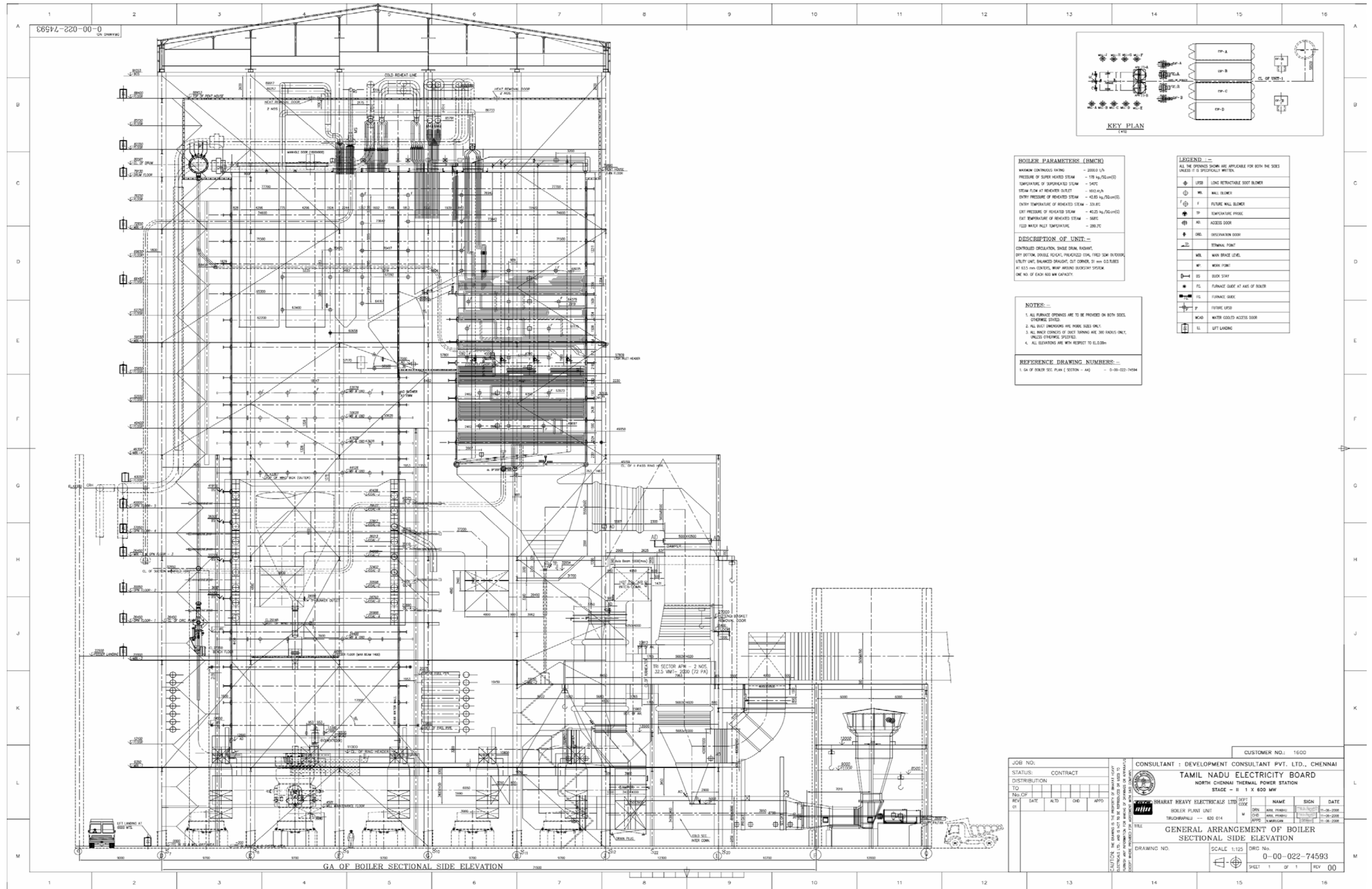
PROJECT : NORTH CHENNAI – 600 MW, CUST. No. 1600

BOILER DRUM SKETCH FOR TRANSPORT ANALYSIS

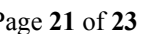


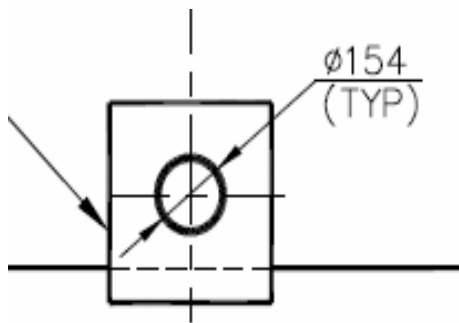
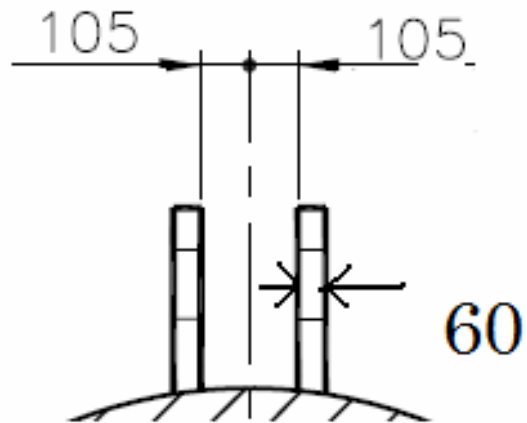
Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014

2. Boiler Mounting Structural Diagram – Front View



Boiler mounting structural – Top view





QUALITY PLAN

S. No.	Component/Activity	Characteristics	Acceptance Norms
1	Hydraulic Power Pack	Make of components	As per list given in offer
2	Hydraulic Power Pack	Rating of various components	As per specifications
3	Hydraulic Power Pack	Workmanship	Visual
4	Hydraulic Power Pack	Operation	Operation of consoles & solenoids
5	Hydraulic Power Pack	Dimensional Check	Measurement By Tape
6	Control Panel	Make of components	As per list given in offer PO
7	Control Panel	Circuit components	As per approved circuit
8	Control Panel	Wiring	As per approved circuit
9	Control Panel	Workmanship of panel	Visual
10	Control Panel	Software testing	As per manufacturer standard
11	Load test in Laboratory	Main cylinder pressure	Testing and certification to 150% of working pressure.
12	Load test in Laboratory	Complete strand jack	load testing and certification to 100% of safe working load.
13	Load test in Laboratory	Complete strand jack	Dynamic load testing and certification to 110% of safe working load.
14	Load test in Laboratory	Complete strand jack	Static load testing and certification to 125% of safe working load.
15	Load test in Laboratory	Fixed Anchors of Strand Jack	Static load testing and certification to 125% of safe working load.