T E N D E R S P E C I F I C A T I O N

No. - BHE/PW/PUR/SLT-BL4/497

FOR

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE; ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING & TRIAL OPERATION; HANDING OVER OF 405 TPH CFBC BOILER AND AUXILIARIES INCLUDING ESP, ROTATING MACHINES, DUCTS & DAMPERS, FUEL PIPING, BOILER INTEGRAL PIPING, POWER CYCLE PIPING ETC. OF 125 MW CAPACITY UNIT NO. 4

AT

GUJARAT INDUSTRIAL POWER COMPANY LIMITED

SURAT LIGNITE POWER PLANT (SLPP)

NANI NAROLI, TALUKA-MANGROL

DISTT: SURAT, GUJARAT

PART –I

(TECHNICAL BID SPECIFICATION, NOTICE INVITING TENDER and GCC)

BHARAT HEAVY ELECTRICALS LIMITED
(*A GOVERNMENT OF INDIA UNDERTAKING*)
POWER SECTOR : WESTERN REGION
345-KINGSWAY : NAGPUR-440 001

Contents

LEGEND:

$: PLACED BEFORE 'GENERAL CONDITIONS OF CONTRACT' IN BOTH HARD AND SOFT COPY DOCUMENTS.

#: ATTACHED AT THE END OF HARD COPY OF TENDER SPECS. PART-I (TECHNICAL BID) AND AS A SEPARATE FILE TITLED 'WEB_NIT_GCC' AS SOFT COPY HOSTED IN WEB PAGE.

@: ISSUED AS SEPARATE BOOKLET IN HARD COPY AS PART-II (PRICE BID) AND AS SEPARATE FILE TITLED 'PRICE_BID' AS SOFT COPY HOSTED IN WEB PAGE.

BHARAT HEAVY ELECTRICALS LIMITED
(A GOVERNMENT OF INDIA UNDERTAKING)
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345-KINGSWAY, NAGPUR-440 001

TENDER SPECIFICATION No. No. - BHE/PW/PUR/SLT-BL4/497

FOR

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE; ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING & TRIAL OPERATION; FINAL PAINTING AND HANDING OVER OF 1x405 TPH CFBC BOILER AND AUXILIARIES INCLUDING ESP, ROTATING MACHINES, DUCTS & DAMPERS, FUEL PIPING, BOILER INTEGRAL PIPING, POWER CYCLE PIPING ETC. OF 125 MW CAPACITY UNIT -4

AT

GUJARAT INDUSTRIAL POWER COMPANY LIMITED
SURAT LIGNITE POWER PLANT (SLPP)
NANI NAROLI, TALUKA-MANGROL
DISTT: SURAT, GUJARAT

EARNEST MONEY DEPOSIT: Please see Special Conditions of Contract.

LAST DATE FOR TENDER SUBMISSION	Please obtain updated information from web page "http://www.bhel.com" → Tender Notifications → View Corrigendums.

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING PART-I AND PART- II (PRICE BID), ARE ISSUED TO:

M/s. .....

.....

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.
BIDDER SHALL NOTE THAT THEIR OFFER WILL BE CONSIDERED SUBJECT TO THE APPROVAL OF BHEL'S CUSTOMER.

For Bharat Heavy Electricals Limited

Dy. General Manager (Purchase)
Place: Nagpur
Date:

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
POWER SECTOR - WESTERN REGION
345-KINGSWAY, NAGPUR 440 001

PROCEDURE FOR SUBMISSION OF SEALED TENDERS

THE TENDERER MUST SUBMIT THEIR TENDERS AS REQUIRED IN TWO PARTS IN SEPARATE SEALED COVERS PROMINENTLY SUPERSCRIBED AS PART-I TECHNICAL BID AND PART-II PRICE BID AND ALSO INDICATING ON EACH OF THE COVERS THE TENDER SPECIFICATION NUMBER AND DUE DATE AND TIME AS MENTIONED IN THE TENDER NOTICE.

Part-I (Technical Bid) cover-I:

Excepting rate schedule, all other schedules, data sheets and details called for in the specification shall be enclosed in part-I "Technical Bid" only.

EARNEST MONEY DEPOSIT (EMD)

EMD shall be included in the Technical Bid. **EMD shall be paid by bidders only in the form of account payee Demand Draft payable at Nagpur in favour of Bharat Heavy Electricals Limited.** No other mode of payment of EMD shall be acceptable.
Bidder may opt to deposit “One Time EMD” of Rs. 2.0 lacs with this office (BHEL:PSWR:Nagpur) which will enable them to participate in all the future tender enquiries in respect of Erection and Commissioning services issued from this office. Interested bidders may clearly send their consent for converting the present EMD into an “One Time EMD” in their offer.
Bidders who have already submitted such “One Time EMD” will be exempted from submission of any EMD for this tender. However bidder shall furnish details of the “One Time EMD” in his offer including the Check List furnished herein.

Part-II (Price Bid) cover-II:

All indications of price shall be given in this part-II "Price Bid". **EMD shall not be included in this cover.**

THESE TWO SEPARATE COVERS-I AND II (PART-I AND PART-II) SHALL TOGETHER BE ENCLOSED IN A THIRD ENVELOPE (COVER-III) ALONGWITH REQUISITE EMD AS INDICATED EARLIER AND THIS SEALED COVER SHALL BE SUPERSCRIBED AND SUBMITTED TO ADDL. GENERAL MANAGER (PURCHASE) AT THE ABOVE MENTIONED ADDRESS ON OR BEFORE THE DUE DATE AS INDICATED.

THE QUALIFIED TENDERER WILL BE INTIMATED SEPARATELY ABOUT THE STATUS OF THEIR OFFER.

TENDERER ARE REQUESTED TO MAKE SPECIFIC NOTE OF THE FOLLOWING CONDITIONS:

1. CONTRACTOR SHOULD HAVE ADEQUATE RESOURCES INCLUDING MAJOR T&P AT HIS DISPOSAL FOR THIS JOB.

2. CONTRACTOR SHOULD HAVE SOUND FINANCIAL STABILITY.

3. TENDERER SHOULD MEET QUALITY REQUIREMENT REGARDING WORKMANSHIP, DEPLOYMENT OF PERSONNEL, ERECTION TOOLS AND NECESSARY INSPECTION, MEASUREMENT & TESTING INSTRUMENTS.

4. BIDDER SHALL MEET ALL THE QUALIFYING REQUIREMENTS AS MENTIONED IN THE NOTICE INVITING TENDER.

5. ALL INFORMATION AS CALLED FOR IN VARIOUS APPENDICES AND CLAUSES OF TENDER SPECIFICATION SHOULD BE FURNISHED. PLEASE REFER THE CHECKLIST. THE DETAILS SO FURNISHED BY TENDERER SHOULD BE COMPLETE IN ALL RESPECTS AND AS PER FORMAT S SPECIFIED IN TENDER SPECIFICATION.

6. OFFERS RECEIVED WITH ANY DEVIATION OR WITHOUT RELEVANT INFORMATION AS DESCRIBED ABOVE ARE LIABLE TO BE REJECTED. PRICE BIDS RECEIVED IN THE FORM OTHER THAN SPECIFIED IN PART-II (PRICE BID) ARE LIABLE TO BE REJECTED.

7. **TENDERER SHALL NOTE THAT THEIR OFFER WILL BE CONSIDERED SUBJECT TO THE APPROVAL OF BHEL'S CUSTOMER.**

PROJECT INFORMATION

INTRODUCTION

Gujarat Industries Power Company Limited (GIPCL), as part of expansion plan is installing the two units each of 125 MW under "2x125 MW, Expansion project (Phase II)-Unit-3 & 4" plan in their existing 2x125 MW phase-I premise at Surat Lignite Power Plant (SLPP), Nani Naroli, P.O. Nani Naroli-394110, Taluka - Mangrol, Dist.- Surat.

The site is located at a distance of approximately 28 km from Kosamba, Village Nani Naroli, Taluk Mangrol, District Surat- Gujarat.

The further information is as given below:

SN	Description		Details
1.0	CUSTOMER	:	Gujarat Industries Power Co. Ltd.
			P. O. Petrochemicals – 391 346
			Baroda, India
2.0	CONSULTANT	:	TCE Consulting Engineers Limited
			73/1, St. Mark's Road
			Bangalore – 560 001.
3.0	PROJECT	:	Surat Lignite Power Plant
			2 x 125MW – Phase II (Expansion Project) Unit Nos. 3 & 4
4.0	LOCATION	:	At a distance of 28 kms from Kosamba, Village Nani Naroli, Taluk Mangrol, District Surat, Gujarat, India.
5.0	NEAREST AIRPORT	:	Baroda, Gujarat.
6.0	ROAD APPROACH	:	Accessible by road from two points Kim and Kosamba which are on Mumbai-Ahmedabad highway. From Kim, the site is around 23 kms and from Kosamba, the site is around 28 kms.
7.0	NEAREST RAILWAY STATION	:	Kim/Kosamba is on Mumbai-Ahmedabad broad gauge line. Same is at a distance of 32 kms from the proposed power project site.
8.0	NEAREST PORT	:	Mumbai
9.0	ALTITUDE	:	About 50 m above mean sea level.
10.0	SEISMIC ZONE	:	Zone – III as per Indian Standard IS:1893 (Current Issue).

SN	Description				Details
11.0	RAINFALL(ANNUAL TOTAL R.O.MEAN)			:	1800 mm (Maximum rainfall occurs during June to September)
12.0	AMBIENT AIR EMPERATURE				
	(a) Maximum dry bulb			:	45.6 Deg. C.
	(b) Minimum dry bulb			:	4.4 Deg. C.
	(c) Maximum daily average dry bulb			:	37.3 Deg. C
	(d) Reference Temperature for design of electrical equipment / devices			:	(+) 50 Deg. C
13.0	RELATIVE HUMIDITY (a) Maximum			:	87%
	(b) Minimum			:	33%
	(c) Average			:	71%
	(d) Relative humidity for design of equipment / devices			:	(+) 100%
14.0	CLIMATIC CONDITION			:	Hot, humid and dusty.
15.0	WIND DATA				
15.1	(a) Wind load as per IS 875 (Part-3) 1987				
		(i)	Basic wind speed	:	44 m/sec.
		(ii)	Factor KI	:	1.07
		(iii)	Terrain category 1 & the corresponding value of K2	:	1.09

Above information furnished are for general guidance of Contractor. Contractor is advised to visit the site and appraise himself about the conditions of site and infrastructure available in the area for fulfilling their commitments under the contract.

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)				
1	Name of the Bidder with Postal Address for Correspondence			
2	Name of Contact Person with Telephone & Fax No.	Mr./Ms Tel No. Fax No.		
3	Nature of the firm	PROPRIETARY / PARTNERSHIP / LIMITED CO.		
4	Details of EMD Please Indicate whether 1) One Time EMD or, 2) Only for this Tender	DD No. ……. DD Date……. Name of Bank……... Amount: Rs……..		
5	Validity of Offer (BHEL's Requirement: 180 days from Due Date)	Validity _____ days		
6	Mobilization Time (Please refer Section-11 of SCC)	Mobilization Time _____		
7	Whether any conditions stipulated?	**Yes** (vide Document reference:		**No**
		Bidder to note that tender with conditions unacceptable to BHEL shall be rejected.		
8	Bidder has visited the project site and acquainted with the site conditions		Yes	No
9	Details of **concurrent jobs** (**Appendix-VIII**) are furnished		Yes	No
10	Headquarters organization is furnished		Yes	No
11	Proposed site organization is furnished		Yes	No
12	Names and particulars of directors/partners are furnished		Yes	No
13	Financial status of the firm (**Annexure 'A' of GCC**) is furnished		Yes	No
14	**Audited Profit & Loss Account** for preceding three years authenticated by Bidder's Chartered Accountants is furnished		Yes	No

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)			
15	**Latest Certificate by Bidder's Banker for Overdraft & BG Limits** is Furnished (Certificate shall not be older than six months from the Last Date for offer submission)	Yes	No
16	Copy of **IT Return** of last three financial years along with copy of **PAN Card** are Furnished	Yes	No
17	Month-wise **Manpower Deployment Plan** (**Appendix-VI**) is furnished	Yes	No
18	**Analysis of Unit Rates** (**Appendix-V**) quoted is furnished	Yes	No
19	**Month-wise deployment plan for major T&P** (**Appendix-VII**) furnished	Yes	No
20	Whether all the pages of the **Tender Specification** documents are **read, understood and signed**	Yes	No
21	**Power of Attorney** enclosed in favour of person making offer	Yes	No
22	Bidder has familiarized himself with all Relevant Local Laws & Local Conditions	Yes	No
23	Safety Requirement of this work in a Running plant Premises has been understood.	Yes	No
24	Erection and Commissioning programme furnished	Yes	No
25	**List of Jobs completed** (**Appendix-IX**) in last seven years is furnished	Yes	No
26	Whether **copies of detailed Work Orders (with Scope and BOQ)** and **Completion Certificates** in support of above furnished	Yes	No
27	Whether contractor has left any job unfinished? If so, give reasons.	Yes	No
28	Whether any client has terminated the contractor's work before completion? If so, furnish reasons for the same	Yes	No

NOTE: STRIKE OFF YES OR NO, AS APPLICABLE

DATE: SIGNATURE OF BIDDER

DECLARATION BY BIDDER'S AUTHORIZED SIGNATORY

I, HEREBY CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO THE TENDER SPECIFICATION **No. BHE/PW/PUR/SLT-BL4/497** ARE TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE. I HAVE GONE THROUGH THE SPECIFICATIONS, CONDITIONS AND STIPULATIONS IN DETAIL AND AGREE TO COMPLY WITH THE REQUIREMENTS AND INTENT OF THE SPECIFICATION. I FURTHER CERTIFY THAT I AM DULY AUTHORIZED REPRESENTATIVE OF THE UNDER-MENTIONED TENDERER AND A VALID POWER OF ATTORNEY TO THIS EFFECT IS ALSO ENCLOSED.

AUTHORISED REPRESENTATIVE'S SIGNATURE WITH
NAME AND ADDRESS

DATE:

BIDDER'S NAME AND ADDRESS

CERTIFICATE OF NO-DEVIATION

TENDER SPECIFICATION No. BHE/PW/PUR/SLT-BL4/497

I/WE, M/s .....

HEREBY CERTIFY THAT NOTWITHSTANDING ANY CONTRARY INDICATIONS / CONDITIONS ELSEWHERE IN OUR OFFER DOCUMENTS, I/WE HAVE NEITHER SET ANY TERMS AND CONDITIONS NOR THERE IS ANY DEVIATION TAKEN FROM THE CONDITIONS OF BHEL'S TENDER SPECIFICATIONS, EITHER TECHNICAL OR COMMERCIAL, AND I/WE AGREE TO ALL THE TERMS AND CONDITIONS MENTIONED IN BHEL'S TENDER SPECIFICATION WITH ASSOCIATED AMENDMENTS, CLARIFICATIONS etc.

SIGNATURE OF THE TENDERER

DATE:

SECTION-3
OFFER OF THE BIDDER

To,
DGM (Purchase)
BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345, KINGSWAY
NAGPUR- 440 001

DEAR SIR,

I/WE HEREBY OFFER TO CARRY OUT THE WORK DETAILED IN TENDER SPECIFICATION NO. BHE/PW/PUR/SLT-BL4/497 ISSUED BY BHARAT HEAVY ELECTRICALS LIMITED, POWER SECTOR-WESTERN REGION, NAGPUR, IN ACCORDANCE WITH THE TERMS AND CONDITIONS THEREOF.

I/WE HAVE CAREFULLY PERUSED THE FOLLOWING LISTED DOCUMENTS CONNECTED WITH THE ABOVE WORK AND AGREE TO ABIDE BY THE SAME.

1. INSTRUCTIONS TO TENDERERS
2. GENERAL CONDITIONS OF CONTRACT
3. SPECIAL CONDITIONS OF CONTRACT
4. OTHER SECTIONS, APPENDICES, SCHEDULES AND DRAWINGS.

I/WE HAVE DEPOSITED / FORWARDED HEREWITH THE REQUISITE EARNEST MONEY DEPOSIT, DETAILS OF EMD PAYMENT ARE FURNISHED IN THE CHECK LIST.

EMD SHALL BE REFUNDED SHOULD OUR OFFER NOT BE ACCEPTED / EMD **NEED NOT BE REFUNDED AND THE AMOUNT MAY BE TREATED AS "ONE TIME EMD" FOR ERECTION AND COMMISSIONING TENDERS OF BHEL-PSWR, NAGPUR**. SHOULD OUR OFFER BE ACCEPTED, I/WE FURTHER AGREE TO DEPOSIT SECURITY DEPOSIT FOR THE WORK AS PROVIDED FOR IN THE TENDER SPECIFICATION WITHIN THE STIPULATED TIME AS MAY BE INDICATED BY BHEL, POWER SECTOR-WESTERN REGION, NAGPUR.

I/WE FURTHER AGREE TO EXECUTE ALL THE WORKS REFERRED TO IN THE SAID DOCUMENTS UPON THE TERMS AND CONDITIONS CONTAINED OR REFERRED TO THEREIN AND AS DETAILED IN THE APPENDICES ANNEXED THERETO.

PLACE: SIGNATURE OF BIDDER:
DATE : ADDRESS:

WITNESSES WITH THEIR ADDRESS

SIGNATURE	NAME	ADDRESS
1.		
2.		

SECTION-4
SPECIAL CONDITIONS OF CONTRACT

SCOPE OF WORK

4.0 GENERAL

THE WORK TO BE CARRIED OUT UNDER THE SCOPE OF THESE SPECIFICATIONS IS BROADLY AS UNDER:

1) COLLECTION OF MATERIALS/COMPONENTS/EQUIPMENTS FROM BHEL/ CUSTOMER STORES/ STORAGE YARD, HANDLING/ LOADING AND TRANSPORTATION TO ERECTION SITE/ SITE OF WORK AND HANDLING/UNLOADING AT ERECTION SITE/ SITE OF WORK.

2) PRE-ASSEMBLY, IF ANY, PRE-ERECTION CHECKS AS APPLICABLE

3) ERECTION, ALIGNMENT AND WELDING, BOLTING, FASTENING, GROUTING AS APPLICABLE OF :

   a) BOILER SUPPORTING STRUCTURES, STAIRWAYS AND GALLERIES.
   b) BOILER PRESSURE PARTS INCLUDING BOILER DRUM.
   c) BOILER TRIM & INTEGRAL PIPING AND MOUNTINGS.
   d) FIXING OF ANCHORS & ATTACHMENTS WITH PRESSURE PARTS FOR REFRACTORY LINING (APPLICATION OF REFRACTORY LINING INSIDE COMBUSTOR WILL BE DONE BY OTHER AGENCY).
   e) FUEL OIL PIPING.
   f) NON-PRESSURE PARTS INCLUDING CYCLONES ETC.
   g) ROTATING MACHINES (e.g. FANS WITH THEIR DRIVES & LUBE OIL SYSTEM ETC.).
   h) ELECTROSTATIC PRECIPITATOR.
   i) INSULATION OF ESP BETWEEN INNER AND OUTER ROOF INCLUDING FIXING OF PINS, RETAINER, BEINDING WIRES ETC. (FIXING COMPONENTS)
   j) PULVERISED FUEL & LIME STONE PIPING.
   k) ELECTRICAL TRACING OF PIPING & SYSTEM WITH ASSOCIATED ELECTRICAL WORKS.
   l) EXTERNAL AND INTERCONNECTING STRUCTURES (e.g. DUCT SUPPORTING, LIFT STRUCTURE etc.).
   m) HANDLING ARRANGEMENTS FOR ROTATING MACHINES.
   n) POWER CYCLE PIPING, TANKS AND VESSELS ETC.

4) NON-DESTRUCTIVE EXAMINATION & POST WELD HEAT TREATMENT

5) PRE-COMMISSIONING CHECKS/TESTS, TRIAL RUNS/TESTING AND ASSISTANCE FOR COMMISSIONING

6) TRIAL OPERATION, RELIABILITY RUN AND ASSOCIATED TESTS

8) COMPLETION OF FACILITY/SYSTEMS INCLUDING COMMON SYSTEM

9) HANDING OVER OF THE UNIT

4.1 SCOPE OF WORK IS FURTHER DETAILED IN VARIOUS CLAUSES HEREINAFTER.

4.1.1 GENERAL REQUIREMENTS – COMMON TO ALL WORK

4.1.1.1
THE INTENT OF SPECIFICATION IS TO PROVIDE SERVICES ACCORDING TO THE MOST MODERN AND PROVEN TECHNIQUES AND CODES. THE OMISSION OF SPECIFIC REFERENCE TO ANY METHOD, EQUIPMENT OR MATERIAL NECESSARY FOR PROPER AND EFFICIENT EXECUTION OF THIS WORK SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF PROVIDING SUCH FACILITIES TO COMPLETE THE WORK WITHOUT ANY EXTRA COMPENSATION.

4.1.1.2
THE TERMINAL POINTS DECIDED BY BHEL SHOULD BE FINAL AND BINDING ON THE CONTRACTOR FOR DECIDING THE SCOPE OF WORK AND EFFECTING PAYMENT FOR THE WORK DONE.

4.1.1.3
THE WORK SHALL BE EXECUTED UNDER THE USUAL CONDITIONS AFFECTING MAJOR POWER PLANT CONSTRUCTION AND IN CONJUNCTION WITH NUMEROUS OTHER OPERATIONS AT SITE. THE CONTRACTOR AND HIS PERSONNEL SHALL COOPERATE WITH PERSONNEL OF BHEL, BHEL'S CUSTOMER, CUSTOMER'S CONSULTANTS AND OTHER CONTRACTORS, COORDINATING HIS WORK WITH OTHERS AND PROCEED IN A MANNER THAT SHALL NOT DELAY OR HINDER THE PROGRESS OF WORK OF THE PROJECT AS A WHOLE.

4.1.1.4
THE WORK COVERED UNDER THIS SPECIFICATION IS OF HIGHLY SOPHISTICATED NATURE, REQUIRING THE BEST QUALITY WORKMANSHIP, SUPERVISION, ENGINEERING AND CONSTRUCTION MANAGEMENT. THE CONTRACTOR SHOULD ENSURE PROPER PLANNING AND SUCCESSFUL & TIMELY COMPLETION OF THE WORK TO MEET THE OVERALL PROJECT SCHEDULE. THE CONTRACTOR MUST DEPLOY ADEQUATE QUANTITY OF TOOLS & PLANTS, MODERN / LATEST CONSTRUCTION AIDS ETC. HE MUST ALSO DEPLOY ADEQUATE TRAINED, QUALIFIED AND EXPERIENCED SUPERVISORY STAFF AND SKILLED PERSONNEL.

4.1.1.5
CONTRACTOR SHALL ERECT AND COMMISSION ALL THE EQUIPMENTS AND AUXILIARIES AS PER THE SEQUENCE & METHODOLOGY PRESCRIBED BY BHEL DEPENDING UPON THE TECHNICAL REQUIREMENTS. AVAILABILITY OF MATERIALS AND FRONTS WILL DECIDE THIS. BHEL ENGINEER'S DECISION REGARDING CORRECTNESS OF THE WORK AND METHOD OF WORKING SHALL BE FINAL AND BINDING ON THE CONTRACTOR. NO CLAIMS FOR EXTRA PAYMENT FROM THE CONTRACTOR WILL BE ENTERTAINED ON THE GROUND OF DEVIATION FROM THE METHODS / SEQUENCE ADOPTED IN ERECTION OF SIMILAR SETS ELSEWHERE.

4.1.1.6
ALL NECESSARY CERTIFICATES AND LICENSES, PERMITS & CLEARANCES REQUIRED TO CARRY OUT THIS WORK FROM THE RESPECTIVE STATUTORY/ LOCAL AUTHORITIES ARE TO BE ARRANGED BY THE CONTRACTOR AT HIS COST IN TIME TO ENSURE SMOOTH PROGRESS OF WORK.

4.1.1.7
THE BOILER SHALL BE ERECTED AS PER RELEVANT PROVISIONS OF LATEST INDIAN BOILER REGULATIONS AND AMENDMENTS/ADDENDA THEREOF, IF ANY.

4.1.1.8
THE WORK SHALL CONFORM TO DIMENSIONS AND TOLERANCES SPECIFIED IN THE VARIOUS DRAWINGS / DOCUMENTS THAT WILL BE PROVIDED DURING VARIOUS STAGES OF ERECTION. IF ANY PORTION OF WORK IS FOUND TO BE DEFECTIVE IN WORKMANSHIP, NOT CONFORMING TO DRAWINGS OR OTHER STIPULATIONS DUE TO CONTRACTOR'S FAULT, THE CONTRACTOR SHALL DISMANTLE AND RE-DO THE WORK DULY REPLACING THE DEFECTIVE MATERIALS AT HIS COST, FAILING WHICH THE WORK WILL BE GOT DONE BY BHEL AND RECOVERIES WILL BE EFFECTED FROM THE CONTRACTOR'S BILLS TOWARDS EXPENDITURE INCURRED INCLUDING COST OF MATERIALS AND DEPARTMENTAL OVERHEADS OF BHEL.

4.1.1.9
THE CONTRACTOR SHALL PERFORM ANY SERVICES, TESTS ETC, WHICH MAY NOT BE SPECIFIED BUT NEVERTHELESS, REQUIRED FOR THE COMPLETION OF WORK WITHIN QUOTED RATES.

4.1.1.10
THE CONTRACTOR SHALL EXECUTE THE WORK IN THE MOST SUBSTANTIAL AND WORKMANLIKE MANNER. THE STORES SHALL BE HANDLED WITH CARE AND DILIGENCE.

4.1.1.11
BHEL RESERVES RIGHT TO RECOVER FROM THE CONTRACTOR ANY LOSS WHICH ARISES OUT OF UNDUE DELAY / DISCREPANCY / SHORTAGE / DAMAGE OR ANY OTHER CAUSES DUE TO CONTRACTOR'S LAPSE DURING ANY STAGE OF WORK. ANY LOSS TO BHEL DUE TO CONTRACTOR'S LAPSE SHALL HAVE TO BE MADE GOOD BY THE CONTRACTOR.

4.1.1.12
ALL CRANES, TRANSPORT EQUIPMENT, HANDLING EQUIPMENT, TOOLS, TACKLES, FIXTURES, EQUIPMENT, MANPOWER, SUPERVISORS/ENGINEERS, CONSUMABLES ETC, EXCEPT OTHERWISE SPECIFIED AS BHEL SCOPE OF FREE ISSUE, REQUIRED FOR THIS SCOPE OF WORK SHALL BE PROVIDED BY THE CONTRACTOR. ALL EXPENDITURE INCLUDING TAXES AND INCIDENTALS IN THIS CONNECTION WILL HAVE TO BE BORNE BY HIM UNLESS OTHERWISE SPECIFIED IN THE RELEVANT CLAUSES. THE CONTRACTOR'S QUOTED RATES SHOULD BE INCLUSIVE OF ALL SUCH CONTINGENCIES.

4.1.1.13
DURING THE COURSE OF ERECTION, TESTING AND COMMISSIONING CERTAIN REWORK / MODIFICATION / RECTIFICATION / REPAIR / FABRICATION ETC MAY BECOME NECESSARY ON ACCOUNT OF FEED BACK / REVISION OF DRAWING ETC. THIS WILL ALSO INCLUDE MODIFICATIONS / RE-WORKS SUGGESTED BY BHEL / CUSTOMER / OTHER INSPECTION GROUP. CONTRACTOR SHALL CARRY OUT SUCH REWORK / MODIFICATION / RECTIFICATION / FABRICATION / REPAIR ETC PROMPTLY AND EXPEDITIOUSLY. DAILY LOG SHEETS SIGNED BY BHEL ENGINEER AND INDICATING THE DETAILS OF WORK CARRIED OUT, MAN-HOURS ETC SHALL BE MAINTAINED BY THE CONTRACTOR FOR SUCH REWORKS. CLAIM OF CONTRACTOR IF ANY, FOR SUCH WORKS WILL BE GOVERNED BY RELEVANT CLAUSES OF SECTION-13, SPECIAL CONDITIONS OF CONTRACT.

4.1.1.14
ALL WORKS SUCH AS CLEANING, LEVELING, ALIGNING, TRIAL ASSEMBLY, DISMANTLING OF CERTAIN EQUIPMENTS / COMPONENTS FOR CHECKING AND CLEANING, SURFACE PREPARATION, FABRICATION OF STRUCTURES, TUBES AND PIPES AS PER GENERAL ENGINEERING PRACTICE AND AS PER BHEL ENGINEER'S INSTRUCTIONS AT SITE, CUTTING, GOUGING, WELD DEPOSITING, GRINDING, STRAIGHTENING, CHAMFERING, FILING, CHIPPING, DRILLING, REAMING, SCRAPPING, LAPPING, FITTING UP ETC AS MAY BE APPLICABLE IN SUCH ERECTION WORKS AND WHICH ARE TREATED INCIDENTAL TO THE ERECTION WORKS AND NECESSARY TO COMPLETE THE WORK SATISFACTORILY, SHALL BE CARRIED OUT BY THE CONTRACTOR AS PART OF THE WORK WITHIN THE QUOTED RATES.

4.1.1.15
THE CONTRACTOR SHALL MAKE ALL FIXTURES, TEMPORARY SUPPORTS, STEEL STRUCTURES REQUIRED FOR JIGS & FIXTURES, ANCHORS FOR LOAD AND GUIDE PULLEYS REQUIRED FOR THE WORK. CONTRACTOR SHALL ARRANGE NECESSARY STEEL FOR SUCH USAGE. ONLY THE STEEL FOR DRUM LIFTING TEMPORARY STRUCTURE (CAT HEAD) WILL BE PPROVIDE BY BHEL IN RANDOM SIZE MATERIALS AVAILABLE AT SITE.

4.1.1.16
THE CONTRACTOR SHALL TAKE DELIVERY OF THE COMPONENTS, EQUIPMENTS, CHEMICALS, AND LUBRICANTS ETC FROM THE BHEL STORES/ STORAGE AREA AFTER GETTING THE APPROVAL OF BHEL ENGINEER ON STANDARD INDENT FORMS OF BHEL. COMPLETE AND DETAILED ACCOUNT OF THE MATERIALS AND EQUIPMENTS AFTER USAGE SHALL BE SUBMITTED TO THE BHEL AND RECONCILED PERIODICALLY.

4.1.1.17
CONTRACTOR SHALL PLAN AND TRANSPORT EQUIPMENTS, COMPONENTS FROM STORES/ STORAGE YARD TO ERECTION SITE AND ERECT THEM IN SUCH A MANNER AND SEQUENCE THAT MATERIAL ACCUMULATION AT SITE DOES NOT LEAD TO CONGESTION AT SITE OF WORK. MATERIALS SHALL BE STACKED NEATLY, PRESERVED AND STORED IN THE CONTRACTOR'S SHED AND AT WORK AREAS IN AN ORDERLY MANNER. IN CASE IT IS NECESSARY TO SHIFT AND RE-STACK THE MATERIALS KEPT AT WORK AREAS/ SITE TO ENABLE OTHER AGENCIES TO CARRY OUT THEIR WORK OR FOR ANY OTHER REASON, SAME SHALL BE DONE BY CONTRACTOR MOST EXPEDITIOUSLY. NO CLAIM FOR EXTRA PAYMENT FOR SUCH WORK WILL BE ENTERTAINED.

4.1.1.18
PLANT MATERIALS SHOULD NOT BE USED FOR ANY TEMPORARY SUPPORTS / SCAFFOLDING/ PREPARING PRE-ASSEMBLY BED ETC.

4.1.1.19
THE DETAILS OF EQUIPMENTS TO BE ERECTED UNDER THIS CONTRACT IS GENERALLY AS PER THE SCHEDULE GIVEN IN RELEVANT APPENDICES. THESE DETAILS ARE APPROXIMATE AND MEANT ONLY TO GIVE A GENERAL IDEA TO THE TENDERER ABOUT THE MAGNITUDE OF THE WORK INVOLVED. ACTUAL QUANTUM AND TYPE OF EQUIPMENTS WILL BE BASED ON THE RELEVANT ERECTION DOCUMENTS WHICH WILL BE FURNISHED TO THE CONTRACTOR IN DUE COURSE OF ERECTION AND THE WEIGHT AND QUANTITY AS PER THE RELEVANT ENGINEERING DOCUMENTS WILL ONLY BE ADMISSIBLE FOR THE BILLING PURPOSE.

4.1.1.20
HANGERS & SUSPENSIONS, SUPPORTS ETC FOR TUBES, PIPING, & DUCTS ETC WILL BE SUPPLIED IN RUNNING / RANDOM LENGTHS / SIZES WHICH SHALL BE CUT TO SUITABLE SIZES AND ADJUSTED AS REQUIRED.

4.1.1.21
SPRING SUSPENSION/CONSTANT LOAD HANGERS MAY HAVE TO BE PRE-ASSEMBLED FOR REQUIRED LOAD AND ERECTION CARRIED OUT AS PER INSTRUCTIONS OF BHEL. ADJUSTMENTS, REMOVAL OF TEMPORARY ARRESTS/LOCKS, CUTTING OF EXCESS THREAD LENGTH OF HANGER TIE-ROD ETC HAVE TO BE CARRIED OUT AS AND WHEN REQUIRED. LOAD SETTING OF SPRING HANGERS, AS PER BHEL'S DOCUMENTS/INSTRUCTIONS, DURING VARIOUS STAGES OF ERECTION & TESTING AND AFTER FLOATING OF PIPING/DUCTING DURING COLD AND HOT CONDITION WILL HAVE TO BE DONE AS PART OF WORK. THIS EXERCISE MAY HAVE TO BE REPEATED TILL SATISFACTORY RESULTS ARE ACHIEVED.

4.1.1.22
LAYOUT OF FIELD ROUTED/ SMALL BORE PIPING SHALL BE DONE AS PER SITE REQUIREMENT. NECESSARY SKETCH FOR ROUTING THESE LINES SHOULD BE GOT APPROVED FROM BHEL BY THE CONTRACTOR. THERE IS A POSSIBILITY OF SLIGHT CHANGE IN ROUTING THE ABOVE PIPE LINES EVEN AFTER COMPLETION OF ERECTION.

4.1.1.23
WELDING OF NECESSARY INSTRUMENTATION TAPPING POINTS, THERMOWELL, THERMOCOUPLE PAD, METAL TEMP PAD AND CLAMPS, ROOT VALVE, CONDENSING VESSEL, FLOW NOZZLES, FLOW METERING & MEASUREMENT DEVICES, AND CONTROL VALVES TO BE PROVIDED ON BOILER & ITS AUXILIARIES AND PIPING ARE COVERED WITHIN THE SCOPE OF THIS SPECIFICATION. THE INSTALLATION OF ALL THE ABOVE ITEMS WILL BE CONTRACTOR'S RESPONSIBILITY EVEN IF:

a) ITEMS ARE NOT SPECIFICALLY INDICATED UNDER THE RESPECTIVE PRODUCT GROUPS AS GIVEN IN THE TECHNICAL SPECIFICATIONS.
b) ITEMS ARE SUPPLIED BY AN AGENCY OTHER THAN BHEL.

PRE-HEATING, NDE, AND POST WELD HEAT TREATMENT FOR ABOVE SHALL BE DONE AS PER THE SPECIFICATIONS AS PART OF WORK.

4.1.1.24
CERTAIN INSTRUMENTATION LIKE PRESSURE SWITCHES, AIR SETS, FILTERS, REGULATORS, PRESSURE GAUGES, JUNCTION BOXES, POWER CYLINDERS, DIAL THERMOMETERS, FLOW METERS, VALVE ACTUATORS, FLOW INDICATORS, CENTRIFUGAL/SPEED SWITCHES OF MOTORS, ACCUMULATORS ETC ARE RECEIVED IN ASSEMBLED CONDITION AS INTEGRAL PART OF EQUIPMENTS. CONTRACTOR SHALL DISMOUNT SUCH INSTRUMENTS FOR CALIBRATION AND HAND OVER THE SAME TO BHEL. C & I ERECTION AGENCY WILL DO STORAGE/RE-ERECTION CALIBRATION ETC.

4.1.1.25
FIXING AND SEAL WELDING OF THERMOWELLS & PLUGS BEFORE HYDRO TEST/ STEAM BLOWING OF EQUIPMENT OR OTHER PIPING SYSTEM IS WITHIN THE SCOPE OF WORK. CONTRACTOR SHALL ALSO REMOVE THE SEAL WELDED PLUGS BY PROCESS OF GRINDING

AND FIX AND SEAL WELD THERMOWELLS AFTER HYDRO TEST/STEAM BLOWING OF LINES AS PART OF WORK.

4.1.1.26

ACTUATORS/DRIVES OF VALVES, D AMPERS, GATES, POWERED VANES ETC MAY HAVE TO BE SERVICED, LUBRICATED, BEFORE ERECTION, DURING PRE-COMMISSIONING & COMMISSIONING, INCLUDING CARRYING OUT MINOR ADJUSTMENTS REQUIRED AS INCIDENTAL TO THE WORK.

4.1.1.27

ALL ELECTRICAL MOTORS HAVE TO BE TESTED FOR IR & PI VALUES PRIOR TO THE TRIAL RUN. WHERE REQUIRED, DRY OUT MAY HAVE TO BE CARRIED OUT BY USING EXTERNAL HEATING SOURCE. CONTRACTOR SHALL MAKE ALL ARRANGEMENTS IN THIS REGARD AND COMPLETE THE WORK AS INSTRUCTED.

4.1.1.28

IN INSTALLATION OF VARIOUS EQUIPMENTS IT MAY BECOME NECESSARY TO INSTALL THESE ON TEMPORARY SUPPORTS/ HANGER DUE TO VARIOUS REASONS INCLUDING NON-AVAILABILITY OF SUSPENSION MATERIALS. CONTRACTOR SHALL INSTALL SUCH TEMPORARY SUSPENSIONS/HANGERS AND LATER ON SHIFT THE RELEVANT EQUIPMENTS TO THEIR RESPECTIVE PERMANENT HANGERS/ SUSPENSIONS/ SUPPORTS AS INCIDENTAL TO WORK. REQUISITE MATERIALS FOR SUCH TEMPORARY ARRANGEMENTS WILL BE PROVIDED BY BHEL ON FREE -RETURNABLE BASIS WHICH SHALL BE RETURNED TO BHEL AFTER THE USE.

4.1.1.29

THE WORK SHALL BE CARRIED OUT STRICTLY IN ACCORDANCE TO THE “FIELD QUALITY PLAN” APPROVED BY BHEL/CLIENT. CONTRACTOR, JOINTLY WITH BHEL, SHALL PREPARE ALL NECESSARY RECORDS OF MEASUREMENTS/READINGS/ PROTOCOLS ETC.

4.1.1.30

INTERCONNECTION/ HOOKUP, IF ANY, WITH THE EXISTING SYSTEM SHALL FORM PART OF WORK. SUCH INTERCONNECTIONS, HOOKUPS MAY REQUIRE SHUT DOWN OF RUNNING PLANT AND THE RELEVANT WORK HAVE TO BE COMPLETED WITHIN SUCH PLANNED SHUTDOWNS. THIS MAY CALL FOR WORKING WITH ENHANCED RESOURCES AND ON EXTENDED HOURS. CONTRACTOR'S OFFER SHALL COVER ALL SUCH CONTINGENCIES.

4.2 DETAILS OF SCOPE OF WORK FOR BOILER & AUXILIARIES & PIPING

THE SCOPE OF WORK IS FURTHER DETAILED IN THE SPECIFICATIONS HEREINAFTER.

4.2.1 PRESSURE PARTS

A) INSTALLATION OF TEMPORARY STRUCTURE FOR DRUM LIFTING IS IN THE SCOPE OF THE CONTRACTOR’S WORK. THE REQUIRED STEEL FOR THE PURPOSE WILL BE PROVIDED IN RANDOM SIZES BY BHEL FREE OF CHARGE. THESE SHALL BE FABRICATED TO SUIT THE REQUIREMENT, ERECTED AND WELDED AS PART OF WORK. NDT HAS TO BE CARRIED OUT AS PER INSTRUCTIONS. THESE STRUCTURES HAVE TO BE DISMANTLED AT APPROPRIATE STAGE AND RETURNED TO BHEL AS PER THE INSTRUCTIONS OF BHEL ENGINEER. ALSO, THE RELEVANT AREA OF PERMANENT STRUCTURES HAVE TO BE FINISHED AS INSTRUCTED/ AS PER RELEVANT CODES OF PRACTICE. PAYMENT FOR ABOVE WILL BE MADE AT THE RATE ACCEPTED FOR

STRUCTURES; NO SEPARATE PAYMENT WILL BE MADE FOR FABRICATION, DISMANTLING AND FINISHING WORK AND RETURN OF MATERIALS.

B) PRESSURE PARTS COMPONENTS LIKE HEADERS, PANELS, COILS, LOOSE TUBES ETC HAVE TO BE FLUSHED/BLOWN WITH COMPRESSED AIR, CHECKED FOR DIMENSIONAL ACCURACY AND CONFIGURATION AND MINOR RECTIFICATIONS, IF NECESSARY WILL HAVE TO BE DONE BEFORE ERECTION. THIS WILL INVOLVE MAKING APPROPRIATE BED OF STEEL STRUCTURES OVER THE CONCRETE BLOCKS/ STEEL PEDESTALS. NECESSARY STEEL, CONCRETE BLOCKS SHALL BE ARRANGED BY THE CONTRACTOR. BED SHALL BE FABRICATED AS PER BHEL REQUIREMENT.

C) NORMALLY THE HIGH PRESSURE VALVES WILL HAVE PREPARED EDGES FOR WELDING. BUT, IF IT BECOMES NECESSARY, THE CONTRACTOR SHALL PREPARE NEW EDGES OR RECONDITION THE EDGES BY GRINDING OR CHAMFERING TO MATCH THE CORRESPONDING TUBES AND PIPES. NO GAS CUTTING WILL BE PERMITTED. ALL FITTINGS LIKE "T" WELDING OF ALL ATTACHMENTS ON PRESSURE PARTS INCLUDING THOSE REQUIRED FOR REFRACTORY AND INSULATION WORK IS IN THE SCOPE OF WORK.

D) PIECES, WELD NECK FLANGES, REDUCERS, ETC SHALL BE SUITABLY MATCHED WITH PIPES FOR WELDING (THIS IS APPLICABLE TO PIPING WORK ALSO).

E) SURFACES INSIDE SEAL BOX AND OTHER AREAS THAT ARE TO BE APPLIED WITH CASTABLE REFARCTORY LINING SHALL BE PAINTED WITH BLACK BITUMEN PAINT BEFORE BOXING UP AND APPLICATION OF REFRACTORY. SEAL BOXES NEED TO BE PARTIALLY CUT OPEN IN ORDER TO POUR REFRACTORY. CONTRACTOR SHALL CARRY OUT NECESSARY CUTTING AND SEAL WELDING OF SUCH CUTOUTS. CONTRACTOR SHALL PROVIDE THE BLACK BITUMEN PAINT OF REQUIRED SPECIFICATION FOR SUCH APPLICATIONS.

F) FURNACE AREA AND HEAT RECOVERY AREA OF FLUE GAS PASSAGE HAS TO BE MADE LEAK PROOF BY SEAL WELDING. AIR LEAK TEST BY PRESSURIZATION HAS TO BE CONDUCTED TO PROVE EFFECTIVENESS OF THE SEAL WELD AND SOAP BUBBLE OR ANY OTHER SIMILAR TEST WILL HAVE TO BE CARRIED OUT FOR THE ENTIRE SEAL WELDS TO ASCERTAIN THE EFFECTIVE SEALING IS ACHIEVED. THE TESTS MAY HAVE TO BE REPEATED TILL SATISFACTORY RESULT IS ACHIEVED.

G) IF REQUIRED, THE PRESSURE PARTS, AFTER INITIAL ERECTION AND TESTS, WILL HAVE TO BE PRESERVED BY EITHER DRY OR WET PRESERVATION PROCEDURE. CONTRACTOR SHALL ERECT THE PIPING & VALVES AND PROVIDE NECESSARY ASSISTANCE FOR THE SAME. REQUIRED PIPING, VALVES AND PRESERVATIVE (GAS/CHEMICALS) WILL BE PROVIDED BY BHEL AS FREE ISSUE.

H) THE DRUM INTERNALS, IF ALREADY INSTALLED, MAY HAVE TO BE REMOVED TO FACILITATE INSPECTION BY STATUTORY AUTHORITIES AND CHEMICAL CLEANING. THE DRUM INTERNALS ARE TO BE PRESERVED PROPERLY AND RE-FITTED AT APPROPRIATE STAGE AS PART OF WORK.

I) BOILER DRUM: BOILER DRUM WILL BE UNLOADED/DRAGGED BY MATERIAL HANDLING AGENCY IN THE BOILER CAVITY. FURTHER ACITIVITIES OF ORIENTATION, LIFTING, ERECTION, ALIGNMENT ETC IS IN THE SCOPE OF WORK.

J) CORRECTIONS IN THE PROFILES OF SCALLOPED PLATES/BARS, SKIN CASING, SEAL PLATES ETC. FOR PROPER MATCHING WITH MATING PARTS, WHEREVER REQUIRED, SHALL BE DONE AS INCIDENTAL TO THE WORK.

K) ALL SITE WELDING PROJECTIONS/ PROTRUSIONS/REINFORCEMENTS/ PENETRATIONS OF BUTT WELD JOINT AS WELL AS FIN WELDINGS ON THE INNER SURFACE OF COMBUSTOR (HOT ZONE) IS REQUIRED TO BE FLUSH GROUND AS PER REQUIREMENT. SIMILARLY, ANY SUCH PROJECTIONS/ PROTRUSIONS/ REINFORCEMENTS/ PENETRATIONS OF SHOP WELDINGS WILL HAVE TO BE GROUND FLUSH AS PART OF WORK WITHOUT ANY ADDITIONAL PAYMENT.

4.2.2 TRIM & INTEGRAL PIPING OF BOILER AND CRITICAL PIPING

4.2.2.1
THE WORK ON VARIOUS PIPING SYSTEMS WILL INCLUDE CUTTING TO REQUIRED LENGTH, EDGE PREPARATION, LAYING, FIXING & WELDING OF THE PIPES / ELBOWS / FITTINGS/ VALVES ETC. IN THE PIPELINE, FIXING & ADJUSTMENT OF SUPPORTS / ANCHORS / SHOCK ABSORBERS AND CARRYING OUT ALL OTHER ACTIVITIES / WORK TO COMPLETE THE ERECTION AND ALSO CARRYING OUT ALL PRE-COMMISSIONING / ASSISTANCE FOR COMMISSIONING OPERATIONS MENTIONED IN THE SPECIFICATION AS PER BHEL ENGINEERS INSTRUCTIONS AND / OR AS PER APPROVED DRAWINGS / DOCUMENTS.

4.2.2.2
TUBES / PIPES WHEREVER DEEMED CONVENIENT, WILL BE SENT IN RANDOM LENGTHS. THESE SHALL BE CUT AND EDGE PREPARED TO SUIT THE SITE CONDITIONS AND THE LAYOUTS. FITTINGS LIKE BENDS TEES, ELBOWS, REDUCERS, FLANGES ETC WILL BE SUPPLIED AS LOOSE ITEMS. HOWEVER, BENDS OF TUBE SIZE UP TO Nb. 50 mm WILL HAVE TO BE FORMED AT SITE AS INCIDENTAL TO WORK.

4.2.2.3
ALL DRAINS / VENTS / RELIEF/ ESCAPE / SAFETY VALVE EXHAUST PIPING ETC TO VARIOUS TANKS / SEWAGE / DRAIN CANAL / FLASH BOX / SUMP / ATMOSPHERE ETC FROM THE STUBS ON THE PIPING AND EQUIPMENTS ARE COVERED IN THE SCOPE OF WORK.

4.2.2.4
CONNECTION (EITHER FLANGED, BOLTED OR WELDED) OF PIPING TO THE TERMINAL POINTS/EQUIPMENTS ETC IS IN THE SCOPE OF WORK EVEN THOUGH SUCH TERMINAL POINT/EQUIPMENT MAY NOT FORM PART OF THIS WORK. ALL NDE INCLUDING RADIOGRAPHY OF JOINTS SO MADE, POST-WELD-HEAT-TREATMENT IF ANY, ARE ALSO WITHIN THE SCOPE OF WORK/SPECIFICATION. THE TERMINAL POINTS WORK IS INCLUSIVE OF CUTTING OF EXISTING LINES, IF REQUIRED, EDGE PREPARATION, WELDING/BLANKING AND HOOK UP WORK.

4.2.2.5
IT SHOULD BE ENSURED THAT ALL THE TERMINAL POINT CONNECTIONS ARE DONE WITHOUT TRANSFERRING ANY UNDUE LOAD OR STRAIN TO THE OTHER EQUIPMENTS. NECESSARY PROTOCOLS HAVE TO BE PREPARED FOR SUCH FIT-UP ALONGWITH BHEL/CUSTOMER REPRESENTATIVE BEFORE CONNECTING. ALL NDE INCLUDING RADIOGRAPHY OF JOINTS SO MADE, POST WELD HEAT TREATMENT IF ANY, IS ALSO WITHIN THE SCOPE OF WORK/ SPECIFICATION.

4.2.2.6
MECHANICAL FREENESS OF VALVES HAVE TO BE ENSURED PRIOR TO ERECTION.

4.2.2.7
THE ABOVE PROVISIONS SHALL BE APPLICABLE, MUTATIS - MUTANDIS, TO OTHER PIPING SYSTEMS e.g. FUELOIL PIPING, LUB OIL PIPING OF ROTATING M/c ACW LINES, SOOT BLOWING STEAM PIPING ETC.

4.2.2.8
MAIN STEAM AND HP BYPASS PIPINGS (UNDER PGMA -80300, 80301 AND 80304) IN THE SCOPE ARE OF SA-335 P-91 MATERIAL. BIDDER SHALL FOLLOW BHEL APPROVED PROCEDURE FOR WELDING, PRE HEATING, PWHT & NDT OF SA-335 P-91 MATERIAL. DETAILED PROCEDURE WILL BE ISSUED TO THE CONTRACTOR AT SITE.

4.2.2.9 FOLLOWING ITEMS OF WORK SHALL ALSO FORM PART OF PIPING ERECTION:

1. INSTALLATION & REMOVAL OF ISOLATING DEVICES/NRV AND REMOVAL & RE-FIXING OF INTERNALS REQUIRED FOR HYDRAULIC TESTING, PRE-COMMISSIONING AND COMMISSIONING ACTIVITIES. REQUIRED GASKETS WILL BE SUPPLIED BY BHEL FREE OF COST.

2. MATCHING OF FLANGES FOR ACHIEVING PARALLELISM AND ALIGNMENT RESORTING TO HEAT CORRECTION OR OTHER SUITABLE METHODS AS PER INSTRUCTIONS OF BHEL ENGINEERS.

3. TO LOCATE THE CAUSE OF VIBRATIONS IN PUMPS OR OTHER AUXILIARIES AND TO CARRY OUT NECESSARY CORRECTIONS IN PIPING AND ITS SUPPORTS. THIS MAY INVOLVE CUTTING, FRESH EDGE PREPARATION, WELDING, RADIOGRAPHY, STRESS RELIEVING, ETC., OF SUCTION, DISCHARGE, RE-CIRCULATING AND OTHER CONNECTED PIPING AND ITS SUPPORTS AT A NUMBER OF PLACE.

4. FABRICATION AND ERECTION OF RACKS AND STEEL SUPPORTS FOR ALL THE PIPING INCLUDING CRITICAL PIPING. STEEL FOR THIS PURPOSE WILL BE SUPPLIED AS FREE ISSUE IN RANDOM SIZES BY BHEL.

5. ERECTION, WELDING, NDE AND STRESS RELIEVING OF CERTAIN EQUIPMENTS, E.G. FLOW NOZZLES, CONTROL VALVES ETC, AFTER COMPLETION OF CERTAIN ACTIVITIES E.G. CHEMICAL CLEANING, STEAM BLOWING ETC IS PART OF WORK. THIS MAY INVOLVE REMOVAL OF PORTIONS FROM THE ALREADY ERECTED PIPELINES IN ORDER TO INTRODUCE THESE EQUIPMENTS AND RESULTANT EDGE PREPARATION ETC SHALL BE INCIDENTAL TO WORK. NO SEPARATE/ ADDITIONAL PAYMENT IS ENVISAGED FOR CUTTING, WELDING AND EDGE PREPARATION IN THIS REGARD. THE REMOVED PIECES OF PIPES SHALL BE RETURNED TO BHEL STORES WITH PROPER CLEANING, DRESSING AND IDENTIFICATION MARKING.

6. WELDING OF ROOT VALVES WITH SMALL LENGTH OF PIPING TO THE PRESSURE, FLOW AND LEVEL TAPPING POINTS ON PIPING OR FLOW NOZZLES / ORIFICES / METERING ELEMENTS FIXED ON PIPING.

7. OPENING OF VALVE ACTUATORS, DISMANTLING OF ACTUATORS FROM THE VALVES, REFITTING AND RENDERING ASSISTANCE CONNECTED WITH THE ELECTRICAL AND MECHANICAL PROBLEMS.

8. FIXING AND WELDING INCLUDING DUE NDE & PWHT ETC OF CARRIER PLATES ON TO THE PIPES.

4.2.2.10

AS FAR AS POSSIBLE PRE-ASSY OF PIPING ON GROUND IS TO BE DONE. THE ERECTION OF VARIOUS PIPING MAY HAVE TO BE STARTED FROM ANY RANDOM REFERENCE INSTEAD OF THE TERMINAL POINTS INORDER TO MEET CERTAIN COMPLETION COMMITMENTS.

4.2.2.11

THE LOCATION OF DRAIN HEADERS, VALVES, STATIONS, STEAM TRAPS OF PIPING AS INDICATED IN THE BHEL DRAWINGS ARE SUGGESTIVE ONLY. THE FINAL LOCATION AND ROUTINGS SHALL BE DECIDED TO SUIT THE SITE CONDITIONS. WHILE ROUTING SUCH LINES AND FIXING THE STATIONS, IT HAS TO BE ERECTED SO AS TO PROVIDE EASY ACCESSIBILITY AND FREE PATH FOR THE PURPOSE OF EASY OPERATION AND MAINTENANCE. THESE LOCATIONS SHALL BE ACCEPTABLE TO THE CLIENT. SOMETIMES, THE LOCATIONS OF STATIONS AND ROUTING OF LINES MAY HAVE TO BE CHANGED AS PER THE SITE CONDITIONS. ALL SUCH WORKS SHALL BE CARRIED OUT EXPEDITIOUSLY AS PER THE INSTRUCTIONS OF BHEL ENGINEER. THE DECISION OF BHEL ENGINEER IS FINAL AND BINDING ON THE CONTRACTOR.

4.2.2.12

THE RATE QUOTED IN RATE SCHEDULE IS ALSO INCLUSIVE OF PRE-HEATING, WELDING, POST HEATING, POST WELD HEAT TREATMENT/ STRESS RELIEVING AND NDE OF PIPING. THIS PROVISION IS APPLICABLE, MUTATIS-MUTANDIS, TO ALL OTHER ITEM RATES.

4.2.2.13

ERECTION OF PIPING SYSTEMS SHALL INVOLVE CO-ORDINATION WITH THE ERECTION OF THE TURBINE, TURBO-GENERATOR, CONDENSER, BOILER, BOILER FEED PUMPS AND OTHER MAJOR EQUIPMENTS. WHEREVER REQUIRED, APPROVAL OF CONCERNED BHEL ENGINEER/OTHER ERECTION AGENCY MUST BE OBTAINED PRIOR TO MAKING PIPING INTERFACE CONNECTIONS TO SUCH EQUIPMENTS. SEQUENCE OF WORK SHALL BE CAREFULLY PLANNED TO MINIMIZE INTERFERENCE WITH OTHER GROUPS WORKING IN THE SAME AREA. ACTUAL SEQUENCE TO BE FOLLOWED SHALL BE SUBJECT TO THE APPROVAL OF BHEL ENGINEER AND BHEL ENGINEER MAY DIRECT THE CONTRACTOR TO RESCHEDULE HIS WORK TO SUIT THE STATUS OF THE SITE WORK.

4.2.2.14

WHILE ERECTING THE FIELD RUN PIPES, THE CONTRACTOR SHALL CHECK THE ACCESSIBILITY OF VALVES, INSTRUMENTS TAPPING POINTS AND MAINTAIN MINIMUM HEAD ROOM REQUIREMENT AND OTHER NECESSARY CLEARANCE FROM THE ADJOINING WORK AREAS TO AVOID INTERFERENCES.

4.2.2.15

ALL PIPELINES SHALL BE GIVEN PROPER SLOPE TOWARDS THE DRAIN POINTS DURING ERECTION. FOR MAINTAINING THE SLOPES AS GIVEN IN THE DRAWINGS FOR LARGER THICKNESS AND LARGER DIA PIPELINES, EDGE PREPARATION FOR WELDING MAY HAVE TO BE ALTERED SUITABLY TO ACHIEVE THE SLOPE.

4.2.2.16
ALL PIPELINES SHALL BE PROVIDED, AS PER THE INSTRUCTIONS OF BHEL ENGINEER, WITH SUITABLE VENT AND THE DRAIN POINTS WITH VALVE (S) ON THE HIGHEST AND LOWER POINTS OF THE PIPE RUN ALTHOUGH MAY NOT BE SPECIFICALLY MENTIONED IN THE DRAWING.

4.2.2.17
IT MAY BECOME NECESSARY TO MAKE & INSTALL TEMPORARY SPOOL PIECES FOR CERTAIN PROCESS REQUIREMENTS. CONTRACTOR'S SCOPE SHALL INCLUDE PREPARATION, ERECTION, FIT-UP, WELDING, NDE ETC AND DISMANTLING OF SUCH SPOOL PIECES AT APPROPRIATE STAGE WITHOUT ANY ADDITIONAL PAYMENT.

4.2.2.18
IN PIPELINES LIKE CRH LINES, EXTRACTION LINES, ETC., THE NRVS, STRAINERS ETC WILL BE ERECTED BY OTHER ERECTION AGENCY. ALIGNMENT OF THESE VALVES TO MATCH THE PIPE ENDS (BOTH SIDES), WELDING, HEAT TREATMENT AND NDE ETC IS IN THE SCOPE AS INCIDENTAL TO WORK.

4.2.2.19
NORMALLY, HANGERS SETTING IN COLD CONDITION ARE DONE BY SIMULATION ADDING ADDITIONAL TEMPORARY WEIGHT, WHICH WILL BE ROUGHLY EQUAL TO THE WEIGHT OF THE INSULATION. ATTACHMENT OF TEMPORARY WEIGHTS AND FLOATING OF THE JOINTS IN THE SIMULATION TEST TO BE TREATED AS PART OF JOB. HANGER SETTINGS HAVE TO BE REPEATED FOR ACHIEVING FREE-FLOATING JOINTS. HANGER ADJUSTMENTS TO BE REPEATED FOR STEAM BLOWING BY RESETTING HOT AND COLD VALUES IF REQUIRED. THIS MAY HAVE TO BE REPEATED SEVERAL TIMES AFTER STEAM BLOWING AND SYNCHRONIZATION. THE WEIGHTS WILL BE SUPPLIED BY BHEL. CONTRACTOR HAS TO TRANSPORT FROM BHEL STORES AND RETURN THE SAME AFTER COMPLETION OF WORK. NO EXTRA CLAIM ON THIS ACCOUNT WILL BE ENTERTAINED.

4.2.2.20
INSTRUMENT AIR, SERVICE AIR, SERVICE WATER, DEMINERALISED WATER SYSTEM PIPING INLCUDED UNDER THESE SPECIFICATIONS ARE FOR BOILER & TG WITH RESPECTIVE AUX. SIMILARLY AUX. STEAM HEADER INTERCONNECTION BETWEEN TWO UNITS, AUX. STEAM TO FO SYSTEM TP, FUEL OIL SUPPLY AND RETURN PIPING, COOLING WATER PUMPS SYSTEMS WORKS, AND ELECTRICAL HEAT TRACING WORK INCLUDED IN THESE SPECIFICATIONS ARE COMMON FOR TWO UNITS (I.E. UNIT-3&4).

CONTRACTOR SHALL CARRY OUT AND COMPLTE THE ERECTION OF PIPING WORK OF SYSTEM AND WELDING / CONNECTION OF TERMINAL POINTS EQUIPMENTS/ AUXILIARIES INCLDUNG WELDING OF TERMINAL POINT FLANGES/PIPES ETC. AS PER THE PRIORITY AND SCOPE DECIDED BY BHEL ENGINEER AT SITE (REFER CLUASE 4.2.2.4).

4.2.3 ROTATING MACHINERY

A) SPECIFICATIONS COVERED UNDER THE FOLLOWING PARA AND ALSO OTHER RELEVANT SPECIFICATIONS CONTAINED IN OTHER PARAS ELSEWHERE IN THIS TENDER DOCUMENT WILL BE APPLICABLE FOR ROTATING MACHINES LIKE FD / ID / PA / SEAL

AIR FANS, BLOWERS, FUEL FEEDERS, HP & LP DOSING PUMP SKIDS AND OTHER SIMILAR AUXILIARIES.

B) ALL LUBRICANTS FOR TESTING, PRESERVATION AND LUBRICANTS FOR TRIAL RUNS OF THE EQUIPMENTS SHALL BE SUPPLIED BY BHEL AS FREE ISSUE. ALL SERVICES INCLUDING LABOUR SHALL BE PROVIDED BY THE CONTRACTOR FOR DRAWING THESE FROM BHEL / CUSTOMER'S STORES, TRANSPORTING, HANDLING, FILLING, EMPTYING, RE-FILLING, ACCOUNTING AND RETURN OF SURPLUS LUBRICANTS / EMPTY CONTAINERS / OLD & USED LUBRICANTS AFTER DRAINING ETC. CONTRACTOR SHOULD CLEAN THE SPILLED / LEAKING LUBRICANTS THOROUGHLY, CONSUMABLES FOR SUCH CLEANING WILL BE IN CONTRACTOR'S SCOPE.

C) ALL ROTATING MACHINERY AND EQUIPMENTS SHALL BE CLEANED, LUBRICATED, CHECKED FOR THEIR SMOOTH ROTATION, IF NECESSARY, BY DISMANTLING AND RE-FITTING BEFORE ERECTION. ALSO, THE EQUIPMENTS MAY HAVE TO BE CHECKED FOR CLEARANCES, TOLERANCES AT ANY STAGE OF THE WORK INCLUDING DURING TESTING, COMMISSIONING ETC. SHAFT OF THE ROTATING MACHINES SHALL BE ROTATED PERIODICALLY TO AVOID DAMAGES. ALL THESE SHALL BE PART OF WORK.

D) TRIAL RUN OF THE DRIVES IN UN-COUPLED STATE AND THEN COUPLED WITH EQUIPMENT HAS TO BE DONE AFTER NECESSARY ALIGNMENT.

E) FORCED LUBE OIL SYSTEMS INCLUDING LUBE OIL PIPING OF DRIVES, ROTATING EQUIPMENTS ETC FORM PART OF THE WORK UNDER THESE SPECIFICATIONS. HYDRAULIC TEST OF OIL COOLERS, OIL PIPING ETC ARE IN THE SCOPE OF WORK. WHERE REQUIRED COOLER MAY HAVE TO BE DISMANTLED FOR HYDRAULIC TEST AND RE-ERECTED THEREAFTER AS PART OF WORK.

F) CERTAIN ROTATING MACHINERY, AFTER TESTING, PRE-COMMISSIONING MAY HAVE TO BE RE-ALIGNED/HOT ALIGNED AND VITAL CLEARANCES RE-SET. THIS MAY NECESSITATE DISCONNECTION OF CABLING, REMOVAL OF CERTAIN INSTRUMENTS ETC AND RESTORATION THEREAFTER.

G) PROTECTIVE LUBRICANT COATS / FILL PROVIDED ON / IN THE CRITICAL AREA OF EQUIPMENTS HAVE TO REMOVED AT APPROPRIATE STAGE AND REGULAR LUBRICANTS, AFTER REMOVAL / CLEANING OF PROTECTIVE COAT / FILL, AS PER SPECIFICATIONS SHOULD BE FILLED / APPLIED. CLEANING / FLUSHING AGENTS / OILS WILL BE PROVIDED BY BHEL.

H) CHEMICAL CLEANING, STEAM BLOWING AND AIR DRYING OF THE CONNECTING PIPES FOR THE LUBE OIL SYSTEM HAS TO BE CARRIED OUT WHEREVER REQUIRED AS PER INSTRUCTION MANUALS / DRAWINGS. CHEMICALS, SUITING BHEL SPECIFICATION, FOR SUCH CHEMICAL CLEANING IS IN THE SCOPE OF CONTRACTOR.

I) EVENTHOUGH ROTATING MACHINES MAY BE GROUTED TO FOUNDATION USING NON-SHRINK GROUT MIX, BLUE MATCHING OF PACKER PLATES / SHIMS WITH FOUNDATION / BETWEEN PACKERS / EQUIPMENT BASE SHOULD BE DONE AS INCIDENTAL TO WORK WHEREVER INSTRUCTED BY BHEL ENGINEER.

J) SKID MOUNTED EQUIPMENTS MAY NEED CHECKING, RE-SETTING DUE TO VARIOUS REASONS AS INCIDENTAL TO WORK.

4.2.4 ERECTION OF ELECTROSTATIC PRECIPITATOR

4.2.4.1
WHEREVER CALLED FOR, PRE-ASSEMBLY OF SUPPORTING STRUCTURES, CASING WALLS HAVE TO BE DONE, ON GROUND.
4.2.4.2
LOADING OF COLLECTING ELECTRODES EITHER FROM TOP OR BOTTOM, TO BE DECIDED SUITING SITE CONDITIONS, SHALL BE DONE WITH DUE CARE AS PER INSTRUCTIONS.

4.2.4.3
STRAIGHTNESS OF ALL COLLECTING ELECTRODES HAS TO BE CHECKED ON GROUND PRIOR TO LOADING IN TO THE FIELD.

4.2.4.4
BUNDLE OF COLLECTING ELECTRODES SHOULD BE HANDLED ONLY WITH SPECIAL LIFTING BEAM AND SLINGS SUPPLIED FOR THE PURPOSE.

4.2.4.5
BHEL WILL SUPPLY HUCK BOLTING M/CWITH NECESSARY AUXILIARIES FREE OF CHARGES. HOWEVER, ELECTRICAL CONNECTIONS, OPERATION ETC SHALL BE ARRANGED BY THE CONTRACTOR.

4.2.4.6
CLEARANCES AS PRESCRIBED AMONGST COLLECTING ELECTRODES AND WITH CASING WALLS HAVE TO BE MAINTAINED. SPOT HEATING OF COLLECTING ELECTRODES, WHEREVER CALLED FOR, SHALL BE DONE AS PART OF WORK TO ACHIEVE THE REQUIRED CLEARANCES.
4.2.4.7
ERECTION, ALIGNMENT/ FIXING IN FINAL POSITION, OF HIGH VOLTAGE RECTIFIERS OF ESP IS IN THE SCOPE OF WORK. HOWEVER TESTING & COMMISSIONING WILL BE DONE BY OTHER AGENCY.

4.2.4.8
INSTALLATION OF HIGH VOLTAGE INTERLOCKS (EXCEPTING ROTARY SWITCH INTERLOCK OF SWITCHGEAR PANELS) IS IN THE SCOPE OF WORK.

4.2.4.9
COMPLETE ERECTION, ALIGNMENT, TESTING, PRE-COMMISSIONING AND COMMISSION ETC FOR DRIVE MOTORS OF COLLECTING ELECTRODES AND EMITTING ELECTRODE RAPPING MECHANISM IS IN THE SCOPE OF WORK.

4.2.4.10
APPLICATION OF THERMAL INSULATION (MINERAL WOOL MATTRESSES) BETWEEN THE INNER ROOF AND OUTER ROOF IS PART OF WORK UNDER THIS SOCPE. PAYMENT WILL BE MADE FOR THIS INSULATION AT THE ACCEPTED RATE FOR ESP.

4.2.4.11 AIR LEAK TEST

AFTER ERECTION OF ESP AND BEFORE CLEARING FOR INSULATION, AIR LEAK TEST HAS TO BE CARRIED OUT. NECESSARY EQUIPMENT LIKE, AIR BLOWER, VENTURY, DUCTING, AND INSTRUMENTATION ETC. WILL BE PROVIDED BY BHEL FREE OF CHARGES. HANDLING AT

STORES, TRANSPORT, ERECTION, COMMISSINONING AND CARRYING OUT THE LEAKAGE TEST, ATTENDING TO THE LEAKAGES TILL SATISFACTORY SEALING / LEAK PROOFNESS SHALL BE IN SCOPE OF THE WORK. CONTRACTOR SHALL DISMANTLE THE TEST EQUIPMENTS AND RETURN TO BHEL STORES IN GOOD CONDITION AFTER DUE RECONCILIATION, CLEANING AND SERVICING. NO SEPARATE/ ADDITIONAL PAYMENT IS ENVISAGED FOR THE ABOVE.

4.2.5
MAIN SUPPORTING STRUCTURES, EXTERNAL STRUCTURES, ELEVATOR STRUCTURES, STAIRWAYS, GALLERIES & PLATFORMS & HANDLING ARRANGEMENT.

4.2.5.1
BOILER MAIN SUPPORTING STRUCTURES HAS TO BE ERECTED IN A SEQUENTIAL MANNER.

4.2.5.2
QUALITY NORMS WITH REGARD TO VERTICALITY OF COLUMN, INTER-ALIA, HAVE TO BE ADHERED TO STRICTLY, AT VARIOUS STAGES OF ERECTION.

4.2.5.3
STIFFENING/STRENGTHENING OF MAIN SUPPORTING STRUCTURE, IF ANY, DUE TO DEVIATION IN VERTICALITY OF COLUMNS POST DRUM LIFTING, SHALL BE CARRIED OUT, INCLUDING FABRICATION, IF ANY. NECESSARY STEEL FOR THIS WILL BE PROVIDED IN RANDOM SIZES BY BHEL AS FREE ISSUE. PAYMENT FOR SUCH STIFFENING/ STRENGTHENING SHALL BE MADE FOR WEIGHT CERTIFIED BY BHEL ENGINEER AT THE ITEM RATE APPLICABLE TO STRUCTURES, PROVIDED THE DEVIATION HAS OCCURED FOR THE REASONS NOT ATTRIBUTABLE TO THE CONTRACTOR.

4.2.5.4
IN CASE THE CEILING GIRDERS ARE SENT IN PIECES, THESE HAVE TO BE ASSEMBLED, WELDED AND NDE & PWHT (SR) DONE ON GROUND PRIOR TO THEIR ERECTION IN POSITION.

4.2.5.5
IT IS LIKELY THAT, IN DEVIATION FROM PRESCRIBED SEQUENCE, ERECTION OF CERTAIN ELEMENTS OF STRUCTURE MAY BE DEFERRED FOR LATER STAGE, TO FACILITATE, SAY CRANE BOOM REACH TO HIGHER ELEVATION, PASSAGE OF DRUM DURING DRUM LIFTING ETC. THIS MAY NECESSITATE TEMPORARY INSTALLATION OF SOME STRUCTURAL STEELS AT APPROPRIATE LOCATIONS TO KEEP THE STABILITY OF STRUCTURE INTACT. SUCH TEMPORARY INSTALLATIONS SHALL BE REMOVED SUBSEQUENTLY AND RETURNED TO BHEL STORES/ STORAGE YARD. FINISHING WORK IN THE RELATED PERMANENT STRUCTURES SHALL BE DONE AS PER THE INSTRUCTION OF BHEL ENGINEER. BHEL WILL PROVIDE NECESSARY STEELS ON FREE ISSUE BASIS IN RANDOM SIZES FOR SUCH INSTALLATIONS, WHICH SHALL BE FABRICATED BY THE CONTRACTOR TO SUIT THE REQUIREMENT.

PAYMENT FOR SUCH INSTALLATIONS SHALL BE MADE ON THE ACCEPTED TONNAGE RATE OF STRUCTURES. NO SEPARATE PAYMENT WILL BE MADE FOR FABRICATION, REMOVAL & RETURN OF THE MATERIALS TO BHEL STORES.

4.2.5.6
IN SOME CASES, THE STRUCTURAL MATERIAL WILL BE SUPPLIED IN RANDOM LENGTHS, WHICH HAVE TO BE FABRICATED TO SUIT THE REQUIREMENT AS INCIDENTAL TO WORK.

ALSO, IT MAY SOMETIMES BE NECESSARY TO REMOVE SOME OF THE ERECTED MEMBERS TO FACILITATE ERECTION OF BIGGER/ PRE-ASSEMBLED EQUIPMENTS. IN SUCH CASES, THE REMOVAL AND RE-ERECTION OF SUCH MEMBERS AS AGREED BY THE BHEL ENGINEER WILL HAVE TO BE DONE BY THE CONTRACTOR AS INCIDENTAL TO WORK.

4.2.5.7
CONTRACTOR SHALL ARRANGE MATERIALS REQUIRED FOR TEMPORARY CAT LADDERS & WORKING PLATFORMS DURING ERECTION OF COLUMNS, PLATFORMS AND OTHER STRUCTURAL COMPONENTS. SUCH ARRANGEMENTS SHALL, AS FAR AS POSSIBLE, BE ONLY OF CLAMPING & BOLTING TYPE, AS WELDING ON COLUMNS ETC WILL NOT BE PERMITTED. AFTER THE COMPLETION OF WORK THESE SHALL BE REMOVED.

4.2.5.8
ALL THE HAND RAILS AND TOE GUARDS SHALL BE PROVIDED AS PER DRAWINGS AND SITE REQUIREMENT. HAND RAILS SUPPLIED IN RUNNING LENGTHS SHALL BE SUITABLY CUT, EDGE PREPARED AND WELDED. ALSO, HAND RAILS/ GUARDS MAY HAVE TO BE PROVIDED FROM THE SAFETY POINT OF VIEW IN CERTAIN PLACES THOUGH NOT INDICATED IN THE ERECTION DRAWINGS. THE WELD JOINTS OF HAND RAILS SHALL BE GROUND SMOOTH TO FLUSH FINISH.

4.2.5.9
THE FLOOR GRILLS ARE GALVANIZED ELECTROFORGED TYPE. THESE FLOOR GRILLS ARE TO BE FIXED BY CLIP AND STUDS WITH NUTS (ALL SUPPLIED BY BHEL) COMBINATION. THESE STUDS HAVE TO BE WELDED ON STRUCTURE, FOLLOWED BY FIXING THE FLOOR GRILLS AND HOLDING THEM WITH CLIPS & NUTS. FLOOR GRILLS HAVE TO BE CUT TO SUIT LAYOUT REQUIREMENTS & HAVE TO BE FINISHED WITH STRIPS. CUTTING SHALL BE DONE ONLY BY MECHANICAL CUTTERS A**ND NOT BY GAS CUTTING.**
FIXING & WELDING OF HAND RAILS AND POSTS TO THE SUPPORTING STRUCTURE / MATCHING COMPONENT IS PART OF SCOPE OF WORK. CONTRACTOR SHALL APPLY COLD GALVANIZING PAINT ON SUCH SITE CUT AND WELDED AREA INCLUDING THE HAND RAILS AND POST. THE COLD GALVANIZING PAINT SHALL BE SUPPLIED BY THE CONTRACTOR AS PART OF SCOPE OF WORK.

4.2.5.10
FIXING OF BOILER ROOF SHEETING AND SIDE CLADDING SHALL BE DONE BY SELF-TAPPING SCREWS**.** SPECIAL PURPOSE ELECTRICALLY OPERATED HAND TOOLS ARE AVAILABLE IN THE MARKET FOR THIS, WHICH DRILLS, TAPS AND FIXES THE SCREWS IN A SINGLE OPERATION. BHEL WILL SUPPLY THE NECESSARY SELF-DRILLING-CUM-TAPPING SCREWS ANS FIXING CLIPS. CONTRACTOR SHALL DEPLOY THE **DRILLING CUM FIXING MACHINE** REQUIRED FOR THIS PURPOSE AS A REGULAR SCOPE OF WORK.

4.2.5.11
THE CONTRACTOR SHALL ALSO INSTALL ADDITIONAL PLATFORMS OF PERMANENT NATURE FOR APPROACHING DIFFERENT EQUIPMENT AS PER THE SITE REQUIREMENT AND TO MEET O&M REQUIREMENTS, THOUGH THESE MAY NOT INDICATED IN THE ERECTION DRAWINGS. MATERIALS REQUIRED FOR SUCH PLATFORMS WILL BE SUPPLIED BY BHEL IN RANDOM SIZES ON FREE ISSUE BASIS. THESE HAVE TO BE FABRICATED TO SUIT THE REQUIREMENT. PAYMENT ONLY FOR ERECTED WEIGHT AS CERTIFIED BY BHEL ENGINEER SHALL BE MADE AT THE RATE APPLICABLE FOR STRUCTURES. NO PAYMENT IS ENVISAGED FOR FABRICATION OF STRUCTURES.

4.2.5.12
ALL RELEVANT PROVISIONS AS ABOVE SHALL APPLY, MUTATIS-MUTANDIS, TO THE WORK OF EXTERNAL STRUCTURES, INTERCONNECTING STRUCTURES, ELEVATOR STRUCTURES, ESP STAIRWAYS AND GALLARIES & EQUIPMENT HANDLING SYSTEM ETC.

4.2.7 OTHER PRODUCTS AND SYSTEMS AND COMMON REQUIREMENTS

A) DUCTS / EXPANSION BELLOWS (METALLIC & NON-METALLIC) ARE NORMALLY SUPPLIED IN LOOSE COMPONENTS / SEGMENTS AND THESE ARE TO BE ASSEMBLED AND WELDED/ JOINTED AT SITE BEFORE ERECTION. THE FABRIC PORTION OF NON-METALLIC EXPANSION JOINTS (NMEJ) NAMELY BOLSTER, FABRIC BELT AND CANOPY, WHEREVER SO SPECIFIED, SHALL BE INSTALLED BY CONTRACTOR SRTICTLY IN ACCORDANCE WITH THE INSTRUCTIONS OF THE MANUFACTURER. IN CASE BHEL FINDS IT NECESSARY, SUPERVISION/GUIDENCE OF EQUIPMENT SUPPLIER/BHEL FOR THE FIRST FEW CASES WILL BE ARRANGED. CONTRACTOR SHALL ENSURE THAT ALL SUBSEQUENT NMEJ ARE ASSEMBLED WITH DUE CARE AND PROPER PROCEDURE. IN SIMIALR MANNER ALL JOINTS, CONNECTING DUCTS, EXPANSION PIECES AND DAMPERS SHALL BE SEAL WELDED. THESE WELDS HAVE TO BE MADE LEAK PROOF AND TESTED AS PER TECHNICAL INSTRUCTION / REQUIREMENT.

B) CERTAIN STRUCTURAL ITEMS LIKE SILENCER SUPPORTS, ROOF CLADDING STRUCTURE, PLATFORM ETC WILL BE SUPPLIED IN RUNNING LENGTHS WHICH SHALL BE CUT TO REQUIRED SUITABLE SIZES AND ADJUSTED/TRIMMED AS PART OF WORK.

C) CONTRACTOR HAS TO MAKE CANOPIES FOR MOTORS, ACTUATORS, LUB OIL UNITS, CONTROL VALVES, ETC. MATERIAL FOR THIS WILL BE SUPPLIED IN RANDOM LENGTHS / SIZES. NO SEPARATE PAYMENT FOR FABRICATION IS ENVISAGED. ONLY THE ERECTION TONNAGE RATE APPLICABLE FOR STRUCTURE WILL BE PAID FOR THIS WORK.

D) ID FANS ARE PROVIDED WITH VARIABLE FREQUENCY DRIVES. CONTRACTOR HAS TO ERECT & COMMISSION THE ONLY THE MOTOR AND OTHER MECHANICAL COMPONENTS LIKE COUPLING ETC. PANELS, TRANSFORMERS, CABLING ETC ARE NOT IN THIS WORK SPECIFICATION.

E) ALL WELDED JOINTS SHOULD BE PAINTED WITH ANTICORROSIVE PAINT/PRIMER IMMEDIATELY AFTER COMPLETION OF ALL WORK. NECESSARY PAINTS AND OTHER CONSUMABLES FOR THE ABOVE WORK ARE IN THE SCOPE OF THE CONTRACTOR.

F) HANGERS AND SUSPENSIONS, SUPPORT STEELS FOR DUCTS AND OTHER EQUIPMENTS, PIPING ETC WILL BE SUPPLIED IN RUNNING/RANDOM LENGTHS/ SIZES, WHICH SHALL BE CUT TO SUITABLE SIZES AND ADJUSTED AS REQUIRED.

D) TOUCH UP AND PRESERVATIVE PAINTNG OF ALL COMPONENTS ISSUED TO AND/OR ERECTED BY CONTRACTOR SHALL FORM PART OF SCOPE OF WORK. THE PAINTS, PRIMER FOR TOUCH UP AND PRESERTATIVE PAINTING OF COMPONENTS/EQUIPMENTS (OTHER THAN SITE WELD JOINTS) WILL BE SUPPLIED BY BHEL AND ALL OTHER REQUIRED ARRANGEMENTS, CONSUMABLES, T&P AND FACILITIES SHALL BE PROVIDED BY CONTRACTOR AS SCOPE OF WORK.

4.3 PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENT OF BOILER & AUXILIARIES

4.3.1
BUILDINGS, FOUNDATIONS AND OTHER NECESSARY CIVIL WORKS FOR SUPPORTING STRUCTURES, EQUIPMENTS ETC, WILL BE PROVIDED BY THE BHEL/CUSTOMER. THE CHECKING OF DIMENSIONAL ACCURACY, AXES, ELEVATION, LEVELS ETC, WITH REFERENCE TO BENCH MARKS OF FOUNDATIONS AND ANCHOR BOLT PITS AND ALSO ADJUSTMENTS OF FOUNDATION LEVEL, DRESSING AND CHIPPING OF FOUNDATION SURFACES OF ALL EQUIPMENTS CONTRACTOR/BHEL SHALL PREPARE PROTOCOLS BEFORE TAKING OVER THE FOUNDATIONS. DRESSING AND CHIPPING OF FOUNDATIONS UPTO 25MM FOR ACHIEVING PROPER LEVELS WILL BE WITHIN THE SCOPE OF WORK/SPECIFICATION.

4.3.2
ALL TEMPORARY FOUNDATIONS AND ANCHOR POINTS REQUIRED FOR INSTALLING ERECTION EQUIPMENTS AND WINCHES, FOUNDATIONS FOR PUMPS, TANKS ETC ARE IN THE SCOPE OF CONTRACTOR. ALL BUILDING MATERIALS LIKE CEMENT, STEEL INCLUDING RE-INFORCEMENT BARS, GRITS CEMENTS ETC FOR SUCH TEMPORARY FOUNDATIONS SHALL HAVE TO BE ARRANGED BY THE CONTRACTOR WITHIN THE QUOTED RATES. ALL SUCH FOUNDATIONS SHALL BE DEMOLISHED AND NORMAL GROUND CONDITIONS RESTORED AFTER THE USAGE.

4.3.3
THE COMPLETE WORK OF SECONDARY GROUTING OF EQUIPMENTS (STATIC AS WELL AS ROTATING IN TOTALITY) ETC IS INCLUDED IN THE SCOPE OF WORK/SPECIFICATION. CONTRACTOR SHALL ARRANGE ALL MANPOWER, T&P, FORM WORK AND SHUTTERING MATERIALS, ALL GROUTING MATERIALS SUCH AS ORDINARY PORTLAND CEMENT, SAND, STONE CHIPS ETC & QUICK-SETTING-NON-SHRINK-FREE-FLOW SPECIAL GROUT MIX OF REQUIRED SPECIFICATION (LIKE CONBEXTRA-GP1/ GP2 OR EQUIVALENT).

4.3.3.1
THE QUICK-SETTING-NON-SHRINK-FREE-FLOW SPECIAL GROUT MIX SHALL BE PURCHASED ONLY FROM THE FOLLOWING BHEL APPROVED VENDORS:

1. M/S FOSROC CHEMICALS (INDIA) PVT LTD;
2. M/S SIKA INDIA PVT LTD;
3. M/S PAGEL CONCRETE TECHNOLOGIES PVT LTD;
4. M/S PIDILITE INDUSTRIES LTD.

IN ORDER TO ENSURE THE QUALITY, THE MAJOR GROUTING OF EQUIPMENTS USING ANY OF ABOVE GROUT MIXES SHALL ESSENTIALLY BE DONE AS PER THE RECOMMENDATIONS OF SUPPLIER WITH REGARD TO GROUT PREPARATION AND USE OF MACHINERY ETC UNDER THE SUPERVISION OF THE RESPECTIVE SUPPLIER. BHEL HAS ARRANGEMENT WITH ABOVE SUPPLIERS FOR SUPERVISION SERVICES AND THE SUPERVISION CHARGES FOR THE SAME WILL BE BORNE BY BHEL. HOWEVER, THE CONTRACTOR SHALL ENSURE READINESS OF EQUIPMENT FOR GROUTING IN ALL RESPECT BEFORE SUCH A SERVICE IS REQUISITIONED AND THE DURATION IS NOT PROLONGED UNDULY. ANY OVERSTAY REQUIRED DUE TO CONTRACTOR SHALL BE CHARGED TO THE CONTRACTOR WITH BHEL'S DEPARTMENTAL CHARGES. CONTRACT SHALL CONSULT BHEL ENGINEER BEFORE DECIDING UPON THE VENDOR FOR THE ABOVE.

4.3.3.2
CLEANING OF THE FOUNDATION SURFACES, POCKET HOLES, ANCHOR BOLT PITS AND DE-WATERING AND MAKING THEM FREE OF OIL, GREASE, SAND AND OTHER FOREIGN MATERIALS BY SODA WASHING, WATER WASHING, COMPRESSED AIR AND OTHER APPROVED METHODS WILL BE WITHIN THE SCOPE OF THIS WORK.

4.3.4
BHEL WILL PROVIDE ONLY SHIMS AND PACKER PLATES (EITHER MACHINED OR PLAIN) WHICH ARE RECEIVED FROM BHEL'S MANUFACTURING PLANTS AND GO AS PERMANENT PART OF THE EQUIPMENT. ADDITIONAL PACKER PLATES AND SHIMS IF REQUIRED WILL HAVE TO BE PREPARED BY THE CONTRACTOR OUT OF STEEL PLATES, STEEL SHEETS TO MEET SITE REQUIREMENTS. NECESSARY STEEL PLATES FOR THIS PURPOSE WILL BE PROVIDED BY BHEL FREE OF COST.

4.3.5
PACKER PLATES SHALL NOT ONLY BE BLUE MATCHED WITH FOUNDATIONS BUT ALSO INTER-PACKER CONTACT SURFACES, CONTACT SURFACES BETWEEN PACKER AND PEDESTALS, CONTACT SURFACE BETWEEN PACKER AND FOUNDATION FRAME ETC SHALL ALSO BE BLUE MATCHED AND REQUIRED QUANTUM OF CONTACT SHALL BE ACHIEVED BY CHIPPING AND SCRAPPING AS PER ENGINEER'S INSTRUCTIONS.

4.4 WELDING, RADIOGRAPHY AND OTHER NON-DESTRUCTIVE TESTING, POST WELD HEAT TREATMENT

4.4.1 WELDING
4.4.1.1
INSTALLATION OF EQUIPMENT INVOLVES GOOD QUALITY WELDING, NDE CHECKS, POST WELD HEAT TREATMENT ETC. CONTRACTOR'S PERSONNEL ENGAGED SHOULD HAVE ADEQUATE QUALIFICATION ON THE ABOVE WORKS.

4.4.1.2
THE METHOD OF WELDING (VIZ) ARC, TIG OR OTHER METHOD WILL BE INDICATED IN THE DETAILED DRAWING/DOCUMENTS. BHEL ENGINEER WILL HAVE THE OPTION OF CHANGING THE METHOD OF WELDING AS PER SITE REQUIREMENT.

4.4.1.3
WELDING OF HIGH PRESSURE JOINTS SHALL BE DONE BY IBR CERTIFIED HIGH PRESSURE WELDERS WHO HAVE BEEN PERMITTED BY CIB OF STATE CONCERNED FOR DEPLOYMENT AT THE SITE OF WORK.

4.4.1.4
WELDING OF ALL ATTACHMENTS TO PRESSURE PARTS, PIPING SHALL BE DONE ONLY BY THE QUALIFIED AND APPROVED WELDERS.

4.4.1.5
BEFORE ANY WELDER IS ENGAGED ON WORK, HE SHALL BE TESTED AND QUALIFIED BY BHEL/ CUSTOMER, THOUGH THEY MAY POSSESS THE IBR/OTHER CERTIFICATE. BHEL RESERVES THE RIGHT TO REJECT ANY WELDER WITHOUT ASSIGNING ANY REASON. ALL THE EXPENDITURE IN TESTING/QUALIFICATION OF THE CONTRACTOR'S WELDER SHALL BE BORNE BY CONTRACTOR.

4.4.1.6
UNSATISFACTORY AND CONTINUOUS POOR PERFORMANCE MAY RESULT IN DISCONTINUATION OF CONCERNED WELDER.

4.4.1.7
THE WELDED SURFACE SHALL BE CLEANED OF SLAG AND PAINTED WITH PRIMER PAINT TO PREVENT RUSTING, CORROSION. FOR THIS CONSUMABLES LIKE PAINT /PRIMER ETC WILL BE IN THE CONTRACTOR'S SCOPE.

4.4.1.8
HP JOINT FIT-UP, SHOULD BE PROTECTED, WHERE REQUIRED, BY USE OF TAPES/PROTECTIVE PAINT AS MAY BE PRESCRIBED BY BHEL. THE CONTRACTOR SHALL ARRANGE CONSUMABLES LIKE PROTECTIVE PAINTS/TAPES ETC.

4.4 .1.9
THE CONTRACTOR SHALL MAINTAIN WELDING RECORDS IN THE FORM AS PRESCRIBED BY BHEL CONTAINING ALL NECESSARY DETAILS, AND SUBMIT THE SAME TO THE BHEL ENGINEER AS REQUIRED. INTERPRETATION OF THE BHEL ENGINEER REGARDING ACCEPTABILITY OF THE WELDS SHALL BE FINAL.

4.4.1.10
IN THE CASE OF P-91 PIPE WELDING, CONTRACTOR SHALL DEPLOY WELDERS HAVING EXPERIENCE IN WELDING OF P-91 MATERIAL. THE WELDERS ENGAGED BY CONTRACTOR IF NOT QUALIFIED FOR P-91 WELDING WILL BE TRAINED BY BHEL AT BHEL WELDING RESEARCH INSTITUTE (WRI) TRICHY AND ALLOWED TO WORK ONLY AFTER PASSING THE REQUIRED TEST ARRANGED BY BHEL. ALL THE EXPENDITURE TOWARDS SUCH QUALIFICATION INCLUDING COST OF TRAINING, TRAVELING EXPENSES, STAY ETC., SHALL BE BORNE BY THE CONTRACTOR.

4.4.1.11
JOINT FIT UP WILL BE A STAGE OF INSPECTION. WHERE REQUIRED, JOINTS SHALL BE OFFERED FOR VISUAL INSPECTION AFTER ROOT RUN. SUBSEQUENT WELDING SHOULD BE MADE ONLY AFTER THE APPROVAL OF ROOT RUN.

4.4.1.12 SOCKET WELDING:
IN EXECUTION OF THIS WORK, CONSIDERABLE NUMBER OF SOCKET WELD JOINTS IS INVOLVED. THE EXACT QUANTITY OF SUCH SOCKET WELDS OR PROBABLE VARIATION IN THE QUANTUM CANNOT BE FURNISHED. THE TENDERER SHALL TAKE NOTICE OF THIS WHILE QUOTING AS NO EXTRA CLAIM ON THIS ACCOUNT WILL BE ENTERTAINED. THE SOCKET WELDING ON HP PARTS/ HP PIPING SHALL BE DONE BY THE IBR QUALIFIED WELDERS. CONTRACTOR HAS TO ADHERE TO THE PROCEDURES/SPECIFICATION AS INDICATED IN THE DRAWING FOR SOCKET WELDING.

4.4.1.13
WELDING ELECTRODES HAVE TO BE STORED IN ENCLOSURES HAVING TEMPERATURE AND HUMIDITY CONTROL ARRANGEMENTS. THIS ENCLOSURE SHALL MEET BHEL SPECIFICATIONS.

4.4.1.14
WELDING ELECTRODES, PRIOR TO THEIR USE, CALL FOR BAKING FOR SPECIFIED PERIOD AND WILL HAVE TO BE HELD AT SPECIFIED TEMPERATURE FOR SPECIFIED PERIOD. ALSO,

DURING EXECUTION, THE WELDING ELECTRODES HAVE TO BE CARRIED IN PORTABLE OVENS.

4.4.2 HEAT TREATMENT:

4.4.2.1
FOR THE PURPOSE OF TEMPERATURE RECORDING OF STRESS RELIEVING PROCESS, THERMOCOUPLES HAVE TO BE ATTACHED TO THE WELD JOINT. THE NUMBER OF TEMPERATURE MEAS URING POINTS AND LOCATIONS SHALL BE AS PER THE STANDARDS OF BHEL. THERMOCOUPLES HAVE TO BE ATTACHED USING CAPACITOR DISCHARGE TYPE PORTABLE THERMOCOUPLE ATTACHMENT UNIT. CONTRACTOR SHALL ARRANGE SUFFICIENT NUMBER OF THERMOCOUPLE ATTACHMENT UNITS.

4.4.2.2
CONTRACTOR SHOULD PROVIDE TEMPERATURE INDICATOR / TEMPERATURE RECORDER FOR MEASURING TEMPERATURE DURING PRE-HEATING FOR WELDING OR FOR CONTROLLING TEMPERATURE OF METAL FOR HOT CORRECTION ETC. THE TEMPERATURE RECORDERS SHOULD BE PREFERABLY OF SOLID STATE TYPE.

4.4.2.3
HEAT TREATMENT MAY BE REQUIRED TO BE CARRIED OUT AT ANY TIME (DAY OR NIGHT) TO ENSURE THE CONTINUITY OF THE PROCESS. THE CONTRACTOR SHALL MAKE ALL NECESSARY ARRANGEMENTS INCLUDING LABOURER REQUIRED FOR THE SAME AS PER DIRECTIONS OF BHEL.

4.4.2.4
IN CERTAIN CASES ONLY THE PRE-HEATING OF WELD JOINTS MAY BE CALLED FOR.

4.4.2.5
FOR WELD JOINTS OF HEAVY STRUCTURAL SECTIONS, IF HEAT TREATMENT IS REQUIRED, THE SAME SHALL BE CARRIED OUT AS PART OF THE WORK.

4.4.2.6
CHECKING EFFECTIVENESS OF STRESS RELIEVING BY HARDNESS TESTS (BY DIGITAL HARDNESS TESTER OR OTHER APPROVED TEST METHODS AS PER BHEL ENGINEER'S INSTRUCTION) INCLUDING NECESSARY TESTING EQUIPMENTS IS WITHIN THE SCOPE OF THE WORK / SPECIFICATION.

4.4.2.7
PREHEATING, INTER-PASS HEATING, POST WELD HEATING AND STRESS RELIEVING AFTER WELDING ARE PART OF ERECTION WORK AND SHALL BE PERFORMED BY THE CONTRACTOR IN ACCORDANCE WITH BHEL ENGINEER'S INSTRUCTIONS. WHERE THE ELECTRIC RESISTANCE HEATING METHOD IS ADOPTED CONTRACTOR SHALL MAKE ALL ARRANG EMENT INCLUDING HEATING EQUIPMENT WITH AUTOMATIC RECORDING DEVICES, ALL HEATING ELEMENTS, THERMOCOUPLES AND ATTACHMENT UNITS, GRAPH SHEETS, THERMAL CHALKS, & INSULATING MATERIALS LIKE MINERAL WOOL, ASBESTOS CLOTH, CERAMIC BEADS, ASBESTOS ROPES ETC, REQUIRED FOR ALL HEATING AND STRESS RELIEVING WORKS.

BHEL WILL PROVIDE THE INDUCTION HEATING EQUIPMENT SET FOR SA 335 P-91 MATERIALS PIPING ONLY. THE SET WILL COMPRISE OF FOLLOWING:

(i) MAIN PANEL
(ii) CAPACITOR PANEL
(iii) INTERCONNECTION POWER & CONTROL CABLES BETWEEN ABOVE PANELS
(iv) 185 sq mm SPECIAL CONNECTING CABLE FROM CAPACITOR PANEL OUTPUT – 5 Mtr LENGTHS.

CONTRACTOR SHALL PROVIDE THE INPUT ELECTRICAL POWER CONNECTION INCLUDING ARRANGEMENTS SUCH AS DB, CABLES ETC, THERMOCOUPLE PADS, THERMOCOUPLES AND COMPENSATING CABLES, INDUCTION HEATING ANNEALING CABLES (FROM THE CAPACITOR PANEL TO JOINT AND FOR WRAPPING AROUND THE WELD JOINT) (SPEC: SINGLE CORE 240 Sq mm, 1200A, 3KHz), CERAMIC WOOL AND OTHER CONSUMABLES ETC AS MAY BE REQUIRED. QUANTUM OF ANNEALING CABLE REQUIREMENT WILL DEPEND ON MANY PARAMETERS e.g. WELD JOINT SIZE, HEAT INPUT, TYPE OF CONNECTION i.e. SERIES OR PARALLEL ETC.
LIKELY SUPPLIER: MANSFIELD CABLE CO. NOIDA (UP).

4.4.2.8
ALL THE RECORDED GRAPHS FOR HEAT TREATMENT SHALL BE HANDED OVER TO BHEL/ IBR AUTHORITIES AND DUE CLEARANCES OBTAINED.

4.4.2.9
DURING WELDING & POST WELD HEAT TREATMENT OF MAIN STEAM PIPING (P-91 MATERIAL), THE INDUCTION HEATING PROCESS SHALL CONTINUE UN-INTERRUPTED. THEREFORE, CONTACTOR SHALL ARRANGE BACK-UP DG SET TO TAKE CARE OF POWER INTERRUPTIONS DURING THE PROCESS.

4.4.2.10
RESULTS OF THESE PROCESSES SHALL BE VERIFIED/ VALIDATED AS PER REQUIREMENTS OF BHEL/CLIENT.

4.4.3 NON DESTRUCTIVE EXAMINATION :

4.4.3.1
CONTRACTOR SHALL PROVIDE ALL RESOURCES AND MAKE ALL ARRANGEMENTS FOR THE RADIOGRAPHIC EXAMINATION OF WELDS FOR THIS WORK. FOR REASONS OF SAFETY, INVARIABLY THE RADIOGRAPHY WORK WILL BE CARRIED OUT AFTER THE NORMAL WORKING HOURS AND CLOSE OF OTHER SITE ACTIVITIES ONLY. IN THIS REGARD, THE CONTRACTOR HAS TO ADHERE TO THE SAFETY RULES / REGULATIONS LAID BY BARC AUTHORITIES FROM TIME TO TIME.

4.4.3.2
RADIOGRAPHY INSPECTION OF WELDS SHALL BE PERFORMED IN ACCORDANCE WITH REQUIREMENTS AND RECOMMENDATION OF BHEL ENGINEER. THE MINIMUM QUANTUM OF RADIOGRAPHIC INSPECTION SHALL BE AS PER PROVISION OF IBR/BHEL'S ERECTION DOCUMENTS. THEY MAY, HOWEVER BE INCREASED DEPENDING UPON THE PERFORMANCE OF THE INDIVIDUAL WELDER AT THE DISCRETION OF BHEL ENGINEER/BOILER INSPECTING AUTHORITY. BIDDER SHALL ALSO ARREAGE THE UT EQUIPMENT WITH RECORDING FACILITY AT HIS OWN COST. USAGE OF UT EQUIPMENT SHALL BE AS PER DIRECTION OF BHEL ENGINEER. RECORDS OF UT SHALL BE PRODUCED AS PER SITE REQUIREMENT.

4.4.3.4
ALL X-RAY / GAMMA RAY FILMS OF WELD JOINTS SHALL BE PRESERVED PROPERLY AND BE HANDED OVER TO BHEL/ IBR AUTHORITIES AND REQUISITE CLEARANCES SHALL BE OBTAINED BY THE CONTRACTOR.

4.4.3.5
THE FIELD WELDED JOINTS SHALL BE SUBJECT TO DYE-PENETRANT/MPT/RT/ OTHER NON-DESTRUCTIVE EXAMINATION AS SPECIFIED IN THE RESPECTIVE ENGINEERING DOCUMENTS/ AS INSTRUCTED BY BHEL.

4.4.3.6
WHERE REQUIRED, SURFACE PREPARATION, LIKE SMOOTH GRINDING OF WELDED AREA, PRIOR TO RADIOGRAPHY SHALL BE DONE. IT MAY ALSO BECOME NECESSARY TO ADOPT INTER-LAYER RADIOGRAPHY/MPT/UT DEPENDING UPON THE SITE/ TECHNICAL REQUIREMENT NECESSITATING INTERRUPTIONS IN CONTINUITY OF THE WORK AND MAKING NECESSARY ARRANGEMENTS FOR CARRYING OUT THE ABOVE WORK. THE CONTRACTOR SHALL TAKE ALL THIS INTO ACCOUNT IN HIS OFFER. THE REQUIRED NDT METHOD/PROCEDURE WILL BE DECIDED BY BHEL ENGINEER AT SITE.

4.4.3.7
TENDERER SHALL NOTE THAT 100% RADIOGRAPHY SHALL BE TAKEN ON ALL HIGH PRESSURE WELDING TILL SUCH TIME THE WELDERS' PERFORMANCE IS FOUND BY BHEL ENGINEERS TO BE SATISFACTORY. SUBSEQUENTLY, SUBJECT TO CONSISTENCY IN WELDER'S PERFORMANCE THE PERCENTAGE OF RADIOGRAPHY WILL BE BASED ON BHEL'S STANDARD PRACTICE/CODE REQUIREMENT. THE DEFECTS SHALL BE RECTIFIED IMMEDIATELY AND TO THE SATISFACTION OF BHEL ENGINEER. THE DECISION OF BHEL ENGINEER REGARDING ACCEPTANCE / REJECTING THE JOINTS WILL BE FINAL AND BINDING ON THE CONTRACTOR.

4.4.3.8
100% RADIOGRAPH OF CERTAIN SIZES IN PIPING HAVE TO BE TAKEN AS PER BHEL STANDARDS/ DRAWINGS.

4.4.3.9
FOR CARRYING OUT ULTRASONIC TESTING OF WELDING JOINTS OF LARGE SIZE TUBES AND PIPES, IT WILL BE NECESSARY TO PREPARE SURFACE BY GRINDING AND BUFFING A SMOOTH FINISH AND CONTOUR AS NECESSARY. THE CONTRACTOR'S SCOPE OF WORK INCLUDES SUCH PREPARATION AS INCIDENTAL TO WORK.

4.4.3.10
AFTER STRESS RELIEVING 5% OF UT FOR ALL CRITICAL LINES AND 2% OF UT FOR OTHER ALLOY STEEL LINES TO BE TAKEN TO ENSURE SOUNDNESS OF JOINTS PARTICULARLY STRESS RELIEVING CRACKS. NO SEPARATE PAYMENT WILL BE MADE.

4.4.3.11
CONTRACTOR MAY HAVE TO UNDERTAKE RADIOGRAPHY WITH COBALT-60 ISOTOPE CAMERA IN CERTAIN CASES. HOWEVER, FOR ANY REASON IF USE OF COBALT-60 IS NOT POSSIBLE THEN THESE JOINTS SHALL BE CHECKED BY RADIOGRAPHY AFTER COMPLETION OF WELDING UP TO SUITABLE PART OF THICKNESS WITH IR–192 OTHER SUITABLE SOURCE. SUBSEQUENTLY AFTER COMPLETING THE JOINT UT TO BE DONE. FOR THIS CONTRACTOR HAS TO DEPLOY LEVEL–II OPERATOR CERTIFIED BY BARC.

4.4.3.12
IN THE CASE OF P-91 PIPING WHEREVER RADIOGRAPHY IS NOT POSSIBLE, ALTERNATIVELY ULTRASONIC TEST HAS TO BE CARRIED OUT APART FROM OTHER NDE CHECKS.

4.4.3.13
FOR PIPING OF THICKNESS LESS THAN 25 MM NO RADIOGRAPHY PLUGS WILL BE PROVIDED. RADIOGRAPHY SHOTS TO BE TAKEN BY DOUBLE WALL TECHNIQUE OR ANY OTHER METHOD TO BE ADOPTED IN CONSULTATION WITH BHEL ENGINEER AT SITE.

4.4.3.14
NO SEPARATE PAYMENT FOR ANY NDE ACTIVITIES, EXCEPT FOR RADIOGRAPHY, IS ENVISAGED. FOR RADIOGRAPHY PAYMENT WILL BE MADE BASED ON THE ACCEPTED ITEM RATE ON CERTIFIED MEASUREMENT.

4.5 TESTING, PRE-COMMISSIONING, AND ASSISTANCE FOR COMMISSIONING

4.5.1
TESTING, PRE-COMMISSIONING AND ASSISTANCE FOR COMMISSIONING WILL INVOLVE, THOUGH NOT LIMITED TO THESE, VARIOUS TESTING e.g. HYDRO-STATIC PRESSURE, PRESSURE DECAY TESTS, LEAK TEST, TRIAL RUNS OF EQUIPMENTS; FLUSHING BY AIR, WATER, OIL, STEAM AS APPLICABLE; CHECKING/SETTING VARIOUS CLEARANCES/ PARAMETERS, ENSURING OPERATION OF VARIOUS EQUIPMENTS FREE OF UNDUE RESTRICTIONS, CHEMICAL CLEANING & ALKAALI BOIL OUT OF BOILER, STEAM BLOWING OF THE BOILER AND THE CRITICAL PIPING, FLOATING OF SAFETY VALVES, COAL FIRING, TRIAL OPERATION AND LOADING ETC ARE SOME OF THESE ACTIVITIES. ALL THE ACTIVITIES FOR COMMISSIONING OF THE SET, AS INFORMED BY BHEL FROM TIME TO TIME SHALL BE COMPLETED.

4.5.2
ALL THESE TESTS SHOULD BE REPEATED TILL ALL THE EQUIPMENTS SATISFY THE REQUIREMENT / OBLIGATIONS OF BHEL TO THEIR CLIENT AND ALSO THE RELEVANT STATUTORY AUTHORITY.

4.5.3
CONTRACTOR SHALL LAY/INSTALL NECESSARY TEMPORARY PIPING, PUMPS, VALVES, BLANKS, GAUGES, CABLES, SWITCHES ETC FOR CONDUCT OF HYDRAULIC / PRESSURE TEST, CHEMICAL CLEANING, STEAM / AIR BLOWING ETC. THIS MAY INVOLVE CUTTING OF SOME PORTION OF EXISTING PIPING / VALVES, PLACING OF RUBBER WEDGES / BLANKS IN THE VALVES AND OTHER OPENINGS, FABRICATION AND INSTALLATION OF TEMPORARY TANKS FOR CHEMICAL MIXING, TEMPORARY ACCESS PLATFORMS TO MIXING TANKS ETC. WHERE REQUIRED, BENDS HAVE TO BE FABRICATED / FORMED AT SITE FROM RANDOM LENGTH / SIZE OF PIPES / STRUCTURAL STEEL. TEMPORARY INSTALLATION ITSELF HAS TO BE TESTED, TRIED, AND SUBJECT TO NON-DESTRUCTIVE EXAMINATIONS AS PER THE INSTRUCTIONS OF BHEL AS PART OF WORK**.**

NO PAYMENT WILL BE MADE FOR TEMPORARY INSTALLATIONS MADE FOR HYDRAULIC TESTING OF VARIOUS SYSTEMS & PIPING. SIMILARLY NO PAYMENT WILL BE MADE FOR ELECTRICAL INSTALLATIONS MADE FOR ANY TEMPORARY SYSTEM.

4.5.4
ALL MATERIALS, EQUIPMENTS NECESSARY FOR INSTALLATION OF TEMPORARY SYSTEM AS ABOVE WILL BE SUPPLIED BY BHEL AS FREE RETURNABLE ISSUE IN RANDOM SIZES / LENGTHS. HOWEVER, SERVICING, FABRICATION, ERECTION, DISMANTLING OF THE SAME AFTER COMPLETION OF THE PROCESS, AND HANDING OVER BACK TO BHEL STORES WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

IN ACCOUNTING OF MATERIALS FOLLOWING WASTAGE ALLOWANCES ARE PROVIDED:

1. STRUCTURAL ITEMS : 5%

2. PIPES : 3%

NO WASTAGE ALLOWANCE FOR VALVES & OTHER EQUIPTMENTS.

4.5.5
FABRICATION, FIT-UP, PRE-HEATING, WELDING, POST-WELD HEATING AND POST-WELD-HEAT TREATMENT IF ANY, OF REQUISITE BLANKS FOR CONDUCT OF HYDRAULIC TEST / LEAKAGE TEST IS PART OF WORK. SIMILARLY, REMOVAL OF BLANKS, RESTORATION AND NORMALIZATION OF THE CONCERNED SYSTEM / LINE IS TO BE DONE AS PART OF WORK. BHEL WILL PROVIDE THE MATERIAL FOR BLANKS FREE OF CHARGE. NO SEPARATE PAYMENT IS ENVISAGED FOR THESE ACTIVITIES.

4.5.6
CLEANING, SERVICING OF TANKS, PUMPS, EQUIPMENTS, VALVES, DURING ERECTION AND COMMISSIONING STAGES ARE IN THE SCOPE OF WORK. GASKETS, PACKING & SPARES FOR REPLACEMENT WILL BE P ROVIDED FREE OF CHARGES BY BHEL.

4.5.7
AFTER CHEMICAL CLEANING / PICKLING OF LUBRICATING SYSTEM (INCLUDING OIL PIPING, OIL TANK AND OTHER FITTINGS) OF ROTATING MACHINES, OIL FLUSHING FOR LUBRICATING SYSTEMS AS PER INSTRUCTIONS OF BHEL ENGINEER SHALL BE CARRIED OUT. CLEANING OF OIL TANK OF LUBRICATING OIL SYSTEM OF ROTATING MACHINERY BEFORE AND AFTER OIL FLUSHING IS IN THE SCOPE OF WORK.

4.5.8
TRANSPORTATION OF OIL DRUMS FROM CUSTOMER'S / BHEL'S STORES, FILLING OF OIL FOR FLUSHING, FIRST FILL OF LUBRICANTS AND SUBSEQUENT TOPPING UP DURING TRIALS, TESTS AND COMMISSIONING IS INCLUDED IN THE SCOPE OF THIS CONTRACT. THE CONTRACTOR SHALL HAVE TO RETURN ALL THE EMPTY DRUMS TO THE CUSTOMER / BHEL STORES. SIMILARLY, FOR VARIOUS PRE-COMMISSIONING / COMMISSIONING ACTIVITIES / PROCESSES MENTIONED IN VARIOUS CLAUSES, TRANSPORT OF CHEMICALS FROM BHEL / CUSTOMER'S STORES, CHARGING OF CHEMICALS INTO THE SYSTEM AND RETURNING OF REMAINING CHEMICALS AND THE EMPTY CONTAINERS OF THE CHEMICALS TO CUSTOMER / BHEL STORES IS THE RESPONSIBILITY OF THE CONTRACTOR.

4.5.9
DURING TRIAL RUNS/ TESTS, PRE-COMMISSIONING / COMMISSIONING, REPLACING / CHANGING MECHANICAL / OTHER SEALS OF EQUIPMENTS LIKE PUMPS, REMOVAL AND CLEANING / REPLACING OF FILTERS ETC IS WITHIN THE SCOPE OF WORK. REPLACEMENT SPARES FOR THIS PURPOSE WILL BE PROVIDED BY BHEL.

4.5.10

IN CASE ANY DEFECT IS NOTICED DURING TESTS, TRIAL RUNS OF ALL EQUIPMENTS AND THEIR AUXILIARIES, SUCH AS INTERFERENCES, RUBBING, LOOSE COMPONENTS, ABNORMAL NOISE OR VIBRATION, STRAIN ON CONNECTED EQUIPMENT ETC THE CONTRACTOR SHALL IMMEDIATELY ATTEND TO THESE DEFECTS AND TAKE NECESSARY CORRECTIVE MEASURES. READJUSTMENT AND/OR REALIGNMENT, IF NECESSARY, SHALL BE DONE AS PER BHEL ENGINEER'S INSTRUCTIONS. CLAIM, IF ANY, FOR THESE WORKS SHALL BE GOVERNED BY SECTION-13, SPECIAL CONDITIONS OF CONTRACT PROVIDED THE CAUSE OF SUCH WORK IS NOT ATTRIBUTABLE TO THE CONTRACTOR.

4.5.11

i) CONTRACTOR SHALL CUT / OPEN / DISMANTLE WORK, IF NEEDED, AS PER BHEL ENGINEER'S INSTRUCTIONS DURING COMMISSIONING FOR INSPECTION, CHECKING AND MAKE GOOD THE WORKS AFTER INSPECTION IS OVER.

ii) SIMILARLY, DURING THE COURSE OF ERECTION, IF CERTAIN PORTION OF EQUIPMENTS ERECTED BY THE CONTRACTOR HAS TO BE UNDONE FOR ENABLING OTHER CONTRACTORS / AGENCIES OF BHEL / CUSTOMER TO CARRY OUT THEIR WORK, CONTRACTOR SHALL CARRY OUT SUCH JOBS EXPEDITIOUSLY AND PROMPTLY AND MAKE GOOD THE JOB AFTER COMPLETION OF WORK BY OTHER CONTRACTORS / AGENCIES OF BHEL / CUSTOMER AS PER BHEL ENGINEER'S / AGENCIES OF BHEL / CUSTOMERS INSTRUCTIONS. CLAIMS, IF ANY, IN THIS REGARD SHALL BE GOVERNED AS PER CLAUSES 13.1 TO 13.7.

4.5.12

DURING THIS PERIOD, THOUGH BHEL/ CLIENT'S STAFF WILL ALSO BE ASSOCIATED IN THE WORK, THE CONTRACTOR'S RESPONSIBILITY WILL BE TO ARRANGE FOR COMPLETE REQUIREMENT OF MEN AND REQUIRED TOOLS AND PLANTS, CONSUMABLES, SCAFFOLDING AND APPROACHES ETC TILL SUCH TIME THE COMMISSIONED UNIT UNDERGOES TRIAL OPERATIONS.

4.5.13

COMMISSIONING ACTIVITIES WILL CONTINUE TILL THE COMPLETION OF TRIAL OPERATION. DURING THIS PERIOD CONTRACTOR SHALL MAKE AVAILABLE THE SERVICES OF SEPARATE DEDICATED WORKFORCE COMPRISING OF SUITABLE SKILLED AND SEMI-SKILLED / UN-SKILLED WORKMEN AND SUPERVISORY STAFF ALONGWITH NECESSARY TOOLS AND PLANTS, CONSUMABLES ETC.

4.5.14

IT SHALL BE SPECIFICALLY NOTED THAT THE CONTRACTOR MAY HAVE TO WORK ROUND THE CLOCK DURING THE PRE-COMMISSIONING AND COMMISSIONING PERIOD ALONGWITH BHEL ENGINEERS AND HENCE CONSIDERABLE OVERTIME PAYMENT IS INVOLVED. THE CONTRACTOR'S QUOTED RATES SHALL BE INCLUSIVE OF ALL THESE FACTORS.

4.5.15

THE CONTRACTOR SHALL CARRY OUT ANY OTHER TESTS AS DESIRED BY BHEL ENGINEER ON ERECTED EQUIPMENT COVERED UNDER THE SCOPE OF THIS CONTRACT DURING TESTING, PRE-COMMISSIONING AND COMMISSIONING, TO DEMONSTRATE THE COMPLETION OF ANY PART OR WHOLE OF WORK PERFORMED BY THE CONTRACTOR.

4.5.16
AT VARIOUS STAGES OF COMPLETION BOILER HAS TO BE PRESERVED AGAINST CORROSION EITHER BY WET PRESERVATION OR BY DRY PRESERVATION AS PER THE REQUIREMENT OF BHEL ENGINEER. CONTRACTOR SHALL CARRY OUT ALL THE INCIDENTAL JOBS LIKE FILLING UP OF WATER, DOZING OF CHEMICALS AND PRESSURIZING THE SYSTEM TO THE REQUIRED PRESSURE, CHANGE OF GAS REFILLS ETC. THE BOILERS HAVE A PERMANENT N_2 BLANKETING ARRANGEMENT.

DURING THIS PERIOD, THOUGH BHEL/ CLIENT'S STAFF WILL ALSO BE ASSOCIATED IN THE WORK, THE CONTRACTOR'S RESPONSIBILITY WILL BE TO ARRANGE FOR COMPLETE REQUIREMENT OF MEN AND REQUIRED TOOLS AND PLANTS, CONSUMABLES, SCAFFOLDING AND APPROACHES ETC., TILL SUCH TIME THE COMMISSIONED UNIT IS TAKEN OVER.

4.5.16
COMMISSIONING ACTIVITIES WILL CONTINUE TILL THE COMPLETION OF TRIAL RUN, TRIAL OPERATION. DURING THIS PERIOD CONTRACTOR SHALL MAKE AVAILABLE THE SERVICES OF SEPARATE DEDICATED LABOR FORCE COMPRISING OF SUITABLE SKILLED AND SEMI/UN-SKILLED HANDS ALONG WITH NECESSARY TOOLS AND PLANTS, CONSUMABLES ETC.

4.5.17
IT SHALL BE SPECIFICALLY NOTED THAT THE CONTRACTOR MAY HAVE TO WORK ROUND THE CLOCK DURING THE PRE-COMMISSIONING AND COMMISSIONING PERIOD ALONG WITH BHEL ENGINEERS AND HENCE CONSIDERABLE OVERTIME PAYMENT IS INVOLVED. THE CONTRACTOR'S QUOTED RATES SHALL BE INCLUSIVE OF ALL THESE FACTORS.

4.5.18
CONDUCT OF PERFORMANCE GUARANTEE TEST IS EXCLUDED FROM IN THE SCOPE OF WORK. HOWEVER, CONTRACTOR SHALL INSTALL ALL NECESSARY TAPPING POINTS ETC REQUIRED FOR PG TEST**.**

4.5.19
THE CONTRACTOR SHALL CARRY OUT ANY OTHER TESTS AS DESIRED BY BHEL ENGINEER ON ERECTED EQUIPMENT COVERED UNDER THE SCOPE OF THIS CONTRACT DURING TESTING, PRE-COMMISSIONING AND COMMISSIONING, TO DEMONSTRATE THE COMPLETION OF ANY PART OR WHOLE OF WORK PERFORMED BY THE CONTRACTOR.

4.6 GENERAL RESPONSIBILITY OF THE CONTRACTOR

4.6.1
THE CONTRACTOR SHALL HAVE TOTAL RESPONSIBILITY FOR ALL EQUIPMENT AND MATERIALS IN HIS CUSTODY AT CONTRACTOR'S STORES, LOOSE, SEMI-ASSEMBLED, ASSEMBLED OR ERECTED BY HIM AT SITE. HE SHALL EFFECTIVELY PROTECT THE FINISHED WORKS FROM ACTION OF WEATHER AND FROM DAMAGES OR DEFACEMENT AND SHALL ALSO COVER THE FINISHED PARTS IMMEDIATELY ON COMPLETION OF WORK AS PER BHEL ENGINEER'S INSTRUCTIONS. THE MACHINE SURFACES/FINISHED SURFACES SHOULD BE GREASED AND COVERED.

4.6.2 PRESERVATION & PROTECTION OF COMPONENTS

AT ALL STAGES OF WORK, EQUIPMENTS/MATERIALS IN THE CUSTODY OF CONTRACTOR, INCLUDING THOSE ERECTED, WILL HAVE TO BE PRESERVED AS PER THE INSTRUCTIONS OF BHEL.

4.6.3
THE CONTRACTOR SHALL MAKE SUITABLE SECURITY ARRANGEMENTS INCLUDING EMPLOYMENT OF SECURITY PERSONNEL AND ENSURE PROTECTION OF ALL MATERIALS/ EQUIPMENT IN THEIR CUSTODY AND INSTALLED EQUIPMENTS FROM THEFT/FIRE/ PILFERAGE AND ANY OTHER DAMAGES AND LOSSES.

4.6.4
CONTRACTOR SHALL COLLECT ALL SCRAP MATERIALS PERIODICALLY FROM VARIOUS AREA OF WORK SITE, DEPOSIT THE SAME AT ONE PLACE EARMARKED AT SITE OR SHIFT THE SAME TO A PLACE EARMARKED IN BHEL/ CLIENT'S STORES. IN CASE OF FAILURE OF CONTRACTOR IN COMPLIANCE OF THIS REQUIREMENT, BHEL WILL MAKE SUITABLE ARRANGEMENT AT CONTRACTOR'S RISK AND COST.

4.6.5
THE ENTIRE SURPLUS, DAMAGED, UNUSED MATERIALS, PACKAGING MATERIALS / CONTAINERS, SPECIAL TRANSPORTING FRAMES, GUNNY BAGS, ETC SHALL BE RETURNED TO BHEL STORES BY THE CONTRACTOR.

4.6.6
THE CONTRACTOR SHALL NOT WASTE ANY MATERIALS ISSUED TO HIM. IN CASE IT IS OBSERVED AT ANY STAGE THAT THE WASTAGE/EXCESS UTILISATION OF MATERIALS IS NOT WITHIN THE PERMISSIBLE LIMITS, RECOVERY FOR THE EXCESS QUANTITY USED OR WASTED WILL BE EFFECTED WITH DEPARTMENTAL CHARGES FROM THE CONTRACTOR. DECISION OF BHEL ON THIS WILL BE FINAL AND BINDING ON THE CONTRACTOR.

4.6.7
FOR ANY CLASS OF WORK FOR WHICH NO SPECIFICATIONS HAVE BEEN LAID DOWN IN THESE SPECIFICATIONS, WORK SHALL BE EXECUTED AS PER THE INSTRUCTIONS OF BHEL.

4.7
BHEL IS OPERATING WEB BASED COMPUTERIZED SITE OPERATION MANAGEMENT SYSTEM (SOMS) THAT INCLUDES, INTER-ALIA, ISSUE OF MATERIALS, DAILY PROGRESS REPORTING, CONTRACTOR'S RUNNING MONTHLY BILLING AND MATERIAL RECONCILIATION THROUGH A COMPUTERIZED DATA MANAGEMENT SYSTEM. CONTRACTOR SHALL INSTALL NECESSARY HARDWARE TO HOOK-UP WITH THE BHEL'S SYSTEM AND USE THE SAME FOR HIS SCOPE OF WORK.

IN THE EVENT THE COMPUTERIZED SOMS IS INOPERATIVE FOR ANY REASONS, THE CONTRACTOR SHALL TAKE DELIVERY OF MATERIALS FROM THE STORAGE AREA/SHEDS OF BHEL/CUSTOMER AFTER GETTING THE APPROVAL OF THE ENGINEER/CUSTOMER ON STANDARD INDENT FORMS TO BE SPECIFIED BY BHEL/CUSTOMER. ALL THESE RECORDS HOWEVER SHALL BE UPDATED IN THE SOMS AS AND WHEN THE SOMS IS REACTIVATED/NORMALIZED.

4.8

ERECTION AND COMMISSIONING OF HP BYPASS SYSTEM ALONG WITH VALVES, VALVE ACTUATORS, OIL SUPPLY UNIT, FILTERS, ACCUMULATOR, TANK, AND CONTROL OIL PIPING WITH FITTINGS ETC. IS INCLUDED UNDER THESE SPECIFICATIONS. CONTRACTOR SHALL CARRY OUT THE COMPLETE WORKS OF INSTALLATION, ERECTION, WELDING, NDE/NDT ETC., MAKING ARRANGEMENTS AND FLUSHING OF OIL SYSTEM, FILLING THE FRESH OIL AND SUBSEQUENT TOPPING UP, PROVID ING COMMISSIONING ASSISTANCE FOR DAY TO DAY ACTIVITIES OF CLEANING OF FILETER /ATETNDING THE CLEAKAGES (IF ANY) ETC. DURING PRE-COMMISSIONING/ COMMISSIONING AND REGULAR OPERAT ION TILL TRIAL OPERATION.

4.9 EXCLUSIONS

THE FOLLOWING WORKS ARE SPECIFIC EXCLUSIONS FROM THE SCOPE OF WORK / SPECIFICATION:-

I) SOME SUB-DELIVERY ITEMS AND ELECTRICAL COMPONENTS SUCH AS PUSH-BUTTONS, JUNCTION BOXES ETC.

II) E&C WORK OF CABLE TRAYS, CABLES AND EARTHING ETC

III) CONTROL PANELS, EPMS, MCC ETC.

IV) ELECTRICAL & C&I ITEMS OF HANDLING SYSTEM (PG 99)

V) ALL ELECTRICAL AND CONTROL & INSTRUMENTATION ITEMS EXCEPT THOSE SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS. HOWEVER THE ELECTRICAL TRACING WORK ALONG WITH ELECTRICAL PANEL WORKS ETC. IS SPECIFICALLY INCLUDED UNDER THIS SPECIFICATION.

VI) CIVIL WORKS EXCEPT TO THE EXTENT SPECIFICALLY INDICATED ELSEWHERE IN THIS TENDER.

VII) REFRACTORY & INSULATION (Excepting insulation between ESP Inner and Outer roofs).

VIII) PNEUMATIC COPPER TUBING AND FITTINGS THEREOF.

IX) ELECTRONIC PROBE/ELECTRONIC COMPONENTS OF ASH LEVEL INDICATORS.

X) TESTING AND COMMISSIONING OF HEATING ELEMENTS, THERMOSTATS, HV RECTIFIER TRANSFORMERS.

XI) APPLICATION OF REFRACTORY LINING ON INSIDE WALLS OF COMBUSTOR, CYCLONE INCLUDING IT'S INLET & OUTLET DUCTS, RETURN LEG TO COMBUSTOR ETC.

XII) ELECTRICAL AND C&I ITEMS OF VARIABLE FREQUENCY DRIVES AS PROVIDED ELSEWHERE IN THESE SPECIFICATIONS.

XIII) FINAL PAINTING

SECTION-5

SPECIAL CONDITIONS OF CONTRACT

5.0 OBLIGATIONS OF THE CONTRACTOR (TOOLS, TACKLES, CONSUMABLES ETC.)

5.1 ACCOMMODATION, DRINKING WATER & LOCAL TRANSPORTATION FOR THE LABOUR & OTHER EMPLOYEES

5.1.1
Contractor shall make his own arrangements for labour colony and staff quarters including land & space, lighting, water, sanitation etc with hygiene and comply with all requirements. Also, the contractor has to make his own arrangement for transportation of his workmen and other employees. BHEL/client shall not provide any facility with regard to above.

5.2 tools and tackles, measuring and monitoring devices:

5.2.1
The contractor shall provide all (excepting those indicated in BHEL scope) required tools and plants, monitoring and measuring devices (MMD) and handling & transportation equipments for the scope of work covered under these specifications. Contractor has to provide suitable cranes for material handling at BHEL/client's stores/storage yard. Please refer relevant appendix for the list of T&P being provided by BHEL free of charges on sharing basis.

5.2.2
All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification. Indicative list of major t&p to be arranged by the contractor has been furnished in relevant appendix. Contractor shall also mobilize all other T&P necessary for timely and satisfactory completion of the work in scope.

5.2.3
Contractor's responsibilities with regard to operator, fuel, lubricants and daily upkeep of t&p provided by BHEL are further detailed in section-7.

5.2.4
Timely deployment of adequate quantity of T&P is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned programme and to achieve the milestones.

5.2.5
Contractor shall maintain and operate his tools and plants in such a way that major breakdowns are avoided. In the event of major breakdown, contractor shall make alternative arrangements expeditiously so that the progress of work is not hampered.

5.2.6
In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make the alternative arrangement at the risk and cost of the contractor.

5.2.7
The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. The movements of cranes and other equipment should be such that no damage / breakage occurs to foundations, other equipments, material,

property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility. The necessary test certificates for equipments to be submitted.

5.2.8
Use of welding generators/ rectifiers for welding only shall be permitted. Use of welding transformers will be subject to specific approval of BHEL engineer.

5.2.9
The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of measuring & monitoring devices (MMD). Test/ calibration certificates shall be furnished to BHEL. MMD shall be calibrated only at accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL.

5.2.10
BHEL T&P will be issued in basic assembled condition, contractor shall transport these T&P to & fro between BHEL stores and site. Additional loose components / sub-assemblies / attachments as and when necessary, will be issued by BHEL. Assembly of such additional loose components/sub-assemblies/ attachments is in contractor's scope.

5.3 Consumables

5.3.1
The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those specifically indicated as BHEL scope.

5.3.2
All consumables to be used for the work shall have prior approval of BHEL engineer with regard to brand and quality specifications. Test reports / certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

5.3.3 Primers & Paints

All primers and paints (other than which are specifically included in scopes of BHEL) shall be is in the scope of contractor.

5.3.4 CONSUMABLES FOR BHEL SUPPLIED EQUIPMENTS (CRANES, T &P ETC)

Refer relevant clause of section-7 special conditions of contract in this regard.

5.3 WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES

5.4.1
All the required welding electrodes, except those indicated as BHEL scope elsewhere in these specifications, as approved by BHEL shall be arranged by contractor at his cost. it shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. on receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL regarding type of electrodes, batch number, date of expiry etc. batch test certificates shall be made available for verification & record before the actual use of the welding consumables.

BHEL reserves the right to reject the use of any electrodes, if found non-acceptable because of bad quality, deterioration in quality due to improper storage, shelf life expiry, unapproved type / brand etc.

5.4.2
Filler wires, for TIG welding of pressure parts & piping, to the extent supplied by the manufacturing units of BHEL along with the components / equipments only shall be provided by BHEL as free issue. Contractor shall at his cost meet requirements of TIG filler wires, if any, beyond these free issue quantities.

Similarly, BHEL will provide as free issue the welding electrode for welding of P-91 material tubes/pipes released as part of supply from manufacturing unit of BHEL

5.4.3
Gases like argon, oxygen, and acetylene etc that are required for erection related activities shall be arranged by the contractor at his cost. Argon gas for p-91 pipe joints welding process shall be conforming to grade–3 of IS:5760-1998 with oxygen and water vapour restricted to maximum 6 ppm each and with argon purity level of minimum 99.99%. The supply should accompany test certificate for the batch indicating individual element 'ppm' level and overall purity level.

5.4.4
Nitrogen gas, if required, for preservation of boiler and nitrogen capping during chemical cleaning process, will be provided by BHEL free of charge. Contractor shall arrange necessary connector, nipple, regulator, header and piping for usage of such gas from cylinders.

5.5 FIELD OFFICE

5.5.1
The contractor shall make his own arrangements for field office and stores for accommodating necessary equipments, tools room for execution of the work. only open space will be provided by BHEL / customer, free of charges within the project premises as per the availability of space.

5.5.2
On completion of work, all the temporary buildings, structures, pipelines, cables, etc shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. in the event of his failure to do so, the same will be arranged to be removed and expenditure thereof will be recovered from the contractor. The decision of BHEL engineer in this regard shall be final. However, the scope of dismantling and leveling the area is limited only to the contractor's site office, yard and other spaces occupied by the contractor.

5.6 AREA LIGHTING

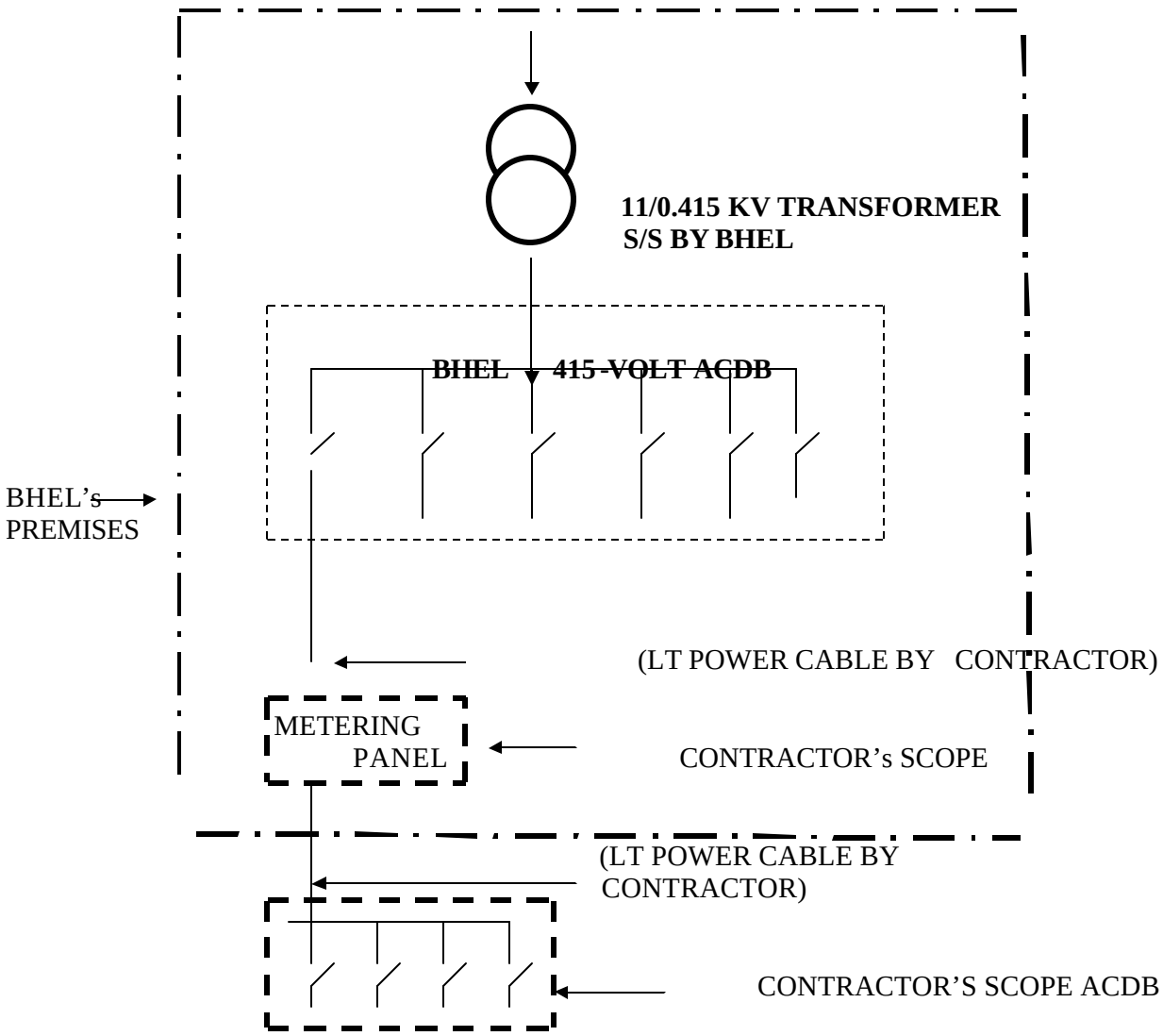
5.6.1
Contractor shall arrange adequate floodlights, hand lamps and area lighting. Contractor shall use his own materials like cables, fuses, switch-boards etc. BHEL/client will not provide anything in this regard.

5.7 CONSTRUCTION POWER & WATER

5.7.1

BHEL shall provide 3-phases, 415 volts construction power on chargeable basis at one single point located at a radial distance of 500 meters from transformer sub-station. Contractor shall make necessary arrangement for tapping the power from sub-station board at his cost as per the following sketch.

SINGLE LINE DIAGRAM FOR 11/0.415 KV CONSTRUCTION POWER DISTRIBUTION (A TYPICAL ARRANGEMENT)



5.7.1.1

Contractor shall install metering panel suitable for out door installation with locking arrangement within the premises of BHEL transformer sub station. Metering panel should have provision of bus bars (3 phase & neutral), energy meter C.T.. Operated for metering the power consumption for three-phase four wires system. The CT ratio 400/ 1 or 5 amps. Preferably meter should be of M/s L&T make digital energy meter type er-300p, CTR 400/5 amps, 3 phase, 4 wire connection. Further contractor, the shall abide for the following obligation at his cost:

- Contractor shall carry out necessary cabling from BHEL's ACDB to metering panel & from metering panel to contractor's ACDB which is to be installed near to their load center.

- Contractor shall install the power factor improvement devices in their ACDB for improvement of power factor in order to achieve the system stability in distribution network.
- Once the contractor's feeder is charged, only authorized person shall be allowed to access the metering panel with due permission of BHEL's engineer.

- In case energy meter installed by contractor become defective due to unforeseen reasons, it shall be brought to the notice of BHEL site engineer and shall arrange its immediate replacement. The recovery of the power consumed, for the period/ duration of the outage of meter, shall on the basis of past average consumption and shall be binding on contractor as per decision/discretion of BHEL engineer at site.

5.7.1.2

Contractor shall submit daily power consumption report in prescribed format; however meter reading shall be jointly recorded for monthly power consumption from first day to last day of month or as per billing duration as prescribed by GIPCL. **Energy consumption shall be recovered from the monthly running bills as per meter reading jointly recorded and it shall be charged @ Rs.12.50 per unit (KWH) of consumption.** The per unit rate is inclusive of all taxes & duties.

5.7.1.3

Contractor shall ensure compliance of statutory requirement for his electrical installations and construction power flow shall be permitted only after submission of test report/certificate by contractor from authorized authorities for installation as per the requirement of statutory authority. The all expenses towards the certification of installation shall be borne by contractor.

5.7.1.4

It shall be the responsibility of the contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. Licensed and experienced electrician shall do the installation and maintenance of this.

5.7.3

The contractor shall make his own arrangements for tapping off construction water from available single point as provided by customer. However in case of inadequate supply / non-availability of construction water from customer, contractor shall have to arrange construction water himself at his own expenses.

Contractor shall collect drinking water from sources/tapping point as provided by customer by making his own arrangement.

5.7.4

Contractor shall be well equipped with back-up power supply arrangement like dg set and diesel operated welding machine etc. To tackle situations arising due to failure of customer supplied power, so as to ensure continuity and competition of critical

processes that are underway at the time of power failure or important activities planned in immediate future.

5.7.5
BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.

5.8 RESPONSIBILITIES WITH REGARD TO LABOUR EMPLOYMENT ETC.

Refer clause 2.8 of general conditions of contract also in this regard.

5.8.1
Contractor shall also comply with the requirements of local authorities/ project authorities calling for police verification of antecedents of the workmen, staff etc.

5.8.2
BHEL / customer may insist for witnessing the regular payment to the labour. They may also like to verify the relevant records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL / customer.

5.8.3
It is the responsibility of the contractor to arrange gate pass for all his employees, t&p etc for entering the project premises. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer / BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permits for working beyond normal working hours.
5.8.4.
Contractor shall provide at different elevation suitable arrangement for urinal and drinking water facility with necessary plumbing & disposal arrangement including construction of septic tank. These installations shall be maintained in hygienic condition at all times.

5.9
If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability/shortfall in provision of resources from the contractor's side, BHEL will make suitable alternate arrangements at the risk and cost of contractor. The expenditure incurred with overheads thereon shall be recovered from the contractor.

5.10 TAXES, DUTIES, LEVIES

Please refer Clause no. 2.8.4 of General Conditions of Contract. Notwithstanding anything contained therein, the following provisions shall be applicable for this contract.

5.10.1

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

5.10.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and deposit the same with the concerned tax authorities, such applicable amount will be paid by BHEL. Contractor shall submit to BHEL documentary evidence of Service Tax registration and remittance record of such tax immediately after depositing the tax with concerned authorities. Contractor shall obtain prior written consent from BHEL before billing the amount towards such taxes.

With introduction of Cenvat Credit Rules 2004, which came into force w.e.f. 10.09.2004, Excise Duty paid on Input Goods including Capital Goods and Service Tax paid on Input Services that are used for providing the output services can be taken credit of against the Service Tax payable on output services. However BHEL may opt for availing the abatement provision in which case cenvat credit may not be available on input duty.

5.10.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

5.10.4 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.

5.10.5 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same **before opening of Price Bid**. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

5.11 SUBMISSION OF PERIODICAL REPORTS

CONTRACTOR SHALL SUBMIT PERIODICAL REPORTS IN RESPECT OF FOLLOWING ASPECTS OF OPERATION:

1) CONSUMPTION OF CONSUMABLES LIKE WELDING ELECTRODES, GASES AND PAINTS
2) CONSUMPTION OF CONSTRUCTION POWER
3) AVAILABILITY AND UTILIZATION OF BHEL'S TOOLS & PLANTS
4) AVAILABILITY AND UTILIZATION OF CONTRACTOR'S TOOLS & PLANTS
5) DAILY MANPOWER REPORTS
6) DAILY PROGRESS REPORTS OF ACTIVITIES & INCIDENTS
7) CALIBRATION REPORTS
8) RECORDS OF WAGES PAYMENT
9) ANY OTHER REPORT/RECORD AS MAY BE SPECIFIED BY BHEL/CLIENT.

SECTION-6

SPECIAL CONDITIONS OF CONTRACT

6.0 CONTRACTOR'S OBLIGATION IN REGARD TO EMPLOYMENT OF SUPERVISORY STAFF AND WORKMEN

6.1

THE CONTRACTOR SHALL DEPLOY ALL THE SKILLED/SEMISKILLED/ UNSKILLED LABOUR INCLUDING HIGHLY SKILLED WORKMEN ETC. THESE WORKMEN SHOULD HAVE PREVIOUS EXPERIENCE ON SIMILAR JOB. THEY SHALL HOLD VALID CERTIFICATES WHEREVER NECESSARY. BHEL RESERVES THE RIGHT TO INSIST ON REMOVAL OF ANY EMPLOYEE OF THE CONTRACTOR AT ANY TIME IF HE IS FOUND TO BE UNSUITABLE AND THE CONTRACTOR SHALL FORTHWITH REMOVE HIM. CONTRACTOR SHOULD FURNISH A TENTATIVE DEPLOYMENT PLAN OF HIS MANPOWER AS REQUIRED VIDE APPENDIX-VI. ALSO THE ACTUAL DEPLOYMENT WILL BE SO AS TO SATISFY THE ERECTION AND COMMISSIONING TARGETS SET BY BHEL.

6.2

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENGAGE HIS WORKMEN IN SHIFTS AND OR ON OVERTIME BASIS FOR ACHIEVING THE TARGETS SET BY BHEL. THIS TARGET MAY BE SET TO SUIT BHEL'S COMMITMENTS TO ITS CUSTOMER OR TO ADVANCE DATE OF COMPLETION OF EVENTS OR DUE TO OTHER REASONS. THE DECISION OF BHEL IN REGARD TO SETTING THE ERECTION AND COMMISSIONING TARGETS WILL BE FINAL AND BINDING ON THE CONTRACTOR.

6.3

CONTRACTOR SHALL DEPLOY ONLY QUALIFIED AND EXPERIENCED ENGINEERS/ SUPERVISORS. THEY SHALL HAVE PROFESSIONAL APPROACH IN EXECUTING THE WORK.

6.4

THE CONTRACTOR'S SUPERVISORY STAFF SHALL EXECUTE THE WORK IN THE MOST PROFESSIONAL MANNER IN THE STIPULATED TIME. ACCURACY OF WORK AND AESTHETIC FINISH ARE ESSENTIAL PART OF THIS CONTRACT. THEY SHALL BE RESPONSIBLE TO ENSURE THAT THE ASSEMBLY AND WORKMANSHIP CONFORM TO DIMENSIONS AND TOLERANCES GIVEN IN THE DRAWINGS/INSTRUCTIONS GIVEN BY BHEL ENGINEER FROM TIME TO TIME.

6.5

THE SUPERVISORY STAFF EMPLOYED BY THE CONTRACTOR SHALL ENSURE PROPER OUTTURN OF WORK AND DISCIPLINE ON THE PART OF THE LABOUR PUT ON THE JOB BY THE CONTRACTOR. ALSO IN GENERAL THEY SHOULD SEE THAT THE WORKS ARE CARRIED OUT IN A SAFE AND PROPER MANNER AND IN COORDINATION WITH OTHER LABOUR AND STAFF EMPLOYED DIRECTLY BY BHEL OR OTHER CONTRACTORS OF BHEL OR BHEL'S CLIENT.

6.6

IF AT ANY TIME, IT IS FOUND THAT THE CONTRACTOR IS NOT IN A POSITION TO DEPLOY THE REQUIRED ENGINEERS/SUPERVISORS/WORKMEN DUE TO ANY REASON; BHEL SHALL HAVE THE OPTION TO MAKE ALTERNATE ARRANGEMENTS AT THE CONTRACTOR'S RISK AND COST.

6.7 SITE ORGANISATION

THE CONTRACTOR SHALL PROVIDE ADEQUATE STAFFING IN THE FOLLOWING AREAS IN ADDITION TO THE STAFFING REQUIREMENTS OF EXECUTION AS INSTRUCTED/INFORMED BY BHEL FROM TIME TO TIME:

- 6.7.1 OVERALL PLANNING, MONITORING & CONTROL
- 6.7.2 QUALITY CONTROL AND QUALITY ASSURANCE
- 6.7.3 MATERIALS MANAGEMENT
- 6.7.4 SAFETY, FIRE & SECURITY
- 6.7.5 INDUSTRIAL RELATIONS AND FULFILLMENT OF LABOUR LAWS AND OTHER STATUTORY OBLIGATIONS.

SECTION- 7

SPECIAL CONDITIONS OF CONTRACT

7.0 OBLIGATIONS OF BHEL

7.1 FACILITIES TO BE PROVIDED BY BHEL

7.1.1 SPACE FOR SITE OFFICE / STORES
REFER SECTION-5 IN THIS REGARD.

7.1.2 CONSTRUCTION POWER & WATER
REFER SECTION-5 IN THIS REGARD.

7.1.3 OTHER MATERIALS AND CONSUMABLES:

BHEL SHALL NOT PROVIDE ANY MATERIAL / CONSUMABLES EXCEPT THOSE SPECIFICALLY MENTIONED AS BHEL SCOPE IN THESE SPECIFICATIONS.

7.1.4 MATERIALS FOR IBR WELDER SITE QUALIFICATION TEST (PIPES)

BHEL WILL PROVIDE ONLY THE TUBES/PIPES FREE OF CHARGES FOR PREPARATION OF TEST PIECES FOR CONDUCTING THE SITE QUALIFICATION TEST OF HIGH PRESSURE/ IBR WELDERS. CONTRACTOR SHALL PREPARE THE REQUIRED TEST PIECES FROM SUCH RAW MATERIALS. CONTRACTOR SHALL ARRANGE ALL THE MATERIALS AND PREPARE TEST COUPONS FOR SITE QUALIFICATION TEST OF ALL OTHER WELDERS.

7.2 FILLER WIRE FOR TIG WELDING AND WELDING ELECTRODES FOR WELDING OF P91 MATERIAL TUBES/PIPES

REFER SECTION-5 IN THIS REGARD.

7.3 EQUIPMENTS – TOOLS & PLANTS

BHEL WILL MAKE AVAILABLE T&P LISTED IN THE RELEVANT APPENDIX FREE OF CHARGE. FURTHER DETAILS ARE AS UNDER:

7.3.1 CRANES TO BE PROVIDED BY BHEL

7.3.1.1
BHEL WILL MAKE AVAILABLE THE CRANE (AS PER RELEVANT APPENDIX) FREE OF CHARGES TO THE CONTRACTOR ON SHARING BASIS MAINLY FOR THE PURPOSES ENUMERATED VIDE NOTES IN THE ABOVE REFERRED APPENDIX. BHEL PROVIDED CRANES HAVE TO BE SHARED WITH OTHER AGENCIES / CONTRACTORS OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR.

7.3.1.2
CONTRACTOR SHALL PROVIDE SLEEPERS AND LAY NECESSARY SLEEPER BEDS, BACKFILLING OF APPROACHES WHEREVER NECESSARY FOR SAFE MOVEMENT OF THE CRANES AS DIRECTED BY BHEL. CONTRACTOR SHALL TRANSPORT THE EQUIPMENTS AND COMPONENTS/SUB ASSEMBLIES/ATTACHMENTS OF BHEL EQUIPMENTS TO & FRO BETWEEN BHEL STORES AND SITE.

7.3.1.3
CRANES, WILL BE INITIALLY ISSUED IN BASIC ASSEMBLED CONDITION. ANY ALTERATION/ADDITION LIKE BOOM REDUCTION/EXTENSION, ASSEMBLY OF COMPONENTS/SUB-ASSEMBLIES NEEDED FOR MODULATING THE CAPACITY/REACH/ OTHER FEATURES OF CRANES AND RESTORATION TO THE STATE AS DIRECTED BY BHEL SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

7.3.1.4
THE DAY-TO-DAY UPKEEP AND RUNNING MAINTENANCE LIKE FILLING / TOPPING UP OF LUBRICANTS, CHANGING FILTERS ETC, OF BHEL CRANES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SPARES IF ANY, REQUIRED IN NORMAL COURSE WILL BE PROVIDED BY BHEL. MAJOR BREAKDOWNS WILL BE ATTENDED TO BY BHEL. THE CRANES PROVIDED BY BHEL WILL BE WITHDRAWN FOR REGULAR AND CAPITAL

MAINTENANCE AS PER THE RESPECTIVE SCHEDULE OF MAINTENANCE. AS FAR AS POSSIBLE SUCH SCHEDULES WILL BE INTIMATED TO THE CONTRACTOR IN ADVANCE AND MAY BE ADJUSTED DEPENDING ON THE WORK REQUIREMENTS AT SITE. HOWEVER NO CLAIM WHATSOEVER WILL BE ENTERTAINED ON ACCOUNT OF NON-AVAILABILITY OF CRANE(S).

7.3.1.5
CONTRACTOR SHALL PROVIDE THE FUEL AND OPERATOR FOR THE ALL BHEL CRANES.

7.3.1.6
WHERE THE SERVICES OF THE CRANES PROVIDED BY BHEL ARE TO BE SHARED BY OTHER AGENCIES/ CONTRACTORS OF BHEL, THE CONTRACTOR'S RESPONSIBILITIES DEFINED ABOVE WILL ALSO BE APPORTIONED ACCORDINGLY TO THE BENEFICIARY AGENCY. WORKING ARRANGEMENTS IN THIS REGARD WILL BE DONE AT SITE BY BHEL ENGINEER AND IN ANY CASE HIS DECISION SHALL BE FINAL AND BINDING.

7.4 OTHER T&P

7.4.1
THE RESPONSIBILITIES OF CONTRACTOR DEFINED ABOVE FOR BHEL CRANES SHALL ALSO BE APPLICABLE, MUTATIS – MUTANDIS, IN RESPECT OF OTHER TOOL & PLANTS PROVIDED BY BHEL.

7.4.2
CHEMICAL CLEANING EQUIPMENTS PROVIDED BY BHEL THAT HAVE TO BE USED IN TEMPORARY INSTALLATIONS FOR THE RESPECTIVE PURPOSE HAVE TO BE SERVICED BY THE CONTRACTOR PRIOR TO USE. BHEL WILL PROVIDE NECESSARY SPARES, PACKING ETC FREE OF CHARGE FOR THE SAME. THESE HAVE TO BE RETURNED TO BHEL AFTER DUE SERVICING AND PRESERVATION.

7.4.3
SPECIAL TOOLS WHICH ARE SUPPLIED BY BHEL AS PART OF MAINTENANCE TOOLS TO BE HANDED OVER TO CUSTOMER UNDER REGULAR DU / DESS NUMBERS IN VARIOUS PRODUCT GROUPS MAY BE ISSUED TO THE CONTRACTOR FREE OF CHARGES FOR SPECIFIC ACTIVITIES, AT THE DISCRETION OF BHEL. CONTRACTOR SHALL RETURN THEM AFTER THE COMPLETION OF THE SPECIFIC ACTIVITY FOR WHICH THE TOOLS WERE SPARED, IN GOOD WORKING ORDER.

7.4.4
THE CONTRACTOR MUST NOT USE THESE EQUIPMENTS FOR ANY PURPOSE OTHER THAN WHAT THEY ARE INTENDED FOR.

7.4.5
IF THE ABOVE ITEMS ISSUED TO CONTRACTOR ARE FOUND NOT UTILISED / NOT MAINTAINED TO THE SATISFACTION OF BHEL ENGINEER OR MISUSED, THESE WILL BE WITHDRAWN AND NO REPLACEMENT WILL BE DONE FOR SUCH ITEMS.

7.4.6
REQUIRED TEMPORARY STRUCTURAL STEEL, PIPES & FITTINGS, VALVES FOR DRUM LIFTING, CONDUCT OF HYDRAULIC TEST, CHEMICAL CLEANING / STEAM BLOWING / OIL FLUSHING / ACID CLEANING ETC SHALL BE PROVIDED BY BHEL.

7.5 CHEMICALS, GASES AND LUBRICANTS FOR PRE-COMMISSIONING AND COMMISSIONING

7.5.1
ALL LUBRICANTS AND CHEMICALS REQUIRED FOR TESTING, PRESERVATION, CHEMICAL CLEANING / ACID CLEANING, OIL FLUSHING, AND THE LUBRICANTS FOR TRIAL RUNS OF THE EQUIPMENTS AND TRIAL OPERATION OF THE UNIT WILL BE SUPPLIED BY BHEL FREE OF CHARGES.

SECTION-8
SPECIAL CONDITIONS OF CONTRACT

8 INSPECTION / QUALITY ASSURANCE / STATUTORY INSPECTION

8.1
VARIOUS INSPECTION / QUALITY ASSURANCE PROCEDURES / METHODS AT VARIOUS STAGES OF ERECTION AND COMMISSIONING WILL BE AS PER BHEL / CUSTOMER QUALITY PLANS / CODES / IBR AND OTHER STATUTORY PROVISIONS AND AS PER BHEL ENGINEER'S INSTRUCTIONS.

8.2
PREPARATION OF QUALITY ASSURANCE LOG SHEETS AND PROTOCOLS WITH CUSTOMER/ CONSULTANTS/STATUTORY AUTHORITY, WELDING LOGS, NDE AND POST WELD HEAT TREATMENT RECORDS, TESTING & CALIBRATION RECORDS AND OTHER QUALITY ASSURANCE DOCUMENTATION AS PER BHEL ENGINEER'S INSTRUCTIONS, IS WITHIN THE SCOPE OF WORK/SPECIFICATION. THESE RECORDS SHALL BE SUBMITTED TO BHEL/CUSTOMER FOR APPROVAL FROM TIME TO TIME.

8.3
A DAILY LOGBOOK OF ALL MEASUREMENTS AND TESTING/CALIBRATION SHOULD BE MAINTAINED BY CONTRACTOR ON THE JOB FOR DETAILING INSPECTION DETAILS OF VARIOUS EQUIPMENTS.

8.4
THE PERFORMANCE OF HP WELDERS WILL BE REVIEWED FROM TIME TO TIME AS PER THE BHEL/IBR STANDARDS. HIGH PRESSURE WELDERS' PERFORMANCE RECORD SHALL BE FURNISHED PERIODICALLY. CORRECTIVE ACTION AS INFORMED BY BHEL SHALL BE TAKEN IN RESPECT OF THOSE WELDERS NOT CONFORMING TO THESE STANDARDS. THIS MAY INCLUDE REMOVAL/ DISCONTINUANCE OF CONCERNED WELDER(S). CONTRACTOR SHALL ARRANGE FOR THE ALTERNATE WELDERS IMMEDIATELY.

8.5
ALL THE WELDERS INCLUDING HP WELDERS SHALL CARRY IDENTITY CARDS AS PER THE PROFORMA PRESCRIBED BY BHEL ONLY WELDERS DULY AUTHORISED BY BHEL/BOILER INSPECTOR/CUSTOMER/ CONSULTANT SHALL BE ENGAGED ON THE WORK.

8.6
CONTRACTOR SHALL PROVIDE ALL THE MEASURING AND MONITORING DEVICES (MMD) REQUIRED FOR COMPLETION OF THE WORK SATISFACTORILY. THESE MMDS SHALL CONFORM TO JOB REQUIREMENT IN RESPECT OF MEASUREMENT RANGE, ACCURACY LEVEL & ANY OTHER SPECIFICATION.

8.7
THE MMD DEPLOYED BY THE CONTRACTOR SHALL, AT ALL STAGES OF WORK, HAVE VALID AND CURRENT CALIBRATION CERTIFICATE. THE CALIBRATION OF THESE MMDS SHALL BE GOT DONE FROM THE AGENCIES ACCREDITED/ APPROVED BY BHEL/EIL. COPY OF CALIBRATION CERTIFICATES IN RESPECT OF THESE MMD HAS TO BE SUBMITTED TO BHEL. PERIODICAL STATUS REPORT REGARDING VALIDITY OF CALIBRATION HAS TO BE SUBMITTED TO BHEL. RE-CALIBRATION/ RE-VALIDATION SHALL BE DONE FOR THE CONTINUITY OF USAGE, AS PER BHEL SPECIFICATIONS. CONTRACTOR SHALL CONFORM TO THE SPECIFICATIONS OF BHEL REGARDING STORAGE OF THE MMD.
CONTRACTOR SHALL RECORD THE IDENTIFICATION NUMBER OF THE MMDS USED FOR MEASUREMENT OF PARAMETERS IN THE RELEVANT FQP LOG SHEET/JOINT MEASUREMENT RECORD. IN CASE THE CONTRACTOR IS FOUND TO BE USING / HAS USED ANY MMD THAT DOES/DID NOT HAVE APPROPRIATE AND VALID CALIBRATION, A PENALTY OF RS. 2,000/- FOR EVERY SUCH INCIDENCE WILL BE IMPOSED BY BHEL. THIS WILL BE IN ADDITION TO THE CONSEQUENTIAL EXPENSES TO BE BORNE BY THE CONTRACTOR ON ACCOUNT OF RE-WORK/ RECTIFICATION OF THE AFFECTED WORK.

8.8
RE-WORK NECESSITATED ON ACCOUNT OF USE OF INVALID MMD SHALL BE ENTIRELY TO THE CONTRACTOR'S ACCOUNT. HE SHALL BE RESPONSIBLE TO TAKE ALL CORRECTIVE ACTIONS, INCLUDING RESOURCE AUGMENTATION IF ANY, AS SPECIFIED BY BHEL TO MAKE-UP FOR THE LOSS OF TIME.

8.9
IN THE COURSE OF WORK BHEL MAY COUNTER/ FINALLY CHECK THE MEASUREMENTS WITH THEIR OWN MMDS. CONTRACTOR SHALL RENDER ALL ASSISTANCE IN CONDUCT OF SUCH COUNTER CHECK / FINAL MEASUREMENTS.

8.10
VIBRATION INDICATORS/VIBRATION RECORDERS/VIBRATION ANALYSERS WILL BE PROVIDED BY BHEL FOR CHECKING AND ANALYSING VIBRATION LEVELS OF ROTATING EQUIPMENTS WITH QUALIFIED OPERATORS. CONTRACTOR SHALL PROVIDE NECESSARY MANPOWER FOR CARRYING OUT SUCH TESTS. SIMILARLY, BHEL WILL PROVIDE THE OSCILLOSCOPE FOR ANY SPECIFIC REQUIREMENT.

8.11
TOTAL QUALITY IS THE WATCHWORD OF THE WORK AND CONTRACTOR SHALL STRIVE TO ACHIEVE THE QUALITY STANDARDS, PROCEDURES LAID DOWN BY BHEL. HE SHALL FOLLOW ALL THE INSTRUCTIONS AS PER BHEL DRAWINGS AND QUALITY STANDARDS. CONTRACTOR SHOULD ENGAGE WELL-QUALIFIED AND EXPERIENCED ENGINEER FOR QUALITY ASSURANCE AND NDT SERVICES.

8.12 STAGE INSPECTION BY FES / QA ENGINEERS

8.12.1
APART FROM DAY-TO-DAY INSPECTION BY BHEL ENGINEERS STATIONED AT SITE AND ALSO BY CUSTOMER'S ENGINEERS, STAGE INSPECTION OF EQUIPMENTS UNDER ERECTION AND COMMISSIONING AT VARIOUS STAGES OF ERECTION AND COMMISSIONING BY TEAMS OF ENGINEERS FROM FIELD ENGINEERING SERVICES OF BHEL'S MANUFACTURING UNITS AND QUALITY ASSURANCE TEAMS FROM FIELD QUALITY ASSURANCE, FACTORY QUALITY ASSURANCE AND COMMISSIONING ENGINEERS FROM TECHNICAL SERVICES OF BHEL / CONSULTANT WILL ALSO BE CONDUCTED. CONTRACTOR SHALL ARRANGE ALL LABOUR, TOOLS AND TACKLES ETC FOR SUCH STAGE INSPECTIONS AS PART OF WORK.

8.13 STATUTORY INSPECTION OF WORK

8.13.1
THE WORK TO BE EXECUTED UNDER THESE SPECIFICATIONS HAS TO BE OFFERED FOR INSPECTION, AT APPROPRIATE STAGES OF WORK TO STATUTORY AUTHORITIES TO COMPLY WITH APPLICABLE REGULATIONS.

8.13.2
THE WORK RELATED STATUTORY INSPECTIONS, THOUGH NOT LIMITED TO, ARE AS UNDER:

1) INSPECTORATE OF STEAM BOILERS AND SMOKE NUISANCE
2) FACTORY INSPECTOR, LABOUR COMMISSIONER, ELECTRICAL INSPECTOR, PF COMMISSIONER AND OTHER AUTHORITIY CONNECTED TO THIS PROJECT WORK

THE SCOPE INCLUDES GETTING THE APPROVALS FROM THE STATUTORY AUTHORITIES, WHICH INCLUDES ARRANGING FOR INSPECTION VISITS OF STATUTORY AUTHORITY PERIODICALLY AS PER BHEL ENGINEER'S INSTRUCTIONS, ARRANGING MATERIALS FOR GROUND INSPECTION, TAKING RUB OUTS FOR THE PRESSURE PARTS TO BE OFFERED FOR INSPECTION, SUBMITTING CO-RELATED INSPECTION REPORTS, DOCUMENTS, RADIOGRAPHS ETC AND FOLLOWING UP THE MATTER WITH THEM. CONTRACTOR SHALL ALSO MAKE ALL ARRANGEMENTS FOR OFFERING THE PRODUCTS / SYSTEMS FOR INSPECTION AT LOCATION, AS APPLICABLE, TO THE CONCERNED AUTHORITY.

8.13.3
THE CONTRACTORS SHALL PAY ALL FEES CONNECTED WITH TESTING OF HIS WELDERS / WORKERS AND TESTING, INSPECTION & CALIBRATION OF HIS MMD AND T&P.

8.13.4
IT SHALL BE CONTRACTOR'S RESPONSIBILITY TO OBTAIN APPROVAL OF STATUTORY AUTHORITIES, WHENEVER APPLICABLE, FOR THE CONDUCTING OF ANY WORK WHICH COMES UNDER THE PURVIEW OF THESE AUTHORITIES. ANY COST ARISING FROM THIS SHALL BE CONTRACTOR'S ACCOUNT.

8.13.5
CONTRACTOR SHALL PAY FEES FOR VISITS, INSPECTION FEES ETC OF IBR AUTHORITIES IN ADDITION TO ALL OTHER EXPENSES IN THIS REGARD.

8.13.6
CONTRACTOR SHOULD BE QUALIFIED TO EXECUTE PRESSURE PARTS & PIPING WORK COMING UNDER THE PURVIEW OF IBR, FOR WHICH HE SHOULD REGISTER HIMSELF WITH CIB OF STATE CONCERNED. CONTRACTOR ALSO SHOULD BE AWARE OF THE LATEST IBR REGULATIONS AND ELECTRICITY ACT, INCLUDING THE AMENDMENTS THEREOF.

8.14.0
THE QUALITY MANAGEMENT SYSTEM OF BHEL, POWER SECTOR – WESTERN REGION (PSWR) HAS ALREADY BEEN CERTIFIED AND ACCREDITED UNDER ISO 9001: 2000 STANDARDS IN THIS REGARD. THE BASIC PHILOSOPHY OF THE QUALITY MANAGEMENT SYSTEM IS TO DEFINE THE ORGANIZATIONAL RESPONSIBILITY, WORK AS PER DOCUMENTED PROCEDURES, VERIFY THE OUTPUT WITH RESPECT TO ACCEPTANCE NORMS, IDENTIFY THE NON-CONFORMING PRODUCT/ PROCEDURE AND TAKE CORRECTIVE ACTION FOR REMOVAL OF NON-CONFORMANCE SPECIFYING THE STEPS FOR AVOIDING RECURRENCE OF SUCH NON-CONFORMITIES, & MAINTAIN THE RELEVANT QUALITY RECORDS. THE NON-CONFORMITIES ARE TO BE IDENTIFIED THROUGH THE CONDUCT OF PERIODICAL AUDIT OF IMPLEMENTATION OF QUALITY SYSTEMS AT VARIOUS LOCATIONS/STAGES OF WORK. SUPPLIERS/VENDORS OF VARIOUS PRODUCTS/SERVICES CONTRIBUTING IN THE WORK ARE ALSO CONSIDERED AS PART OF THE QUALITY MANAGEMENT SYSTEM. AS SUCH THE CONTRACTOR IS EXPECTED NOT ONLY TO CONFORM TO THE QUALITY MANAGEMENT SYSTEM OF BHEL BUT ALSO IT IS DESIRABLE THAT THEY THEMSELVES ARE ACCREDITED UNDER ANY QUALITY MANAGEMENT SYSTEM STANDARD.

SECTION-9
SPECIAL CONDITIONS OF CONTRACT

Safety, Occupational Health and Environmental Management

BHEL PSWR has been certified for Environmental Management under ISO 14001:1996 standard and Occupational Health & Safety under OHSAS 18001 by DNV. In order to comply with the above standards, it shall be the endeavor of BHEL and all its subcontractors to meet and implement the requirements by following the guidelines issued under Environmental, Occupational Health and Safety Management (EHS) manual a copy of which will be available with the BHEL Site-in-charge.

Contractor shall also enter into a "Memorandum of Understanding" as given in clause 9.9 in case of award of contract.

9.0 Responsibility of the Contractor in Respect of Safety of Men, Equipment, Material and Environment.

9.1 The Contractor shall:

9.1.1

Abide by the Safety Regulations applicable for the Site/Project and in particular as mentioned in the booklet "Safe Work Practices" issued by BHEL. Contractors are also to ensure that their employees and workmen use safety equipments as stipulated in the Factories Act (Latest Revision) during the execution of the work. Failure to use safety equipment as required by BHEL Engineer will be a sufficient reason for issuance of memo, which shall become part of Safety evaluation of the contractor at the end of the Project. Also all site work may be suspended if it is found that the workmen are employing unsafe working practice and all the costs/losses incurred due to suspension of work shall be borne by contractor. A comprehensive list of National Standards from which the contractor can draw references for complying with various requirements under this section is given under 9.10

9.1.2

Hold BHEL harmless and indemnified from and against all claims, cost and charges under Workmen's Compensation Act 1923 and 1933 and any amendment thereof and the contractor shall be solely responsible for the same.

9.1.3

Abide by the Procedure governing entry/exit of the contractor's personnel within the Customer/Client premises. All the contractors employees shall be permitted to enter only on displaying of authorized Photo passes or any other documents as authorized by the Customer/Client.

9.1.4

Be fully responsible for the identity, conduct and integrity of the personnel/workers engaged by them for carrying out the contract work and ensure that none of them are ever engaged in any anti national activity

9.1.5

Prepare a signboard giving the following information and display it near work site:

i) Name of Contractor
ii) Name of Contractor Site-in-charge & Telephone number
iii) Job Description in short
iv) Date of start of job
v) Date of expected completion
vi) Name of BHEL Site-in-charge.

9.1.6
Abide by the rules and regulations existing during the contract period as applicable for the contractors at the Project premises.

9.1.7
Observe the timings of work as advised by BHEL Engineer-in-charge for carrying out the contract work.

9.2 SPECIAL CONDITIONS

9.2.1 Safety

9.2.1.1 Safety Plan

Before commencing the work, contractor shall submit a "safety plan" to the authorized BHEL official. The safety plan shall indicate in detail the measures that would be taken by the contractor to ensure safety to men, equipment, material and environment during execution of the work. The plan shall take care to satisfy all requirements specified hereunder.

The contractor shall submit "safety plan" before start of work. During negotiations, before placing of work order and during execution of the contract, BHEL shall have right to review and suggest modifications in the safety plan. Contractor shall abide by BHEL's decision in this respect.

9.2.1.2
The contractor shall take all necessary safety precautions and arrange for appropriate appliances and/or as per direction of BHEL or it's authorized person to prevent loss of human lives, injuries to men engaged and damage to property and environment.

9.2.1.3
The contractor shall provide to his work force and also ensure the use of Personnel Protection Equipment (PPE) as found necessary and/or as directed and advised by BHEL officials without which permission is liable to be denied.

- Safety helmets conforming to IS 2925/1984 (1990)
- Safety belts conforming to IS 3521/1989
- Safety shoes conforming to IS 1989 part-II/1986(1992)
- Eye and face protection devices conforming to IS 2573/1986(1991), IS 6994 (1973), part-I (1991), IS 8807/1978 (1991), IS 8519/1977(1991).
- Other job specific PPEs of standard ISI make as may be prescribed

9.2.1.4
All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, cages, safety nets, ladders, equipment, etc used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorized BHEL official who shall have the right to ban the use of any item found to be unsafe.

9.2.1.5
All electrical equipment, connections and wiring for construction power, its distribution and use shall conform to the requirements of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carryout all types of electrical works. All electrical appliances including portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed.

9.2.1.6
The contractor shall not use any hand lamp energized by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

9.2.1.7
The contractor shall adopt all fire safety measures as per relevant Indian Standards

9.2.1.8
Where it becomes necessary to provide and/or store petroleum products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provisions and/or storage in accordance with the rules and regulations laid down by the relevant government acts, such as petroleum act, explosives act, petroleum and carbides of calcium manual of the chief controller of explosives, Government of India etc. The contractor in all such matters shall also take prior approval of the authorized BHEL official at the site.

9.2.1.9
Proper means of access must be used e.g. ladders, scaffolds, platforms etc. No makeshift access such as oil drums or pallets shall be used. Design of these will be in accordance with relevant standards and certified by competent persons before use.

9.2.1.10
Temporary arrangements made at Site for lifting , platforms, approach access etc should be properly designed and approved before being put to use.

9.2.1.11
All excavations and openings must be securely and adequately fenced/barricaded and warning signs erected when considered necessary as per relevant code of practice.

9.2.1.12
No persons shall remove guardrails, covers or protective devices unless authorized by a responsible supervisor and alternative precautions have been taken

9.2.1.13
Access ways, means of escape and fire exits shall be clearly marked, kept clear and unobstructed at all times

9.2.1.14
Only authorized persons holding relevant license will drive and operate site plant and equipments e.g. cranes, dumpers, excavators, transport vehicles etc

9.2.1.15
Only authorized personnel are allowed to repair, commission electrical equipments.

9.2.1.16
Gas Cylinders shall be handled and stored as per Gas Cylinders Rules and relevant safe working practices

9.2.1.17
All wastes generated at Site shall be segregated and collected in a designated place so as to prevent spillage/contamination/scattering at Site, until the waste is lifted for disposal to designated disposal area as advised by BHEL official.

9.2.1.18
The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working when natural day light is not adequate for clear visibility.

9.2.1.19
The contractor shall train adequate number of workers/supervisors for administering “FIRST AID”. List of competent first aid administers should be prominently displayed.

9.2.1.20
The contractor shall display at strategic places and in adequate numbers the following in fluorescent markings

- Emergency telephone numbers
- Exit, Walkways
- Safe working load charts for wire ropes, slings, D shackles etc
- Warning signs

9.2.1.21
The contractor shall be held responsible for any violation of statutory regulations (local, state or central) and BHEL instructions that may endanger safety of men, equipment, material and environment in his scope of work or other contractors or agencies. Cost of damage, if any, to life and property arising out of such violation of statutory regulations and BHEL instructions shall be borne by the contractor.

9.2.1.22
In case of a fatal or disabling injury/accident to any person at construction sites due to lapses by the contractor, the victim and/or his/her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and/or his/her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.

9.2.1.23
In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover cost of such damages from payments due to the contractor after holding an appropriate enquiry.

9.2.1.24
In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from payments due to the contractor after notifying the contractor suitably and giving him opportunity to present his case.

9.2.1.25
If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given a reasonable opportunity to do so, and/or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorized BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

9.2.1.26 **Emergency Response**

BHEL will have an Emergency Response Plan for each Project Site in consultation with the Owner as the case may be, detailing the procedure for mobilization of personnel and equipment, and defining the responsibilities of the personnel indicated, in order to prepare for any emergency that may arise in order to ensure the priorities of

- Safeguard of life
- Protect assets under construction or neighbouring
- Protect environment
- Resumption of normal operations as soon as the emergency condition is called off

All Contractors shall also be part of the Emergency response Plan and the personnel so nominated shall be aware of their duties and responsibilities in an emergency response situation.

9.2.1.27
At least 5% Contractors supervisors and workmen shall undergo training in administering 'First Aid'. The trained persons should represent for all categories of work and for all areas of work. Adequate number of trained persons should be available for each shift. These first aides shall be included in the emergency response team. Contractor employees and workmen are encouraged to participate in first aid training programmes whenever organized by BHEL.

9.2.2 OCCUPATIONAL HEALTH

9.2.2.1
Specific occupational health hazards will be identified through the hazard evaluation processes in consultation with BHEL engineers and the necessary prevention/reduction/elimination methods implemented.

9.2.2.2
All personnel working in an activity with a potential risk to health shall be made aware of all those risks and the actions they must take to reduce/control/eliminate the risk

9.2.2.3
Safety coordinator shall conduct periodic checks to ensure that every group of workers engaged in similar activities are aware of potential risks to health and the actions required to be taken to mitigate the risk

9.2.2.4
In order to protect personnel from associated health hazards, the following main areas will be focused

- Issue of approved Personnel Protective Equipment
- Verification that the PPE are adequate/maintained and worn by all staff involved in operations that are potentially hazardous to their health
- Ensure that the personnel deployed are physically fit for the operation/work concerned
- Provide hygienic and sanitary working conditions

9.2.2.5
Contractor workers employees engaged in noise risk areas shall be issued with hearing protection aids and the use of the same will be enforced. Further, these workers will be educated on the hazards of noise

9.2.2.6
Contractor workers engaged in dust environment shall be issued with necessary dust protection aids and the use of the same shall be enforced

9.2.2.7
Workers engaged in exposure to bright light/rays as in welding or radiation shall be issued with eye protection devices and the use of the same shall be enforced

9.2.2.8
Adequate arrangements shall be made to provide safe drinking water

9.2.2.9
Health monitoring records on at least sample basis for contractor employees & workmen shall be maintained for persons engaged in specified categories of work. These shall include

- Noise induced hearing loss
- Lung Function test
- Ergonomic Test
- Eye Test for Welders, Grinders, Drivers etc

9.2.3.0 HYGIENE and HOUSEKEEPING

9.2.3.1
Good house keeping and proper hygiene is one of the key requirements of Occupational Health Safety and Environment management. Towards this the contractor shall encourage his workers and supervisors to maintain cleanliness in their area of work.

9.2.3.2
The Contractor shall arrange to place waste bins/chutes at convenient locations for the collection of scrap and other wastes. The bins shall be clearly marked and segregated for metal, non-metal, hazardous and non hazardous wastes.

9.2.3.3
BHEL may take up appropriate remedial measures at the cost of the contractors if the contractors fail in good house keeping and if there is an imminent risk of pollution

9.2.4 ENVIRONMENT MANAGEMENT

9.2.4.1
BHEL has a sound environmental management system, which is to be maintained and implemented by all the contractors. The system allows for project specific objectives to be set and developed sensitive to client requirements, applicable environmental legislation and BHEL's own objectives and policy. BHEL engineers will assess and monitor the environmental impact of their work and lay out objectives for their minimization. The contractors shall implement the objectives for continual improvement of environmental performance. BHEL shall regularly audit environmental impacts and their improvements.

9.2.4.2 WASTE MANAGEMENT

9.2.4.3.1
The objective of waste management is to ensure the safe and responsible disposal of waste, ensuring that it is correctly disposed of and being able to audit the process to ensure compliance.

9.2.4.3.2
Chemical wastes if any shall be collected separately and disposed of to BHEL designated refuse yard as per BHEL advice.

9.2.4.3.3
No dangerous chemicals, noxious waste products or materials will be disposed off on or off site without approval obtained through BHEL.

9.2.4.3.4
All disposal of wastes generated during construction shall be in accordance with all relevant legislation.

9.2.4.3.5
Acid and alkali cleaning wastes shall be neutralized to acceptable norms before disposal to the designated area.

9.2.4.3.6
All necessary measures shall be taken to ensure safe collection and disposal of waste oils. In particular to ensure the prevention of their discharge into surface waters, ground waters, coastal waters or drainages

9.3 **SUPERVISION**

9.3.1

Contractor must provide at least one full time on site safety coordinator when the manpower engaged is in excess of 50 for the contract activities in the premises. If the manpower is less than 50, the on site safety coordination responsibilities shall be assumed by any one of the contractor's other supervisory staff; however in both the cases, the contractor must specify in writing the name of such persons to the BHEL Engineer in Charge.

9.3.2

Contractor's safety coordinator or his supervisor responsible for safety as the case may be shall conduct at his work site, and document formal safety inspection and audits at least once in a week. Such documents are to be submitted to BHEL Engineer in Charge for his review and record.

Contractor, supervisor must attend all schedule safety meetings as would be intimated to him by the BHEL Engineer in Charge.

9.3.3

Before starting work under any contract, the contractor must ensure that a job specific safety procedures/field practices as required over and above the safety permit conditions are prepared and followed .He should also ensure that all supervisors and workers involved understand and follow this procedures /field practices.

9.3.4
Contractor must ensure that in his work site appropriate display boards are put displaying signs for site safety, potential hazards and precautions required.

9.4.0 **TRAINING & AWARENESS**

9.4.1

Contractor shall deploy experienced supervisors and other manpower who are well conversant with the safety and environment regulations of the Project. The electricians to be deployed on the job should have wireman license.

9.4.2
All Supervisors & Workmen of the Contractor shall undergo Fire safety training/ demonstration whenever arranged by BHEL with the help of either Customer's Fire and Safety department or outside faculty so as to acquire knowledge of fire prevention and also to be able to make use of appropriate fire extinguishers.

9.4.3
Contractor must familiarize himself from BHEL Engineer in Charge about all known potential fire, explosion or toxic release hazards related to the contract. He in turn will ensure that same information has been passed to the supervisors and workmen

9.4.4
Contractor must ensure that all his supervisors are properly trained and each employee has received and understood from his supervisor necessary training and briefing about the safety requirement. Necessary document as a means to verify that employees have understood the training is to be maintained.

9.4.5
The contractor supervisors shall also give a small safety briefing to all the workmen under his charge before undertaking any new work and specially understand the safety requirements that are mandatory

9.5.0 **REPORTING**

9.5.1
The contractor shall submit report of all accidents, fires and property damage, dangerous occurrences to the authorized BHEL official immediately after such occurrence but in any case not later than twelve hours of the occurrence. Such report shall be furnished in the manner prescribed by BHEL and also to meet statutory requirement.

9.5.2
Any injury sustained by any of the contractor's employees within the Project premises must be reported to BHEL supervisor and FIRST AID should be immediately administered. The Contractor shall be responsible for keeping and maintaining proper records of Accidents to his personnel.

9.5.3
Contractor must arrange to immediately investigate, properly document and report any injury, accident or near miss involving any of his employees and take appropriate follow up action. He must furnish within 12 hours of the incident a written report to BHEL Engineer in charge and the Safety Section.

9.5.4
According to the Factory Act and the Employees state Insurance Act & regulation, any person sustaining any injury within the project premises and absenting himself from work for more

than 46 hours, his accident report has to be sent to the respective Government Authorities. Therefore contractor shall inform the owner's representative such matter immediately for their needful action.

9.5.5
In addition, contractor shall submit periodic reports on safety to the authorised BHEL official from time to time as prescribed.

9.5.6
Before commencing the work, the contractor shall appoint/nominate a responsible officer to supervise implementation of all safety measures and liaison with his counterpart of BHEL.

9.6 **AUDIT REVIEW AND INSPECTION**

9.6.1
BHEL shall conduct audit on the contractor performance and compliance with the project specific requirements of the Environment and Occupational Health & Safety Management systems. The programme of audit shall cover all activities under the contract but will focus particularly on high-risk activities. The Construction Manager shall decide the schedule of audit. The audit findings shall be communicated to the contractors and necessary remedial action as advised by BHEL Engineers shall be under taken within the stipulated time.

9.6.2
Inspections shall be carried out regularly by the contractors and by BHEL Engineers on activities, facilities, equipment and documentation, to cover the following aspects.

- Compliance with procedures and systems
- Availability, condition and use of PPE
- Condition of maintenance tools, equipments, facilities
- Availability of fire fighting equipments and its condition
- Use of fire fighting equipments and first aid kit
- Awareness of occupational health hazard
- Awareness of safe working practices
- Presence of quality supervision
- Housekeeping

The Safety coordinator shall visit and inspect work sites daily. All unsafe acts, unsafe conditions that have imminent potential for causing harm/injury/damage will be immediately corrected. He shall maintain a daily logbook giving details of unsafe acts or conditions observed and the corrective action taken and recommendations for preventing recurrence. Adequacy of corrective actions will be verified

The contractor shall take remedial measures as per the findings of each inspection
Besides the above, the contractor shall be required to carry out the following inspections

Sl no	**Equipment**	**Scope of inspection**	**Inspection by**	**Schedule**
1	Hand tools	To identify unsafe/defective tool	User	Daily
2	Power tools	To identify unsafe /defective tool	User	Daily

Sl no	Equipment	Scope of inspection	Inspection by	Schedule
3	Fire Extinguishers	To check pressure and any defect	User / Safety Coordinator	Daily Every month
4	Lifting equipment/tackles	To check for defects and efficacy of brakes	User Third party	Daily Every Year
5	PPE	To check for defects	User	Daily

9.7 **NON COMPLIANCE**:-

9.7.1
NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND THE BHEL HAS RIGHT TO IMPOSE FINES ON THE CONTRACTOR AS UNDER **for every instance of violation noticed**:

Sl. No	Instance of Violation	Fine (in Rs)
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slinging property	200/-
07.	Using Damaged Sling	200/-
08.	Lifting Cylinders Without Cage	500/-
09.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
10.	Not Removing Small Scrap From Platforms	200/-
11.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	200/-
12.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
13.	Improper Earthing Of Electrical T&P	500/-
	Major Accident or Accidents causing partial loss of earning to the victim	50,000/- per victim
14	Fatal Accident or Accidents causing permanent loss of earning to the victim	1,00,000/- per victim

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected above will be utilised for giving award to the employees who could avoid accident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

9.8
CITATION:-If safety record of the contractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the contractor may be considered by BHEL after completion of the job

9.9 Memorandum of Understanding

After Award Of Work, Contractors Are Required To Enter Into A Memorandum Of Understanding As Given Below:

Memorandum of Understanding

BHEL, PSWR is committed to Health, Safety and Environment Policy (EHS Policy) as given in the booklet titled "Safe Working Practices" issued to all contractors.

M/s _____ do hereby also commit to the same EHS Policy while executing the Contract Number _____

M/s _____ shall ensure that safe work practices not limited to the above booklet are followed by all construction workers and supervisors. Spirit and content therein shall be reached to all workers and supervisors for compliance.

BHEL will be carrying out EHS audits twice a year and M/s _____ shall ensure to close any non-conformity observed/reported within fifteen days.

Signed by authorized representative of M/s----------

Name :

Place & Date:

9.10

Comprehensive list of National Standards for reference and use wherever applicable in the execution of Civil, Erection and Commissioning Contracts.

IS No	YEAR	Amd upto	DESCRIPTION
IS 10204	1982		PORTABLE FIRE EXTINGUISHERS MECHANICAL FOAM TYPE
IS 10245	1994		SPECIFICATION FOR BREATHING APPARATUS
IS 10291	1982		SAFETY CODE FOR DRESS DRIVERS IN CIVIL ENGINEERING WORKS
IS 10658	1983		HIGHER CAPACITY DRY POWDER FIRE EXTINGUISHERS (TROLLEY MOUNTED)
IS 10662	1992		COLOUR TELEVISION
IS 10667	1983		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF FOOT AND LEG
IS 11037	1984		ELECTRONIC FAN REGULATORS
IS 11057	1984		INDUSTRIAL SAFETY NETS
IS 11451	1998		RECOMMENDATION FOR SAFETY AND HEALTH REQUIREMENT RELATING TO OCCUPATION EXPOSURE TO ASBESTOS
IS 1169	1967		PEDESTAL FANS
IS 1179	1967		SPECIFICATION FOR EQUIPMENT FOR EYE AND FACE PROTECTION DURING WELDING

IS No	YEAR	Amd upto	DESCRIPTION
IS 11833	1986		DRY POWDER FIRE EXTINGUISHERS FOR METAL FIRES
IS 11972	1987		CODE OF PRACTICE FOR SAFETY PRECAUTION TO BE TAKEN WHEN ENTERING A SEWARAGE SYSTEM
IS 1287	1986		ELECTRIC TOASTER
IS 13063	1991		STRUCTURAL SAFETY OF BUILDINGS ON SHALLOW FOUNDATIONS ON ROCKS
IS 13385	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE WHEEL MOUNTED WATER TYPE (GAS CARTRIDGES)
IS 13386	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE MECHANICAL FOAM TYPE
IS 13415	1992		CODE OF SAFETY FOR PROTECTIVE BARRIERS IN AND AROUND BUILDINGS
IS 13416	1992		RECOMMENDATIONS FOR PREVENTIVE MEASURES AGAINST HAZARDS AT WORKING PLACE PART 1 TO PART 5
IS 13430	1992		CODE OF PRACTICE FOR SAFETY DURING ADDITIONAL CONSTRUCTION AND ALTERATION TO EXISTING BUILDINGS
IS 13849	1993		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CONSTANT PRESSURE)
IS 1446	1985		CLASSIFICATION OF DANGEROUS GOODS (FIRST REVISION)
IS 1476	1979		REFRIGERATORS
IS 1641	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): GENERAL PRINCIPLES OF FIRE GRADING AND CLASSIFICATION
IS 1642	1989		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS- DETAILS OF CONSTRUCTION
IS 1643	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): EXPOSURE HAZARD
IS 1646	1997		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): ELECTRICAL INSTALLATIONS
IS 1904	1986		CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF FOUNDATIONS IN SOIL
IS 1905	1987		STRUCTURAL SAFETY OF BUILDINGS MASONARY WALLS
IS 2082	1985		ELECTRICAL GEYSERS
IS 2171	1985		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CARTRIDGE)
IS 2309	1989		PRACTICE FOR THE PROTECTION OF BUILDINGS A ND ALLIED BUILDINGS AGAINST LIGHTENING
IS 2312	1967		EXHAUST FANS
IS 2361	1994		SPECIFICATION FOR BUILDING GRIPS - FIRST REVISION
IS 2418	1977		TUBULAR FLUORSCENT LAMPS IS 2418 (FT-1)
IS 2750	1964		STEEL SCAFFOLDINGS
IS 2762	1964		SAFE WORKING LOADS IN KGS FOR WIRE ROPE SLINGS
IS 2878	1986		FIRE EXTINGUISHERS CARBON DIOXIDE TYPE (PORTABLE AND TROLLEY MOUNTED)
IS 2925	1984		SPECIFICATION FOR INDUSTRIAL SAFETY HELMETS
IS 3016	1982		CODE OF PRACTICE FOR FIRE PRECAUTIONS IN WELDING AND CUTTING OPERATIONS- FIRST REVISION
IS 3315	1974		DESERT COOLERS
IS 3521	1989		INDUSTRIAL SAFETY BELTS AND HARNESS

IS No	YEAR	Amd upto	DESCRIPTION
IS 368	1983		IMMERSION WATER HEATERS
IS 3696	1991		SAFETY CODE OF SCAFFOLDS AND LADDERS PART 1 TO 2
IS 3737	1996		LEATHER SAFETY BOOTS FOR WORKERS IN HEAVY METAL INDUSTRIES
IS 374	1979		CEILING FANS INCLUDING REGULATORS
IS 3764	1992		EXCAVATION WORK - CODE OF SAFETY
IS 3786	1983		METHOD FOR COMPUTATION OF FREQUENCY AND SEVERITY RATES FOR INDUSTRIAL INJURIES AND CLASSIFICATION OF INDUSTRIAL ACCIDENTS
IS 3935	1966		CODE OF PRACTICE FOR COMPOSITE CONSTRUCTION
IS 4014	1967		CODE OF PRACTICE FOR STEEL TUBULAR SCAFFOLDING
IS 4081	1986		SAFETY CODE FOR BLASTING AND RELATED DRILLING OPERATIONS
IS 4082	1977	1996	STACKING AND STORAGE OF CONSTRUCTION MATERIALS AND COMPONENTS AT SITE
IS 4130	1991		DEMOLITION OF BUILDINGS - CODE OF SAFETY PART 1 TO 2
IS 4138	1977		SAFETY CODE FOR WORKING IN COMPRESSED AIR (FIRST REVISION)
IS 4155	1966		GLOSSARY OF TERMS RELATING TO CHEMICAL AND RADIATION HAZARDS AND HAZARDOUS CHEMICALS
IS 4209	1967		CODE OF SAFETY FOR CHEMICAL LABORATORY
IS 4250	1980		FOOD MIXERS
IS 4262	1967		CODE OF SAFETY FOR SULFURIC ACID
IS 4756	1978		SAFETY CODE FOR TUNNELING WORK
IS 4912	1978		SAFETY REQUIREMENTS FOR FLOOR AND WALL OPENINGS, RAILINGS AND TOE BOARDS
IS 5121	1969		SAFETY CODE FOR PILING AND OTHER DEEP FOUNDATIONS
IS 5182	1969	1982	METHODS FOR MEASUREMENT OF AIR POLLUTION
IS 5184	1969		CODE OF SAFETY FOR HYDROFLUORIC ACID
IS 5216	1982	2000	RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICE IN ELECTRICAL WORK PART I AND II
IS 555	1979		TABLE FANS
IS 5557	1995		INDUSTRIAL AND SAFETY LINED RUBBER BOOTS (SECOND REVISION)
IS 5916	1970		SAFETY CODE FOR CONSTRUCTION INVOLVING USE OF HOR BITUMINOUS MATERIALS
IS 5983	1980		SPECIFICATION FOR EYE PROTECTORS- FIRST REVISION
IS 6234	1986		PORTABLE FIRE EXTINGUISHERS WATER TYPE (STORED PRESSURE)
IS 692	1994		CRITERIA FOR SAFETY AND DESIGN OF STRUCTURES SUBJECTED TO UNDERGROUND BLASTS
IS 6994	1973		SPECIFICATION FOR SAFETY GLOVES
IS 7155	1986		CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8)
IS 7205	1974		SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK
IS 7293	1974		SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY

IS No	YEAR	Amd upto	DESCRIPTION
IS 7323	1994		GUIDELINES FOR OPERATIONS OF RESERVOIRS
IS 7812	1975		CODE OF SAFETY FOR MERCURY
IS 7969	1975		SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS
IS 8089	1976		CODE OF SAFE PRACTICE FOR LAYOUT OF OUTSIDE FACILITIES IN AN INDUSTRIAL PLANT
IS 8091	1976		CODE OF PRACTICE FOR INDUSTRIA L PLANT LAYOUT
IS 8095	1976		ACCIDENTS PREVENTION TAGS
IS 818	1968	1997	CODE OF PRACTICE FOR SAFETY AND HEALTH REQUIREMENTS IN ELECTRIC AND GAS WELDING, AND CUTTING OPERATIONS
IS 8448	1989		AUTOMATIC LINE VOLTAGE CORRECTOR (STABILISER)
IS 8519	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR BODY PROTECTION
IS 8520	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR EYE, FACE AND EAR PROTECTION
IS 875	1987		STRUCTURAL SAFETY OF BUILDING: LOADING STANDARD PART 1 TO 5
IS 8807	1978		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF ARMS AND HANDS
IS 8978	1985		INSTANTANEOUS WATER HEATERS
IS 8989	1978		SAFETY CODE FOR ERECTION OF CONCRETE FRAMED STRUCTURES
IS 940	1989		PORTABLE FIRE EXTINGUISHERS WATER TYPE (GAS CARTRIDGE)
IS 9457	1980		SAFETY COLOURS AND SIGNS
IS 9679	1980		CODE OF SAFETY FOR WORK ENVIRONMENTAL MONITORING
IS 9706	1997		CODE OF PRACTICE FOR THE CONSTRUCTION OF AERIAL RPEWAYS FOR THE TRANSPORTATION OF MATERIAL
IS 9759	1981		GUIDELINES FOR DEWATERING DURING CONSTRUCTION
IS 9815	1989		SERVO MOTOR OPERATED LINE VOLTAGE CORRECTOR (SERVO STABILISER)
IS 9944	1992		RECOMMENDATIONS ON SAFE WORKING LOAD FOR NATURAL AND MAN-MADE FIBRE ROPE SLINGS
IS 996	1979		SINGLE PHASE ELECTRIC MOTORS
ISO 3873	1977		SAFETY HELMET

SECTION-10

SPECIAL CONDITIONS OF CONTRACT

10.0 DRAWINGS AND DOCUMENTS

10.1
The detailed drawings, specifications available with BHEL engineers will also form part of this tender specification. Revision of drawings/documents may take place due to various considerations as is normal in such large project. Work will have to be carried out as per revised drawings/ documents. These documents will be made available to the contractor during execution of work at site.

10.2
One set of necessary drawings/documents to carry out the erection work will be furnished to the contractor by BHEL on loan that shall be returned to BHEL after completion of the work. Contractor's personnel shall take care of these documents given to them.

10.3
The data furnished in various sections and appendices and the drawings enclosed with this tender specification describe the equipment to be installed, tested and commissioned under this specification, briefly. However, the changes in the design and in the quantity may be expected to occur as is usual in any such large scale of works.

10.4
If any error or ambiguity is discovered in the specification/information contained in the documents/drawings and tender, the contractor shall forthwith bring the same to the notice of BHEL before submission of offer.

10.5
In case an ambiguity is detected after award of work, the same must be brought to the notice of BHEL before commencement of the work/activity. BHEL's interpretation in such cases will be final and binding on the contractor.

10.6
In case of any conflict between general instructions to tenderness, general conditions of contract contained in sections 1 & 2 respectively and special conditions of contract contained in sections 4 to 15 and appendices, provisions contained in special conditions of con t in sections 4 to 15 and appendices shall prevail.

10.7
In case of discrepancy between quoted item rate and corresponding amount in the rate schedule, the **quoted item rates shall be reckoned as correct and amount recalculated**. Quoted item rates shall also prevail for arriving at the total price quoted for offer evaluation. Offers will evaluated on the total amount for the entire Rate Schedule and the work will be awarded without splitting the scope.

10.8
Bank Guarantees to be furnished by the contractor towards Security Deposit and Performance Guarantee (last 5% payment against workmanship warranty/defect liability) shall have a claim period of six months over and above the validity period required for the respective cases. BG for advance payment shall be kept valid for a period of two more months beyond the recovery period of the advance with interest thereof.

SECTION-11

SPECIAL CONDITIONS OF CONTRACT

TIME SCHEDULE, MOBILIZATION, PROGRESS MONITORING, OVERRUN, VARIATION ETC.

11.1 TIME SCHEDULE & MOBILIZATION

11.1.1 INITIAL MOBILIZATION AND TENTATIVE SCHEDULE

CONTRACTOR SHALL REACH SITE WITHIN **TWO WEEKS** FROM THE DATE OF FAX LETTER OF INTENT, MAKE HIS SITE ESTABLISHMENT AND BE REDAY TO COMMENCE THE PRIORITY ACTIVITIES AS PER DIRECTIONS OF CONSTRUCTION MANAGER BHEL.

THE CONTRACTOR HAS TO SUBSEQUENTLY AUGMENT HIS RESOURCES IN SUCH A MANNER THAT THE ENTIRE WORK IS COMPLETED TO ACHIEVE THE FOLLOWING TENTATIVE SCHEDULE:

SN	MAJOR MILESTONE	TENTATIVE COMPLETION SCHEDULE FROM START OF CONTRACT PERIOD
02	BOILER DRUM LIFTING	4TH MONTH
03	BOILER HYDRAULIC TEST	10th MONTH
04	BOILER LIGHT UP & ALKALI BOIL OUT	15th MONTH
05	STEAM BLOWING COMPLETION & SAFETY VALVE FLOATING	17th MONTH
06	SYNCHRONISATION AND COAL FIRING	18th MONTH
07	**COMPLETION OF RELIABILITY RUN OPERATION**	**21st MONTH**
08	COMPLETION OF FACILITIES INCLUDING COMMON FACILITIES	22n MONTH

IN ORDER TO MEET ABOVE SCHEDULE IN GENERAL, AND ANY OTHER INTERMEDIATE TARGETS SET, TO MEET CUSTOMER/PROJECT SCHEDULE REQUIREMENTS, CONTRACTOR SHALL ARRANGE & AUGMENT ALL NECESSARY RESOURCES FROM TIME TO TIME ON THE INSTRUCTIONS OF BHEL.

11.1.2 **CONTRACT PERIOD**

THE TOTAL CONTRACT PERIOD FOR COMPLETION OF ENTIRE WORK UNDER SCOPE SHALL BE **22 (TWENTY TWO) MONTHS** FROM THE START OF CONTRACT PERIOD.

PERMANENT ERECTION OF THE FIRST COLUMN SEGMENT OR MAJOR SUB-ASSEMBLY/MAIN ASSEMBLY OF ANY OTHER EQUIPMENT ON ITS DESIGNATED FOUNDATION FOLLOWING DUE PROCESS OF PRE-ASSEMBLY AND QUALITY CHECKS AS PER APPROVED FIELD QUALITY PLAN (FQP) SHALL BE RECKONED AS THE START OF CONTRACT PERIOD FOR THIS CONTRACT. PLACEMENT OF PACKER PLATES, SHIM, ANCHORS, EMBEDMENTS ETC SHALL NOT BE CONSIDERED FOR THIS PURPOSE.

11.1.3 GRACE PERIOD

GRACE PERIOD OF 4 (FOUR) MONTHS BEYOND THE CONTRACT PERIOD MAY BE PROVIDED FOR THIS CONTRACT AT THE DISCRETION OF BHEL.

11.1.4 CONSEQUENCE OF DELAY

IT MAY BE NOTED THAT IN THE EVENT DELAY IN COMPLETION IS ATTRIBUTABLE TO THE CONTRACTOR AND LEADS TO IMPOSITION OF LIQUIDATED DAMAGES BY BHEL'S CLIENT, BHEL WILL IMPOSE LD ON THE CONTRACTOR AS PER GCC.

11.2 PROGRESS MONITORING, CONTRACT EXTENSION AND OVERRUN

11.2.1 PROGRESS MONITORING

PROGRESS WILL BE REVIEWED PERIODICALLY (DAILY/WEEKLY/MONTHLY) INCLUDING MONTH END REVIEW VIS-A-VIS THE PLANS DRAWN AS ABOVE. THE CONTRACTOR SHALL SUBMIT PERIODICAL PROGRESS REPORTS AND OTHER REPORTS/INFORMATION INCLUDING MANPOWER, CONSUMABLES ETC AS DESIRED BY BHEL.

11.2.2 ASCERTAINING AND ESTABLISHING THE REASONS FOR SHORTFALL

THE ONUS PROBANDI THAT THE CAUSES LEADING TO EXTENSION OF THE CONTRACT PERIOD IS NOT DUE TO ANY REASONS ATTRIBUTABLE TO THE CONTRACTOR IS ON HIM (THE CONTRACTOR). REVIEW OF THE PERFORMANCE AS STATED VIDE CL. 11.2.1 ABOVE WILL BE MADE CONSIDERING THE AVAILABILITY OF COMPONENTS TO BE ERECTED AND OTHER INPUTS / CONSTRAINTS OVER WHICH THE CONTRACTOR HAS NO CONTROL. THE PROGRAMME WILL BE REVIEWED AREA-WISE AND THE FOLLOWING FACTS WILL BE RECORDED IN CASE OF SHORTFALL AT THE END OF EVERY MONTH:

A) ERECTION / COMMISSIONING PROGRAMME NOT ACHIEVED OWING TO NON-AVAILABILITY OF FRONTS.

B) ERECTION / COMMISSIONING PROGRAMME NOT ACHIEVED OWING TO NON-AVAILABILITY OF MATERIALS.

C) ERECTION/COMMISSIONING PROGRAMME NOT ACHIEVED OWING TO NON-AVAILABILITY OF TOOLS AND PLANTS, MANPOWER AND CONSUMABLES BY THE CONTRACTOR OR ANY OTHER REASON ATTRIBUTABLE TO THE CONTRACTOR.

D) ERECTION / COMMISSIONING PROGRAMME NOT ACHIEVED DUE TO ANY OTHER REASONS NOT ATTRIBUTABLE TO THE CONTRACTOR.

11.2.3 CONTRACT EXTENSION

IF THE COMPLETION OF WORK AS DETAILED IN THESE SPECIFICATIONS GETS DELAYED BEYOND THE END OF CONTRACT PERIOD AND GRACE PERIOD THEN DEPENDING ON THE BALANCE WORK LEFT OUT, BHEL AT ITS DISCRETION MAY EXTEND THE CONTRACT.

11.2.4

A JOINT PROGRAMME SHALL BE DRAWN FOR THE WORK TO BE COMPLETED DURING THE EXTENDED CONTRACT PERIOD. REVIEW OF THE PROGRAM AND RECORD OF SHORTFALL AS DESCRIBE VIDE CLAUSE NO. 11.2.2 SHALL BE DONE DURING THE EXTENDED PERIOD. THE OVER RUN CHARGES WILL BE PAID IN PROPORTION TO THE ACHIEVEMENT OF THE RESPECTIVE MONTH VIS-À-VIS THE PLAN FOR THE MONTH (FOR ASSESSING PERFORMANCE, AGREED PLAN SHALL BE REDUCED BY SHORTFALL ATTRIBUTABLE TO THE BHEL). BHEL MAY DISALLOW CONTRACTOR'S CLAIM FOR OVERRUN CHARGES IF MONTHLY PROGRAMME AS MENTIONED HEREIN ARE NOT MADE BY HIM.

11.2.5

THE PART OF EXTENSION ATTRIBUTABLE TO THE CONTRACTOR, IF ANY, IN TOTAL CONTRACT EXTENSION SHALL BE EXHAUSTED FIRST i.e., IMMEDIATELY AFTER END OF GRACE PERIOD. THIS SHALL BE FOLLOWED BY THE EXTENSION ON ACCOUNT OF FORCE MAJEURE CONDITIONS, IF ANY, AND LASTLY ON ACCOUNT OF BHEL.

11.2.6 OVERRUN COMPENSATION

IF THE CONTRACT IS EXTENDED BEYOND THE CONTRACT AND GRACE PERIOD FOR ANY REASON OTHER THAN THOSE ATTRIBUTABLE TO THE CONTRACTOR OR FORCE MAJEURE CONDITIONS, THE CONTRACTOR WILL BE COMPENSATED BY PAYMENT OF OVERRUN CHARGES AT THE RATE OF Rs. 1,00,000/- (RUPEES ONE LAKH ONLY) PER MONTH. OVERRUN COMPENSATION WILL BE PAID FOR THE EXTENSION ATTRIBUTABLE TO BHEL ONLY. NO OVERRUN COMPENSATION WILL BE PAYABLE FOR THE EXTENSION ON ACCOUNT OF REASONS ATTRIBUTABLE TO CONTRACTOR AND/OR FORCE MAJEURE CONDITIONS. OVERRUN COMPENSATION FOR ELIGIBLE PERIOD SHALL BE IN PROPORTION TO THE PROGRESS ACHIEVED AGAINST THE PLAN FOR RESPECTIVE PERIOD.

11.3 PRICE VARIATION

AGREED RATES SHALL REMAIN FIRM THROUGHOUT THE CONTRACT PERIOD AND EXTENSIONS THEREOF. NO PRICE VARIATION/ADJUSTMENT SHALL BE APPLICABLE FOR THIS CONTRACT.

11.4 CONTRACT VARIATIONS

11.4.1 VARIATION IN WEIGHT

WEIGHTS OF VARIOUS EQUIPMENTS, QUANTITIES OF VARIOUS ITEMS OF WORK COVERED UNDER THESE SPECIFICATIONS, & INDICATED IN RELEVANT APPENDICES ARE LIKELY TO VARY. FOR ANY UPWARD OR DOWNWARD VARIATION IN THE QUANTITIES, THE RATES ACCEPTED SHALL BE APPLICABLE WITHOUT ANY VARIATION. PAYMENT WILL BE MADE FOR THE ACTUALLY EXECUTED QUANTITIES OF VARIOUS ITEMS OF WORK.

11.4.2 VARIATION IN SITE WELD JOINT QUANTITIES

THE INDICATIVE QUANTITIES OF SITE WELD JOINTS OF PRESSURE PARTS OF BOILER ARE FURNISHED IN RELEVANT APPENDIX. HOWEVER, FOR ANY VARIATION IN THESE QUANTITIES OR ANY OTHER PIPING SYSTEMS/ SCHEMES APPLICABLE/RELATED AND INDICATED IN THESE SPECIFICATION, NO ADDITIONAL PAYMENT OR RECOVERY IS ENVISAGED IN THIS CONTRACT.

11. INTEREST BEARING RECOVERABLE ADVANCE

INTEREST BEARING (@ 13.5% PER ANNUM INTEREST ON MONTHLY REDUCING BALANCE BASIS) RECOVERABLE ADVANCE LIMITED TO 5% OF THE CONTRACT VALUE MAY BE PAID BY BHEL AT ITS DISCRETION DEPENDING ON THE MERIT OF THE CASE AGAINST RECEIPT & ACCEPTANCE OF BANK GUARANTEE FROM THE CONTRACTOR FOR THE AMOUNT SOUGHT. THIS BANK GUARANTEE (BG) SHALL BE VALID AT LEAST FOR ONE YEAR OR THE RECOVERY DURATION. IN CASE RECOVERY OF DUES DOES NOT GET COMPLETED WITHIN THE AFORESAID BG VALIDITY PERIOD, THE CONTRACTOR MUST RENEW THE VALIDITY OF BG OR SUBMIT FRESH BG FOR THE OUTSTANDING AMOUNT AND REMAINING RECOVERY PERIOD. BHEL IS ENTITLED TO MAKE RECOVERY OF THE ENTIRE OUTSTANDING AMOUNT IN CASE THE CONTRACTOR FAILS TO COMPLY WITH THE BG REQUIREMENT AS ABOVE.

RECOVERY OF DUES WILL BE MADE MINIMUM @ 10% OF THE ADMITTED GROSS RUNNING BILL AMOUNT FROM THE FIRST APPLICABLE RUNNING BILL ONWARDS TILL ENTIRE DUE (PRINCIPAL PLUS INTEREST) IS RECOVERED. IN THE EVENT SUFFICIENT TIME DURATION IS NOT LEFT FOR RECOVERY @10%, THE RATE OF RECOVERY SHALL BE SUITABLY ENHANCED SO THAT ENTIRE DUE IS RECOVERED WITHIN THE CONTRACT PERIOD (INCLUDING EXTENSIONS GRANTED OR FORECLOSURE IF ANY).

11.7 DEFINITION OF WORK COMPLETION

THE CONTRACTOR'S SCOPE OF WORK UNDER THESE SPECIFICATIONS WILL BE DEEMED TO HAVE BEEN COMPLETED IN ALL RESPECT, ONLY WHEN ALL THE ACTIVITIES ARE COMPLETED SATISFACTORILY AND SO CERTIFIED BY BHEL SITE IN CHARGE. THE DECISION OF BHEL IN THIS REGARD SHALL BE FINAL AND BINDING ON THE CONTRACTOR.

SECTION-12

SPECIAL CONDITIONS OF CONTRACT

12.0 TERMS OF PAYMENT

12.0.1
The contractor shall submit his monthly on account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas from the 25th of previous calendar month to 24th of the current month.

12.0.2
Clause 2.6 of general conditions of contract shall be referred to as regards mode of payment, and measurement of the work completed.

12.0.3
Release of payment in each running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter.
The 5% thus remaining shall be on account of workmanship guarantee of work executed. The same will be released after completion of the guarantee period of **12 months** from the date of completion of entire work as certified by BHEL.
However, this amount may be released earlier (including before completion of work) subject to receipt and acceptance of bank guarantee of equal amount in BHEL's prescribed format and the BG shall be kept valid till completion of such guarantee period and an additional six months claim period. This is also subject to the condition that the contractor has started the work and also furnished/remitted the initial Security Deposit as per contract.

12.0.4
The payment for running bills will normally be released within around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

12.0.5
BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, the following details are to be furnished by the Contractor pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker:

1. Name of the Company
2. Name of Bank
3. Name of Bank Branch
4. City/Place
5. Account Number
6. Account type
7. IFSC code of the Bank Branch
8. MICR Code of the Bank Branch

BHEL may also choose to release payment by other alternative modes as suitable.

12.1 STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

12.1.3 BOILER AND IT'S AUXILIARIES

100% OF ITEM RATE FOR VARIOUS ITEMS OF WORK UNDER THESE SPECIFICATIONS WILL BE RELEASED, BASED ON CERTIFIED COMPLETION BY BHEL ENGINEER, AS PRO-RATA PROGRESSIVE PAYMENT AS PER THE STAGE BREAK UP GIVEN HEREAFTER:

12.1.3.1

SN	PART OF THE ACTIVITY COMPLETED	PERCENTAGE OF ACCEPTED ITEM RATES				
		NON-PRESSURE PARTS.	STRUC - TURES	PRESSURE PARTS	ROTAT-ING M/c	ELECTROSTATIC PRECIPITATOR
A	TRANSPORT, & ERECTION / PLACEMENT	40	40	40	40	40
B	ALIGNMENT, BOLTING, GROUTING & WELDING	45	45	40	45	45
C	GAS TIGHTNESS TEST / KEROSENE LEAK TEST / LPI TEST ETC	5	---	---	---	5
D	NDE TEST (OTHER THAN RADIOGRAPHY HEAT TREATMENT ETC	---	5	10	---	--
E	TRIAL RUN OF ROT.M/C	---	---	---	5	--
F	ON COMPLETION OF DRUM LIFTING	---	4	---	---	--
G	ON COMPLETION OF HYDRAULIC TEST OF BOILER (DRAINABLE)	---	2	3	---	--
H	ON COMPLETION OF HYDRAULIC TEST OF BOILER (NON-DRAINABLE)	---	---	3	---	--
I	ON COMPLETION OF BOILER LIGHT UP AND ABO	3	1	1	3	3
J	ON COMPLETION OF SVF & STEAM BLOWING	1	1	1	1	--
K	COAL FIRING	4	---	---	4	5
L	TRIAL OPERATION COMPLETION	1	1	1	1	1
M	COMPLETION OFALL FACILITIES	1	1	1	1	1
	TOTAL	100%	100%	100%	100%	100 %

12.1.3.2 PIPING INCLUDING SG PIPING, POWER CYCLE PIPING AND OTHER SYSTEMS PIPING:

(A) 25% OF THE CONTRACT RATE ON PRORATA BASIS AFTER PLACEMENT IS COMPLETED.

(B) 30% OF THE CONTRACT RATE ON PRORATA BASIS AFTER ALIGNMENT & JOINT FIT-UP IS COMPLETED.

(C) 25% OF THE CONTRACT RATE ON PRORATA BASIS AFTER COMPLETION OF WELDING

(D) 10% OF THE CONTRACT RATE ON PRORATA BASIS AFTER COMPLETION OF NDE (OTHER THAN RADIOGRAPHY) & POST WELD HEAT TREATMENT, IF ANY.

(E) 5% OF THE CONTRACT RATE ON PRORATA BASIS AFTER COMPLETION OF HYDRAULIC TEST

(F) 3% OF THE CONTRACT RATE ON PRORATA BASIS AFTER FLOATING OF LINE ON PERMANENT SUPPORTS AND REMOVAL OF TEMPORARY SUPPORT

(G) 1% OF THE CONTRACT RATE ON PRORATA BASIS AFTER FINAL ADJUSTMENT OF SUPPORTS FOR COLD AND HOT VALUES FOR BOILER TRIM, INTEGRAL PIPING AND CRITICA L PIPING.

(H) 1% OF THE CONTRACT RATE ON PRORATA BASIS AFTER SATISFACTORY COMPLETION OF ALL FACILITIES.

12.1.3.3
FOR RADIOGRAPHY TEST (RT) THE PAYMENT SHALL BE 100% OF THE CONTRACT RATE ON PRORATA BASIS ON ACCEPTANCE OF THE SAME. IN THE CASE OF SUBSTUTION OF 'RT' WITH ULTRASONIC TEST, THE RATES WILL BE LIMITED TO THAT OF RADIGRAPHY.

12.2 GENERAL

12.2.1
WEIGHT OF PACKERS AND SHIMS WHICH BECOME PERMANENT PART OF EQUIPMENT, BOTH FIGURING IN SHIPPING LIST AND THOSE FABRICATED AT SITE WILL BE PAID FOR ON SHIPPING LIST BASED ACTUAL WEIGHT.

12.2.2
CERTAIN OPTIMIZED ASSEMBLIES / OR MODULES MAY BE MADE, ASSEMBLING PRODUCTS FROM TWO OR MORE DIFFERENT PRODUCT GROUP MAIN ASSEMBLY AND DISPATCHED. PAYMENT FOR ERECTION OF THESE OPTIMIZED ASSEMBLIES / OR MODULES WILL BE REGULATED AS PER THE WEIGHT OF INDIVIDUAL PRODUCT GROUP MAIN ASSEMBLIES CONTRIBUTING TO THE TOTAL WEIGHT OF THE MODULE OR OPTIMIZED ASSEMBLY AT THE QUOTED RATE FOR THE RESPECTIVE PRODUCT GROUP MAIN ASSEMBLIES, IN THE RATE SCHEDULE.

12.2.3
FOR PAYMENT OF TEMPORARY SYSTEM FOR CHEMICAL CLEANING AND STEAM BLOWING OF BOILER AND PIPING THE MEASUREMENT FOR THE PIPING, FITTING, VALVES ETC AND EQUIPMENTS LIKE TANKS, STRUCTURES PROVIDED BY BHEL & NOT FIGURING IN SHIPPING LIST WILL BE BASED ON JO INTLY MEASURED QUANTITY AND CORRESPONDING STANDARD WEIGHTS. PAYMENT WILL BE MADE AT THE RATE APPLICABLE FOR **NON-PRESSURE PARTS** FOR ITEMS. NO PAYMENT WILL BE MADE FOR THE EQUIPMENTS BROUGHT BY THE CONTRACTOR SUCH AS PUMPS ETC AND FOUNDATIONS MADE BY THE CONTRACTOR FOR TEMPORARY SYSTEMS.

12.3 MEASUREMENT OF THE WORK COMPLETED

A) WHERE PAYMENT IS TO BE MADE ON THE BASIS OF WEIGHT, THE WEIGHT PER UNIT GIVEN IN THE BHEL DOCUMENT ONLY SHALL BE TAKEN IN TO CONSIDERATION. IN CASE SUCH INFORMATION IS NOT AVAILABLE IN BHEL DOCUMENTS, THEN THE LATEST RELEVANT INDIAN STANDARDS IN THIS REGARD MAY BE APPLIED.

B) SPARES, SURPLUS QUANTITY, ERECTION CONTINGENCY MATERIALS WILL NOT BE PAID FOR UNLESS THE SAME HAS BEEN CONSUMED IN PLACE OF REGULAR ITEM OF MEASURABLE WORK AS PER THE RATE SCHEDULE.

C) WHERE THE PAYMENT IS MADE ON THE BASIS OF ITEM RATE, ACTUAL EXECUTED QUANTITY MEASURED JOINTLY SHALL ONLY BE PAID FOR.

D) IT IS CLARIFIED THAT AS FAR AS WEIGHT CONSTITUTED BY WELDING CONSUMABLES AND OTHER CONSUMABLES SUPPLIED BY BHEL AS WELL AS BY THE CONTRACTOR, SHALL NOT BE CONSIDERED FOR PAYMENT.

E) BHEL ENGINEER'S DECISION REGARDING STAGE OF PAYMENT CORRESPONDING TO PROGRESS OF WORK, CALCULATION OF WEIGHT ETC WILL BE FINAL AND BINDING ON THE CONTRACTOR.

F) NO SEPARATE PAYMENT SHALL BE MADE FOR GROUTING OF EQUIPMENTS, STRUCTURES ETC SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS.

G) NO SEPARATE PAYMENT WILL BE MADE FOR THE WEIGHT/VOLUME OF LUBRICANT, OILS, CHEMICALS, GASES, WATER, and PRESERVATIVES ETC.

H) NO PAYMENT WILL BE MADE FOR THE SPECIAL TOOLS (e.g. FURNACE PLATFOMS – SKY CLIMBERS, PASSENGER ELEVATOR) ETC USED IN VARIOUS ACTIVITIES OF THIS WORK.

I) NO PAYMENT WILL BE MADE FOR WEIGHT OF RUBBER LINING.

SECTION-13
SPECIAL CONDITIONS OF CONTRACT

13.0 EXTRA CHARGES FOR RECTIFICATION AND MODIFICATION

13.1
IF EXTRA WORKS (REQUIRING LESS THAN **100 MAN-HOURS**) FOR MODIFICATION, REWORK, REVAMPING, IN BRIEF, ANY WORK DONE TO CHANGE THE STATE EXISTING TO A STAGE DESIRED AND ALSO FABRICATION, ALL OR ANY, ARE NEEDED DUE TO ANY CHANGE IN OR DEVIATION FROM THE DRAWINGS AND DESIGN OF EQUIPMENT, OPERATION/ MAINTENANCE REQUIREMENTS, MISMATCHING, TRANSIT DAMAGES AND OTHER ALLIED WORKS WHICH ARE NOT VERY SPECIFICALLY INDICATED IN THE DRAWINGS, BUT ARE FOUND ESSENTIAL FOR SATISFACTORY COMPLETION OF THE WORK, ARE DONE, NO EXTRA CHARGES WILL BE PAID. THE TENDERERS ARE REQUESTED TO TAKE THIS ASPECT INTO ACCOUNT AND THE QUOTED RATE SHOULD INCLUDE ALL SUCH CONTINGENCIES.

13.2
IT MAY ALSO BE NOTED THAT IF ANY SUCH SAID EXTRA WORKS ARISE ON ACCOUNT OF THE CONTRACTOR'S FAULT, IRRESPECTIVE OF TIME CONSUMED IN RECTIFICATION OF THE DAMAGE/LOSS, IT WILL HAVE TO BE CARRIED OUT BY THE CONTRACTOR FREE OF COST. UNDER SUCH CIRCUMSTANCES, ANY MATERIAL AND CONSUMABLE REQUIRED FOR THIS PURPOSE WILL ALSO HAVE TO BE ARRANGED BY THE CONTRACTOR AT HIS COST.

13.3
HOWEVER, BHEL MAY CONSIDER FOR PAYMENT AS EXTRA, FOR SUCH OF THOSE WORKS DETAILED IN CLAUSE 13.1 WHICH REQUIRE MORE THAN **100 MAN-HOURS** AND SUCH PAYMENT WILL BE REGULATED BY THE TERMS, CONDITIONS AND STIPULATIONS CONTAINED IN THE CLAUSES 13.4 TO13.8 AND/OR 14.2.1 TO 14.2.10 AS THE CASE MAY BE. IT MAY BE SPECIFICALLY NOTED THAT THE DECISION OF BHEL AS TO WHETHER SUCH PAYMENT IS DUE SHALL BE FINAL AND BINDING ON THE CONTRACTOR. IT MAY ALSO BE NOTED THAT ONLY THOSE WORKS THAT ARE IDENTIFIED AS MAJOR AND WARRANT EXTRA PAYMENT AND CERTIFIED AS SUCH BY THE SITE ENGINEER AND ACCEPTED BY THE DESIGNERS AND/OR COMPETENT AUTHORITY OF BHEL, WILL BE CONSIDERED FOR EXTRA PAYMENT.

13.4
FOR EXTRA WORKS ARISING OUT OF TRANSIT, STORAGE AND ERECTION DAMAGES, PAYMENT, IF FOUND DUE, WILL BE REGULATED BY CLAUSES 14.2.1 TO 14.2.10.

13.5
A SEPARATELY IDENTIFIABLE GANG, WITHOUT AFFECTING ROUTINE ACTIVITIES, SHOULD CARRY OUT ALL THE EXTRA WORK. DAILY LOG SHEETS IN THE PRO-FORMA PRESCRIBED BY BHEL SHOULD BE MAINTAINED AND SHALL BE SIGNED BY THE CONTRACTOR'S REPRESENTATIVE AND BHEL ENGINEER. NO CLAIM FOR EXTRA WORK WILL BE CONSIDERED/ENTERTAINED IN THE ABSENCE OF THE SAID SUPPORTING DOCUMENTS I.E. DAILY LOG SHEETS. IT MAY, HOWEVER BE NOTED THAT SIGNING OF LOG SHEETS BY BHEL ENGINEER DOES NOT MEAN THE ACCEPTANCE OF SUCH WORKS AS EXTRA WORKS. ALL ADMISSIBLE CLAIMS SHALL BE SUBMITTED TO BHEL

13.6
BHEL RETAINS THE RIGHT TO AWARD OR NOT TO AWARD ANY OF THE MAJOR REPAIR/ REWORK/MODIFICATION/RECTIFICATION/FABRICATION WORKS UNDER CLAUSES 13.1 TO 13.6 TO THE CONTRACTOR, AT THEIR DISCRETION WITHOUT ASSIGNING ANY REASON FOR THE SAME.

13.7
EXTRA WORKS THAT ARISE ON ACCOUNT OF CONTRACTOR'S FAULT WILL HAVE TO BE CARRIED OUT BY THE CONTRACTOR FREE OF COST INCLUDING THE SUPPLY OF MATERIAL AND CONSUMABLES

13.8
AFTER ELIGIBILITY OF EXTRA WORKS IS ESTABLISHED AND FINALLY ACCEPTED BY BHEL ENGINEER/DESIGNER, PAYMENT WILL BE RELEASED ON COMPETENT AUTHORITY'S APPROVAL AT THE FOLLOWING RATE.

MAN-DAY RATE FOR ELIGIBLE EXTRA WORKS :

SINGLE AVERAGE MAN-DAY RATE, INCLUDING OVERTIME IF ANY, AND OTHER SITE EXPENSES AND INCIDENTALS, INCLUDING CONSUMABLES, TOOLS AND TACKLES, FOR CARRYING OUT ANY MAJOR REWORK/ REPAIRS/ RECTIFICATION/ MODIFICATION/ FABRICATION OF 8 HOURS AS MAY ARISE DURING THE COURSE OF ERECTION. (REFER CLAUSES 13.1 TO 13.8 AND 14.2.1 TO 14.2.10) WILL BE **RS. 320/- (RUPEES THREE HUNDRED AND TWENTY ONLY)**

NO PAYMENT WILL BE MADE IF AN ITEM OF WORK LASTS LESS THAN 100 MANHOURS.

SECTION-14

SPECIAL CONDITIONS OF CONTRACT

14.0 Insurance

14.1 Marine, Storage cum Erection (MCE) Insurance and Repairing Damages

14.1.1
BHEL/client has an MCE insurance cover, inter-alia, for all the permanent project equipments/components supplied by BHEL under scope of this work by way of a transit and storage cum erection policy covering liability against damages/ losses etc.

14.2 Reporting Damages and Carrying out Repairs

14.2.1
Checking all components/equipments at siding/site and reporting to transporter and /or insurance authorities of any damages/losses will be done by BHEL.

14.2.2
Contractor shall render all help to BHEL in inspection including handling, re-stacking etc, assessing and preparing estimates for repairs of components damaged during transit, storage and erection, commissioning and preparing estimates for fabrication of materials lost/damaged during transit, storage and erection. Contractor shall help BHEL to furnish all the data required by railways, insurance company or their surveyors.

14.2.3
Contractor shall report to BHEL in writing any damages to equipments/ components on receipt, storing, and during drawl of the materials from stores, in transit to site and unloading at place of work and during erection and commissioning. The above report shall be as prescribed by BHEL site management. Any consequential loss arising out of non-compliance of this stipulation will be borne by contractor.

14.2.4
Contractor shall carry out fabrication of any material lost/damaged as per instructions from BHEL engineer.

14.2.5
BHEL, however, retains the right to award or not to award to the contractor any of the rectification/rework/repairs of damages and also fabrication of components.

14.2.6
All the repairs/rectification/rework of damages and fabrication of materials lost, if any, shall be carried out by a separately identifiable gang for certification of man-hours. Daily log sheets should be maintained for each work separately and should be signed by contractor's representative and BHEL engineer. Signing of log sheets does not necessarily mean the acceptance of these as extra works.

14.2.7
All rectification, repairs, rework and fabrication of components lost, which are minor and incidental to erection work (consuming not more than 100 man-hours on each occasion) shall be treated as part of work without any extra cost.

14.2.8
Insurance cover under this policy will generally be as per clauses 2.10.1 to 2.10.4 of General Conditions of Contract unless and otherwise specified differently in the Special Conditions.

14.2.9
In case the loss/damage is not attributable to the contractor, Payments of all extra works on account of repair / rectification / reworks of damages and fabrication of materials lost will be as per provisions of Section-13 of SCC.

14.2.10
In case the repairs/rectification/rework and fabrication of materials lost, the work has been done by more than one agency including the contractor, the payment towards extra charges will be on pro-rata basis and the decision of BHEL in this regard is final and binding on the contractor.

14.2.11
In case of theft / damage / loss of materials due to **repeated/continued instances of negligence/failure** attributable to the contractor, the expenses incurred on account of repair/ replacement of such components including BHEL's overhead expenses as applicable (presently @ 30%) in excess of the amount realized from the underwriters, if any, shall be recovered from the contractor. Recovery will be limited to Normal Deductible Franchise (DF)/Excess as per applicable Insurance (TAC) tariff guidelines for every incidence of loss/damage.

14.2.12
In case any insurance claim does not become tenable due to **willful** negligence/ damage/loss attributable to the contractor, the total cost of repair/replacement including BHEL overhead expenses shall be recovered from the contractor.

14.3 Insurance by the Contractor and Indemnification of BHEL

14.3.1

BHEL has taken third party liability insurance, indicating in the proposal for such insurance that sub-contractors will be taking part in the erection work detailed in this tender specification. However, the bidder has to bear any expenses/consequences over and above the amount that may be reimbursed to BHEL by such coverage of third party liability insurance taken by BHEL.

Such additional liability will be to cover and indemnify BHEL and its customer of all liabilities which may come up and cause harm/damage to other contractors/customer/BHEL properties/ personnel or all or anybody rendering service to BHEL/ customer or is connected with BHEL/ customer's work in any manner whatsoever. The bidders' specific attention is also invited to clause 2.10 of General Conditions of Contract.

14.3.2
Contractor shall obtain suitable statutory as well as non-statutory insurance policies for all the properties belonging to him and also for his personnel deployed at project for execution of the contract work.

SECTION-15

SPECIAL CONDITION OF CONTRACT

15.0 EARNEST MONEY DEPOSIT & SECURITY DEPOSIT

15.1 EARNEST MONEY DEPOSIT:

EARNEST MONEY DEPOSIT FOR THIS TENDER WILL BE Rs. 2,00,000/ - (RUPEES TWO LACS ONLY).

ONE TIME EMD WILL ALSO BE Rs. 2 LACS.

EMD SHALL BE DEPOSITED IN CASH (AS PERMISSIBLE UNDER INCOME TAX ACT), PAY ORDER OR DEMAND DRAFT (PAYABLE AT NAGPUR IN FAVOUR OF 'BHARAT HEAVY ELECTRICALS LIMITED') ONLY. **NO OTHER FORM OF EMD REMITTENCE SHALL BE ACCEPTABLE TO BHEL.**

15.1.1 EMD BY THE TENDERER WILL BE FORFEITED AS PER TENDER DOCUMENTS IF

I) AFTER OPENING THE TENDER, THE TENDERER REVOKES HIS TENDER WITHIN THE VALIDITY PERIOD OR INCREASES HIS EARLIER QUOTED RATES.

II) THE TENDERER DOES NOT COMMENCE THE WORK WITHIN THE PERIOD AS PER LOI / CONTRACT. IN CASE THE LOI / CONTRACT IS SILENT IN THIS REGARD THEN WITHIN 15 DAYS AFTER AWARD OF CONTRACT.

15.1.2 EMD SHALL NOT CARRY ANY INTEREST.

15.2 SECURITY DEPOSIT

15.2.1 SECURITY DEPOSIT SHOULD BE COLLECTED FROM THE SUCCESSFUL TENDERER. THE RATE OF SECURITY DEPOSIT WILL BE AS BELOW:

SN	Contract Value	Security Deposit Amount
1	Up to Rs. 10 lakhs	10% of Contract Value
2	Above Rs. 10 lakhs upto Rs.50 lakhs	1 lakh + 7.5% of the Contract Value exceeding Rs. 10 lakhs.
3	Above Rs. 50 lakhs	Rs 4 lakhs + 5% of the Contract Value exceeding Rs. 50 lakhs.

THE SECURITY DEPOSIT SHALL BE REMITTED <u>BEFORE START OF THE WORK</u> BY THE CONTRACTOR IN THE MANNER SPECIFIED AS FOLLOWS.

15.2.2 SECURITY DEPOSIT MAY BE FURNISHED IN ANY ONE OF THE FOLLOWING FORMS

I) CASH (AS PERMISSIBLE UNDER THE INCOME TAX ACT)

II) PAY ORDER, DEMAND DRAFT IN FAVOUR OF BHEL.

III) LOCAL CHEQUES OF SCHEDULED BANKS, SUBJECT TO REALIZATION.

IV) SECURITIES AVAILABLE FROM POST OFFICES SUCH AS NATIONAL SAVINGS CERTIFICATES, KISAN VIKAS PATRAS ETC.

(CERTIFICATES SHOULD BE HELD IN THE NAME OF CONTRACTOR FURNISHING THE SECURITY AND DULY PLEDGED IN FAVOUR OF BHEL AND DISCHARGED ON THE BACK).

V) BANK GUARANTEE FROM SCHEDULED BANKS / PUBLIC FINANCIAL INSTITUTIONS AS DEFINED IN THE COMPANIES ACT SUBJECT TO A MAXIMUM OF 50% OF THE TOTAL SECURITY DEPOSIT VALUE. THE BALANCE 50% HAS TO BE REMITTED EITHER BY CASH OR IN THE OTHER FORM OF SECURITY. THE BANK GUARANTEE FORMAT SHOULD HAVE THE APPROVAL OF BHEL.

VI) FIXED DEPOSIT RECEIPT ISSUED BY SCHEDULED BANKS / PUBLIC FINANCIAL INSTITUTIONS AS DEFINED IN THE COMPANIES ACT. THE FDR SHOULD BE IN THE NAME OF CONTRACTOR, A/C BHEL, DULY DISCHARGED ON THE BACK.

VII) SECURITY DEPOSIT CAN ALSO BE RECOVERED AT THE RATE OF 10% FROM THE RUNNING BILLS. HOWEVER IN SUCH CASES AT LEAST 50% OF THE SECURITY DEPOSIT SHOULD BE REMITTED (BY BANK GUARANTEE OR DEMAND DRAFT) BEFORE START OF THE WORK AND THE BALANCE 50% MAY BE RECOVERED FROM THE RUNNING BILLS.

VIII) EMD OF THE SUCCESSFUL TENDERER, EXCEPTING THOSE WHO HAVE REMITTED ONE TIME EMD, SHALL BE CONVERTED AND ADJUSTED AGAINST THE SECURITY DEPOSIT OR SPECIFIC REQUEST BY THE CONTRACTOR.

IX) THE SECURITY DEPOSIT SHALL NOT CARRY ANY INTEREST.

NOTE: ACCEPTANCE OF SECURITY DEPOSIT AGAINST SL. NO. (IV) AND (VI) ABOVE WILL BE SUBJECT TO HYPOTHECATION OR ENDORSEMENT ON THE DOCUMENTS IN FAVOUR OF BHEL. HOWEVER, BHEL WILL NOT BE LIABLE OR RESPONSIBLE IN ANY MANNER FOR THE COLLECTION OF INTEREST OR RENEWAL OF THE DOCUMENTS OR IN ANY OTHER MATTER CONNECTED THEREWITH.

15.2.3 SECURITY DEPOSIT SHALL NOT BE REFUNDED TO THE CONTRACTOR EXCEPT IN ACCORDANCE WITH THE TERMS OF THE CONTRACT.

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
A - PRESSURE PARTS:			
04	116	Upper Drum + Intl Id 61-	135.475
04	144	Upper Drum Sspn Id 49-60	12.750
04	146	Upper Drum Sspn Id 61-71	3.841
05	137	Inlet Front Lower Ww Header	3.224
05	147	Inlet Rear Lower Ww Header	3.424
05	158	Inlet Side Waterwall Header	5.300
05	159	Inlet Side Water Wall Header	5.300
05	200	Evaporator Outlet Header	7.779
05	216	Baffle Wall Header	4.900
05	251	Outlet Side Upper Ww Header	7.235
05	260	Outlet Centre Ww Header	13.300
05	300	Bed Evaporator Inter Header	0.223
05	331	Fbhe Evap Inlet Header	13.724
05	341	Fbhe Evap.Intermediate Header	16.773
05	342	Fbhe Vacant Channel Inlet	0.885
05	351	Fbhe Evap Right Wall Inl	5.615
05	361	Fbhe Partition Wall Inle	1.800
05	441	Fbhe Evap Outlet Header	4.617
05	442	Fbhe Evap Outlet Header	1.888
05	451	Fbhe Right Wall Outlet H	1.034
05	452	Fbhe Right Wall Outlet H	1.288
05	461	Fbhe Partition Wall Outl	2.642
05	493	Manifold Header	0.992
05	494	Downcomer Header Ii	3.446
05	495	Downcomer Header Iii	6.428
05	496	Downcomer Header Iv	2.795
05	497	Downcomer Header V	0.325
05	498	Downcomer Header Vi	0.998
05	531	Seal Pot Inlet Header	0.591
05	541	Seal Pot Intermidiate He	0.664
05	551	Seal Pot Inlet Header Ch	0.526
05	631	Seal Pot Outlet Header	0.476
05	641	Seal Pot Outlet Header	0.523
05	651	Seal Pot Outlet Header C	0.523
06	613	Floor Ww Pnl	11.385
06	615	Fbhe Baffle Panel	21.500
06	616	Baffle Ww Pnl	1.011
06	617	Upper Baffle Ww Pnl	1.859
06	618	Lower Baffle Ww Pnl	3.054
06	621	Front Roof Ww Pnl	14.969
06	630	Front Ww Pnl	37.615
06	631	Front Upper Ww Pnl	19.951
06	637	Waterwall Lower Front Pa	15.998

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
06	640	Rear Ww Pnl	28.721
06	641	Rear Upper Ww Pnl	19.951
06	647	Rear Lower Ww Pnl	16.011
06	650	Side Ww Pnl	6.247
06	651	Side Upper Ww Pnl	25.316
06	653	Side Intermediate Ww Pnl	42.494
06	655	Side Lower Ww Pnl	49.095
07	101	Downcomer Piping-Natural	58.881
07	102	Downcomer Piping-Control	27.927
07	201	Riser Tubes	27.899
07	202	Supply Tubes	34.569
07	203	Spider Tubes	8.557
07	206	Riser Tubes-Hp	57.832
07	221	Furnace Floor Tubes	24.068
07	400	Waterwall Header Suspens	9.955
07	401	Waterwall Suspension	38.260
07	402	Ww Front Header Suspensi	45.700
07	410	Downcomer Suspension	8.500
07	430	Hanger Tube Supports	8.530
07	431	Riser Tube Support	6.200
07	432	Riser Tube Support Hp	8.500
07	500	Metal Spraying	0.500
07	510	Evaporator Coils	25.348
07	601	Pressure Seals	6.320
10	100	Sh Hanger Inlet Header	2.343
10	121	Horizontal Intermediate	5.600
10	123	Hor Front Sh Inlet Hdr	4.810
10	135	Horizontal Spaced Shinle	3.900
10	136	Ltsh In let Header	3.061
10	182	Sh Rear Wall Inlet Heade	2.900
10	183	Sh Frontwall Inlet Head	2.900
10	184	Sh Extended Side Wall In	3.310
10	191	Sh Radiant Wall Roof Inl	12.082
10	207	Front Intermediate Sh Ou	2.741
10	221	Horizontal Intermediate	10.100
10	223	Hor Front Sh Outlet Hdr	5.282
10	235	Horizntl Spaced Sh Outle	7.100
10	236	Ltsh Outlet Header	5.282
10	284	Sh Extended Side Wall Ou	3.494
10	286	Roof Superheater Outlet	3.753
10	819	Hor Sh Distribution Hdr	2.115
11	239	Sh Hor Spaced Front Coil	31.393
11	240	Hp.Horizontal Sh Coil At	32.728
11	248	Sh Hor Spaced Rear Upper	54.000

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
11	250	Sh Hor Spaced Rear Lower	87.579
11	251	Eco.Miscellaneous Compon	7.525
11	252	Loose tubes for SH - 2A	5.488
11	253	Loose tubes for SH - 2B	5.973
11	254	Loose tubes for SH - III	10.460
11	585	Sh Front Wall Pnl + Hdr	0.609
11	682	Sh Rear Wall Panels	16.200
11	683	Sh Side Wall Panels	8.536
11	684	Side Wall Pannels	8.536
11	685	Sh Front Wall Panels	18.500
11	687	Sh Rear Roof Panels	7.500
12	136	Link from SH -2A to SH-2	34.400
12	147	Sh Hor Spaced Rear Inlet	5.683
12	800	SH – DESH - - Stage 1	1.100
12	802	Ltsh Hanger Tubes	14.257
12	850	Sh Conn Pipes-Saturated	11.763
12	852	Sh Desh Links	45.100
12	900	Sh Desh	1.800
12	901	Sh Hngr,Suprts,Guides &	2.530
12	902	Support for side wall	3.120
12	903	5h Miscl Components	12.500
12	904	Support for SH 2A to SH	2.584
12	905	Sh Hdr Suprts & Suspensi	10.615
12	906	Sh Suprts For Lines & Li	4.143
12	908	Sh Coil&Wall Supports	4.025
15	136	Ltrh Inlet Header	7.145
15	138	Htrh Inlet Header	4.945
15	236	Ltrh Outlet Header	8.239
15	238	Htrh Outlet Header	6.273
16	235	Rh Hor Spaced Coil Atc	112.000
16	236	Rh Hor Spaced Upper Coil	27.058
16	237	Rh Hor Spaced Inter Coil	11.143
16	239	Rh Hor Spaced Front Coil	6.550
17	852	R.H Desh Links From Rhh2	23.055
17	900	Rh Desh	1.557
17	901	Rh Hngr,Suprts,Guides &	4.134
19	001	Cast Iron Ecconomiser	4.199
19	004	Air Heater Coils	13.024
19	104	Coil & Suprt Of Plain Tu	76.444
19	114	Coils And Supports Of Up	87.516
19	121	Coils And Supports Of Lo	10.476
19	124	Coils And Supports Of Lo	87.516
19	184	Coils And Supports Of Ce	77.536
19	701	Inlet Eco Headers	3.194

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
19	702	Outlet Eco Headers	3.206
19	703	Economiser I Outlet Head	0.540
19	708	Economiser-2 Inlet Heade	0.540
19	850	Eco Feed Pipe	1.641
19	851	Eco Links To Drum	10.270
19	854	Lp Economiser Link To Dr	2.111
19	901	Eco. Supports & Suspensi	2.092
19	903	Eco. Miscellaneous Compo	18.100
19	905	Eco Suprts & Suspensions	15.000
19	905	CONNECTOR PLATE	0.050
21	600	Soot Blower Piping And F	5.700
21	601	Sootblower Piping Suppor	2.425
21	725	Rot Sb Sprt Bearings	1.421
21	800	Sb Valves (Bhel)	0.327
21	825	Sb Valves (Sub Delivery)	0.260
21	850	Soot Blower Safety Valve	0.031
24	400	Boiler Trim Piping And F	34.600
24	401	Boiler Trim Piping Suppo	6.280
24	440	Sample Cooler And Suppor	0.487
24	460	Valves (Bhel) Indl Blr	11.283
24	465	Valves & Fittings (Sd)	3.180
24	473	Dwlg-Bhel Make Indl Boil	0.266
24	475	Headers For Trim Piping	1.057
24	480	Erv And Safety Valves(Bh	2.297
24	994	Name Plates	0.136
42	120	Piping F.O Pump House	1.200
42	152	Piping,OprG Floor Lfo	0.800
42	153	Piping,OprG Floor Hfo	3.500
42	154	Piping,PorG Floor Do	0.500
42	156	Piping,OprG Floor Fuel G	1.000
42	157	Piping,OprG Floor Atm Ai	1.000
42	158	Piping,OprG Floor Steam -	2.800
42	159	Piping,OprG Floor Stm Tr	1.000
42	252	SD P.Porg Floor LFO	0.600
42	253	Subdel,OprG Floor Hfo	2.000
42	352	Bhel Valve Oprg Floor H	0.300
42	353	Bhel Valve,OprG Floor Hf	1.300
42	358	Bhel Valve,OprG Floor St	0.450
42	700	Bps Fasteners	0.200
		SUB-TOTAL OF " A"	**2225.501**
B		**NON-PRESSURE PARTS**	
08	101	Furnace Upper Buckstay	137.907
08	107	Furnace Key Buckstay Low	23.206

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
08	171	Extended Side Upper Furn	55.464
08	400	Furnace Guide	1.430
08	501	Furnace Backpass Bucksta	21.563
08	507	Lower Back Pass Buckstay	18.134
08	900	Furnace Key Buckstay	8.111
08	901	Furnace Key Buckstay Upp	0.850
08	910	Ex.Movement Measurement	0.653
09	001	Seal Boxes For Furnace O	18.110
09	002	Seal Boxes For Instrumen	2.130
18	001	Roof Skin Casing	1.138
20	001	Long Retractable Soot Bl	6.015
20	004	Wall Box Assembly For Lr	0.672
20	021	Pneumatic Control Panel-	7.165
20	988	Sdot Blower Commissionin	0.008
24	420	Safety Valve Esc Pipe & Dr.	29.650
24	425	Silencer Support-Safety	6.123
24	485	Safety Valve/Erv Silencer	29.454
24	490	Silencer For Start Up Ve	5.484
28	220	Doors	3.208
28	700	Bps Fasteners	0.575
30	215	Main Boiler (Main insulation pins/attachments)	5.000
31	010	Skin Casing Comps Welded	12.170
31	105	Second Pass Skin Casing	1.340
41	141	Start-Up Burner & Valves	3.500
41	390	Oil Gun Vice Assy And Ra	0.100
42	010	Lfo Pump Set	2.500
42	020	Hfo Pump Set	4.000
42	030	Hfo Heater Set	10.000
42	045	Drain Oil Pump Set	0.700
42	065	Drain Oil Tank	1.100
42	820	Electrical Tracing	1.000
43	002	Scanner Air System Assy	1.800
43	008	Piping,Sb Seal Air Syste	9.100
43	202	Seal Air Sys SD	0.450
43	208	Subdelivery,Sb Seal Air	0.500
44	410	Duct Wind Box Ash Drain	12.910
44	411	Gate Valve Combtr Grate	3.320
44	413	Duct Grate Discharge	7.638
44	415	Duct Fbhe Grate Discharg	1.651
44	416	Expansion Joint Fbhe Gra	0.266
44	417	Gate Valve Fbhe Grate Di	0.900
44	418	Gate Valve Fbhe Wb Ash	1.150
44	421	Spise Valve Combtr Botto	7.500

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
44	422	Spise Valve Ash O/Lfbhee	24.800
44	424	Duct Spise Fbhe & Ash Co	24.140
44	425	Expansion Joint Ash Duct	0.100
44	426	Bottom Ash Cooler	3.600
44	428	W/B Ash Cooler Ball Valv	0.680
47	003	Coal Bunker Isolation Va	7.024
47	004	Nmej Above Disc Chain Co	2.000
47	005	Dischrge Chain Conveyor	90.000
47	006	Nmej Below Ddlf	2.500
47	007	Nmej Rotary Valve & Feed	2.700
47	008	Rotary Valve Self Cleani	1.000
47	009	Master Fuel Trip Valve	2.700
47	010	Limestone Isolation Valv	1.439
47	011	Lime Stone Rotary Valve	4.800
47	012	Nmej For Lime Stone Chut	1.000
47	013	Lime Stone Isolation Bal	0.500
47	014	Duct Coal Bunker To Feed	7.212
47	015	Duct Lime Stone Bunker T	2.840
47	016	Bed Material Bin Isolati	0.264
47	017	Rotary Valve - Bed Mater	1.000
47	018	Duct Burner To Combustor	1.467
47	019	Nmej For Connecting Chut	0.115
47	020	Bed Material Isolation B	0.100
48	012	Rect Duct Bet F.D Fan A	30.451
48	013	Dampers Bet F.D Fan A	3.275
48	014	Expn Piecesbet F.D Fan A	1.979
48	015	Supportsetcbet F.D Fan A	1.645
48	022	Rect Duct Sec.Air Inter	60.508
48	023	Dampers Sec.Air Inter	1.757
48	024	Expn Piecessec.Air Inter	2.437
48	025	Supportsetcsec.Air Inter	11.593
48	032	Rect Duct A.H Bypass Se	30.910
48	033	Dampers A.H Bypass Se	1.130
48	034	Expn Piecesa.H Bypass Se	10.930
48	035	Support Fan To Fbhe Air	16.630
48	042	Rect Duct-A.H Interconn	11.190
48	044	Expn Piecesa.H Interconn	2.300
48	045	Support Fan To Ash Coole	0.300
48	052	Rect Duct Gas Recircln-	6.360
48	054	Expn Piecesgas Recircln-	0.520
48	055	Support, Gas Recircln-Se	1.070
48	072	Rect Duct Hot And Cold	3.447
48	082	Sqduct,Cold Air Fdfon-Bo	38.416
48	123	Dampers Airheater Byp	2.717

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
48	200	Instrument Tappings On D	3.829
48	202	Rect Ductsairheater To	58.992
48	203	Dampers Airheater To	1.518
48	204	Expn Piecesairheater To	5.498
48	205	Supportsetcairheater To	4.435
48	207	Flowmeters For Secondary	7.229
48	212	Wind Box Connecting Duct	37.114
48	214	Expn Pieceswindbox Conne	1.841
48	215	Supports Wind Box Connec	13.939
48	222	Rect Duct-Airheater Pri	9.348
48	223	Dampers Airheater Pri	2.416
48	224	Expn Piecesairheater Pri	2.100
48	225	Supports For Hot P.A (Ah	1.255
48	232	Rect Ducts Hot Air Busdu	25.827
48	234	Expn Pieceshot Air Busdu	0.550
48	235	Support Hot Air Bus	3.952
48	242	Rect Ductshot Priairsys	7.543
48	244	Expn Pieceshot Priairsys	1.975
48	245	Support-Hot Pri Air Sys	1.123
48	252	Rect Ducts Hot Priairsy	4.787
48	254	Expn Pieces-Pafan Delive	1.300
48	255	Support,Hot Pafan To Mil	0.316
48	262	Rect Duct Airhtr Toprin	7.700
48	264	Expn Piecesairhtr Toprin	4.100
48	265	Supportsetcairhtr Toprin	5.300
48	292	Rect Duct Hotsealair Fo	2.182
48	295	Supports -Gr Hot Seal Air	0.499
48	312	Rect Ductsgrsystem -Grfa	124.765
48	314	Expn Piecesgrsystem -Grfa	1.600
48	315	Support,Gr Fan Delivery	6.881
48	319	Ducting - Furnace Entry	5.227
48	322	Rect Duct Fluegas To Mi	93.133
48	324	Expn Pieces-Boiler To Ec	0.400
48	325	Support Boiler To Econom	0.324
48	332	Sqduct,Boiler-Chimney	37.712
48	333	Dampers,Boiler-Chimney	2.278
48	334	Support,Boiler-Chimney	0.200
48	335	Supportsetcfluegas Ducts	4.400
48	382	Rect Duct Economiser To	62.898
48	384	Expn Pieceseconomiser To	1.483
48	385	Supportsetceconomiser To	5.925
48	452	Rect Ducts Boiler To Air	93.589
48	455	Supportsetcboiler To Air	22.185
48	460	Guillotene Gate Ep Inlet	15.236

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
48	462	Rect Duct Boiler Outlet	67.614
48	463	Dampers Boiler Outlet	1.872
48	464	Expn Piecesboiler Outlet	14.922
48	465	Bof To Ep Ducting Suppor	21.899
48	470	Esp Outlet Gate	10.978
48	480	Guillotene Gate Ep Outle	10.978
48	482	Rect Ducts -Elec Prptr/M.	62.357
48	484	Expn Pieceselec Prptr/M.	6.444
48	485	Supportsetcelec Prptr/M.	5.346
48	490	Guillotene Gate Id Fan O	9.317
48	492	Rect Duct Ind Draft Fan	82.762
48	494	Expn Piecesind Draft Fan	5.744
48	495	I.D.System Duct Supports	11.635
48	700	Bulked Bps Components	6.232
48	772	Sq Duct-Ah To Ah Interco	168.432
48	774	Expansion Joint Fg Ah -Ah	10.966
48	775	Support-Ah To Ah Interco	2.730
48	921	CFBC BLOWER SILENCER	0.000
48	965	CFBC BLOWER	0.000
48	(013 to 490	GATES/DAMPERS	45.000
50	**111**	**Horizontal Tubular APH**	**734.000**
50	**510**	**Steam Coil APH**	**3.200**
50	**610**	**SCAPH-Horizontal Type**	**3.200**
66	101	Lignite Bunker Hopper	350.000
66	102	Lignite Bunker above Hop	205.000
66	125	Polymer Lining	10.000
66	132	Bed Matl Bunker Evacuati	3.700
66	201	Pulverised Coal Bunker	4.218
66	202	Pulverised Coal Bunker 1	17.440
66	301	Bunker Beneath Cyclone S	21.778
66	302	Bunker Beneath Cyclone S	40.907
66	325	Lining for Lime Stone Bu	3.000
81	441	ELECTRICAL HEAT TRACING-TAPES AND ACCESSORIES **(COMMON FOR TWO UNITS)**	0.500
81	441	ELECTRICAL HEAT TRACING POWER DISTRIBUTION PANEL **(COMMON FOR TWO UNITS)**	0.500
---	---	HP DOSING SKID	8.000
---	---	LP DOSING SKID	13.000
---	---	PLATE HEAT EXCHANGER FOR BOILER	30.000
		TOTAL OF TOTAL "B"	**3576.606**

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
C		**STRUCTURES**	
34	010	Bunker Foundation Materi	10.000
34	100	Bunker Bay Columns	36.000
34	101	Bunker Structure Columns	1.835
34	102	Bunker Structure Columns	4.930
34	200	Lignite Bunker Support B	21.000
34	300	Bunker Floors	113.000
34	500	Bunker Column Bracing	430.000
34	610	Bunker Roof Structure	42.000
34	611	Bunker Roof Sheeting	14.000
34	810	Floor Grills	42.000
34	820	Stairs & Ladders	14.000
34	850	Handrails & Posts	21.000
35	010	Foundation Materials-Boi	13.648
35	110	Main Columns Left	240.685
35	120	Main Columns Right	175.796
35	130	Main Columns Middle	103.441
35	190	Girder Pin Connections	9.461
35	210	Boiler Ceiling Structure	60.754
35	220	Boiler Ceiling Structure	14.164
35	230	Boiler Ceiling Structure	1.057
35	240	Ceiling Girders - Main	67.739
35	250	Ceiling Girders - Cross	4.923
35	310	Horizontal Bracing I Mbl	74.715
35	320	Horizontal Bracing Ii Mb	36.197
35	330	Horizontal Bracing Iii M	88.556
35	380	Landing Platforms	42.815
35	390	Platform At Drum Floor L	36.485
35	440	Horizontal Beams	61.681
35	441	Horizontal Beams-Lower	48.173
35	442	STRUCTURE	30.000
35	510	Column Bracings-Front Br	182.828
35	520	Column Bracings-Side Bra	283.226
35	530	Column Bracings-Rear Bra	77.439
35	610	Boiler Roof Structure	108.484
35	611	Boiler Roof Sheeting	29.493
35	700	Hsfg Fasteners For Pg 35	3.386
36	210	Main Floor 1st Level	36.657
36	211	Main Floor-First Level I	25.746
36	220	Main Floor 2 Level	26.985
36	230	Main Floor 3rd Level	32.943
36	240	Main Floor 4th Level	19.812
36	250	Main Floor 5th Level	28.328
36	260	Main Floor 6th Level	27.434

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
36	270	Main Floor 7th Level	10.976
36	280	Main Floor 8th Level	5.704
36	290	Main Floor 9th Level	7.724
36	300	Main Floor 10th Level	10.161
36	390	Miscellaneous Platforms	30.919
36	810	Floor Grills And Guard P	94.840
36	820	Stairs And Ladders	25.000
36	850	Handrails And Hand Rail	42.626
38	010	Lift Foundation Material	4.000
38	110	Lift Columns	40.000
38	210	Inter Connecting Floors	5.000
38	390	Misc Structure	10.000
38	510	Column Bracing	30.000
38	610	Str.For Side Cladding	10.000
38	611	Side Sheeting	6.000
39	012	Foundation Materials I.D	3.143
39	100	Col Frames For Ducting B	7.657
39	101	Columns Frames Before E	19.286
39	121	Columns Fd Sys.	11.369
39	140	Cols Frames Near I.D.Fan	3.624
39	150	Col Frames Betn I.D.Fan	19.799
39	160	Column Bracing For Fd Sy	32.732
39	200	Portal/Inter Conn Beams	28.779
39	300	Platforms - External Str	2.148
39	301	Struc And Platform For F	0.357
39	303	Monorail Beams For Fans	3.559
39	311	Duct Support Beams	7.264
39	323	Fd Fan Handling System	2.645
99	100	Fan Handling Equipment	5.000
99	512	Furnace Cradle 2 Wall Co	0.500
		TOTAL OF "C"	**3223.631**
D. ROTATING MACHINES			
56	000	TOOLS & FIXTURE/CONT	0.200
56	011	FD FAN FOUNDATION MATL	1.500
56	017	FD FAN C&I ITEMS	0.100
56	021	ID FAN FOUNDATION MATL	3.700
56	027	ID FAN C&I ITEMS	0.100
56	031	PA FAN FOUNDATION MATL	0.750
56	037	PA FAN C&I ITEMS	0.100
56	115	FDFAN BC1S2000-2500	28.500
56	133	BAC 1 SUC PA FAN	12.000
56	226	IDFAN BCDS2500-3150	57.500
56	810	RADL FDFAN COUPLING	0.300

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
56	820	RADL IDFAN COUPLING	0.200
56	830	RADL PAFAN COUPLING	0.200
56	910	RAD FDFAN ACCESSORY	2.000
56	911	FD FAN SILENCER	24.000
56	913	FD ACTUATOR	0.700
56	923	ID ACTUATOR	0.300
56	930	RAD PAFAN ACCESSORY	2.000
56	931	PA FAN SILENCER	24.000
56	933	PA ACTUATOR	**0.300**
--	---	DRIVE MOTORS	**80.000**
81	104	BOILER FEED PUMPS	**20.300**
81	110	COOLING WATER PUMPS (**COMMON FOR TWO UNITS)**	**1.300**
		TOTAL OF "D"	**260.050**
E. ELECTROSTATIC PRECIPITATOR			
78	101	ROLL/SLIDE SUPPORTS	7.800
78	105	ESP-SUB-DELIVERY COMPONENTS	0.168244
78	106	INSULATOR HOUSING AS	10.368346
78	108	GAS DIST. ASSY	20.94688
78	109	GD-RAPPING MECHANISM	4.57584
78	110	GD_DRIVE ARRANGEMENT	0.213102
78	111	GAS SCREEN-EP	15.281688
78	113	EMIT SYST SUSPENSION	3.863328
78	114	SUPPORT INSULATORS	1.680
78	115	EMITTING ELECTRODES	7.4222
78	116	EMIT ELECT RAPP MECH	11.614064
78	117	DRIVE ARGT. FOR EMIT. SYS	7.169512
78	119	COL ELEC SUSPENSION	42.431724
78	120	COLLECTING ELECTRODE	343.44156
78	121	EMIT SYS FRAME-TOP	43.449942
78	122	EMIT SYS FRAME BOTOM	41.028467
78	123	INSPECTION DOORS	3.414276
78	124	SHOCK BARS	30.439816
78	125	COLL ELECT RAPP MECH	28.922946
78	126	COLL ELEC RAPP DRIVE	1.491714
78	128	ESP ROOF PANELS	55.123544
78	131	GEARED MOTORS FOR RAPPING MECH	3.98364
78	132	EMIT SYS FRAME-MIDLE	65.32737
78	142	OUTER ROOF-EP	106.400
78	143	HOPPER RIDGES	25.840
78	144	HOPPER UPPER PART	147.000

APPENDIX-I			
ESTIMATED WEIGHT OF VARIOUS SYSTEMS/ EQUIPMENTS IN SCOPE			
PG	**MA**	**Description**	**WT in MT**
78	145	HOP MLD&LOWER PART	137.300
78	146	INSULATOR SUPP PANEL	33.700
78	147	ROOF PANEL ASSY	55.500
78	148	CASING STRUCTURE	113.48454
78	149	CASING SHELL/PANEL	256.2768
78	150	INLET-OUTLET FUNNEL	52.718
78	156	RECTIFIER HANDL SYST	13.400
78	157	SPLITTER&GUIDE VANES	8.205776
78	165	APP PLATFORM-HOPPER	37.900
78	167	MIN WOOL FOR ESP INSULATION	55.100
78	168	FIXING COMP. FOR ESP INSULATIN	65.400
78	172	INTERLOCKS-EP	0.670
78	173	ELECTRICALLY OPERTD HOIST&ACCE	1.500
78	176	RECTIFIRS&CONTRLS-EP	26.600
78	180	FOUNDATION MATLS FOR ESP	4.389192
78	181	SUPPOTING STRUCTURES FOR ESP	225.000
78	190	HEATING ELEMENTS	0.990
89	610	EP GALLERIES&STAIRS	29.000
89	611	ESP ROOF HANDRAILS	3.300
		TOTAL OF "E"	**2149.832511**

F. PIPING, TANKS AND VESSELS				
SN	**PGMA**	**DESCRIPTION**	**TENTATIVE WEIGHT(MT)**	**IBR**
1.	80300	MS FROM SUPERHEATER TO BOILER STOP VALVE	6.500	I
2.	80301	MS FROM BOILER STOP VALVE TO ESV	30.000	I
3.	80303	MS HEADER TO AUX PRDS	6.300	I
4.	80304	MS HEADER TO HPBP VALVE	4.200	I
5.	80307	HP & LP BYPASS WARM UP	0.650	I
6.	80310	HRH FROM REHEATER TO INTERCEPTOR VALVE	64.900	I
7.	80312	LPBP VALVE UPSTREAM & DOWNSTREAM	15.900	I
8.	80320	CRH FROM TURBINE TO REHEATER	19.600	I
9.	80321	HPBP VALVE TO CRH PIPING	7.100	I
10.	80322	CRH PIPING TO DEAERATING HEATER	6.900	I
11.	80331	EXTRACTION STEAM TO LP HEATER-2	3.200	I

F. PIPING, TANKS AND VESSELS

SN	PGMA	DESCRIPTION	TENTATIVE WEIGHT(MT)	IBR
12.	80332	EXTRACTION STEAM TO LP HEATER-3	1.300	I
13.	80335	EXTRACTION STEAM TO DEAERATING HEATER	4.900	I
14.	80336	EXTRACTION STEAM TO HP HEATER NO.1	1.100	I
15.	80337	EXTRACTION STEAM TO HP HEATER-2	0.880	I
16.	80340	AUX STEAM HEADER	2.300	I
17.	80341	AUX STEAM HEADER INTERCONN BETWEEN UNITS**(COMMON FOR TWO UNITS)**	5.000	I
18.	80344	AUX STEAM TO FO SYSTEM TP **(COMMON FOR TWO UNITS)**	8.000	I
19.	80345	AUX STEAM TO DEAERATING HEATER	1.300	I
20.	80349	AUX STEAM TO GLAND SEALS - TG SCOPE	1.500	I
21.	80364	CBD TANK VENT TO SYSTEM	0.370	I
22.	80365	CBD TANK VENT/SV EXHAUST TO ATMOSPHERE	0.780	N
23.	80366	IBD TANK VENT TO ATMOSPHERE	4.200	N
24.	80395	AUX STEAM TO FUEL OIL ATOMISING	0.840	I
25.	80417	BOILER FEED DISCHARGE PIPING	3.500	I
26.	80418	ERECTION MATERIALS FOR INSTRUMENTS	1.800	N
27.	80420	BOILER FEED PUMP SUCTION	4.900	N
28.	80421	BOILER FEED PUMP RECIRCULATION	5.200	I
29.	80423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	25.600	I
30.	80424	BFD BETWEEN HTRS & GROUP PROTECTION VLV	8.900	I
31.	80425	BFD FROM FINAL HPH TO SG TP	24.400	I
32.	80429	BOILER FILLING PIPING	1.200	N
33.	80430	SPRAY WATER TO HPBP	1.400	I
34.	80431	SPRAY WATER TO AUX PRDS	2.500	I
35.	80432	SPRAY WATER TO BOILER DESH UPTO SG TP	4.500	I
36.	80450	CBD AND EMERGENCY DRUM DRAIN	2.800	I
37.	80451	BOILER INTEGRAL PIPING DRAINS	2.100	I
38.	80452	HP PIPING DRAINS - SG SCOPE	6.400	I

F. PIPING, TANKS AND VESSELS

SN	PGMA	DESCRIPTION	TENTATIVE WEIGHT(MT)	IBR
39.	80453	LP PIPING DRAINS - SG SCOPE	4.800	I
40.	80460	SG AUX. COOLING WATER UNIT SYSTEM	35.200	N
41.	80473	DEMINERALISED WATER SYSTEM	5.500	N
42.	80477	SERVICE WATER PIPING	100.000	N
43.	80600	HIGH PRESSURE DOSING PIPING	0.480	N
44.	80601	LOW PRESSURE DOSING PIPING	0.540	N
45.	80612	SERVICE AIR FOR INDIVIDUAL UNITS	18.200	N
46.	80616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	20.700	N
47.	80650	FUEL OIL SUPPLY AND RETURN PIPING**(COMMON FOR TWO UNITS)**	35.000	N
48.	80901	SUB DELIVERY VALVES FOR LIGHT UP	0.850	N
49.	80905	BHEL VALVES FOR LIGHT UP	7.800	N
50.	80920	H&S FOR HYDRO TEST	1.500	N
51.	80923	H&S FOR STEAM BLOWING	24.000	N
52.	80933	H & S FOR LP PIPING	15.000	N
53.	80928	H&S FOR BOILER LIGHT UP - TG	35.000	N
54.	80992	IMPORTED ELECTRODES	0.290	N
55.	PG-22	HP BYPASS SYSTEM	4.000	I
56.	-----	AUX. PRDS SYSTEM	4.000	
		SUB-TOTAL OF PG-80	**605.780**	
57	81003	CONTINUOUS BLOW DOWN EXPANDER-D1500 MM	2.400	I
58	81008	INTERMITTENT BLOW DOWN EXPANDER-D2000 MM	4.300	N
59	81411	DIRECT GAUGES FOR STEAM LINES	0.030	N
60	81412	DIRECT GAUGES FOR NON-STEAM LINES	1.200	N
61	81415	TEST THERMOWELLS	0.080	N
62	81432	CONSUMABLES AND ERECTION MATERIALS	0.010	N
		SUB-TOTAL OF PG-81	**08.020**	
		TOTAL OF PG-80 & 81	**613.800**	

APPENDIX-I

ADDITIONAL INFORMATION:

i) BOILER DRUM WEIGHT – 78.00 MT.

ii) HEAVIEST CEILING GIRDER WEIGHT -13.00 MT
DIMENSION -13 M (LENGHT)X1.6M(DEPTH)X0.5M(WIDTH)

NOTES:

1. **MAIN STEAM AND HP BYPASS PIPINGS (UNDER PGMA-80-300, 80-301 AND 80-304) ARE OF SA-335 P-91 MATERIAL. BIDDER SHALL TAKE NOTE OF SAME AND FOLLOW BHEL APPROVED PROCEDURE FOR WELDING, PRE HEATING, ARGON PURGING, POST HEATING, PWHT & NDT OF SA-335 P-91 MATERIAL**. DETAILED PROCEDURE WILL BE ISSUED TO THE CONTRACTOR AT PROJECT SITE.

2. **THE MATERIAL OF PIPING SYSTEM UNDER PGMA 80-473 (DENINERALISED WATER SYSTEM) IS STAINLEES STEEL.**

3. AS AN ADDITIONAL INFORMATION, THE TENTATIVE SIZE OF MAJOR PIPING SYSTEMS LIKE MAIN STAEM SYSTEM, HRH SYSTEM, CRH SYSTEM, CONDENSATE DISCHARGE SYSTEM, FEED WATER SYSTEM IS 355.6X29, 558.8X28.58, 508X25, 355.6X7.92 AND 273X32 MM RESPECTIVELY. THE HEADER /COMMON COONECTING PIPES WHICH MAY BE OF HIGHER SIZE AND THE SIZES OF OTHER PIPING SYSETM/SCHEMES SHALL BE AS PER DRAWING REQUIREMENT AND DRAWINGS WILL BE HANDED OVER AT SITE DURING EXECUTION OF WORK.

4. ESIDES PRODUCT GROUPS INDICATED HEREIN, THERE IS LIKELIHOOD OF ADDITION OF NEW PRODUCT GROUPS BY BHEL' s UNIT FOR RELEASE OF SOME ITEMS, INTEGRAL TO THIS WORK. TENDERERS' QUOTED UNIT RATES SHALL BE APPLICABLE FOR SUCH PRODUCT GROUPS ALSO.

5. BHEL' s DECISION WITH REGARD TO CLASSIFICATION OF A PARTICULAR PRODUCT GROUP FOR APPLICABLE RATE CATEGORY SHALL BE FINAL & BINDING ON THE CONTRACTOR.

6. BESIDES THE ABOVE, WEIGHT OF ALL TEMPORARY PIPING, VALVES, PUMPS, TANKS AND OTHER MISCELLANEOUS EQUIPMENTS ETC FOR CARRYING OUT HYDRAULIC TEST, CHEMICAL CLEANING, STEAM BLOWING AND OTHER TESTS, AS STATED ELSEWHERE WILL GET ADDED.

7. # - ELECTRICAL & C&I ITEMS OF HANDLING SYSTEM (PG99) IS EXCLUDED FROM THE SCOPE OF WORK.

APPENDIX-II

LIST OF APPROXIMATE NUMBER OF HIGH PRESSURE SITE BUTT JOINTS OF BOILER

SN	PG-N0.	ODxTHK	MATERIAL SPEC.	NO. OF JOINTS	REMARKS
1	05,06 & 07	57X8	SA209T1	2450	COMBUSTOR PANELS
2	05,06 &07	88.9X11.13	SA106Gr.B	4	COMBUSTOR PANELS
3	05,06 &07	88.9X15.24	SA106Gr.C	80	COMBUSTOR PANELS
4	05,06 &07	38x8	SA209T1	3400	EBHE PANELS
5	05,06 &07	133X17.5	SA106Gr.C	240	EBHE PANELS
6	05,06 &07	88.9x11.13	SA106Gr.C	10	EBHE PANELS
7	05,06 &07	38x5.6	SA209T1	200	EBHE PANELS
8	05,06 &07	38x8	SA209T1	400	EBHE PANELS
9	05,06 &07	457X40	SA106GR.C	10	DC PIPES
10	05,06 &07	219.1X22.23	SA106GR.B	45	DC PIPES
11	05,06 &07	159X16	SA106GR.B	20	DC PIPES
12	05,06 &07	368X40	SA106GR.C	16	DC PIPES
13	05,06 &07	44.5X8	SA210GR.A1	564	DC PIPES
14	05,06 &07	44.5X8	SA210GR.A1	282	DC PIPES
15	05,06 &07	168.3X14.27	SA106GR.C	240	COMBUSTOR SUPPLY PIPES
16	05,06 &07	44.5X8	SA209T1	20	FBHE SUPPLY PIPES
17	05,06 &07	57X8	SA209T1	5	FBHE SUPPLY PIPES
18	05,06 &07	101.6X10	SA106GR.C	35	FBHE SUPPLY PIPES
19	05,06 &07	88.9X11.13	SA106GR.B	50	FBHE SUPPLY PIPES
20	05,06 &07	159X16	SA106GR.C	40	FBHE SUPPLY PIPES
21	05,06 &07	159X16	SA106GR.C	140	COMBUSTOR RISERS
22	05,06 &07	159X16	SA106GR.C	160	FBHE RISERS
23	05,06 &07	108/101.6X12.5/10	SA106GR.C	54	FBHE RISERS
24	05,06 &07	88.9X12.5	SA106GR.B	260	FBHE RISERS
25	05,06 &07	273X50	SA106GR.C	8	OUTLET RING HEADERS
26	12	159X18/16	SA106GR.C	20	DRUMSTUB TO PIPE
27	12	159X16	SA106GR.C	20	SH.CONN. PIPE TO DIST.HDR
28	12	273X32	SA106GR.C/ SA234WPC	12	SH.CONN. PIPE TO ELBOW
29	12	273X23	SA106GR.C	12	SH.CONN. PIPE TO PIPE
30	12	38.1X6	SA210GR.A1	165	H ANFER HDR.STUB TO HANGER TUBE
31	12	38.1X6	SA210GR.A1 SA213T11	165	H ANG.TUBE
32	12	38.1X6	SA213T11 SA213T22	165	H ANG.TUBE TO SH-III COIL HANG.TUBE
33	12	38.1X6/6.3	SA213T22	165	SH-III COIL

APPENDIX-II

LIST OF APPROXIMATE NUMBER OF HIGH PRESSURE SITE BUTT JOINTS OF BOILER

SN	PG-N0.	ODxTHK	MATERIAL SPEC.	NO. OF JOINTS	REMARKS
					H ANG.TUBE TO RH-II UPPER COIL H.T
34	12	38.1X6.3/6	SA213T22 SA213T11	165	RH-II UPPER COIIL H.T TO RH-II LOWER COIL H.T
35	12	38.1X6	SA213T11	165	RH-II LOWER COIL H.T TO SH-IB COIL H.T
36	12	38.1X6	SA213T11	165	SH-IB COIL H.T TO HT (LOWER)
37	12	38.1X6	SA213T11 SA210GR.A1	165	HT (LOWER) TO BP BOTTOM RING HDR.
38	12	38.1X6/5.6	SA210GR.A1	111	LOWER RING HDR.TUBE TO REAR PANEL
39	12	38.1X5.6	SA210GR.A1	222	PANEL TO PANEL
40	12	38.1X5.6	SA210GR.A1	111	HDR.TUBE TO ROOF PANEL
41	12	38.1X5.6	SA210GR.A1	222	HDR.TUBE TO FRONT PANEL
42	12	38.1X5.6	SA210GR.A1	111	PANEL TO PANEL
43	12	38.1X5.6	SA210GR.A1	568	SIDE HDR.TUBE TO PANEL TO SIDE WALL HDR.TUBES
44	12	38.1X5.6	SA210GR.A1	96	SIDE HDR. NIPPLE TO LOOSE TUBE TO PANEL
45	12	159X18	SA106GR.C	26	PIPE TO PIPE
46	12	159X18	SA106GR.C SA234WPC	8	PIPE TO ELOW
47	12	159X18	SA106GR.C	12	HDR STUB TO PIPE
48	12	273X28	SA106GR.C	12	PIPE TO PIE
49	12	273X28/32	SA106GR.C SA234WPC	6	PIPE TO ELBOW
50	12	273X40/32	SA234WPC	2	REDUCER TO ELBOW
51	12	273X28/40	SA106GR.C SA234WPC	2	PIPE TO REDUCER
52	12	323.9X40/36	SA234WPC SA106GR.C	2	REDUCER TO UPPER COLLECTION HDR.
53	12	323.9X40	SA234WPC SA106GR.C	2	REDUCER TO SH-IB INLET HDR
54	12	38.1X5.6/4/4 /5.6	SA209T1	990	SH-IB INLET HDR. TO LOOSE TUBE TO COIL TO OUTLET HDR.
55	12	368X57.1/36	SA234WPC12CL. 1 SA335P12	1	SH-IB HDR.TEE TO PIPE

APPENDIX-II

LIST OF APPROXIMATE NUMBER OF HIGH PRESSURE SITE BUTT JOINTS OF BOILER

SN	PG-N0.	ODxTHK	MATERIAL SPEC.	NO. OF JOINTS	REMARKS
56	12	368X41.14	SA335P12 SA234WPC	1	PIPE TO ELBOW
57	12	368X36	SA335P12	9	PIPE TO PIPE
58	12	368X36	SA335P12	2	PIPE TO DESH
59	12	368X36	SA335P12 SA234WPC12CL. 1	1	PIPE TO REDUCER
60	12	323.9X45/36	SA335P12 SA234WPC12CL. 1	1	SH-2A HDR TO REDUCER
61	12	406.4X65/90	SA335P22	1	PIPE TO SH-2A OUTLET HDR
62	12	406.4X65/75	SA335P22	1	PIPE TO SH-2B INLET HDR.
63	12	406.4X65	SA335P22	11	PIPE TO PIPE
64	12	406.4X65	SA335P22 SA234WP22CL.1	4	PIPE TO ELBOW
65	12	406.4X45	SA335P22 SA234WP22CL.1	1	PIPE TO ELBOW
66	12	406.4X45	SA234WP22CL.1 SA335P22	1	ELBOW TO SH-3 INLET HDR
67	12	406.4X45/65	SA335P22	1	DESH TO PIPE
68	12	406.4X45	SA335P22	1	PIPE TO PIPE
69	12	406.4X70/90	SA335P22	1	PIPE TO SA-3B OULET HDR.
70	12	406.4X70	SA335P22	7	PIPE TO PIPE
71	12	406.4X70/65	SA335P22	1	PIPE TO DESH
72	12	38X7.1	SA213T22	564	SA-2A INLET HDR NIPPLE TO LOOSE TUBE TO COIL
73	12	38X7.1	SA213T22	564	SA-2A OUTLET HDR NIPPLE TO LOOSE TUBE TO COIL
74	12	38X7.1	SA213T22	564	SH-2B INLET HDR NIPPLE TO LOOSE TUBE TO COILS
75	12	38X7.1	SA213T22	564	SH-2B OUTLET HDR NIPPLE TO LOOSE TUBE TO COILS
77	12	273X40/36	SA234WPB SA106GR.C	8	EQ TEE TO PIPE
78	12	273X36.57/28	SA234WPC SA106GR.C	4	ELBOW TO PIPE
79	12	38X5/5.6	SA213T22	224	SH-3 IN.HDR STB TO LOOSE TUBE
80	12	38X5.6	SA213T22	224	SH-3 LOOSE TUBE TO

APPENDIX-II

LIST OF APPROXIMATE NUMBER OF HIGH PRESSURE SITE BUTT JOINTS OF BOILER

SN	PG-N0.	ODxTHK	MATERIAL SPEC.	NO. OF JOINTS	REMARKS
		38.1X5.6			COIL
81	12	38.1X5.6 38X5.6	SA213T22	224	SH-3 COIL TO LOOSE TUBE
82	12	38X5.6 38.1X5.0	SA213T22	224	SH-3 LOOSE TUBE TO OUTLET HDR.STUB
83	17	51x5.6	SA213T11 SA213T22	282	RH-I INLET HDR NIPPLES TO LOOSE TUBES
84	17	51x5.6	SA213T22	282	LOOSE TUBES TO COILS
85	17	51x5.6	SA213T22	282	RH-I OUTLET HDR.NIPPLES TO LOOSE TUBES
86	17	51x5.6	SA213T22	282	LOOSE TUBES TO COILS
87	17	609.6X6.5 /30	SA335P22	1	HDR TO PIPE
88	17	609.6X30	SA335P22 SA234WP22CL1	2	PIPE TO ELBOW
89	17	609.6X30	SA335P22	9	PIPE TO PIPE
90	17	609.6X30	SA335P22 SA234WP22CL1	1	PIPE TO REDUCER
91	17	457.2X30 /32	SA234WP22CL1	1	REDUCER TO ELBOW
92	17	457.2X32 /36	SA234WP22CL1	1	ELBOW TO HDR.
93	17	44.5X4	SA213T22	616	RH-II INLET HDR.NIPPLES TO LOOSE TUBES
94	17	44.5X4	SA213T22	616	LOOSE TUBE TO COILS
95	17	44.5X4	SA213T22	616	COIL TO COIL
96	17	44.5X4	SA213T22	616	RH-II OUTLET HDR.NIPPLE TO LOOSE TUBES
97	17	44.5X4	SA335P22	616	LOOSE TUBE TO COILS
98	19	273X28	SA106GR.C SA216WCB	3	PIPE TO VALVES
99	19	273X28	SA106GR.C	4	PIPE TO PIPE/ELBOW
100	19	38.1X4	SA210GR.A1	220	ECO COIL WITH INLET HDR.TUBE
101	19	38.1X4	SA210GR.A1	660	ECO. BANKS (TUBE TO TUBE)
102	19	38.1X4	SA210GR.A1	220	ECO COIL WITH OUTLET HDR.TUBE
103	19	273X28	SA106GR.C SA234WPC	2	ECO OUTLET HDR. TO REDUCER

APPENDIX-II

LIST OF APPROXIMATE NUMBER OF HIGH PRESSURE SITE BUTT JOINTS OF BOILER

SN	PG-N0.	ODxTHK	MATERIAL SPEC.	NO. OF JOINTS	REMARKS
104	19	219.1X 22.23	SA106GR.B	24	PIPE TO PIPE
105	19	219.1X 22.23	SA106GR.B SA234WPC	4	PIPE TO ELBOE REDUCER
106	24	33.4X9.09	SA335GR.P22	15	PIPE TO PIPE/BENDS
107	24	33.4X6.35	SA335GR.P22 SA182 F22	2.8M	PIPE TO VALVE
108	24	33.4X6.35	SA335GR.P22	84	PIPE TO PIPE/BEND
109	24	48.3X7.14	SA106GR.B TO SA105	1.4M	PIPE TO VALVE
110	24	48.3X7.14	SA106GR.B	28	PIPE TO PIPE/BEND
111	24	60.3X7.14	SA106GR.B TO SA105	2.7M	PIPE TO VALVE
112	24	60.3X8.74	SA106GR.B	70	PIPE TOPIPE/BEND
113	24	73X14.02	SA335GR.P22 TO SA182 F22	1.1M	PIPE TO VALVE
114	24	73X14.02	SA335GR.P22	4	PIPE TO PIPE
115	24	159X30	SA335GR.P22	10	PIPE TO PIPE
116	24	168.3X7.11	SA335GR.P22	8	PIPE TO PIPE
117	24	273X12.7	SA335GR.P22	4	PIPE TO PIPE
118	24	21.3X3.73	SA106GR.B	1.2M	PIPE TO VALVE
119	24	21.3X3.73	SA106GR.B	150	PIPE TO PIPE
120	24	21.3X3.73	SA335GR.P22 SA182 F22	0.6M	PIPE TO VALVE
121	24	21.3X3.73	SA335GR.P22	10	PIPE TO PIPE
122	24	21.3X7.47	SA335GR.P22 SA182 F22	0.6M	PIPE TO VALVE
123	24	21.3X7.47	SA335GR.P22	14	PIPE TO PIPE
124	24	33.4X3.38	SA106GR.B SA105	1.2M	PIPE TO VALVE/ ELL
125	24	33.4X3.38	SA106GR.B	14	PIPE TO PIPE
126	24	33.4X3.38	SA335GR.P22 SA182 F22 SA182 F12	1.7M	PIPE TO VALVE/ ELL
127	24	33.4X3.38	SA335GR.P22	30	PIPE TO PIPE
128	24	33.4X4.55	SA106 GR.B SA105	1.0M	PIPE TO VALVE/ ELL
129	24	33.4X4.55	SA106 GR.B	50	PIPE TO PIPE
130	24	33.4X6.35	SA106 GR.B SA105	1.5M	PIPE TO VALVE / ELL
131	24	33.4X6.35	SA106 GR.B	10	PIPE TO PIPE
132	24	33.4X6.35	SA335 GR.P22 SA182 F22	2.0M	PIPE TO VALVE

APPENDIX-II

LIST OF APPROXIMATE NUMBER OF HIGH PRESSURE SITE BUTT JOINTS OF BOILER

SN	PG-N0.	ODxTHK	MATERIAL SPEC.	NO. OF JOINTS	REMARKS
133	24	33.4X6.35	SA335 GR.P22	50	PIPE TO PIPE
134	24	48.3X7.14	SA106 GR.B	1.2M	PIPE TO VALVE
135	24	48.3X7.14	SA106 GR.B	10	PIPE TO PIPE/ BEND
136	24	60.3X8.74	SA106GR.B SA105	4.0M	PIPE TO VALVE
137	24	60.3X8.74	SA106GR.B	125	PIPE TO PIPE
138	24	60.3X8.74	SA335 GR.P22 SA182 F22	1.5M	PIPE TO VALVE
139	24	60.3X8.74	SA335 GR.P22	20	PIPE TO PIPE / BEND
140	24	60.3X11.07	SA335 GR.P22 SA182 F22	2.0M	PIPE TO VALVE
141	24	60.3X11.07	SA335 GR.P22	25	PIPE TO PIPE/BEND
142	24	73.0X9.52	SA106 GR.B SA105	24	PIPE TO PIPE/ VALVE
143	24	88.9X11.13	SA106 GR.B	22	PIPE TO PIPE / VALVE
144	24	108X12.5	SA106 GR.B SA105	12	PIPE TO PIPE/ VALVE
145	24	33.4X4.55	SA106 GR.B SA105	4.5M	PIPE TO VALVE / TEE
146	24	33.4X4.55	SA106 GR.B	125	PIPE TO PIPE / REDUCER
147	24	48.3X7.14	SA106 GR.B SA105	20.8M	PIPE TO VALVE / TEE
148	24	48.3X7.14	SA106 GR.B	250	PIPE TO PIPE REDUCER
149	24	60.3X8.74	SA106 GR.B	1.7M	PIPE TO VALVE
150	24	60.3X8.74	SA106 GR.B	90	PIPE TO PIPE REDUCER
151	24	31.8X4	SA213 TP347 SA182F12	0.2M	TUBE TO CONN. PIPECE
152	24	33.4X4.55	SA106 GR.B SA182 F12	1	PIPE TO CONN. PIPECE
153	24	33.4X4.55	SA106 GR.B SA105	5.2M	PIPE TO VALVE
154	24	33.4X4.55	SA106 GR.B SA106 GR.B SA234 WPB	54	PIPE TO PIPE/ REDUCER / BEND
155	24	48.3X7.14	SA106GR.B SA105	3.3M	PIPE TO VALVE / GAUGE
156	24	48.3X7.14	SA106 GR.B SA106 GR.B SA234WPB	20	PIPE TO PIPE / REDUCER/PIPE BEND
157	24	21.3X3.73	SA106GR.B	0.5M	PIPE TO VALVE

APPENDIX-II

LIST OF APPROXIMATE NUMBER OF HIGH PRESSURE SITE BUTT JOINTS OF BOILER

SN	PG-N0.	ODxTHK	MATERIAL SPEC.	NO. OF JOINTS	REMARKS
			SA105		
158	24	21.3X3.73	SA106GR.B	15	PIPE TO PIPE
159	24	21.3X4.78	SA106GR.B SA105	1.1M	PIPE TO VALVE
160	24	21.3X4.78	SA106GR.B SA182 F12	10	PIPE TO PIPE / REDUCER
161	24	33.4X6.35	SA106GR.B SA105/ SA106GR.B	6.2M	PIPE TO VALVE /TEE/ELL
162	24	33.4X6.35	SA106 GR.B SA182 F12	35	PIPE TO PIPE / REDUCER
163	24	73X9.53	SA106 GR.B SA105 SA182 F12CL2	60	PIPE TO PIPE ELL/ REDUCER/ VALE
164	24	73X9.53	SA335GR.22 SA182F12CL2	0.5	PIPE TO CONN. PIPECE
165	24	73X9.53	SA106GR.B SA182 F12CL2	0.5M	PIPE TO CONN. PIPECE
166	24	21.3X4.78	SA106GR.B SA105	1.1M	PIPE TO VALVE
167	24	21.3X4.78	SA106GR.B SA182 F12	10	PIPE TO PIPE / REDUCER
168	24	33.4X6.35	SA106GR.B SA105 SA106GR.B	6.2M	PIPE TO VALVE / TEE / ELL
169	24	33.4X6.35	SA106GR.B SA182 F12	25	PIPE TO PIPE/ REDUCER
170	24	73.0X9.53	SA106GR.B SA182F12CL2	64	PIPE TO PIPE / BEND/TEE / VALVE
171	24	73.0X14.02	SA335GR.P22 SA182 F12CL2	0.5M	PIPE TO CONN. PIECE
172	24	73.0X9.53	SA106GR.B SA182 F12	10	PIPE TO CONN. PIECE
173	24	21.3X4.78	21.3X4.78	1.1M	PIPE TO VALVE
174	24	21.3X4.78	21.3X4.78	10	PIPE TO PIPE / REDUCER
175	24	33.4X6.35	33.4X6.35	6.2M	PIPE TO VALVE/ TEE/ELL
176	24	33.4X6.35	33.4X6.35	25	PIPE TO PIPE/ REDUCER
177	24	48.3X7.14	48.3X7.14	7.6M	PIPE TO VELVE / TEE/ CONN. PIECE
178	24	48.3X7.14	48.3X7.14	22	PIPE TO PIPE / REDUCER

APPENDIX-II

LIST OF APPROXIMATE NUMBER OF HIGH PRESSURE SITE BUTT JOINTS OF BOILER

SN	PG-N0.	ODxTHK	MATERIAL SPEC.	NO. OF JOINTS	REMARKS
179	24	48.3X7.14	SA335GR.P22 SA182 F12	0.6M	PIPE TO VALVE /CONN. PIPECE
180	24	48.3X7.14	SA335GR.P22	3	PIPE TO PIPE

NOTE:

1. THE SITE WELD JOINTS INDICATED ABOVE ARE TENTATIVE AND FOR PRESSURE PARTS ONLY. THE WELD JOINTS ARE LIKELY TO VARY IN ACTUAL ACCORDING TO SITE CONDITIONS AND AS PER DESIGN CONSIDERATIONS. CONTRACTOR SHALL CARRY OUT ALL NECESSARY SITE WELD JOINTS REQUIRED FOR COMPLETION OF ENTIRE SCOPE OF WORK UNDER THESE SPECIFICATIONS. NO ADDITONAL PAYMENTS SHALL BE MADE FOR ANY VARIATIONS IN THE ACTUAL QUANTITY OF JOINTS CARRIED OUT.

2. THE MATERIAL OF JOINTS MAY BE OF FROM ANY OF MATERIAL SPECIFICATIONS OR COMBINATION IE SA 209 T1, SA 210 GR A1, SA 210 GR A2, SA 210 GR A3, SA182 F12, SA182 F22 CL1, SA 213T11, SA 213 T 12, SA 213 T 22, SA105, SA106GR.B, SA 106 GR C, SA216 WCB, SA 234 WPB, SA 213 TP347, SA 335 P12, SA 335 P22 AND SA234WP22 CL1, SA 335 P22.

3. THE JOINTS INDICATED ABOVE DO NOT INCLUDE JOINTS FOR FINE FITTINGS / TRIM PIPING, SUIT BLOWER, OIL SYSTEM ETC WHICH SHALL BE SUPPLIED IN RUNNING METERS AND THE SAME ARE TO BE ERECTED AS PER LAYOUT AT SITE WITHIN THE ACCEPTED RATES.

4. WELDING OF OIL SYSTEM JOINTS SHALL BE AS PER WELDING SCHEDULES. WELDING OF OIL SYSTEM JOINTS SHALL BE AS PER WELDING SCHEDULES.

5. THE ERECTION WELD JOINTS FOR ALL OTHER SYSTEMS / PIPINGS LIKE INTEGRAL PIPING, CRITICAL PIPING (INCLUDING MAIN STAEM AND HP BYPASS PIPING P-91 MATERIAL), POWER CYCLE PIPING, FEED WATER PIPING, CONDENSATE WATER PIPING, COOLING WATER PIPING, OIL SYSTEM PIPING ETC. SHALL BE AS PER DRAWING/ AS PER SITE REQUIREMENT AND WORK OF SAME SHALL BE CARRIED OUT AS PART OF SCOPE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER AT SITE. CONTRACTOR MAY NOTE OF SAME AND NO ANY CLAIM SHALL BE CONSIDERED FOR ANY EXTRA JOINTS WHAT SO EVER

6. RADIOGRAPHY AND STRESS RELIEVING SHALL BE DONE AS PER WELD SCHEDULES/ DRAWINGS OR THE INSTRUCTION OF BHEL SITE ENGINEER.

APPENDIX-III			
LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS			
SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	REMARKS
01	TYRE-MOUNTED CRANE 250 TON CAPACITY	01	THIS WILL BE MADE AVAILABLE FROM BEGINNING FOR ERECTION ON SHARING BASIS.
02	CRAWLER CRANE CAPACITY 100 TON	01	THIS WILL BE MADE AVAILABLE FROM 2 ND MONTH FOR ERECTION ON SHARING BASIS.
03	CRAWLER CRANE CAPACITY-75 MT	01	THIS WILL BE MADE AVAILABLE FROM 3 RD. MONTH FOR ERECTION ON SHARING BASIS.
04	CRAWLER CRANE CAPACITY-18 MT	01	THIS WILL BE MADE AVAILABLE FROM 4 TH FOR ERECTION ON SHARING BASIS.
05	MULTI SHEAVE PULLEY BLOCK : SUITABLE CAPACITY	04	FOR BOILER DRUM ERECTION PURPOSE ONLY
06	SINGLE SHEAVE PULLEY BLOCK : 10 TON CAPACITY	10	FOR BOILER DRUM ERECTION PURPOSE ONLY – QTY MAY VARY TO SUIT SITE CONDITION
07	ELECTRIC WINCH WITH W IRE ROPE : 10/ 15 TON CAPACITY	02	--DO--
08	HUCK BOLTING MACHINE COMPLETE SET	02 Nos.	FOR HUCK BOLTING OF SHOCK BARS AND SHOCK PADS ON SHARING BASIS.
09	INDUCTION HEATING MACHINE	01 No.	THIS WILL BE PROVIDED ONLY FOR P-91 MATERIAL WELDING AS PER REQUIREMENT ON SHARING BASIS. FOR DETAILS REFER CLAUSE NO. 4.4.2.7
10	ACID CLEANING PUMPS 150 TPH	03 Nos.	FOR CHEMICAL CLEAING ON SHARING BASIS AS PER REQUIREMENT
11	HYDRO TEST PUMP CAPACITY -250/450 KG/CM^2	01 No. EACH	ON SHARING BASIS AS PER REQUIREMENT.
12	FURNACE MAINTENANCE PLATFORM	01 SET	THIS WILL BE ON SHARING BASIS AND WILL BE EITHER REGULAR DU OR BHEL'S OWN EQPT.

NOTES:

1. BHEL WILL MAKE AVAILABLE THE CRANES ON SHARING BASIS MAINLY FOR THE PURPOSE OF:
   (i) UNLOADING AND RE-HANDLING OF MATERIALS AT ERECTION SITE

(ii) LOADING AT ERECTION SITE FOR RETURN OF EXCESS MATERIALS TILL BHEL CRANES ARE AVAILABLE.

(iii) PRE-ASSEMBLY AND ERECTION.

(iv) ANY OTHER ERECTION RELATED ACTIVITY AT THE DISCRETION & APPROVAL OF BHEL SITE INCHARGE.

2. CONTRACTOR SHALL PROVIDE THE FUEL AND OPERATOR FOR THE CRANES FOR CONTRACOR'S USE.

3. ALSO REFER SECTION-7 OF SPECIAL CONDITIONS OF CONTRACT.

5. THE CRANES HAVE TO BE SHARED WITH OTHER AGENCIES / CONTRACTORS OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR.

APPENDIX-IV

LIST OF T&P AND MMD TO BE DEPLOYED BY THE CONTRACTOR

A: TOOL & PLANTS

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY
1	CRAWLER CRANE (CAPACITY OF CRANE INDICATED HERE IS FOR NORMAL AND CONTINUOUS REQUIREMENT. HOWEVER FOR CERTAIN SPECIFIC HEAVY LOADS BEYOND THESE NORMAL REQUIREMENT, CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENT FOR HANDLING & LOADING OF MATERIALS AT STORAGE YARD	18/20/25 T	01 No. -TO BE DEPLOYED FROM BEGINNING AT YARD.
2	PICK AND CARRY MOBILE CRANE	8 – 10 T	01 No.-TO BE DEPLOYED AT ERECTION SITE FROM THE BEGINNING.
3	TRAILER WITH HORSE	ADEQUATE CAP TO HANDLE HEAVY COMPONENTS OF BOILER ETC. AS PER SCOPE	01
4	TRACTOR TROLLEY	ADEQUATE CAP TO HANDLE COMPONENTS OF BOILER ETC	02
5	AIR COMPRESSOR (ELECTRIC/DIESEL) – 7 Kg/cm^2	140 CFM	02
6	TIG WELDING SET	-	AS REQUIRED
7	3 Ph DISTRIBUTION BOARD WITH COMPLETE SET UP AND MATERING PANEL HAVING PROVISION OF BUS BARS (3PHASE & NEUTRAL), ENERY METER C.T. OPERATED FOR DRAWL OF CONSTRUCTION POWER (REFER SECTION-5)	600 Amp, 415 Volt	AS PER REQMT
8	PRE HEATING / STRESS RELIEVING SET (HEATING CONTROL PANEL, CABLES, HEATING ELEMENTS ETC.)	AS PER REQUIREMENT	2 SETS
9	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE	IR 192 & COBALT 60	1 SET EACH
10	THEODOLITE OF REQUIRED ACCURACY	-	01No.
11	ELECTRO-HYDRAULIC PIPE BENDING MACHINE	2" Nb X 12MM THICK PIPE	AS PER SITE REQUIREMENT
12	WELDING GENERATOR (ELECTRIC & DIESEL)	300 AMPS	AS REQUIRED
13	RADIOGRAPHY FILM VIEWER	HI INTENSITY	2 NOS.
14	ELECTRIC CABLE FOR DRAWL & DISTRIBUTION OF CONSTRUCTION POWER	AS PER SITE REQUIREMENT	AS PER SITE REQUIREMENT

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY
15	PIPE BENDING MACHINE – HAND OPERATED	UP TO 50 mm Nb PIPES	AS PER SITE REQUIEREMENT
16	BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR BAKING COATED WELDING ELECTRODES	AS PER REQUIREMENT	02 EACH
17	PORTABLE OVEN FOR COATED WELDING ELECTRODES	AS PER SITE REQUIREMENT	AS PER REQUIREMENT

B: MEASURING AND MONITORING DEVISES (MMD):

AS PER REQUIREMENT TO BE FINALIZED AT SITE, SHALL MEET THE REQUIREMENTS AS PER FIELD QUALITY PLAN AND OTHER ERECTION, TESTING RELATED ACTIVITIES.

NOTE:
1. THE LIST INDICATED ABOVE IS ONLY SUGGESTIVE AND NOT EXHAUSTIVE. CONTRACTOR SHALL DEPLOY ALL OTHER T&P AND MMD AS WELL THAT ARE NECESSARY FOR PROPER EXECUTION OF THE SCOPE OF WORK.

APPENDIX-V

ANALYSIS OF UNIT RATE QUOTED

SL. NO.	DESCRIPTION	% OF QUOTED RATE	REMARKS
01	SITE FACILITIES VIZ., ELECTRICITY, WATER OTHER INFRASTRUCTURE.		
02	SALARY AND WAGES + RETRENCHMENT BENEFITS		
03	CONSUMABLES		
04	T&P DEPRECIATION & MAINTENANCE		
05	ESTABLISHMENT & ADMINISTRATIVE EXPENSES		
06	OVERHEADS		
07	PROFIT		
	TOTAL	100%	

SIGNATURE OF THE TENDERER

DATE:

APPENDIX-VI

FORMAT FOR MONTH-WISE MANPOWER DEPLOYMENT PLAN

(CATEGORY -WISE NUMBERS TO BE INDICATED FOR EACH MONTH)

SN	CATEGORY	MONTHS																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	RESIDENT ENGINEER																										
02	ERECTION ENGINEERS																										
03	ERECTION SUPERVISORS																										
04	QUALITY ASSURANCE ENGINEER																										
05	SAFETY ENGINEER																										
06	MATERIALS MANAGEMENT SUPERVISORS																										
07	HIGH PRESSURE WELDERS																										
08	STRUCTURAL & OTHER WELDERS																										
09	FITTERS																										
10	CRANE OPERATOR																										
11	TRUCK/TRAILER DRIVERS																										
12	STORE KEEPERS																										
13	ELECTRICIANS																										
14	SEMISKILLED/ UNSKILLED WORKERS																										
SO																											
ON																											
	MONTH WISE TOTAL																										

DATE:

SIGNATURE OF TENDERER

APPENDIX–VII

FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

SL. NO.	DESCRIPTION & CAPACITY OF T&P	MONTHS																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01																											
02																											
03																											
04																											
05																											
06																											
07																											
08																											
09																											
10																											
SO ON																											

DATE:

SIGNATURE OF THE TENDERER

APPENDIX-VIII

CONCURRENT COMMITMENTS OF BIDDER

SN	FULL POSTAL ADRESS OF CLIENT AND NAME OF OFFICER IN-CHARGE	DESCRIPTION OF THE WORK	VALUE OF THE CONTRACT	COMMENC-EMENT DATE	SCHEDU-LED COMPLE-TION	% COMPL-TD. AS ON DATE	ANTICIPA-TED COMPLN. DATE	REMARKS

DATE

SIGNATURE OF THE TENDERER

APPENDIX–IX

DETAILS OF SIMILAR WORK DONE DURING THE LAST SEVEN YEARS

SN	FULL POSTAL ADDRESS OF CLIENT & NAME OF OFFICER IN CHARGE	DESCRIP-TION OF WORK	VALUE OF CONTRACT	DATE OF AWARD OF WORK	DATE OF COMMENCEMENT OF WORK	ACTUAL COMPLETION TIME (MONTHS)	DATE OF ACTUAL COMPLETION OF WORK	REMARKS
1								
2								
3								
4								

BIDDERS SHALL ENCLOSE COPIES OF DETAILED WORK ORDER (GIVING BILL OF QUANTITIES AND SCOPE OF WORK) AND COMPLETION CERTIFICATE IN SUPPORT OF THIS STATEMENT.

DATE

SIGNATURE OF TENDERER WITH SEAL