

# **TENDER SPECIFICATION**

**No. - BHE/PW/PUR/UKT-STG/651**

**FOR**

**COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD;  
TRANSPORTATION TO SITE ; ERECTION ,TESTING & ASSISTANCE FOR  
COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF TURBINE AND  
GENERATOR SET AND ITS AUXILIARIES, HP/LP HEATER AND DEAERATOR,  
POWER CYCLE PIPING, CIRCULATING WATER PUMPS, AUXILIARY COOLING  
WATER PUMPS, ON LINE CONDENSER TUBE CLEANING SYSTEM, INSULATION  
AND FINAL PAINTING ETC OF 1X500 MW UKAI THERMAL POWER PROJECT  
UNIT No-6**

**AT**

**GUJARAT STATE ELECTRICITY CORPORATION LIMITED**

**DIST- TAPI**

**GUJARAT**

**PART I**

**(TECHNICAL BID SPECIFICATION, NOTICE INVITING TENDER & GCC)**

**BOOK NO. :**



**BHARAT HEAVY ELECTRICALS LIMITED  
(A GOVERNMENT OF INDIA UNDERTAKING)**

**POWER SECTOR : WESTERN REGION  
345, KINGSWAY : NAGPUR 440 001**

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**LEGEND:**

\$: Included in Tender Specifications Part-I. Hosted in BHEL web page ([www.bhel.com](http://www.bhel.com)) as file titled “**NIT+GCC-651**”.

@: Issued as separate hard copy booklet ‘Tender Specifications Part-II (Price Bid-651)’. Hosted in BHEL web page ([www.bhel.com](http://www.bhel.com)) as file titled “**PRICE BID-651**”

**Note:**

Rest of the tender documents are included in Tender Specifications Part-I. Hosted in BHEL web page ([www.bhel.com](http://www.bhel.com)) as file titled “**TECH BID-651**”

# **BHARAT HEAVY ELECTRICALS LIMITED**

(A GOVERNMENT OF INDIA UNDERTAKING)

POWER SECTOR - WESTERN REGION

SHREEMOHINI COMPLEX

345, KINGS WAY - NAGPUR 440 001

## **TENDER SPECIFICATION DOCUMENT ISSUE DETAILS**

**TENDER SPECIFICATION NO:- BHE/PW/PUR/UKT- STG/651**

FOR

**COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD;  
TRANSPORTATION TO SITE ; ERECTION ,TESTING & ASSISTANCE FOR  
COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF TURBINE AND  
GENERATOR SET AND ITS AUXILIARIES, HP/LP HEATER AND  
DEAERATOR,POWER CYCLE PIPING, CIRCULATING WATER PUMPS, AUXILIARY  
COOLING WATER PUMPS, ON LINE CONDENSER TUBE CLEANING SYSTEM,  
INSULATION AND FINAL PAINTING ETC OF 1X500 MW UKAI THERMAL POWER  
PROJECT UNIT No-6**

AT

**GUJARAT STATE ELECTRICITY CORPORATION LIMITED  
DIST- TAPI**

**GUJARAT**

EARNEST MONEY DEPOSIT: Please see Special Conditions of Contract.

LAST DATE FOR                      Please obtain updated information from web page  
TENDER SUBMISSION:            "<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  
SHREEMOHINI COMPLEX  
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.
- In case customer approval is required for this package, bidder's offer will be accepted subject to approval of bidder by customer.

## PROJECT INFORMATION

### (A) INTROCUCTION

BHEL's Client M/s Gujarat State Electricity Corporation limited (GSECL) has their existing 5 units pulverized Coal based Power Plant at Ukai Thermal Power Plant Distt- Tapi Gujarat. The said client has undertaken the process of expanding the capacity of the power plant by setting up on more power generation unit of 490 MW. The Ukai TPS is about 90 km from Surat .The site is approachable by road .The nearest railway station is Ukai- Songarh.

### (B) LOCATION & APPROACH

- 1) Existing Project : Total Five units of 120,200 & 210 MW
- 2) Project : Thermal Power Station Unit#6 (500 MW),Ukai
- 3) Project location : UKAI,DIST:TAPI,GUJARAT STATE

**Nearest Railway Station:** SONGARH on the broad gauge, connected from Surat junction on Howrah line. Power Station is having broad gauge private railway siding served through Rly. Station at distance of about 10 Kms.

**ROAD:** The site is also connected by roads from SURAT-DHULIA through highway SH-6 at a distance of 10 Kms from Songarh.

### (C) CLIMATIC CONDITIONS

Maximum temperature	: 45 Deg Celsius
Minimum temperature	: 5 Deg Celsius
Max daily average temp	: 35 Deg Celsius
Max yearly average temp	: 30 Deg Celsius
Maximum Humidity	: 85%
Minimum Relative Humidity	: 15%
Average Annual rainfall	: 1500mm (During June -Sep)
Wind Velocity	: 20 km/hr

### (D) Seismic Zone: As per IS 1839/70: Zone -III

## 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 (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	<p>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 }</p> <ol style="list-style-type: none"> <li>1. Name of the Company</li> <li>2. Name of Bank</li> <li>3. Name of Bank Branch</li> <li>4. City/Place</li> <li>5. Account Number</li> <li>6. Account type</li> <li>7. IFSC code of the Bank Branch</li> <li>8. MICR Code of the Bank Branch</li> </ol>	YES	NO

NOTE: STRIKE OFF YES OR NO, AS APPLICABLE

DATE:

SIGNATURE OF TENDERER



## DECLARATION BY BIDDER'S AUTHORIZED SIGNATORY

I, \_\_\_\_\_ HEREBY  
CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO  
THE TENDER SPECIFICATION No. **BHE/PW/PUR/UKT-STG/651** ARE TRUE AND  
COMPLETE TO THE BEST OF MY KNOWLEDGE. I HAVE GONE THROUGH THE  
SPECIFICATIONS, CONDITIONS AND STIPULATIONS IN DETAIL AND AGREE TO COMPLY  
WITH THE REQUIREMENTS AND INTENT OF THE SPECIFICATION. I FURTHER CERTIFY  
THAT I AM DULY AUTHORIZED REPRESENTATIVE OF THE UNDER-MENTIONED TENDERER  
AND A VALID POWER OF ATTORNEY TO THIS EFFECT IS ALSO ENCLOSED.

AUTHORISED REPRESENTATIVE'S SIGNATURE WITH  
NAME AND ADDRESS

DATE:

TENDERER'S NAME AND ADDRESS

## **CERTIFICATE OF NO DEVIATION**

**TENDER SPECIFICATION: NO.BHE/PW/PUR/UKT-STG/651**

**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.**

DATE:

SIGNATURE OF THE TENDERER

## 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/UKT-STG/651** 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 TENDERERS
2. GENERAL CONDITIONS OF CONTRACT
3. SPECIAL CONDITIONS OF CONTRACT
4. OTHER SECTIONS, APPENDICES, SCHEDULES AND DRAWINGS.

I/WE HAVE DEPOSITED / FORWARDED HERewith THE EARNEST MONEY DEPOSIT FOR A SUM OF **RS.2,00,000/- (RUPEES TWO LAKHS ONLY)** AS STIPULATED VIDE CLAUSE NO, 1.4 OF GENERAL CONDITIONS OF CONTRACT, DETAILS OF WHICH IS FUNISHED IN THE CHECK LIST, & WHICH SHALL BE REFUNDED SHOULD OUR OFFER NOT BE ACCEPTED. SHOULD OUR OFFER BE ACCEPTED, I/WE FURTHER AGREE TO DEPOSIT SUCH ADDITIONAL SUM WHICH ALONGWITH THE SUM OF **RS. 2,00,000/- (RUPEES TWO LAKHS ONLY)** MENTIONED ABOVE, SHALL MAKE UP 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:  
DATE :

SIGNATURE OF TENDERER:  
ADDRESS:

WITNESSES WITH THEIR ADDRESS

SIGNATURE

NAME

ADDRESS

1.

2.

## **SECTION-4**

### **SPECIAL CONDITIONS OF CONTRACT**

#### **4.0 SCOPE OF WORK**

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

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE; ERECTION, TESTING & ASSISTANCE FOR COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF TURBINE AND GENERATOR SET AND ITS AUXILIARIES, HP/LP HEATER AND DEAERATOR, POWER CYCLE PIPING, CIRCULATING WATER PUMPS, AUXILIARY COOLING WATER PUMPS, ON LINE CONDENSER TUBE CLEANING SYSTEM, INSULATION AND FINAL PAINTING ETC AT 1X500 MW UKAI THERMAL POWER PROJECT UNIT No-6

##### **4.0.1**

THE WORK COVERED UNDER THIS SPECIFICATION IS OF HIGHLY SOPHISTICATED NATURE, REQUIRING THE BEST QUALITY OF WORKMANSHIP FOR FABRICATION, ENGINEERING AND CONSTRUCTION MANAGEMENT. THE BIDDER SHOULD ENSURE TIMELY COMPLETION OF WORK. THE BIDDER MUST HAVE ADEQUATE QUANTITY OF TOOLS, CONSTRUCTION AIDS, EQUIPMENTS ETC, IN HIS POSSESSION. HE MUST ALSO HAVE ON HIS ROLLS ADEQUATE, TRAINED, QUALIFIED AND EXPERIENCED SUPERVISORY STAFF AND SKILLED PERSONNEL.

##### **4.0.2**

THE WORK SHALL BE EXECUTED UNDER THE USUAL CONDITIONS AFFECTING MAJOR POWER PLANT CONSTRUCTION AND IN CONJUNCTION WITH NUMEROUS OTHER OPERATIONS AT SITE. THE BIDDER AND HIS PERSONNEL SHALL CO-OPERATE WITH THE PERSONNEL OF OTHER AGENCIES, CO-ORDINATE HIS WORK WITH OTHERS AND PROCEED IN A MANNER THAT SHALL NOT DELAY OR HINDER THE PROGRESS OF WORK AS A WHOLE.

##### **4.0.3**

ALL THE WORK SHALL BE CARRIED OUT AS PER THE INSTRUCTIONS OF BHEL ENGINEER. BHEL ENGINEERS DECISION REGARDING THE CORRECTNESS OF THE WORK AND METHOD OF WORKING SHALL BE FINAL AND BINDING ON THE BIDDER.

##### **4.0.4**

THE BIDDER SHALL AT HIS COST PERFORM ANY SERVICES, TESTS ETC, ALTHOUGH NOT SPECIFIED BUT NEVERTHELESS REQUIRED FOR THE COMPLETION OF WORK.

##### **4.0.5**

CONTRACTOR SHALL ERECT ALL THE EQUIPMENTS AS PER SEQUENCE PRESCRIBED BY BHEL AT SITE. THE SEQUENCE OF ERECTION, METHODOLOGY WILL BE DECIDED BY THE BHEL ENGINEERS DEPENDING UPON THE AVAILABILITY OF MATERIAL, WORK FRONTS ETC. NO CLAIMS FOR EXTRA PAYMENT FROM THE CONTRACTOR WILL BE ENTERTAINED ON THE GROUNDS OF DEVIATION FROM THE METHODS AND SEQUENCE OF ERECTION ADOPTED IN ERECTION OF SIMILAR TG SETS OR FOR ANY REASONS WHATSOEVER.

##### **4.0.6**

ALL THE NECESSARY CERTIFICATES AND LICENSES REQUIRED TO CARRYOUT THIS WORK ARE TO BE ARRANGED BY THE CONTRACTOR EXPEDITIOUSLY AT HIS COST.

##### **4.0.7**

THE WORK TO BE CARRIED OUT UNDER THE SCOPE OF THESE SPECIFICATIONS COVERS THE COMPLETE WORK OF LOADING AT STORES/STORAGE YARD, HANDLING, TRANSPORTING, UNLOADING AT ERECTION SITE, PRE-ASSEMBLY, ERECTION, ALIGNMENT, HOT ALIGNMENT, BOLTING, FASTENING, WELDING, RADIOGRAPHY, LEVELLING, COLD PULLING, ADJUSTING, NON-DESTRUCTIVE TESTING, POST WELD HEAT TREATMENT, HYDRAULIC TEST, CHEMICAL CLEANING, PASSIVATION, STEAM BLOWING, OIL FLUSHING, WATER FLUSHING, AIR FLUSHING, PRE-COMMISSIONING TESTS, TRIAL RUNNING OF AUXILIARIES COVERED UNDER THESE SPECIFICATIONS, COMMISSIONING AND ALL OTHER ACTIVITIES TILL HANDING OVER OF THE UNIT. THE WORK SHALL CONFORM TO DIMENSIONS AND TOLERANCES SPECIFIED IN THE VARIOUS DRAWINGS, DOCUMENTS ETC. THAT WILL BE PROVIDED DURING THE COURSE OF INSTALLATION. IF ANY PORTION OF THE WORK IS FOUND TO BE DEFECTIVE IN WORKMANSHIP OR NOT CONFORMING TO DRAWINGS OR OTHER SPECIFICATIONS, THE CONTRACTOR SHALL DISMANTLE AND RE-DO THE WORK DULY REPLACING THE DEFECTIVE MATERIALS AT HIS COST FAILING WHICH THE WORK WILL BE GOT DONE BY BHEL AT THE COST AND RISK OF THE CONTRACTOR.

#### **4.0.8**

THE TERMINAL POINTS AS DECIDED BY BHEL SHALL BE FINAL AND BINDING ON THE CONTRACTOR.

#### **4.0.9**

THE INDICATIVE SCHEDULE OF WEIGHT OF MAJOR EQUIPMENTS GIVEN IN RELEVANT APPENDICES ARE MEANT FOR PROVIDING A GENERAL IDEA TO THE CONTRACTOR ABOUT THE MAGNITUDE OF THE WORK INVOLVED.

#### **4.0.10**

DURING THE COURSE OF EXECUTION OF THIS WORK, CERTAIN REWORK/ MODIFICATION/ RECTIFICATION/ REPAIRS/ FABRICATION ETC. WILL BE NECESSARY ON ACCOUNT OF FEED BACK FROM VARIOUS THERMAL POWER STATIONS ON UNITS ALREADY COMMISSIONED AND/OR UNITS UNDER ERECTION AND COMMISSIONING AND ALSO ON ACCOUNT OF DESIGN DISCREPANCIES AND MANUFACTURING DEFECTS AND SITE OPERATION/MAINTENANCE REQUIREMENTS. CONTRACTOR SHALL CARRYOUT SUCH REWORK/MODIFICATION/ RECTIFICATION /FABRICATION/REPAIRS ETC., PROMPTLY AND EXPEDITIOUSLY. DAILY LOG SHEETS INDICATING THE DETAILS OF WORK CARRIED OUT, MAN HOURS, CONSUMABLES USED ETC, SHALL BE MAINTAINED BY THE CONTRACTOR AND GOT SIGNED BY BHEL ENGINEER EVERY DAY. CLAIMS OF CONTRACTOR, IF ANY, FOR SUCH WORKS WILL BE DEALT AS PER CLAUSES OF SECTION-13, SPECIAL CONDITIONS OF CONTRACT.

#### **4.0.11**

ALL TOOLS AND TACKLES, FIXTURES, EQUIPMENTS, MATERIALS, MANPOWER, SUPERVISORS/ ENGINEERS, CONSUMABLES ETC. REQUIRED FOR THIS SCOPE OF WORK SHALL BE PROVIDED BY THE CONTRACTOR. ALL EXPENDITURE INCLUDING TAXES AND INCIDENTALS IN THIS CONNECTION WILL HAVE TO BE BORNE BY HIM UNLESS OTHERWISE SPECIFIED IN THE RELEVANT CLAUSE.

#### **4.0.12**

THE CONTRACTOR SHALL MAKE ADEQUATE SECURITY ARRANGEMENTS INCLUDING EMPLOYMENT OF SECURITY PERSONNEL AND ENSURE PROTECTION FROM THEFT, FIRE, PILFERAGE, DAMAGE AND LOSS OF MATERIALS/EQUIPMENTS ISSUED TO HIM FOR THE WORK. SPECIAL CARE WILL HAVE TO BE TAKEN TO GUARD AGAINST PILFERAGE / THEFT OF COPPER TUBING, BRASS FITTINGS, BRASS VALVES AND OTHER COSTLY MATERIALS.

#### **4.0.13**

ALL EQUIPMENTS SHALL BE HANDLED VERY CAREFULLY TO PREVENT ANY DAMAGE OR LOSS. NO BARE WIRE ROPES, SLINGS ETC, SHALL BE USED FOR HANDLING OF THE EQUIPMENTS WITHOUT THE SPECIFIC PERMISSION OF THE ENGINEER.

#### **4.0.14**

CONTRACTOR SHALL ENSURE PROPER HOUSEKEEPING AND REMOVE ALL SCRAP MATERIALS PERIODICALLY FROM VARIOUS WORK AREA COVERED IN THE SCOPE AND DEPOSIT THE SAME AT

BHARAT HEAVY ELECTRICALS LIMITED:PSWR:NAGPUR  
TENDER SPECIFICATION No. BHE/PW/PUR/UKT –STG/651

THE PLACE EARMARKED FOR THIS PURPOSE. IN CASE OF CONTRACTOR'S FAILURE TO DO THE SAME, BHEL RESERVES THE RIGHT TO REMOVE SCRAP AT CONTRACTOR'S COST AND RISK.

#### **4.0.15**

ACCESS TO SITE FOR INSPECTION BY BHEL AND CUSTOMER ENGINEERS SHALL BE MADE AVAILABLE BY THE CONTRACTOR AT ALL TIMES.

#### **4.0.16**

CONTRACTOR SHALL MOBILISE SUFFICIENT QUANTITY OF SLEEPERS FOR STACKING OF MATERIALS IN HIS CUSTODY.

#### **4.0.17**

THE CONTRACTOR'S SCOPE OF WORK IS FURTHER DESCRIBED IN THE FOLLOWING CLAUSES:

### **4.1 COLLECTION AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES**

#### **4.1.1**

CONTRACTOR SHALL TAKE DELIVERY OF THE COMPONENTS, EQUIPMENTS, LUBRICANTS, CHEMICALS, SPECIAL CONSUMABLES, STEEL ETC FROM THE STORAGE YARD/STORES/SHEDS OF BHEL/ CLIENT. THE CONTRACTOR SHOULD NOTE THAT THE TRANSPORT OF EQUIPMENTS TO ERECTION SITE, ASSEMBLY YARDS ETC SHOULD BE DONE BY THE PRESCRIBED ROUTE, WITHOUT DISTURBING THE OTHER WORKS AND CONTRACTORS AND IN THE MOST PROFESSIONAL MANNER. SPECIAL EQUIPMENTS SUCH AS LABORATORY EQUIPMENTS, MEASURING AND CONTROLS EQUIPMENTS, SPECIAL ELECTRODES, VALVES, SHIMS, PACKING MATERIALS FOR JOINTS AND SEALS, LUBRICANTS, ACTUATORS ETC, SHALL BE STORED, WHEN TAKEN OVER BY THE CONTRACTOR, IN APPROPRIATE MANNER AS PER BHEL'S INSTRUCTIONS.

#### **4.1.2**

THE CONTRACTOR SHALL RETURN ALL PARTS, MATERIALS, AND CONSUMABLES ETC. REMAINING EXTRA OVER THE NORMAL REQUIREMENT WITH PROPER IDENTIFICATION TAGS TO BHEL STORES. IN CASE OF ANY MISUSE OR USE OVER ACTUAL REQUIREMENT, BHEL RESERVES THE RIGHT TO RECOVER THE COST OF PARTS/MATERIALS USED IN EXCESS OR MISUSED, WITH DEPARTMENTAL CHARGES.

#### **4.1.3**

TRANSPORTATION OF LUBE OIL, GAS CYLINDERS ETC. FROM STORES, IS INCLUDED IN THE SCOPE OF THIS CONTRACT. THE CONTRACTOR SHALL HAVE TO RETURN THE ENTIRE EMPTY AND EXCESS DRUMS TO THE CUSTOMER/BHEL STORES. SIMILARLY, TRANSPORT OF CHEMICALS FOR VARIOUS PRE-COMMISSIONING ACTIVITIES/ PROCESSES MENTIONED IN CLAUSES HEREIN FROM BHEL/CUSTOMER'S STORES AND CHARGING OF CHEMICALS INTO THE SYSTEM FOR CARRYING OUT VARIOUS PRE-COMMISSIONING ACTIVITIES AND PROCESSES MENTIONED HEREIN AND RETURNING OF REMAINING AND/OR THE EMPTY CONTAINERS OF THE CHEMICALS TO CUSTOMER/BHEL STORES IS THE RESPONSIBILITY OF CONTRACTOR. AFTER COMPLETION OF OIL FLUSHING OPERATION, THE USED OIL SHALL BE FILLED IN EMPTY DRUMS AND WHICH IN TURN SHALL BE RETURNED TO BHEL/CUSTOMER'S STORES.

### **4.2 PREPARATION OF FOUNDATION**

#### **4.2.1**

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

#### **4.2.2**

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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 ESSENTIAL 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 EQUIPMENTS INSTALLATION – COMMON REQUIREMENTS**

### **4.3.1**

FILLING OF LUBRICANTS FOR STEAM TURBINE, TURBO-GENERATOR AND OTHER ROTATING AUXILIARIES FOR PURPOSE OF OIL FLUSHING, INITIAL FILL UP AND SUBSEQUENT TOPPING UP DURING VARIOUS STAGES OF WORK.

### **4.3.2**

ALL WORKS SUCH AS CLEANING, LEVELLING, ALIGNING, HOT ALIGNMENT, 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, GRINDING, STRAIGHTENING, CHAMFERING, FILLING, MACHINING, CHIPPING, DRILLING, REAMING, SCRAPING, LAPPING, SHAPING, FITTING-UP, DRILLING OF HOLES, MAKING DOWEL PINS, MINOR RECTIFICATION OF FOUNDATION BOLTS ETC. ARE INCIDENTAL TO THE ERECTION/COMMISSIONING AND ANY OTHER WORK/ACTIVITY WHICH IS NECESSARY TO COMPLETE THE WORK SATISFACTORILY, SHALL BE CARRIED OUT BY THE CONTRACTOR AS PART OF THE WORK.

### **4.3.3**

CLEANING, SERVICING, LUBRICATION OF ACTUATORS, PUMPS, HEADERS, GOVERNING SYSTEM, ESV & IV, CONTROL VALVES, LP BYPASS AND OTHER VALVES, TANKS, VESSELS ETC. DURING ERECTION AND COMMISSIONING STAGES IS IN THE SCOPE OF WORK. HOWEVER, GASKETS/PACKINGS/LUBRICANTS FOR REPLACEMENT WILL BE PROVIDED BY BHEL FREE OF COST.

### **4.3.4**

ALL EQUIPMENT SHALL BE PRESERVED AND PROTECTED PERIODICALLY BEFORE AND AFTER ERECTION AS PER ADVICE OF BHEL ENGINEER. THE JOURNALS OF STEAM TURBINE ROTORS, GENERATOR ROTOR, HT MOTORS AND OTHER ROTATING MACHINES SHALL BE THOROUGHLY CLEANED, GREASED/PAINTED WITH PRESERVATIVE AGENTS PERIODICALLY AS INSTRUCTED BY BHEL ENGINEER.

### **4.3.5**

TRIAL RUN OF ALL MOTORS INCLUDING CHECKING DIRECTION OF ROTATION IN UNCOUPLED CONDITION, CHECK ALIGNMENT AND RE-COUPLE THE MOTOR TO DRIVEN EQUIPMENT.

### **4.3.6**

AFTER INITIAL TRIAL OF ROTATING EQUIPMENTS, CONTROL AND POWER CABLING FOR MOTORS AND OTHER EQUIPMENTS/INSTRUMENTATION MAY HAVE TO BE DISCONNECTED FOR CHECKING ALIGNMENT AND RESETTING/REALIGNMENT/HOT ALIGNMENT. CONTRACTOR WILL HAVE TO PROVIDE SERVICES FOR DISCONNECTION AND RECONNECTION OF CONTROL AND POWER CABLES.

### **4.3.7**

ALL RACKS OR ASSEMBLED UNITS LIKE GOVERNING RACK, LP BYPASS RACK, SEAL OIL UNIT, GAS UNIT, SEAL OIL VALVE RACK, PRIMARY WATER UNIT, GAS CYLINDER RACKS ETC SUPPLIED FROM MANUFACTURING UNITS WILL BE TESTED IN BHEL/ CUSTOMER STORES OR AT SITE. THIS MAY REQUIRE TRANSPORTATION, FILLING OF OIL, WATER ETC IN THESE RACKS FOR CARRYING OUT TESTING OF THESE RACKS. DEFECTS NOTICED DURING TESTING OF THESE RACKS WILL HAVE TO BE RECTIFIED BY THE CONTRACTOR FREE OF CHARGES. FURTHER, ANY PIPELINE / FLANGES / FITTINGS NOT FOUND ASSEMBLED PROPERLY, THE SAME HAVE TO BE RECTIFIED / CORRECTED BY THE CONTRACTOR FREE OF CHARGES.

## **4.4 PIPING INSTALLATION**

### **4.4.1**

THE SCOPE OF WORK IN PIPING SYSTEM (AIR, WATER, OIL, STEAM ETC.) WILL INCLUDE CUTTING TO REQUIRED LENGTH, EDGE PREPARATION, LAYING, FIXING AND WELDING OF THE

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ELBOWS/FITTINGS/VALVES ETC., FIXING SUPPORTS/HANGERS/SHOCK ABSORBERS/ GUIDES AND RESTRAINTS ETC. AND CARRYING OUT ALL OTHER ACTIVITIES/WORKS TO COMPLETE THE ERECTION AND ALSO CARRYING OUT ALL PRE-COMMISSIONING/COMMISSIONING OPERATIONS MENTIONED IN THESE SPECIFICATIONS AS PER ENGINEER'S INSTRUCTIONS AND/OR AS PER APPROVED DRAWINGS. INDICATIVE LIST OF SCHEMES OF PIPING AND THEIR APPROXIMATE WEIGHTS ARE PROVIDED **VIDE RELEVANT APPENDIX.**

#### **4.4.2**

CARRYING OUT OF PIPING AS PER THE SPECIFICATIONS BETWEEN EQUIPMENTS CONSTITUTING TERMINAL POINTS, 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 EITHER ENDS, WITH DUE NDE & PWHT IF APPLICABLE, FOR ALL THE PIPING SCHEMES COVERED IN THE SCOPE OF WORK.

#### **4.4.3**

FIT UP AND WELDING/BOLTING/FASTENING OF PIPING TO THE TERMINAL POINTS (SUCH AS STUBS, VALVES, FLANGES ON TERMINAL POINTS/EQUIPMENTS, STUBS ON HEADERS, BATTERY LIMITS ETC) FORMING PART OF THE SCOPE OF WORK/SPECIFICATION AND STRESS RELIEVING AND RADIOGRAPHY OF JOINTS SO MADE ARE ALSO WITHIN THE SCOPE OF WORK. PERMANENT FASTENERS AND GASKETS WILL BE SUPPLIED BY BHEL.

#### **4.4.4**

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

#### **4.4.5**

ALL DRAINS / VENTS / RELIEF / ESCAPES / SAFETY VALVE PIPING TO VARIOUS TANKS/ SEWAGE / DRAIN CANAL / FLASH BOX / CONDENSER / SUMP / ATMOSPHERE ETC. FROM THE STUBS ON THE PIPING AND EQUIPMENTS ERECTED BY CONTRACTOR IS COMPLETELY COVERED IN THE SCOPE OF THIS TENDER.

#### **4.4.6**

THE FOLLOWING ITEMS OF WORK SHALL BE INCIDENTAL AND FORMING PART OF PIPING FABRICATION AND ERECTION:

- 1 TO LOCATE CAUSE OF VIBRATIONS IN EQUIPMENTS/AUXILIARIES/PIPELINES AND CARRYING OUT NECESSARY CORRECTIONS IN CASE THE SAME IS ATTRIBUTED TO THE CONTRACTOR.
- 2 FABRICATION AND ERECTION & WELDING OF RACKS, STEEL SUPPORTS, GUIDES, RESTRAINTS FOR ALL THE PIPING. STEEL FOR THIS PURPOSE WILL BE SUPPLIED BY BHEL FREE OF CHARGE IN RANDOM AND RUNNING LENGTHS.
- 3 PRE-ASSEMBLY OF SPRING SUSPENSION/HANGERS AND SHOCK ABSORBER AS PER REQUIREMENT.
- 4 ERECTION OF STEAM TRAPS, FILTERS, FLOW NOZZLES/ FLOW INDICATORS/ FLOW ORIFICES OTHER MEASURING ELEMENTS IN THE PIPING. THESE MAY HAVE BEEN SUPPLIED EITHER BY BHEL OR THEIR CUSTOMER. THIS MAY INVOLVE CUTTING OF PIPE LINES, FRESH EDGE PREPARATION AND WELDING WITH STRESS RELIEVING WHEREVER APPLICABLE.
- 5 FABRICATION / MAKING OF BENDS FOR PIPES AND TUBES OF DIAMETER UPTO 65MM.
- 6 MATCHING OF ALL FITTINGS LIKE TEES, BENDS, FLANGES, REDUCERS VALVES, SOCKET FITTINGS, ETC WITH PIPES FOR WELDING.

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- 7 SERVICING OF VALVES AND ACTUATORS
- 8 CLEANING OF ALL PIPES BY WIRE BRUSHING / BLOWING BY COMPRESSED AIR.
- 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/ MEASURING ELEMENTS FIXED ON PIPING.
- 10 WELDING OF BLANKS WITH STRESS RELIEVING IF REQUIRED ON A TEMPORARY BASIS.

#### **4.4.7**

PIPELINES WILL BE FIELD ROUTED AS PER SCHEMES/ SUGGESTIVE LAYOUT OR AS PER THE INSTRUCTIONS OF BHEL ENGINEER. PIPES & TUBES WILL BE SUPPLIED IN RANDOM LENGTHS AND RUNNING LENGTHS. THE CONTRACTOR SHALL HAVE TO LAY THE PIPING AFTER CARRYING OUT THE NECESSARY FABRICATION, EDGE PREPARATION, ROUTING ETC TO SUIT SITE REQUIREMENT IN BEST PROFESSIONAL MANNER.

#### **4.4.8**

AS FAR AS POSSIBLE PRE-ASSEMBLY SHALL BE DONE. 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 SETTINGS TO BE ENSURED AS PER REQUIREMENT.

### **4.5 CONDENSER INSTALLATION**

#### **4.5.1**

THE CONDENSER WILL BE DESPATCHED IN LOOSE PARTS MAINLY COMPRISING OF BOTTOM PLATES, DOME VALVES, FRONT AND REAR WATER CHAMBER, FRONT AND REAR WATER BOXES, SIDE WALLS, HOT WELL, SPRING ELEMENTS, SUPPORT PLATES, AIR EXTRACTION PIPES, BAFFLES, STIFFENING RODS AND PIPES ETC. THE CONDENSER IS TO BE ASSEMBLED AT SITE IN POSITION BY WELDING THE DIFFERENT PARTS. CONDENSER TUBING AND TUBE EXPANSION (ROLLER EXPANSION) IS TO BE DONE AT SITE BY THE CONTRACTOR, AFTER TAKING DUE CARE TO CLEAN ALL THE TUBE HOLES. AFTER FINAL ALIGNMENT AND LEVELLING OF TURBINE EXHAUST AND CONDENSER, THE SAME HAS TO BE WELDED TO THE EXHAUST POSITION OF LP EXHAUST AS PER THE SEQUENTIAL WELDING PROCEDURE. CONDENSER TUBE MATERIAL IS STAINLESS STEEL.

#### **4.5.2**

BEFORE INSERTION OF TUBES, THE CONTRACTOR SHALL CLEAN THE HOLES IN THE TUBE PLATES AND TUBE SUPPORT PLATES TO REMOVE PAINT, CORROSION SPOTS, OXIDE SCALES ETC. USAGE OF SUITABLE CLEANING AGENT MAY ALSO BE REQUIRED WHICH HAS TO BE SUPPLIED BY THE CONTRACTOR.

#### **4.5.3**

THE TUBES SHALL BE EXPANDED USING AN AUTOMATIC ELECTRONIC TORQUE CONTROLLED TUBE EXPANDING UNIT OR PNEUMATIC TUBE EXPANDER. TUBE EXPANSION SHALL BE CHECKED WITH DIAL BORE GAUGE. THE TOTAL SET UP INCLUDING TUBE EXPANDERS AND TUBE CUTTING TOOLS ETC. FOR CARRYING OUT THE COMPLETE CONDENSER TUBE EXPANSION WORKS SHALL BE PROVIDED BY THE CONTRACTOR.

#### **4.5.4**

THE CONTRACTOR SHALL CARRY OUT THE CONDENSER NECK WELDING WITH LP CYLINDER EXHAUST HOOD ONLY AFTER FINAL INSTALLATION OF LP CASING. NECK WELDING SHALL BE SUBJECTED TO SPECIFIED NON-DESTRUCTIVE TESTING.

#### **4.5.5**

THE HYDROSTATIC TESTING OF STEAM SPACE AND HYDRAULIC TESTING OF WATER SPACE UP TO THE TERMINAL POINT AFTER ASSEMBLY OF WATER BOXES ARE ALSO INCLUDED IN THE SCOPE.

#### **4.5.6**

WORK OF PAINTING OF CONDENSER SURFACES IN VARIOUS AREA AND AT VARIOUS STAGES OF WORK ARE SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS.

### **4.6 GENERATOR INSTALLATION**

#### **4.6.1 GENERATOR STATOR**

THE GENERATOR STATOR, WEIGHING 275 METRIC TONNES (APPROX.) , WILL BE DELIVERED TO SITE EITHER (1) ON A TRAILOR OR (2) ON A SPECIAL WAGON CONSISTING OF 8 BOGIES (FOUR ON EITHER SIDE) WITH FACILITIES TO SWIVEL. THESE TWO SETS OF BOGIES ARE CONNECTED BY A CARRIER BEAM, WHICH CARRIES THE LOAD OF THE STATOR. TG CONTRACTOR TO ARRANGE 6(SIX) NOS. 100 MT JACKS ALSO FOR UNLOADING THE GENERATOR STATOR FROM THE RAILWAY WAGON.

THE CONTRACTOR SHALL HAVE TO LIFT THE GENERATOR STATOR FROM THE ABOVE TRANSPORT ARRANGEMENT IN THE UNLOADING BAY OUTSIDE THE MACHINE HALL.

IN THE EVENT PLACEMENT OF TRAILER / WAGON IS NOT POSSIBLE BELOW THE PORTAL GANTRY CRANE THEN THE STATOR MAY HAVE TO BE UNLOADED NEAR THE MAINTENANCE BAY BY THE CONTRACTOR. THIS LOCATION MAY BE AROUND 80 METRES AWAY FROM THE PORTAL CRANE. CONTRACTOR HAS TO DRAG THE STATOR SAFELY USING SUITABLE METHOD FROM THE POINT OF UNLOADING TO THE REACH OF PORTAL CRANE.

THE PERCENTAGE ALLOCATED FOR CARRYING OUT THE ACTIVITY OF GENERATOR STATOR DRAGGING IS 0.50%. THIS SHALL BE PAID ONLY WHEN THE ACTIVITY IS PERFORMED. NO PAYMENT / COMPENSATION SHALL BE MADE IF THE ACTIVITY IS NOT PERFORMED.

#### **4.6.2**

THE GENERATOR STATOR SHALL BE LIFTED AND PLACED BY THE CONTRACTOR WITH THE HELP OF PORTAL GANTRY CRANE AS PER THE SCHEME ENVISAGED BY BHEL ON TO THE GENERATOR FOUNDATION. FOR THIS PURPOSE, THE PORTAL CRANE WILL BE PROVIDED BY BHEL FREE OF HIRE CHARGES TO THE CONTRACTOR. HOWEVER, THE TRANSPORTATION FROM STORE/ STORAGE YARD / SHED, ASSEMBLY, ERECTION, TESTING AND COMMISSIONING OF THIS PORTAL CRANE BEFORE THE STATOR LIFTING AND TRANSPORTING, DISMANTLING, CLEANING, SHIFTING/ PACKING BACK TO STORE/ STORAGE YARD/ SHED AFTER ITS USE WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

BHEL MAY PROVIDE STRAND JACK SYSTEM FOR STATOR LIFTING IN PLACE OF PORTAL CRANE. VENDOR TO PROVIDE ALL THE REQUIRED T&P, MANPOWERS, GROUND PREPARATION, CONSOLIDATION OF LAND ETC INCLUDING FIUNDATIONS IF REQUIRED AS PER BHEL SITE ENGINEER TO SUIT THE STATOR LIFTING REQUIREMENT. VENDOR SHALL UNLOAD, THE STRAND JACK, WHICH WILL BE ISSUED IN PARTS / COMPONENTS AND ARE TO BE ASSEMBLED AT SITE BY THE CONTRACTOR AS PER THE INSTRUCTIONS OF BHEL ENGINEERS / ERECTION MANUAL. THE SCOPE INCLUDES RECEIPT OF THE MATERIALS FROM BHEL STORES, TRANSPORTATION TO SITE, SERVICING OF THE COMPONENTS ETC, CHECKING AND LUBRICATING WIRE ROPES, PRE ASSEMBLY AND ASSEMBLY OF COMPONENTS, PREPARATION OF FOUNDATION, ERECTION OF STRAND JACK ON THE FOUNDATION, GROUTING OF BASE PLATES, CABLING, PRE-COMMISSIONING AND COMMISSIONING OF DRIVES, LOAD TESTING, REGULAR MAINTENANCE ETC. A QUALIFIED/ EXPERIENCED OPERATOR IS TO BE PROVIDED BY THE CONTRACTOR. AFTER ERECTION OF THE GENERATOR STATOR, THE CONTRACTOR HAS TO DISMANTLE THE STRAND JACK AS INSTRUCTED BY BHEL AND RETURN THE SAME TO STORE IN GOOD CONDITION. THERE IS NO SEPARATE RATE FOR THE ABOVE AND QUOTED RATES SHALL BE INCLUSIVE OF THIS.

THE ASSEMBLY OF THE SPECIAL WAGON FOR RETURN AFTER UNLOADING OF STATOR IS IN THE SCOPE OF THIS WORK.

#### **4.6.3**

CONTRACTOR SHALL HAVE TO KEEP THE LIASON WITH RAILWAYS ON ARRIVAL OF GENERATOR AT RAILWAY SIDING

### **4.7 DEAERATOR INSTALLATION AND HANDLING OF HEAVY AND VOLUMINOUS EQUIPMENTS/COMPENENTS:**

#### **4.7.1**

CONTRACTOR SHALL PROVIDE ALL REQUIRED SUITABLE CRANES AND TRAILERS FOR LOADING OF MATERIALS DURING COLLECTION OF FROM BHEL/ CLIENT'S STORES/ STORAGE YARD, TRANSPORTATION TO SITE OF WORK AND AT WORK SITE INCLUDING UNLOADING AT SITE OF WORKS FOR ALL EQUIPMENTS AND CONSIGNMENTS INCLUDING HEAVY AND VOLUMINOUS EQUIPMENTS/ COMPONENTS/ CONSIGNMENTS LIKE HP TURBINE MODULE, LP TURBINE INNER-OUTER CASING, LP TURBINE INNER CASING, LP ROTOR, GENERATOR ROTOR, BRUSHLESS EXCITER, HP HEATERS, DEAERATOR/ FST SECTIONS ETC. BHEL/CUSTOMER SHALL NOT PROVIDE ANY T & P OTHER THAN MENTIONED IN **APPENDIX-III FOR THE PURPOSE IDENTIFIED. THE CONTRACTOR SHALL MAKE SUITABLE ARRANGEMENTS/ARRANGE CRANE WELL IN ADVANCE FOR LIFTING AND PLACEMENT TO FINAL POSITION, FITUP, WELDING ETC. OF DEAERATOR / FST SECTIONS AT REQUIRED ELEVATION / LOCATION WITH UTMOST CARE.**

#### **4.7.2**

ERECTION OF PERMANENT APPROACH PLATFORM AND LADDERS ETC FOR DE-AERATOR AND FST IS IN THE SCOPE OF WORK. THE STRUCTURAL STEEL AND OTHER MEMBERS WILL BE SUPPLIED IN RANDOM LENGTH/SIZE & WILL HAVE TO BE CUT TO REQUIRED SIZE AND PROFILE AS INCIDENTAL TO WORK.

### **4.8 HYDROSTATIC TESTING, PRESERVATION AND OTHER TESTS**

#### **4.8.1**

CONTRACTOR SHALL CARRY OUT THE FOLLOWING TESTS REQUIRED TO COMPLETE THE ERECTION AND COMMISSIONING OF THE TG SET:

- a. HYDRAULIC TESTING OF INDIVIDUAL EQUIPMENTS LIKE CONDENSER, COOLERS, HEATERS, OTHER AUXILIARIES AND EQUIPMENTS. REQUIRED CAPACITY HYDRAULIC TEST PUMP/ FILL PUMP AND OTHER NECESSARY ARRANGEMENT SHALL BE PROVIDED BY CONTRACTOR TO CARRY OUT HYDRAULIC TESTING OF THE EQUIPMENTS AND PIPING AS PART OF SCOPE OF WORK UNDER THIS TENDER SPECIFICATION.
- b. ULTRASONIC TEST
- c. DYE PENETRANT TEST
- d. MAGNETIC PARTICLE TEST.

ALL ABOVE FACILITIES (MEN, MATERIALS, EQUIPMENTS, CONSUMABLES ETC) WITH OPERATING ENGINEER/EXPERIENCED PERSON AND PROPER APPROACH WHEREVER REQUIRED SHALL BE PROVIDED BY THE CONTRACTOR FOR SATISFACTORY COMPLETION OF THE ABOVE TESTS.

#### **4.8.2**

CONTRACTOR SHALL LAY ALL NECESSARY TEMPORARY PIPING, INSTALL PUMPS, VALVES, PRESSURE GAUGES, ELECTRIC CABLES AND SWITCHES ETC, REQUIRED FOR THE HYDRO TEST. AFTER THE TEST IS OVER, ALL THE TEMPORARY PIPING, PUMPS, ETC WILL BE REMOVED. IT MAY ALSO SPECIFICALLY BE NOTED THAT SERVICING, ERECTION AND DISMANTLING OF PIPING AND

EQUIPMENTS FOR CONDUCTING HYDRAULIC TEST WILL BE DONE BY THE CONTRACTOR. NO SEPARATE PAYMENT SHALL BE MADE FOR THIS PURPOSE.

#### **4.8.3**

ALL THE ABOVE TESTS SHALL BE REPEATED TILL ALL THE EQUIPMENTS, PIPING AND SYSTEMS SATISFY THE TECHNICAL AND STATUTORY REQUIREMENTS. ALL RELATED WORKS FORM PART OF THE SCOPE.

#### **4.8.4**

SUITABLE WELDING AND STRESS RELIEVING OF TEMPORARY BLANKS OR SUITABLY FIXING TEMPORARY BLANK FLANGES WITH GASKETS AND FASTENERS AND WELDING AND PROVIDING SUITABLE DE-AERATION/ VENTING /DRAIN POINTS WITH VALVES AS PER BHEL ENGINEER'S INSTRUCTION, FOR PERFORMING HYDRO TEST OF PIPING IS WITHIN THE SCOPE OF WORK. REQUIRED VALVES, FASTENERS, BLANK FLANGES, BLANKS OR STEEL FOR BLANK FLANGES WILL BE PROVIDED BY CONTRACTOR. AFTER COMPLETION OF HYDRAULIC TEST, WELDED BLANKS SHALL BE CUT AND REMOVED AND WELD BURRS GROUND FINISHED AND CAVITIES/SCARS OF CUTTING WELD FILLED AND GROUND AS PER BHEL ENGINEERS' INSTRUCTION.

#### **4.8.5**

HYDRO TEST OF PIPING MAY HAVE TO BE REPEATED SEVERAL TIMES TO MEET TECHNICAL AND STATUTORY REQUIREMENTS BEFORE APPLICATION OF INSULATION.

#### **4.8.6**

WHILE CONDUCTING HYDRAULIC TEST OF STEAM LINES, WATER LINES, OIL LINES EITHER INDIVIDUALLY OR GROUPING A FEW LINES OR IN PORTIONS. BLANKS/SPOOLS MAY HAVE TO BE PUT UP AT TERMINAL POINTS, STRAINERS, WALLS, and FLANGES ETC. AFTER CONDUCTING THE TESTS, THE BLANKS SHALL BE REMOVED AND THE LINES RESTORED. ALSO INTERCONNECTING PIPING BETWEEN BOILER AND TURBINE, THE HYDRAULIC TEST MAY HAVE TO BE DONE SECTION WISE AND SOME -TIMES PIPING OF OTHER AGENCIES MAY HAVE TO BE COMBINED. CONTRACTOR SHALL CARRY OUT ALL SUCH INCIDENTAL WORK TO SATISFACTORILY CONDUCT THE HYDRO TEST. WHEREVER WORK IS INVOLVED IN THE TERMINAL POINTS, CONTRACTOR SHALL CARRYOUT THE SAME AS PER INSTRUCTION OF BHEL ENGINEER. THE DECISION OF BHEL ENGINEER IS FINAL AND THE SAME IS BINDING ON THE CONTRACTOR.

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

### **4.9 PRE-COMMISSIONING TESTS, COMMISSIONING AND POST COMMISSIONING**

#### **4.9.1**

COMMISSIONING OF THE TG AND AUXILIARIES SHALL INVOLVE THE FOLLOWING TESTS AND ACTIVITIES OF THE EQUIPMENTS ERECTED :

- (1) TRIAL RUN OF FEED PUMPS, CEP, AND VARIOUS ROTATING MACHINERIES / PUMPS.
- (2) TRIAL RUN OF MOTORS/ DRIVES FOR VARIOUS AUXILIARIES.
- (3) HYDRAULIC TEST OF PIPELINES, CLOSED SYSTEMS, TANKS AND VESSELS.
- (4) FLUSHING OF ALL PIPELINES BY AIR/OIL/WATER/STEAM AS THE CASE MAY BE.
- (5) SERVICING OF ALL VALVES AND FITTINGS.
- (6) MANUAL/ MECHANICAL CLEANING OF OIL TANKS, DEAERATOR, FST, SUCTION STRAINERS / FILTER ELEMENTS OF CEP, BFP, BOOSTER PUMP AND OTHER VARIOUS EQUIPMENTS AND

TANKS ERECTED BY THE CONTRACTOR. THIS MAY HAVE TO BE REPEATED SEVERAL TIMES DURING THE COMMISSIONING PROCESS.

- (7) CHEMICAL CLEANING OF PIPING SYSTEMS, DEAERATOR AND FST AS PER REQUIREMENT. CONTRACTOR SHALL CARRY OUT DISASSEMBLY AND REASSEMBLY OF VULNERABLE COMPONENTS LIKE DEAERATOR SPRAY NOZZLES, GAUGES, INSTRUMENTS ETC. AS INSTRUCTED BY BHEL DURING THIS PROCESS.
- (8) PUTTING TURBINE ON BARRING GEAR.
- (9) ROLLING AND SYNCHRONISATION.
- (10) FULL LOAD OPERATION.
- (11) TRIAL OPERATION

THE ABOVE ACTIVITIES/TESTS/TRIAL RUNS MAY HAVE TO BE REPEATED TILL SATISFACTORY RESULTS ARE OBTAINED AND ALSO TO MEET THE TECHNICAL AND STATUTORY REQUIREMENTS.

#### **4.9.2**

CONTRACTOR SHALL LAY TEMPORARY PIPELINES WITH FITTINGS AND ACCESSORIES ETC. AS INSTRUCTED BY BHEL ENGINEER FOR THE PURPOSE OF PRE-COMMISSIONING AND COMMISSIONING ACTIVITIES LIKE HYDRAULIC TESTING, CHEMICAL CLEANING, OIL FLUSHING, STEAM BLOWING ETC. OF PIPING AND OTHER EQUIPMENTS AS PART OF THE SCOPE OF WORK. TEMPORARY INSTALLATIONS SHALL BE DISMANTLED BY CONTRACTOR AND RETURNED TO BHEL STORES AS SPECIFIED ELSEWHERE IN THIS T.S.

#### **4.9.3**

THE CONTRACTOR SHALL PROVIDE ALL ASSISTANCE FOR ELECTRICAL AND INSTRUMENTATION TESTING AND COMMISSIONING OF EQUIPMENTS UNDER THIS SCOPE OF WORK, TO BHEL AND THEIR TESTING & COMMISSIONING AGENCY.

#### **4.9.4**

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

#### **4.9.5**

IN CASE ANY MALFUNCTIONING AND / OR DEFECT IS FOUND DURING TESTS / TRIAL RUNS SUCH AS LOOSE COMPONENTS, UNDUE NOISE OR VIBRATIONS, STRAIN ON CONNECTED EQUIPMENTS ETC. THE CONTRACTOR SHALL IMMEDIATELY ATTEND TO THESE DEFECTS/ MALFUNCTIONING AND TAKE NECESSARY CORRECTIVE MEASURES. IF ANY READJUSTMENT AND REALIGNMENTS ARE NECESSARY, THE SAME SHALL BE DONE AS PER BHEL ENGINEER'S INSTRUCTIONS, FREE OF COST.

#### **4.9.6**

CLEANING OF OIL TANK BY SAND BLASTING OR OTHER METHODS AS PER INSTRUCTIONS OF BHEL ENGINEER BEFORE AND AFTER OIL FLUSHING IS RESPONSIBILITY OF CONTRACTOR.

#### **4.9.7**

THE CONTRACTOR SHALL ASSOCIATE FOR INITIAL AND SUBSEQUENT FILLINGS OF GAS IN GENERATOR GAS SYSTEM AS AND WHEN REQUIRED TILL UNIT IS HANDED OVER TO CUSTOMER.

#### **4.9.8**

THE CONTRACTOR SHALL CARRY OUT AIR TIGHTNESS TEST ON GENERATOR GAS COOLING SYSTEM AND WATER FLUSHING OF PRIMARY WATER SYSTEM TO THE SATISFACTION OF BHEL ENGINEER.

#### **4.9.9**

REPLACING/CHANGING MECHANICAL/OTHER SEALS OF EQUIPMENT, PUMPS ETC. DURING COMMISSIONING STAGE IS WITHIN THE SCOPE OF WORK.

#### **4.9.10**

DURING THE STAGES OF COMMISSIONING, AND TILL UNIT IS HANDED OVER, IF ANY PART OF TG AND AUXILIARIES NEED REPAIR/RECTIFICATION/REWORK/REPLACEMENT, THE SAME SHALL BE DONE EXPEDITIOUSLY AND PROMPTLY BY THE CONTRACTOR. CONTRACTOR'S CLAIM IF ANY, FOR SUCH REPAIR/RECTIFICATION/REWORK/ REPLACEMENT ETC. FOR REASONS NOT ATTRIBUTABLE TO THE CONTRACTOR, WILL BE GOVERNED BY CLAUSES 13.1 TO 13.8 OF THE SPECIFICATION. THE PARTS TO BE REPLACED SHALL HOWEVER, BE PROVIDED BY BHEL FREE OF COST.

#### **4.9.11**

DURING THIS PERIOD, THOUGH BHEL'S AND CUSTOMER'S ENGINEERS WILL ALSO BE ASSOCIATED IN THE WORK, THE CONTRACTOR'S RESPONSIBILITY WILL BE TO MAKE AVAILABLE RESOURCES IN HIS SCOPE TILL SUCH TIME THE COMMISSIONED UNITS ARE TAKEN OVER BY THE CUSTOMER.

#### **4.9.12**

IN CASE ANY MALFUNCTIONING AND/OR DEFECTS ARE FOUND DURING TESTS, TRIAL RUN SUCH AS LOOSE COMPONENT, UNDUE NOISE OR VIBRATION, STRAIN ON CONNECTED EQUIPMENT ETC., THE CONTRACTOR SHALL IMMEDIATELY ATTEND TO THESE DEFECTS/ MALFUNCTIONS AND TAKE NECESSARY CORRECTIVE MEASURES. IF ANY READJUSTMENT OR REALIGNMENT IS NECESSARY, SAME SHALL BE DONE AS PER BHEL ENGINEER'S INSTRUCTION.

#### **4.9.13**

THE PRE-COMMISSIONING ACTIVITIES WILL START PRIOR TO OIL FLUSHING OF THE TG AND VARIOUS TRIALS, COMMISSIONING OPERATIONS SHALL CONTINUE TILL THE TG IS HANDED OVER TO CUSTOMER. SIMULTANEOUS COMMISSIONING CHECKS, ACTIVITIES WILL BE IN PROGRESS IN VARIOUS AREAS LIKE TRIAL RUN OF VARIOUS EQUIPMENT, CHECKING OF EQUIPMENT ERECTED, MAKING READY FOR TRIAL RUNS, FILLING UP OF LUBRICANTS, CHEMICALS ETC. ALL THESE WORKS NEED SPECIALISED GANGS INCLUDING ELECTRICIANS, INSTRUMENT TECHNICIANS, FITTERS, IN EACH AREA TO RENDER ASSISTANCE TO BHEL COMMISSIONING STAFF. CONTRACTOR SHALL EARMARK SEPARATE MANPOWER FOR VARIOUS COMMISSIONING ACTIVITIES. THIS MANPOWER SHALL NOT BE DISTURBED OR DIVERTED. THE MOBILISATION OF THESE COMMISSIONING GANGS SHALL BE SUFFICIENT SO THAT PLANNED COMMISSIONING ACTIVITIES ARE TAKEN UP IN TIME AND ALSO COMPLETED AS PER SCHEDULE AND THE WORK IS TO BE UNDERTAKEN ROUND THE CLOCK IF REQUIRED.

#### **4.9.14**

CONTRACTOR SHALL CUT OPEN WORKS IF NEEDED AS PER BHEL ENGINEER'S INSTRUCTIONS DURING COMMISSIONING FOR INSPECTION, CHECKING AND MAKE GOOD THE WORKS AFTER INSPECTION IS OVER, WITHOUT ANY EXTRA PAYMENT.

#### **4.9.15**

AFTER THE START OF COMMERCIAL OPERATION OF MACHINE, COMMISSIONING ACTIVITIES WILL CONTINUE. IT SHALL BE THE RESPONSIBILITY OF CONTRACTOR TO PROVIDE FOLLOWING MANPOWER ALONG WITH SUPERVISOR AS PART OF COMMISSIONING ASSISTANCE FOR A PERIOD OF **THREE MONTHS**. OVER RUN CHARGE SHALL NOT BE PAYABLE DURING SUCH ASSISTANCE IF NO MAJOR ERECTION/COMMISSIONING WORK ARE PENDING. HOWEVER, IF MAJOR ERECTION/COMMISSIONING WORKS ARE PENDING DURING THIS PERIOD FOR REASONS NOT ATTRIBUTABLE TO THE CONTRACTOR, OVER RUN CHARGE, IF ANY, SHALL BE PAYABLE TO THE CONTRACTOR AS PER SECTION-11.

- |                                  |        |
|----------------------------------|--------|
| 1) SUPERVISOR                    | 2 NOS. |
| 2) PIPE FITTER/MILLWRIGHT FITTER | 2 NOS. |
| 3) WELDER                        | 2 NOS. |
| 4) RIGGER                        | 3 NOS. |

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- |                                      |            |
|--------------------------------------|------------|
| 5) ELECTRICIAN/INSTRUMENT TECHNICIAN | 1 NO. EACH |
| 6) UNSKILLED WORKER                  | 6 NOS.     |

#### **4.9.16**

THE ABOVE FIGURES SHOWS ONLY MINIMUM REQUIRED OVER AND ABOVE LABOUR REQUIRED FOR COMPLETING PENDING ERECTION AND COMMISSIONING WORKS AND CLEARING OF PUNCH LISTS. CONTRACTOR HAS TO PROVIDE NUMBER OF PERSONNEL AND OTHER RESOURCES AS PER WORK DEMAND.

#### **4.9.17**

IT SHALL BE SPECIFICALLY NOTED THAT ABOVE EMPLOYEES OF THE CONTRACTOR MAY HAVE TO WORK ROUND THE CLOCK ALONG WITH BHEL COMMISSIONING ENGINEERS.

#### **4.9.18**

DURING COMMISSIONING, OPENING OF VALVES, CHANGING OF GASKETS, CHECKING, REALIGNING OF ROTATING AND OTHER EQUIPMENT, ATTENDING TO LEAKAGES IN PIPING, TANKS ETC. AND ADJUSTMENTS OF ERECTED EQUIPMENT MAY ARISE. VALVES SHALL BE SERVICED AND LUBRICATED TO THE SATISFACTION OF BHEL ENGINEER DURING THE ERECTION AND COMMISSIONING AS PER BHEL ENGINEER'S INSTRUCTIONS.

#### **4.9.19**

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE FOR NECESSARY RESOURCES TILL THE COMPLETION OF WORK UNDER THESE SPECIFICATION, EVEN IN CASE ERECTION, TESTING AND COMMISSIONING OF THE TG AND OTHER EQUIPMENTS ARE DELAYED DUE TO REASONS NOT ATTRIBUTABLE TO THE CONTRACTOR.

### **4.10 WELDING AND HEAT TREATMENT**

#### **4.10.1**

REMOVAL OF WELDING SLAG AND BURRS BY HAND FILES, WITH BRUSHES AND/OR FLEXIBLE GRINDERS WILL BE CARRIED OUT SIMULTANEOUSLY.

#### **4.10.2**

ON ALL STEAM, OIL, INSTRUMENT, GAS, AIR PIPING ETC. BOTH TIG WELDING AND SUBSEQUENT ARC WELDING OR TOTAL TIG WELDING PROCESS IS TO BE ADOPTED AS INSTRUCTED BY BHEL ENGINEER.

#### **4.10.3**

ALL WELD JOINTS ON PIPING SHALL BE GROUND / FILED / DRESSED ON COMPLETION OF WELDING AND BEFORE RADIOGRAPHY AS PER INSTRUCTIONS BHEL ENGINEER.

#### **4.10.4**

ALL ELECTRODES AND FILLER WIRES SHALL BE PROCURED BY THE CONTRACTOR. THE SELECTION AND USE OF ELECTRODES WILL BE AS PER THE STANDARDS AND SPECIFICATIONS OF BHEL.

#### **4.10.5**

CONTRACTOR SHOULD PURCHASE THE ELECTRODES AS PER THE RECOMMENDATIONS OF BHEL ENGINEER, WELDING MANUAL, WELDING SCHEDULE AND OTHER RELEVANT DOCUMENTS. THE ELECTRODES SHALL BE PURCHASED ONLY FROM BHEL APPROVED MANUFACTURERS.

#### **4.10.6**

THE PURCHASE OF ELECTRODES SHALL BE ACCOMPANIED BY PROPER TEST CERTIFICATE AND THESE CERTIFICATES SHOULD BE SUBMITTED REGULARLY FOR THE SCRUTINY OF BHEL ENGINEER.



**4.10.7**

ALL ELECTRODES SHALL BE STORED IN A CLEAN DRY AREA. THE STORAGE ROOM SHALL BE OF PERMANENT NATURE AND DAMP PROOF, AND THE ROOM SHALL BE EXCLUSIVELY MEANT FOR STORAGE OF WELDING ELECTRODES AND FILLER WIRES. EXCEPTING FOR A VENT IN THE TOP, IT IS NOT PREFERRED TO HAVE ANY OTHER OPENING LIKE WINDOWS OR VENTILATORS. THE TEMPERATURE INSIDE THE ROOM HAS TO BE KEPT IN THE RANGE OF 8-10<sup>0</sup> C ABOVE ATMOSPHERIC TEMPERATURE AND HUMIDITY SHOULD BE LESS THAN 50%. THIS IS TO BE ACCOMPLISHED BY USING ELECTRIC HEATERS OR INFRA RED LAMPS. THE STORAGE ROOM MUST BE PROVIDED WITH HYGROMETER AND THERMOMETER. TEMPERATURE AND HUMIDITY ARE TO BE MONITORED REGULARLY. 15-20 HOLDERS, WELDING CABLES, CONNECTING CABLES TO EQUIPMENTS AND OTHER WELDING ACCESSORIES INCLUDING TEMPORARY ELECTRICAL CONNECTION FROM CONSTRUCTION POWER POINT TO INDIVIDUAL EQUIPMENT LIKE WINCHES, HOISTING EQUIPMENT, WELDING GENERATORS, TRANSFORMERS, HEAT TREATMENT EQUIPMENT AND OTHER CONSTRUCTION EQUIPMENT SHALL BE ARRANGED BY CONTRACTOR.

**4.10.8**

ALL RACKS AND OTHER ITEMS USED FOR STORAGE OF ELECTRODES SHALL BE OF STEEL AND NOT OF WOOD.

**4.10.9**

ALL ELECTRODES SOON AFTER PURCHASE SHALL BE OFFERED FOR INSPECTION TO THE BHEL ENGINEER. CONTRACTOR SHALL BE STRICTLY PROHIBITED FROM USING ELECTRODES NOT INSPECTED/APPROVED BY BHEL ENGINEER.

**4.10.10**

ALL WELDING CONSUMABLES SHALL BE ISSUED TO THE WELDERS ONLY BY AUTHORISED PERSON WHO IS CONTROLLED BY CONTRACTOR'S WELDING ENGINEER. THE NECESSARY BAKING REQUIREMENTS ARE TO BE ENSURED BY CONTRACTOR'S WELDING ENGINEER.

**4.10.11**

ALL WELDERS SHALL BE TESTED AND APPROVED BY BHEL ENGINEER/ CUSTOMER BEFORE THEY ARE ACTUALLY ENGAGED ON WORK THOUGH THEY MAY POSSESS THE REQUISITE CERTIFICATE. BHEL RESERVES THE RIGHT TO REJECT ANY WELDER WITHOUT ASSIGNING ANY REASONS. STATUTORY REQUIREMENTS LIKE IBR APPROVAL FOR WELDERS ARE TO BE COMPLIED WITH BEFORE STARTING OF THE WORK. IF REQUIRED, THE WELDERS MAY HAVE TO UNDERGO PROCEDURE QUALIFICATION TEST ALSO. THE DECISION OF BHEL ENGINEER WILL BE FINAL IN THIS REGARD.

**4.10.12**

ALL CHARGES FOR TESTING OF CONTRACTOR'S WELDERS INCLUDING DESTRUCTIVE AND NON-DESTRUCTIVE TESTS CONDUCTED BY BHEL AT SITE SHALL HAVE TO BE BORNE BY THE CONTRACTOR INCLUDING SUPPLY OF TEST PLATES FOR TESTING OF WELDERS.

**4.10.13**

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 FACT 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.

**4.10.14**

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

**4.10.15**

PRE-HEATING AND STRESS RELIEVING BEFORE AND AFTER WELDING ARE PART OF ERECTION WORK AND SHALL BE PERFORMED BY THE CONTRACTOR IN ACCORDANCE WITH INSTRUCTIONS OF BHEL ENGINEER. CONTRACTOR HAS TO ARRANGE FOR THE RECORDERS ALONG WITH ACCESSORIES AND SUITABLE TECHNICIANS FOR HEAT TREATMENT PURPOSE. THE TEMPERATURE RECORDERS AND THERMOCOUPLES SHALL BE DULY CALIBRATED. 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.

**4.10.16**

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

**4.10.17**

WHEREVER NECESSARY, CONTRACTOR SHOULD PROVIDE TEMPERATURE INDICATOR/ TEMPERATURE RECORDER AS REQUIRED BY BHEL ENGINEER FOR MEASURING PREHEAT TEMPERATURE FOR WELDING OR FOR CONTROLLING TEMPERATURE OF METAL FOR HOT CORRECTION ETC. DECISION OF BHEL ENGINEER ON METHOD AND OF CHECKING PREHEAT TEMPERATURE OR CONTROLLING TEMPERATURE FOR HOT CORRECTION AND WELDING SHALL BE FINAL AND BINDING ON CONTRACTOR.

**4.10.18**

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 LABOUR REQUIRED FOR THE SAME AS PER DIRECTIONS OF BHEL.

**4.10.19**

HEAT TREATMENT REQUIREMENTS SHALL BE AS PER THE WELDING SCHEDULES OF BHEL

**4.10.20**

FOR WELD JOINTS OF HEAVY STRUCTURAL ITEMS LIKE BEAMS, I-SECTIONS, IF HEAT TREATMENT IS REQUIRED, THE SAME SHALL BE CARRIED OUT AS PART OF THE WORK.

**4.10.21**

CHECKING EFFECTIVENESS OF STRESS RELIEVING BY HARDNESS TESTS (EITHER BY POLDI 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.

**4.10.22**

TIG WELDING PROCESS IS TO BE USED FOR ALL ROOT PASS WELDS IN PIPES. SUBSEQUENT WELDING AFTER ROOT PASS CAN BE CARRIED OUT BY MANUAL METAL ARC WELDING WITH BASIC COATED ELECTRODES. FOR THE PIPE OF THICKNESS LESS THAN 6MM, THE ENTIRE WELDING HAS TO BE CARRIED OUT BY TIG WELDING. HOWEVER, BHEL SITE ENGINEER WILL HAVE THE OPTION OF CHANGING THE METHOD ADOPTED. FOR MANUAL ARC WELDING SHALL BE DONE AS PER WEAVING TECHNIQUE AND THE WIDTH OF WEAVING SHALL NOT EXCEED 1.5 TIMES OF THE DIA OF THE ELECTRODES.

**4.10.23**

TWO PIECES TO BE JOINED SHALL BE INDIVIDUALLY CHECKED FOR THE WELD EDGE PREPARATION AND PROFILE DIMENSIONS AND WITH RESPECT TO THE TEMPLATE. DYE PENETRANT CHECK SHALL BE CARRIED OUT ON EDGE PREPARED SURFACES AT RANDOM. THE PERCENTAGE SHALL DEPEND ON PIPING SYSTEM AS SPECIFIED BY BHEL ENGINEER.

**4.10.24**

JOINT FIT UP WILL BE A STAGE FOR INSPECTION.

#### **4.10.25**

ALL JOINTS SHALL BE OFFERED FOR VISUAL INSPECTION AFTER ROOT RUN. SUBSEQUENT WELDING SHOULD BE MADE ONLY AFTER THE APPROVAL OF ROOT RUN.

### **4.11 RADIOGRAPHY**

#### **4.11.1**

RADIOGRAPHIC INSPECTION OF WELDS SHALL BE ARRANGED BY THE CONTRACTOR INCLUDING ALL CONSUMABLES LIKE ISOTOPE CAMERA, X-RAY 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 PENETRATOR/ 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.

#### **4.11.2**

CONTRACTOR SHALL NOTE THAT 100% RADIOGRAPHY SHALL BE TAKEN ON ALL HIGH PRESSURE WELDING TILL SUCH TIME THE WELDERS' PERFORMANCE IS FOUND 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/REJECTION OF THE JOINTS WILL BE FINAL AND BINDING ON THE CONTRACTOR.

#### **4.11.3**

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.

#### **4.11.4**

100% RADIOGRAPHY OF WELD JOINTS OF CERTAIN PIPING HAVE TO BE CARRIED OUT AS PER BHEL STANDARDS/ DRAWINGS / SPECIFICATION.

#### **4.11.5**

IT MAY ALSO BECOME NECESSARY TO ADOPT INTER-LAYER RADIOGRAPHY/MPT/UT DEPENDING UPON THE SITE/TECHNICAL REQUIREMENT NECESSITATING INTERRUPTIONS IN CONTINUITY OF THE WORK AND MAKING NECESSARY ARRANGEMENTS FOR CARRYING OUT THE ABOVE WORK. NECESSARY TRAINED PERSONNEL SHALL BE DEPLOYED FOR THIS PURPOSE.

### **4.12 ACID CLEANING / ALKALI FLUSHING / STEAM BLOWING / OIL FLUSHING ETC.**

#### **4.12.1**

CONTRACTOR SHALL LAY TEMPORARY PIPELINES WITH FITTINGS AND ACCESSORIES AND ALSO ERECT/COMMISSION PUMPS AFTER SERVICING AS PER REQUIREMENTS, TANKS AND OTHER INSTALLATIONS, AS A SYSTEM AS INSTRUCTED BY BHEL FOR THE PURPOSE OF CHEMICAL CLEANING, STEAM BLOWING, STEAM WASHING, STEAM FLUSHING, WATER FLUSHING, WATER WASHING, OIL FLUSHING ETC. OF PIPING AND OTHER EQUIPMENTS WHICH ARE WITHIN THE SCOPE OF WORK AND ALSO SYSTEMS IN WHICH EQUIPMENTS AND PIPING ERECTED BY CONTRACTOR FORM A PART OF THE SCOPE OF WORK.

IT SHALL BE SPECIFICALLY NOTED BY THE CONTRACTOR THAT ALL PIPES FOR ABOVE WORKS SHALL BE SUPPLIED IN RANDOM LENGTH AND IN LOOSE CONDITION. CONTRACTOR HAS TO ASSEMBLE AND ERECT THEM AS PER SCHEMES / DRAWINGS PROVIDED BY BHEL. FURTHER, FLANGES , BEND ETC. FOR COMPLETING THE SCHEME SHALL BE MACHINED/ FABRICATED BY THE CONTRACTOR AT HIS OWN COST . HOWEVER, PLATES / STEEL ETC. FOR THE SAME WILL BE PROVIDED BY BHEL FREE OF CHARGES.

#### **4.12.2**

AFTER THE CHEMICAL CLEANING HAS BEEN SUCCESSFULLY COMPLETED, DISMANTLING OF ALL TEMPORARY INSTALLATIONS AS INSTRUCTED BY BHEL IS WITHIN THE SCOPE OF WORK UNDER THIS SPECIFICATION. THE DISMANTLED MATERIALS SHALL BE DRESSED AND RETURNED TO BHEL AS STATED ELSEWHERE IN THIS TENDER SPECS.

#### **4.12.3**

PRESERVATION OF THE CLEANED SURFACES WILL BE THE RESPONSIBILITY OF CONTRACTOR UNDER THE GUIDANCE OF BHEL ENGINEER.

#### **4.12.4**

HYDAULIC TEST OF TEMPORARY PIPING IS TO BE CARRIED OUT AS PER THE INSTRUCTIONS OF BHEL ENGINEER. CARRYING OUT REPAIRS, IF ANY, IS IN THE SCOPE OF WORK/ SPECIFICATION.

#### **4.12.5**

FOR CHEMICAL CLEANING OF THE PIPING SYSTEM, CONTRACTOR WILL HAVE TO LAY TEMPORARY PIPING TO CONNECT THE ENTIRE SYSTEM IRRESPECTIVE OF WHETHER THE EQUIPMENT/SYSTEM CONNECTED IS IN THE SCOPE OF CONTRACTOR OR NOT. DECISION OF BHEL ENGINEER IN THIS REGARD WILL BE FINAL AND BINDING ON THE CONTRACTOR.

#### **4.12.6**

DURING THE INITIAL STAGES OF WORK, TRENCHES FOR DRAINING WATER MAY NOT BE AVAILABLE AFTER ALKALI FLUSHING OR MASS FLUSHING FOR DISCHARGING AND EMPTYING. NECESSARY LOW POINT DRAINS AND TEMPORARY PIPING FOR THIS WILL HAVE TO BE PROVIDED BY CONTRACTOR FROM MATERIALS PROVIDED BY BHEL.

#### **4.12.7**

LAYING EFFLUENT DISCHARGE LINE FROM MIXING TANK (FOR ACID CLEANING OR ANY OTHER CHEMICAL CLEANING PROCESS) AS PER THE INSTRUCTIONS OF BHEL ENGINEER AND DISMANTLING, SERVICING FOR PRESERVATION AND HANDING OVER THE SAME TO BHEL STORES AFTER COMPLETION OF THE JOB IS WITHIN THE SCOPE OF WORK/SPECIFICATION.

#### **4.12.8**

RADIOGRAPHIC EXAMINATION OF WELD JOINTS ON TEMPORARY PIPES AS REQUIRED BY THE ENGINEER IN-CHARGE SHOULD BE CARRIED OUT.

#### **4.12.9**

CONTRACTOR SHALL ALSO CARRY OUT THE REPAIRS OR ATTEND LEAKS ETC., IN THE TEMPORARY PIPING AND EQUIPMENTS FOR THE ABOVE OPERATIONS / ACTIVITIES WHILE CARRYING OUT THE ABOVE ACTIVITIES / OPERATIONS.

#### **4.12.10**

FOR CHEMICAL CLEANING OF SYSTEM WHICH CONSIST OF EQUIPMENT/PIPING ERECTED BY THE CONTRACTOR AND ALSO EQUIPMENT/PIPING ERECTED BY OTHER CONTRACTORS OF BHEL/CUSTOMER'S CONTRACTOR HAS TO ARRANGE FOR WORKERS AND SUPERVISORY STAFF AS REQUIRED SUPPLEMENTING/COMPLIMENTING THE LABOUR AND SUPERVISORY STAFF MOBILISED BY OTHER AGENCIES FOR CHEMICAL CLEANING OF THE PORTION OF EQUIPMENT ERECTED BY THEM IN THE SYSTEM. DECISIONS ON THE STRENGTH OF GANGS AND SUPERVISORY STAFF FOR DEPLOYMENT OF LABOUR AND ALLOCATION OF WORK FOR THEM AT SITE, BY BHEL ENGINEER IS FINAL AND BINDING ON THE CONTRACTOR.

#### **4.12.11**

CONTRACTORS QUOTED RATE SHALL BE INCLUSIVE OF FABRICATION, COST OF CONSUMABLES, ERECTION, DISMANTLING OF TEMPORARY PIPING AND SERVICING OF THE EQUIPMENTS AND VALVES AND HANDING OVER TO BHEL.

#### **4.12.12**

AFTER ACID CLEANING/PICKLING OF LUBRICATING SYSTEM(INCLUDING OIL PIPING, OIL TANK AND OTHER FITTINGS) OF ROTATING MACHINES, OIL FLUSHING FOR LUBRICATING SYSTEMS AS PER INSTRUCTIONS OF BHEL ENGINEER SHALL BE CARRIED OUT. CLEANING OF OIL TANK OF LUBRICATING OIL SYSTEM OF ROTATING MACHINERIES, COOLER ETC. BEFORE AND AFTER OIL FLUSHING IS THE RESPONSIBILITY OF THE CONTRACTOR.

#### **4.12.13**

FOR FULL WELDING OF STRUCTURES, TANKS AND PIPING ETC., ONLY WELDING GENERATORS SHALL BE USED. THE USE OF WELDING TRANSFORMERS WILL BE SUBJECT TO THE APPROVAL OF BHEL ENGINEER.

#### **4.12.14**

ERECTION AND COMMISSIONING OF CONNECTING PIPING – PERMANENT AND TEMPORARY FOR OIL PURIFICATION EQUIPMENTS AND ALL OPERATIONS FOR CLEANING, OIL FLUSHING, DISMANTLING OF TEMPORARY PIPING DURING PRE AND POST-COMMISSIONING OF EQUIPMENT UPTO FULL LOAD.

### **4.13 GENERAL**

#### **4.13.1**

DURING THE COURSE OF ERECTION, PLATFORMS AND FLOOR GRILLS ARE TO BE CUT AT CERTAIN PLACES TO ROUTE STEAM, OIL, WATER AND AIR PIPING, CABLE TRAYS, ETC OR FOR ACCOMMODATING ERECTION, RIGGING ETC, THE CUTTING OF PLATFORMS AND GRILLS SHOULD BE MINIMUM AND AS APPROVED BY BHEL ENGINEER. AFTER COMPLETION OF WORK, THE PLATFORM/GRILLS CUT SHALL BE MADE GOOD NEATLY AS INSTRUCTED BY BHEL ENGINEER.

#### **4.13.2**

ERECTION AND WELDING OF STAINLESS STEEL FITTINGS INCLUDING SUPPLY OF NECESSARY STAINLESS STEEL WELDING ELECTRODES IS WITHIN THE SCOPE OF THE WORK/SPECIFICATION.

#### **4.13.3**

NO TEMPORARY SUPPORTS SHOULD BE WELDED ON TO THE PIPING.

#### **4.13.4**

CONTRACTOR SHALL CARRY OUT PRESERVATION PAINTING ON ALL ITEMS TAKEN FROM STORES. THE PRESERVATION PAINTING HAS TO BE CARRIED OUT ON MATERIAL TAKEN FROM STORES AND ALSO ON MATERIAL ERECTED WHEREVER THE SHOP PAINTING HAS GIVEN AWAY. PERIODICAL INSPECTION SHALL BE MADE AS PER THE INSTRUCTIONS OF BHEL ENGINEER AND THE PORTION OF ITEMS OR THE COMPLETE ITEMS NEEDING PAINTING SHALL BE CARRIED OUT TO THE SATISFACTION OF BHEL ENGINEER. THIS FACILITY SHALL BE PROVIDED BY THE CONTRACTOR TILL THE COMMISSIONING AND HANDING OVER OF THE EQUIPMENT TO THE CUSTOMER. PRESERVATIVE AND TOUCH UP PAINTING ON EQUIPMENTS COVERED UNDER THIS SPECIFICATION STORED AT STORES/STORAGE YARD SHALL ALSO BE CARRIED OUT BY THE CONTRACTOR.

#### **4.13.5**

ADJUSTMENT OF SPRING HANGERS FOR PIPING SHALL BE DONE BY THE CONTRACTOR DURING INITIAL ERECTION. AFTER INITIAL COMMISSIONING TRIALS, IT IS POSSIBLE THAT THE SPRING HANGERS HAVE TO BE ADJUSTED REPEATEDLY TILL THE CORRECT SPRING COMPRESSION IS ACHIEVED. CONTRACTOR SHALL DO THE SAME TO THE SATISFACTION OF BHEL ENGINEER. THE MARKING OF COLD AND HOT POSITIONS ON THE HANGERS SHALL BE DONE BY THE CONTRACTOR.

#### **4.13.6**

THE CONTRACTOR SHALL RETURN TO BHEL THE EXCESS MATERIALS LEFT OVER AFTER COMPLETION OF WORK, MATERIALS ISSUED FOR TEMPORARY PIPELINES FOR HT, CHEMICAL CLEANING, FLUSHING, BLOWING ETC. AND MATERIALS ISSUED ON RETURNABLE BASIS IN NEATLY DRESSED CONDITION. NECESSARY GRINDING, EDGE CUTTING (SQUARE FACING), EDGE PREPARATION (VEE), PAINTING ETC. TO THE CONDITION SIMILAR TO THE ONE AT THE TIME OF ISSUE SHALL BE IN SCOPE OF WORK.

#### **4.13.7**

WHEREVER THE EQUIPMENTS ARE ERECTED BY THE CONTRACTOR AND CONNECTED PIPING IS DONE BY OTHER AGENCY, CONTRACTOR SHALL WELD / TIGHTEN THE INCOMING PIPES TO EITHER THE EQUIPMENT OR THE COUNTERFLANGE PROVIDED ON THE EQUIPMENT.

### **4.14 PG TEST TAPPING POINTS**

INSTALLATION AND WELDING OF TAPPING POINTS FOR TAKING PERFORMANCE TEST MEASUREMENTS SHALL BE CARRIED OUT BY THE CONTRACTOR AS PART OF THIS WORK FOR THE EQUIPMENTS COVERED UNDER THIS TENDER SPECIFICATION UNDER THE GUIDANCE OF BHEL ENGINEER. THE SCOPE WILL BE LIMITED TO ALL THE TAPPING POINTS FOR WHICH MATERIALS ARE AVAILABLE AND THEIR LOCATIONS IDENTIFIED WITHIN THE REGULAR CONTRACT PERIOD AND EXTENSIONS THEREOF.

#### **4.14.1**

ALL PACKING AND FORWARDING MATERIAL SHALL BE RETURNED AS SOON AS THE MATERIAL IS UNPACKED. THE LOCATION FOR STORAGE OF SUCH MATERIALS SHALL BE AS INDICATED BY BHEL ENGINEER.

#### **4.14.2**

ALL MEASURING AND MONITORING DEVICES (MMD) USED FOR THE WORK IN SCOPE OF THIS TENDER SPECIFICATIONS, SHALL BE CALIBRATED BY THE ACCREDITED AGENCIES WHO ARE APPROVED BY BHEL OR CALIBRATION TRACTABILITY IS ESTABLISHED UPTO NATIONAL PHYSICAL LABORATORY.

#### **4.14.3**

CONTRACTOR SHALL FURNISH THE CONSUMPTION DETAILS OF CHEMICALS, LUBRICANTS, TIG WELDING FILLER WIRE, WELDING ELECTRODES AND OTHER CONSUMABLES ON MONTHLY BASIS.

### **4.15 SPECIFIC INCLUSIONS**

#### **4.15.1**

ALL TERMINAL CONNECTIONS FOR EQUIPMENT & PIPING COVERED IN THIS SPECIFICATION.

#### **4.15.2**

IMPULSE/PNEUMATIC PIPING BETWEEN CUSTOMER'S BATTERY LIMIT AND EQUIPMENTS.

#### **4.15.3**

AUXILIARY COOLING WATER LINES BETWEEN BATTERY LIMITS OF CUSTOMER AND EQUIPMENTS.

#### **4.15.4**

SERVICING AND ASSEMBLY OF CONTROL VALVES/REGULATING VALVES, FIXING OF FILTER ELEMENTS/STRAINERS & STEAM BLOWING & BLANKING DEVICES IN LP BYPASS, M.S. STRAINER, HRH STRAINER & AND BLANKING OF LP BYPASS, ESV & IV SYSTEM, FOR HYDRO TEST, STEAM BLOWING ETC IS THE PART OF SCOPE OF WORK.

#### **4.15.5**

IT MAY BE SPECIFICALLY NOTED THAT IT SHOULD NOT BE CONSTRUED OR CLAIMED BY THE CONTRACTOR THAT WITH THE TECHNICAL SPECIFICATION AND "EXCLUSIONS AND/OR

INCLUSIONS" DETAILED IN THIS TENDER SPECIFICATION, BHEL HAS COVERED THE ENTIRE SCOPE OF WORK AND/OR THE DETAILS THEREOF TO BE EXECUTED BY THE CONTRACTOR.

#### **4.15.6**

COMPLETE CONTROL FLUID SYSTEM OF BOTH HP AND LP BYPASS SYSTEM IS INCLUDED IN THIS SPECIFICATION. ASSOCIATED ASSISTANCE FOR COMMISSIONING LIKE LUBE OIL FLUSHING, FILLING AND TOPPING UP OF LUBE OIL ETC SHALL BE PART OF THE WORK.

#### **4.15.7**

ASSEMBLY AND INSTALLATION OF STRAINER ELEMENTS OF MS AND HRH SYSTEM IS WITHIN THE SCOPE OF WORK. CLEANING OF THESE STRAINER ELEMENTS DURING TRIAL OPERATION OF MACHINE IS ALSO COVERED UNDER THIS SCOPE.

#### **4.15.8**

CHIPPING OF FOUNDATION, PLACEMENT, ERECTION, ALIGNMENT, COMMISSIONING, GROUTING, MOUNTING OF EQUIPMENT MOUNT INSTRUMENTS, PANELS AND OTHER FITTINGS OF BHEL (PEM BOUGHT OUT ITEMS) SUPPLIED PUMPS & PACKAGES ARE IN SCOPE OF THE WORK. ERECTION AND COMMISSIONING OF THESE EQUIPMENTS/PUMPS & PACKAGES WILL BE REQUIRED TO COMPLETE TO MEET THE COMMISSIONING SCHEDULE/ MILESTONE ACTIVITIES OF OTHER AREAS LIKE BOILER, ETC. CONTRACTOR SHALL PLAN AND COMPLETE ERECTION & COMMISSIONING OF THESE EQUIPMENTS ON PRIORITY AS PER DECISION OF BHEL ENGINEER/CUSTOMER REQUIREMENT. DETAILS OF SUCH SYSTEMS ARE FURNISHED IN **RELEVANT APPENDIX.**

#### **4.15.9**

ELECTRIC WIRE ROPE HOISTS SHALL BE ERECTED, TESTED AND COMMISSIONED FOR VACUUM PUMP MOTOR HANDLING AND CW BUTTERFLY VALVES HANDLING. CHAIN PULLY BLOCKS WITH TROLLEY (MANUAL OPERATED) SHALL BE ERECTED, TESTED AND COMMISSIONED FOR CONTROL FLUID SYSTEM, CENTRAL LUBE OIL SYSTEM ETC.

### **4.16 CW PIPINGS**

#### **4.16.1**

ERECTION, WELDING, NDT (RADIOGRAPHY & DPT.), SUPPORTING, PROTECTIVE/PRESERVATIVE COATING INCLUDING FINISH PAINTING WITH SUPPLY OF REQUIRED PAINTS/PRIMER, HYDRAULIC TESTING COMMISSIONING/CHARGING OF CW SYSTEM OF CONDENSER COOLING WATER PIPING-SUPPLY & RETURN (FROM CONDENSER TO B.F. VALVES, B.F. VALVES TO OUTSIDE THE TG HALL UPTO BATTERY LIMIT OF TRANSFORMER YARD APPROX. 80 METRES FROM 'A' ROW).

#### **4.17 WELD FIT-UP AND WELD JOINT PROTECTIVE PAINT, COMPONENT PRESERVATIVE PAINTING ETC.**

- 1) ALL PROTECTIVE PAINTS FOR THE PROTECTION OF WELD JOINT FIT-UPS, APPLICATION OF PRIMERS ON FINISHED WELD JOINTS ARE IN THE SCOPE OF CONTRACTOR.
- 2) TWO COATS OF STEAM WASHABLE PAINTS SHALL BE APPLIED ON STEAM SIDE OF LP TURBINE AND CONDENSER COMPONENTS, AS ADVISED BY BHEL. THE STEAM WASHABLE PAINTS, PRIMER AND THINNER WILL BE SUPPLIED BY BHEL FREE. HOWEVER, ARRANGEMENTS FOR SURFACE PREPARATION AND PAINT APPLICATION LIKE SAND/SHOT-BLASTING, CONSUMABLES LIKE SURFACE CLEANING AGENTS, PAINT BRUSH, BRUSH CLEANSER, LABOUR AND NECESSARY TOOLS AND PLANTS ARE IN THE SCOPE OF CONTRACTOR.
- 3) ALL SITE WELD JOINTS FALLING IN STEAM SIDE SHALL BE PAINTED WITH TWO COATS OF STEAM WASHABLE PAINT.
- 4) THE WATER BOXES SHALL BE SANDBLASTED TO REMOVE ALL TRACES OF PRIMER APPLIED AT THE WORKS. THEREAFTER APPLY TWO COATS OF PRIMER PAINT FOLLOWED BY

TWO/THREE COATS OF ALLOYED RESINE MACHINERY ENAMEL PAINTS AS APPROVED BY **BHEL/GSECL**). CONTRACTOR SHALL SUBMIT MANUFACTURER'S BATCH TEST CERTIFICATE / TEST CERTIFICATE FROM **BHEL/GSECL** APPROVED LABORATORY FOR THE PRIMERS AND PAINTS. PRIOR APPROVAL OF BHEL FOR EACH AND EVERY BATCH OF THE PRIMER & PAINTS SHALL BE MANDATORY. IN ORDER TO ACHIEVE A DESIRED MINIMUM PAINT DRY FILM THICKNESS (DFT) AS SPECIFIED IN BHEL DRAWING, NUMBER OF COATS MAY BE APPLIED AND METHOD OF APPLICATION SHALL BE AS RECOMMENDED BY THE PAINT MANUFACTURER. REQUIRED PAINTS & PRIMERS AND OTHER CONSUMABLES SHALL BE ARRANGED BY CONTRACTOR.

- 5) ALL WATER SIDE SURFACES OF WATER CHAMBERS INCLUDING TUBE PLATE SHALL BE THOROUGHLY SURFACE PREPARED AND PAINTED. REQUIRED PRIMER & PAINTS AND OTHER CONSUMABLES FOR CONDENSER WATER BOX AND TUBE PLATES SHALL BE PROVIDED BY CONTRACTOR.
- 6) AFTER THE SUCCESSFUL COMPLETION OF HYDRAULIC TESTING, THE INTERIOR SURFACES OF THE WATER BOXES, MAIN TUBE PLATES SHALL BE PAINTED WITH SUITABLE ANTICORROSIVE PAINTS AS PER SPECIAL PROCEDURES LAID DOWN BY BHEL. REQUIRED NECESSARY PAINTS ALONG WITH PRIMERS AND OTHER CONSUMABLES SHALL BE ARRANGED BY CONTRACTOR.
- 7) PRIOR TO HYDRAULIC TESTING OF WATER SIDE OF CONDENSER, INTERIOR SURFACES OF WATER BOXES SHALL BE PAINTED.
- 8) AFTER COMPLETION OF TUBING AND TUBE SIDE HYDRO TEST, ALL WATER SIDE SURFACES OF WATER CHAMBERS INCLUDING TUBE PLATE SHALL BE PAINTED.
- 9) PRESERVATION OF ALL COMPONENTS/EQUIPMENTS DURING VARIOUS STAGES OF ERECTION, COMMISSIONING TILL HANDING OVER IS IN THE CONTRACTOR'S SCOPE. ALL PRESCRIBED METHODS OF SURFACE CLEANING PRIOR TO APPLICATION OF PRESERVATIVE PAINT SHALL BE FOLLOWED BY THE CONTRACTOR. CONTRACTOR HAS TO ARRANGE ALL PRIMER AND PAINTS, AND OTHER CONSUMABLES LIKE WIRE BRUSH, PAINTING BRUSH REQUIRED FOR THIS WORK.
- 10) CONDENSER INTERNAL COMPONENTS/PARTS/SURFACES HAVE TO BE SURFACE PROTECTED WITH STEAM WASHABLE PAINT AS PER BHEL STANDARDS.

#### **4.18 LINING AND INSULATION**

APPLICATION OF THERMAL INSULATION / SPRAY INSULATION, FINISHING, CLADDING AND OUTER CASING ETC OF THE FOLLOWING:

1. TG INTEGRAL PIPING AND TANKS & VESSELS
2. DEAERATOR, FEED WATER STORAGE TANK
3. OTHER EQUIPMENTS INCLUDING BOIs, THOUGH NOT LISTED ABOVE BUT REQUIRED FOR COMPLETION
4. ST-TG AUXILIARIES INCLUDING, BUT NOT LIMITED, TO HEAT EXCHANGERS, PUMPS, TANKS AND VESSELS AND OTHER EQUIPMENTS
5. TG INTEGRAL & CYCLE PIPING INCLUDING CONDENSATE AND EXTRACTION SYSTEM PIPING

##### **4.18.1**

THE WORK SHALL CONFORM TO DIMENSION AND TOLERANCES SPECIFIED IN THE VARIOUS DRAWING. AND DOCUMENTS THAT WILL BE PROVIDED DURING THE EXECUTION. IF ANY PORTION OF THE WORK IS FOUND TO BE DEFECTIVE IN WORKMANSHIP OR NOT CONFORMING TO DRAWINGS OR OTHER SPECIFICATIONS, THE CONTRACTOR SHALL DISMANTLE AND RE-DO THE WORK DULY REPLACING THE DEFECTIVE MATERIALS AT HIS COST. FAILING WHICH THE WORK WILL BE GOT DONE BY ENGAGING OTHER AGENCIES OR DEPARTMENTALLY AND RECOVERIES WILL BE DEDEDCTED FROM CONTRACTOR'S BILLS TOWARDS EXPENDITURE INCURRED INCLUDING 30% DEPARTMENTAL CHARGES.



- 4.18.2 THE TERMINAL POINTS AS DECIDED BY BHEL SHALL BE FINAL AND BINDING ON THE CONTRACTOR.
- 4.18.3 ALL INSULATION AND REFRACTORY MATERIALS INCLUDING IRON COMPONENTS AND OUTER SHEET CASING MATERIALS, CLADDING SHEETS ETC REQUIRED WILL BE SUPPLIED BY BHEL AND THE SAME HAVE TO BE ERECTED/ APPLIED AS PER THE DRAWINGS AND SPECIFICATIONS OF BHEL BY THE CONTRACTOR.
- 4.18.4 THE CONTRACTOR SHALL PROVIDE THE REQUIRED QUANTITY OF WIRE, NAILS, AND PLANKS FOR FORMWORK AND OTHER MATERIALS FOR SHUTTERING AND CURING WORKS.
- 4.18.5 CONTRACTOR SHALL OBSERVE ALL PRECAUTION FOR LAYING, CURING ETC OF POURABLE INSULATION. THE CONTRACTOR AT HIS OWN COST SHALL REDO ANY DEFECTIVE WORKS FOUND.
- 4.18.6 WOOL INSULATION IS RECEIVED AT SITE AS LOOSE BONDED MATTRESSES IN STANDARD SIZES. THESE ARE TO BE DRESSED/CUT TO SUITE THE EQUIPMENTS. MULTIPLE LAYERS OF WOOL HAVE TO BE APPLIED AS DIRECTED AND AS PER DRAWINGS AND SPECIFICATIONS FOR ALL EQUIPMENTS/ SYSTEMS COVERED UNDER THE SCOPE OF WORK.
- 4.18.6 CUTTING & DRESSING OF INSULATION BRICKS TO SUIT THE SITE AREA OF APPLICATION IS INCIDENTAL TO WORK.
- 4.18.7 REMOVABLE TYPE OF INSULATION HAS TO BE PROVIDED FOR VALVES FITTINGS, EXPANSION JOINTS ETC AS PER DRAWING OR AS DIRECTED BY BHEL ENGINEER.
- 4.18.8 THE CLADDING AND OUTER CASING ARE ALUMINIUM SHEETS. ALL RELEVANT SPECIFICATIONS AND PROCEDURES WITH REGARDS TO BEADING, SEALING ETC FOR ALUMINIUM SHEETS HAVE TO BE ADHERED TO.
- 4.18.9 CLADDING/OUTER CASING SHALL BE FIXED EXPEDITIOUSLY, SO AS TO AVOID DAMAGE TO THE INSULATION FROM THE WEATHER.
- 4.18.10 THE OVERLAPPING SURFACE OF OUTER CASING/CLADDING SHEET SHALL BE COATED WITH SEALING COMPOUND, WHICH WILL BE SUPPLIED BY BHEL FREE OF COST.
- 4.18.11 TO TAKE CARE OF BIMETAL CORROSION DUE TO VARIETY OF METALS IN CONTACT OF EACH OTHER VIZ RETAINER TO SUPPORT, SUPPORT TO OUTER CASING/CLADDING, CLADDING-TO-CLADDING ETC, SUITABLE PAINTS SPECIFIED BY BHEL, TO BE APPLIED AND/OR NEOPRENE RUBBER PACKING/STRIPS OR ANY OTHER INSERT MAY HAVE TO BE FIXED AS REQUIRED.
- 4.18.12 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 DURING COMMISSIONING TO FIX GAUGES, FITTINGS,

INSTRUMENTS ETC. THESE GAPS WILL HAVE TO BE FINISHED AS PER DRAWINGS AT LATER DATE BY THE CONTRACTOR AT HIS COST.

CONTRACTOR SHALL CUT OPEN WORKS IN NEEDED AS PER BHEL ENGINEER'S INSTRUCTIONS DURING COMMISSIONING FOR INSPECTION, CHECKING AND MAKE GOOD THE WORKS AFTER INSPECTION IS OVER WITHOUT ANY EXTRA PAYMENT.

4.18.13

A LOG BOOK SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE CLEARANCE OF THE AREA FOR APPLICATION OF REFRACTORY AND INSULATION. WHERE THE CONTRACTOR DOSE THE WORK ON HIS OWN ACCORD WITHOUT PRIOR PERMISSION. THE WORK SHOULD BE RE-DONE, AT HIS OWN COST, WHERE NECESSITATED.

4.18.14

WASTAGE ALLOWANCE FOR THE MATERIAL ISSUED ARE ENVISAGED AS FOLLOWS:

A	POURABLE & CASTABLE INSULATION	-	2%
B	INSULATION BRICKS AND MOTOR	-	2%
C	WOOL MATTRESSES	-	2%
D	CLADDING SHEETS	-	2%

THE WASTAGE ALLOWANCE WILL BE APPLICABLE ON THE NET ISSUED QUANTITY i.e. TOTAL QUANTITY ISSUED REDUCED BY THE QUANTITY RETURNED TO STORES AS UNUSED/FRESH ITEM. CONTRACTOR SHALL RECONCILE THE MATERIAL ISSUES PERIODICALLY AS PRESCRIBED BY BHEL SITE. PAYMENT FOR THE DONE WILL BE REGULATED AS PER PROVISION OF SECTION -12.

4.18.15

THE FOLLOWING WORKS ARE ALSO INCLUDED IN THE SCOPE OF THIS CONTRACT.

CUTTING OF CLADDING SHEETS AS PER THE PROFILE OF THE EQUIPMENT AND PAINTING ON INNER SURFACE TWO COATS OF BITUMINOUS PAINT. PAINT WILL BE SUPPLIED BY BHEL.

CUTTING OF THE WOOL MATTRESSES TO THE REQUIRED SHAPE AND APPLICATION OF FINISHING CEMENT OF REQUIRED THICKNESS WHEREVER REQUIRED.

4.18.16

INSULATION WORK OF TEMPORARY PIPING FOR ALKALI BOIL OUT, STEAM BLOWING AND CHEMICAL CLEANING HAS TO BE CARRIED OUT AT SITE. THE SAME HAVE TO BE REMOVED AND RETURNED TO THE BHEL STORES AFTER THE COMPLETION OF ACTIVITY. RATES QUOTED FOR APPLICATION OF WOOL FOR BOILER AND AUXILIARIES WILL BE APPLICABLE FOR THIS WORK ALSO. NO SEPARATE PAYMENT WILL BE MADE FOR REMOVAL OF TEMPORARY INSULATION AND RETURN OF THE SAME TO BHEL STORES/YARD.

4.18.17

IN CERTAIN INSTANCES, CO-ORDINATED/PHASED APPLICATION OF CASTABLE REFRACTORY/ INSULATION ON PRESSURE PARTS ETC MAY BE NECESSITATED IN CONSIDERATION OF SEQUENCE OF ACTIVITIES OF OTHER ERECTION AGENCIES. CONTRACTOR SHALL DO SUCH PHASED WORK AS MAY BE DIRECTED BY BHEL.

4.18.18

PRIOR TO APPLICATION OF REFRACTORY BITUMINOUS PAINTING ON THE PRESSURE PARTS AND OTHER AREA IS UNDER CONTRACTOR SCOPE. ONLY THE BITUMINOUS PAINT WILL BE SUPPLIED BY BHEL FREE OF COST. NO SEPARATE PAYMENT WILL BE MADE FOR APPLICATION OF PAINT.

**4.19 FINAL PAINTING**

4.19.1

ALL EXPOSED METAL PARTS OF THE EQUIPMENT INCLUDING PIPING, STRUCTURES, RAILINGS ETC. WHEREVER APPLICABLE, AFTER INSTALLATION UNLESS OTHERWISE SURFACE PROTECTED, SHALL BE FIRST PAINTED WITH AT LEAST ONE COAT OF SUITABLE PRIMER WHICH MATCHES THE SHOP PRIMER PAINT USED, AFTER THOROUGHLY CLEANING ALL SUCH PARTS OF ALL DIRT, RUST, SCALES, GREASES, OILS AND OTHER FOREIGN MATERIALS BY WIRE BRUSHING, SCRAPING OR SAND BLASTING, AND THE SAME BEING INSPECTED AND APPROVED BY BHEL ENGINEER FOR PAINTING. AFTERWARDS, THE ABOVE PARTS SHALL BE FINISHED WITH TWO COATS OF ALLOYED RESIN MACHINERY ENAMEL PAINTS.

4.19.2 TOUCH-UP PAINTING ON DAMAGED AREAS -

a) FOR COATINGS DAMAGED UP TO METAL SURFACE

SURFACE PREPARATION SHALL BE CARRIED OUT BY MANUAL CLEANING. MINIMUM 6 INCHES ADJOINING AREA WITH EXISTING COATING SHALL BE ROUGHENED BY WIRE BRUSHING, EMERY PAPER RUBBING ETC., FOR BEST ADHESION OF PATCH PRIMER.

PRIMER COAT OF TOUCH-UP PRIMER TO BE APPLIED BY BRUSH IMMEDIATELY AFTER THE SURFACE PREPARATION.

OVER THIS PRIMER COAT, FINISH COAT AND FINAL FINISH COAT SHALL BE APPLIED AS COVERED ABOVE BY BRUSH WITHIN MAXIMUM SEVEN ( 7 ) DAYS OF APPLICATION OF TOUCH UP PRIMER.

PAINTING SCHEME IS ENCLOSED FOR INFORMATION AT **ANNEXURE-1**. HOWEVER, FOR EXECUTION ONLY THE LATEST DOCUMENT SHALL BE APPLICABLE AND NO CLAIM WHATSOEVER SHALL BE ENTERTAINED IN CASE OF ANY VARIANCE BETWEEN SUCH DOCUMENTS. SIMILARLY, DOCUMENTS AS PROVIDED PROGRESSIVELY DURING THE EXECUTION OF WORK FOR ALL OTHER PRODUCTS/ EQUIPMENTS ETC SHALL BE APPLICABLE.

4.19.3

PAINTING OF WELDED AREAS / PAINTING OF AREAS EXPOSED AFTER REMOVAL OF TEMPORARY SUPPORTS / TOUCH-UP PAINTING ON DAMAGED AREAS OF EMPLOYER'S STRUCTURES, WHERE INTER-CONNECTION, WELDING / MODIFICATION ETC. HAS BEEN CARRIED OUT BY THE BIDDER.

(A.) CLEAN THE SURFACE TO REMOVE FLUX SPATTERS AND LOOSE RUST, LOOSE COATINGS IN THE ADJOINING AREAS OF WELD SEAMS BY WIRE BRUSH AND EMERY PAPER.

(B.) PAINTING PROCEDURE TO BE FOLLOWED AS MENTIONED ABOVE FOR TOUCH-UP PAINTING ON DAMAGED AREAS.

4.19.4

THE SCOPE OF WORK INCLUDES PAINTING OF COLOUR BANDS, LETTERING, MARKING AND SIGNS FOR DIRECTION OF FLOW/ROTATION, NAMES ETC OF APPROVED COLOURS AS PER THE STANDARD COLOUR CODES AND SPECIFICATIONS SPECIFIED IN TENDER SPECIFICATION OR AS ADVISED BY BHEL/CUSTOMER ENGINEER AT SITE FOR THE EQUIPMENTS/ COMPONENTS COVERED IN THESE SPECIFICATIONS.

4.19.5

ALL EXPOSED METAL PARTS OF THE EQUIPMENT INCLUDING PIPING, STRUCTURES, HAND RAILING, GRATING ETC SHALL BE THOROUGHLY CLEANED OFF DUST, RUST, SCALES AND OTHER FOREIGN MATERIALS BY MANUAL OR MECHANISED WIRE BRUSHING, SCRAPING, SAND BLASTING ETC AND THE SAME BEING INSPECTED AND APPROVED BY BHEL/CUSTOMER ENGINEER BEFORE APPLICATION OF PRIMER. AFTERWARDS, THE ABOVE PARTS SHALL BE FINISH PAINTED WITH SPECIFIED NUMBER OF COATS AS PER SPECIFICATION.

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- 4.19.6  
IN CERTAIN ISOLATED INSTANCES WHERE IT IS NOT POSSIBLE TO CLEAN THE EQUIPMENTS AS EXPLAINED ABOVE, CLEANING BY GRINDING MIGHT HAVE TO BE RESORTED TO. NO DAMAGE TO THE EQUIPMENT/COMPONENTS SHOULD BE CAUSED.
- 4.19.7  
SURFACE TO BE PAINTED SHOULD BE FREE OF OIL AND GREASE. IT SHOULD BE REMOVED BY USING SUITABLE CLEANING AGENTS INCLUDING PERMITTED SOLVENTS. SURFACE CLEANED BY CHEMICAL AGENT, IF REQUIRED, SHALL BE TREATED FURTHER AS PRESCRIBED IN USE OF SUCH CLEANING AGENTS. THE CONTRACTOR AT HIS OWN COST SHALL PROVIDE ALL THE CONSUMABLES AND APPLICATION IMPLEMENTS.
- 4.19.8  
DURING THE PREPARATION OF SURFACE, IF THE SHOP COAT IS DAMAGE BY CHEMICAL CLEANING OR BY MECHANICAL MEANS, CONTRACTOR SHALL REPAIR THE SAME FREE OF COST TO BHEL. BHEL WILL MAKE AVAILABLE ONLY THE PRIMER AND PAINTS FREE OF ANY CHARGE TO CONTRACTOR.
- 4.19.9  
SPECIFIED DRYING TIME SHALL BE PERMITTED FROM ONE TO ANOTHER COAT.
- 4.19.10  
THIS WORK REQUIRES WORKING AT HIGHER ALTITUDES FROM GROUND LEVEL TO AS HIGH AS 90 M AND MORE. 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 STANDARD QUALITY FOR SAFE AND SMOOTH EXECUTION OF WORK.
- 4.19.11  
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.
- 4.19.12  
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.
- 4.19.13  
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, AIR AT ONE POINT WILL BE MADE AVAILABLE BY BHEL FREE. LAYING OF AIR HOSE PIPE AND ANY OTHER LINE REQUIRED SHALL BE DONE BY CONTRACTOR AT HIS COST. THE CONTRACTOR SHALL PROVIDE SPRAY EQUIPMENT SET.
- 4.19.14  
THE CONTRACTOR SHALL PROVIDE ALL THE NECESSARY SCAFFOLDING MATERIALS, TEMPORARY STRUCTURES AND NECESSARY SAFETY DEVICES ETC, DURING EXECUTION OF THE WORK.
- 4.19.15  
FINAL PAINTING WORK SHALL BE STARTED AFTER OBTAINING CLEARANCE FROM BHEL ENGINEERS AND AS PER HIS INSTRUCTIONS.

#### 4.20 EXCLUSIONS

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

- A) **REGENERATIVE SYSTEM PIPING IS EXCLUDED FROM THE SCOPE. FOR DETAILS OF PIPING INCLUDED IN SCOPE OF THIS TENDER SPECIFICATION, PLEASE REFER 'APPENDIX-I' ENCLOSED HEREWITH.**
- B) ALL CABLE CONNECTIONS, EXCEPT THOSE SPECIFIED AS SCOPE OF WORK.
- C) MEASURING INSTRUMENTS, MONITORING, RELAYING, PROTECTION AND SIGNALLING EQUIPMENTS OTHER THAN THOSE SUPPLIED WITH THE EQUIPMENTS BY / ON BEHALF OF BHEL AND WHICH HAVE BEEN INDICATED AS SCOPE OF WORK.
- D) ERECTION, TESTING AND COMMISSIONING OF ELECTRICAL PANELS AND STARTING RESISTORS FOR DC JOP AND DC EOP, OIL PURIFICATION UNIT PANELS OF LUBE OIL SYSTEM ETC.
- E) ERECTION, TESTING AND COMMISSIONING OF ELECTRICAL PANELS AND STARTING RESISTORS OF SEAL OIL, PRIMARY WATER, GAS SYSTEMS, C.W. PUMPS. ETC.
- F) ELECTRICAL TESTING OF MOTORS, TURBO-GENERATOR. HOWEVER ERECTION OF THESE WILL BE UNDER THE SCOPE OF THIS TENDER SPECIFICATION.
- G) IMPULSE PIPING AND FITTINGS FROM THE TAPPING POINTS OF VARIOUS EQUIPMENT OTHER THAN THOSE SPECIFIED AS SCOPE OF WORK.
- H) CIVIL WORKS TO THE EXTENT NOT SPECIFICALLY PROVIDED FOR IN THIS TENDER.
- I) SUPPLY OF MATERIALS FOR TEMPORARY PIPING (PIPE, VALVE, STRUCTURAL STEEL ETC.) REQUIRED FOR HYDRAULIC TEST, CHEMICAL CLEANING, FLUSHING OR STEAM/AIR BLOWING OF THE PIPELINES.
- J) SUPPLY OF CHEMICALS AND LUBE OIL FOR PRE-COMMISSIONING AND COMMISSIONING ACTIVITIES.
- K) SOME SUB-DELIVERY ITEMS AND ELECTRICAL COMPONENTS SUCH AS PUSH-BUTTONS, JUNCTION BOXES ETC.
- L) E&C WORK OF CABLE TRAYS, CABLES AND EARTHING ETC
- M) ALL ELECTRICAL AND CONTROL & INSTRUMENTATION ITEMS EXCEPT THOSE SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS.
- N) SUPPLY OF PRIMER AND PAINTS FOR FINAL PAINTING
- O) PNEUMATIC COPPER TUBING AND FITTINGS THEREOF.
- P) STATUTORY ELECTRICALS CLEARANCE.

## SECTION-5

### SPECIAL CONDITIONS CONTRACT

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

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

BHEL/CLIENT IS NOT PROVIDING ANY SPACE FOR LABOUR COLONY. CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR ACCOMODATION WITH NECESSARY FACILITIES ETC FOR HIS WORKMEN AND THE STAFF OUT SIDE THE PROJECT PREMISES. ALSO, THE CONTRACTOR HAS TO MAKE HIS OWN ARRANGEMENT FOR TRANSPORTATION OF HIS WORKMEN AND OTHER EMPLOYEES. BHEL/CLIENT SHALL NOT PROVIDE ANY FACILITY IN THIS REGARD.

##### 5.2 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES:

###### 5.2.1

THE CONTRACTOR SHALL PROVIDE ALL (EXCEPTING THOSE INDICATED IN BHEL SCOPE) REQUIRED TOOLS AND PLANTS, MONITORING AND MEASURING DEVICES (MMD) AND HANDLING & TRANSPORTATION EQUIPMENTS FOR THE SCOPE OF WORK COVERED UNDER THESE SPECIFICATIONS. CONTRACTOR HAS TO PROVIDE SUITABLE CRANES FOR MATERIAL HANDLING AT BHEL/CLIENT'S STORES/STORAGE YARD. BHEL'S CRANE WILL NOT BE AVAILABLE FOR THIS PURPOSE. PLEASE REFER RELEVANT **APPENDIX** FOR THE LIST OF T&P BEING PROVIDED BY BHEL FREE OF CHARGES ON SHARING BASIS.

###### 5.2.2

ALL TOOLS AND TACKLES TO BE DEPLOYED BY THE CONTRACTOR FOR THE WORK SHALL HAVE THE PRIOR APPROVAL OF BHEL ENGINEER WITH REGARD TO BRAND, QUALITY AND SPECIFICATION. INDICATIVE LIST OF MAJOR T&P TO BE ARRANGED BY CONTRACTOR HAS BEEN FURNISHED IN **APPENDIX-IV**. CONTRACTOR SHALL ALSO MOBILISE ALL OTHER T&P NECESSARY FOR TIMELY AND SATISFACTORY COMPLETION OF THE WORK IN SCOPE.

###### 5.2.3

CONTRACTOR SHALL CARRY OUT INSTALLATION, COMMISSIONING, TESTING AND DISMANTLING OF THE 360 TON PORTAL GANTRY CRANE PROVIDED BY BHEL. CONTRACTORS SCOPE SHALL ALSO INCLUDE TO & FRO TRANSPORTATION OF THE PORTAL GANTRY CRANE BETWEEN BHEL STORES AND SITE OF WORK AND SHALL PROVIDE T & P INCLUDING CRANE ETC. REQUIRED FOR ASSEMBLY AND DISMATLING OF ABOVE PORTAL GANTRY CRANE .

###### 5.2.4

CONTRACTOR SHALL PROVIDE ALL REQUIRED SUITABLE CRANES AND TRAILERS FOR MATERIALS HANDLING DURING COLLECTION FROM BHEL/ CLIENT'S STORES/ STORAGE YARD, TRANSPORTATION TO SITE OF WORK AND AT WORK SITE FOR ALL EQUIPMENTS AND CONSIGNMENTS INCLUDING HEAVY AND VOLUMINOUS EQUIPMENTS/ COMPONENTS/ CONSIGNMENTS LIKE HP TURBINE MODULE, LP TURBINE INNER-OUTER CASING, LP TURBINE INNER CASING, LP ROTOR, GENERATOR ROTOR, BRUSHLESS EXCITER, HP HEATERS, DEAEATOR/FST SECTIONS ETC. BHEL/CUSTOMER SHALL NOT PROVIDE ANY T & P OTHER THAN MENTIONED IN APPENDIX-III FOR THE PURPOSE IDENTIFIED. **THE CONTRACTOR SHALL MAKE SUITABLE ARRANGEMENTS WELL IN ADVANCE FOR LIFTING AND PLACEMENT TO FINAL POSITION OF DEAEATOR / FST SECTIONS AT REQUIRED ELEVATION / LOCATION WITH UTMOST CARE.**

###### 5.2.5

THE GENERATOR STATOR SHALL BE LIFTED AND PLACED BY THE CONTRACTOR WITH THE HELP OF PORTAL GANTRY CRANE AS PER THE SCHEME ENVISAGED BY BHEL ON TO THE GENERATOR FOUNDATION. FOR THIS PURPOSE, THE PORTAL CRANE WILL BE PROVIDED BY BHEL FREE OF HIRE CHARGES TO THE CONTRACTOR. PORTAL GANTRY CRANE WILL BE ISSUED IN PARTS / COMPONENTS AND ARE TO BE ASSEMBLED AT SITE BY THE CONTRACTOR AS PER THE INSTRUCTIONS OF BHEL ENGINEERS / ERECTION MANUAL. THE SCOPE INCLUDES RECEIPT OF THE MATERIALS FROM BHEL STORES, TRANSPORTATION TO SITE, SERVICING OF THE COMPONENTS / DRIVES / PULLEYS ETC,, CHECKING AND LUBRICATING WIRE ROPES , PRE ASSEMBLY AND ASSEMBLY OF COMPONENTS, PREPARATION OF FOUNDATION, ERECTION OF CRANE ON THE FOUNDATION, GROUTING OF CRANE BASE PLATES, CABLING, PRE-COMMISSIONING AND COMMISSIONING OF DRIVES, LOAD TESTING , CHECKING OF OVER-LOAD PROTECTION , REGULAR MAINTENANCE ETC. A QUALIFIED / EXPERIENCED OPERATOR IS TO BE PROVIDED BY THE CONTRACTOR. AFTER ERECTION OF THE GENERATOR STATOR, THE CONTRACTOR HAS TO DISMANTLE THE CRANE IN SEQUENCE AS INSTRUCTED BY BHEL AND APPLY PRESERVATIVES / TOUCH-UP PAINTS, WHEREVER REQUIRED AND RETURN THE SAME TO STORE IN GOOD CONDITION. NECESSARY CONSUMABLES, TOOLS AND PLANTS INCLUDING GAS WELDING M/C ETC. ARE TO BE PROVIDED BY THE CONTRACTOR. THERE IS NO SEPARATE RATE FOR THE ABOVE AND QUOTED RATES SHALL BE INCLUSIVE OF THIS.

BHEL MAY PROVIDE STRAND JACK SYSTEM FOR STATOR LIFTING IN PLACE OF PORTAL CRANE. VENDOR TO PROVIDE ALL THE REQUIRED T&P, MANPOWERS, GROUND PREPARATION, CONSOLIDATION OF LAND ETC INCLUDING FIUNDATIONS IF REQUIRED AS PER BHEL SITE ENGINEER TO SUIT THE STATOR LIFTING REQUIREMENT. VENDOR SHALL UNLOAD, THE STRAND JACK, WHICH WILL BE ISSUED IN PARTS / COMPONENTS AND ARE TO BE ASSEMBLED AT SITE BY THE CONTRACTOR AS PER THE INSTRUCTIONS OF BHEL ENGINEERS / ERECTION MANUAL. THE SCOPE INCLUDES RECEIPT OF THE MATERIALS FROM BHEL STORES, TRANSPORTATION TO SITE, SERVICING OF THE COMPONENTS ETC, CHECKING AND LUBRICATING WIRE ROPES, PRE ASSEMBLY AND ASSEMBLY OF COMPONENTS, PREPARATION OF FOUNDATION, ERECTION OF STRAND JACK ON THE FOUNDATION, GROUTING OF BASE PLATES, CABLING, PRE-COMMISSIONING AND COMMISSIONING OF DRIVES, LOAD TESTING, REGULAR MAINTENANCE ETC. A QUALIFIED/ EXPERIENCED OPERATOR IS TO BE PROVIDED BY THE CONTRACTOR. AFTER ERECTION OF THE GENERATOR STATOR, THE CONTRACTOR HAS TO DISMANTLE THE STRAND JACK AS INSTRUCTED BY BHEL AND RETURN THE SAME TO STORE IN GOOD CONDITION.

THERE IS NO SEPARATE RATE FOR THE ABOVE AND QUOTED RATES SHALL BE INCLUSIVE OF THIS.

THE ASSEMBLY OF THE SPECIAL WAGON FOR RETURN AFTER UNLOADING OF STATOR IS IN THE SCOPE OF THIS WORK.

CONTRACTOR SHALL PROVIDE THE COMPLETE OPERATING CREW LIKE OPERATOR, HELPERS FOR HANDLING TRAILING CABLE FOR EOT & PORTAL GANTRY CRANES. IT MAY BE SPECIFICALLY NOTED THAT THE EOT CRANE SHALL BE SHARED BY MANY OTHER AGENCIES WORKING WITHIN THE TG HALL. THE CONTRACTOR SHALL HAVE TO EXTEND THE SERVICES OF THE EOT CRANE OPERATION TO ALL SUCH OTHER AGENCIES AS INSTRUCTED BY BHEL. THE REQUIRED LOADS WILL BE PROVIDED BY BHEL FREE OF CHARGES FOR LOAD TESTING OF PORTAL CRANES.

#### **5.2.6**

CONTRACTOR HAS TO PROVIDE SPANNERS OF ALL SIZES FOR CARRYING OUT THE COMPLETE ERECTION / COMMISSIONING WORKS. NO SPANNERS WILL BE PROVIDED BY BHEL TO THE CONTRACTOR.

#### **5.2.7**

CONTRACTOR HAS TO ARRANGE SLINGS OF ALL SIZES FOR COMPLETING THE WORKS COVERED UNDER THESE SPECIFICATIONS EXCEPT THE SPECIAL SLINGS FOR GENERATOR STATOR

LIFTING/HANDLING, WHICH WILL BE PROVIDED BY BHEL FREE OF CHARGES ON RETURNABLE BASIS.

**5.2.8**

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.

**5.2.9**

CONTRACTOR'S RESPONSIBILITIES WITH REGARD TO OPERATOR, FUEL, LUBRICANTS AND DAILY UPKEEP OF T&P'S PROVIDED BY BHEL IS FURTHER DETAILED IN SECTION-7.

**5.2.10**

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.

**5.2.11**

COMPLETE SET OF HYDRAULIC JACKS OF 50 TONNES AND 100 TONNES CAPACITY SHALL BE ARRANGED BY THE CONTRACTOR FOR USE DURING ERECTION AND COMMISSIONING OF TURBINE. ALSO, THE CONTRACTOR SHALL ARRANGE HYDRAULIC JACKS OF 100 TONNES AND 63 TONNES CAPACITY ALONG WITH LONG HIGH PRESSURE HOSES OF SUITABLE LENGTH FOR GENERATOR ERECTION AND ALIGNMENT. THESE JACKS SHALL OF INTERNATIONALLY REPUTED MAKE, HIGHLY RELIABLE AND MAINTAINED IN EXCELLENT WORKING CONDITION. THEY SHALL BE TESTED FOR SAFE WORKING BEFORE DEPLOYING IN ACTUAL WORK. THESE JACKS SHALL NOT BE PERMITTED FOR USE ANYWHERE OTHER THAN STEAM TURBINE / GENERATOR AREA.

**5.2.12**

ALL JACK BOLTS THAT ARE REQUIRED DURING ERECTION FOR CARRYING OUT ROLL-CHECK ETC. WILL HAVE TO BE ARRANGED BY THE CONTRACTOR. NO JACK BOLTS WILL BE PROVIDED BY BHEL.

**5.2.13**

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.

**5.2.14**

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.

**5.2.15**

THE T&P TO BE ARRANGED BY THE CONTRACTOR SHALL BE IN PROPER WORKING CONDITION AND THEIR OPERATION SHALL NOT LEAD TO UNSAFE CONDITION. CONTRACTOR SHALL OBTAIN PRIOR APPROVAL OF BHEL FOR ALL THE T&P BEFORE DEPLOYING IN ACTUAL WORK. THE MOVEMENT 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.

**5.2.16**

NORMALLY, USE OF WELDING GENERATORS ONLY IS PERMITTED FOR WELDING. THE USE OF WELDING TRANSFORMERS WILL BE SUBJECT TO PRIOR APPROVAL OF BHEL.

**5.2.17**



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. ALL CALIBRATION SHALL BE TRACEABLE TO NATIONAL OR INTERNATIONAL STANDARDS.

### **5.2.18 SCAFFOLDING MATERIALS**

- (A) THE 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.
- (B) (i) **CONTRACTOR SHALL DEPLOY ADEQUATE NUMBERS OF SCAFFOLDING MS PIPES (SIZE NOMINAL BORE – 40 mm, LENGTH : 6M EACH) WITH NECESSARY CLAMPS (AT LEAST ONE PAIR OF CLAMPS PER PIPE ) AND FITTINGS.**
  - (ii) BHEL WILL IMPOSE PENALTY FOR ANY SHORTFALL IN QUANTITY, OF PIPE AND ASSOCIATED PAIR OF CLAMPS. THE RECOVERY WILL CONTINUE TILL THE SHORTFALL IS MADE GOOD. THIS PROVISION WILL BE APPLICABLE TILL THE COMPLETION OF WORK. **PENALTY WILL BE IMPOSED AT THE RATE OF Rs.15/- PER PIPE AND ASSOCIATED PAIR OF CLAMPS PER MONTH ON PRO-RATA BASIS.**
- (C) FOR WORKING IN OVERHEAD POSITION AT HIGH ELEVATIONS CONTRACTOR SHALL ARRANGE NON-COMBUSTIBLE LIGHT-WEIGHT AND STURDY PLATFORM MATERIALS.

### **5.3 CONSUMABLES**

#### **5.3.1**

THE CONTRACTOR SHALL PROVIDE ALL CONSUMABLES REQUIRED FOR CARRYING OUT THE WORK COVERED UNDER THESE SPECIFICATIONS EXCEPTING THOSE WHICH ARE SPECIFICALLY INDICATED AS BHEL SCOPE.

TG SPECIAL CONSUMABLES LIKE HYLOMAR / GOLDEN HERMETITE / STAG-B / MOLYKOTE/ ANABOND COMPOUNDS / RUBBER FIXING COMPOUNDS ETC. WILL HAVE TO BE ARRANGED BY THE CONTRACTOR.

#### **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**

BHEL WILL PROVIDE PAINT & PRIMER FOR FINAL PAINTING ONLY. PRIMERS AND PAINTS FOR OTHER REQUIREMENTS ARE IN CONTRACTOR'S SCOPE.

### **5.4 WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES**

#### **5.4.1**

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ALL WELDING CONSUMABLES INCLUDING FILLER WIRES IS IN THE CONTRACTORS SCOPE.

#### **5.4.2**

ALL THE REQUIRED WELDING ELECTRODES AS APPROVED BY BHEL SHALL BE ARRANGED BY CONTRACTOR AT HIS COST. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN PRIOR APPROVAL OF BHEL , BEFORE PROCUREMENT, REGARDING MANUFACTURER, TYPE OF ELECTRODES ETC. ON RECEIPT OF THE ELECTRODES AT SITE, IT SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY BHEL REGARDING TYPE OF ELECTRODES, BATCH NUMBER, DATE OF EXPIRY ETC. BATCH TEST CERTIFICATES SHALL BE MADE AVAILABLE FOR VERIFICATION & RECORD BEFORE THE ACTUAL USE OF THE WELDING CONSUMABLES.

BHEL RESERVES THE RIGHT TO REJECT THE USE OF ANY ELECTRODES, IF FOUND NON-ACCEPTABLE BECAUSE OF BAD QUALITY, DETERIORATION IN QUALITY DUE TO IMPROPER STORAGE, SHELF LIFE EXPIRY, UNAPPROVED TYPE / BRAND ETC.

#### **5.4.3**

THE CONTRACTOR SHALL PROVIDE ALL CONSUMABLES REQUIRED FOR CARRYING OUT THE WORK COVERED UNDER THIS SCOPE OF WORK INCLUDING TIG WIRES FOR WELDING OF PIPING JOINTS.

#### **5.4.4**

ALL THE REQUIRED GASES LIKE ARGON, OXYGEN, ACETYLENE ETC INCLUDING REQUIRED HIGH PURITY NITROGEN GAS (FOR PURGING OF GENERATOR STATOR WATER SYSTEM) SHALL BE ARRANGED BY THE CONTRACTOR AT HIS COST.

### **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.

#### **5.5.3**

BHEL IS INSTALLING A COMPUTERIZED SITE MANAGEMENT SYSTEM AT SITE TO COVER AREAS OF MATERIALS MANAGEMENT, ERECTION & COMMISSIONING, QUALITY CONTROL, BILLING, MIRS, ETC. VENDOR SHOULD ALSO HAVE COMPUETERISED SYSTEM INCLUDING FAST INTERNET CONNECTIVITY FOR EFFECTIVE COMMUNICATION THROUGH E-MAIL, DAILY PROGRESS REPORT AND BILLING ETC.

### **5.6 AREA LIGHTING**

#### **5.6.1**

CONTRACTOR SHALL ARRANGE ADEQUATE FLOODLIGHTS, HAND LAMPS AND AREA LIGHTING FOR MATERIAL HANDLING, UNLOADING, VERIFICATION, STACKING, ERECTION, PRE-ASSEMBLY ACTIVITIES ETC. ALL TEMPORARY WIRING MUST COMPLY WITH REGULATIONS AND WILL BE

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SUBJECTED TO ENGINEER'S INSPECTION BEFORE CONNECTING TO SUPPLY POINT. 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 NEAR THE SITE APPROXIMATELY 500 METERS FROM ERECTION SITE. HOWEVER **TAXES, DUTIES, LEVIES ETC. WILL HAVE TO PAID EXTRA IF CHARGED BY THE CUSTOMER SEPERATELY.** 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. . IT MAY BE NOTED DISTANCE OF 500 M IS ONLY AN ESTIMATED DISTANCE. IT MAY VARY TO ANY EXTENT DEPENDING UPON SITE CONDITIONS.

### **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. LICENSED AND EXPERIENCED ELECTRICIAN SHALL DO THE INSTALLATION AND MAINTENANCE OF THIS.

WHILE REASONABLE EFFORTS WILL BE MADE TO ENSURE CONTINUOUS ELECTRIC POWER SUPPLY, INTERRUPTIONS CANNOT BE RULED OUT AND NO CLAIM FROM THE CONTRACTOR SHALL BE ENTERTAINED ON THIS ACCOUNT SUCH AS IDLE LABOUR, EXTENSION OF TIME ETC. THE CONTRACTOR SHALL ADJUST HIS WORKING SHIFT ACCORDINGLY AND DEPLOY ADDITIONAL MANPOWER, IF NECESSARY, SO AS TO ACHIEVE THE TARGET.

### **15.2.2 CONSTRUCTION WATER**

THE CUSTOMER WILL PROVIDE WATER FOR CONSTRUCTION PURPOSE AT A SINGLE POINT. **SUPPLY OF CONSTRUCTION WATER SHALL BE FREE OF CHARGE. TAXES, DUTIES, LEVIES ETC WILL HAVE TO PAID EXTRA IF CHARGED BY CUSTOMER SEPARATELY.** ALL ARRANGEMENTS FOR FURTHER DISTRIBUTION BEYOND THIS POINT HAVE TO BE MADE BY THE CONTRACTOR.

### **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. CONTRACTOR SHALL TAKE SUITABLE INSURANCE POLICY FOR SUCH ACCIDENTAL LOSS/DAMAGES.

## **5.8 RESPONSIBILITIES WITH REGARD TO LABOUR EMPLOYMENT ETC.**

REFER CLAUSE 2.8 OF GENERAL CONDITIONS OF CONTRACT IN THIS REGARD.

### 5.8.2

CONTRACTOR SHALL ALSO COMPLY WITH THE REQUIREMENTS OF LOCAL AUTHORITIES/ PROJECT AUTHORITIES CALLING FOR POLICE VERIFICATION OF ANTECEDENTS OF THE WORKMEN, STAFF ETC.

### 5.8.3

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.

### 5.8.4

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.

### 5.8.5

CONTRACTOR SHALL PROVIDE AT DIFFERENT ELEVATION SUITABLE ARRANGEMENT FOR URINAL AND DRINKING WATER FACILITY WITH NECESSARY PLUMBING & DISPOSAL ARRANGEMENTS INCLUDING CONSTRUCTION OF SEPTIC TANK. THESE INSTALLATIONS SHALL BE MAINTAINED IN HYGIENIC CONDITION AT ALL TIMES.

### 5.8.6

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 THEREBY SHALL BE RECOVERED FROM THE CONTRACTOR.

### 5.9.0 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.

#### 5.9.1

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

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

### 5.9.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and deposit the same with the concerned tax authorities, such applicable amount will be paid by BHEL.

**Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person**

authorized by him in respect of taxable service provided, and shall contain the following, namely,

- I. The name, address and the registration number of the contractor,
- II. The name and address of the party receiving taxable service,
- III. Description, classification and value of taxable service provided and,
- IV. The service tax payable thereon.

**All the four conditions shall be fulfilled in the invoice before release of service tax payment.**

Contractor shall obtain prior written consent from BHEL before billing the amount towards such taxes.

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

### **5.9.3 VAT (Sales Tax /WCT)**

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

### **5.9.4 Modalities of Tax Incidence on BHEL**

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

### **5.9.5 New Taxes/Levies**

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

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

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be

taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

#### **5.10 SUBMISSION OF PERIODICAL REPORTS**

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

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

**BHEL AT SITE WILL SUGGEST FORMATS FOR THESE REPORTS.**

## **SECTION-6**

### **SPECIAL CONDITION OF CONTRACT**

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

##### **6.1**

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

##### **6.7**

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.

#### **1.12 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:

- 1) OVERALL PLANNING, MONITORING & CONTROL
- 2) MATERIALS MANAGEMENT
- 3) CONDENSER & AUXILIARIES
- 4) TURBINE & AUXILIARIES.
- 5) GENERATOR & AUXILIARIES.

- 6) PUMPS & AUXILIARIES.
- 7) PIPING.
- 8) QUALITY CONTROL AND QUALITY ASSURANCE
- 9) SAFETY, FIRE & SECURITY
- 10) INDUSTRIAL RELATIONS AND FULFILMENT OF LABOUR LAWS AND OTHER STATUTORY OBLIGATIONS.



## **SECTION-7**

### **SPECIAL CONDITION 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 TEST MATERIALS (PLATES & PIPES)**

BHEL WILL PROVIDE SUITABLE PLATES AND PIPES FREE OF COST ONLY FOR SITE TEST OF WELDERS INCLUDING IBR WELDERS BEFORE THEIR DEPLOYMENT. HOWEVER, ALL DESTRUCTIVE AND NON-DESTRUCTIVE EXAMINATIONS OF TEST BLANKS / PIECES SHALL BE IN THE SCOPE OF CONTRACTOR. RESPONSIBILITIES WITH REGARD TO DEPLOYMENT OF IBR WELDERS AND MEETING THE STIPULATIONS SHALL BE THE RESPONSIBILITY OF CONTRACTOR.

#### **7.2 FILLER WIRE FOR TIG WELDING**

ALL FILLER WIRES SHALL BE ARRANGED BY THE CONTRACTOR. PLEASE REFER SECTION-5 IN THIS REGARD.

#### **7.3 EQUIPMENTS – TOOLS & PLANTS**

BHEL WILL MAKE AVAILABLE ONLY THOSE T&P'S THAT ARE LISTED IN **APPENDIX-III** FREE OF CHARGE. OTHER REQUIRED T&P'S SHALL BE ARRANGED BY THE CONTRACTOR. FURTHER DETAILS ARE AS UNDER:

##### **7.3.3**

BHEL WILL MAKE AVAILABLE ON SHAREABLE BASIS, FREE OF HIRE CHARGE, SERVICES OF EQUIPMENTS & T&P INDICATED IN **APPENDIX-III**. AS MOST OF THE EQUIPMENTS WILL BE IN THE CUSTODY OF BHEL AND HAVE TO BE SHARED AMONG OTHER CONTRACTORS, THE REQUIREMENTS SHALL BE INDICATED TO BHEL SUFFICIENTLY IN ADVANCE AND FINALISE ALLOTMENT OF THE SAME. IT MAY BE NOTED THAT THE CONTRACTOR HAS TO DEPLOY ALL NECESSARY TOOLS & PLANTS TO SUIT THE ACTIVITY SCHEDULES GIVEN BY BHEL/CUSTOMER. T&P BEING SUPPLIED BY BHEL ARE ONLY TO SUPPLEMENT THE RESOURCES DEPLOYED BY THE CONTRACTOR.

##### **7.3.3**

EOT CRANE OF CUSTOMER WILL BE PROVIDED FREE OF CHARGE FOR ACTIVITIES OF HANDLING & ERECTION WITHIN TG HALL. PORTAL GANTRY CRANE WILL BE PROVIDED FOR HANDLING AND LIFTING OF GENERATOR STATOR BY BHEL.

EOT CRANE IN TG HALL WILL BE ISSUED ON NEED BASIS AND IS TO BE SHARED WITH OTHER CONTRACTORS. QUALIFIED & EXPERIENCED OPERATORS ARE TO BE PROVIDED BY THE CONTRACTOR ON FULL TIME BASIS. CARRYING OUT ROUTINE MAINTENANCE / SERVICING , PROVIDING MANPOWER, TOOL & TACKLES FOR ANY REPAIR / RECTIFICATION OF THE CRANES IS ALSO IN THE SCOPE OF THE CONTRACTOR. THE QUOTED RATES SHALL BE INCLUSIVE OF THE ABOVE.

##### **7.3.3**

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

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

#### **7.4 OTHER T & P**

##### **7.4.1**

THE RESPONSIBILITIES OF CONTRACTOR DEFINED ABOVE FOR BHEL CRANES (AS APPLICABLE) SHALL ALSO BE APPLICABLE, MUTATES-MUTANDIS, IN RESPECT OF OTHER TOOL & PLANTS PROVIDED BY BHEL.

##### **7.4.2**

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

##### **7.4.3**

ALL THE TOOLS AND PLANTS ISSUED TO CONTRACTOR WILL BE INSPECTED PERIODICALLY BY BHEL ENGINEER. IN CASE CONTRACTOR FAILS TO MAKE GOOD, THE DAMAGES CAUSED, BHEL WILL DO THE SAME AT CONTRACTOR'S COST. THE TOOLS AND TACKLES WILL BE ISSUED ONLY TO PERSONS NOMINATED BY THE CONTRACTOR.

##### **7.4.4**

REQUIRED TEMPORARY STRUCTURAL STEEL, PIPES & FITTINGS, VALVES FOR CONDUCTING HYDRAULIC TEST, CHEMICAL CLEANING / STEAM BLOWING / OIL FLUSHING / ACID CLEANING ETC SHALL BE PROVIDED BY BHEL ON RETURNABLE BASIS.

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

##### **7.5.1**

ALL LUBRICANTS AND CHEMICALS REQUIRED FOR TESTING, CHEMICAL CLEANING, ACID CLEANING, OIL/CHEMICAL/GAS FLUSHING REQUIRED FOR TESTING, PRE-COMMISSIONING & COMMISSIONING UPTO TRIAL OPERATION OF EQUIPMENTS/UNIT WILL BE PROVIDED BY BHEL. CARBON-DIOXIDE AND HYDROGEN GAS FOR PURGING AND FILLING IN TURBO-GENERATOR WILL ALSO BE SUPPLIED BY BHEL. CONTRACTOR SHALL ARRANGE FOR TAKING DELIVERY AND LOADING OF ALL SUCH CONSUMABLES FROM BHEL/ CUSTOMER STORES/ YARD, TRANSPORTATION TO SITE OF WORK AND UNLOADING THEREON, FILLING IN THE SYSTEM AND RETURN THE USED LUBE OIL, BALANCE QUANTITY OF CONSUMABLES ETC, TO BHEL STORES DULY RECONCILED FOR QUANTITY.

#### **7.6 PRIMER AND PAINTS FOR FINAL PAINTING**

ALL PRIMER AND PAINTS REQUIRED FOR FINAL PAINTING SHALL BE SUPPLIED BY BHEL FREE OF CHARGES.

THE CONTRACTOR, HOWEVER, SHALL PROVIDE ACCOUNT OF ALL THE ITEMS ISSUED TO HIM AND RETURN ALL PRIMER, PAINTS ETC REMAINING EXTRA OVER THE NORMAL REQUIREMENT WITH PROPER IDENTIFICATION TAGS IN A PACKED CONDITION TO BHEL STORES. IN CASE OF ANY MISUSE OR EXCESS USE OVER THE NORMAL REQUIREMENT BHEL RESERVES THE RIGHT TO RECOVER THE COST OF SUCH MISUSE / EXCESS USE. DECISION OF BHEL ENGINEER IN THIS REGARD WILL BE FINAL AND BINDING ON THE CONTRACTOR.

## **SECTION-8 (Rev 01, 24/01/2009)**

### **SPECIAL CONDITIONS OF CONTRACT**

#### **8.0 Inspection/Quality Assurance/Quality Control/ Statutory Inspection**

8.1 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 and other statutory provisions and as per BHEL engineer's instructions.

8.2 Preparation of quality assurance log sheets and protocols with customer/ consultants/statutory authority, welding logs, NDE records, testing & calibration records and other quality control and quality assurance documentation as per BHEL engineer's instructions, is within the scope of work/specification. These records shall be submitted to BHEL/customer for approval from time to time.

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.

8.3 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 / centering / leveling 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.

8.4 The performance of welders will be reviewed from time to time as per the BHEL standards. Welders' performance record shall be periodically furnished for scrutiny of BHEL's Engineer. Corrective action as informed by BHEL shall be taken in respect of those welders not conforming to these standards. This may include removal/ discontinuance of concerned welder(s). Contractor shall arrange for the alternate welders immediately.

8.5 All the welders shall carry identity cards as per the proforma prescribed by BHEL/Customer/Consultant. Only welders duly authorized by BHEL/customer/consultant shall be engaged on the work.

8.6 Contractor shall provide all the measuring monitoring devices (MMDs) required for completion of the work satisfactorily. These MMDs shall be of brand, quality and accuracy specified by BHEL Engineer and should have necessary calibration and other certificates as per the requirement of BHEL Engineer. Decision of BHEL Engineer regarding acceptance or otherwise of the measuring instruments/gauges/tools for the work under this specification, is final and binding on the contractor. The indicative list of MMDs required for this work and to be made available by the contractor is given in relevant appendix. The list will be reviewed by BHEL and the contractor shall meet any augmentation needed wherever required.

8.7 It is the responsibility of the contractor to prove the accuracy of the testing/measuring/calibrating equipments brought by him based on the periodicity of calibration as called for in the BHEL's quality assurance standards/BHEL Engineer's instructions.

8.8

Any re-laying or re-termination of cables/re-erection of instruments/ recalibration of instruments etc. required due to contractor's mistake or design requirement and found at any stage inspection, shall be carried out by the contractor at no extra cost.

- 8.9 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.
- 8.10 Re-work necessitated on account of use of invalid MMDs 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.
- 8.11 In the courses of erection, it may become necessary to carry repeated checks of the work with instruments recently calibrated, re-calibrated. BHEL may counter/ finally check the measurements with their own MMDs. Contractor shall render all assistance in conduct of such counter/final measurements.
- 8.12 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.
- 8.13 Total Quality is the watchword of the work and Contractor shall strive to achieve the Quality Standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and Quality Standards. Contractor shall provide the services of Quality Assurance Engineer.
- 8.14 Stage Inspection By FES/QA Engineers**
- Apart from day-to-day inspection by BHEL Engineers stationed at Site and Customer's Engineers, stage inspection of equipments under erection and commissioning at various stages shall also be conducted by teams of Engineers from Field Engineering Services of BHEL's Manufacturing Units, Quality Assurance teams from field Quality Assurance, Unit/Factory Quality Assurance and Commissioning Engineers from Technical Services etc. Contractor shall arrange all labour, tools and tackles etc for such stage inspections free of cost.
- 8.15 Any modifications suggested by BHEL FES and QA Engineers' team shall be carried out. Claims of contractor, if any, shall be dealt as per Section 13, and provided such modifications have not arisen for reasons attributable to the contractor.

#### **Statutory Inspection of Work**

- 8.16 The work to be executed under these specifications has to be offered for inspection, at appropriate stages of work completion, to various statutory authorities for compliance with applicable regulations.

The work related statutory inspections, though not limited to, are as under:

- 1) Inspectorate of steam boilers and smoke nuisance
- 2) Factory Inspector, Labour Commissioner, Electrical Inspector PF Commissioner and other authority connected to this project work

The scope includes getting the approvals from the statutory authorities, which includes arranging for inspection visits of statutory authority periodically as per BHEL Engineer's instructions, arranging materials for ground inspection, taking rub outs for the pressure

parts to be offered for inspection, submitting co-related inspection reports, documents, radiographs etc and following up the matter with them. Contractor shall also make all arrangements for offering the Products / Systems for inspection at location, as applicable, to the concerned authority.

- 8.17 Contractor should be qualified to execute pressure parts & piping work coming under the purview of IBR, for which he should register himself with CIB of state concerned. contractor also should be aware of the latest IBR regulations and Electricity Act, including the amendments thereof.
- 8.18 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.
- 8.19 Other fees like fees for periodic visits, hydraulic test fees, light up inspection fees etc. shall be borne by the contractor.
- 8.20 Payment of Registration fees for Boiler is excluded from the scope.
- 8.21 BHEL shall pay the ground inspection fees of Boiler Inspectorate. All other arrangements for site visits periodically by Boiler Inspector to site, for obtaining Inspection certificate etc, will have to be made by contractor.
- 8.22 The quality management system of BHEL, Power Sector – Western Region (PSWR) has already been certified and accredited under ISO 9002 standards in this regard. The basic philosophy of the quality management system is to define the organizational responsibility, work as per documented procedures, verify the output with respect to acceptance norms, identify the non-conforming product/ procedure and take corrective action for removal of non-conformance specifying the steps for avoiding recurrence of such non-conformities, & maintain the relevant quality records. The non-conformities are to be identified through the conduct of periodical audit of implementation of quality systems at various locations/stages of work. Suppliers/vendors of various products/services contributing in the work are also considered as part of the quality management system. As such the contractor is expected not only to conform to the quality management system of BHEL but also it is desirable that they themselves are accredited under any quality management system standard.

#### **Field Quality Assurance**

- 8.23 Contractor shall carry out all activities conforming to the approved Field Quality Plan (FQP) as revised from time to time. Total quality shall be the watchword of the work and contractor shall strive to achieve the quality standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and quality standards. Contractor shall provide the services of quality assurance engineer as per the relevant clauses.

## **SECTION-9**

### **SPECIAL CONDITIONS OF CONTRACT**

#### **Safety, Occupational Health and Environmental Management**

BHEL PSWR has been certified for Environmental Management under ISO 14001:1996 standard and Occupational Health & Safety under OHSAS 18001 by DNV. In order to comply with the above standards, it shall be the 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 administrators 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

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- 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

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.

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

#### **9.2.4.3.5**

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

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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, 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 NON COMPLIANCE:-

##### 11.1.2

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

Sl. No	Instance of Violation	Fine (in Rs)
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-

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Sl. No	Instance of Violation	Fine (in Rs)
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slings 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.

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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 SEWAGE SYSTEM
IS 1287	1986		ELECTRIC TOASTER
IS 13063	1991		STRUCTURAL SAFETY OF BUILDINGS ON SHALLOW FOUNDATIONS ON ROCKS
IS 13385	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE WHEEL MOUNTED WATER TYPE (GAS CARTRIDGES)
IS 13386	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE MECHANICAL FOAM TYPE
IS 13415	1992		CODE OF SAFETY FOR PROTECTIVE BARRIERS IN AND AROUND BUILDINGS
IS 13416	1992		RECOMMENDATIONS FOR PREVENTIVE MEASURES AGAINST HAZARDS AT WORKING PLACE PART 1 TO PART 5
IS 13430	1992		CODE OF PRACTICE FOR SAFETY DURING ADDITIONAL CONSTRUCTION AND ALTERATION TO EXISTING BUILDINGS
IS 13849	1993		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE ( CONSTANT PRESSURE)
IS 1446	1985		CLASSIFICATION OF DANGEROUS GOODS (FIRST REVISION)
IS 1476	1979		REFRIGERATORS
IS 1641	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): GENERAL PRINCIPLES OF FIRE GRADING AND CLASSIFICATION
IS 1642	1989		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS- DETAILS OF CONSTRUCTION

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IS No	YEAR	Amd upto	DESCRIPTION
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 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,

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IS No	YEAR	Amd upto	DESCRIPTION
			RAILINGS AND TOE BOARDS
IS 5121	1969		SAFETY CODE FOR PILING AND OTHER DEEP FOUNDATIONS
IS 5182	1969	1982	METHODS FOR MEASUREMENT OF AIR POLLUTION
IS 5184	1969		CODE OF SAFETY FOR HYDROFLUORIC ACID
IS 5216	1982	2000	RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICE IN ELECTRICAL WORK PART I AND II
IS 555	1979		TABLE FANS
IS 5557	1995		INDUSTRIAL AND SAFETY LINED RUBBER BOOTS ( SECOND REVISION)
IS 5916	1970		SAFETY CODE FOR CONSTRUCTION INVOLVING USE OF HOR BITUMINOUS MATERIALS
IS 5983	1980		SPECIFICATION FOR EYE PROTECTORS - FIRST REVISION
IS 6234	1986		PORTABLE FIRE EXTINGUISHERS WATER TYPE ( STORED PRESSURE)
IS 692	1994		CRITERIA FOR SAFETY AND DESIGN OF STRUCTURES SUBJECTED TO UNDERGROUND BLASTS
IS 6994	1973		SPECIFICATION FOR SAFETY GLOVES
IS 7155	1986		CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8)
IS 7205	1974		SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK
IS 7293	1974		SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY
IS 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

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IS No	YEAR	Amd upto	DESCRIPTION
			RPEWAYS FOR THE TRANSPORTATION OF MATERIAL
IS 9759	1981		GUIDELINES FOR DEWATERING DURING CONSTRUCTION
IS 9815	1989		SERVO MOTOR OPERATED LINE VOLTAGE CORRECTOR (SERVO STABILISER)
IS 9944	1992		RECOMMENDATIONS ON SAFE WORKING LOAD FOR NATURAL AND MAN-MADE FIBRE ROPE SLINGS
IS 996	1979		SINGLE PHASE ELECTRIC MOTORS
ISO 3873	1977		SAFETY HELMET

## SECTION-10

### SPECIAL CONDITIONS OF CONTRACT

#### 10.0 DRAWINGS AND DOCUMENTS

##### 10.1

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

##### 10.2

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

##### 10.3

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

##### 10.4

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

##### 10.5

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

##### 10.6

In case of any conflict between general instructions to tenderness, general conditions of contract contained in sections 1 & 2 respectively and special conditions of contract contained in sections 4 to 15 and appendices, provisions contained in special conditions of 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. Offers will be evaluated on the total amount for the entire Rate Schedule and the work will be awarded without splitting the scope.

##### 10.8

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

**SECTION-11**  
**SPECIAL CONDITIONS OF CONTRACT**

**TIME SCHEDULE, MOBILIZATION, PROGRESS MONITORING, OVER RUN, VARIATION ETC.**

**11.1 MOBILIZATION, TIME SCHEDULE, CONTRACT PERIOD AND GRACE PERIOD**

**11.1.1**

**CONTRACTOR SHALL MOBILIZE NECESSARY RESOURCES WITHIN SHORTEST POSSIBLE TIME OF ISSUE OF FAX LETTER OF INTENT TO COMMENCE THE ERECTION WORK. SUCH RESOURCES SHALL BE PROGRESSIVELY AUGMENTED TO MATCH THE SCHEDULE OF MILESTONES AND COMMISSIONING.**

**11.1.2**

**MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.**

THE ACTIVITIES FOR ERECTION, TESTING ETC. SHALL BE STARTED AS PER DIRECTIONS OF CONSTRUCTION MANAGER OF BHEL. CONTRACTOR SHALL MOBILISE FURTHER RESOURCES (IN ADDITION TO THOSE REQUIRED FOR ACTIVITIES UNDER CLAUSE No. 11.1.1) AS PER REQUIREMENT TO COMMENCE THE WORK OF ERECTION, TESTING ETC. OF BOILER AND AUXILIARIES AND PROGRESSIVELY AUGMENT THE RESOURCES TO MATCH SCHEDULE OF THE PROJECT.

**11.1.3**

COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

**ERECTION/PLACEMENT ON IT'S DESIGNATED FOUNDATION/LOCATION, OF THE FIRST MAJOR PERMANENT EQUIPMENT/COMPONENT/COLUMN COVERED IN THE SCOPE OF THESE SPECIFICATIONS SHALL BE RECOGNIZED AS "START OF CONTRACT PERIOD". SMALLER ITEMS LIKE PACKER PLATES, SHIMS, ANCHORS, INSERTS ETC. WILL NOT BE CONSIDERED AS START OF CONTRACT PERIOD.**

BASED ON THE AVAILABILITY OF CIVIL FOUNDATIONS AND MATERIALS FROM MANUFACTURING UNITS CONTRACTOR MAY HAVE TO ADVANCE THE START OF ERECTION AFTER GETTING CLEARANCE FROM CONSTRUCTION MANAGER.

THE CONTRACTOR HAS TO SUBSEQUENTLY AUGMENT HIS RESOURCES IN SUCH A MANNER THAT FOLLOWING MAJOR MILESTONES OF ERECTION & COMMISSIONING ARE ACHIEVED ON SPECIFIED SCHEDULES:

SN	MAJOR MILESTONE	COMPLETION
1	COMMENCEMENT OF CONDENSER ERECTION	12-Aug-09
2	BOXING UP OF TURBINE AND GENERATOR	30-Aug-10
3	OIL FLUSHING COMPLETION	15-Oct-10
4	COMPLETION OF GOVERNING SYSTEM / BARRING GEAR	17-Nov-10
5	ROLLING AND SYNCHRONISATION	29-Dec-10
6	TRIAL OPERATION COMPLETION AND HANDING OVER	05-Feb-11

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

#### **11.1.4**

##### **START OF CONTRACT PERIOD AND DURATION.**

NORMALLY TOTAL CONTRACT PERIOD FOR COMPLETION OF ENTIRE WORK SHALL BE 22 **(TWENTY TWO)** MONTHS FROM THE START OF ERECTION. ERECTION OF THE FIRST EQUIPMENT OR, MAJOR COMPONENT / SET OF COMPONENTS OF LARGE EQUIPMENT, AS IDENTIFIED BY BHEL SITE-IN-CHARGE, ON ITS PERMANENT LOCATION/ FOUNDATION SHALL BE RECKONED AS THE START OF CONTRACT PERIOD. SMALL COMPONENTS LIKE PACKER PLATES, INSERT PLATES, ANCHORS ETC. WILL NOT BE CONSIDERED FOR THIS PURPOSE.

HOWEVER THE CONTRACTOR SHALL HAVE TO MOBILIZE HIS RESOURCES EARLIER THAN THE START OF CONTRACT PERIOD FOR PREPARATORY WORK LIKE TAKING OVER AND CHIPPING OF FOUNDATIONS, BLUE-MATCHING AND GROUTING OF PACKER PLATES ETC.

THE CONTRACTOR SHALL COMPLETE ALL THE WORK IN THE SCOPE OF THIS CONTRACT WITHIN THE CONTRACT PERIOD.

#### **11.1.5**

##### **GRACE PERIOD**

GRACE PERIOD OF 4 **(FOUR)** MONTHS BEYOND THE CONTRACT PERIOD OF 22 **(TWENTY TWO)** MONTHS IS PROVIDED FOR THIS CONTRACT. HOWEVER, ALL MILESTONE EVENTS AS PER ACTUAL REQUIREMENT OF PROJECT SCHEDULE SHALL HAVE TO BE ACHIEVED BY THE CONTRACTOR WITHOUT TAKING RECOURSE TO THE GRACE PERIOD.

#### **11.2**

##### **PROGRESS MONITORING, CONTRACT EXTENSION AND OVERRUN**

##### **11.2.1 PROGRESS MONITORING**

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

##### **11.2.2 ASCERTAINING AND ESTABLISHING THE REASONS FOR SHORTFALL**

THE ONUS PROBANDI THAT THE CAUSES LEADING TO EXTENSION OF THE CONTRACT PERIOD IS NOT DUE TO ANY REASONS ATTRIBUTABLE TO THE CONTRACTOR IS ON HIM (THE CONTRACTOR). REVIEW OF THE PERFORMANCE AS STATED VIDE CLAUSE 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:

##### **11.2.2.1**

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

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.

##### **11.2.2.2**

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

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### **11.3 CONTRACT EXTENSION**

#### **11.3.1**

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

#### **11.3.2**

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 11.2.2 SHALL BE DONE DURING THE EXTENDED PERIOD. THE OVER RUN CHARGES WILL BE PAID IN PROPORTION TO THE ACHIEVEMENT OF THE RESPECTIVE MONTH VIS-À-VIS THE PLAN FOR THE MONTH (FOR ASSESSING 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.

#### **11.3.3**

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.

### **11.4**

#### **OVERRUN COMPENSATION**

IF THE CONTRACT IS EXTENDED BEYOND THE CONTRACT AND GRACE PERIOD FOR ANY REASON OTHER THAN THOSE ATTRIBUTABLE TO THE CONTRACTOR OR FORCE MAJEURE CONDITIONS, THE CONTRACTOR WILL BE COMPENSATED BY PAYMENT OF OVERRUN CHARGES AT THE RATE OF **RS.50,000/-** (RUPEES FIFTY THOUSANDS ONLY) PER MONTH. OVERRUN COMPENSATION WILL BE PAID FOR THE EXTENSION ATTRIBUTABLE TO BHEL ONLY. **NO OVERRUN COMPENSATION SHALL BE PAYABLE FOR THE EXTENSION OF CONTRACT ON ACCOUNT OF REASONS OF DELAY OF ERECTION & COMMNG. WORKS ATTRIBUTABLE TO CONTRACTOR AND/OR FORCE MAJEURE CONDITIONS.** OVERRUN COMPENSATION FOR ELIGIBLE PERIOD SHALL BE IN PROPORTION TO THE PROGRESS ACHIEVED AGAINST THE PLAN FOR RESPECTIVE PERIOD.

### **11.5**

#### **11.5 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

##### **11.5.1**

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.

##### **11.5.2**

The basis for calculation of price variation in each category, their component, Base Index, Base Date of accounting shall be as under:

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.SL NO.	CATEGORY	COMPO NENT ('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...

#### 11.5.3

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

$$A = K \times R \times \frac{(X_N - X_0)}{X_0}$$

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

#### 11.5.4

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.

#### 11.5.5

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

#### 11.5.6

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](http://www.eaindustry.nic.in)) and CONSUMER PRICE INDEX for INDUSTRIAL WORKERS (GENERAL), applicable to 'All India' as published by Labour Bureau, Shimla.

#### 11.5.7

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.

#### 11.5.8

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.

#### 11.5.9

With the above provision, the clause no. 2.15 of General Conditions of Contract section-2 is not applicable.

### **11.6 CONTRACT VARIATIONS**

#### **11.6.1 VARIATION IN WEIGHT /QUANTITY**

QUANTITY & WEIGHT OF VARIOUS EQUIPMENTS AND ITEMS OF WORK COVERED UNDER THE TENDER SPECIFICATION ARE LIKELY TO VARY. FOR ANY UPWARD OR DOWNWARD VARIATION IN QUANTITIES AS WELL AS WEIGHT IN RESPECT OF TG & AUXILIARIES UNDER ITEM SL. NO.1 OF RATE SCHEDULE, THE ACCEPTED PRICE SHALL REMAIN FIRM.

#### **11.7 INTEREST BEARING RECOVERABLE 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).

## **11.8**

### **DEFINITION OF WORK COMPLETION**

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

## SECTION-12

### SPECIAL CONDITIONS OF CONTRACT

#### 12.0.1

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. However, first RA Bill shall be released only after signing of Contract Agreement.

#### 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:

9. Name of the Company
10. Name of Bank
11. Name of Bank Branch
12. City/Place
13. Account Number
14. Account type
15. IFSC code of the Bank Branch
16. 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 PAYMENT

### (A) RATE SCHEDULE FOR TG AND AUX PACKAGE

S N	DESCRIPTION	% TAGE
<b>I</b>	<b>STEAM TURBINE, GENERATOR AND AUX</b>	
<b>1.00</b>	<b>CONDENSER (15.50%)</b>	
1.01	Preparation of foundation	1.00%
1.02	Placement, Alignment, Assembly and welding of bottom plate segments, Hot well with NDT and placement of Spring elements	2.00%
1.03	Assembly and positioning of water chambers, water boxes, side plates, bottom plates, welding and NDT	1.50%
1.04	Erection, Alignment and welding & NDT of tube support plates and internals like Baffle plates, Air evacuation pipes etc	1.50%
1.05	Assembly, welding and NDT of dome walls and stiffeners, extraction piping and steam throw device, LPH1, supports etc	1.50%
1.06	Insertion, expansion, end milling of Condenser tubes	3.00%
1.07	Hydraulic test of Steam and Water side	1.00%
1.08	Welding and NDT of Condenser neck joint and completion of balance works on condenser	2.00%
1.09	Erection of Condenser water box handling system	1.00%
1.10	Assembly, Erection, Fixing and supporting of Condenser R E joints and Butterfly valves with fittings	1.00%
	<b>SUB TOTAL - 1</b>	<b>15.50%</b>
<b>2.00</b>	<b>TURBINE (19.00%)</b>	
2.01	Matching, leveling, alignment of base plates and bearing pedestals	1.50%
2.02	Grouting of pedestals and base plate	1.00%
2.03	Placement and alignment of LP outer casing bottom half of LP cylinder and Centre guide keys	1.00%
2.04	Placement of LP rotor and alignment with inner casing and checking of blade clearance	1.00%
2.05	Assembly, alignment and welding of LP outer casing upper half	1.00%
2.06	Placement and alignment of IP Turbine outer casing and inner casing bottom half of IP cylinder	0.50%
2.07	Placement and alignment of IP rotor with lower casing and boxing up of inner & outer casing ( Upper halves )	1.50%
2.08	Boxing up of LP inner - inner and inner - outer and roll check	1.00%
2.09	Placement of H.P. Turbine, lowering of HP rotor on bearings and checking of clearance, coupling etc	1.00%
2.10	Alignment of HP/IP/LP rotor	1.00%
2.11	Reaming and coupling of HP/IP/LP rotor	1.50%
2.12	Assembly of regulation system	1.00%
2.13	Erection, Alignment and welding of Cross around piping	1.00%
2.14	Installation of IVs, ESVs, LPBP valves, MS strainers (internals), HRH strainers (internals)	1.00%
2.15	Final box up of LP Turbine	1.00%
2.16	Completion of Turbovisory works	1.00%
2.17	Final boxing up of bearing pedestals after oil flushing completion	1.00%
2.18	Erection of extraction piping inside the condenser	1.00%

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	<b>SUB TOTAL - 2</b>	<b>19.00%</b>
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<b>S N</b>	<b>DESCRIPTION</b>	<b>% TAGE</b>
<b>3.00</b>	<b>GENERATOR (14.50%)</b>	
3.01	Checking and preparation of foundation, placement of foundation plate	1.00%
3.02	Grouting of foundation plates	1.00%
3.03	Erection and testing of Portal crane for stator lifting and dismantling of portal crane after stator lifting	1.00%
3.04	Unloading of Gen stator from Railway wagon / Trailer and shifting / dragging to reach of Portal crane	0.50%
3.05	Lifting of Gen stator and placing on foundation	1.50%
3.06	Fixing of bushings	1.00%
3.07	Leveling and alignment of stator	1.00%
3.05	Generator rotor insertion	1.00%
3.07	Box up of Generator and assembly of Hydrogen seals	1.00%
3.08	Alignment of generator rotor with LP rotor	1.00%
3.09	Coupling reaming and honing	1.00%
3.10	Preparation of Exciter set foundation and grouting	1.00%
3.11	Erection of Excitation equipment and alignment of Generator - Exciter rotors including swing check	1.00%
3.12	Excitation system completion	0.50%
3.13	Final Gas tightness test of stator with complete system	1.00%
	<b>SUB TOTAL - 3</b>	<b>14.50%</b>
<b>4.00</b>	<b>CONDENSATE EXTRACTION PUMPS ( 3.00%)</b>	
4.01	Preparation of foundation and placement of canister	1.00%
4.02	Placement of pump and motor	1.00%
4.03	Alignment of coupling	1.00%
	<b>SUB TOTAL - 4</b>	<b>3.00%</b>
<b>5.00</b>	<b>PIPING (7.50%)</b>	
5.01	Turbine lub oil piping, jacking oil piping	1.00%
5.02	Genrator seal oil piping	1.00%
5.03	Turbine water and Steam drainage piping	1.00%
5.04	Extraction piping	1.00%
5.05	Control oil piping for ESV, IV, LPBP valves, NRV	1.00%
5.06	Desuperheater for wet steam washing, debris filter with associated piping	1.00%
5.07	Condensate spray piping	0.50%
5.08	Generator Primary water piping	1.00%
	<b>SUB TOTAL - 5</b>	<b>7.50%</b>
<b>6.00</b>	<b>OTHER SYSTEMS (12.50%)</b>	
6.01	Generator gas system with all equipments and fittings	1.00%
6.02	Erection of Central lub oil system (pumps, tanks, strainers and piping etc) with associated fittings	1.00%
6.03	Erection of lube oil pumps (AOP, EOP, JOP etc), Main oil tank and oil coolers	1.00%
6.04	Erection of Control fluid tank, CF coolers, CF pumps, purification unit etc	1.00%
6.05	Erection of Vacuum pumps and piping	1.00%
6.06	Erection of seal oil, Primary water and gas system units / racks / equipments	1.00%
6.07	Erection of gland steam condenser, drain cooler with fittings	0.50%
6.08	Erection of Boiler fill pump and Condensate transfer pumps with fittings	0.50%
6.09	Erection of HP / LP By Pass system with all equipment, piping and fittings	1.00%
6.10	Erection of Flash tanks and connection to incoming pipes	1.00%

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S N	DESCRIPTION	% TAGE
6.11	Insulation of all equipments, piping etc except spray insulation	2.00%
6.12	Electric wire rope hoists and chain pulley blocks with traveling trolley	0.50%
6.13	Final painting of all equipments and system covered in the scope	1.00%
	<b>SUB TOTAL - 6</b>	<b>12.50%</b>
<b>II</b>	<b>HP/LP HEATERS AND DEAERATOR (4.00%)</b>	
7.01	Placement of HP Heaters	1.00%
7.02	Placement of LP Heaters	0.50%
7.03	Lifting and placement of Deaerator and Feed Storage Tank with fittings and associated platform	2.00%
7.04	Welding of FST shells	0.50%
	<b>SUB TOTAL - 7</b>	<b>4.00%</b>
<b>III</b>	<b>POWER CYCLE PIPING (BOILER FEED PUMPS) (7.00%)</b>	
8.01	<b>Motor driven Boiler Feed Pump - 1 No</b>	
	a) Foundation chipping, blue matching of foundation and levelling, centring of grillage / foundation frame and bolt grouting	0.50%
	b) Placement of Feed pumps, Booster pump, motor, Hydraulic coupling and preliminary alignment	0.50%
	c) Grouting of grillage / foundation and final alignment of BFP, BP, Motor and HC	0.50%
	d) Erection of lub oil piping and other balance piping like mechanical seal etc, erection of panel / rack and oil flushing of oil piping	0.50%
8.02	<b>Turbine driven Boiler Feed Pump - 2 Nos</b>	
	a) Foundation chipping, blue matching of foundation and levelling, centring of grillage / foundation frame and bolt grouting	1.00%
	b) Placement of Turbine, Feed pumps, Booster pump, Gear box and preliminary alignment	1.00%
	c) Grouting of grillage/foundation and alignment of Turbine, Gear box, BFP & BP	1.00%
	d) Erection of lub oil piping, jacking oil piping, Governing oil piping, Governing oil console, Oil tanks, oil pumps, oil purification units, coolers and other equipments, acid cleaning, oil flushing of pipelines	1.00%
	e) Erection of gland steam piping, drainage piping, cooling water piping, sealing lines etc	1.00%
	<b>SUB TOTAL - 8</b>	<b>7.00%</b>
<b>IV</b>	<b>CONDENSATE POLISHING UNIT (0.50%)</b>	
9.01	Erection of condensate polishing unit	0.50%
	<b>SUB TOTAL - 9</b>	
<b>V</b>	<b>ON LINE CONDENSER TUBE CLEANING SYSTEM (1.00%)</b>	
10.01	Erection of condenser on line Tube cleaning system	1.00%
	<b>SUB TOTAL - 10</b>	
<b>VI</b>	<b>CIRCULATING WATER PUMP - 4 Nos (6.00%)</b>	
11.01	Preparation of foundation and frame grouting	1.00%
11.02	Placement of pumps	2.00%
11.03	Placement of motor and alignment	2.00%
11.04	Installation of Butter fly valves	1.00%
	<b>SUB TOTAL - 11</b>	<b>6.00%</b>

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S N	DESCRIPTION	% TAGE
<b>VII</b>	<b>AUXILIARY COOLING WATER PUMP (3.00%)</b>	
12.01	Prerparation of foundation and frame grouting	0.75%
12.02	Placement of pumps	0.75%
12.03	Placement of motor and alignment	0.75%
12.04	Installation of Butter fly valves	0.75%
	<b>SUB TOTAL - 12</b>	<b>3.00%</b>
<b>VIII</b>	<b>CHEMICAL DOSING SYSTEM (0.50%)</b>	
13.01	Erection of chemical dosing system	0.50%
	<b>SUB TOTAL - 13</b>	
<b>IX</b>	<b>COMMISSIONING (6.00%)</b>	
14.01	Oil Flushing	1.00%
14.02	Barring Gear	1.00%
14.03	Commissioning of condensate system	1.00%
14.04	Commissioning of Feed water system	1.00%
14.05	Synchronisation	2.00%
	<b>SUBTOTAL - 14</b>	<b>6.00%</b>
	<b>GRAND TOTAL</b>	<b>100.00%</b>

**Note:** In this case time required to complete the indicated break up percentage is very long, construction manager may at his discretion further split up the above percentages to facilitate payment.

## **12.2 MEASUREMENT OF THE WORK COMPLETED**

### **A)**

PAYMENT IS TO BE MADE ON THE BASIS OF PERCENTAGE, THE PERCENTAGE GIVEN IN THE BHEL DOCUMENT ONLY SHALL BE TAKEN IN TO CONSIDERATION.

### **B)**

SPARES, SURPLUS QUANTITY, ERECTION CONTINGENCY MATERIALS WILL NOT BE PAID.

### **C)**

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.

### **D)**

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

### **E)**

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

### **F)**

NO PAYMENT WILL BE MADE FOR THE SPECIAL TOOLS OR TEST WEIGHTS ETC. USED FOR ERECTION & TESTING IN VARIOUS ACTIVITIES OF THIS WORK.



## **SECTION-13 SPECIAL CONDITIONS OF CONTRACT**

### **EXTRA CHARGES FOR MODIFICATION AND RECTIFICATION**

#### **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 CONTRACTOR'S OWN FAULT, 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 MAN-DAY 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.

#### **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**

BHEL MAY, AT THEIR ABSOLUTE DISCRETION, CONSIDER FOR PAYMENT, AS EXTRA ON MAN-DAY BASIS AS FOUND BY THEM AS JUSTIFIABLE FOR SUCH OF THOSE WORKS SPECIFIED IN CLAUSE NO. 13.1 WHICH REQUIRE MAJOR MODIFICATION / REPAIR / REWORK / RECTIFICATION ETC. IT MAY ALSO BE NOTED THAT ONLY THOSE WORKS WHICH ARE IDENTIFIED AS MAJOR AND WARRANT EXTRA PAYMENT AND CERTIFIED AS SUCH BY BHEL SITE ENGINEER, ACCEPTED BY THE DESIGNERS, AND / OR COMPETENT AUTHORITY OF BHEL WILL BE CONSIDERED FOR EXTRA PAYMENT.

**13.8**

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

**MAN-DAY RATE FOR ELIGIBLE EXTRA WORKS :**

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

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

**MAN HOUR RATE FOR ELIGIBLE EXTRA WORKS**

AVERAGE MAN-HOUR RATE INCLUDING OVERTIME IF ANY, AND OTHER SITE EXPENSES AND INCIDENTALS, INCLUDING SUPERVISION, CONSUMABLES, TOOLS AND TACKLES, WILL BE RS. 40/- (RUPEES FORTY ONLY) PER MAN-HOUR.

NO PAYMENT WILL BE MADE, IF AN ITEM OF WORK LASTS LESS THAN 100 MAN-HOURS.

## SECTION-14 (rev:01 dated 02/02/2009)

### SPECIAL CONDITIONS OF CONTRACT

#### INSURANCE

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

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

The contractor has to arrange on his own, insurance cover for all the T&P and other construction equipments deployed at site. Such assets are not covered in insurance policy taken by BHEL.

##### 14.3

It shall also be the responsibility of the contractor to arrange for accident risk policy/workmen compensation policy for the staff and workmen.

##### 14.4

The contractor has to provide assistance in lodging and realizing the insurance claims covered by the MCE insurance policy that is taken by BHEL. Scope shall include receipt inspection (shortage/damage/loss reporting) immediately on arrival of consignment, recording such damage/loss/shortage intimation on the LR/RR/LWB duly countersigned by the driver/transporter's representative while acknowledging receipt of consignment to the concerned transporter, intimating the loss/damage/shortage to BHEL, providing assistance for inspection of the reported consignment at the time of insurance survey, liaising with the transporter and insurance company etc.

##### 14.5

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 for every incidence of loss/damage.

##### 14.6

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.

**SECTION-15 (Rev dated 12/1/2009)**  
**SPECIAL CONDITION OF CONTRACT**

**15.0 EARNEST MONEY DEPOSIT, SECURITY DEPOSIT & BANK GUARANTEE**

**15.1 Earnest Money Deposit:**

- i) EMD for this tender is Rs. 2,00,000/- (Rupees 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
- BHARAT HEAVY ELECTRICALS LIMITED:PSWR:NAGPUR  
TENDER SPECIFICATION No. BHE/PW/PUR/UKT-STG/651

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 Hyderabad
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.

## PROPOSED PAINTING SCHEME FOR TG AREA

S N	AREA / DESCRIPTION	COLOUR	IS SPECIFICATION
1	A) HANGER SUPPORTS, B) PLATFORMS C) STAIR SIDE CHANNEL D) TG STRUCTURE, E) ELECTRIC HOIST & CHAIN PULLEY BLOCK STRUCTURE, F) FLOOR BEAMS. G) GALLERIES H) MANUAL DOORS	SMOKE GREY	SYNTHETIC ENAMEL AS PER IS:2932
2	A) FLOOR GRILLS, B) HANGERS, HANGER RODS C) SUSPENSION RODS, D) STAIR CASE STEP TREADS.	BLACK	SYNTHETIC ENAMEL AS PER IS:2932
3	A) TG LUB OIL PIPING	GOLDEN BROWN	SYNTHETIC ENAMEL AS PER IS:2932
4	A) COOLING WATER PIPING B) AUX COOLING WATER PIPING C) LP PIPING DRAINS D) CONDENSATE PIPING	SEA GREEN	SYNTHETIC ENAMEL AS PER IS:2932
5	A) HAND RAILS AND POSTS B) CHUTE PIPE C) LADDER D) ELECTRICAL AND MECHANICAL HOISTS E) MONORAIL BEAMS	GOLDEN YELLOW	SYNTHETIC ENAMEL AS PER IS:2932
6	TOE GUARD PLATE	POST OFFICE RED	SYNTHETIC ENAMEL AS PER IS:2932
7	A) SILENCERS FOR SAFETY VALVES B) INSTRUMENT TAPPING POINTS ON STEAM LINES	HEAT RESISTENT ALUMINIUM	IS13183 Gr-I
8	STEAM PIPING (BAND - EACH 5MTR)	POST OFFICE RED	SYNTHETIC ENAMEL AS PER IS:2932
9	EQUIPMENT(PUMPS, OIL COOLERS, EXHAUST FANS, HT & LT MOTORS, BFP HYD COUPLING, VALVES, ACTUATORS ETC) AND PANELS.	EXISTING MFG UNIT COLOUR	SYNTHETIC ENAMEL AS PER IS:2932
10	PANELS (TOUCH UP PAINTING)	EXISTING MFG UNIT COLOUR	SYNTHETIC ENAMEL AS PER IS:2933
11	A) CONDENSER AIR EVACUATION PIPING B) INSTRUMENT AIR PIPING C) SERVICE AIR PIPING	SKY BLUE	SYNTHETIC ENAMEL AS PER IS:2932
12	FIRE FIGHTING	FIRE RED	SYNTHETIC ENAMEL AS PER IS:2932
13	LP TURBINE	BOTTLE GREEN	SYNTHETIC ENAMEL AS PER IS:2932
14	GENERATOR	ORANGE	SYNTHETIC ENAMEL AS PER IS:2932
15	EXCITER	ORANGE	SYNTHETIC ENAMEL AS PER IS:2932
16	TG LUB OIL TANK AND PIPING	GOLDEN BROWN	SYNTHETIC ENAMEL AS PER IS:2932
17	CONDENSER	BOTTLE GREEN	SYNTHETIC ENAMEL AS PER IS:2932
18	LEGEND IN BLOCK LETTER OVER GOLDEN YELLOW BACKGROUND	BLACK	SYNTHETIC ENAMEL AS PER IS:2932

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC****UKAI TPS U-6:1x500MW**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
<b>(STEAM TURBINE)</b>				
1	75001	EMBEDMENT FOR ANCHOR POINTS	4400x1600x1000	4940
2	75003	COMPONENTS FOR BASE PLATE ASSEMBLY	4900x1200x600	6350
3	75004	COMPONENTS OF BASE PLATE	2800x1700x600	3700
4	75101	BASE PLATE FOR LP CASING	1850x1400x500	7200
5	75102	LP OUTER CASING PARTS	9000x2187x3460	15520
6	75103	LP OUTER CASING PARTS	9000x2187x3460	15520
7	75104	LP OUTER CASING PARTS	5670x3290x1140	4600
8	75105	LP OUTER CASING PARTS	5670x3290x1140	4600
9	75106	LP OUTER CASING PARTS	3400x1200x1200	1255
10	75107	LP LONGITUDINAL GIRDER (LEFT)	8200x1680x1950	21412
11	75108	LP LONGITUDINAL GIRDER (RIGHT)	8200x1680x1950	21412
12	75109	LP FRONT WALL (TS)	8760x3850x1150	18300
13	75110	LP FRONT WALL (GS)	8760x3850x1150	18300
14	75111	LP SHAFT SEALING (FRONT) LP SHAFT SEALING (FRONT)	1800x170x740	2300
15	75112	LP SHAFT SEALING (REAR)	1800x170x740	2300
16	75113	LP SHAFT SEAL COMPENSATOR (TS)	1500x1500x650	350
17	75114	LP SHAFT SEAL COMPENSATOR (GS)	1500x1500x650	350
18	75115	AUXILIARIES OF LP TURBINE	2300x1200x900	2340
19	75201	HP/IP BRG.PED.ASSLY.	4080x2005x2126	13275
20	75202	HP/IP BRG.PED.PARTS	1000x600x600	400
21	75301	ASSEMBLY DEVICES	1000x750x750	300
22	75302	INSPECTION SHAFT FOR IPC	4050x600x900	1430
23	75304	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	3800x2500x1300	6860
24	75305	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	2300x2100x900	1800
25	75306	COMPONENTS OF ASSLY FIXTURE FOR HPT	3300x1800x1300	3350
26	75307	COMPONENTS FOR ASSLY FIXTURE FOR HPT	5450x4050x400	3400
27	75308	AUXILIARIES OF LP TURBINE	3750x1000x1000	1680
28	75309	AUXILIARIES OF LP TURBINE	2000x1000x1550	890
29	75310	AUXILIARIES OF LP TURBINE	2000x1000x1550	890
30	75311	ASSEMBLY TOOLS	1700x800x400	1020
31	75312	AUXILIARIES OF IP TURBINE	1200x500x550	260
32	75313	AUXILIARIES OF IP TURBINE	1100x500x650	210
33	75314	AUXILIARIES OF IP TURBINE	1100x500x650	210
34	75315	BOLT HEATING EQUIPMENT AND BREECH NUT HEATING DEVICE	1700x900x700	150



**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
35	75316	GROMMET SLINGS	1700x1700x300	3910
36	75318	OIL FLUSHING AND PRESSURE TEST DEVICE	750x550x400	900
37	75319	STEAM BLOWING & HYDRAULIC TEST DEVICES	2900x2100x1200	4650
38	75320	TOOLS FOR GOV.SYST.&VALVES	1750x1200x1000	1500
39	75321	VALVE SUPPORT FOR HPT OVERHALL	1500x750x750	905
40	75401	IP-LP BEARING PEDESTAL ASSLY	3700x1860x2100	14500
41	75501	LP/GEN. PEDESTAL ASSEMBLY	3200x2280x2070	9370
42	75502	BEARING PEDESTAL (PARTS)	1600x800x600	1150
43	75601/1	FRONT BEARING PEDESTAL	3140x3140x2050	12386
44	75601/2	HYDRAULIC TURNING GEAR	2100x1000x600	750
45	75601/3	MAIN OIL PUMP ASSEMBLY.	1400x1200x600	550
46	75704/1	LP CASING ASSEMBLY	1900x1200x600	3000
47	75704/2	PARTS OF LP OUTER CASING ASSLY	500x500x400	120
48	75705	LP EXTRACTION A1	4400x1620x870	1820
49	75706	LP EXTRACTION A1	4400x1620x850	1814
50	75707/1	LP EXTRACTION A1	3420x1620x870	1286
51	75707/2	LP EXTRACTION A1	950x750x750	330
52	75708	LP EXTRACTION A2	2920x2120x1370	1730
53	75709	LP EXTRACTION A2	3420x1220x1120	1350
54	75710	LP EXTRACTION A3	1920x1120x920	655
55	75711	LP EXTRACTION A3	3120x920x870	1050
56	75716	LP EXTRACTION PIPE SHEATHING	2900x2050x1180	2650
57	75717	INNER GUIDE PLATE OF DIFFUSER (TS)	2300x2300x500	1850
58	75718	DIFFUSER (TS)	5050x1800x2550	6800
59	75719	DIFFUSER (GS)	5050x1800x2550	6800
60	75720	LP INNER OUTER CASING (U/H)	8640x3650x2550	36100
61	75721	LP INNER CASING (L/H)	9100x3890x3180	54540
62	75722	LP INNER INNER CASING (U/H)	4600x1900x2350	13300
63	75723	LP CASING ASSEMBLY	5000x2500x800	5910
64	75724	LP INNER CASING ASSLY/FASTENER	2000x1000x600	2050
65	75725	INNER GUIDE PLATE OF DIFFUSER (GS)	2300x2300x500	1700
66	75728	STEAM INLET PIPE (LPT)	3200x1500x1500	1700
67	75801	LP ROTOR	8800x4000x4162	95240
68	75901	IP ROTOR	4800x2120x1995	23132
69	75902	IP OUTER CASING (U/H)	4050x3800x2650	25850
70	75903	IP OUTER CASING (L/H)	3400x5250x2600	25870
71	75904	IP INNER CASING (U/H)	2900x3200x1850	15200
72	75905	IP INNER CASING (L/H)	2900x3200x1851	15200
73	75906	IP INLET ASSEMBLY	4500x3725x1300	13550
74	75907	IP SHAFT SEALING	1400x1200x900	950
75	75908	IP TURBINE (PARTS)	2000x1900x1000	3125
76	75909	I.P. TURBINE PARTS	1000x1000x750	475

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
77	76001/1	HP TURBINE	5675x3400x2900	88650
78	76001/2	EMERGENCY GOVERNOR	495x395x695	57
79	76002	HP INLET ASSLY. & HP EXHAUST ASSLY. (PARTS)	1200x1200x500	80
80	76003	HP EXHAUST ASSEMBLY	1650x1400x900	2000
81	76004	HPT RELATED PARTS	1300x1300x700	200
82	76104	ESV & CV CASING WITH VALVES	3360x3360x2590	23146
83	76105/1	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x1200x1200	4250
84	76105/2	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x1200x1200	4250
85	76107	HP CONTROL VALVE SERVOMOTOR	2800x1200x2100	3280
86	76108	ESV & CV CASING WITH VALVES	3360x3360x2590	23146
87	76112	HP CONTROL VALVE SERVOMOTOR	2800x1200x2100	3288
88	76201	HP CONTROL VALVE SERVOMOTOR	2800x1200x2100	3288
89	76202	IV & CV CASING WITH VALVES	5040x4690x2770	33276
90	76203/1	IV SERVOMOTOR WITH LIMIT SW. MOUNTINGS	2700x1450x1400	3965
91	76203/2	IV SERVOMOTOR WITH LIMIT SW. MOUNTINGS	2700x1450x1400	3965
92	76204	IP CONTROL VALVE SERVOMOTOR	3240x1240x1950	3019
93	76205/1	FRAME FOR SUSPENSION (IV)	3400x3150x750	2026
94	76205/2	FRAME FOR SUSPENSION (IV)	3400x3150x750	2026
95	76205/3	LOOSE ITEMS FOR FRAME FOR SUSPENSION(IV)	300x200x200	20
96	76206	IV & CV CASING WITH VALVES	5040x4690x2770	33276
97	76210	IP CONTROL VALVE SERVOMOTOR	3240x1240x1950	3003
98	76301/1	SUSPENSION OF LPBP VALVE	3600x1700x800	1836
99	76301/2	SUSPENSION OF LPBP VALVE	3600x1700x800	1836
100	76402	INJECTOR FOR SUC. PIPE NB 350	3300x800x800	588
101	76403	INJECTOR FOR SUC. PIPE NB 300	3300x1750x1200	999
102	76404	MAIN OIL TANK & NOZZLE ARRGT. ASSY.	6180x3260x2650	10697
103	76405	MAIN OIL TANK & NOZZLE ARRGT. ASSY.	4200x1200x900	402
104	76406	OIL STRAINERS	1500x1000x1200	228
105	76407	OIL STRAINERS	1500x1000x1200	228
106	76409	OIL STRAINERS	2050x1200x1410	470
107	76412	DIRTY/LEAKAGE OIL TANK	1000x1000x3000	515
108	76413	WASTE OIL TANK	1000x1000x3000	515
109	76414	VAR.ORIFICES THR.VALV.&FLUSH.P ARTS	1700x700x760	255
110	76415	VARIABLE ORIFICE 125	400x300x200	50
111	76601	CROSS AROUND PIPE (PARTS)	3500x1750x1800	2150
112	76602	CROSS AROUND PIPE (PARTS)	3500x1750x1800	2150
113	76603	COMPENSATOR ASSEMBLY (CAP)	1900x1950x1750	3190
114	76604	COMPENSATOR ASSEMBLY (CAP)	1900x1950x1750	3190
115	76605	COMPENSATOR ASSEMBLY (CAP)	1900x1950x1750	3190

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
116	76606	COMPENSATOR ASSEMBLY (CAP)	1900x1950x1750	3190
117	76607	COMPENSATOR ASSEMBLY (CAP)	1900x1950x1750	3270
118	76608	COMPENSATOR ASSEMBLY (CAP)	1900x1950x1750	3270
119	76609	REDUCER ASSEMBLY (CAP)	1250x1250x500	242
120	76610	REDUCER ASSEMBLY (CAP)	1250x1250x500	242
121	76611	CROSS AROUND PIPE (PARTS)	2000x1150x600	2030
122	76612	CROSS AROUND PIPE (PARTS)	2000x1150x600	2030
123	76613	MITRE BEND ASSEMBLY (CAP)	3640x1540x2040	2240
124	76614	MITRE BEND ASSEMBLY (CAP)	3640x1540x2040	2240
125	76701	CHANGE OVER VALVE	800x500x200	97
126	76702/1	CRH NRV WITH SERVOMOTOR	3200x2300x2600	10528
127	76702/2	STEAM BLOWING DEV.FOR NRV CRH LINE	2500x1600x1200	5600
128	76703/1	GLAND STEAM PRESSURE INDICATOR	300x250x200	10
129	76801	RATING,COLLABORATION&COMPANY'S MONOGRAM PLATE	850x550x200	55
130	76901	OIL STRIPPER	600x600x850	133
131	76902	OIL STRIPPER	600x600x850	133
132	76903	HOUSING FOR M.S STRAINER	1725x1250x730	2370
133	76904	HOUSING FOR M.S STRAINER	1725x1250x730	2370
134	76908	HOUSING FOR HRH STEAM STRAINER	2275x1650x1100	4480
135	76909	HOUSING FOR HRH STEAM STRAINER	2275x1650x1101	4480
136	76912/1	BLANKING ARRANGEMENT FOR MS STRAINER HOUSINGS	1000x900x800	948
137	76912/2	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSINGS	1600x1200x1000	2535
138	76913	GASKETS FOR MS & HRH STRAINER HOUSINGS	1000x1000x600	37
139	76914	COMPENSATOR	600x600x900	50
140	76915	ASSY. & DISASSY. DEVICES FOR MS & HRH STEAM STRAINERS	2140x1400x500	564
141	76917	STEAM STRAINER (MS)	1200x900x500	350
142	76918	STEAM STRAINER (HRH)	1800x1500x800	750
143	77001	GOV.SYSTEM CONTROL RACK ASSLY. & TRANSPORT DEVICE	2800x1360x2750	1847
144	77002	SUPPLY RACK HP VALVE-2 (RIGHT)	2300x1400x2550	1797
145	77003	SUPPLY RACK HP VALVE-1 (LEFT)	2300x1400x2550	1797
146	77004	SUPPLY RACK FOR IP VALVES 1 & 2	2300x1400x2550	2080
147	77006	GOVERNING SYSTEM PROTECTION RACK & TRANSPORT DEVICE	2450x1300x2250	1622
148	77201	TURBINE INSTRUMENTS RACKS (FRAMES)	2750x1500x800	2600
149	77202		1700x750x750	750
150	77203	IMPLUSE PIPES (CARBON STEEL)	6900x650x500	1225
151	77204	GAUGES AND SENSORS	2800x1250x1250	1035
152	77205	TRANSMITTERS & J.B.OF BEARINGS	500x300x200	118
153	77206	IMPULSE PIPES (ALLOY STEEL AND S.S.)	6900x500x500	1136

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
<b>(GENERATOR)</b>				
154	501	STATOR	8830x4100x4120	275000
155	502	ROTOR WITH TOOLS AND TACKLES	14000x1850x1750	73159
156	503	END SHIELD LOWER HALF (TE)	6000x2296x2640	31473
157	504	END SHIELD UPPER HALF (TE)	6000x2296x2640	28747
158	505	END SHIELD LOWER HALF (EE)	4700x1500x2420	12847
159	506	GENERATOR BEARING (2 NOS.).	1250x1150x1250	3006
160	508	BAFFLE RING,BAFFLE RING CARRIER & AIR GAP SEAL ASSLY	1682x1688x1095	347
161	509	TERMINAL BUSHING (6 NOS.)	2200x1830x610	1427
162	510	TERMINAL BUSHING BOX WITH COVER	3600x2500x1940	11580
163	511	SHAFT SEALS (EE & TE) AND OIL CATCHER (INNER & OUTER)	2140x1140x840	1560
164	512	COMPRESSOR BAFFLE RING ASSLY.	1920x1920x1340	1745
165	515	GENERATOR END SHIELD BASE EE & TE (2 NOS. EACH)	1940x1550x980	3464
166	516	PRIMARY WATER TANK	8100x2000x1200	2000
167	517	P.W.TANK PIPE LINES	6800x2100x500	818
168	518	FOUNDATION PLATES	2895x760x840	3030
169	519	ANCHOR BOLTS	2740x655x600	1485
170	520	CHANNELS,ANGLES,PIPES & STUDS	5800x1120x520	1558
171	521	ROTOR & GENERAL ASSY.DEVICES	2460x1170x1240	2952
172	524	WIRE ROPE FOR ROTOR (2 NO.)	1800x1800x400	289
173	530	GENERATOR ACCESSORIES	2140x2140x1240	1608
174	530/1	GENERATOR ACCESSORIES	1350x850x300	472
175	531	GENERATOR ACCESSORIES	2240x940x1220	1525
176	532/1	DRY AIR BLOWER	1100x1000x700	80
177	532/2	GENERATOR MAINTENANCE DEVICES	2550x1180x1140	1405
178	533	ERECTION DEVICES/FOUND TN ITEMS	1640x1140x1240	2781
179	534	BRUSHLESS EXCITER SET WITH COVERS	5750x2350x3400	32928
180	535	BRUSHLESS EXCITER FRONT COVER WITH PACKING	4400x3400x3100	4478
181	536	BRUSHLESS EXCITER REAR COVER WITH PACKING	4400x3400x3100	4978
182	537	EXCITER BED PLATE ACCESSORIES & RACK ASSEMBLY	3900x1250x1150	1741
183	539	SEAL OIL STORAGE TANK	3700x1400x1260	1532
184	540	PW PUMP AND FILTER UNIT	3450x2750x2815	5294
185	541	INSTRUMENT RACK	785x1850x1815	875
186	542	SEAL OIL MOTOR PUMP UNIT	3610x2040x2350	3235
187	543	SEAL OIL UNIT	3550x2900x3700	9160
188	545	GAS UNIT	1980x1640x2420	1205
189	547	CO2 VAPOURISER	1520x840x840	250
190	548	LIQUID DETECTOR RACK	500x2430x1550	673
191	549	EXCITER BED PLATE ACCESSORIES (NON TEST BED)	5800x1140x1240	2925
192	550	EXCITER ACCESSORIES	2200x1100x1000	1111
193	551	END SHIELD UPPER HALF (EE)	4700x1500x2420	9353
194	556	P.W.TANK PIPE LINES	3000x600x500	454
195	557	SPECIAL TOOLS & TACKLES	800x700x300	87

BHARAT HEAVY ELECTRICALS LIMITED:PSWR:NAGPUR  
TENDER SPECIFICATION No. BHE/PW/PUR/UKT-STG/651

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
196	558	EMBEDMENTS	800x800x300	928
197	559	SEALING FOR TRANSPORT	3950x2420x150	869
198	561	SEAL RING	700x700x200	80
199	562	CONNECTION PIECE ASSEMBLY	1600x1050x400	862
200	563	GENERATOR ACCESSORIES	1700x1200x250	140
201	564	COOLER AIR VENT ASSEMBLY	8300x150x100	51
202	565	H2 DISTRIBUTOR	3480x1540x440	333
203	566	CO2 DISTRIBUTOR	4860x1240x440	353
204	567	N2 DISTRIBUTOR	1400x1240x440	143
205	568	TG SYSTEM INTEGRAL PIPING (HANGER & SUPPORTS)	6200x1500x1200	3410
206	569	TG SYSTEM INTEGRAL PIPING (FITTINGS)	3500x1700x1000	2576
207	570	TG SYSTEM INTEGRAL PIPING (STRAIGHT PIPES)	7000x1000x1300	5570
208	571	TG SYSTEM INTEGRAL PIPING (STRAIGHT PIPES)	6600x1500x2000	9380
209	572	TG SYSTEM INTEGRAL PIPING (FLANGES)	3500x1700x300	2576
210	573	TG SYSTEM INTEGRAL PIPING (HANGER & SUPPORTS)	2500x1200x1000	1555
211	574	TG SYSTEM INTEGRAL PIPING (VALVES)	2750x1400x1400	3799
212	575	TG SYSTEM INTEGRAL PIPING (INSTRUMENTS)	1000x940x900	177
213	576	TG SYSTEM INTEGRAL PIPING (FASTENERS & SEALINGS)	1000x1000x500	630
214	577	EXCTR. BED PLATE ACCESSORIES (NON TEST BED ITEMS)	1000x800x800	775
215	578	RESINS	1200x600x600	100
216	580	EMBEDMENTS FOR PORTAL CRANE	1400x1000x400	1651
217	581	ALKALYSER UNIT	1150x780x1900	267
218	582	PLATFORM FOR P W TANK	5000x1000x500	852
219	583	TG SYSTEM INTEGRAL PIPING (STRAIGHT PIPES)	7000x400x300	230
220	584	RR WHEEL AIR GUIDE COVER	2800x1500x2000	1572
221	585	CONSUMABLES	800x400x200	55

**CONDENSOR**

222	78001	HOTWELL(FRONT HALF)	7300x3300x1800	7005
223	78002	HOT WELL(REAR HALF)	7560x3300x1850	7527
224	78004	BOTTOM PLATE(FRONT/REAR PART)	8760x3555x725	8177
225	78005	BOTTOM PLATE(FRONT/REAR PART)	8760x3560x725	8177
226	78006	BOTTOM PLATE(MIDDLE PART)	8760x3850x675	8364
227	78007	BOTTOM PLATE(MIDDLE PART)	8760x3850x625	8364
228	78010	LOOSE ITEMS(BOTTOM PLATE)	2485x780x180	492
229	78012	SPRING ELEMENT(CONDENSER SUPPORT)	1970x1320x1320	6780
230	78013	SPRING ELEMENT(CONDENSER SUPPORT)	1970x1320x1320	6780
231	78014	SPRING ELEMENT(CONDENSER SUPPORT)	1970x1320x1320	6780
232	78018	LOOSE ITEMS(CONDENSER SUPPORT)	1920x1000x660	4094
233	78019	LOOSE ITEM(CONDENSER SUPPORT)	1600x1100x600	4584
234	78020	FRONT WATER CHAMBER(GEN.SIDE)	7050x4470x540	9900
235	78022	FRONT WATER BOX(GEN.SIDE)	7645x4460x2640	28300

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
236	78023	FRONT WATER CHAMBER(TUR.SIDE)	7050x4470x540	9900
237	78025	FRONT WATER BOX(TUR.SIDE)	7645x4460x2640	28300
238	78026	REAR WATER CHAMBER(GEN.SIDE)	7050x4470x540	9900
239	78028	REAR WATER BOX (GEN.SIDE)	6655x4460x2495	28300
240	78029	REAR WATER CHAMBER(TUR.SIDE)	7050x4470x540	9900
241	78031	REAR WATER BOX (TUR.SIDE)	6655x4460x2495	21560
242	78032	PLATES(SIDE WALL-TUR.SIDE)	6925x2470x120	15804
243	78038	LOOSE ITEMS(SIDE WALL-TUR.SIDE )	7800x330x230	1100
244	78040	PLATES(SIDE WALL-GEN.SIDE)	6925x2470x120	15804
245	78046	LOOSE ITEMS(SIDE WALL-GEN.SIDE )	7800x330x230	1100
246	78048	RODS(SHELL INTERNALS)	3530x900x270	4376
247	78049	RODS(SHELL INTERNALS)	3530x900x270	4376
248	78050	RODS(SHELL INTERNALS)	3530x900x270	4376
249	78051	RODS(SHELL INTERNALS)	3530x900x270	4376
250	78052	RODS(SHELL INTERNALS)	3530x900x270	4376
251	78053	RODS(SHELL INTERNALS)	3530x900x270	4376
252	78054	RODS(SHELL INTERNALS)	3530x900x270	4376
253	78055	RODS(SHELL INTERNALS)	3530x900x270	4376
254	78056	RODS(SHELL INTERNALS)	3630x590x380	4705
255	78057	RODS(SHELL INTERNALS)	1000x680x390	1421
256	78058	AIR EXTRACTION PIPE	7100x900x560	2452
257	78059	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
258	78060	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
259	78061	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
260	78062	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
261	78063	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
262	78064	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
263	78065	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
264	78066	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
265	78067	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
266	78069	LOOSE ITEMS(SHELL INTERNALS)	2190x970x775	6823
267	78070	LOOSE ITEMS(SHELL INTERNALS)	6200x900x570	5915
268	78071	LOOSE ITEMS(SHELL INTERNALS)	1920x1000x660	1820
269	78076	LOWER DOME WALL(TUR.SIDE)- LOWER PART	13150x4050x550	9894
270	78077	LOWER DOME WALL(TUR.END)-UPPER PART	10520x2140x1130	4000
271	78078	LOOSE ITEMS(LOWER DOME WALL-TUR.SIDE)	4900x900x500	773
272	78104	LOWER DOME WALL(GEN.SIDE)- LOWER PART	13150x4050x930	10450
273	78105	LOWER DOME WALL(GEN.SIDE)- UPPER PART	10520x2140x1080	3700
274	78106	LOOSE ITEMS(LOWER DOME WALL-GEN.SIDE)	4900x1400x900	1180
275	78110	LOWER DOME WALL(FWB SIDE)- LOWER PART	9150x4600x870	8365
276	78111	LOWER DOME WALL(FWB SIDE)- UPPER PART	7850x2300x920	3450
277	78112	LOWER DOME WALL(FWB SIDE)- LOOSE ITEMS	1650x1100x1100	808

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
278	78116	LOWER DOME WALL(RWB SIDE)- LOWER PART	9140x4430x1530	9300
279	78117	LOWER DOME WALL(RWB SIDE)- UPPER PART	7850x2320x520	3677
280	78118	LOOSE ITEMS(LOWER DOME WALL- RWB SIDE)	1800x1800x1500	1116
281	78121	PIPES(DOME INTERNAL STIFFENING)	1840x1350x1535	3895
282	78122	PIPES(DOME INTERNAL STIFFENING )	2176x1500x1285	4940
283	78123	PIPES(DOME INTERNAL STIFFENING )	2766x1500x1120	6300
284	78124	PIPES(DOME INTERNAL STIFFENING )	5250x2270x220	1963
285	78125	PIPES(DOME INTERNAL STIFFENING )	1470x750x850	2930
286	78126	PIPES(DOME INTERNAL STIFFENING )	5250x2270x220	1963
287	78129	LOOSE ITEMS(LP HEATER SUPPORTS)	2250x1700x1070	2965
288	78130	LOOSE ITEMS(LP HEATER SUPPORTS )	7125x1125x580	3665
289	78132	UPPER DOME WALL (TUR.SIDE)	8700x1600x296	2628
290	78133	UPPER DOME WALL(GEN.SIDE)	8700x1600x296	2628
291	78136	UPPER DOME WALL (FWB SIDE)	7180x3000x300	5410
292	78137	LOOSE ITEMS(UPPER DOME WALL- FWB SIDE)	3600x550x200	731
293	78139	UPPER DOME WALL(RWB SIDE)	7180x3000x450	5754
294	78140	LOOSE ITEMS(UPPER DOME WALL- RWB SIDE)	3600x550x200	731
295	78154	STEAM THROW DEVICE	1850x1040x860	2120
296	78155	STEAM THROW DEVICE	1850x1040x860	2120
297	78157	LOOSE ITEMS(CONDENSER)	4500x1000x1000	1955
298	78158	LOOSE ITEMS(CONDENSER)	800x600x500	103
299	78159	FASTENERS(CONDENSER)	1200x1100x350	2737
300	78162	TOOLS & TACKLES(CONDENSER)	300x350x500	45
301	78166	STAND PIPE NO.1(CONDENSER)	3500x600x600	69
302	78167	LOOSE ITEMS(STAND PIPE NO.1&2- CONDENSER)	3650x550x300	375
303	78169	STAND PIPE NO.2(CONDENSER)	3500x600x600	69
304	78175	INSTRUMENTATION-NON FRAGILE (CONDENSER)	1500x1300x700	733
305	78176	INSTRUMENTATION-FRAGILE (CONDENSER)	1500x600x600	252
306	78301	GLAND STEAM CONDENSER	1750x1200x1700	1610
307	78304	LOOSE ITEMS OF GSC	700x300x200	60
308	78305	LOOSE ITEMS OF GSC (FRAGILE)	600x500x350	35
309	78315	LP.HEATER NO.1	13000x2100x2000	21100

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>S No</b>	<b>Pkg. No</b>	<b>Short Description</b>	<b>Pkg. Size</b>	<b>Gross Wt</b>
310	78316	STAND PIPE(LPH NO.1)	2600x350x350	55
311	78317	LOOSE ITEMS(LPH NO.1)	500x400x400	135
312	78318	LOOSE ITEMS-FRAGILE(INSTRUMENTATION,LPH NO.1)	700x400x400	85
313	78319	LOOSE ITEMS(INSTRUMENTATION, LPH NO.1)	2100x500x400	170
314	78320	TROLLEY FOR LP HEATER NO.1	1350x800x200	200
315	78401	TURBINE OIL COOLER	5850x1700x2300	13250
316	78402	TURBINE OIL COOLER	5850x1700x2300	13250
317	78406	LOOSE ITEMS(TOC)	800x800x500	130
318	78424	HYDROGEN COOLER	4600x1450x800	2665
319	78425	HYDROGEN COOLER	4600x1450x800	2665
320	78426	HYDROGEN COOLER	4600x1450x800	2665
321	78427	HYDROGEN COOLER	4600x1450x800	2665
322	78428	LOOSE ITEMS (HYDROGEN COOLERS)	1300x1000x600	2140
323	78431	EXCITER AIR COOLER	3780x920x830	1980
324	78432	EXCITER AIR COOLER	3780x920x830	1980
325	78436	CONTROL FLUID COOLER	3300x850x1030	1506
326	78437	CONTROL FLUID COOLER	3300x850x1030	1506
327	78438	LOOSE ITEMS(CFC)	600x600x500	103

**BOI**

328	10001	STARTER CABINET FOR DC S.OIL STARTER CABINET FOR DC S.OIL	1230x1060x2550	675
329	10002	GEN INSTRUMENTATION CABINET GEN INSTRUMENTATION CABINET	1230x1060x2550	675
330	10003	LOOSE INSTRUMENTS	600x600x400	65
331	10004	LOOSE INSTRUMENTS	1000x800x400	76
332	10005	STARTER CABINET FOR DC JOP STARTER CABINET FOR DC JOP	1230x1060x2550	675
333	10006	STARTER CABINET FOR DC EOP STARTER CABINET FOR DC EOP	1230x1060x2550	675



**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

SL	PKG.NO	DESCRIPTION	PKG.SIZE(MM)	GR.WT IN KG.
1	12002	GENERATOR INSTRUMENTATION	1230x 1060x 2550	550
2	12003	LOOSE ITEMS	600x 600x 400	60
3	12004	LOOSE ITEMS	600x 600x 400	60
4	12005	STARTER CABINET FOR DC JACKING	1230x 1060x 2550	550
5	12006	STARTER CABINET FOR DC	1230x 1060x 2550	550
<b>SUB TOTAL D</b>				<b>2220.00</b>
			<b>TOTAL(A+B+C+D)</b>	<b>2097890.60</b>

**PUMPS, DEARATOR, COOLER, H.P. HEATERS AND DRIVE TURBINE FROM HYD.**

SL	ITEM DESCRIPTION	TOTAL QTY.	UNIT WT. IN KG	TOTAL WT. KG.
<b>A:</b>	<b>BOOSTER PUMPS</b>			
1	BOOSTER PUMPS (MD+TDA+TDB)	3	5710	17130
2	B.P. SKIDS	3	1000	3000
	LOOSE ITEMS			115
			<b>SUB TOTAL A</b>	<b>20245</b>
<b>B:</b>	<b>BOILER FEED PUMPS</b>			
1	BOILER FEED PUMP(MD+TDA+TDB)	3	11500	34500
2	GRILLAGE ASSLY. (BP+MOTOR)	1	3710	3710
3	GRILLAGE ASSY. (BPF+HC)	1	3800	3800
4	BFP SKIDS	3	1000	3000
5	HYDRAULIC COUPLING	1	15000	15000
6	R.C. VALVES	3	900	2700
7	CONICAL TYPE SUCTION STRAINER	3	1200	3600
8	BASKET TYPE SUCTION STRAINER	3	2350	7050
9	PORTABLE OIL CENRIFUSE	1	1000	1000
10	LOCAL GUAGE BOARD	3	1000	3000
11	CONNECTING COUPLING (BFP AND HC)	1	80	80
12	CONNECTING COUPLING (MOTOR AND HC)	1	357	357
13	CONNECTING COUPLING (BP AND MOTOR)	1	31	31
14	LOCAL INSTRUMENT RACK	1	200	200
15	LOCAL GUAGE BOARD	3	1050	3150
16	LOCAL GUAGE BOARD	3	850	2550
17	HYDRAULIC COUPLING WORKING OIL	1	8820	8820
18	LOOSE ITEMS			9800
			<b>SUB TOTAL B</b>	<b>102348</b>
<b>C:</b>	<b>CONDENSATE EXTRACTION PUMPS</b>			
1	CONDENSATE EXTRACTION PUMP(A, B, C)	3	6220	18660
2	CEP CANISTERS ASSLY	3	2910	8730
3	SUCTION STRAINER SIMPLEX	3	1500	4500
4	CONNECTING COUPLING FOR CEP	3	50	150
5	LOCAL INSTRUMENT RACK	1	250	250
6	LOCAL GUAGE BOARD	1	400	400
7	LOCAL GUAGE BOARD	1	1000	1000
8	LOOSE ITEMS			4350
			<b>SUB TOTAL C</b>	<b>38040</b>
<b>D:</b>	<b>DRAIN COOLER</b>			
1	DRAIN COOLER ASSLY	1	5400	5400
2	LOOSE ITEMS			143
			<b>SUB TOTAL D</b>	<b>5543</b>

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

SL	ITEM DESCRIPTION	TOTAL QTY.	UNIT WT. IN KG	TOTAL WT. KG.
<b>E:</b>	<b>DEAERATOR</b>			
1	DEAERATOR STORAGE TANK SECTION -I	1	30280	30280
2	DEAERATOR STORAGE TANK SECTION -II	1	25388	25388
3	DEAERATOR STORAGE TANK SECTION -III	1	31897	31897
4	HEADER ASSLY	1	28532	28532
5	LOOSE ITEMS			23130
			<b>SUB TOTAL E</b>	<b>139227</b>
<b>F:</b>	<b>L.P. HEATERS</b>			
1	L.P. HEATER 2	1	26000	26000
2	L.P. HEATER 3	1	18000	18000
3	LOOSE ITEMS			1784
			<b>SUB TOTAL F</b>	<b>45784</b>
<b>G:</b>	<b>H.P.HEATERS</b>			
1	H.P.HEATER 5A	1	44500	44500
2	H.P.HEATERS 6A	1	54000	54000
3	H.P.HEATERS 5B	1	44500	44500
4	H.P.HEATERS 6B	1	54000	54000
5	LOOSE ITEMS			5186
			<b>SUB TOTAL G</b>	<b>202186</b>
<b>H</b>	<b>CW PUMPS</b>			
	CW PUMP-A WITH ACCESSORIES	1	36000	36000
	CW PUMP-B WITH ACCESSORIES	1	31000	31000
	CW PUMP-C WITH ACCESSORIES	1	31000	31000
			<b>SUBTOTAL H</b>	<b>98000</b>
<b>J</b>	<b>DRIVE TURBINE</b>			
1	TWIN OIL COOLER(BFP AND DT)	2	5700	11400
2	DC STARTER CUIBICAL	2	2000	4000
3	ASSEMBLED DRIVE TURBINE	2	14560	29120
4	GEAR BOX	2	1000	2000
5	LUBE OIL CONSOLE ASSEMBLY 1	2	9011	18022
6	LUBE OIL CONSOLE ASSEMBLY 2	2	65818	131636
7	EMERGENCY OIL PUMP	2	1700	3400
8	THERMAL INSULATION	2	800	1600
9	JACKING OIL PUMP	2	175	350
10	TURBINE OIL PURIFICATION UNIT	2	1500	3000
11	OIL ACCUMULATOR	2	30	60
12	CHARGING KIT	2	10	20
13	CENTRIFUGAL EXHAUST FAN	4	150	600
14	TRANSFER OIL PUMP	2	350	700
15	SERO PRIME-46 OIL	2	21000	42000
16	ACCOUSTICS ENCLOSURE	2	3000	6000
17	URBINE BLADED ROTOR	1		0
18	LOOSE ITEMS			41126
			<b>SUB TOTAL J</b>	<b>295034</b>
<b>SUM TOTAL(A+B+C+D+E+F+G+H+J)</b>				<b>946407</b>

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC****SUPPLY FROM BHOPAL**

SL	ITEM DESCRIPTION	TOTAL QTY	SIZE (MM)	UNIT WT KG	TOTAL WTKG
<b>(A)</b>	<b>RE JOINTS</b>	1 Set			
1)	2200 Dia Pressure Balance type				78004
	i) Mitred bends,	2 Inlet Assy. +		} 78004	
	Pipe assembly, Loose flange, Blank flange - 4 Nos each	2 Outlet Assy			
	ii) Tie roads 12 Nos	12			
	iii) Bellows – 8 Nos	8			
	iv) Spring support – 1set	1 Set			
	v) Hard ware – 1set	1 Set			
2)	1600 Dia ordinary Type for CWP Pump discharge	4		1850	7400
3)	800 Dia NB ordinary Type for ACW pump discharge	3		525	1575
				<b>SUB TOTAL A</b>	<b>86979</b>
<b>(B)</b>	<b>FLASH TANKS</b>	5 NOS			
1)	HP DRAIN FT	1	3000-OD; 5500L	8150	8150
2)	LP DRAIN FT	1	2500 OD; 5190 L	6300	6300
3)	STEAM DRAIN FT	1	2200 OD; 3400L	3650	3650
4)	UNIT FT	1	1200 OD; 1800L	1700	1700
5)	FEED WATER SAFETY VALVE FT	1	1200 OD; 2800L	1650	1650
				<b>SUB TOTAL B</b>	<b>21450</b>
<b>(C)</b>	<b>MISC TANKS</b>				
1)	CLEAN OIL TANK	1	6100L 3500W 4500H	9500	9500
2)	DIRTY OIL TANK	1	6100L 3500W 4500H	9500	9500
3)	OIL UNLOADING TANK	1	2300L 1200W 800H	550	550
				<b>SUB TOTAL C</b>	<b>19550</b>
<b>(D)</b>	<b>BUTTERFLY VALVES</b>	Total 14 Nos.			
1	2200 DIA (ELE)	4	2530L 3000W 1110H	9353	37412
2	1600 DIA (HYD)	4	1830L 2320W 518H	5185	20740
3	Power Pack for 1600 DIA (HYD) BF Valve	4	1050L 1050W 1675H	800	3200
4	Control Panel for 1600 DIA (HYD) Valve	4	300L 700W 900H	95	380
5	800 DIA (ELE)	3	1030L 1250W 415H	1360	4080
6	700 DIA (MAN)	2	930L 1160W 405H	1130	2260
7	450 DIA (MAN)	1	635L 800W 290H	387	387
				<b>SUB TOTAL D</b>	<b>68459</b>
<b>(E)</b>	<b>MOTORS</b>				
	<b>BFP is 11 KV</b>				
	<b>Balance Motors 6.6 KV</b>				
SL	ITEM DESCRIPTION	TOTAL QTY	SIZE (MM)	UNIT WT KG	TOTAL WTKG
5	*900 KW CEP 4 P	3	2700 2200 1700	5750	17250
6	*10000 KW BFP 4 P	1	4300L 4500W 2400H	23500	23500

BHARAT HEAVY ELECTRICALS LIMITED:PSWR:NAGPUR  
TENDER SPECIFICATION No. BHE/PW/PUR/UKT-STG/651

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

7	*2000 KW CWP	12 P	4	9900	39600
8	*775 KW ACW	4 P	3		
<b>SUB TOTAL E</b>					<b>80350</b>
<b>TOTAL(A+B+C+D+E)</b>					<b>276788</b>

**SUPPLY PEM**

SL.NO.	ITEM DESCRIPTION	TOTAL WT. KG.	TOTAL WT. MT
1	CONTROL VALVES		
2	FLOW ELEMENTS	6000	6
3	<b>CHAIN PULLEY BLOCK / HOIST:</b>		
a)	ELECTRIC HOIST	3000	3
b)	CHAIN PULLEY BLOCK	6000	6
4	CHEMICAL DOZING SYSTEM	12000	12
5	LUBE OIL TRANSFER PUMPS	500	0.5
6	AIR TRAPS	500	0.5
7	ALUMINIUM SHEET	62500	62.5
8	ANCILLIARY MATERIALS FOR INSULATION	35000	35
9	ME BELLOWS	34500	34.5
10	STEAM TRAPS	100	0.1
11	THERMAL INSULATION	265000	265
12	<b>VALVES:</b>		
a)	AIR RELEASE VALVE	600	0.6
b)	BALL VALVES	700	0.7
c)	BUTTER FLY VALVES(STEAM SERVICE)	11000	11
d)	BUTTER FLY VALVES(WATER SERVICE)	4000	4
e)	DUAL PLATE CHECK VALVE	3600	3.6
f)	STEEL GATE/GLOBE/NRV(WATER SYSTEM VALVES)	800	0.8
13	AUX PRDS	1000	1
14	COLTCS	16000	16
15	DEBRIS FILTERS	10000	10
16	DESUPERHEATER FOR WET STEAM WASHING	1000	1
17	MISC. PUMPS: HORIZONTAL	60000	60
18	PORTABLE OIL PURIFICATION SYSTEM	500	0.5
19	STRAINERS - SIMPLE	3000	3
<b>TOTAL</b>		<b>537300</b>	

S N	ITEM ID	DESCRIPTION	QTY	U	REMARKS
		<b>BOUGHT OUT ITEMS FROM HARDWAR</b>			
1	BG001	EMPTY H2 CYLINDER	115	NO	
2	BG002	EMPTY CO2 CYLINDER	44	NO	
3	BG003	EMPTY N2 CYLINDER	12	NO	
4	BG005	MOISTURE MEASURING SYSTEM	1	ST	
5	BG007	VAPOUR EXHAUSTER	2	NO	
6	BG009	H2 GAS ANALYSER CABINET	2	NO	
7	BG011	REFRIGERATION GAS DRYER	2	NO	
8	BG018	STARTING RESISTOR FOR DC S.O MOTOR	1	NO	

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

S N	ITEM ID	DESCRIPTION	QTY	U	REMARKS
9	BG019	SOUND ABSORBING LINING FOR EXCITER COVER & COUPLING COVER	1	ST	
10	BG021	GROUNDING BRUSH MONITOR	1	ST	
11	BG066	GENERATOR END WINDING VIBRATION MONITORING EQUIPMENT FOR TURBOGENERATOR	1	ST	
12	BG079	PRIMARY WATER COOLER (PLATE TYPE)	2	No	
13	BG080	STROBOSCOPE	1	NO	
14	BH001	WELDED AUSTENITIC S.S. TUBES GR.304 (FOR CONDENSOR)	1	ST	
15	BH010	CONDENSOR AIR EVACUATION PACKAGE (VACUUM PUMP)	2	NO	
16	BH012	AIR EXHAUSTER WITH MOTOR (GSC AIR EXHAUSTER)	2	NO	
17	BT001	LIFTING BEAM	1	NO	
18	BT002	JACKING OIL PUMPS	1	ST	
19	BT003	AOP & EOP	1	ST	
20	BT004	DUPLEX FILTER (LUB.OIL)	1	NO	
21	BT005	DUPLEX FILTER (JACKING OIL)	1	NO	
22	BT006	BUTTERFLY VALVES	1	ST	
23	BT007	THREE WAY TEMP. CONTROL VALVE	1	ST	
24	BT008	DOUBLE THREE WAY VALVES	1	ST	
25	BT009	NRV WITH ALUMINIUM FLAP	1	ST	
26	BT010	PRESSURE LIMIT VALVE	1	NO	
27	BT012	OIL VAPOUR EXHAUSTER	2	NO	
28	BT013	LEAD DIAPHRAGM	4	NO	
29	BT014	SPRAY NOZZLES	1	ST	
30	BT015	DIRT CATCHERS	1	NO	
31	BT016	DAMPER	1	ST	
32	BT017	VARIABLE LOAD SPRING CAGES	1	ST	
33	BT018	FLEXIBLE BENDS	1	ST	
34	BT020	THERMAL INSULATION OF TURBINE	1	NO	
35	BT021	THERMAL INSULATION OF TIP	1	ST	
36	BT022	TURBINE CLEADING	1	NO	
37	BT023	TURBINE OIL	1	M3	
38	BT024	DRY AIR PRESERVATION SYSTEM	1	NO	
39	BT027	TURBINE INTEGRAL PIPING	1	ST	
40	BT028	H & S FOR TURBINE INTEGRAL PIPING	1	ST	

**NOTE :**

1. THE LIST IS TENTATIVE AND HAS BEEN GIVEN TO ENABLE THE CONTRACTOR TO STUDY THE NATURE OF WORK TO BE DONE IN THIS CONTRACT. THERE MAY BE VARIATION IN SIZE, WEIGHT ETC. AND NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED ON ACCOUNT OF THIS BY BHEL.
2. SOME OF THE PACKAGES MAY BE SENT IN PARTS TO SUIT THE SITE CONDITION / TRANSPORTATION, THE SAME IS TO BE ASSEMBLED AT SITE WITHOUT ANY EXTRA COST, LIKEWISE THE PACKAGE MAY BE ASSEMBLED TOGETHER AND SEND AS A SINGLE ASSY. CONTRACTOR MAY HAVE TO DISMANTLE AND ERECT OR, ERECT AS SINGLE ASSEMBLY AS PER THE INSTRUCTION OF BHEL ENGINEERS WITHOUT ANY EXTRA COST.
3. TG INTEGRAL PIPING SHOWN IN WEIGHT DETAIL UNDER GENERATOR PACKAGE COVERS ONLY INTEGRAL PIPING RELATED TO GENERATOR. INTEGRAL PIPING FOR TURBINE IS OUTSOURCED BY BHEL/HARIDWAR AND COVERED IN THE LIST OF BOUGHT OUT PACKAGES. LIST OF BOI PACKAGES IS ATTACHED AS ANNEXURE. THIS IS PART OF SCOPE. APPROXIMATE TONNAGE FOR TURBINE INTEGRAL PIPING IS 60 MT.

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**WEIGHT DETAILS**

<b>S.No.</b>	<b>EQUIPMENT / PACKAGE</b>	<b>APPROX. WT. (in MT)</b>
1	STEAM TURBINE	946
2	GENERATOR	584
3	CONDENSOR	576
4	ACG	2
5	BOOSTER PUMPS	20
6	BOILER FEED PUMPS	102
7	CONDENSATE EXTRACTION PUMPS	38
8	DRAIN COOLER	5
9	DEAERATOR	139
10	LP HEATERS	45
11	HP HEATERS	202
12	CW PUMPS	98
13	DRIVE TURBINE	295
14	RE JOINTS	86
15	FLASH TANKS	21
16	MISC TANKS	19
17	BUTTERFLY VALVES	68
18	MOTORS	80
19	PEM - SUPPLY	537
20	BOUGHT OUT ITEMS FROM HARDWAR	60
	<b>TOTAL</b>	<b>3923</b>

**NOTE :**

THE WEIGHT INDICATED ABOVE IS APPROXIMATE AND THERE MAY BE A VARIATION IN WEIGHT OF EQUIPMENT / PACKAGE. NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED BY BHEL ON ACCOUNT OF VARIATION IN WEIGHT QUANTITIES.

**LIST OF T & P TO BE MADE AVAILABLE BY BHEL FREE OF CHARGES****TOOLS AND PLANTS TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS**

SL.NO.	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
01	EOT CRANE IN TG HALL 115/25T CAPACITY	01	FOR HANDLING AND ERECTION WITHIN TG HALL.
02	PORTAL GANTRY CRANE WITH ACCESSORIES (360 T CAP.) OR STRAND JACK	01	FOR GENERATOR STATOR HANDLING & LIFTING ONLY
03	250 MT CRANE	01	FOR ERECTION OF FST & DEAEERATOR ON SHARING BASIS

**NOTE:**

1. OPERATOR FOR EOT CRANE AND PORTAL CRANE WILL BE PROVIDED BY THE CONTRACTOR. HOWEVER FOR 250 MT CRANE BHEL WILL PROVIDE THE OPERATOR.
- 2.
3. EOT CRANE WILL BE USED ON SHARING BAISIS BY OTHER AGENCIES WORKING WITHIN THE TG HALL UNDER THE INSTRUCTION OF BHEL. THE CONTRACTOR SHALL EXTEND THE SERVICES OF HIS OPERATOR TO SUCH OTHER AGENCIES.
4. ABOVE T&P WILL BE PROVIDED ON SHARING BASIS ONLY. CONTRACTOR HAS TO PLAN HIS ACTIVITIES WELL IN ADVANCE AND INFORM BHEL ENGINEER IN CHARGE/ CONSTRUCTION MANAGER THE DATE OF ACTUAL USE.
5. THE SERVICES OF EOT CRANE AND PORTAL GANTRY CRANE WILL BE ON SHARING BASIS.
6. Contractor shall provide all necessary tools & tackles, crane, trailers etc. for transportation of Portal Gantry Crane components/parts from BHEL Stores/ storage yard, assembly/erection at site, testing, commissioning, dismantling after completion of works and returning to BHEL Stores/storage yard as per instruction of BHEL Engineer.

## LIST OF MAJOR T &amp; P TO BE DEPLOYED BY THE CONTRACTOR

**A: MAJOR TOOLS AND PLANTS & MMDs TO BE DEPLOYED BY THE CONTRACTOR**

S.N.	DESCRIPTION	QUANTITY
1	CRANES ( OF SUITABLE CAPACITY )	AS PER REQUIREMENT
2	DG SET FOR UNINTERUPED SUPPLY SPECIALLY FOR P-91 WELDING	DO
3	TRAILER WITH HORSE, 30 TON CAP	DO
4	TRAILER TROLLEY, 20 TON CAP	DO
5	WELDING GENERATOR SETS ( ELECTRIC AS WELL DIESEL )	DO
6	3- PHASE COMPLETE SET UP FOR DRAWAL OF POWER	DO
7	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER	DO
8	TIG WELDING SET	DO
9	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS	DO
10	ELECTRICAL BAKING OVEN - BIG	DO
11	ELECTRODE BAKING OVEN - PORTABLE	DO
12	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS	DO
13	VACUUM CLEANER (INDUSTRIAL)	DO
14	PIPE CUTTING AND BEVELLING MACHINE	DO
15	PIPE BENDING M/C ( ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE)	DO
16	AIR COMPRESSOR 120 CFM	01 NO
17	STEP DOWN TRANSFORMER, 230V/24V	AS PER REQUIREMENT
18	CONDENSER TUBE EXPANDER SET	DO
19	ELECTRICALLY OPERATED WINCHES 3T/5T CAP.	DO
20	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)	DO
21	<b>HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :</b>	
	A) - JACKS OF 100 T CAPACITY (WITH HAND OPERATED PUMPS)	06 NOS.
	B) - JACKS OF 50 T CAPACITY (WITH HAND OPERATED PUMPS)	06 NOS.
	<b>GANG OPERATED JACKS CONSISTING OF THE FOLLOWING :</b>	
	A) - JACKS OF 100 T CAPACITY (HAVING BROAD BASE ONE INCH LIFT)	06 NOS.
	B) - JACKS OF 63 T CAPACITY (WITH 4-6 INCH LIFT , FOR GEN. END SHIELDS)	04 NOS.
	C) - LONG HIGH PRESSURE HOSES ( FOR GENERATOR ALIGNMENT)	12 NOS.
	ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.	
22	TORQUE WRENCH (0 TO 200 N-M CAP.)	01 NO.
23	TORQE WRENCH (UPTO 2000 N-M CAP.)	01 NO.
24	SLINGS FOR LP TURBINE ROTOR	01SET
25	SLINGS FOR HP TURBINE MODULE	01SET
26	SLINGS FOR GENERATOR ROTOR	01SET
27	BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FOUNDATION BOLTS)	AS REQUIRED
28	LONG FEELER GAUGE SET	AS REQUIRED
29	SPANNERS / EYE BOLTS ( OF ALL SIZES )	AS REQUIRED
30	HYDRAULIC TEST PUMPS AND FILL PUMPS	AS REQUIRED

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ANY OTHER MAJOR T&P REQUIRED FOR SATISFACTORY COMPLETION OF THE WORKS.

**B: MEASURING AND MONITORING DEVICES (MMD):**

AS PER REQUIREMENT TO BE FINALIZED AT SITE.

**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.

**ANALYSIS OF UNIT RATE QUOTED**

<b>SL.N.</b>	<b>DESCRIPTION</b>	<b>% OF QUOTED RATE</b>	<b>REMARKS</b>
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-VI**

FORMAT FOR MONTH-WISE MANPOWER DEPLOYMENT PLAN  
(CATEGORY-WISE NUMBERS TO BE INDICATED FOR EACH MONTH)

SL. NO.	CATEGORY	MONTHS										
		1	2	3	4	5	6	7	8	9	10	SO ON
01	RESIDENT ENGINEER											
02	ERECTION ENGINEERS											
03	ERECTION SUPERVISORS											
04	QUALITY ASSURANCE ENGINEER											
05	SAFETY ENGINEER											
06	MATERIALS MANAGEMENT SUPERVISORS											
07	HIGH PRESSURE WELDERS											
08	STRUCTURAL & OTHER WELDERS											
09	FITTERS											
10	CRANE OPERATOR											
11	TRUCK/TRAILER DRIVERS											
12	STORE KEEPERS											
13	ELECTRICIANS											
14	SEMISKILLED/ UNSKILLED WORKERS											
SO ON												
	MONTH WISE TOTAL											

SIGNATURE OF TENDERER  
DATE:

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**APPENDIX–VII**  
**FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS**

SL. NO.	DESCRIPTION & CAPACITY OF T&P	MONTHS										
		1	2	3	4	5	6	7	8	9	10	SO ON
01												
02												
03												
04												
05												
06												
07												
08												
09												
10												

SIGNATURE OF THE TENDERER

DATE:

BHARAT HEAVY ELECTRICALS LIMITED:PSWR:NAGPUR  
TENDER SPECIFICATION No. BHE/PW/PUR/KKT-STG/568

### APPENDIX-VIII

#### CONCURRENT COMMITMENTS

SL.NO	FULL POSTAL ADDRESS OF CLIENT AND NAME OF OFFICER IN-CHARGE	DESCRIPTION OF THE WORK	VALUE OF THE CONTRACT	COMMENCEMENT DATE	SCHEDULED COMPLETION	% COMPLETED AS ON DATE	ANTICIPATED COMPLETION DATE	REMARKS

SIGNATURE OF THE TENDERER

DATE: