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

NO. BHE/PW/PUR/PIPVG-HRSG+RO DM/626

FOR

RECEIPT, COLLECTION, LOADING, UNLOADING, TRANSPORATION OF MATERIALS FROM BHEL/CLIENT'S STORES /STORAGE YARDS TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, FINAL PAINTING AND HANDING OVER OF 2X 291 TPH HEAT RECOVERY STEAM GENERATOR AND ITS AUXILIARIES, RO-DM PLANT WITH ASSOCIATED SUB-SYSTEMS,PIPINGS,FITTINGS,VALVES AND SUPPORTS INCLUDING MISC.PUMPS AND TANKS & VESSELS ETC, INSULATION, STEEL STACK WITH COMPLETE PLATFORMS ETC INCLUDING ELECTRICAL WORKS OF STACK, INTEGRAL AND POWER CYCLE PIPING, REGENERATIVE CYCLE PIPING WITH ASSOCIATED FITTINGS, VALVES, HANGERS & SUPPORTS ETC FOR 2X351.43 MW COMBINED CYCLE POWER PLANT

AT

GSPC PIPAVAV POWER COMPANY LIMITED

VILL-KOVAYA (NEAR PIPAVAV), TALUKA: RAJULA,
DIST- AMRELI (GUJARAT)

PART I - TECHNICAL BID

BOOK NO.

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

C O N T E N T S

SN	DESCRIPTION	SECTION/ APPENDIX NO.	NO. OF PAGES
	APPENDICES		
	DETAILS OF QUANTITIES	APPENDIX-I	12
	DRAWINGS ATTACHED AS A PART OF TENDER	APPENDIX-II	01
	LIST OF T&P TO BE PROVIDED BY BHEL FREE OF CHARGE ON SHARING BASIS	APPENDIX-III	1
	MAJOR TOOL & PLANTS & MMD TO BE DEPLOYED BY THE CONTRACTOR	APPENDIX-IV	2
	GSPC'S PAINTING SCHEDULE	APPENDIX-V	13
	FORMAT FOR MONTHWISE MANPOWER DEPLOYMENT PLAN	APPENDIX-VI	1
	FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOL & PLANTS OF CONTRACTOR	APPENDIX-VII	2
	CONCURRENT COMMITMENTS	APPENDIX-VIII	1
	ANALYSIS OF UNIT RATE	APPENDIX-IX	1
	DETAILS OF SIMILAR WORK DONE IN LAST SEVEN YEARS	APPENDIX-X	1
	RATE SCHEDULE (PART-II: PRICE BID)		**@**

LEGEND:

$: Included in Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled **"NIT+GCC-626".**

@: Issued as separate hard copy booklet 'Tender Specifications Part-II (Price Bid-626)'. Hosted in BHEL web page (www.bhel.com) as file titled **"PRICE BID-626"**

Note:

Rest of the tender documents are included in Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled "**TECH BID-626"**

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

TENDER SPECIFICATION NO. **BHE/PW/PUR/PIPVG-HRSG+RO DM/626**

NAME OF THE WORK:

RECEIPT, COLLECTION, LOADING, UNLOADING, TRANSPORATION OF MATERIALS FROM BHEL/CLIENT'S STORES /STORAGE YARDS TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, FINAL PAINTING AND HANDING OVER OF 2X 291 TPH HEAT RECOVERY STEAM GENERATOR AND ITS AUXILIARIES, RO-DM PLANT WITH ASSOCIATED SUB-SYSTEMS,PIPINGS,FITTINGS,VALVES AND SUPPORTS INCLUDING MISC.PUMPS AND TANKS & VESSELS ETC, INSULATION, STEEL STACK WITH COMPLETE PLATFORMS ETC INCLUDING ELECTRICAL WORKS OF STACK, INTEGRAL AND POWER CYCLE PIPING, REGENERATIVE CYCLE PIPING WITH ASSOCIATED FITTINGS, VALVES, HANGERS & SUPPORTS ETC FOR 2X351.43 MW COMBINED CYCLE POWER PLANT

AT

GSPC PIPAVAV POWER COMPANY LIMITED

VILL-KOVAYA (NEAR PIPAVAV), TALUKA: RAJULA, DIST- AMRELI
(GUJARAT)

PART: I - TECHNICAL BID

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 Corrigendum.

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING **PART-I** AND **PART-II** ARE ISSUED TO:

M/s. ……

……

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

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, KINGS WAY - 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.

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. GEN 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:

- CONTRACTOR SHOULD HAVE ADEQUATE RESOURCES INCLUDING MAJOR T&PS AT HIS DISPOSAL FOR THIS JOB.
- CONTRACTOR SHOULD HAVE SOUND FINANCIAL STABILITY.
- TENDERER SHOULD MEET QUALITY REQUIREMENT REGARDING WORKMANSHIP, DEPLOYMENT OF PERSONNEL, ERECTION TOOLS AND NECESSARY INSPECTION, MEASUREMENT & TESTING INSTRUMENTS.
- ALL INFORMATION AS CALLED FOR IN VARIOUS APPENDICES AND CLAUSES OF TENDER SPECIFICATION SHOULD BE FURNISHED IN COMPLETENESS. PLEASE REFER THE CHECKLIST.
- CLARIFICATION ON TENDER IF ANY, SHALL BE OBTAINED BY THE TENDERER BEFORE SUBMITTING THEIR OFFER.
- OFFERS MUST BE SUBMITTED WITHOUT ANY DEVIATION.
- 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.
- **TENDERER SHALL NOTE THAT THEIR OFFER WILL BE CONSIDERED SUBJECT TO THE APPROVAL OF BHEL'S CUSTOMER.**

PROJECT INFORMATION

INTRODUCTION

GSPC PIPAVAV POWER CO. Ltd. is going to install 2x351.43 MW Gas Based Combined Cycle Power Plant (CCPP). The entire work of this project have been awarded to BHEL on total turn-key basis (EPC Contract) comprising of Design, Engineering, Manufacturing, Supply, transportation, Unloading, Storage, erection, testing, Commissioning with Auxiliaries and ancillaries including civil & structural works and handing over as per contract.

The plant is located at a distance of 115 KM from Mumbai city of Maharashtra state on the way Panvel – Goa National Highway No. 17. **Contractor is advised to visit the site and appraise himself about the conditions of the site and infrastructure available in the area for fulfilling their commitment under the contract.**

APPROACH TO SITE

Location:

In Amreli District of Gujarat State, Latitude 71º 16' N / Longitude 20º 54' E
The site is a PIPAVAV Plant of GSPCL in Amreli District of State of Gujarat.

Access by Road:
PIPAVAV is connected by road from State Highway NH 34 running between Rajula and Jafrabad.

Nearest Railway Station: Rajula

Nearest Airport: Diu (80 kms) / Ahmadabad (375kms by road)

Nearest Seaport: Pipavav (35 kms)

1. **Owner** GSPC PIPAVAV POWER COMPANY Ltd (GPPC)
2. **Project Title** 2X351.43 MW PIPAVAV CCPP
3. **Location** Village: Kovaya Near Pipavav Taluka: Rajula,

Distt: Amreli, Gujarat, India

4. **Nearest Railway Stn.:** Rajula

METEOROLOGICAL DATA

5. Ambient Air Temperature

a. Highest ever temperature recorded (Dry Bulb) 43 Deg.C

b. Lowest ever temperature recorded (Dry Bulb) 10 Deg.C

c. Maximum Daily Average (Dry Bulb) 33 Deg C

d. Average Mean temperature
(Dry Bulb) : 33 deg C (For CCPP Performance)

e. Average Mean temperature
(Wet Bulb) : 28 deg C (For CCPP Performance)

f. Average Mean temperature

(Wet Bulb) : 28.5 deg C (For Cooling Tower Performance)

g. Design Ambient for Electrical Equipment 50 deg C

6. Relative Humidity

a. Maximum 89%

b. Minimum 10%

c. Average 70%

7. Rainfall

a. Annual Average – 1050 mm in the period June to October. Maximum intensity of rainfall; 150 mm/hr continuously maximum rainfall in a day – 400mm.

8. Wind Data

a. 16.5 km/hr (Normal)

9. Seismic Zone - Zone III as per IS: 1893-2005 (Part – IV)

10. Fuel - Degasified Liquefied Natural Gas(RNLG)

11. Ambient Air Quality - The site is located close to Kovaya village and is bordering Birla group Cement plant and colony .This area is classified under semi-urban area.

The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.

CHECK LIST

(VIDE PARA 1.3 OF SECTION-I OF GENERAL CONDITIONS OF CONTRACT)

1	NAME OF THE TENDERER WITH ADDRESS		
2	NATURE OF THE FIRM	LIMITED / PARTNERSHIP / PROPRIETARY	
3	EMD DETAILS (Rs. 2.0 LACS BY DD ONLY OR ONE TIME EMD)		
4	VALIDITY OF OFFER (REQUIRED 6 MONTHS FROM DUE DATE)		
5	MOBILIZATION TIME (NOT EXCEEDING 30 DAYS FROM FAX LOI)		
6	WHETHER NO DEVIATION CERTIFICATE FURNISHED	YES	NO
7	TENDERER HAS VISITED THE PROJECT SITE AND ACQUAINTED WITH THE SITE CONDITIONS	YES	NO
8	DETAILS OF CONCURRENT JOBS ARE FURNISHED (AS PER RELEVANT APPENDIX)	YES	NO
9	HEAD QUARTER'S ORGANISATION IS FURNISHED	YES	NO
10	PROPOSED SITE ORGANISATION IS FURNISHED	YES	NO
11	FINANCIAL STATUS OF THE COMPANY (RELEVANT ANNEXURE OF GCC) IS FURNISHED	YES	NO
12	PROFIT & LOSS ACCOUNT FOR PRECEDING THREE YEARS IS FURNISHED	YES	NO
13	LATEST SOLVENCY CERTIFICATE FROM THE BANKER IS FURNISHED	YES	NO
14	LATEST INCOME TAX CLEARANCE CERTIFICATE OR COPY OF PAN CARD ACCOMPANIED BY 'IT RETURN' COPY IS FURNISHED	YES	NO
15	MANPOWER DEPLOYMENT PLAN (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO
16	MONTHWISE DEPLOYMENT PLAN FOR MAJOR T&P (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO
17	ANALYSIS OF UNIT RATES QUOTED (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO
18	POWER OF ATTORNEY ENCLOSED IN FAVOUR OF PERSON MAKING OFFER.	YES	NO

19	DETAILS OF SIMILAR WORK DONE IN LAST SEVEN YEARS (AS PER RELEVANT APPENDIX) AND SUPPORTING DOUCMENTS FURNISHED.	YES	NO
20	PROGRAMME FOR THE SUBJECT WORK FURNISHED	YES	NO
21	BIDDER HAS FMILIARIZED HIMSELF WITH ALL RELEVANT LOCAL LAWS & CONDITIONS.	YES	NO
22	WHETHER ALL THE PAGES OF THE TENDER DOCUMENTS ARE READ, UNDERSTOOD AND SIGNED	YES	NO
23	WHETHER THE FOLLOWING DETAILS PERTAINING TO YOUR BANK ACCOUNT DULY ENDORSED BY THE BANK HAVE BEEN FURNISHED {TO ENABLE BHEL RELEASE PAYMENTS THROUGH ELECTRONIC FUND TRANSFER (EFT/RTGS) AS SPECIFIED IN SECTION 12 } 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	YES	NO

NOTE: STRIKE OFF YES OR NO, AS APPLICABLE

DATE: SIGNATURE OF TENDERER

DECLARATION SHEET

I, HEREBY CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO THIS TENDER SPECIFICATION NO.BHE/PW/PUR/PIPVG-HRSG+RO DM/626 ARE TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE. I HAVE GONE THROUGH THE SPECIFICATION, CONDITIONS AND STIPULATIONS IN DETAIL AND AGREE TO COMPLY WITH THE REQUIREMENTS AND INTENT OF THE SPECIFICATION. I FURTHER CERTIFY THAT I AM DULY AUTHORISED REPRESENTATIVE OF THE UNDER MENTIONED TENDERER AND A COPY OF VALID POWER OF ATTORNEY TO THIS EFFECT IS ALSO ENCLOSED.

SIGNATURE OF TENDERER

DATE:

CERTIFICATE OF NO DEVIATION

TENDER SPECIFICATION: NO. BHE/PW/PUR/PIPVG-HRSG+RO DM/626

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

HEREBY CERTIFY THAT IN OUR OFFER I/WE HAVE NEITHER SET ANY TERMS AND CONDITIONS NOR THERE ANY DEVIATION TAKEN FROM THE CONDITIONS STIPULATED BY BHEL, EITHER TECHNICAL OR COMMERCIAL AND I/WE AGREE TO ALL THE TERMS AND CONDITIONS STIPULATED BY BHEL IN THE TENDER SPECIFICATION INCLUDING ASSOCIATED AMENDMENTS AND CLARIFICATIONS.

SIGNATURE OF THE TENDERER

DATE:

Section-3
Offer of the Contractor

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/PIPVG-HRSG+RO DM/626 for 2X351.43 MW Pipavav CCPP, 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 documents connected with the above work and agree to abide by the same.

1. Instructions to bidders
2. General conditions of contract
3. Special conditions of contract
4. Other sections, appendices, schedules and drawings.

I/WE HAVE DEPOSITED / FORWARDED HEREWITH THE EARNEST MONEY DEPOSIT FOR A SUM OF RS. 2, 00,000/- (RUPEES TWO LAKH ONLY) 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

4.0 **GENERAL**

THE SCOPE OF WORK COVERS THE COMPLETE WORK OF COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD INCLUDING LOADING; TRANSPORTATION TO SITE; ERECTION, TESTING AND ASSISTANCE FOR COMMISSIONING AND HANDING OVER OF COMPLETE HRSG & ITS AUXILIARIES AND RO-DM PLANT, STEEL STACK INCLUDING ITS ELECTRICAL WORKS, POWER CYCLE PIPING INCLDING P-91 MATERIAL PIPING, REGENERATIVE SYSTEM PIPING WITH ASSOCIATED FITTINGS, VALVES, SUPPORTS INCLUDING TANKS & VESSELS. THE WORK IS MAINLY CATEGORISED AS FOLLOWS:

1) ERECTION, TESTING AND COMMISSIONING OF 2X291 TPH HRSG AND ITS AUXILIARIES

2) STEEL STACK OF 70 M HEIGHT WITH ASSOCIATED ELECTRICAL WORKS

3) ERECTION, TESTING AND COMMISSIONING OF RO-DM PLANT

4) ERECTION, TESTING AND COMMISSIONING OF POWER CYCLE PIPING INCLUDING P-91 MATERIAL PIPING

5) ERECTION, TESTING AND COMMISSIONING OF REGENERATIVE PIPING

6) APPLICATION OF THERMAL LINING & INSULATION ON ALL THE ABOVE AS APPLICABLE

7) FINAL PAINTING

4.1 GENERAL RESPONSIBILITIES

4.1.1
THE INTENT OF SPECIFICATION IS TO PROVIDE ERECTION AND COMMISSIONING 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 ERECTION AND COMMISSIONING OF THE PLANT SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF PROVIDING SUCH FACILITIES TO COMPLETE THE WORK WITHOUT ANY EXTRA COMPENSATION.

4.1.2
THE TERMINAL POINTS DECIDED BY BHEL SHALL BE FINAL AND BINDING ON THE CONTRACTOR FOR DECIDING THE SCOPE OF WORK AND EFFECTING PAYMENT FOR THE WORK DONE.

4.1.3
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 CUSTOMER'S CONTRACTOR'S, CO-ORDINATING HIS WORK WITH OTHERS AND PROCEED IN A MANNER THAT SHALL NOT DELAY OR HINDER THE PROGRESS OF WORK AS A WHOLE.

4.1.4
CONTRACTOR SHALL ERECT AND COMMISSION ALL THE EQUIPMENTS AND AUXILIARIES AS PER THE SEQUENCE & METHODOLOGY PRESCRIBED BY BHEL. THE BHEL ENGINEER DEPENDING UPON THE TECHNICAL REQUIREMENTS, AVAILABILITY OF MATERIALS AND FRONTS, WILL DECIDE THIS. NO CLAIMS FOR EXTRA PAYMENT FROM THE CONTRACTOR WILL BE ENTERTAINED ON THE GROUND OF DEVIATION FROM THE METHODS ADOPTED IN ERECTION OF SIMILAR SETS ELSEWHERE.

4.1.5
THE WORK COVERED UNDER THIS SPECIFICATION IS OF HIGHLY SOPHISTICATED NATURE, REQUIRING THE BEST QUALITY WORKMANSHIP, ENGINEERING AND CONSTRUCTION MANAGEMENT. THE CONTRACTOR SHOULD ENSURE SUCCESSFUL AND TIMELY COMPLETION OF THE WORK. THE CONTRACTOR MUST DEPLOY ADEQUATE QUANTITY OF TOOLS, CONSTRUCTION AIDS, EQUIPMENT ETC HE MUST ALSO DEPLOY ADEQUATE TRAINED, QUALIFIED AND EXPERIENCED SUPERVISORY STAFF AND SKILLED PERSONNEL.

4.1.6
ALL NECESSARY CERTIFICATES AND LICENSES, PERMITS & CLEARANCES REQUIRED TO CARRY OUT THIS WORK ARE TO BE ARRANGED BY THE CONTRACTOR EXPEDITIOUSLY AT HIS COST. **CONTRACTOR SHALL OBTAIN ALL INFORMATIONS WITH REGARD TO APPLICABLE CLEARANCES REQUIRED FOR INSTALLATIONS CONVERED IN THIS SCOPE OF WORK AND OBTAIN SUCH CLEARANCES AND BEAR ALL COST & EXPENSES FOR THE SAME.**

4.1.7
ALL TOOLS, TACKLES, FIXTURES, EQUIPMENTS, MATERIALS HANDLING AND TRANSPORTATION, MANPOWER, SUPERVISORS/ ENGINEERS, CONSUMABLES ETC, REQUIRED FOR THIS SCOPE OF WORK SHALL BE PROVIDED BY THE CONTRACTOR. THESE TOOLS & PLANT, EQUIPMENTS, MEN & MATERIAL SHALL REMAIN AT SITE THROUGHOUT THE DURATION OF CONTRACT AND EXTENSION THEREOF, IF ANY. DIVERSION/REMOVAL OF THESE SHALL BE DONE ONLY ON THE APPROVAL OF BHEL. BHEL WILL BE PROVIDING THEIR T & P ON SHARING BASIS FOR ERECTION AND RELATED ACTIVITIES AT SITE AS PER DETAILS SPECIFIED IN SECTIONS-7.

4.1.8
DURING THE COURSE OF ERECTION, TESTING AND COMMISSIONING CERTAIN REWORK/ MODIFICATION/ RECTIFICATION/ REPAIR/ FABRICATION ETC, WILL BE

NECESSARY ON ACCOUNT OF FEED BACK FROM VARIOUS POWER STATION UNITS ALREADY COMMISSIONED AND/ OR UNITS UNDER ERECTION AND COMMISSIONING AND ALSO ON ACCOUNT OF DESIGN DISCREPANCIES OR MANUFACTURING DEFECTS AND SITE OPERATION/ MAINTENANCE REQUIREMENTS. THIS WILL ALSO INCLUDE MODIFICATIONS/ RE-WORKS SUGGESTED BY FES/ 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. CLAIM OF CONTRACTOR IF ANY, FOR SUCH WORKS WILL BE GOVERNED BY CLAUSES 13.1 TO 13.8.

4.1.9
ALL WORKS SUCH AS CLEANING, LEVELING, ALIGNING, TRIAL ASSEMBLY, DISMANTLING OF CERTAIN EQUIPMENTS/ COMPONENTS FOR CHECKING AND CLEANING, SURFACE PREPARATION, FABRICATION OF SHEETS, TUBES AND PIPES AS PER GENERAL ENGINEERING PRACTICE AND AS PER BHEL ENGINEER'S INSTRUCTIONS AT SITE, CUTTING, 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.

4.1.10
THE CONTRACTOR SHALL PROVIDE, EXCEPTING THOSE SPECIFICALLY IN BHEL SCOPE, ALL FIXTURES, CONCRETE BLOCK SUPPORTS, WOODEN SLEEPERS, STEEL STRUCTURES REQUIRED FOR JIGS & FIXTURES, TEMPORARY SUPPORTS AND SCAFFOLDS, LADDERS ETC, ANCHORS FOR LOAD AND GUIDE PULLEYS REQUIRED FOR THE WORK. ALL EXTRANEOUS STEEL AND SCAFFOLDING MATERIAL, LADDERS, STEPS ETC., WELDED ON THE STRUCTURAL OR OTHER COMPONENTS DURING ERECTION SHOULD BE CUT AND REMOVED AND SUCH AREAS BE FINISHED PROPERLY AS PER BHEL ENGINEER’S INSTRUCTIONS.

4.1.11
NO MEMBERS OF THE STRUCTURE/PLATFORM, PIPES, GRILLS, PLATFORMS, OTHER SYSTEM COMPONENTS AND AUXILIARIES SHOULD BE CUT WITHOUT SPECIFIC APPROVAL OF BHEL ENGINEER. AFTER COMPLETION OF WORK, THE STRUCTURES/ PLATFORM / GRILLS CUT SHALL BE MADE GOOD NEATLY AS INSTRUCTED BY BHEL ENGINEER.

4.1.12
CONTRACTOR SHALL TAKE DELIVERY OF THE COMPONENTS, EQUIPMENTS, CHEMICALS, LUBRICANTS ETC FROM THE BHEL/CLIENT’S STORES/STORAGE AREA AFTER GETTING THE APPROVAL OF BHEL ENGINEER ON STANDARD REQUISITION FORMS TO BE SPECIFIED BY BHEL. COMPLETE AND DETAILED ACCOUNT OF THE

EQUIPMENTS ERECTED AS WELL AS THE PROGRESS SHALL BE SUBMITTED TO THE BHEL ENGINEER AS DIRECTED.

4.1.13
CONTRACTOR SHALL PLAN AND TRANSPORT EQUIPMENTS, COMPONENTS FROM STORAGE 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, CONTRACTOR SHALL DO IT MOST EXPEDITIOUSLY. NO CLAIM FOR EXTRA PAYMENT FOR SUCH WORK WILL BE ENTERTAINED.

4.1.14
THE RATES QUOTED IN RATE SCHEDULE SHALL BE INCLUSIVE OF WELDING, BOLTING, FASTENING, JOINTING AND PRE-HEATING, POST WELD HEAT TREATMENTS/ STRESS RELIEVING, DESTRUCTIVE/NON-DESTRUCTIVE EXAMINATION (NDE) ETC AS APPLICABLE

4.1.15
THE CONTRACTOR SHALL HAVE TOTAL RESPONSIBILITY FOR ALL EQUIPMENTS AND MATERIALS IN HIS CUSTODY AT HIS 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.

4.1.16 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. NECESSARY PRESERVATION AGENTS, EXCEPTING THE PRIMER & PAINT, FOR THE ABOVE WORK SHALL BE PROVIDED BY BHEL.

4.1.17
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.

4.1.18
CONTRACTOR SHALL COLLECT ALL SCRAP MATERIALS PERIODICALLY FROM VARIOUS AREA OF WORK SITE AND PRE- ASSEMBLY AREA, DEPOSIT THE SAME AT THE 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.

4.1.19
THE ENTIRE SURPLUS, DAMAGED, SCRAP, UNUSED MATERIALS, PACKAGE MATERIALS / BOXES / CONTAINERS, SPECIAL TRANSPORTING FRAMES ETC, SHALL BE RETURNED TO BHEL STORES BY THE CONTRACTOR WITH PROPER RECORDS**.**

4.1.20
THE CONTRACTOR SHALL NOT WASTE ANY MATERIALS ISSUED TO HIM. IN CASE IT IS OBSERVED AT ANY STAGE THAT THE WASTAGE/EXCESS UTILIZATION OF MATERIALS IS NOT WITHIN THE PERMISSIBLE LIMITS, RECOVERY FOR THE EXCESS QUANTITY USED OR WASTED WILL BE AFFECTED WITH DEPARTMENTAL CHARGES FROM THE CONTRACTOR. THE ALLOWANCE TOWARDS SUCH WASTAGE SHALL BE IN LINE WITH STANDARD ENGINEERING PRACTICES, STANDARDS/ CODES AS MAY BE APPLICABLE. DECISION OF BHEL ON THIS WILL BE FINAL AND BINDING ON THE CONTRACTOR. IN ADDITION TO ABOVE, THERE COULD BE INVISIBLE SCRAP/ WASTAGE I.E. WHICH CAN NOT BE SEEN PHYSICALLY AND LOST IN THE PROCESS. THE TOTAL OF INVISIBLE SCRAP/ WASTE SHALL NOT EXCEED 1%.

4.1.21
STRUCTURAL MATERIALS REQUIRED FOR THE SUPPORTING / OPERATING PLATFORMS REQUIRED FOR THE VALVES/EQUIPMENTS AT VARIOUS LEVELS FOR THE SAFE OPERATION WILL BE ISSUED IN RANDOM SIZES TO THE CONTRACTOR FREE OF COST. HOWEVER, THE CONTRACTOR'S QUOTED RATE SHALL INCLUDE FABRICATION AND ERECTION OF ALL SUCH OF PLATFORMS AT SITE AND NO EXTRA PAYMENTS SHALL BE ALLOWED FOR THIS AND ONLY TONNAGE RATE APPLICABLE WILL BE PAYABLE.

4.1.22
ALL TEMPORARY LINES REQUIRED FOR CHEMICAL CLEANING, HYDRAULIC TESTING, STEAM BLOWING, ETC., SHALL BE SUPPLIED IN 'AS IS WHERE IS' CONDITION. THE CONTRACTOR SHALL ARRANGE TO CARRYOUT THE REQUIRED FABRICATION, DRESSING, GRINDING, CLEANING, CUTTING, EDGE PREPARATION ETC., WHILE CARRYING OUT ERECTION. NO EXTRA CLAIM ON THIS ACCOUNT WILL BE ENTERTAINED.

4.1.23
ACTUATORS/DRIVES OF VALVES, GATES, ETC MAY HAVE TO BE SERVICED, LUBRICATED, BEFORE ERECTION, DURING PRE-COMMISSIONING & COMMISSIONING, INCLUDING CARRYING OUT MINOR ADJUSTMENTS REQUIRED AS INCIDENTAL TO THE WORK.

4.1.24
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. BHEL SHALL PROVIDE THE MOTORIZED MEGGAR FOR THIS PURPOSE.

4.1.25
CONTRACTOR SHALL ARRANGE, EXCEPTING THOSE PROVIDED BY BHEL, SUITABLE CAPACITY EQUIPMENTS SUCH AS FILL PUMPS, PRESSURIZING PUMPS ETC WITH DRIVE MOTORS, STARTERS, CABLES & SWITCHES ETC FOR WATER FILLING, PRESSURE TESTING ETC.

4.1.26
ALL THE HEAT AFFECTED ZONE CREATED DURING FABRICATION AND WELDING HAVE TO BE PAINTED WITH RED OXIDE PRIMER MEETING CUSTOMER SPECIFICATION AFTER DUE COOLING AND CLEANING OF THE AREA. ALL PRIMER, CONSUMABLE ETC ARE IN CONTRACTOR'S SCOPE.

4.1.27
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.

4.1.28
THE HRSG AND PIPING SHALL BE ERECTED AS PER RELEVANT PROVISIONS OF INDIAN BOILER REGULATIONS & LATEST AMENDMENTS/REVISIONS THEREOF.

4.1.29
THE SCHEDULE OF TENTATIVE WEIGHTS, ETC. IS MADE AVAILABLE IN THE APPENDIX – I FOR PROVIDING A GENERAL IDEA TO THE TENDERER ABOUT THE MAGNITUDE OF THE WORK INVOLVED HOWEVER, THE WORK SHALL BE EXECUTED AS PER THE DOCUMENTS/ DRGS ETC PROVIDED DURING THE COURSE OF WORK.

4.2 PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENTS

4.2.1
BUILDINGS, FOUNDATIONS AND OTHER NECESSARY CIVIL WORKS FOR SUPPORTING STRUCTURES, EQUIPMENTS ETC, WILL BE PROVIDED BY BHEL. 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.

4.2.2
ALL MINOR FOUNDATIONS AND ANCHOR POINTS REQUIRED FOR INSTALLING ERECTION EQUIPMENTS LIKE WINCHES, ANCHORS ETC. ARE TO BE CAST BY THE CONTRACTOR.

4.2.3
THE COMPLETE WORK OF SECONDARY GROUTING OF EQUIPMENTS 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-GP-2 OR EQUIVALENT).

4.2.3.1
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. CONTRACTOR SHALL CONSULT BHEL ENGINEER BEFORE DECIDING UPON THE VENDOR FOR THE ABOVE.

4.2.3.2
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.

4.2.4
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.

4.2.5
THE CONTRACTOR SHALL CARRY OUT SCRAPPING AND MATCHING OF EMBEDDED PLATES, PERMANENT SPACERS AND ALL THE MATCHING PARTS OF TURBINE, GENERATOR, PUMPS AND OTHER EQUIPMENTS WHEREVER REQUIRED. THE SUPPORT AND SOLE PLATES MATCHING AND CONCRETE SURFACE BEDDING IS ALSO COVERED IN THE SCOPE OF WORK. THE FINE DRESSING OF CONCRETE SHALL BE WITH PRUSSIAN BLUE-MATCH CHECKS.

4.2.6
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 PERCENTAGE CONTACT SHALL BE ACHIEVED BY CHIPPING AND SCRAPPING AS PER ENGINEER'S INSTRUCTIONS.

4.3 WELDING, HEAT TREATMENT AND NON DESTRUCTIVE EXAMINATION (NDE)

4.3.1 WELDING:

4.3.1.1
THE HRSG AND PIPING SHALL BE ERECTED IN CONFORMITY WITH THE PROVISION OF INDIAN BOILER REGULATIONS AND AS MAY BE DIRECTED AS PER OTHER STANDARD / SPECIFICATIONS / CODES IN PRACTICE. METHOD OF WELDING (VIZ) ARC, TIG OR OTHER METHODS AS INDICATED IN THE ERECTION WELDING SCHEDULE SHALL BE FOLLOWED; BHEL ENGINEER WILL HAVE THE OPTION TO CHANGE THE METHOD TO SUIT SITE CONDITIONS.

4.3.1.2
WELDING AND TACKING OF HIGH PRESSURE JOINTS SHALL BE DONE BY CERTIFIED HIGH PRESSURE WELDERS WHO POSSESS VALID CERTIFICATE OF CHIEF INSPECTOR OF BOILERS OF THE STATE IN WHICH BOILER IS BEING ERECTED. WELDER SHALL ALSO APPEAR IN ADVANCE, BEFORE CHIEF INSPECTOR OF BOILERS OF THE STATE FOR RE-QUALIFICATION TESTS BEFORE EXPIRY OF THE VALIDITY OF THE CERTIFICATE, AS PER THE PROVISIONS OF INDIAN BOILER REGULATIONS AND KEEP THE CERTIFICATE VALID TILL THE COMPLETION OF THE WORK. THE SERVICES OF SUCH WELDERS WHOSE VALIDITY OF CERTIFICATE IS EXPIRED SHOULD NOT BE ENGAGED ON THE WORKS.

4.3.1.3
IN THE CASE OF P-91 PIPE WELDING, CONTRACTOR SHALL DEPLOY WELDERS HAVING EXPERIENCE IN WELDING OF P-91 MATERIAL. BHEL, AT ITS DISCRETION, MAY EXTEND HELP IN TRAINING OF CONTRACTOR'S WELDERS, NOT QUALIFIED FOR P-91 WELDING, AT BHEL WELDING RESEARCH INSTITUTE (WRI) TRICHY. SUCH

WELDERS WOULD BE ALLOWED TO WORK ONLY AFTER PASSING THE REQUIRED QUALIFYING TEST AND ACCEPTANCE BY ALL CONCERNED. ALL EXPENDITURES TOWARDS SUCH QUALIFICATION INCLUDING COST OF TRAINING, TRAVELING EXPENSES, STAY ETC SHALL BE BORNE BY THE CONTRACTOR.

4.3.1.4
ALL WELDERS SHALL BE TESTED AND APPROVED BY BHEL ENGINEER/CUSTOMER BEFORE THEY ARE ACTUALLY ENGAGED ON WORK THOUGH THEY MAY POSSESS THE REQUISITE EXPERIENCE CERTIFICATE. BHEL RESERVES THE RIGHT TO REJECT ANY WELDER WITHOUT ASSIGNING ANY REASONS.

4.3.1.5
ALL EXPENSES FOR WELDERS QUALIFICATION TESTING OF CONTRACTOR'S WELDERS INCLUDING DESTRUCTIVE AND NON-DESTRUCTIVE TESTS CONDUCTED BY BHEL AT SITE SHALL HAVE TO BE BORNE BY THE CONTRACTOR. BHEL WILL PROVIDE THE RAW PIPES AND PLATES FOR PREPARATION OF TEST COUPONS FREE OF CHARGES.

4.3.1.6
BHEL ENGINEER IS ENTITLED TO STOP ANY WELDER FROM HIS WORK IF HIS WORK IS UNSATISFACTORY FOR ANY TECHNICAL REASON OR IF THERE IS A HIGH PERCENTAGE OF REJECTION OF JOINTS WELDED BY HIM, WHICH IN THE OPINION OF BHEL ENGINEERS, WILL ADVERSELY AFFECT THE QUALITY OF WELDING THOUGH THE WELDER HAS EARLIER PASSED THE TESTS PRESCRIBED. THE FACTS THAT THE WELDERS HAVE PASSED THE TEST, DOES NOT RELIEVE THE CONTRACTOR FROM HIS CONTRACTUAL OBLIGATIONS TO CHECK THE PERFORMANCE OF THE WELDERS. CONTRACTOR SHALL SUBMIT A MONTHLY PERFORMANCE RECORD OF ALL WELDERS.

4.3.1.7
ALL WELDED JOINTS SHALL BE SUBJECT TO ACCEPTANCE BY BHEL ENGINEER WHOSE DECISION WILL BE FINAL AND BINDING.

4.3.1.8
THE HIGH PRESSURE WELDERS WHO POSSESS NECESSARY CERTIFICATE SHALL APPEAR WELL IN ADVANCE BEFORE EXPIRY OF THE VALIDITY OF HIS CERTIFICATE FOR RE-QUALIFICATION TEST AS PER RELEVANT PROVISION OF IBR AND KEEP THE CERTIFICATE VALID TILL THE COMPLETION OF WORK. THE SERVICES OF SUCH WELDERS, THE VALIDITY OF WHOSE CERTIFICATES HAVE EXPIRED SHALL HAVE TO BE TERMINATED FORTHWITH.

4.3.1.9
FOR PROTECTION OF ALL PIPE JOINTS AGAINST RUSTING BETWEEN THE FIT UP AND ACTUAL TIME OF WELDING, SUPPLY AND APPLICATION OF SPECIAL DE-OXIDISED WELDABLE ALUMINIUM PAINTING AS APPROVED BY SITE ENGINEER SHALL BE DONE AS PART OF WORK. PROVIDING SUCH PRESERVATIVE IS CONTRACTOR'S RESPONSIBILITY.

4.3.1.10
WELDING ELECTRODES HAVE TO BE STORED IN ENCLOSURES HAVING TEMPERATURE AND HUMIDITY CONTROL ARRANGEMENT. THIS ENCLOSURE SHALL MEET BHEL SPECIFICATIONS.

4.3.1.11
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 DURING SHIFING FROM BACKING AND HOLDING OVEN. CONTRACTOR HAS TO MAKE SUFFICIENT NUMBER OF BACKING OVENS TO MEET THE REQUIREMENT.

4.3.2 HEAT TREATMENT:

4.3.2.1
PRE-HEATING, POST HEATING AND STRESS RELIEVING ARE PART OF ERECTION WORK AND SHALL BE PERFORMED BY THE CONTRACTOR IN ACCORDANCE WITH INSTRUCTIONS OF BHEL ENGINEER. DURING PREHEAT AND STRESS RELIEVING OPERATIONS THE TEMPERATURE SHALL BE MEASURED AS PER THE INSTRUCTIONS OF BHEL ENGINEERS BY THERMOCOUPLES AND RECORDED GRAPHS FOR THE HEAT TREATMENT WORKS CARRIED OUT SHALL BE THE PROPERTY OF BHEL. THE CONTRACTOR HAS TO PROVIDE THERMO-CHALKS FOR CHECKING PREHEAT TEMPERATURE FOR WELDING OR FOR MONITORING TEMPERATURE OF METAL FOR HOT CORRECTION AS PER BHEL ENGINEER'S INSTRUCTIONS.

4.3.2.2
FOR THE PURPOSE OF STRESS RELIEVING, THERMOCOUPLES HAVE TO BE ATTACHED TO THE WELD JOINT. THE NUMBER OF TEMPERATURE MEASURING POINTS AND LOCATIONS SHALL BE AS PER THE STANDARDS OF BHEL. THERMOCOUPLES HAVE TO BE ATTACHED USING CAPACITOR DISCHARGE TYPE PORTABLE THERMOCOUPLE ATTACHMENT UNIT AND **NOT BY MANUAL ARC WELDING**. CONTRACTOR SHALL ARRANGE SUFFICIENT NUMBER OF THERMOCOUPLE ATTACHMENT UNITS.

4.3.2.3
WHEREVER NECESSARY, CONTRACTOR SHOULD PROVIDE TEMPERATURE INDICATOR / TEMPERATURE RECORDER AS REQUIRED BY BHEL ENGINEER FOR MEASURING HEAT TREATMENT TEMPERATURE FOR WELDING OR FOR CONTROLLING TEMPERATURE OF METAL FOR HOT CORRECTION ETC. THE TEMPERATURE RECORDERS SHOULD BE PREFERABLE OF SOLID STATE TYPE. DECISION OF BHEL ENGINEER ON METHOD AND OF CHECKING PREHEATS TEMPERATURE OF CONTROLLING TEMPERATURE FOR HOT CORRECTION AND WELDING SHALL BE FINAL AND BINDING ON CONTRACTOR.

4.3.2.4
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.

4.3.2.5
WHEREVER HEAT TREATMENT / STRESS RELIEVING IS NOT MENTIONED, BUT PRE-HEATING IS REQUIRED ON JOINTS, THE SAME SHALL BE CARRIED OUT AS PART OF THE WORK.

4.3.2.6
FOR WELD JOINTS OF HEAVY STRUCTURAL SECTIONS, IF HEAT TREATMENT IS REQUIRED, THE SAME SHALL BE CARRIED OUT AS PART OF THE WORK.

4.3.2.7
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.

4.3.2.8
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 ARRANGEMENT 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 OR EQUIVALENT MATERIALS PIPING, VALVE, AND FITTINGS & SPECIALITIES 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 M 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).

4.3.2.8
ALL THE RECORDED GRAPHS FOR HEAT TREATMENT SHALL BE HANDED OVER TO BHEL/ IBR AUTHORITIES AND DUE CLEARANCES OBTAINED.

4.3.2.9
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 DG SET FOR THE SAME TO TAKE CARE OF POWER FAILURES.

4.3.2.10
RESULTS OF THESE PROCESSES SHALL BE VERIFIED/ VALIDATED AS PER REQUIREMENTS OF BHEL/CLIENT.

NON DESTRUCTIVE EXAMINATION:

4.3.3.1
RADIOGRAPHIC INSPECTION OF WELDS SHALL BE ARRANGED BY THE CONTRACTOR INCLUDING ALL CONSUMABLES LIKE ISOTOPE CAMERA, FILM, CHEMICALS ETC. SCAFFOLDING AND APPROACHES FOR TAKING RADIOGRAPHS. THE NECESSARY SKILLED TECHNICIAN AND LABOURERS FOR TAKING THE RADIOGRAPHS SHALL BE PROVIDED BY THE CONTRACTOR. WHILE TAKING RADIOGRAPHS, THE CONTRACTOR HAS TO USE PROPER PENETRAMETER / IMAGE QUALITY INDICATORS AS INSTRUCTED BY THE BHEL ENGINEER. ALL THE PROCESSED AND ACCEPTED FILMS WILL BE THE PROPERTY OF BHEL. IN THIS REGARD, THE CONTRACTOR HAS TO ADHERE TO THE SAFETY RULES / REGULATIONS LAID BY BARC AUTHORITIES FROM TIME TO TIME. IT MAY PLEASE BE NOTED THAT INVARIABLY THE RADIOGRAPHIC WORK WILL BE CARRIED AFTER THE NORMAL WORKING HOURS.

4.3.3.2
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.

4.3.3.3
WHEREVER RADIOGRAPHS ARE NOT ACCEPTED, ON ACCOUNT OF BAD SHOT, JOINTS SHALL BE RE-RADIOGRAPHED AND RE-SHOTS SUBMITTED FOR EVALUATION. RADIOGRAPHS SHALL BE TAKEN ON JOINTS AFTER CARRYING OUT

REPAIRS. HOWEVER, IF DEFECT PERSISTS AFTER FIRST REPAIR, AS PER RADIOGRAPH, CARRYING OUT REPAIRS AND RADIOGRAPHY SHALL BE REPEATED TILL JOINT IS MADE ACCEPTABLE. IN CASE, THE JOINT IS NOT REPAIRABLE, THE SAME SHALL HAVE TO BE CUT AND REPAIRED AT CONTRACTOR'S COST. DECISION OF BHEL ENGINEER IN ALL THESE MATTERS IS FINAL AND BINDING ON THE CONTRACTOR. PAYMENT IS CONSIDERED ONLY FOR RADIOGRAPHY AFTER CLEARING ALL DEFECTS.

4.3.3.4
100% RADIOGRAPH OF CERTAIN SIZES IN PIPING HAVE TO BE TAKEN AS PER BHEL STANDARDS/ DRAWINGS.

4.3.3.5
ALL FIELD-WELDED JOINTS SHALL BE SUBJECTED TO DYE-PENETRANT EXAMINATION AS SPECIFIED IN RESPECTIVE DRAWINGS AND SHALL HAVE TO BE ACCEPTED BY BHEL ENGINEER. ANY RECTIFICATION REQUIRED SHALL HAVE TO BE DONE BY THE CONTRACTOR AT HIS COST.

4.3.3.6
FOR CARRYING OUT ULTRASONIC TESTING OF WELDING JOINTS, 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 AND NO EXTRA CHARGE IS PAYABLE FOR THIS.

4.3.3.7
IT MAY ALSO BECOME NECESSARY TO ADOPT INTER LAYER RADIOGRAPHY/MPT/UT AND FINAL NDE COMBINING 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.

4.3.3.8
NOT USED

4.3.3.9
ALL THE WELDED JOINTS OF STEAM ADMISSION PIPELINES TO HPT, IPT AND LPT SHALL HAVE TO BE SUBJECTED TO NON-DESTRUCTIVE TESTS VIZ. MAGNETIC PARTICLE TEST, DYE PENETRATION TEST AND HARDNESS TEST IN ADDITION TO RADIOGRAPHY AND ULTRASONIC TESTING. ALL THE WELD SEAMS SHALL BE PROPERLY GROUND AND SUBJECTED TO 100% RADIOGRAPHIC EXAMINATION.

4.3.3.10
CONTRACTOR MAY HAVE TO UNDERTAKE RADIOGRAPHY WITH COBALT-60 ISOTOPE CAMERA. IN CASE DUE TO UNAVOIDABLE CIRCUMSTANCES COBALT-60 IS NOT POSSIBLE TO BE USED, THOSE JOINTS SHALL BE CHECKED BY 'ULTRASONIC TEST'. AFTER COMPLETION OF SUITABLE PART OF THE THICKNESS, RADIOGRAPHY WITH

IR–192/COBALT 60 OR OTHER SUITABLE SOURCE AS ACCEPTABLE TO BARC TO BE DONE IN CASE COBALT-60 SOURCE CANNOT BE USED, SUBSEQUENTLY AFTER COMPLETING THE JOINT UT TO BE DONE. CONTRACTOR SHALL DEPLOY LEVEL–II OPERATOR CERTIFIED BY BARC FOR THIS PURPOSE.

4.3.3.11
IN THE CASE OF P-91 PIPING NDT REQUIREMENT, WHERE NO RADIOGRAPHY IS POSSIBLE, ALTERNATIVELY ULTRASONIC TEST HAS TO BE CARRIED OUT APART FROM OTHER NDE.

4.3.3.12
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.

4.3.3.13
NO SEPARATE PAYMENT FOR ANY NDE ACTIVITIES IS ENVISAGED. THE QUOTED PRICE SHALL INCLUDE ALL THE NDE ACTIVITIES.

4.4 **ERECTION OF HRSG, ITS AUXILIARIES**

4.4.1 **HRSG**

4.4.1.1 **COLLECTION, TRANSPORTATION & STACKING AND ERECTION OF MODULES**:

4.4.1.1 ERECTION OF HEAT TRANSFER MODULES:

THE HEAT TRANSFER MODULES WILL BE SENT LOOSE, 7 NOS WITH INTERMEDIATE WOODEN PACKING, IN LIGHT CRATING-CUM-ARRESTOR ARRANGEMENT WELDED TO THE TRAILER BED. THE CRATE-ARRESTOR HAS TO BE CUT AT SITE FOR UNLOADING THE MODULES ONE-BY-ONE. FOR UNLOADING THE MODULES SPECIAL UNLOADING FRAMES HAVE TO BE USED AS THE MODULES BEING FLEXIBLE HAVE PROPENSITY TO BENDING. UTMOST CARE IS, THEREFORE, ESSENTIAL WHILE UNLOADING THE MODULES AND A SPECIAL FRAME WILL HAVE TO BE USED FOR UNLOADING SUPPLIED BY BHEL, MU.

THESE MODULES WILL BE UNLOADED DIRECTLY AT SITE AND ONLY 7 MODULES, WITH WOODEN PACKING BETWEEN THEM AT APPROPRIATE LOCATIONS, SHALL BE KEPT IN EACH STACK.

FOR ERECTION OF THESE MODULES YET ANOTHER FRAME, FOR MAKING THE MODULE VERTICAL WILL BE REQUIRED. FRAME WILL BE PROVIDED BY BHEL MU.

IN ALL THESE HANDLING OF MODULES POLYESTER FLAT WEBBING SLING MAY HAVE TO BE USED. CONTRACTOR SHALL PROVIDE THE SAME.

THERE ARE 327 MODULES PER UNIT OF BOTH CARBON STEEL AND ALLOY STEEL PUT TOGETHER FOR EACH UNIT. THE DIMENSION OF EACH MODULE IS 4MX24 M MAX, AND EACH MODULE WEIGHS 10 MT APPROX.

4.4.1.2 ERECTION OF BOILER DRUMS:
THERE ARE TOTAL 3 BOILER DRUMS ONE EACH FOR HP, IP AND LP CIRCUIT. THE TENTATVE WEIGHT AND DIMENSIONS RESPECTIVELY ARE AS UNDER:

HP DRUM - 2 NO- WEIGHT -157 TONS, LENGTH- 20 M, HEIGHT 3.5 M (EACH)
IP DRUM - 2 NO- WEIGHT- 38 TONS, LENGTH- 16.5 M, HEIGHT 2.5M (EACH)
LP DRUM - 2 NO - WEIGHT -21 TONS, LENGTH 16.5 M, HEIGHT 2.5 M (EACH)

THESE HAVE TO BE ERECTED WITH THE HELP OF ADEQUATE CAPACITY CRANE FROM THE SIDE OF HRSG AFTER THE ERECTION OF CASING AND HEAT TRANSFER MODULES OF RESPECTIVE CIRCUITS.

4.4.1.3
IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE TEMPORARY LADDERS ON COLUMNS, CHIMNEY ETC IN A MANNER PRESCRIBED BY BHEL USING THEIR OWN MATERIAL TILL SUCH TIME AS PERMANENT STAIRWAYS ARE COMPLETED.

4.4.1.4
PRESSURE PARTS COMPONENTS LIKE HEADERS, MODULES, LOOSE TUBES ETC. HAVE TO BE 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, IN RANDOM SIZES, FOR THIS PURPOSE WILL BE PROVIDED BY BHEL FROM THE PACKING MATERIALS / SCRAPS ETC., WHERE AS NECESSARY CONCRETE BLOCKS SHALL BE ARRANGED BY THE CONTRACTOR. BED SHALL BE FABRICATED AS PER REQUIREMENT. THESE SHALL BE DISMANTLED & RETURNED TO BHEL AT APPROPRIATE STAGE. NO SEPARATE PAYMENT FOR MAKING / DISMANTLING SUCH BED IS ENVISAGED.

4.4.1.5
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. ALL FITTINGS LIKE "T" PIECES, WELD NECK FLANGES, REDUCERS, ETC., SHALL BE SUITABLY MATCHED WITH PIPES FOR WELDING (THIS IS APPLICABLE TO PIPING WORK ALSO).

4.4.1.6
TUBES OR PIPES WHEREVER DEEMED CONVENIENT, WILL BE SENT IN RANDOM LENGTHS. TUBES / PIPES SENT IN STANDARD/ RANDOM LENGTH SHALL BE CUT AND EDGE PREPARED TO SUIT THE SITE CONDITIONS AND THE LAYOUTS. BENDS OF TUBES UPTO OD 65 MM WILL HAVE TO BE FORMED AT SITE AS INCIDENTAL TO THE WORK. THIS IS APPLICABLE TO PIPING WORK ALSO.

4.4.1.7
WELDING OF ALL ATTACHMENTS ON CASING, NON-PRESSURE PARTS, PRESSURE PARTS/ PIPING INCLUDING THOSE REQUIRED FOR INSULATION WORK IS IN THE SCOPE OF WORK.

4.4.1.8
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 BUBBLE/ SOAP 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 ACHIEVED.

4.4.1.9
IF REQUIRED, THE PRESSURE PARTS, AFTER INITIAL ERECTION AND TESTS, WILL HAVE TO BE PRESERVED BY EITHER DRY OR WET PRESERVATION PROCEDURE. CONTRACTOR SHALL RENDER ALL ASSISTANCE FOR THIS AND ERECT TEMPERORY PIPING WITH VALVES WHEREVER NECESSARY. REQUIRED MATERIAL WILL BE PROVIDED BY BHEL.

4.4.1.10
THE DRUM INTERNALS, IF ALREADY INSTALLED, MAY HAVE TO BE REMOVED TO FACILITATE TUBE EXPANSION, INSPECTION BY STATUTORY AUTHORITIES AND CHEMICAL CLEANING. THE DRUM INTERNALS ARE TO BE PRESERVED PROPERLY AND REFITTED AFTERWARDS AS PART OF WORK.

4.4.2 POWER CYCLE PIPING AND REGENERATIVE PIPING
4.4.2.1
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 / COMMISSIONING OPERATIONS MENTIONED IN THE SPECIFICATION AS PER BHEL ENGINEERS INSTRUCTIONS AND / OR AS PER APPROVED DRAWINGS / DOCUMENTS.

4.4.2.2
LYING OF PIPELINES AS PER THE SPECIFICATIONS, BETWEEN EQUIPMENTS CONSTITUTING TERMINAL POINT, WHETHER THE TERMINAL EQUIPMENTS FALL WITHIN THE SCOPE OF THE WORK / SPECIFICATION OR NOT, IS WITHIN THE SCOPE OF THE WORK / SPECIFICATION. THE CONTRACTOR SHALL COMPLETE TERMINAL JOINTS AT BOTH ENDS FOR ALL THE PIPING SCHEMES COVERED IN THE SPECIFICATION.

4.4.2.3
ALIGNING, MATCHING AND WELDING OF PIPING TO THE TERMINAL POINTS (SUCH AS STUBS, ON TERMINAL EQUIPMENTS, STUBS ON HEADERS, BATTERY LIMITS ETC), EVEN IF THESE TERMINAL EQUIPMENT/POINT DO NOT FORM PART OF THIS SCOPE OF WORK / SPECIFICATION, AND STRESS RELIEVING AND NDE OF JOINTS SO MADE IS ALSO WITHIN THE SCOPE OF WORK / SPECIFICATION. ALSO, WHERE THE PIPING CONNECTION TO THE TERMINAL POINTS INVOLVES FLANGED JOINTS, MOUNTING AND WELDING OF FLANGES ON PIPING AS WELL AS TERMINAL EQUIPMENT MATCHING OF FLANGES AS SPECIFIED ELSEWHERE HEREIN, FIXING OF GASKETS, BOLTING AND TIGHTENING AS PER BHEL ENGINEER'S INSTRUCTION IS

ALSO IN THIS SCOPE OF WORK / SPECIFICATIONS. REQUIRED FASTENERS AND GASKETS WILL BE SUPPLIED BY BHEL FREE OF COST.

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

1. INSTALLATION & REMOVAL, AS APPLICABLE, OF ISOLATING DEVICES/ NRVS 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 NUMBER OF PLACES.

4. INCREASE OR DECREASE IN LENGTH OF PIPING INCLUDING CHANGE IN LAYOUT TO SUIT SITE CONDITIONS.

5. FABRICATION AND ERECTION OF RACKS AND STEEL SUPPORTS FOR ALL THE PIPING INCLUDING OF SYSTEM PIPING. STEEL FOR THIS PURPOSE WILL BE SUPPLIED BY BHEL IN RANDOM SIZES.

6. 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.

7. MATCHING OF ALL FITTINGS LIKE TEES, BENDS, FLANGES, REDUCERS, VALVES, SOCKET FITTINGS, ETC WITH PIPES FOR WELDING. THIS MAY INVOLVE WELD BUILD UP, EDGE PREPARATION, ETC.

8. CLEANING OF ALL PIPES AS PRESCRIBED, FLUSHING BY COMPRESSED AIR ETC.

9. 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.

10. WELDING OF WELD BLANKS WITH DUE NDE & PWHT, IF REQUIRED, ON A TEMPORARY BASIS.

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

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

4.4.2.5
ON ALL STEAM PIPING, WATER PIPING, OIL PIPING, AIR PIPING, ETC, WHERE BUTT WELDING IS INVOLVED, ROOT TIG WELDING AND SUBSEQUENT ARC WELDING SHALL BE ADOPTED AS INSTRUCTED BY BHEL ENGINEER. THE DECISION OF BHEL ENGINEER REGARDING WELDING PROCEDURE FOR WELDING OF ABOVE LINES WILL BE BINDING ON THE CONTRACTOR.

4.4.2.6
PIPES / TUBES / STRUCTURAL MATERIALS, WHICH ARE ISSUED IN RUNNING METERS, MAY NOT BE SENT IN STANDARD LENGTHS. THESE HAVE TO BE CUT TO SUIT SITE CONDITIONS.

4.4.2.7
CERTAIN PIPE LINES OF OIL, AIR, STEAM AND WATER WILL BE FIELD ROUTED AS PER SCHEMES APPROVED AT SITE OR AS PER THE INSTRUCTIONS OF BHEL ENGINEER, AND WILL BE SUPPLIED IN RANDOM LENGTHS / RUNNING LENGTHS. THE CONTRACTOR SHALL LAY THE PIPING ACCORDING TO INSTRUCTIONS AT SITES, AFTER CARRYING OUT THE NECESSARY FABRICATION, EDGE PREPARATION, ROUTING ETC, IN BEST PROFESSIONAL MANNER AND AS PER INSTRUCTIONS. THE SUPPORTS FOR FIELD-ROUTED PIPING SHALL BE FABRICATED AND ERECTED AS PER THE REQUIREMENT OF THE WORK. THE STEEL REQUIRED FOR THE SUPPORTS WILL BE PROVIDED BY BHEL FREE OF COST AT THEIR STORES.

4.4.2.9
ALL WELD JOINTS ON PIPING SHALL BE GROUND OR FILED ON COMPLETION OF WELDING AND BEFORE RADIOGRAPHY AS PER INSTRUCTIONS BHEL ENGINEER SO AS TO ACHIEVE SMOOTH SURFACE FREE OF NOTCHES, RIPPLES, UNDULATIONS, ETC. AND TO LIMIT THE REINFORCEMENT AS PER THE CODES.

4.4.2.10
CONTRACTOR SHALL ERECT THE PIPING BY DOING PRE-ASSEMBLE ON GROUND IF POSSIBLE AT THE FIRST INSTANCE. THE PIPE LAYING SHALL BE CARRIED OUT FROM THE AVAILABLE TERMINAL POINT / POINTS OR ANY OTHER AREA BETWEEN

THE TERMINAL POINTS. THE ERECTION CAN BE CARRIED OUT ON TEMPORARY SUPPORTS TO OBTAIN PROPER ALIGNMENT AND WELDING. AFTER FIXING THE PERMANENT SUPPORTS, ALL THE TEMPORARY SUPPORTS SHALL BE REMOVED. THE ALIGNMENT, DISTANCES AND LOADING OF THE SUPPORTS SHALL BE CHECKED AND THE REQUIRED SPRING COMPRESSION ACHIEVED IN THE CASE OF SPRING HANGERS.

4.4.2.11
CONTRACTOR SHALL CARRYOUT EDGE PREPARATIONS FOR WELDS JOINTS IN ACCORDANCE WITH BHEL DRAWINGS / BHEL STANDARDS / BHEL ENGINEER'S INSTRUCTION.

4.4.2.12
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.

4.4.2.13
THE RATE QUOTED IN RATE SCHEDULE IS ALSO INCLUSIVE OF PRE-HEATING, WELDING, POST HEATING, POST WELD HEAT TREATMENT/ STRESS RELIEVING AND NDE.

4.4.2.14
HANGER RODS SHOWN IN THE PIPING ARRANGEMENT DRAWING MAY HAVE TO CUT AND WELDED TO SUIT SITE CONDITION. THE CONTRACTOR SHALL DO CUTTING AND WELDING OF THESE HANGER RODS. THE NDE & STRESS RELIEVING REQUIRED ON WELDED HANGER RODS SHALL BE CARRIED OUT. THE HANGER FOR PIPING WILL BE TESTED FOR EVEN DISTRIBUTION OF LOAD WITH THE HELP OF TORQUE WRENCH.

4.4.2.15
THE PIPING MAY BE PROVIDED WITH HAND HOLES. THE HAND HOLES WILL BE OPENED UP FOR INSPECTION AND SEAL WELDED PRIOR TO OPERATION.

4.4.2.16
STRUCTURAL MATERIALS REQUIRED FOR THE SUPPORTING / OPERATING PLATFORMS REQUIRED FOR THE VALVES/EQUIPMENTS AT VARIOUS LEVELS FOR THE SAFE OPERATION WILL BE ISSUED IN RANDOM SIZES TO THE CONTRACTOR FREE OF COST. HOWEVER, THE CONTRACTOR'S QUOTED RATE SHALL INCLUDE

FABRICATION AND ERECTION OF ALL SUCH OF PLATFORMS AT SITE AND NO EXTRA PAYMENTS SHALL BE ALLOWED FOR THIS AND ONLY TONNAGE RATE APPLICABLE FOR STRUCTURES ONLY WILL BE PAYABLE.

4.4.2.17
ERECTION OF PIPING SYSTEMS SHALL BE COORDINATED BY THE CONTRACTOR AS REQUIRED, WITH THE ERECTION OF THE TURBINE, GENERATOR, CONDENSER, BOILER, BOILER FEED PUMPS AND OTHER MAJOR EQUIPMENTS, APPROVAL MUST BE OBTAINED FROM THE CONCERNED BHEL ENGINEER AND OTHER AGENCIES CONCERNED PRIOR TO MAKING PIPING INTERFACE CONNECTIONS TO THE AFOREMENTIONED 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 ENGINEER AND ENGINEERS MAY, AT TIME, DIRECT THE CONTRACTOR TO RESCHEDULE HIS WORK AS PER STATUS OF THE SITE WORK.

4.4.2.18
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.

4.4.2.19
ALL PIPELINES SHALL BE GIVEN PROPER SLOPE TOWARDS THE DRAIN POINTS DURING ERECTION.

4.4.2.20
ALL PIPE LINES SHALL BE PROVIDED 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 AS PER THE INSTRUCTIONS OF BHEL ENGINEER.

4.4.2.21
FOR INSTRUMENT CONNECTIONS, PIPE STUBS INCLUDING THE INSTRUMENT TUBING UP TO THE ROOT VALVE(S) SHALL BE INSTALLED BY THE CONTRACTOR. ROOT VALVES SHALL BE LOCATED IN THE CONVENIENT LOCATION / PLACE AS REQUIRED BY THE CUSTOMER TO FACILITATE EASY OPERATION AS PER THE DECISION / INSTRUCTION OF BHEL ENGINEER.

4.4.2.22
THE CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECT ORIENTATION OF ALL VALVES SO THAT FLOW DIRECTION, SEATS, STEM AND HAND WHEEL ARE IN DESIRED LOCATIONS. INFORMATION REGARDING ORIENTATION OF VALVES, NOT FULLY LOCATED ON DRAWINGS, MAY BE OBTAINED FROM THE BHEL ENGINEERS.

4.4.2.23
THE PIPING SYSTEMS, WHICH COME UNDER THE PURVIEW OF IBR, SHOULD MEET THE REQUIREMENT OF IBR. THE CONTRACTOR SHALL BE WELL VERSED WITH ALL THE LATEST AMENDMENTS OF INDIAN BOILER REGULATIONS.

4.4.2.24
ALL PIPING SHALL BE GROUPED WHEREVER PRACTICABLE AND SHALL BE ROUTED TO PRESENT A NEAT APPEARANCE.

4.4.2.25
FOR FIELD RUN PIPING, CONTRACTOR SHALL FABRICATE AND ERECT ALL HANGERS AND SUPPORTS AS REQUIRED WITH DUE REGARD TO GENERAL ARRANGEMENT LAYOUT OF OTHER PIPES, HANGERS, CABLE TRAYS, DUCTING, STRUCTURAL MEMBERS, ETC.

4.4.2.26
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.

4.4.2.27
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.

4.4.2.28
IN PIPELINES LIKE CRH LINES, EXTRACTION LINES, ETC., THE NRVS WILL BE ERECTED BY OTHER ERECTION AGENCY. ALIGNMENT OF THESE VALVES TO MATCH THE PIPE ENDS (BOTH SIDES), WELDING, HEAT TREATMENT AND NDE ETC., SHALL BE CARRIED OUT BY THE CONTRACTOR WITHIN THEIR QUOTED RATES. SIMILARLY, ABOVE SPECIFICATION WILL BE APPLICABLE TO STRAINERS COMING IN VARIOUS LINES.

4.4.2.29
ALL TEMPORARY LINES REQUIRED FOR CHEMICAL CLEANING, HYDRAULIC TESTING, STEAM BLOWING, ETC., SHALL BE SUPPLIED IN 'AS IS WHERE IS' CONDITION. THE CONTRACTOR SHALL ARRANGE TO CARRYOUT THE REQUIRED FABRICATION, DRESSING, GRINDING, CLEANING, CUTTING, EDGE PREPARATION ETC., WHILE CARRYING OUT ERECTION. NO EXTRA CLAIM ON THIS ACCOUNT WILL BE ENTERTAINED. FOR HUMAN PROTECTION , TEMPORARY INSULATION OVER PIPING TO BE APPLIED AT NO EXTRA COST.

4.4.2.30
BEFORE LAYING THE PIPING ON SUPPORTS, THE COORDINATES AND ELEVATIONS OF ALL SUPPORTS SHALL BE CHECKED BY THE CONTRACTOR FOR CORRECTNESS. DISCREPANCIES FROM THE EXECUTION DRAWINGS, IF ANY, SHALL BE PROMPTLY

BROUGHT TO THE NOTICE OF BHEL ENGINEER IN WRITING AND CORRECTION SHALL BE CARRIED OUT AS PER HIS INSTRUCTIONS.

4.4.2.31
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.

4.4.2.32
ALL THE INSTRUMENTATION TAP-OFF POINTS LIKE THERMOWELLS, ROOT VALVES, IMPULSE LINES, NIPPLES ETC., SHALL ALSO BE ERECTED AND WELDED BY THE CONTRACTOR IRRESPECTIVE OF WHETHER SUCH MATERIALS ARE SUPPLIED BY BHEL OR ANY OTHER AGENCY.

4.4.2.33
THE WELD GROOVES OF MS LINE, HRH LINE, CRH LINE, BFD LINES AND OTHER PIPES WILL BE AS PER BHEL STANDARD SPECIFICATIONS. FURTHER, THE EDGE PREPARATION SHALL BE DONE AS PER INSTRUCTION OF BHEL SITE ENGINEER AND SAME SHALL BE BINDING ON THE CONTRACTOR.

4.4.2.34
ALL EQUIPMENTS / WORKS SHALL BE PRESERVED AND PROTECTED PROPERLY DURING AND AFTER ERECTION. INSTRUCTIONS / DIRECTIONS GIVEN BY BHEL IN THIS CONNECTION WILL HAVE TO BE OBSERVED BY THE CONTRACTOR.

4.4.2.35
THE LOCATION OF TANKS, VESSELS, VALVES, STATIONS ETC IN THE PIPELINES INDICATED IN THE BHEL DRAWINGS MAY BE INDICATIVE ONLY. THE FINAL LOCATION AND ROUTINGS SHALL BE DECIDED TO SUIT THE SITE CONDITIONS. WHILE ROUTING SUCH LINES AND FIXING THE STATIONS, THEY HAVE 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 MODIFIED AS PER THE SITE CONDITIONS. ALL SUCH WORK SHALL BE CARRIED OUT EXPEDITIOUSLY AS PER THE INSTRUCTIONS OF BHEL ENGINEER. THE DECISION OF BHEL ENGINEER IS FINAL AND BINDING ON THE CONTRACTOR.

4.4.2.36

ALL G.I. PIPELINES SHALL BE JOINED BY THREADED (SCREWED) JOINTS. PIPES AND FITTINGS WILL BE SUPPLIED BY BHEL AS COMMERCIALLY AVAILABLE. CONTRACTOR SHALL ARRANGE TO CHECK AND CLEAN AND REAM THE EXISTING THREADS IF NECESSARY, BY RUNNING THREAD CLEANING DIE/TAP OR BY MACHINING. FRESH THREADING SHALL BE DONE IN CASE EXISTING THREAD IS FOUND DAMAGED BEYOND REPAIR AFTER CUTTING OFF THE DAMAGED PORTION WITHIN THE QUOTED RATES. FRESH THREADING SHALL ALSO BE DONE IN G.I. PIPE ENDS CUT TO SUIT SITE LAYOUT.

4.4.2.37

BOTH MALE AND FEMALE THREADS SHALL BE CLEANED OF OIL, GREASE ETC, WITH APPROPRIATE SOLVENT ETC. PRIOR TO JOINTING. JOINTS SHALL BE SEALED BY APPLYING TEFLON TAPE ON MALE THREAD. ALL JOINTS SHALL BE TIGHTENED ADEQUATELY SO AS TO ACHIEVE LEAK-PROOF JOINT. EXPOSED PORTION OF THE EXTERNAL THREADS SHALL BE COATED WITH ZINC SILICATE PAINT. CONTRACTOR SHALL ARRANGE ALL CONSUMABLES FOR CLEANING, SEALING AND PAINTING

4.4.2.38

PRESSURE TESTING WITH COMPRESSED AIR AND EXTERNAL APPLICATION OF SOAP SOLUTION OR FLAME OR ANY OTHER BHEL-APPROVED METHOD SHALL BE DONE ON ALL JOINTS. SUCH TESTS MAY HAVE TO BE REPEATED SEVERAL TIMES TO ENSURE A LEAK PROOF SYSTEM. LEAKAGES IF ANY, SHALL BE REPAIRED BY THE CONTRACTOR PROMPTLY ACCORDING TO THE BHEL-APPROVED PROCEDURE/METHOD. ANY ADDITIONAL EXPENSES FOR REPAIR ATTRIBUTABLE TO CONTRACTOR SHALL BE BORNE BY THE CONTRACTOR.

4.4.3 OTHER PRODUCTS AND SYSTEMS

4.4.3.1
DUCTS / EXPANSION BELLOWS ARE NORMALLY SUPPLIED IN LOOSE WALL PLATES / SEGMENTS AND THESE ARE TO BE ASSEMBLED AND WELDED AT SITE BEFORE ERECTION. ALL JOINTS CONNECTING DUCTS, EXPANSION PIECES AND DAMPERS SHALL BE SEAL WELDED. THESE WELDS HAVE TO BE TESTED BY LPI AND MADE LEAK PROOF AS PER TECHNICAL INSTRUCTION / REQUIREMENT.

4.4.3.2
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.

4.4.3.3
ADDITIONAL PLATFORMS OF PERMANENT NATURE FOR APPROACHING DIFFERENT EQUIPMENTS LIKE ACTUATORS, VALVES, INSTRUMENTS ETC. AS PER SITE / BHEL CLIENT'S REQUIREMENTS, WHICH MAY NOT BE INDICATED IN DRAWINGS, BUT ESSENTIAL FOR SAFE ACCESS, SHALL BE MADE BY THE CONTRACTOR FROM STRUCTURAL STEEL /

MATERIALS SUPPLIED IN RANDOM LENGTHS / SIZES. THE CONTRACTOR WILL BE PAID FOR THIS WORK ON ACCEPTED ERECTION TONNAGE RATE FOR STRUCTURES.

4.4.4 **LINING & INSULATION**

4.4.4.1
HRSG CASING, INLET AND OUTLET DUCTS HAVE TO BE FULLY INSULATED AT SITE WITH CERAMIC WOOL AND SS CLADDING ON GAS FLOW PATH SIDE.

4.4.4.2
APPLICATION OF WOOL INSULATION, SHEET METAL CLADDING, WELDING OF HOOKS/SUPPORTS TO HOLD INSULATION COVERED UNDER THIS CONTRACT, SHALL INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING :-

A) WHERE INDICATED, REMOVABLE TYPE OF INSULATION TO BE PROVIDED FOR VALVES, EXPANSION JOINTS, ETC. AS PER THE DRAWINGS OR AS DIRECTED BY BHEL ENGINEER.

B) WOOL INSULATIONS ARE RECEIVED AT SITE AS BONDED AND UNBOUNDED MATTRESSES IN STANDARD SIZES. THESE ARE TO BE DRESSED/CUT TO SUIT WORK BY THE CONTRACTOR.

C) APPLICATION OF INSULATION AND REFRACTORY WORKS AND SHEET METAL COVERING AS GIVEN IN VARIOUS DRAWINGS/ SPECIFICATIONS OF BHEL, SUPPLIED TO THE CONTRACTOR.

D) OUTER SHEET CLADDING BY FABRICATION OF ALUMINUM SHEETS TO THE SIZES AND SHAPES SPECIFIED IN DRAWINGS, BEADING, SWAGING, BEVELING OF SHEETS, CROWNING THE SHEETS, IF NECESSARY, FIXING THE SAME TO SUPPORTS, OVER WOOL INSULATION WITH SCREWS/RETAINERS AS SPECIFIED IN BHEL DRAWINGS OR AS INSTRUCTED BY BHEL ENGINEER.

E) WELDING OF HOOKS/SUPPORTS ON EQUIPMENT INCLUDING ON PR. PARTS AND PIPING TO SUPPORT WOOL INSULATION, AS PER THE DRAWINGS OR AS INSTRUCTED BY BHEL ENGINEERS.

F) PAINTING THE INNER SIDE OF ALUMINUM/GI/STAINLESS STEEL CLADDING, WITH ANTI-CORROSIVE PAINT AS SPECIFIED, THE REQUIRED PAINT AND THINNER IS IN THE SCOPE OF BHEL. ALSO, ALL OTHER ACCESSORIES CONSTUMABLES FOR PAINTING, CLEANING THE SURFACES ETC SHALL ALSO BE ARRANGED BY THE CONTRACTOR.

G) THE CONTRACTOR SHALL LEAVE CERTAIN GAPS AND OPENINGS WHILE DOING THE WORK AS PER THE INSTRUCTIONS OF BHEL ENGINEER TO FACILITATE INSPECTION BY BOILER INSPECTOR OR CUT OPEN DURING COMMISSIONING TO FIX GAUGES, FITTINGS, INSTRUMENTS. THESE GAPS WILL HAVE TO BE FINISHED AS PER DRAWINGS AT A LATER DATE BY THE CONTRACTOR AT NO EXTRA COST TO BHEL.

H) THE SKIN CASING PLATES SCALLOPED BARS AND OTHER MATERIALS THAT ARE TO BE MATCHED WITH THE ERECTED COMPONENTS HAVE TO BE CUT AND RE-WELDED FROM THE FABRICATED PIECES AS INCIDENTAL TO WORK.

I) WASTAGE ALLOWANCE FOR THE MATERIALS ISSUED SHALL BE AS UNDER:-

I)	REFRACTORY	2%
ii)	WOOL INSULATION	2%
iii)	CLADDING SHEETS	2%

4.4.4.3
APPLICATION OF LINING AND INSULATION ON ALL PIPING COVERED UNDER THIS SPECIFICATION IS ALSO THE PART OF THIS WORK. SIMILARY, IT IS APPLICABLE FOR LINING AND INSULATION OF TG SIDE AUXILIARIES SUCH AS HEATERS, DE-AERATORS ETC. HOWEVER; APPLICATION OF SPRAY INSULATION ON TURBINE & ISOLATION VALVES IS NOT IN THE SCOPE OF WORK.

4.4.5 **STEEL STACK/ CHIMNEY**

1. THE DETAILS OF CHIMNEY IS AS FOLLOWS:

CHIMNEY INNER DIAMETER = 6.5 M

CHIMNEY TOTAL HEIGHT =70 M

EACH SHELL WILL BE **2.5** M HIGH AND SENT AS 2 HALF CYLINDER FROM UNIT. THE WEIGHT GIVEN ABOVE IS FOR ONE FULL SHELL, AFTER WELDING 2 HALF CYLINDERS AT SITE.

2. WELDING OF CHIMNEY JOINTS SHALL BE CARRIED OUT BY CERTIFIED WELDER. WHEREVER NECESSARY, RADIOGRAPHY HAVE TO BE TAKEN TO MEET THE BHEL/STATUTORY REQUIREMENTS.

3. CHIMNEY HAS TO BE INSULATED UPTO FULL HEIGHT i.e.70 M.

4. HELICAL STRAKES AS INDICATED IN THE ERECTION DRAWING ARE TO BE WELDED ONTO THE CHIMNEY.

5. CHIMNEY BASE WILL BE SUPPLIED IN TWO HALVES, WHICH WILL HAVE TO BE ASSEMBLED AT SITE.

6. PAINTERS TROLLEY WILL BE SUPPLIED IN PARTS AND WILL HAVE TO BE ASSEMBLED.

7. ALL ELECTRICAL WORKS SUCH AS LIGHTENING ARRESTORS, EARTHING AND AVIATION LIGHTS ETC IS IN THE SCOPE OF WORK.

8. STACK/ CHIMNEY HAVE TO BE PAINTED AS PER THE REQUIREMENT OF AVIATION / RELEVANT BIS STANDARDS/CONTRACTUAL SPECIFICATION.

4.5.0 ERECTION OF RO-DM PLANT

WASTEWATER GENERATED DURING REGENERATION IS SENT TO NEUTRALIZING. THE GENERAL FAMILARIZATION FOR EACH SYSTEM OF THE RO-DM PLANT IS DESCRIBED IN THIS SECTION.

THE RO-DM PLANT IS PRIMARILY CONSISTING OF THE FOLLOWING SUB-SYSTEMS.

- PRETREATMENT SYSTEM
- SEAWATER REVERSE OSMOSIS SYSTEM (SWRO)
- BRACKISH WATER REVERSE OSMOSIS SYSTEM (BWRO)
- MEMBRANE CLEANING & PROTECTION SYSTEM
- PH ADJUSTMENT SYSTEM
- DM PLANT SYSTEM
- VALVES & PIPING
- BRINE DISPOSAL SYSTEM

PRETREATMENT SYSTEM

THE PRETREATMENT SYSTEM IS MEANT FOR FURTHER CONDITIONING THE CLARIFIED AND FILTERED SEAWATER TO FIT FOR MEMBRANE FEED. THIS CONSISTS OF PRESSURE SAND FILTERS (PSF), CARTRIDGE FILTER (CF) AND DOSING SYSTEMS ETC.

SEA WATER REVERSE OSMOSIS (SWRO) SECTION

THE PRETREATED & FILTERED WATER FROM CARTRIDGE FILTER IS PRESSURIZED TO THE REQUIRED PRESSURE IN HP PUMP & ERD FOR SWRO MEMBRANES. THE SYSTEM CONSISTS OF 3X50% STREAM. EACH STREAM CONSISTS OF A DEDICATED HP PUMP, ERD AND A MEMBRANE STACK.

BRACKISH WATER REVERSE OSMOSIS (BWRO) SECTION

THE PRETREATED AND FILTERED WATER FROM CARTRIDGE FILTER IS PRESSURIZED TO THE REQUIRED PRESSURE IN HP PUMP FOR BWRO MEMBRANES.

1. HIGH PRESSURE (HP) PUMP ASSEMBLY (BWRO)

HP PUMP USED IN BWRO IS HORIZONTAL / VERTICAL MULTISTAGE CENTRIFUGAL PUMP. THE MOC IS SS316. THE PUMP ASSEMBLY CONSISTS OF PUMP, ELECTRIC MOTOR, COUPLING MOUNTED ON STEEL BASE FRAME. THE PUMP IS HAVING MECHANICAL SEALS AND BEARINGS. THE DISCHARGE OF HP PUMP IS CONNECTED TO MEMBRANES THROUGH SILENT CHECK VALVE AND FEED CONTROL VALVE (FCV). THE FCV IS MANUALLY OPERATED GLOBE TYPE VALVE AND USED TO REGULATE THE APPLIED PRESSURE ON MEMBRANE TO OBTAIN DESIRED RECOVERY.

2. BWRO MEMBRANE STACK ASSEMBLY

2X100% BWRO STREAMS ARE ENVISAGED TO FURTHER REDUCE THE TDS SO THAT IT CAN BE DIRECTLY FED TO DM PLANT. EACH STREAM HAS A DEDICATED HP PUMP, MEMBRANE STACK WITH NECESSARY VALVES.

BWRO STREAM CONSISTS OF FRP PRESSURE VESSELS AND EACH PRESSURE VESSEL IS HOUSING 6 NOS. HIGH SALT REJECTIONS BRACKISH WATER MEMBRANE ELEMENTS OF SPIRAL WOUND CONFIGURATION TO MEET THE AVERAGE FLUX RATE REQUIRED.

THE PERMEATE IS CONNECTED TO A BWRO PERMEATE STORAGE TANK. THIS WILL BE FURTHER PUMPED TO DM PLANT.

SWRO CHEMICAL CLEANING ARRANGEMENT

A COMMON CHEMICAL CLEANING SYSTEM FOR SWRO IS AN AUXILIARY SYSTEM PROVIDED FOR THE OFF LINE CLEANING OF MEMBRANES TO REMOVE THE SCALING IN THE MEMBRANE. THE SAME SYSTEM IS ALSO USED FOR LONG-TERM MEMBRANE PRESERVATION OF MEMBRANE.

THE SYSTEM CONSISTS OF THE FOLLOWING EQUIPMENT.

- 1X100% FRP CLEANING TANK,
- 3X50% SS 316 CENTRIFUGAL PUMPS,
- 1X100% CARTRIDGE FILTER

THE ABOVE CLEANING SYSTEM IS CONNECTED TO THE RO SECTION WITH NECESSARY PIPING / VALVES FOR RECIRCULATION, BRINE/PRODUCT RETURN TO THE TANK, DRAIN ETC. THE CHEMICAL CLEANING DRAIN WILL GO TO DM PLANT'S NEUTRALIZING PIT FOR FURTHER DISPOSAL.

SWRO MEMBRANE PROTECTION SYSTEM

MEMBRANE PROTECTION SYSTEM IS USED TO PROTECT THE MEMBRANE FROM IRREVERSIBLE DAMAGE AND ENHANCE THE LIFE & PERFORMANCE OF THE MEMBRANE. THIS SYSTEM CONSISTS OF ARRANGEMENT FOR FLUSHING & SUCKS BACK AND CHEMICAL CLEANING OF MEMBRANES.

PH ADJUSTMENT SYSTEM

THE DEGASSED SWRO PERMEATE IS POST TREATED WITH SODIUM HYDROXIDE TO ENHANCE THE PH FOR FURTHER USE. THE DOSING RATE WILL BE ADJUSTED MANUALLY BY CHANGING THE STROKE OF THE DOSING PUMPS.

DOSING SYSTEM CONSISTS OF THE FOLLOWING EQUIPMENTS.

- DOSING PUMPS OF 2 X 100 %
- DAY TANK OF 1X 100% FOR 24 HOURS STORAGE REQUIREMENT.
- PREPARATION TANK 1X 100%.

THE DOSING CHEMICAL WILL BE DRAWN FROM THE BULK STORAGE TANK AVAILABLE IN THE DM PLANT.

DM PLANT SYSTEM (SAC+SBA+MB)

THE BWRO PERMEATE WATER IS PUMPED TO THE DM PLANT (2X100%) CONSISTING OF SAC, SBA AND MB EXCHANGER SYSTEM AND THE OUTLET DM WATER IS FED TO THE DM WATER STORAGE TANK. THE CHEMICALS USED FOR REGENERATION OF THE RESINS ARE 30% HCL AND 48% NAOH. THESE CHEMICALS ARE DRAWN FROM THE BULK STORAGE SYSTEM. THE DM WATER REQUIRED FOR REGENERATION IS DRAWN FROM THE DM WATER STORAGE TANK. THE PIT WHERE IT IS NEUTRALIZED FOR FURTHER DISPOSAL. THE DM SYSTEM CONSISTS OF THE FOLLOWING EQUIPMENTS.

- 2X 100% SS316 DM FEED PUMPS
- 2X 100% MSRL SAC VESSELS
- 2X 100% MSRL SBA VESSELS
- 2X 100% MSRL MB VESSELS
- 2X100% SS316 MB REGENERATION PUMPS
- 2X120% HCL MEASURING TANK
- 2X120% ALKALI MEASURING TANK
- 2X100% EJECTORS
- 2X100% MIXED BED BLOWER

VALVES AND PIPING

THE VALVES AND PIPING ARE PROVIDED FOR INTERCONNECTING EQUIPMENTS, ISOLATION, DRAIN, SAMPLE COLLECTION, AIR RELEASE ETC.

1. LP PIPING & VALVES

LP VALVES AND PIPING MATERIALS ARE SELECTED IN THE LOW-PRESSURE AREA SUITABLE TO HANDLE SEAWATER, RO PERMEATE WATER AND CHEMICALS TO AVOID CORROSION. EACH PUMP IS PROVIDED WITH CHECK VALVE, BUTTERFLY VALVE AND RUBBER EXPANSION BELLOW. ALL THE FLANGE FASTENERS ARE OF STAINLESS STEEL. THE SAMPLE VALVES ARE OF UPVC MATERIALS. THE PIPING CONSIDERED AS LOW-PRESSURE PIPING ARE UPTO HP PUMP SUCTION AND RO PERMEATE LINE. AUTO VALVES ARE PROVIDED FOR AUTO OPERATION OF THE PLANT WHEREVER NECESSARY.

2. HP PIPING & VALVES

THE HIGH-PRESSURE PIPING IS THE PIPING FROM HP PUMP DISCHARGE TO RO MEMBRANES AND BRINE PIPING FROM MEMBRANE TO ENERGY RECOVERY DEVICE. SS316 FASTENERS ARE USED TO CONNECT THE PIPING WITH EQUIPMENT AND VALVES. NECESSARY VALVES ARE ENVISAGED FOR REGULATION / ISOLATION OF FLOW.

BWRO CHEMICAL CLEANING SYSTEM

SIMILAR TO SWRO, A COMMON CHEMICAL CLEANING SYSTEM FOR BWRO IS PROVIDED FOR THE OFF LINE CLEANING OF MEMBRANES TO REMOVE THE SCALING IN THE MEMBRANE. THE SAME SYSTEM IS ALSO USED FOR LONG-TERM MEMBRANE PRESERVATION.

THE CLEANING OPERATION SHALL BE PERFORMED BASED ON EITHER PRESSURE DROP ACROSS MEMBRANES OR INCREASED SALT PASSAGE ABOVE THE MEMBRANE MANUFACTURER'S RECOMMENDATION. THE SYSTEM CONSISTS OF THE FOLLOWING EQUIPMENT.

- 1X100% FRP CLEANING TANK,
- 2X100% SS 316 CENTRIFUGAL PUMPS,
- 1X100% CARTRIDGE FILTER

THE ABOVE CLEANING SYSTEM IS CONNECTED TO THE RO SECTION WITH NECESSARY PIPING / VALVES FOR RECIRCULATION, BRINE/PRODUCT RETURN TO

THE TANK, DRAIN ETC. THE CHEMICAL CLEANING DRAIN WILL GO TO DM PLANT'S NEUTRALIZING PIT FOR FURTHER DISPOSAL.

BRINE DISPOSAL SYSTEM

THE BRINE FROM SWRO SECTION SENT TO A COMMON SUMP MEANT FOR CW BLOW DOWN FOR FURTHER DISPOSAL. THE BWRO BRINE IS SENT TO FILTER BACK WASH TANK.

HANDLING ARRANGEMENT

NECESSARY HANDLING ARRANGEMENTS LIKE CHAIN PULLEY BLOCK / HAND OPERATED CRANE / MONORAIL ARE GIVEN AT PUMP ROOM, MEMBRANE RACK AREA. THIS HANDLING ARRANGEMENT IS GIVEN FOR SAFE HANDLING OF EQUIPMENTS LIKE HP PUMP, MOTORS AND MEMBRANE PRESSURE VESSEL AND OTHER EQUIPMENTS ETC FOR NORMAL OPERATION AFTER COMMISSIONING AND THESE MAY NOT BE AVAILABLE FOR ERECTION PURPOSES.

4.6.0 TESTING, PRE-COMMISSIONING, COMMISSIONING AND POST COMMISSIONING

4.6.1

TESTING, PRE-COMMISSIONING, & COMMISSIONING WILL INVOLVE, THOUGH NOT LIMITED TO THESE, VARIOUS TESTING, TRIAL RUNS OF VARIOUS EQUIPMENTS ERECTED AND SYSTEMS INSTALLED; FLUSHING OF THE LINES BY AIR, WATER, OIL/LUBE OIL, GAS, STEAM AS THE CASE MAY BE; CHEMICAL CLEANING OF VARIOUS SYSTEMS & PIPING; STEAM BLOWING OF THE PIPE LINES; FLOATING OF SAFETY VALVES ETC ARE SOME OF THESE ACTIVITIES LEADING TO COMBINED CYCLE OPERATION, TRIAL OPERATION AND RELIABILITY RUN OF COMPLETE SET. ALL THE ACTIVITIES FOR COMMISSIONING OF THE SET, AS INFORMED BY BHEL FROM TIME TO TIME SHALL BE COMPLETED.

4.6.2

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

4.6.3

CONTRACTOR SHALL LAY / INSTALL NECESSARY TEMPORARY PIPING, TANKS, 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. 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.

4.6.4

FOR THE INSTALLATION OF TEMPORARY SYSTEM AS ABOVE BHEL WILL PROVIDE ONLY THE PIPING, STRUCTURAL ITEMS FOR SUPPORTS AND ACCESS PLATFORMS, TANKS/ PLATES FOR FABRICATION OF TANK, VALVES, GAUGES AND THEIR FITTINGS, AND THERMAL INSULATION. THESE WILL BE SUPPLIED IN RANDOM SIZES / LENGTHS. HOWEVER, 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. ALL ABOVE WORKS SHALL BE CARRIED OUT AS PART OF SCOPE OF WORK. CIRCULATION PUMPS OF SPECIFIED CAPACITIES AND SPECIFICATIONS TO MEET THE REQUIREMENT, SUITABLE MOTORS AND THEIR STARTERS, FOUNDATION/ FRAMES, CABLES, SWITCHES ETC SHALL BE ARRANGED BY THE CONTRACTOR FOR WHICH, NO SEPARATE PAYMENT IS ENVISAGED.

4.6.5
FABRICATION, FIT-UP, PRE-HEATING, WELDING, 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.

4.6.6
CLEANING, SERVICING OF TANKS, VALVES, PUMPS, EQUIPMENTS ETC DURING VARIOUS STAGES OF ERECTION, TESTING AND COMMISSIONING ARE IN THE SCOPE OF WORK. GASKETS, PACKING & SPARES FOR REPLACEMENT WILL BE PROVIDED FREE OF CHARGES BY BHEL.

4.6.7
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.

4.6.8
DURING TRIALS/ 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. SPARES SHALL BE PROVIDED BY BHEL.

4.6.9
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. IF ANY READJUSTMENT AND REALIGNMENT ARE NECESSARY, THE SAME SHALL BE DONE AS PER BHEL ENGINEER'S INSTRUCTIONS. CLAIM, IF ANY, FOR THESE WORKS FROM THE CONTRACTOR SHALL BE GOVERNED BY CLAUSES 13.1 TO 13.8.

4.6.10
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.

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 13.8.

4.6.11
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 UNIT IS TAKEN OVER.

4.6.12
COMMISSIONING ACTIVITIES WILL CONTINUE TILL THE COMPLETION OF TRIAL OPERATION AND RELIABILITY RUN. 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 ALONG WITH NECESSARY TOOLS AND PLANTS, CONSUMABLES ETC AS PART OF WORK.

4.6.13
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.

4.6.14
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.

4.7 **FINAL PAINTING**
GPPC's SPECIFICATION WITH REGARD TO FINAL COLOR SCHEME FOR SHOP AND FIELD PAINTING IS ATTACHED FOR READY REFERENCE.

4.7.1
BHEL WILL PROVIDE THE PRIMER, THINNER & PAINTS FOR FINAL PAINTING. ALL OTHER CONSUMABLES LIKE BRUSH, CLEANING AGENTS ETC AND ALL T&P INCLUDING SCAFOLDING MATERIALS, MANPOWER, SUPERVISION IS CONTRACTOR'S SCOPE.

4.7.2
COMPONENTS OF THE BOILER & AUXILIARIES WILL IN GENERAL BE SUPPLIED PAINTED BY BHEL MANUFACTURING UNITS AS PER THEIR STANDARD APPLICABLE PAINTING SCHEMES. CONTRACTOR SHALL APPLY ONE COAT OF FINISH PAINT ON ALL SUCH COMPONENTS AFTER ERECTION AT SITE UNLESS AND OTHERWISE THE SHOP COATING IS DAMAGED.

ALL EXPOSED METAL PARTS OF THE EQUIPMENT INCLUDING PIPING, SUPPORTS, STRUCTURES, RAILING, TANKS/VESSELS, STEEL STACK, ETC., AS APPLICABLE SHALL BE PAINTED AFTER THOROUGHLY CLEANING THE SURFACE FROM DUST, RUST,

GREASES, OILS, SCALES, ETC, BY WIRE BRUSH, SCRAPPING, MECHANICAL MEANS ETC; AS SPECIFIED IN RELEVANT DOCUMENTS.

THE ABOVE PARTS SHALL THEN BE PAINTED WITH ONE COAT OF SPECIFIED PAINT OVER THE SHOP PRIMER/PAINT.

4.7.3
IN ADDITION TO COMPONENTS/EQUIPMENT AS ABOVE, THERE COULD BE FEW OTHERS WITHOUT ANY PROTECTIVE COATING. SUCH COMPONENTS SHALL FIRST BE THOROUGHLY CLEANED OF ALL DIRT, RUST, SCALES, GREASES, OILS AND OTHER FOREIGN MATERIALS BY WIRE BRUSHING, SCRAPING, WASHING, WIPING WITH SOLVENT OR ANY APPROPRIATE METHOD AND THE SAME BEING INSPECTED AND APPROVED BY BHEL FOLLOWED BY APPLICATION OF ONE COAT OF PRIMER. AFTERWARDS, THE ABOVE PARTS SHALL BE OVER-COATED WITH TWO LAYERS OF SPECIFIED PAINT AS PER PROCEDURE PRESCRIBED BY THE PAINT MANUFACTURER.

4.7.4
WHERE THE SHOP PAINTING HAS PEELED OFF, THE AFFECTED AREA SHALL BE CLEANED THOROUGHLY BY THE SPECIFIED METHOD AND THEN PRIMER COAT APPLIED.

4.7.5
IN ADDITION, MARKING OF COLOR BANDS, LEGENDS AND IDENTIFICATION MARKS, DIRECTION OF FLOW/ROTATION MARKS ETC IN VARIOUS AREAS AS SPECIFIED IS PART OF WORK.

4.7.6
THIS WORK REQUIRES WORKING AT HIGHER ALTITUDES FROM GROUND LEVEL TO AS HIGH AS 70 M. THE WORK SPREAD IS ALSO SUBSTANTIAL INVOLVING SUBSTANTIAL RUN OF STRUCTURES AND PIPING. CONTRACTOR SHALL TAKE SUFFICIENT PRECAUTIONS TO AVOID ANY ACCIDENT AND HAZARD IN ALL RESPECTS. THE ROPES, LADDERS, SCAFFOLDING MATERIALS, CLAMPS ETC AND CLIMBER USED SHOULD BE OF APPROPRIATE QUALITY FOR SAFE AND SMOOTH EXECUTION OF WORK.

4.7.7
CONTRACTOR SHALL CARRY OUT THE WORK IN SUCH A WAY THAT OTHER ERECTED EQUIPMENT, STRUCTURE, CIVIL FOUNDATIONS AND OTHER PROPERTY ARE NOT DAMAGED. FOR DAMAGES IN ANY OF SUCH CASES DUE TO LAPSES BY CONTRACTOR, BHEL SHALL HAVE THE RIGHT TO RECOVER THE COST OF SUCH DAMAGES FROM THE CONTRACTOR.

4.7.8
CONTRACTOR SHALL TAKE DUE CARE TO COVER/PROTECT THE EQUIPMENT WHICH ARE ALREADY PAINTED WHILE CARRYING OUT THE PAINTING OF OTHER ADJACENT EQUIPMENT. IF SO HAPPENS, IT SHALL BE CLEANED AND REPAINTED BY THE CONTRACTOR WITHOUT ANY EXTRA CHARGES.

4.7.9
IN GENERAL, PAINTING OF STRUCTURAL PARTS AND COLOUR BANDS, LETTERING, MARKING OF DIRECTION OF FLOW/ROTATION ETC WILL BE CARRIED OUT BY BRUSH PAINTING. HOWEVER, AREAS/ EQUIPMENT INACCESSIBLE FOR MANUAL PAINTING HAVE TO BE PAINTED BY SPRAY PAINTING. THE DECISION OF BHEL ENGINEER, IN THIS REGARD, SHALL BE FINAL AND BINDING ON THE CONTRACTOR. FOR THE PURPOSE OF SPRAY PAINTING, SERVICE AIR AT ONE POINT WILL BE MADE AVAILABLE BY BHEL FREE OF COST. LAYING OF AIR PIPELINE, HOSE AND ANY OTHER LINE REQUIRED SHALL BE DONE BY CONTRACTOR AT HIS COST. THE CONTRACTOR SHALL PROVIDE SPRAY EQUIPMENT SET.

4.7.10
THE CONTRACTOR SHALL PROVIDE ALL THE NECESSARY SCAFFOLDING MATERIALS, TEMPORARY STRUCTURES AND NECESSARY SAFETY DEVICES ETC, DURING EXECUTION OF THE WORK.

4.7.11
FINAL PAINTING WORK SHALL BE STARTED AFTER OBTAINING CLEARANCE FROM BHEL ENGINEERS AND AS PER HIS INSTRUCTIONS.

4.8
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.

4.9 **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 EXCEPT SPECIFICALLY MENTIONED.

III) ERECTION OF CONTROL PANELS (EXCEPT THAT OF STACK ELECTRICAL WORK IF ANY), MCC ETC, CALIBRATION OF INSTRUMENTS.

IV) ALL ELECTRICAL AND CONTROL & INSTRUMENTATION ITEMS EXCEPT THOSE SPECIFIED HEREIN.

V) CIVIL WORKS EXCEPT TO THE EXTENT SPECIFICALLY INDICATED ELSEWHERE IN THIS TENDER.
VI) PNEUMATIC COPPER TUBING AND FITTINGS THEREOF.

SECTION-5

SPECIAL CONDITIONS OF CONTRACT

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

5.1 CONSTRUCTION OF ACCOMODATION FOR LABOURER AND STAFF:

CONTRACTOR SHALL HAVE TO MAKE HIS OWN ARRANGEMENT FOR ACCOMMODATION OF LABOURERS AND OTHER EMPLOYEES WITH FACILITIES OF ELECTRICITY, WATER, SANITATION, DRAINAGE ETC. BHEL/CLIENT SHALL NOT PROVIDE ANY FACILITY IN THIS REGARD.SIMILARLY CONTRACTOR SHALL MAKE ARRANGEMENT FOR TRANSPORTATION OF HIS LABOUR AND STAFF.

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. PLEASE REFER RELEVANT APPENDIX FOR THE LIST OF T&P BEING PROVIDED BY BHEL FREEE 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
AS REGARDS THE HYDRAULIC TEST PUMPS WHICH HAVE TO BE USED IN FOR THE RESPECTIVE PURPOSE HAVE TO BE ARRANGED BY THE CONTRACTOR. BHEL WILL NOT PROVIDE THESE T & P.

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
CONTRACTOR SHALL TRANSPORT BHEL'S T&P TO & FRO BETWEEN BHEL STORES AND SITE. ADDITIONAL LOOSE COMPONENTS / SUB-ASSEMBLIES / ATTACHMENTS AS AND WHEN NECESSARY, WILL BE ISSUED BY BHEL, TO & FRO BETWEEN BHEL STORES AND SITE OF SUCH ITEMS SHALL ALSO BE DONE BY THE CONTRACTOR. ASSEMBLY OF SUCH ADDITIONAL LOOSE COMPONENTS/SUB-ASSEMBLIES/ ATTACHMENTS IS IN CONTRACTOR'S SCOPE. CONTRACTOR SHALL PROVIDE ALL ENABLING SERVICES WITH TOOLS AND TACKLES FOR ASSEMBLY/DISMANTLING AS ABOVE.

5.2.11
CONTRACTOR SHALL PROVIDE THE FUEL, LUBRICANTS AND ALL OTHER CONSUMABLES FOR ALL THE CRANES DEPLOYED BY HIM.

5.2.12 SCAFFOLDING MATERIALS

CONTRACTOR SHALL PROVIDE ALL THE NECESSARY SCAFFOLDING MATERIALS, TEMPORARY STRUCTURES AND NECESSARY SAFETY DEVICES ETC, DURING ALL STAGES TILL COMPLETION OF WORK. SCAFFOLDING MATERIALS (MS PIPES,

GRATINGS ETC) SHALL BE OF LIGHT WEIGHT CONSTRUCTION. CONTRACTOR SHALL ARRANGE STEEL PIPES & CLAMPS WITH ACCESSORIES LIKE BASE PLATE ATTACHMENT, FIXING PINS, STRUTS ETC FOR SCAFFOLDING REQUIRED FOR THIS WORK. IT IS TO BE SPECIFICALLY NOTED THAT NO WOOD OR ANY SUCH OTHER INFLAMMABLE MATERIAL WILL BE PERMITTED TO BE USED FOR ABOVE APPLICATIONS. ANY SUCH USE ON EACH OCCASSION SHALL INVITE LEVY OF PENALTY AS DEEMED FIT BY BHEL ENGINEER.

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**

CONTRACTOR SHALL PROVIDE PRIMERS/PAINTS ETC FOR PRESERVATION. BHEL WILL ISSUE PAINTS FREE OF CHARGE WHEREVER SPECIFICALLY PROVIDED FOR IN THESE SPECIFICATIONS.

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.

5.4 WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES
5.4.1
FILLER WIRES, FOR TIG WELDING OF TUBES AND PIPING COVERED UNDER THESE SPECIFICATIONS, TO THE EXTENT SUPPLIED BY THE MANUFACTURING UNITS OF BHEL ALONGWITH THE COMPONENTS / EQUIPMENTS ONLY SHALL BE PROVIDED (PROPORTIONATELY WHERE CERTAIN PIPING WORK NOT INCLUDED IN THESE SPECIFICATIONS AND ARE BEING DONE BY OTHER AGENCY) BY BHEL AS FREE ISSUE. CONTRACTOR SHALL AT HIS COST MEET REQUIREMENTS OF TIG FILLER WIRES, IF ANY, BEYOND THESE FREE ISSUES BY BHEL. SIMILARLY, BHEL WILL PROVIDE AS FREE ISSUE THE WELDING ELECTRODE FOR WELDING OF T-91/P-91 MATERIAL TUBES/PIPES RELEASED AS PART OF SUPPLY FROM MANUFACTURING UNIT OF BHEL. FOR WELDING OF T-91/P-91 JOINTS

BHEL TRICHY IS NOT SUPPLYING ANY WELDING ELECTRODE WHEREAS PIPING CENTRE CHENNAI WILL BE SUPPLYING WELDING ELECTRODE FOR

T-91/P-91 WELD JOINTS. ACCORDINGLY CONTRACTOR SHALL PROVIDE WELDING ELECTRODE FOR T-91/P-91 JOINTS FOR SUCH PART.

5.4.2
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.

5.4.3
IT IS TO BE SPECIFICALLY NOTED THAT CONTRACTOR SHALL ARRANGE ALL THE REQUIRED WELDING ELECTRODES AS APPROVED ONLY BY BHEL/CLIENT. 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.

5.4.4
GASES LIKE ARGON, OXYGEN, ACETYLENE ETC THAT ARE REQUIRED FOR ERECTION RELATED ACTIVITIES SHALL BE ARRANGED BY THE CONTRACTOR AT HIS COST.

5.4.5
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.

5.4.6
FOR WELDING OF SS JOINTS, IF ANY, PURGING GASES, PAPER DAMS ETC SHALL BE ARRANGED BY THE CONTRACTOR AS HIS SCOPE.

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 **CONSTRUCTION POWER**
CONSTRUCTION POWER (THREE PHASE, 415V / 440V) WILL BE PROVIDED FREE OF CHARGE AT ONE POINT AT A DISTANCE OF 500M APPROX FROM WORK SITE. HOWEVER ANY TAXES, DUTIES, LEVIES ETC SHALL BE BORNE BY THE CONTRACTOR. REQUIRED ENERGY METER, ALL CABLES, FUSES, DISTRIBUTION BOARDS, SWITCHES, SWITCHBOARDS, BUS BARS, EARTHING ARRANGEMENTS, PROTECTION DEVICES E.G. ELCB, IF ANY, AND ANY OTHER INSTALLATION AS SPECIFIED BY STATUTORY AUTHORITY, CLIENT IN THIS REGARD, FOR DRAWL OF CONSTRUCTION POWER SHALL BE ARRANGED BY THE CONTRACTOR. OBTAINING APPROVALS, PAYMENT OF NECESSARY FEES, DUTIES ETC TOWARDS THE CLEARANCE OF SUCH INSTALLATIONS, PRIOR TO THESE BEING PUT TO USE OR AS MAY BE SPECIFIED, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

5.7.2
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. THE INSTALLATION AND MAINTENANCE OF THIS SHALL BE DONE BY LICENSED AND EXPERIENCED ELECTRICIAN.

5.7.3 **CONSTRUCTION WATER**

CONSTRUCTION WATER WILL BE PROVIDED FREE OF COST BY CLIENT THROUGH BHEL AT A SINGLE POINT IN THE WORK SITE. CONTRACTOR SHALL MAKE ALL NECESSARY ARRANGEMENTS FOR FURTHER DISTRIBUTION UP TO RESPECTIVE WORK SPOTS AT THEIR OWN COST.

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 COMPLETION 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

Refer to Clause 2.8.4 of General Conditions of Contract. Notwithstanding anything contained therein, the following provisions shall be applicable for this contract.

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.

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 certificate specifying name of the services covered under this contract. Contractor has to mention in their RA Bill, the service tax registration number 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.

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.

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.

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.

5.10.0 **SUBMISSION OF PERIODICAL REPORTS**

CONTRACTOR SHALL SUBMIT PERIODICAL REPORTS IN RESPECT OF FOLLOWING ASPECTS OF OPERATION:
CONSUMPTION OF WELDING ELECTRODES AND GASES
CONSUMPTION OF CONSTRUCTION POWER
MANPOWER REPORTS
PROGRESS REPORTS – DAILY & PERIODICALLY
FIELD CALIBRATION REPORTS

BHEL AT SITE WILL INFORM FORMATS FOR THESE REPORTS.

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 RELEVENT APPENDIX. 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 IN THIS TENDER SPECIFICATION.

7.1.4 WELDER'S TEST MATERIALS (ONLY TUBES & PIPES)

BHEL WILL ONLY PROVIDE THE TUBE & PIPE PIECES IN RANDOM SIZES FREE OF CHARGES FOR PREPARATION OF TEST COUPONS FOR CONDUCTING THE SITE QUALIFICATION TEST OF HP/ IBR WELDERS. CONTRACTOR SHALL ARRANGE ON HIS OWN ARRANGE OTHER MATERIALS SUCH AS PLATES, TUBES, PIPES ETC FOR QUALIFICATION OF OTHER WELDERS. CONTRACTOR SHALL PREPARE THE REQUIRED TEST COUPONS. ALL COST IN QUALIFICATION OF HIS WELDERS SHALL BE BORNE BY THE CONTRACTOR.

7.2 FILLER WIRE FOR TIG WELDING AND WELDING ELECTRODE FOR T-91/P-91

REFER SECTION-5 IN THIS REGARD.

7.3 EQUIPMENTS – TOOLS & PLANTS

BHEL WILL PROVIDE MAKE AVAILABLE T&P LISTED VIDE THE RELEVANT APPENDIX HEREIN FREE OF CHARGE. CONTRACTOR SHALL ENSURE THESE ARE MAINTAINED IN WORKING CONDITION DURING THEIR DEPLOYMENT FOR THE WORK AND WHILE RETUNING THE SAME. BHEL RESERVES THE RIGHT TO TAKE PENAL ACTION AS DEEMED FIT IN THE EVENT OF DAMAGES TO THESE ON ACCOUNT OF CONTRACTOR. FURTHER DETAILS ARE AS UNDER:

7.3.1 CRANES TO BE PROVIDED BY BHEL

7.3.1.1

BHEL WILL MAKE AVAILABLE THE CRANES (BHEL OWNED AS WELL AS HIRED) AS PER RELEVANT APPENDIX FREE OF CHARGE TO THE CONTRACTOR ON SHARING BASIS MAINLY FOR THE PURPOSES ENUMERATED VIDE NOTES IN THE ABOVE REFERRED APPENDIX. BHEL 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

ALL ARRANGEMENTS, INCLUDING PROVIDING & LAYING OF SLEEPER BEDS, BACKFILLING OF APPROACHES WHEREVER NECESSARY FOR SAFE MOVEMENT OF THE CRANES AS

DIRECTED BY BHEL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SLEEPERS FOR THIS PURPOSE SHALL BE PROVIDED BY THE CONTRACTOR.

7.3.1.3
CRANES, INCLUDING THE CRANES HIRED BY BHEL, 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, ETC, OF BHEL T & P 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.

7.3.1.5
FOR BHEL HIRED CRANE, THE DAY-TO-DAY UPKEEP AND RUNNING MAINTENANCE LIKE FILLING / TOPPING UP OF LUBRICANTS, ETC, SHALL BE THE RESPONSIBILITY OF HIRING AGENCY. SPARES IF ANY, REQUIRED IN NORMAL COURSE WILL BE PROVIDED AND MAJOR BREAKDOWNS WILL BE ATTENDED TO BY HIRING AGENCY.
7. 3.1.6
CONTRACTOR SHALL PROVIDE FUEL FOR ALL THE CRANES PROVIDED BY BHEL FOR THIS WORK (INCLUDING FOR THE CRANES HIRED BY BHEL).
7.3.1.7
CONTRACTOR SHALL PROVIDE OPERATORS FOR BHEL'S OWN CRANES AND ALSO THE LABOUR CREW FOR DAILY UPKEEP OF THE CRANE.FOR CRANES HIRED BY BHEL OPERATORS AND LABOUR CREW WILL BE PROVIDED BY THE CRANE HIRING AGENY.

7.4 **OTHER T&P**

7.4.1
SPECIAL TOOLS WHICH ARE SUPPLIED BY BHEL AS PART OF ERECTION AND/OR 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.

7.4.3
LUBRICANTS LIKE HYDRAULIC OIL, GEAR OIL AND GREASE FOR BHEL'S T&P WILL BE PROVIDED BY BHEL FREE OF CHARGE. ALL OTHER CONSUMABLES LIKE COTTON WASTE ETC SHALL BE IN THE CONTRACTOR'S SCOPE.

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, CONDUCTANCE 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 WILL BE SUPPLIED BY BHEL AS FREE ISSUE. BHEL WILL PROVIDE PAINTS WITH PRIMER & THINNER FOR FINAL PAINTING.

SECTION-8

SPECIAL CONDITIONS OF CONTRACT

8.0 INSPECTION / QUALITY ASSURANCE / QUALITY CONTROL / STATUTORY INSPECTION

8.0.1

Various inspection/quality control/quality assurance procedures /methods at various stages of erection and commissioning will be as per BHEL/customer quality control procedure/codes/IBR and other statutory provisions and as per BHEL engineer's instructions.

8.0.2

Preparation of quality assurance log sheets and protocols with customer's engineers, welding logs and other quality control and quality assurance documentation as per BHEL engineer's instructions, is within the scope of work/specification.

The protocols between contractor and customer/ BHEL shall be made prior to installation for correctness of foundations, materials, procedures, at each stage of installation, generally as per the requirement of customer/ BHEL. This is necessary to ensure elimination of errors or keeping them within tolerable limits and to avoid accumulation and multiplication of errors.

8.0.3

A daily log book should be maintained by every supervisor/engineer of contractor on the job in duplicate (one for BHEL and one for contractor) for detailing and incorporating alignment/clearance / centring / levelling readings and inspection details of various equipments etc.

High pressure welding details like serial number of weld joints, welders name, date of welding, details of repair, heat treatment etc. will be documented in welding log as per BHEL engineer's instructions.

Record of radiography containing details like serial number of weld joints, date of radiography, repairs, if any, re-shots etc. shall also be maintained as per BHEL engineer's instructions.

Record of heat treatments performed shall be maintained as prescribed by BHEL. Similarly, performance report of all welders shall be furnished for scrutiny of BHEL engineer.

8.0.4

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 and any other specification.

8.0.5

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 / MAHAGENCO. 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.

8.0.6

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.

8.0.7

In the courses of erection, it may become necessary to carry repeated checks of the work with instruments recently calibrated, re-calibrated. Such instruments whenever necessary will be provided by BHEL, on returnable basis, on specific authorisation by BHEL engineer.

8.0.8

Vibration indicators / vibration recorders / vibration analysers will be provided by BHEL for checking and analysing vibration levels of rotating equipments with necessary operators. Contractor shall provide necessary labour for carrying out such tests.

8.0.9

Total quality is the watch word 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 shall provide for the services of quality assurance engineer.

8.1 STAGE INSPECTION BY FES / QA ENGINEERS

8.1.1

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 unit/factory quality assurance and commissioning engineers from technical services of BHEL will also be conducted. Contractor shall arrange all labour, tools and tackles etc. For such stage inspections free of cost.

8.1.2

Any modifications suggested by BHEL FES and QA engineers' team shall be carried out. Claims of contractor, if any, shall be dealt as per clause 13.1 to 13.8, and provided such modifications have not arisen for reasons attributable to the contractor.

8.2 STATUTORY INSPECTION.

8.2.1

The scope includes getting the approvals from the statutory authorities (like boiler inspector, electrical inspector, labour officers, factory inspector and any other statutory

authorities). This includes arranging for inspection visits of boiler inspector, electrical inspector periodically as per BHEL engineer's instructions, submitting documents, radiographs etc. and following up the matter with them for statutory approval/clearance wherever applicable.

8.2.2

All fees connected with the contractors for testing his welders / men / workers and testing, inspection, calibrating of his instruments and equipments, shall be paid by the contractor. It shall be contractor's responsibility to obtain approval of statutory authorities, wherever 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. **,** contractor shall pay all other fees (fees for visits, inspection fees, hydraulic test fees, light up inspection fees, registration fees etc.). **I**n case these inspections have to be repeated due to default / fault of the contractor and fees have to be paid again, the contractor shall have to bear the charges. These would be deducted from his bills.

8.2.3

BHEL, Power Sector – Western Region (PSWR) has already been accredited with ISO 9002 certification and as such this work is subject to various audits to meet ISO 9002 requirements. One particular aspect which needs special mention is about arrangement of calibration of instruments by the contractor. Contractor shall ensure deployment of reliable and calibrated MMDs (instrument measuring and test equipment). The MMDS shall have test / calibration certificates from authorised / government approved / accredited agencies traceable to national / international standards. Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL engineer within the contract price. The contractor will also have alternate arrangements for such MMDs so that work does not suffer when the particular equipment / instrument is sent for calibration. Also if any MMDs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall ie. Repeat the readings taken by that instrument; failing which BHEL may deploy MMD and retake the readings at contractor's cost.

SECTION-9

SPECIAL CONDITIONS OF CONTRACT

SAFETY, OCCUPATIONAL HEALTH AND ENVIRONMENTAL MANAGEMENT

INTRODUCTION:

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 ENDEAVOUR 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
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 <u>NON COMPLIANCE</u>:-

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 **<u>FOR EVERY INSTANCE OF VIOLATION NOTICED</u>**:

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 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 No	YEAR	Amd upto	DESCRIPTION
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 AND 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 368	1983		IMMERSION WATER HEATERS
IS 3696	1991		SAFETY CODE OF SCAFFOLDS AND LADDERS PART 1 TO 2

IS No	YEAR	Amd upto	DESCRIPTION
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 No	YEAR	Amd upto	DESCRIPTION
IS 7205	1974		SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK
IS 7293	1974		SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY
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 INDUSTRIAL 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 TENDERERES, 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 CONTRACT 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.

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 CASE.

SECTION-11

SPECIAL CONDITIONS

11.0 TIME SCHEDULE, MOBILISATION, PROGRESS MONITORING, COMPLETION, OVERRUN, PRICE VARIATION ETC.

11.1 TIME SCHEDULE AND MOBILIZATION

11.1.1
THE CONTRACTOR SHALL MOBILIZE AT SITE TO START THE CONTRACTUAL WORK WITHIN **30 DAYS** FROM ISSUE OF FAX LETTER OF INTENT BY BHEL. CONTRACTOR SHALL AUGMENT HIS RESOURCES FURTHER IN SUCH A MANNER THAT THE ENTIRE WORK IS COMPLETED TO ACHIEVE THE FOLLOWING SCHEDULE:

SN	MILESTONE	COMPLETION SCHEDULE FROM START OF ERN OF (UNIT#1)
01	HYDRAULIC TEST	12^{TH} MONTHS
02	GAS IN	14^{TH} MONTH
03	SAFETY VALVE FLOATING & STEAM BLOWING	16^{TH} MONTH
04	RELIABILITY RUN COMPLETION	18^{TH} MONTH

COMPLETION OF ALL FACILITIES:

COMPLETION OF FACILITIES FOR RESPECTIVE UNITS SHALL BE WITHIN TWO (2) MONTHS OF COMPLETION OF RELIABILITY RUN. HOWEVER, COMMON SYSYTEM BETWEEN THE UNITS SHALL TREATED AS PART OF UNIT#1 AND COMPLETED ACCORDINGLY.

START OF CONTRACT PERIOD SHALL BE RECKONED FROM THE DATE OF ERECTION/PLACEMENT OF FIRST MAJOR EQUIPMENT / MAJOR ASSEMBLY / MAJOR SUB-ASSEMBLY ON ITS DESIGNATED FOUNDATION/LOCATION BY THE CONTRACTOR AND SO CERTIFIED BY BHEL ENGINEER. PLACEMENT OF PACKERS, INSERTS, FOUNDATION BOLTS AND SHIMS, OR CHIPPING OF FOUNDATIONS FOR PACKERS ETC. WILL NOT BE CONSIDERED FOR THIS PURPOSE.

Note: Schedule for completion of the second unit (i.e. Unit no. 2) activities will be with a phase difference of three (3) months after the first unit (i.e. Unit-1).

11.1.2
IN ORDER TO MEET ABOVE SCHEDULE IN GENERAL, AND ANY OTHER INTERMEDIATE TARGETS SET, TO MEET CUSTOMER REQUIREMENTS, CONTRACTOR SHALL ARRANGE ALL NECESSARY RESOURCES IN CONSULTATION WITH BHEL.

11.1.3 **CONTRACT PERIOD**
THE TOTAL CONTRACT PERIOD SHALL BE **23 MONTHS** FROM THE START OF ERECTION WORK AS DEFINED IN CLAUSE 11.1.1 HEREIN EARLIER.

11.1.5 **GRACE PERIOD**
GRACE PERIOD OF **4 MONTHS** BEYOND CONTRACT PERIOD WILL BE APPLICABLE.

11.2 PROGRESS MONITORING, CONTRACT EXTENSION AND OVERRUN

11.2.1 PROGRESS MONITORING

11.2.1.1
PROGRESS WILL BE REVIEWED PERIODICALLY (DAILY / WEEKLY / MONTHLY) INCLUDING MONTH END REVIEW VIS-À-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.

11.2.1.2 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.

11.2.2 **CONTRACT EXTENSION**

12.2.2.1
IF THE COMPLETION OF WORK AS DETAILED IN THESE SPECIFICATIONS GETS DELAYED BEYOND THE END OF CONTRACT PERIOD AND GRACE PERIOD CONTRACTOR SHALL REQUEST FOR AN EXTENSION OF THE CONTRACT. DEPENDING ON THE BALANCE WORK LEFT OUT THEN, BHEL AT ITS DISCRETION MAY EXTEND THE CONTRACT.

11.2.2.2
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. 11.2.1.2 SHALL BE DONE DURING THE EXTENDED PERIOD. THE OVERRUN CHARGES WILL BE PAID IN PROPORTION TO THE ACHIEVEMENT OF THE RESPECTIVE MONTH VIS-À-VIS THE PLAN FOR THE MONTH (FOR ASSESSING THE PERFORMANCE, THE AGREED PLAN SHALL BE REDUCED BY SHORTFALL ATTRIBUTABLE TO THE BHEL). BHEL MAY DISALLOW CONTRACTOR'S CLAIM FOR OVER RUN CHARGES IF THE MONTHLY PROGRAMME AS MENTIONED HERE NOT MADE BY HIM.

11.2.2.3
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.

11.2.3 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 OVER RUN CHARGES AT THE RATE OF **RS. 1, 00,000/** PER MONTH (RUPEES ONE LAKH ONLY). OVER RUN COMPENSATION WILL BE PAID FOR THE EXTENSION ATTRIBUTABLE TO BHEL ONLY. NO OVER RUN COMPENSATION WILL BE PAYABLE FOR THE EXTENSION ON ACCOUNT OF REASONS ATTRIBUTABLE TO CONTRACTOR AND / OR FORCE MAJEURE CONDITIONS.

11.3 PRICE VARIATION

IN ORDER TO TAKE CARE OF VARIATION IN COST OF EXECUTION OF WORK ON EITHER SIDE, DUE TO VARIATION IN THE INDEX OF LABOUR, DIESEL AND ELECTRODE, PRICE VARIATION FORMULA AS DESCRIBED HEREIN SHALL BE APPLICABLE

11.3.1
85% COMPONENT OF CONTRACT VALUE SHALL BE PERMITTED TO BE ADJUSTED FOR VARIATION IN VARIOUS RELEVANT INDICES DURING EXECUTION OF WORK. THE REMAINING 15% SHALL BE TREATED AS FIXED COMPONENT.

11.3.2
THE BASIS FOR CALCULATION OF PRICE VARIATION IN EACH CATEGORY, THEIR COMPONENT, BASE INDEX, BASE DATE OF ACCOUNTING SHALL BE AS UNDER:

.SL NO.	CATEGORY	COMPONENT ('K')	BASE INDEX	BASE DATE
A)	LABOUR (ALL CATEGORIES)	40%	CONSUMER PRICE INDEX FOR INDUSTRIAL WORKERS (GENERAL), APPLICABLE TO 'ALL INDIA' AS PUBLISHED BY LABOUR BUREAU, SHIMLA	Base date shall be calendar month of last date of submission of Tender (including extended date of submission if any)
B)	H.S. DIESEL OIL	5%	WHOLE SALE PRICE INDEX (FOR COMMODITY :HIGH SPEED DIESEL) PUBLISHED BY MINISTRY OF COMMERCE AND INDUSTRY (www.eaindustry.nic.in)	...DO...
C)	WELDING ELECTRODE	40%	WHOLE SALE PRICE INDEX (FOR COMMODITY: ELECTRODES) PUBLISHED BY MINISTRY OF COMMERCE AND INDUSTRY (www.eaindustry.nic.in)	...DO...

11.3.3

Payment/recovery due to variation in index shall be determined on the basis of the following notional formula without any initial absorption, in respect of the identified components viz LABOUR, HS DIESEL and ELECTRODE

$$A = K \times R \times \frac{(X_N - Xo)}{Xo}$$

Where

A = Amount to be paid/recovered due to variation in the Index for Labour, Electrode and HS Diesel

K = Percentage component applicable for Labour, Electrode and HS Diesel

R = Value of work done for the billing month

XN = Revised Index No for Labour, Electrode and HS Diesel for the billing month under consideration

Xo = Index no for Labour, Electrode and HS Diesel as on the Base date. Base date for each of the category is defined in the table above

11.3.4

THE ABOVE PRICE VARIATION FORMULA IS APPLICABLE FOR THE ENTIRE CONTRACT PERIOD, GRACE PERIOD, AND THE EXTENDED CONTRACT PERIOD IF ANY. HOWEVER FOR THE PERIOD EXTENDED ON ACCOUNT OF REASONS ATTRIBUTABLE TO THE CONTRACTOR AND/OR FORCE MAJEURE CONDITIONS, THE PRICE VARIATION WILL BE APPLIED BASED ON THE RESPECTIVE INDICES/PRICES FROZEN AT THE CALENDAR MONTH PRECEEDING THE START OF SUCH EXTENDED PERIOD.

11.3.5

THE PRICE VARIATION IS NOT APPLICABLE TO OVER RUN CHARGES, MANDAY RATES FOR EXTRA WORKS ETC.

SIMILARLY PRICE VARIATION SHALL NOT BE APPLICABLE FOR THE RESPECTIVE % ASSIGNED TO MILESTONE ACTIVITIES VIZ OIL FLUSHING, BARRING GEAR, COMMISSIONING OF CONDENSATE SYSTEM, COMMISSIONING OF FEED WATER SYSTEM AND SYNCHRONISATION

11.3.6

THE CONTRACTOR SHALL FURNISH NECESSARY MONTHLY BULLETINS FOR WHOLE SALE PRICE INDEX (FOR COMMODITY :ELECTRODES AND HS DIESEL) PUBLISHED BY MINISTRY OF COMMERCE AND INDUSTRY (WWW.EAINDUSTRY.NIC.IN) AND CONSUMER PRICE INDEX FOR INDUSTRIAL WORKERS (GENERAL), APPLICABLE TO 'ALL INDIA' AS PUBLISHED BY LABOUR BUREAU, SHIMLA.

11.3.7

THE CONTRACTOR WILL BE REQUIRED TO RAISE THE BILLS FOR PRICE VARIATION PAYMENTS ON A MONTHLY BASIS ALONG WITH THE RUNNING BILLS IRRESPECTIVE OF THE FACT WHETHER ANY INCREASE/DECREASE IN THE CONSUMER PRICE INDEX FOR LABOUR, HS DIESEL AND ELECTRODE HAS TAKEN PLACE OR NOT. IN CASE THERE IS DELAY IN PUBLICATION OF BULLETINS (FINAL FIGURE), THE PROVISIONAL VALUES AS PUBLISHED CAN BE CONSIDERED FOR PAYMENTS AND ARREARS SHALL BE PAID/RECOVERED ON GETTING THE FINAL VALUES.

11.3.8

THE TOTAL QUANTUM OF PRICE VARIATION SHALL NOT EXCEED FIFTEEN PERCENTAGE (15%) OF EXECUTED CONTRACT VALUE. EXECUTED CONTRACT VALUE FOR THIS 15% CAP SHALL NOT INCLUDE OVERRUN CHARGES, EXTRA WORKS.

11.3.9

WITH THE ABOVE PROVISION, THE CLAUSE NO. 2.15 OF GENERAL CONDITIONS OF CONTRACT SECTION-2 IS NOT APPLICABLE.

11.4 CONTRACT VARIATIONS

11.4.1 VARIATION IN QUANTITIES

WEIGHT OF VARIOUS EQUIPMENTS, QUANTITIES OF VARIOUS ITEMS OF WORK, ETC. 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, WHEREVER UNIT RATE IS APPLICABLE. PAYMENT WILL BE MADE BY BHEL FOR THE ACTUAL EXECUTED QUANTITIES IN SUCH CASES.

11.5 INTEREST BEARING ADVANCE

INTEREST BEARING (RATE OF INTEREST SHALL BE PRIME LEADING RATE OF SBI PLUS 2% PER ANNUM, 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 BY THE TIME CONTRACTOR REACHES 90% BILLING OF TOTAL VALUE OF WORK EXECUTED & WITHIN THE CONTRACT PERIOD (INCLUDING EXTENSIONS GRANTED OR FORECLOSURE IF ANY).

11.6 DEFINITION OF WORK COMPLETION

THE CONTRACTOR'S SCOPE OF WORK UNDER THESE SPECIFICATIONS WILL DEEM 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 RA account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar 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, on specific request of vendor, this amount may be released on pro rata basis for the value of work executed and accepted by BHEL, along with any RA Bill and onwards, subject to receipt and acceptance of bank guarantee of equal amount in BHEL's prescribed format. 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

12.1.1 FOR PIPES, VALVES, & HANGERS & SUPPORTS

1. 30% OF CONTRACT RATE ON PRO RATA BASIS AFTER COMPLETION OF ERECTION.

2. 40% OF CONTRACT RATE ON PRO RATA BASIS ON COMPLETION OF ALIGNMENT AND WELDING/ BOLTING ETC.

3. 15% OF CONTRACT RATE ON PRO RATA BASIS ON COMPLETION OF RADIOGRAPHY AND OTHER NDE AS APPLICABLE AND HEAT TREATMENT IF ANY.

4. 5% OF CONTRACT RATE ON PRO RATA BASIS ON COMPLETION OF HYDRAULIC TEST/ PRESSURE DECAY TEST OR ANY OTHER TEST AS APPLICABLE FOR RESPECTIVE LINES.

5. 2% OF CONTRACT RATE ON PRO RATA BASIS ON COMPLETION OF PERMANENT SUPPORTS, COLD-SETTING OF HANGERS.

6. 4% OF CONTRACT RATE ON PRO RATA BASIS ON COMPLETION STEAM BLOWING

7. 2% OF CONTRACT RATE ON PRO RATA BASIS ON SYNCHRONIZATION OF THE UNIT..

8. 1% OF CONTRACT RATE ON PRO RATA BASIS AFTER HOT CORRECTION OF HANGERS AND ACCEPTANCE ON A JOINT PROTOCOL BY BHEL AND CLIENT.

9. 1% OF THE CONTRACT RATE ON PRORATA BASIS AFTER SATISFACTORY COMPLETION OF FINAL PAINTING.

12.1.2 HRSG AND IT'S AUXILIARIES

100% OF ITEM RATE FOR VARIOUS ITEMS OF HRSG AND ITS AUXILIARIES WILL BE RELEASED, BASED ON CERTIFIED QUANTITY BY BHEL ENGINEER, AS PRO-RATA PROGRESSIVE PAYMENT AS PER THE STAGE BREAK UP GIVEN HEREUNDER:

SL. NO.	PART OF THE ACTIVITY COMPLETED	PERCENTAGE OF ACCEPTED ITEM RATES (REF RESPECTIVE S.NO. RATE SCHEDULE)			
		NON-PRESSURE PARTS, STACK	STRUCTURES	PRESSURE PARTS, HEAT TRAN. MOD	INSULATION
A	ERECTION / PLACEMENT	45%	45%	40%	---
B	ALIGNMENT / WELDING / BOLTING WITH PERMANENT SUPPORTS	40%	50%	40%	---
C	GAS TIGHTNESS TEST / KEROSENE LEAK TEST / LPI TEST AS APPLICABLE	10%	---	---	---
D	RADIOGRAPHY, HEAT TREATMENT AND OTHER NDE TEST COMPLETION	---	---	10%	---

SL. NO.	PART OF THE ACTIVITY COMPLETED	PERCENTAGE OF ACCEPTED ITEM RATES (REF RESPECTIVE S.NO. RATE SCHEDULE)			
		NON-PRESSURE PARTS, STACK	STRUCTURES	PRESSURE PARTS, HEAT TRAN. MOD	INSULATION
E	APPLICATION OF THERMAL INSULATION	---	---	---	95%
F	ON COMPLETION OF HYDRAULIC TEST OF HRSG	-	-	5%	0
G	ON COMPLETION OF GAS IN	1%	1%	1%	1%
H	ON COMPLETION OF SAFETY VALVE FLOATING	1%	1%	1%	1%
I	ON COMPLETION OF TRIAL OPERATION	1%	1%	1%	1%
J	ON COMPLETION OF FINAL PAINTING	1%	1%	1%	1%
K	ON COMPLETION OF ALL FACILITIES OF HRSG	1%	1%	1%	1%
	TOTAL	100%	100%	100%	100%

12.1.2 RO-DM PLANT

100% OF LUMPSUM PRICE FOR E&C OF RO-DM PLANT WILL BE RELEASED IN RESPECT OF EACH UNIT, BASED ON CERTIFIED COMPLETION OF RESPECTIVE SYSTEM BY BHEL ENGINEER AS PROGRESSIVE PAYMENT AS PER THE BREAK UP OF SUBSYSTEMS GIVEN HEREUNDER:

SL. NO.	COMPLETION OF THE ACTIVITY	PERCENTAGES OF LUMPSUM PRICE (REF SECTION-B. RATE SCHEDULE)		
		ERECTION /INSTALLATION	TRIALS, TESTING & COMMISSIONING	TOTAL
1	DOSING SYSTEM	4%	1%	5%
2	PRETREATMENT SYSTEM	8%	2%	10 %
3	RO SYSTEM (SWRO &BWRO) AND DEGASSER	24%	6%	30 %

SL. NO.	COMPLETION OF THE ACTIVITY	PERCENTAGES OF LUMPSUM PRICE (REF SECTION-B. RATE SCHEDULE)		
		ERECTION /INSTALLATION	TRIALS, TESTING & COMMISSIONING	TOTAL
4	CHEMICAL CLEANING & FLUSHING SYSTEM	8%	2%	10 %
5	PIPING & VALVES	8%	2%	10 %
6	SUPPORT STRUCTURES	4%	1%	5 %
7	DM SYSTEM	20%	5%	25%
8	MISCELLANEOUS SYSTEMS	4%	1%	5 %
TOTAL				100 %

12.1.3
FOR PAYMENT OF TEMPORARY SYSTEM FOR CHEMICAL CLEANING AND STEAM BLOWING OF HRSG 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 JOINTLY MEASURED QUANTITY AND CORRESPONDING STANDARD WEIGHTS. PAYMENT WILL BE MADE AT THE RATE APPLICABLE FOR **NON-PRESSURE PARTS** FOR ITEMS. SIMILARLY, NO PAYMENT WILL BE MADE FOR TEMPORARY SYSTEM INSTALLED FOR CONDUCTING HYDRAULIC TEST OF VARIOUS PIPING SYSTEMS ,HRSG AND RO-DM PLANT.

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.

12.3 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 AN 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 BE IGNORED FOR THE PURPOSE 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) WASTAGE ALLOWANCE PROVIDED ELSEWHERE ON APPLICATION OF REFRACTORY & INSULATION WILL BE APPLIED ON THE NET ISSUED QUANTITY. THE NET ISSUED QUANTITY IS GROSS ISSUE LESS THE QUANTITY RETURNED. THE WASTAGE ALLOWANCE WILL BE APPLIED AT THE FINAL RECONCILIATION STAGE. THE PAYABLE AMOUNT WILL THEN BE RESTRICTED TO THE NET QUANTITY AFTER WASTAGE ALLOWANCE.

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

SECTION-13

SPECIAL CONDITIONS OF CONTRACT

13.0 EXTRA CHARGES FOR RECTIFICATION AND MODIFICATION

13.1
IF EXTRA WORKS (REQUIRING UP TO **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, 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 ON MANDAY BASIS, FOR SUCH OF THOSE ACTIVITIES 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 CONTAINED HEREINAFTER. 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
EXTRA WORKS SHOULD BE DONE BY A SEPARATELY IDENTIFIABLE GANG, WITHOUT AFFECTING ROUTINE ACTIVITIES. DAILY LOG SHEETS IN THE PROFORMA 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 MAN-HOUR LOG SHEETS. IT MAY, HOWEVER, BE NOTED THAT SIGNING OF LOG SHEETS BY BHEL ENGINEER DOES NOT MEAN THE ACCEPTANCE OF SUCH WORKS AS PAYABLE EXTRA WORKS.

13.5
SUCH EXTRA WORKS ARISING OUT OF TRANSIT, STORAGE AND ERECTION DAMAGES, PAYMENT, IF FOUND DUE, WILL BE REGULATED AS PER SECTION-14.

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

13.7
IT SHALL BE NOTED THAT ALL EXTRA WORKS THAT ARISE ON ACCOUNT OF THE CONTRACTOR'S FAULT, 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.
13.7
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 FOR 8 WORKING HOURS, INCLUDING OVERTIME IF ANY, AND OTHER SITE EXPENSES AND INCIDENTALS, INCLUDING SUPREVISION, CONSUMABLES, TOOLS AND TACKLES, WILL BE **RS. 320/- (RUPEES THREE HUNDRED 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.

15.0 EARNEST MONEY DEPOSIT , SECURITY DEPOSIT & BANK GUARANTEE

15.1 Earnest Money Deposit:

i) EMD for this tender is Rs. 2,00,000/- (Rupes Two lakhs only).
ii) Bidders who have already deposited One Time EMD of Rs. 2.00 lakh are exempted from submission of EMD for this tender. However a copy of 'One Time EMD' certificate issued by BHEL/PSWR, Nagpur shall be enclosed along with the Offer.
iii) EMD is to be paid in cash (as permissible under Income Tax Act), Pay order or Demand Draft in favour of Bharat Heavy Electricals Limited and payable at Nagpur.
iv) No other form of EMD remittance shall be acceptable to BHEL.

15.1.1 EMD by the bidder will be forfeited as per Tender Documents if

i) After opening the tender, the bidder revokes his tender within the validity period or increases his earlier quoted rates.

ii) The bidder 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.

15.1.3 In the case of unsuccessful bidders, the Earnest Money will be refunded to them after acceptance of tender by successful bidder

15.2 Security Deposit

15.2.1 Security Deposit shall be furnished by the successful bidder. 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 should be furnished before start of the work by the contractor.

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. 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 the 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 (either by cash/DD or **BG for maximum 50%** of total SD) before start of the work and the balance 50% may be recovered from the running bills.

viii. EMD of the successful bidder shall be converted and adjusted against the cash Security Deposit excepting for such bidder who has remitted One Time EMD.

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

15.3 BANK GUARANTEE

i. It is the responsibility of the bidder to get the Bank Guarantees revalidated/extended for the required period as per the advice of BHEL Site Engineer / Construction Manager. BHEL shall not be held liable for issue of any reminders regarding expiry of the Bank Guarantees.

ii. In case extension/further extensions of any Bank Guarantees are not required, the bidders shall ensure that the same is explicitly conveyed through the Construction Manager to BHEL PSWR/HQ, Nagpur

iii. In case the Bank Guarantees are not extended before the expiry date, BHEL reserves the right to invoke the same by informing the concerned Bank in writing, without any advance notice/communication to the concerned bidder.

iv. **Bidders to note that any corrections to Bank Guarantees shall be done by the issuing Bank, only through an amendment in an appropriate non judicial stamp paper.**

v. Bidders to ensure that the Bank Guarantees submitted are exactly as per format given in the Tender documents.

vi. The Original Bank Guarantee shall be sent directly by the Bank to BHEL under Registered Post (Acknowledgement Due). However, in exceptional cases, where guarantee is directly received by Vendor, the Vendor shall instruct the Bank to send an unstamped duplicate copy of the guarantee directly to BHEL under Registered Post (Acknowledgement Due).

15.3.1 Guidelines for acceptance of Bank Guarantees are as follows :

- Vendors are advised to obtain BG from any of the following BHEL consortium banks

State Bank of India	The Hongkong and Shanghai banking Corporation Ltd.
ICICI Bank Ltd	ABN Amro Bank N.V
Bank of Baroda	IDBI Ltd
Canara Bank	Punjab National Bank
Citi bank N.A	Standard Chartered Bank
Corporation Bank	State Bank of Travancore
Detshe Bank	State Bank of Hydrabad
HDFC Bank Ltd	Syndicate Bank

- The Bank Guarantees of all Public sector banks shall be accepted (Other than consortium banks also).
- The Bank Guarantees of Co-operative banks shall not be accepted.
- Bank Guarantees of other banks (banks other than consortium bank, public sector bank, & Co-operative banks) can be accepted subject to an overall exposure limit (at BHEL, PSWR, Nagpur) of RS. 10 crores for banks with net worth of more than Rs. 500 crores as on last balance sheet date and Rs 5 crores for banks with net worth between Rs. 350 to Rs 500 crores(A certificate and copy of latest Balance Sheet to be given at the time of submission of bank guarantees .
- In case Bank Guarantees given by non consortium banks (Private sector or Public sector), the bank Guarantees shall be enforceable at Nagpur, Maharastra.

APPENDIX-I

DETAILS OF QUANTITIES

(A) ESTIMATED WEIGHT OF VARIOUS PRODUCT GROUPS OF FOR BOTH UNITS:

1. STRUCTURES:

PG	MA	DESCRIPTION	TOTAL WEIGHT (IN KGS)
35	110	MAIN COLUMN LEFT	331341.596
35	120	MAIN COLUMN RIGHT	315042.536
35	130	INLET DUCT COLUMNS	59476.06
35	140	AUX COLUMNS	11579.528
35	220	PR.PARTS SUPPORT ON RO	49405.262
35	520	COLUMN SIDE BRACING	7155.96
35	591	BOTTOM BRACING BEAM	90742.246
35	592	TOP BRACING BEAM	169162.876
35	593	CROSS BEAMS	54389.08
35	594	STIFFENER BEAMS	125004.712
35	595	STACKING BEAM ARRGT	49433.498
35	596	PACKING BEAM ARRGT	233589.764
35	597	PR.PART SUPPORT	87891.148
35	610	BOILER ROOF STRUCTURE	133280.292
35	611	BOILER ROOF SHEETING (P	25000
36	210	MAIN FLOOR I LEVEL	14948.564
36	220	MAIN FLOOR II LEVEL	7406.776
36	230	MAIN FLOOR III LEVEL	6815.536
36	240	MAIN FLOOR IV LEVEL	87379.4
36	250	MAIN FLOOR V LEVEL	5679.632
36	810	FLOORGRILLS&GUARD PLATE	120000
36	820	STAIRS AND LADDERS (G.I	25728.694
36	850	PLATFORMS AND LADDERS (	37343.294
TOTAL			**2047797**

* : FOR INFORMATION ONLY AND WEIGHT NOT INCLUDED IN THE TOTAL. THESE ARE NON-PAYABLE ITEMS.

2. PRESSURE PARTS INCLUDING HEAT TRANSFER MODULES:

PG	MA	DESCRIPTION	TOTAL WEIGHT (IN KGS)
04	116	BOILER DRUM WITH INTERN	76071.47
04	118	BOILER DRUM WITH INTERN	312985.57
04	144	DRUM SLIDE BEARING PLAT	260.00
04	146	DRUM SLIDE BEARING PLAT	260.00
04	148	DRUM SLIDE BEARING PLAT	260.00
04	149	FASTENERS FOR DRUM SADD	46.56
04	156	FASTENERS FOR DRUM SADD	36.24
04	158	FASTENERS FOR DRUM SADD	36.24

04	176	BOILER DRUM WITH INTERN	42041.98
07	206	RISER PIPES - HP	18750.24
07	207	RISER PIPES - IP	3731.16
07	208	RISER PIPES - LP	7145.58
07	210	RISER HEADERS & LINKS -	30510.71
07	211	RISER HEADERS & LINKS -	3596.40
07	212	RISER HEADERS & LINKS -	5429.64
07	411	DOWNCOMER SUSPENSIONS-H	2579.40
07	412	DOWNCOMER SUSPENSIONS-I	1872.82
07	413	DOWNCOMER SUSPENSIONS-L	1041.42
07	504	EVAP. MODULE SUPPORTS-H	6477.72
07	505	EVAP. MODULE SUPPORTS-H	15279.08
07	506	EVAP. MODULE SUPPORTS-I	3038.40
07	507	EVAP. MODULE SUPPORTS-I	3646.12
07	508	EVAP. MODULE SUPPORTS-L	7380.82
07	510	EVAP. MODULE SUPPORTS-L	1927.86
08	910	EXPN MOVEMENT MEASURING	3865.40
10	121	HPSH-II-INLET HEADER	11000.00
10	135	HPSH-IA-INLET HEADER	5000.00
10	221	HPSH-II-OUTLET HEADER	16000.00
10	235	HPSH-IA-OUTLET HEADER	21000.00
10	236	HPSH-IB-OUTLET HEADER	11000.00
12	850	HP SAT. STEAM CONNECTIN	11400.00
12	852	HP SH DE SUPERHEATER L	27200.00
12	853	LP SAT. STEAM CONNECTIN	4800.00
12	855	IP SAT. STEAM CONNECTIN	3400.00
12	900	HP SH DE SUPERHEATER	1751.43
12	901	HP SH. LINK SUPPORTS	4500.00
12	902	IP SH. LINK SUPPORTS	2500.00
12	904	LP SH. LINK SUPPORTS	3000.00
12	911	LP SH MODULE SUPPORTS	631.16
12	912	IP SH MODULE SUPPORTS	471.98
12	913	HP SH MODULE SUPPORTS	5101.73
15	138	REHEATER-II-INTLET HEADE	16000.00
15	174	REHEATER-I-INLET HEADER	12000.00
15	238	REHEATER-II-OUTLET HEADE	14000.00
15	274	REHEATER-I-OUTLET HEADER	16000.00
17	852	REHEATER DESH-LINKS	45200.00
17	900	REHEATER DESH	3194.02
17	901	RH LINK SUPPORTS	1000.00
17	904	RH MODULE SUPPORTS	5576.65
17	905	HRH & CRH LINK SUPPORTS	6000.00
19	101	CPH INLET LINE	5800.00
19	102	CPH OUTLET LINE	4224.86
19	850	HP ECONOMISER FEED PIPE	4400.00
19	851	HP ECONOMISER LINK TO D	4800.00
19	852	HP ECO. I & II MODULE	3200.00
19	853	LP ECONOMISER FEED PIPE	800.00

19	854	IP ECONOMISER FEED PIPE	400.00
19	855	IP ECO LINK TO DRUM	2400.00
19	856	HP ECO-II & III CONNECT	2800.00
19	857	HP ECO-III (FRONT & REA	3800.00
19	901	HP ECONOMISER LINK SUPP	9000.00
19	904	LP ECONOMISER LINK SUPP	800.00
19	905	IP ECONOMISER LINK SUPP	1000.00
19	908	SUPPORTS FOR CPH LINKS	2776.57
19	911	CPH MODULE SUPPORTS	8996.71
19	912	HP ECO-III MODULE SUPPO	10289.04
19	913	HP ECO-III MODULE SUPPO	4062.40
19	914	HP ECO-II MODULE SUPPOR	6197.90
19	915	HP ECO-I MODULE SUPPORT	483.43
19	916	IP ECO MODULE SUPPORTS	1303.14
24	200	DRAINS,VENTS & FITTINGS	10000.00
24	201	BOILER TRIM PIPING SUPP	3000.00
24	273	LP DRUM WATER LEVEL GUA	529.70
24	275	LP DRAIN HEADER	800.00
24	280	LP SAFETY VALVES	1096.20
24	300	DRAINS,VENTS & FITTINGS	12000.00
24	301	BOILER TRIM PIPING SUPP	3000.00
24	360	BHEL VALVES FOR IP CIRC	10000.00
24	373	IP DRUM WATER LEVEL GUA	529.70
24	375	IP DRAIN HEADERS	1000.00
24	380	IP SAFETY VALVES	3656.40
24	400	HP DRAINS,VENTS&FITTING	36000.00
24	401	BLR TRIM PIPING SUPPORT	6000.00
24	460	BHEL VALVES FOR HP CIRC	20000.00
24	465	BELLOWS& VALVES(SUB-DEL	16000.00
24	473	HP DRUM LEVEL GUAGE	529.70
24	475	HP DRAIN HEADERS	1200.00
24	480	HP SAFETY VALVES&ERV	1692.20
24	994	NAME PLATES	410.90
97	402	EWLI	1000.00
HL	101	EVAPORATOR MODULE ASSY.	181195.52
HL	102	EVAPORATOR MODULE ASSY.	181195.52
HL	103	EVAPORATOR MODULE ASSY.	181195.52
HL	104	EVAPORATOR MODULE ASSY.	105558.92
HL	105	EVAPORATOR MODULE ASSY.	105558.92
HL	106	EVAPORATOR MODULE ASSY.	105558.92
HL	111	EVAPORATOR MODULE ASSY.	70114.40
HL	112	EVAPORATOR MODULE ASSY.	70114.40
HL	113	EVAPORATOR MODULE ASSY.	70114.40
HL	114	EVAPORATOR MODULE ASSY.	84124.48
HL	115	EVAPORATOR MODULE ASSY.	84124.48
HL	116	EVAPORATOR MODULE ASSY.	84124.48
HL	121	EVAPORATOR MODULE ASSY.	168291.12
HL	122	EVAPORATOR MODULE ASSY.	168291.12

HL	123	EVAPORATOR MODULE ASSY.	168291.12
HL	124	EVAPORATOR MODULE ASSY.	42065.44
HL	125	EVAPORATOR MODULE ASSY.	42065.44
HL	126	EVAPORATOR MODULE ASSY.	42065.44
HL	131	HP SH-II MODULE ASSY	32555.97
HL	132	HP SH-II MODULE ASSY	32555.97
HL	133	HP SH-II MODULE ASSY	32555.97
HL	134	HP SH-I MODULE ASSY	49092.29
HL	135	HP SH-I MODULE ASSY	49092.29
HL	136	HP SH-I MODULE ASSY	49092.29
HL	141	LP SH MODULE ASSY	11157.01
HL	142	LP SH MODULE ASSY	11157.01
HL	143	LP SH MODULE ASSY	11157.01
HL	147	IP SH MODULE ASSY	10653.93
HL	148	IP SH MODULE ASSY	10653.93
HL	149	IP SH MODULE ASSY	10653.93
HL	151	HP ECO-III MODULE ASSY	224405.18
HL	152	HP ECO-III MODULE ASSY	224405.18
HL	153	HP ECO-III MODULE ASSY	224405.18
HL	154	HP ECO-III MODULE ASSY	89763.20
HL	155	HP ECO-III MODULE ASSY	89763.20
HL	156	HP ECO-III MODULE ASSY	89763.20
HL	157	HP ECO-II MODULE ASSY	179472.50
HL	158	HP ECO-II MODULE ASSY	179472.50
HL	159	HP ECO-II MODULE ASSY	179472.50
HL	161	HP ECO-I MODULE ASSY	14960.83
HL	162	HP ECO-I MODULE ASSY	14960.83
HL	163	HP ECO-I MODULE ASSY	14960.83
HL	164	IP ECO. MODULE ASSY	24721.48
HL	165	IP ECO. MODULE ASSY	24721.48
HL	166	IP ECO. MODULE ASSY	24721.48
HL	171	CPH MODULE ASSY.	196737.44
HL	172	CPH MODULE ASSY.	196737.44
HL	173	CPH MODULE ASSY.	196737.44
HL	181	RH-II MODULE ASSY	41356.15
HL	182	RH-II MODULE ASSY	41356.15
HL	183	RH-II MODULE ASSY	41356.15
HL	184	RH-I MODULE ASSY	34104.96
HL	185	RH-I MODULE ASSY	34104.96
HL	186	RH-I MODULE ASSY	34104.96
HL	201	LINKS FOR EVAP. MODULES	7945.20
HL	202	LINKS FOR EVAP. MODULES	7945.20
HL	203	LINKS FOR EVAP. MODULES	7945.20
HL	204	LINKS FOR EVAP. MODULES	30462.70
HL	205	LINKS FOR EVAP. MODULES	7180.10
HL	206	LINKS FOR EVAP. MODULES	30462.70
HL	211	LINKS FOR EVAP. MODULES	571.20
HL	212	LINKS FOR EVAP. MODULES	571.20

HL	213	LINKS FOR EVAP. MODULES	571.20
HL	214	LINKS FOR EVAP. MODULES	7931.12
HL	215	LINKS FOR EVAP. MODULES	2021.06
HL	216	LINKS FOR EVAP. MODULES	7929.88
HL	221	LINKS FOR EVAP. MODULES	583.42
HL	222	LINKS FOR EVAP. MODULES	583.42
HL	223	LINKS FOR EVAP. MODULES	583.42
HL	224	LINKS FOR EVAP. MODULES	4205.52
HL	225	LINKS FOR EVAP. MODULES	1339.62
HL	226	LINKS FOR EVAP. MODULES	4204.32
HL	231	HP SH-II CROSSOVER ASSY	5060.57
HL	232	HP SH-II CROSSOVER ASSY	5060.57
HL	233	HP SH-II CROSSOVER ASSY	5060.57
HL	234	HP SH-I CROSSOVER ASSY	10560.54
HL	235	HP SH-I CROSSOVER ASSY	10560.54
HL	236	HP SH-I CROSSOVER ASSY	10560.54
HL	251	HP ECO-III CROSSOVER AS	2056.77
HL	252	HP ECO-III CROSSOVER AS	2056.77
HL	253	HP ECO-III CROSSOVER AS	2056.77
HL	254	HP ECO-III CROSSOVER AS	625.10
HL	255	HP ECO-III CROSSOVER AS	625.10
HL	256	HP ECO-III CROSSOVER AS	625.10
HL	257	HP ECO-II CROSSOVER ASS	1199.32
HL	258	HP ECO-II CROSSOVER ASS	1199.32
HL	259	HP ECO-II CROSSOVER ASS	1199.32
HL	264	IP ECO. CROSS OVER ASSY	442.00
HL	265	IP ECO. CROSS OVER ASSY	442.00
HL	266	IP ECO. CROSS OVER ASSY	442.00
HL	271	LINKS FOR CPH MODULES-	3092.24
HL	272	LINKS FOR CPH MODULES-	3092.24
HL	273	LINKS FOR CPH MODULES-	3092.24
HL	281	RH-II CROSS OVER ASSY	6371.68
HL	282	RH-II CROSS OVER ASSY	6371.68
HL	283	RH-II CROSS OVER ASSY	6371.68
HL	284	RH-I CROSS OVER ASSY	6842.10
HL	285	RH-I CROSS OVER ASSY	6842.10
HL	286	RH-I CROSS OVER ASSY	6842.10
HL	301	MODULE COMPNTS- HP FRON	3469.35
HL	302	MODULE COMPNTS- HP FRON	18799.47
HL	303	MODULE COMPNTS- HP FRON	3469.35
HL	304	MODULE COMPNTS- HP REAR	5863.05
HL	305	MODULE COMPNTS- HP REAR	21311.12
HL	306	MODULE COMPNTS- HP REAR	5863.05
HL	311	MODULE COMPNTS- IP FRON	4190.08
HL	312	MODULE COMPNTS- IP FRON	17367.56
HL	313	MODULE COMPNTS- IP FRON	4190.08
HL	321	MODULE COMPNTS- LP FRON	5463.95
HL	322	MODULE COMPNTS- LP FRON	18690.24

HL	323	MODULE COMPNTS- LP FRON	5463.95
HL	331	HP SH MODULE COMPONENTS	1800.00
HL	332	HP SH MODULE COMPONENTS	1800.00
HL	333	HP SH MODULE COMPONENTS	1800.00
HL	351	HP ECO-III MODULE COMPO	4400.00
HL	352	HP ECO-III MODULE COMPO	4400.00
HL	353	HP ECO-III MODULE COMPO	4400.00
HL	354	HP ECO-III MODULE COMPO	4400.00
HL	355	HP ECO-III MODULE COMPO	4400.00
HL	356	HP ECO-III MODULE COMPO	4400.00
HL	357	HP ECO-II MODULE COMPON	4400.00
HL	358	HP ECO-II MODULE COMPON	4400.00
HL	359	HP ECO-II MODULE COMPON	4400.00
HL	371	LINKS FOR CPH MODULES-	8473.22
HL	372	LINKS FOR CPH MODULES-	34231.73
HL	373	LINKS FOR CPH MODULES-	8473.22
TOTAL			**6125075.93**

3. LINING & INSULATION:

TIRUCHI SUPPLY:

28-700	PINS AND B P S COMPONE	11,739.200
32-010	FIXING COMP. INLET DUCT SIDE	7,165.413
32-110	FIXING COMP. INLET DUCT TOP	4,508.743
32-210	FIXING COMP. INLET DUCT BOTTOM	2,941.541
32-310	FIXING COMP. CASING -SH	4,424.964
32-410	FIXING COMP. CASING -HP EVAP	7,094.230
32-510	FIXING COMP. CASING -IP EVAP	6,177.710
32-520	FIXING COMP. CASING -LP EVAP	5,492.263
32-610	FIXING COMP. PIPING INSULATION	12,464.055
32-710	FIXING COMP. CASING -HP ECO	2,573.187
32-720	FIXING COMP. CASING -IP EVAP	3,262.836
32-810	FIXING COMP. OUTLET DUCT	1,777.600
32-910	FIXING COMP. CASING -CPH	5,502.504
33-021	I D CERAMIC WOOL	84,216.000
33-621	MINERAL WOOL FOR PIPING	195,060.000
33-970	MISC. EQIPMENTS EXPANSION METAL	1,050.000
33-975	SEALING COMPONENTS	200.000
37-810	OUTER CASING SHEET	18,335.000
87-950	CHIMNEY INSULATION	38000
87-960	CHIMNEY INSULATION-FIXING COMPONENTS	18000
	TOTAL	**429985.2**

OTTHER LINING & INSULATION ITEMS:

SUPPLIED BY PEM : 350 MT APPROX
SUPPLIED BY HYDERABAD : 22 MT APPROX

4. CHIMNEY:

87-100	CHIMNEY SHELL	630000
87-150	CHIMNEY STRAKES	882000
87-200	PAINTER'S TROLLY	6000
87-300	PLATFORMS &LADDERS	21000
87-930	AVIATION LAMPS & LIGHTNING ARRESTORS	2000
	TOTAL	**1541000**

5. NON-PRESSURE PARTS:

PG	MA	Description	TOTAL WEIGHT (IN KGS)
24	220	LP SAFETY VALVE ESCAPE	3200.00
24	225	LP SAFETY VALVE ESCAPE	4000.00
24	260	BHEL VALVES FOR LP CIRCU	10000.00
24	285	LP SAFETY VALVE SILENCE	4384.00
24	290	LP START-UP VENT SILENC	1096.00
24	320	IP SAFETY VALVE ESCAPE	7000.00
24	325	IP SAFETY VALVE ESCAPE	5000.00
24	385	IP SAFETY VALVE SILENCE	26184.00
24	390	IP START-UP VENT SILENC	1096.00
24	420	HP SAFETY VALVE ESCAPE	10000.00
24	425	HP SAFETY VALVE ESCAPE	7000.00
24	485	HP SAFETY VALVE SILENCE	14162.00
24	490	HP START-UP-VENT SILENC	5436.00
48	200	INSTRUMENT TAPPINGS	796.50
48	422	HRSG INLET DUCT	103213.44
48	452	DUCT BOILER OUTLET	24753.60
48	454	EXP.PIECES BOILER OUTLE	3800.00
48	493	STOCK CLOSURE DAMPER	20000.00
48	700	BULKED BPS COMPONENTS	200.92
HL	098	LOOSE COMPONENTS- DUCT	95810.76
HL	501	SIDE CASING S1 - S2	15445.20
HL	502	SIDE CASING S2-S3	15185.60
HL	503	SIDE CASING S3 - S4	15185.60
HL	504	SIDE CASING S4 - S5	12296.80
HL	505	SIDE CASING S5 û S6	12296.80
HL	506	SIDE CASING S6 û S7	12296.80
HL	507	SIDE CASING S7 - S8	12296.80
HL	508	SIDE CASING S8 - S9	12296.80
HL	509	SIDE CASING S9 -S10	12296.80
HL	510	SIDE CASING S10 -S11	24593.59

HL	601	TOP & BOTTOM CASING S1	16852.27
HL	602	TOP & BOTTOM CASING S2-	12069.07
HL	603	TOP & BOTTOM CASING S3	12034.67
HL	604	TOP & BOTTOM CASING S4	10723.87
HL	605	TOP & BOTTOM CASING S5	10723.87
HL	606	TOP & BOTTOM CASING S6	10723.87
HL	607	TOP & BOTTOM CASING S7-	10780.67
HL	608	TOP & BOTTOM CASING S8	10699.87
HL	609	TOP & BOTTOM CASING S9	10780.67
HL	610	TOP & BOTTOM CASING S10	26034.94
		TOTAL	**622747.8**

6. POWER CYCLE PIPING, REGENERATIVE CYCLE PIPING, TANKS AND VESSELS ETC

TIRUCHI SUPPLY:

PG	MA	DESCRIPTION	TOTAL WEIGHT(IN KGS)
12	851	HP MAIN STEAM LINE	10600
12	854	LP MAIN STEAM LINE	2600
12	856	IP MAIN STEAM LINE	3600
80	145	EXHAUSTS AND VENTS	8000
80	273	BLOW DOWN SYSTEM VALVES	1000
80	274	CBD TANK SAFETY VALVE	168
81	005	IBD TANK	7000
81	011	CBD TANK(SUD DELIVERY)	6000
81	411	BLOW DOWN TANK TUBULAR	133.32
81	413	BDT CONTROL VALVE(SUB-D	200
TOTAL			**39301.32**

PIPING CENTRE SUPPLY:

PGMA	DESCRIPTION	TOTAL WEIGHT(IN KGS)
80304	MS HEADER TO HPBP VALVE	25,000
80307	HP & LP BYPASS WARM UP	5,600
80310	HRH FROM REHEATER TO INTERCEPTOR VALVE	296,000
80312	LPBP VALVE UPSTREAM & DOWNSTREAM	128,000
80320	CRH FROM TURBINE TO REHEATER	62,000
80321	HPBP VALVE TO CRH PIPING	17,000
80345	AUX STEAM TO DEAERATING HEATER	8,100
80349	AUX STEAM TO GLAND SEALS - TG SCOPE	200
80359	STEAM FROM PROCESS BLR	59,000
80388	CONDENSER AIR EVACUATION PIPING	2,500

80392	GS COOLER LEAK OFF TO ATMOSPHERE	700
80400	CONDENSATE SUCTION	5,000
80401	CD FROM PUMP TO LPH1/DC INLET TEE&RECIR	2,500
80402	CD FROM LPH1/DC INLET TEE TO TG TP	40,000
80407	CONDENSATE FOR SEALING OF VACUUM	2,000
80408	CONDENSATE DUMP FROM HEADER	3,000
80417	BOILER FEED DISCHARGE PIPING	42,100
80420	BOILER FEED PUMP SUCTION	4,100
80421	BOILER FEED PUMP RECIRCULATION	6,800
80429	BOILER FILLING PIPING	24,400
80430	SPRAY WATER TO HPBP	4,500
80434	UNLISTED SPRAY WATER - SG SCOPE	500
80436	SPRAY WATER TO LPBP DESH	2,400
80438	GLAND COOLER DRAIN TO CONDENSER	200
80446	DEAERATING HEATER OVER FLOW AND DRAIN	7,200
80449	TG CYCLE PIPING DRAINS & VENTS	1,300
80452	HP PIPING DRAINS - SG SCOPE	2,200
80453	LP PIPING DRAINS - SG SCOPE	3,100
80473	DEMINERALISED WATER SYSTEM	19,100
80496	DRAIN FLASH TANK VENT TO COND.	750
80600	HIGH PRESSURE DOSING PIPING	1,100
80601	LOW PRESSURE DOSING PIPING	300
80612	SERVICE AIR FOR INDIVIDUAL UNITS (COMMON FOR 6969/6970)	6,500
80616	INSTRUMENT AIR FOR INDIVIDUAL UNIT (COMMON FOR 6969/6970)	8,000
80901	SUB DELIVERY VALVES FOR LIGHT UP	1,000
80922	H&S FOR LIGHT UP - NON STEAM LINES	110,000
80933	H & S FOR LP PIPING	2,000
81415	TEST THERMOWELLS	400
TOTAL		**904,550**

PEM SUPPLIED VALVES & SPECIALITIES : 110 MT

TRICHY – VALVES DIVISION SUPPLIES : 8 MT

7.0 RO-DM PLANT EQUIPMENT DETAILS:

THE FOLLOWING ARE THE MAJOR EQUIPMENT / SYSTEM CONSIDERED IN THE RO-DM PLANT (FOR BOTH UNITS TOGETHER).

Sl. No	Description	Qty	Units	Remarks / Approx. unit capacity	Approximate unit Size in Mtrs (LxBxH)	Approx.Unit Wt in MT	Total Wt in MT
DOSING SYSTEM							
1	Acid injection dosing system	2	Set	(1 set = 1dosing tank, 1 Preparation tank(if applicable), 2 dosing pumps and Accessories)	1.2 m dia x 1.5Ht	0.5	1
2	Coagulation dosing system	2	Set			0.5	1
3	Filter Aid dosing system	2	Set			0.5	1
4	Secondary Chlorination Dosing System	2	Set			0.5	1
5	Antiscalant dosing system	2	Set			0.5	1
6	Dechlorination Dosing system	2	Set			0.5	1
7	pH adjustment dosing system	2	Set			0.5	1
PRETREATMENT SYSTEM							
8	Dual Media filter c/w media, UPVC internals, with ladder assembly	8	Nos.	Media = 30 MT	Dia.3.2m x 4.5m Ht	42	336
9	Back wash pump with motor & Acc.	2	Set	≈ 37 KW Motor	1.9 x 0.6 x 0.8	0.7	1.4
10	Air scour Blower with motor & Acc.	2	Nos.	≈ 18.5 KW Motor	1.6 x 0.5 x 0.5	0.7	1.4
RO SYSTEM (SWRO & BWRO) AND DEGASSER							
11	Cartridge filter assembly c/w PP filter elements	3	Set	190 m3/hr	1.4m dia x 1.5m ht	1	3
12	HP pump with HT motor & Acc (Horizontal – Multi stage)	3	Set	≈ 600 KW Motor-6.6 KV	5 x 1.5 x 2.5	7	21
13	Energy Recovery Device	3	Nos.		1.0 x 0.6 x 0.75	1	3
14	Membrane pressure vessel with membranes (SWRO) - each vessel with 7 membrane elements	84	PV		0.3 Dia x 8.5m len	0.31	26.04
15	Suck back tank (SWRO) 7 M3	3	Nos.		Dia 1.6 x 3.5 Ht.	1.5	4.5
16	BWRO Feed pump with motor & Acc.	2	Set	5.5 KW	1.2 x 0.4 x 0.5	0.2	0.4
17	BWRO cartridge filter Assy.	2	Set		Dia.0.3 x 1.5	0.25	0.5

18	BWRO HP pump with motor & Acc.	2	Set	≈ 30 KW	1.9 x 0.6 x 0.8	0.5	1
19	Membrane pressure vessel with 6 membranes each (BWRO)	10	PV		0.3m dia x 7m long	0.25	2.5
20	Degasser tower	3	Set		Dia. 2.0 x 3.5 Ht	5	15
21	Degasser Blowers with motors	6	Set	3.7 KW	1.0 x 0.4 x 0.5	0.25	1.5
CHEMICAL CLEANING & FLUSHING SYSTEM							
22	Chemical cleaning pump with motor & Acc. (SWRO)	3	Set	≈ 55 KW	2.1 x 0.6 x 0.8	0.75	2.25
23	Chemical cleaning cartridge filter assembly (SWRO)	1	Set	190 m3/hr	2.1m dia x 1.5m ht	1	1
24	Chemical cleaning tank (SWRO)	1	No.	≈ 25 m3	3.0m dia x 4.0m ht	3	3
25	Chemical cleaning tank (BWRO)	1	No.	3 m3	1.5m dia x 2.0m ht	0.6	0.6
26	Flushing Pump with Motor & Acc (SWRO)	2	Set	≈ 75 KW	2.1 x 0.6 x 0.8	1	2
27	Chemical cleaning pump with motor & Acc. (BWRO)	3	Set	9.3 KW	1.3 x 0.4 x 0.5	0.25	0.75
28	Chemical Cleaning Cartridge Filter Assembly (BWRO)	1	Set		Dia.0.3 x 1.5	0.3	0.3
PIPING & VALVES							
29	LP piping & valves (Frontal piping of filters, Mixed Bed system and RO plant LP piping)	1	Lot	UPVC, CPVC, HDPE, FRP matarials	Sizes ranging from DN15 upto Max.DN 500	40	40
30	HP piping & valves	1	Lot	Stainless steel	Dia 1/2" to 8"	21	21
SUPPORT STRUCTURES							
31	Membrane rack supports & Valve supports	1	Lot			30	30
32	Other structural supports	1	Lot			40	40
DM SYSTEM							
33	DM Feed pump with motor & Acc.	2	Set	9.3 KW	1.3 x 0.4 x 0.5	0.25	0.5
34	MB Air Blower with motor & Acc.	2	Set	7.5 KW	1.2 x 0.4 x 0.5	0.25	0.5
35	Mixed Bed Units with resin & MSRL frontal piping	2	No.	Resin 1.0 T	1.5 m dia x 3.0m ht	5	10
36	SAC Bed Units with resin & MSRL frontal piping	2	No.	Resin 1.0 T	1.5 m dia x 3.0m ht	5	10
37	SBA Bed Units with resin & MSRL frontal piping	2	No.	Resin 1.0 T	1.5 m dia x 3.0m ht	5	10
38	Inter Connecting pipe works-MSRL	1	Lot			2	2

39	DM Regeneration pump with motor & Acc.	2	Set	5.5 KW	1.2 x 0.4 x 0.5	0.2	0.4
40	Ferric Chloride Bulk Storage Tank	2	Set	10 m3 capacity	2.5 m dia x 6.0 m len	2.5	5
41	Bulk Acid Storage Tank & accessories	2	Set	25 m3 capacity	2.5 m dia x 5.2 m len	4	8
42	Bulk Alkali Storage Tank & accessories	2	Set	10 m3 capacity	2.5 m dia x 3.2 m len	2	4
43	Bulk Alkali transfer pump with motor & Acc.	2	Set	3.7 KW Motor	1.0 x 0.4 x 0.5	0.05	0.1
44	Ferric Chloride Transfer pump	2	Set	3.7 KW Motor	1.0 x 0.4 x 0.5	0.05	0.1
45	Acid Transfer pump with motor & Acc.	2	Set	3.7 KW Motor	1.0 x 0.4 x 0.5	0.05	0.1
46	Neutralizing pit pumps	2	Set	11 KW	1.2 x 0.4 x 0.5	0.25	0.5
47	Acid Measuring Tank	2	Set		1.2 m dia x 1.5 Ht	0.5	1
48	Caustic dilution Tank	2	Set		1.2 m dia x 1.5 Ht	0.5	1
MISCELLANEOUS SYSTEMS							
49	Lab Items	1	Lot			0.6	0.6
51	EOT crane	1		5T capacity			
52	Monoblock rail	5		0.5T capacity			
53	Painting			Total equipment surface area is ~ 900 m2			
						TOTAL	619

1. The motor KW ratings, size & weights indicated are tentative.

NOTE:

1. WEIGHT AND DIMENSIONS ARE APPROXIMATE.

2. BESIDES PRODUCT GROUPS INDICATED ABOVE, 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.

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

4. BHEL'S DECISION WITH REGARD TO CLASSIFICATION OF ANY PRODUCT GROUP TO ANY ITEM RATE SHALL BE FINAL AND BINDING ON THE CONTRACTOR.

APPENDIX-II

DRAWINGS ATTACHED AS PART OF TENDER DOCUMENT

1. GENERARL ARRANGEMENT OF BOILER ELEVATION – 0-00-561-93359/01

2. GENERARL ARRANGEMENT OF BOILER PLAN – 0-00-561-93360/01

3. PROCESS FLOW DIAGRAM FOR RO-DM PLANT – 2-SW-220-00230/01

NOTE:
THE ABOVE DRAWINGS ARE PROVIDED ONLY FOR INFORMATION AND WORK HAS TO BE DONE WITH REFERENCE TO THE LATEST APPLICABLE DRAWING

Above drawings are not hosted in the web-page. Bidders are requested to obtain these drawings from BHEL PSWR Nagpur.

APPENDIX-III

LIST OF T&P TO BE PROVIDED BY BHEL FREE OF CHARGES ON SHARING BASIS

SL.NO.	DESCRIPTION & CAPACITY OF T&P	QUANTITY	REMARKS
01	250 T CRANE (TYRE MOUNTED)	01 No.	THIS CRANE WILL BE PROVIDED FROM START OF WORK.
02	100 T CRAWLER CRANE	01 No.	THIS CRANE WILL BE PROVIDED FROM 3rd MONTH AFTER START OF WORK.
03	75 T CRAWLER CRANE	01 No.	THIS CRANE WILL BE PROVIDED FROM 6th MONTH AFTER START OF WORK.
04	SUITABLE CAPACITY CRANE FOR LIFTING OF BOILER DRUMS	01 No.	THIS CRANE WILL BE PROVIDED AT APPROPRIATE STAGE OF WORK AS PER BHEL DECISION.
05	STEAM BLOWING VALVE SET WITH ACTUATOR	1 SET	TO SUIT SITE REQUIREMENT.
06	PIPING, VALVES & FITTINGS, SUPPORTING STRUCTURES, PLATES/ TANKS FOR TEMPORARY SYSTEMS FOR HYD TEST, CHEMICAL CLEANING, STEAM BLOWING ETC.	1 SET	TO SUIT SITE REQUIREMENT.
07	INDUCTION HEATING M/C	2 SETS	REFER CL. 4.3.2.8
08	CHEMICAL CIRCULATION PUMPS WITH DRIVE MOTORS, STAR-DELTA STARTER PANEL OF ADEQUATE CAPACITY	2 NOS.	FOR BOILER PRE- COMMISIONING SETUP TO SUIT SITE REQUIREMENT

NOTE:

1. BHEL WILL DEPLOY THE CRANES AS PER SCHEDULE GIVEN ABOVE .HOWEVER IN CASE OF ANY DELAY NO CLAIM FROM CONTRACTOR SHALL BE ENTERTAINED.
2. BHEL WILL MAKES AVAILABLE THE CRAWLER CRANE 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
(iii) PRE-ASSEMBLY AND ERECTION.
(iv) ANY OTHER ERECTION RELATED ACTIVITY AT THE DISCRETION & APPROVAL OF BHEL SITE INCHARGE.

3. ALSO REFER SECTION-7.

BHEL 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

MAJOR TOOLS AND PLANTS & MMD TO BE DEPLOYED BY THE CONTRACTOR

A: TOOL & PLANTS

SL. NO.	DESCRIPTION OF EQUIPMENTS	CAPACITY	MINIMUM QUANTITY	REMARKS
01	CRAWLER CRANE	18 T	1 NO.	TO BE DEPLOYED FROM THE START OF ERECTION
02	MOBILE PICK AND CARRY CRANE	10 TON	01	TO BE DEPLOYED FROM THE START OF ERECTION
03	TRAILER WITH HORSE	15 TON / 20 TON	01	TO BE DEPLOYED FROM THE START OF ERECTION
04	AIR COMPRESSOR (ELECTRIC)	140 CFM	01	
05	TIG WELDING SET	-	AS PER REQUIREMENT	
06	3 ph DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWL OF CONSTRUCTION POWER & FITTED WITH ENERGY METER	600 Amp	AS PER REQUIREMENT	
07	PRE HEATING / STRESS RELIEVING SET (HEATING CONTROL PANEL, CABLES, HEATING ELEMENTS ETC.)	AS PER REQUIREMENT	AS PER REQUIREMENT	
08	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE	IR 192	AS PER REQUIREMENT	
09	WELDING GENERATOR (ELECTRIC & DIESEL)	300 AMPS	AS REQUIRED	
10	RADIOGRAPHY FILM VIEWER	AS PER REQMT	1 NO.	
11	ELECTRIC WINCH	3 TON / 2 TON	AS PER SITE REQUIREMENT	
12	ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER	AS PER SITE REQUIREMENT	AS PER SITE REQUIREMENT	
13	PIPE BENDING MACHINE – HAND OPERATED	UP TO 50 mm Nb PIPES	AS PER SITE REQUIREMENT	
14	BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR BAKING COATED WELDING ELECTRODES	AS PER REQUIREMENT	02	
15	PORTABLE OVEN FOR COATED WELDING ELECTRODES	AS PER REQUIREMENT	25	

16	ELECTRIC MOTOR DRIVEN HYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC.	600 Kg/Cm^2 400 Kg/Cm^2 250 Kg/Cm^2	1 NO. 1 NO. 1 NO.	
17	SCAFFOLDING MATERIALS	AS PER SITE REQUIREMENT		
18	ALU. SHEET CLAD PROFILE MAKING MACHINE	AS PER SITE REQUIREMENT		
19	HAND TOOLS, CUTTING TOOLS GRINDING MACHINES ETC	AS PER SITE REQUIREMENT		
20	NIBBLING MACHINE	AS PER SITE REQUIREMENT		
21	SHEARING MACHINE	AS PER SITE REQUIREMENT		

NOTE :

THIS ABOVE LIST IS ONLY INDICATIVE AND NEITHER EXHAUSTIVE NOR LIMITING. QUANTITIES INDICATED ABOVE ARE ONLY THE MINIMUM REQUIRED. CONTRACTOR SHALL DEPLOY ALL NECESSARY T&P TO MEET THE SCHEDULES & AS PRESCRIBED BY BHEL ENGINEER AND REQUIRED FOR COMPLETION OF WORK.

B: MEASURING AND MONITORING DEVISES (MMD):

AS PER REQUIREMENT TO BE FINALIZED AT SITE.

13.0 This section defines the technical requirements for surface preparation selection and application of paints on equipment, vessels, machinery, piping, ducts etc. However, manufacturers shall follow their standard procedures for painting their equipment. The Bidder shall submit a detailed painting procedure for approval of Employer / Employer's Representative after the award of contract.

13.1 The following surface and material shall require painting:

(a) All un-insulated carbon steel and alloy steel equipment like columns, vessels, drums, storage tanks, heat exchangers etc.

(b) All un-insulated carbon steel and low alloy piping, fitting and valves (including painting of identification marks).

(c) All pipe structural steel supports, walkways, platforms, hand rails, ladders etc.

13.2 The following surfaces and material shall not require painting:

(a) Non-ferrous materials

(b) Austenitic stainless steel

(c) Plastic and / or plastic coated materials

(d) Insulated surface of equipment and pipes except colour coating wherever required.

(e) Painted equipment like blowers, pumps, valves, etc., with finishing coats in good condition and with matching colour-code.

13.3 **Codes and Standards**

Painting of equipment shall be carried out as per the specifications indicated below and shall conform to the relevant IS specification for the material and workmanship.

The following Indian Standards may be referred to carrying out the painting job.

IS : 5	:	Colours for ready mixed paints and enamels
IS : 1303	:	Glossary of terms relating to paints
IS : 2379	:	Colour code for identification of pipelines.
IS : 2395	:	Code of practice for finishing of concrete, masonry and plaster surfaces (Parts I and II)

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IS : 2338	:	Code of practice for finishing of wood and wood based materials (Parts I & II)
IS : 158	:	Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali, water and heat resisting
IS : 2074	:	Ready mixed paint, air drying, red oxide zinc chrome, and priming.
IS : 104	:	Ready mixed paint, brushing, zinc chrome, priming
IS : 2932	:	Enamel, synthetic, exterior (a) undercoating (b) Finishing.
SIS : 55900	:	Swedish standard for blasting

13.4 **Surface Preparation**

The surface shall be prepared in a manner suitable for coatings. Chemical derusters or rust converters shall not be applied. Acid cleaning is subject to approval of Purchaser / Purchaser representative.

13.4.1 **Blasting**

The surface of the part / component shall be blasted before the coating material is applied.

Unless otherwise specified in the documents, the surface shall satisfy the following requirements after blasting:

(a) Blasting according to SIS 055900, Grade Sa-$2^1/2$.

Depending on production flow, weldable, ethyl zinc silicate shop primer, dry film thickness 15 – 25 microns shall be used.

13.4.2 **Manual Rust Removal**

Manual rust removal shall be allowed for welded zones and for touching up installed components.

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13.4.3 **Cleaning**

Removal of impurity

	Impurity	Removal
(a)	Dust, loose deposits	Vacuum-cleaning, brushing
(b)	Adhesive deposits	Power brushing
(c)	Oils, greasy impurities	Wet blasting, use of detergent additives by agreement
(d)	Salt deposits	Rinsing
(e)	Markings (e.g., felt tip pen)	Organic solvents to manufacturer's specifications e.g., Trichloro trifluoro ethane and solvents containing acetone (renew solvent and rag frequently).

13.5 **Processing**

13.5.1 **General**

Application Conditions

The primer shall be applied to properly prepared surfaces only. The specifications of the coating material manufacturers shall be observed. The minimum temperature shall be $+5^{0}C$ and the relative humidity shall not exceed 80%. The temperature of the work piece shall be atleast 3 ^{0}C above dew point.

13.5.2 **Application Procedure**

The primer shall be applied by means of brush or by spray. The top coats shall be applied by means of brush, roller or by spray.

At points where coating application is interrupted, the individual layers shall be adequately stepped to ensure proper layer sequence when coating operations are resumed.

13.5.3 **Touching Up**

Before each layer is applied, previous coating shall be touched up where necessary by way of rust removal and cleaning, according coating manufacturer's specifications. The final top coat shall be reapplied completely, if required.

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13.5.4 **Uncoated Surfaces**

Moving parts of machines (e.g., stems, shafts, sliding and locating bearings), nameplates, instruments and sealing surface shall not be coated. Welds shall be left free of coating upto a distance of 30 mm on each side of the weld edge until erection and weld examinations, if any, have been completed.

13.5.5 **Bond Strength**

The pull-off stress determined using the pull-off test method for adhesion shall be not less than 1.5 N/mm^2, according to ISO 4624.

13.6 **Surface Conditions of Coating Surfaces**

The coating surface shall have a uniform film thickness, shade and gloss and shall be free from inclusions, sags and wrinkles.

13.7 **Coating Systems**

13.7.1 **General Requirements for Coating Systems**

Coating materials according to SSPC, BS 5493 or DIN 55 928 shall be used. Intermediate coats are to be pigmented with micaceous iron oxide. The materials shall be matched with each other so that they are compatible. Coatings deviating this specification shall be subject to approval. Standards of surface preparation and painting shall give a time to first maintenance of 10 years.

The colour and gloss of top coats shall be in accordance with sub-clause suggested colour codes for painting (Sub-clause 13.10).

13.7.2 **Standard Coating System (External Coatings)**

(a) For painting of civil structures in general and other steel structures not covered below shall be carried out as specified in the Civil Section D4.3 of the specification

(b) **Galvanised iron and steel requiring paint finish at site**

(i) At site

Surface Treatment

Mechanical cleaning from contaminants by means of washing or steam jetting and sweep blasting with fine sand or etching (T-Wash).

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Touch-up mechanical damages:

De rusting St 3 and application of high build epoxy primer DFT 80 µm.

Finish coating:

Analogous to standard painting scheme

13.7.3 **Painting of indoor components such as valves, pumps, motors, electrical parts, tanks etc.**

At works

Surface preparation:

Blasting according to SIS 055900: grade Sa 2 ½. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer dry film thickness 15 – 25 µm, may be used.

Prime coat:

Two (2) layers of zinc phosphate epoxy, total dry film thickness 75 µm.

At site

Thorough cleaning to remove oil, grease, dirt and any other contaminants. Derusting of all mechanical damages according to SIS 055900 Grade ST3. Touch up with 1 pack inorganic ethyl zinc silicate, dry film thickness 50 µm

Finish coat:

Two (2) layers of a 2 pack epoxy polyamide glossy, according to colour specification, dry film thickness 60 µm.

Total system dry film thickness 135 µm.

Remarks:

Equipment coated with a standard application system can be accepted if the quality of this application system is corresponding with the quality of the above mentioned system.

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13.7.4 **Painting of Outdoors equipments (external surfaces) such as piping, valves, pumps, motors, electrical parts, tanks etc.**

Weather exposure, weather resistance, temperature upto 120°C as per 13.7.1 and 13.7.3 however.

Surface Preparation:

Blasting according to SIS 055900: grade Sa 2 ½. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer dry film thickness 15-25 µm, may be used.

Prime Coat:

Two (2) layers of zinc phosphate epoxy, total dry film thickness 75 µm.

Intermediate Coat:

One (1) layer 2 pack high build epoxy polyamide Mio, dry film thickness 100 µm.

Finish Coat:

One (1) layer of a 2 pack aliphatic polyurethane glossy minimum dry film thickness 50 µm. Total system dry film thickness 225 µm.

13.7.5 **Special Coating System (External Coatings)**

(a) **Parts exposed to temperatures above 120°C, upto 200°C, not insulated**

(i) At works

Surface Preparation:

Blasting according standard SIS 55900 Grade Sa 2 1/2 and ISO 8501-1: 1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film thickness 15-25 µm, may be used.

Prime coat
Inorganic ethyl zinc silicate, dry film thickness 75 µm.

(i) At site

Pre-treatment:

Derusting of all mechanical damages, according to ISO 8501-1: 1989, grade St 3 Touch-up with 1 pack inorganic ethyl zinc silicate, dry film thickness 50 µm.
Removal of all decontaminants from prime coat.

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Intermediate Coat:

1 pack silicon acrylic, dry film thickness 35 μm.

Final coat :

1 pack silicon acrylic, dry film thickness as 35 μm.
Total system dry film thickness 145 μm.
Final coat according to colour code.

(b) **Parts exposed to temperatures above 200^{0}C, upto 400^{0}C, not insulated**

(i) At works

Surface Preparation:

Blasting according to ISO 8501-1: 1988 grade Sa 2^1/2. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film 15-25 μm, shall be used.

Prime coat:

Inorganic ethyl zinc silicate, dry film of thickness 75 μm.

(ii) At site

Pre-treatment:

Derusting of all mechanical damages, according standard Sa 2^1/2 to ISO 8501-1: 1988. Touch-up with coating system according to manufacturer's recommendations.

(c) **Insulated Parts, continuously exposed to condensing water or parts exposed to temperatures**

For parts that are provided with insulation on site.

(i) **Insulated parts, exposed to condensing water**

At works

Surface Preparations:

Blasting according standard Sa 2^1/2 to ISO 8501-1: 1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film thickness 15-25 μm shall be used.

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Prime coat:

Inorganic ethyl zinc silicate, dry film thickness 75μm.

(ii) **Insulated parts exposed to temperatures**

Parts, exposed to temperatures upto <400^{0}C at works

Surface Preparation:

Blasting according to standard Sa 2^1/2 to ISO 8501-1: 1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film thickness 15-25 μm shall be used.

Parts, exposed to temperatures above 400^{0}C at works (Steam pipes, pressure tubes and parts for the HRSG, such as heating surfaces, heaters and super heaters reheaters, etc.)

Surface preparation:

Blasting according standard Sa 2^1/2 to ISO 8501-1: 1988.

Temporary primer:

Varnish.

(d) **Intermittent exposure due to condensing water / chemicals (Indoors)**

(i) At works

Surface Preparation:

Blasting according to standard Sa 2^1/2 to ISO 8501-1: 1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film thickness 15-25 μm may be used.

Prime Coat:

Two layers of zinc phosphate epoxy primer total dry film thickness greater than or equal to 75 μm.

(ii) At site

Pretreatment:

Derusting of all mechanical damages, according standard Sa 3 to ISO 8501-1: 1988, touch-up with 2 pack high build epoxy with volume solid content of more than 85%, 75 μm.

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Intermediate Coat:

2 pack high build epoxy, dry film thickness 80 µm.

Finish coat:

2 pack epoxy according to colour appearance, dry film thickness of 50 µm.

Total system dry film thickness 205 µm.

When exposed to weathering, weather resistance finish coat shall be applied.

(e) **Water exposure**

Surfaces permanently or predominantly in contact with water.

(i) At site / works

Pretreatment:

Removal of all welding pearls.

Blasting according standard Sa 3 to ISO 8501-1: 1988.

Coat:

4 coats 2 pack coal-tar-epoxy, dry film thickness 125 µm each.

Total system dry film thickness 500 µm.

Touch-up after erection as required.

13.7.6 **Buried / underground piping system**

(a) Where pipelines are buried, underground protection shall be provided for the piping system as indicated in any one of the methods given below:

(i) Coal tar primer, coal tar enamel, inner wrap of fibre glass, final outer wrap of enamel impregnated fibre glass. Total thickness of coating shall not be less than 4.0 mm.

(ii) With anti-corrosive tape of minimum 4 mm thick conforming to IS-10221 and AWWA C 203-93.

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(b) Pipe surfaces shall be cleaned by shot or sand blasting before application.

(c) Tests to be carried out after application

(i) Bond / Adhesion test

(ii) Holiday test

13.8 **INTERNAL COATINGS**

13.8.1 **Tanks (Internal Surfaces) as specified in relevant sections of specification**

Industrial, deionised, demineralised and potable water upto 60^{0}C pH range: 4.5 – 9.5.

Blasting according to ISO 8501-1: 1988, grade Sa 2^{1}/2.

Prime coat:

Two layers of zinc phosphate epoxy primer total DFT greater than or equal to 75 μm.

Pretreatment:

Derusting of all mechanical damages, according to standard Sa 3 to ISO 8501-1:1998, touch up with 2 pack high build epoxy with volume solid content of more than 85%, 75 μm.

Intermediate coat:

2 pack high build epoxy, dry film thickness 80 μm.

Finish coats:

2 pack solvent free epoxy paint dry film thickness 150 μm per coat.

In case of service or potable water tanks, the coating material selected shall not taint the water.

QA / QC procedure, including pinhole inspection, for shall be submitted for approval by Employer / Employer's Representative.

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13.8.2 **Rubber Lining of Pipes, Valves and Tanks as specified in relevant sections.**

(a) At works

Pretreatment:

Blasting according standard $2^1/2$ to ISO 8501-1 : 1988.

Rubber lining:

Hard-rubber 5mm for DM water applications, thickness greater than or equal to 3 mm for others. In case of failure of rubber lining for both pipes and vessels, the rubber lining shall be replaced by COROCOAT

13.9 **Painting for Electrical Items**

13.9.1 All the steel work shall be thoroughly cleaned of rust, scale, oil, grease, dirt and swarf by pickling, emulsion cleaning, etc. The sheet steel shall be phosphated / oven dried and then painted with two coats of zinc rich primer paint. After application of the primer, two coats of finishing synthetic enamel paint shall be applied. The colour of the finishing coats inside shall be glossy white and exterior of the treated sheet steel shall be shade 631 of IS-5 / RAL 7032 for all switchboard/MCC/ Distribution boards, control panels, etc.

13.9.2 All electrical equipment shall be given tropical and fungicidal treatment and outdoor equipment shall be provided with rain hood to prevent entry of rain water into the equipment.

13.9.3 Painting and galvanising requirements of switchyard structures are covered in Civil section D4 in Volume - III.

13.10 **Suggested Colour Codes for Painting**

Sl. No.	Item / Service	Colour	IS–5	Colour (Band)	IS - 5
13.10.1	Structures, platforms, galleries, ladders and handrails.	Dark Admirability Grey	632	-	-
13.10.2	Boiler casing, ducting	Nut Brown	413	-	-
13.10.3	Crane				
(a)	Crane structure	Golden Yellow	356	Black	-
(b)	Trolley and hook	Crimson	540	-	-

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13.10.4	Pump motors, compressors	Light Grey	631	-	-
13.10.5	Tanks (without insulation and cladding)				
(a)	Outdoor	Aluminium	-	-	-
(b)	Indoor	Light Grey	631	-	-
13.10.6	Vessels and all other proprietary equipment (without insulation and cladding)	Light Grey	631	-	-
13.10.7	Switchgear	Light Grey	631	-	-
13.10.8	Control and relay panels	Light Grey	631/ 7078 of IS1650	-	-
13.10.9	Turbines	Light Grey	631	-	-
13.10.10	Generators and exciter	Light Grey	631	-	-
13.10.11	Transformers	Aluminium	-	-	-
13.10.12	Machinery guards	Signal red	537	-	-
13.10.13	Piping (Without insulation and cladding)				
(a)	**Water System**				
(I)	Boiler feed	Sea Green	217	-	-
(ii)	Condensate	Sea Green	217	Light Brown	410
(iii)	DM Water	Sea Green	217	Light Orange	557
(iv)	Soft Water	Sea Green	217	French Blue	166
(v)	Bearing cooling water	Sea Green	217	French Blue	166
(vi)	Potable and filtered water	Sea Green	217	French Blue	166
(vii)	Service and clarified water	Sea Green	217	French Blue	166
(viii)	Cooling water	Sea Green	217	French Blue	166
(ix)	Raw water	Sea Green	217	White	-

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(b)	**Air system**				
(i)	Station air	Sky Blue	101	-	-
(ii)	Control air	Sky Blue	101	White	-
(c)	**Oil system**				
(i)	Light oil (HSD)	Light Brown	410	French blue	166
(ii)	Lubricating oil	Light Brown	410	Light grey	631
(iii)	Transformer oil	Light Brown	410	Light Orange	557
(d)	**Gas system**				
(i)	Fuel gas (Regassified LNG)	Canary Yellow			
(ii)	Carbon dioxide	Canary Yellow	309	Light grey	631
(iii)	Hydrogen	Canary Yellow	309	Signal red	537
(e)	**Fire Services**	Fire red	536	-	-
(f)	**Effluent pipes**	Black	-	-	-
(g)	**Vacuum pipes**	Sky Blue	101	Black	-
(h)	**Drainage**	Black	-	-	-

NOTES

1. This colour code basically refers to IS: 2379 for piping with necessary modifications.

2. Where band colour is specified, same shall be provided at 10 metre intervals on long uninterrupted lines and also adjacent to valves and junctions.

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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
01	RESIDENT ENGINEER												
02	ERECTION ENGINEERS												
03	ERECTION SUPERVISORS												
04	QUALITY ASSURANCE ENGINEER												
05	SAFETY ENGINEER												
06	MATL MANAGEMENT SUPERVISORS												
07	HIGH PRESSURE WELDERS INCLUDING P-91 MATL WELDER												
08	STRUCTURAL & OTHER WELDERS												
09	FITTERS												
10	CRANE OPERATOR												
11	TRUCK/TRAILER DRIVERS												
12	STORE KEEPERS												
13	ELECTRICIANS												
14	SCAFFOLDERS, LAGGERS, FITTERS FOR L&I WORK												
15	SEMISKILLED/ UNSKILLED WORKERS												
	MONTH WISE TOTAL												

SIGNATURE OF TENDERER

DATE:

APPENDIX–VII

FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

SL. NO.	DESCRIPTION & CAPACITY OF T&P	MIN QTY	MONTHS 1	2	3	4	5	6	7	8	9	10	11
01	CRAWLER CRANE – CAP 18 T	1 No.											
02	MOBILE PICK AND CARRY CRANE 10 T	1 No.											
03	TRAILER WITH HORSE – 15/20 T	1 No.											
04	AIR COMPRESSOR (ELECTRIC) – 7 CFM	1 No.											
05	ELECTRIC MOTOR DRIVEN HYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC -600 Kg/CM^2 -	1 No.											
06	ELECTRIC MOTOR DRIVEN HYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC - 400 Kg/CM^2	1 No.											
07	ELECTRIC MOTOR DRIVEN HYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC - 250 Kg/CM^2	1 No.											
08	BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE	2 Nos.											
09	PORTABLE ELECTRODE CARRYING OVENS	25 No.											
10	RADIOGRAPHY FILM VIEWER OF SUITABLE CAP	1 No.											
11	SCAFFOLDING PIPES WITH CLAMPS ETC FOR APPLICATION OF LINING & INSULATION												
12	TIG WELDING SET												

13	PRE HEATING / STRESS RELIEVING SET (CONTROL PANEL, CABLES, HEATING ELEMENTS ETC.)												
14	WELDING GENERATOR												
15	ELECTRIC WINCH 3/5 T												
16	SCAFFOLDING PIPES WITH CLAMPS ETC FOR APPLICATION OF LINING & INSULATION												

MINIMUM QUANTITY INDICATED ARE FOR WORKING CONDITION EQUIPMENTS. IT EXCLUDES THE QTY UNDER NON-USEABLE STATE.

SIGNATURE OF THE TENDERER

DATE:

APPENDIX-VIII
CONCURRENT COMMITMENTS

SL.NO.	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

SIGNATURE OF THE TENDERER

DATE:

APPENDIX-IX

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		

SIGNATURE OF THE TENDERER

DATE:

APPENDIX–X

DETAILS OF SIMILAR WORK DONE DURING THE LAST SEVEN YEARS

SL. NO.	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	TIME SCHEDULE (MONTHS)	DATE OF ACTUAL COMPLETION OF WORK	REMARKS

SIGNATURE OF TENDERER WITH SEAL

- PLEASE USE ADDITIONAL SHEET IF NEEDED **IN THE SAME FORMAT.**
- PLEASE ENCLOSE COPIES OF WORK ORDERS INCLUDING DETAILED BILL OF QUANTITIES, COMPLETION CERTIFICATES IN SUPPORT OF THIS STATEMENT.