FOR OFFICIAL USE ONLY
NOT FOR PUBLICATION

TENDERER'S COPY
ORIGINAL COPY

==========

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

## TENDER NO. BHEL/ NR /SCT/ KISHANGANGA / HTG & MM/ 936

## FOR

## "Material Handling and Erection, testing & commissioning work of 3x110 MW Kishanganga HEP in J&K."

## PART I – TECHNICAL BID

**Bharat Heavy Electricals Limited**
**(**A Govt. Of India Undertaking)
**Power Sector – Northern Region,**
**Plot No. 25 , Sector - 16A ,**
**Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)**

**ISO 9001, ISO 14001,
OHSAS 18001 & SA 8000
certified company
SubContract Deptt.**

**Bharat Heavy Electricals Limited**
**(**A Govt. Of India Undertaking)
**Power Sector – Northern Region,**
**Plot No. 25 , Sector - 16A ,**
**Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)**
**Phone: 0091-0120-2416273 / 2416296**
**Fax: 091-0120-2416528**
**Email: swapan@bhelpsnr.co.in/ pdas@bhelpsnr.co.in**

# TENDER NO. BHEL/ NR /SCT/ KISHANGANGA / HTG & MM/ 936

## IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

---

---

---

Rev 01
1st Jun
2012

# NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited

==========

# NOTICE INVITING TENDER (NIT)

# NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES OR PURCHASE TENDERS FROM THIS OFFICE ALSO

==========

To

Dear Sir/Madam

**Sub : NOTICE INVITING TENDER**

Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

**1.0 Salient Features of NIT**

| SL NO | ISSUE | DESCRIPTION | |
|---|---|---|---|
| i | TENDER NUMBER | **BHEL/ NR /SCT/ KISHANGANGA / HTG & MM/ 936** | |
| ii | Broad Scope of job | **"Material Handling and Erection, testing & commissioning work of 3x110 MW Kishanganga HEP in J&K."** | |
| iii | DETAILS OF TENDER DOCUMENT | | |
| a | Volume-IA | *Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc* | **Applicable** |
| b | Volume-IB | *Special Conditions of Contract (SCC)* | **Applicable** |
| c | Volume-IC | *General Conditions of Contract (GCC)* | **Applicable** |
| d | Volume-ID | *Forms and Procedures* | |
| e | Volume-II | *Price Schedule (Absolute value).* | **Applicable** |
| iv | **Issue of Tender Documents** | ***1. Sale from BHEL PS Regional office at :***<br>***Start : 09.11.2013, Time : 09:00***<br>***Closes: 02.12.2013, Time : 12:00***<br>**2. From BHEL website (www.bhel.com)**<br>Tender documents will be available for downloading from website till due date of submission | **Applicable** |
| v | **DUE DATE & TIME OF OFFER SUBMISSION** | ***Date : 02.12.2013 , Time : 15:00***<br>***Place : BHEL PSNR NOIDA*** | **Applicable** |
| vi | **OPENING OF TENDER** | ***Date : 02.12.2013, Time :***<br>*(within 2 hours of the latest due date and time of offer submission).*<br>*Notes:* | **Applicable** |

| | | | |
|---|---|---|---|
| | | *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.*<br>*(2) Bidder may depute representative to witness the opening of tender* | |
| **vii** | **EMD AMOUNT** | *Rs 2,00,000/-* | **Applicable** |
| **viii** | **COST OF TENDER** | *Rs 2000/-.* | **Applicable** |
| **ix** | **LAST DATE FOR SEEKING CLARIFICATION** | ***Date: 18.11.2013***<br>*Along with soft version also, addressing to undersigned & to others as per contact address given below* | **Applicable** |
| **x** | **SCHEDULE OF Pre Bid Discussion (PBD)** | | **Not applicable.** |
| **xi** | **INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)** | Shri J. M. Lyngdoh , IAS (Retd.)<br>Plot No. 144-145,<br>Pragati Resort,<br>Proddator Village & P.O.,<br>Shankarpally Road,<br>Rangareddy Distt. (AP)- 500 033 | **Applicable** |
| **xii** | **Latest updates** | Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information | |

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at NOIDA issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at NOIDA, Sundays and second/ last Saturdays

4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at NOIDA. For other details and for 'One Time EMD' please refer General Conditions of Contract.

5.0 **Procedure for Submission of Tenders**: The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
- One set of tender documents shall be retained by the bidder for their reference

6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped)**

| Sl no | Description | Remarks |
|---|---|---|
| | **Part-I A** | |
| | **ENVELOPE – I superscribed as** :<br>PART-I (TECHNO COMMERCIAL BID)<br>TENDER NO :<br>NAME OF WORK :<br>PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**CONTAINING THE FOLLOWING**:- | |
| i. | Covering letter/Offer forwarding letter of Tenderer. | |
| ii. | Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above.<br><br>**Note:**<br>a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained.<br>b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.<br>i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL<br>ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender | |
| iii. | Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria.<br><br>It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc. | |
| iv. | All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT. | |
| v. | Integrity Pact Agreement (Duly signed by the authorized signatory) | If applicable |
| vi. | Duly filled-in annexures, formats etc as required under this Tender Specification/NIT | |
| vii. | Notice inviting Tender (NIT) | |
| viii. | Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc | |
| ix. | Volume – I B : Special Conditions of Contract (SCC) | |
| x. | Volume – I C : General Conditions of Contract (GCC) | |
| xi. | Volume – I D : Forms & Procedures | |
| xii. | Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item | |
| xiii. | Any other details preferred by bidder with proper indexing. | |

| | | |
|---|---|---|
| | **PART-I B** | |
| | **ENVELOPE – II superscribed as**:<br>PART-I (EMD/COST of TENDER)<br>TENDER NO :<br>NAME OF WORK : | |

| | | |
|---|---|---|
| | PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**CONTAINING THE FOLLOWING**:- | |
| i. | 1. Earnest Money Deposit (EMD) in the form as indicated in this Tender<br>**OR**<br>Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender<br><br>2. Cost of Tender ( Demand Draft or copy of Cash Receipt as the case may be) | |

| | | |
|---|---|---|
| | **PART-II** | |
| | **PRICE BID** consisting of the following shall be enclosed | |
| | **ENVELOPE-III**<br>superscribed as:<br>PART-II (PRICE BID)<br>TENDER NO :<br>NAME OF WORK :<br>PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**CONTAINING THE FOLLOWING** | |
| i | Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I | |
| ii | Volume II – PRICE BID ( Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures) | |

| | | |
|---|---|---|
| | **OUTER COVER** | |
| | **ENVELOPE-IV** (MAIN ENVELOPE / OUTER ENVELOPE)<br>superscribed as:<br>TECHNO-COMMERCIAL BID, PRICE BID & EMD<br>TENDER NO:<br>NAME OF WORK:<br>PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**CONTAINING THE FOLLOWING:** | |
| i | o Envelopes I<br>o Envelopes II<br>o Envelopes III | |

SPECIAL NOTE : All documents/ annexures submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

7.0 Deviation with respect to tender clauses and additional clauses/suggestions in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.

8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

**9.0 Assessment of Capacity of Bidders:**

**Bidders capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:**

I. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The 'Load' is the sum of the unit wise identified packages (refer Table-1) for contracts with BHEL Regions. The cut off month for reckoning 'Load' shall be the month, two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if latest bid submission is in Aug 2011, then the 'load' shall be calculated upto and inclusive of June 2011)

i). Total number of Packages
Total number of Packages in hand = P
Where

- 'P' is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced, excepting packages which are on HOLD due to reasons not attributable to Bidder..

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (**under execution**/ executed during the 'Period of Assessment' in all the Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(**Note**: For example if 'latest date of bid submission' is in Aug 2011, then the 'performance' shall be assessed for a 6 month period upto and inclusive of June 2011, for all the unit wise identified packages (refer Table I)

i). Calculation of Overall 'Performance Rating' for 'similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':
This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) $P_1$, $P_2$, $P_3$ , $P_4$ , $P_5$ , …. $P_N$ etc be the packages (**under execution**/ executed during the 'Period of Assessment' in all Regions) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ ( ie $P_T = P_1 + P_2 + P_3 + P_4 + .. P_N$ )

b) Number of Months '$T_1$' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package $P_1$. Similarly $T_2$ for package $P_2$, $T_3$ for package $P_3$, etc for the tendered scope. Now calculate cumulative total months '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions ( i.e $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + .. T_N$ )

c) Sum '$S_1$ ' of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$,…. $S_{1\text{-}N}$ ) for similar package $P_1$, for the 'period of assessment' '$T_1$' (i.e $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}N}$). Similarly $S_2$ for package $P_2$ for period $T_2$, $S_3$ for package $P_3$ for period $T_3$, etc for the tendered scope for all Regions. Now calculate cumulative sum '$S_T$' of 'Monthly Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e '$S_T$'$= S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

d) **Overall Performance Rating '$R_{BEHL}$' for the similar Package/Packages** (**under execution**/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL)**:**

**Aggregate of Performance scores for all similar packages in all the Regions**

**=** ----------

**Aggregate of months for each of the similar package for which performance should have been evaluated in all the Regions**

$$= \frac{S_T}{T_T}$$

**e) Bidders to note that the risk of non evaluation or non availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder**

**f) Table showing methodology for calculating 'a', 'b' and 'c' above**

| Sl no | Item Description | Details for all Regions | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) | (ix) | (x) |
| 1 | Similar Packages for all Regions → (under execution/ executed during period of assessment) | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | … | $P_N$ | Total No of similar packages for all Regions = $\mathbf{P_T}$ ie Sum (Σ) of columns (iii) to (ix) |
| 2 | Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package ( as in row 1) | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | … | $T_N$ | Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$ |
| 3 | Monthly performance scores for the corresponding period (as in Row 2) | $S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, … $S_{1\text{-}T1}$ | $S_{2\text{-}1}$, $S_{2\text{-}2}$, $S_{2\text{-}3}$, $S_{2\text{-}4}$, … $S_{2\text{-}T2}$ | $S_{3\text{-}1}$, $S_{3\text{-}2}$, $S_{3\text{-}3}$, $S_{3\text{-}4}$, … $S_{3\text{-}T3}$ | $S_{4\text{-}1}$, $S_{4\text{-}2}$, $S_{4\text{-}3}$, $S_{4\text{-}4}$, … $S_{4\text{-}T4}$ | $S_{5\text{-}1}$, $S_{5\text{-}2}$, $S_{5\text{-}3}$, $S_{5\text{-}4}$, … $S_{5\text{-}T5}$ | .. … … … … | $S_{N\text{-}1}$, $S_{N\text{-}2}$, $S_{N\text{-}3}$, $S_{N\text{-}4}$, … $S_{N\text{-}TN}$ | --- |
| 4 | Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3) | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_5$ | … | $S_N$ | Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$ |

ii) Calculation of Overall 'Performance Rating' ($\mathbf{R_{BHEL}}$) in case 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. '$R_{BHEL}$ ' shall be calculated subject to availability of 'performance scores' for at least.6 'package months' in the order of precedence below:

a) 'Period of Assessment.
b) 12 months preceding the cut-off month
c) 24 months preceding the cut-off month
d) 36 months preceding the cut-off month

In case, $R_{BHEL}$ cannot be calculated as above, then Bidder shall be treated as 'NEW VENDOR'. Further eligibility and qualification of this bidder shall be as per definition of 'NEW VENDOR' described in 'Explanatory Notes'

iii) Factor "L" assigned based on Overall Performance Rating ($R_{BHEL}$) at Power Sector Regions,:

| Sl no | Overall Performance Rating ($R_{BHEL}$) | Corresponding value of 'L' |
|---|---|---|
| 1 | =60 | NA |
| 2 | > 60 and ≤ 65 | 0.4 |
| 3 | > 65 and ≤ 70 | 0.35 |
| 4 | > 70 and ≤ 75 | 0.25 |
| 5 | > 75 and < 80 | 0.2 |
| 6 | ≥ 80 | NA |

**III. 'Assessment of Capacity of Bidder':**

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages $P_{Max}$= ($R_{BHEL}$- 60) divided by corresponding value of 'L'
i.e. ($R_{BHEL}$- 60)/L

Note:

i. In case the value of $P_{Max}$ results in a fraction, the value of $P_{Max}$ is to be rounded off to next whole number
ii. For $R_{BHEL}$ = 60 , $P_{Max}$ = '1'
iii. For $R_{BHEL}$ ≥ 80, there will be no upper limit on $P_{Max}$

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if P ≤ $P_{Max}$
(where P is calculated as per clause 9.I)

IV. **Explanatory note**:

a) Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or CI, etc at the individual level irrespective of rating of Plant, and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, CI, Civil, Structure, etc is considered individual level of package. For example in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against sl no II above, needs to be evaluated considering all the identified packages (ie Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above

b) Identified Packages (Unit wise)

**Table-1**

| | Civil | Electrical & CI | Mechanical |
|---|---|---|---|
| | i). Enabling works<br>ii). Pile and Pile Caps<br>iii). Civil Works including foundations<br>iv). Structural Steel Fabrication & Erection<br>v). Chimney<br>vi). Cooling Tower<br>vii). Others (Civil) | i). Electrical<br>ii). CI<br>iii). Others (Elec & CI) | i). Boiler & Aux (All types including CW Piping if applicable)<br>ii). Power Cycle Piping/Critical Piping<br>iii). LP Piping<br>iv). ESP<br>v). Steam Turbine Generator set & Aux<br>vi). Gas Turbine Generator set & Aux<br>vii). Hydro Turbine Generator set & Aux<br>viii). Turbo Blower (including Steam Turbine)<br>ix). Material Handling<br>x). Material Management<br>xi). Material Handling & Material Management<br>xii). Others (Mechanical) |

c) Bidders who have not been evaluated for at least six package months in the last 36 months in the online BHEL system for contractor performance evaluation in BHEL PS Regions, wef July'2010 shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions

A 'NEW VENDOR' if awarded a job (of package/packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI from BHEL.

The "FIRST TIMER" tag shall remain till execution of work for a period of not less than 09 months, from the commencement of work of first package

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Capacity Evaluation of Bidders'.

d) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders' or due to non-approval by Customer, then BHEL at its discretion reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating** '$\mathbf{R_{BHEL}}$' only, starting from the upper band.

e) 'Under execution' shall mean works in progress as per the following:

i. up to Boiler Steam Blowing in case of Steam Generator and Auxiliaries

ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)

iii. Upto execution of at least 90% of anticipated contract value in case of Civil & Structures (unit wise), Enabling works and upto 90% of material unloading (in tonnage) as per the original contract in case of MM Package.

Note : BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (i), (ii) and (iii) above, depending upon the balance scope of work to be completed.

f) Performance evaluation in CL 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work.

10.0 Since the job shall be executed at site**,** bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.

15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**

16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.

**17.0** In case BHEL decides on a `Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.

18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.

19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .

However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDs' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.

20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.

21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.

22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.

23.0 Consortium Bidding (or Technical Tie up) shall be allowed only if specified in Pre Qualifying Requirement (PQR) criteria, and in such a case the following shall be complied with:

23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.

23.2 'Stand alone' bidder cannot become a '**Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected.

23.3 Number of partners for a consortium Bidding (or Technical Tie up) shall be as specified in the PQR

23.4 Prime Bidder shall be as specified in the Pre Qualification Requirement, else the bidder who has the major share of work

23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder' as specified in clause 9.0

23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'

23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified

23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.

23.9 Prime Bidder shall be responsible for the overall execution of the contract

23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats

23.11 In case the Consortium partner or partners back out, their SDs shall be encased by BHEL. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.

23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.

23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.

23.14 The consortium partner shall submit SD equivalent to 2% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.

23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also

24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

25.0 The bidder may have to produce original document for verification if so decided by BHEL.

26.0 The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site www.bhel.com.

27.0 BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid" in the Reverse Auction. Non-submission of „online sealed bid" by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue."

Information and General Terms and Conditions governing RA shall form part of the RFQ/ Enquiry.

28.0 It may please be noted that guidelines/rules in respect of Suspension of Business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', etc may undergo change from time to time and the latest one shall be followed.

29.0 Order of Precedence

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
b. Notice Inviting Tender (NIT)
c. Price Bid
d. Technical Conditions of Contract (TCC)—Volume-1A
e. Special Conditions of Contract (SCC) —Volume-1B
f. General Conditions of Contract (GCC) —Volume-1C
g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

**Enclosure**

I. Annexure-1: Pre Qualifying criteria
II. Annexure-2: Check List.
III. Annexure-3 GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)
IV. Annexure-4 RA Details
V. Annexure-5 Integrity Pact
VI. Other Tender documents as per this NIT.

**ANNEXURE - 1**

## PRE QUALIFYING REQUIREMENTS

| | |
|---|---|
| JOB | **"Material Handling and Erection, testing & commissioning work of 3x110 MW Kishanganga HEP in J&K."** |
| TENDER NO. | **BHEL/ NR /SCT/ KISHANGANGA / HTG & MM/ 936** |

| SL NO. | PRE QUALIFICATION CRITERIA | Bidders claim in respect of fulfilling the PQR Criteria |
|---|---|---|
| | | **Name and Description of qualifying criteria** |
| A | **Submission of Integrity Pact duly signed** | **Applicable** |
| B | **Assessment of Capacity of Bidder to execute the work as per sl no. 9 of NIT** | **Applicable** |
| C | **Technical**<br><br>Tenderers, who wish to participate should have completed erection, testing, commissioning (ETC) of atleast two units of any one type or from any of the combinations below in the last seven years:<br><br>i) Hydro turbine generator sets with Pelton Turbines of 30 MW or above.<br>OR<br>ii) Hydro turbine generator sets with Francis Turbines of 10 MW or above.<br>OR<br>iii) Hydro turbine generator sets with Kaplan Turbines of 6 MW or above.<br>OR<br>iv) Reversible pump turbine generator sets of 10 MW or above.<br>OR<br>v) Francis type pump motor sets of 10 MW or above. | **Applicable** |
| D<br>1.1 | **Financial**<br><br>**TURNOVER**<br><br>Tenderers should have an average annual turnover minimum of Rs. 399 Lac based on the audited accounts of last three Financial Years (2010-11, 2011-12, 2012-13). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this. | **Applicable** |

| | | |
|---|---|---|
| 1.2<br><br>1.3 | **Net worth:** Net worth of the bidders based on the latest audited accounts as furnished for D 1.1 above should be positive.<br>**Profit:** Bidder must have earned cash profit in any one of three financial years as applicable in the last three years defined in D 1.1 above based on latest audited accounts.<br>(Relevant documents, meeting above requirements at C & D, shall be submitted by bidders.) | |
| E | **Approval of Customer (if applicable)** | **Applicable** |
| F | **Consortium criteria** | **Not Applicable** |

**Explanatory Notes for QR 'C'**

1. Tenderer shall submit documents in support of meeting the respective Qualifying Requirement.
2. Last seven years mentioned above will be reckoned from date of Technical Bid opening.
3. If the qualifying work is completed in the seven (7) years period specified above, even if started earlier, the same will also be considered meeting the qualifying requirements.
4. The word "completed" means; tenderer should have completed the work in all respect, however where erection/ pre-commissioning activity of Hydro turbine generator sets/ pump turbine generator sets / pump motor sets has been completed but commissioning could not be done on account of customer constraints such as non-availability of water/ transmission line, will also be considered as completed the work in all respect.

**ANNEXURE - 2**

**CHECK LIST**

**NOTE:- Tenderers are required to fill in the following details and no column should be left blank**

| | | | |
|---|---|---|---|
| 1 | Name and Address of the Tenderer | | |
| 2 | Details about type of the Firm/Company | | |
| 3.a | Details of Contact person for this Tender | Name : Mr/Ms<br>Designation:<br>Telephone No:<br>Mobile No:<br>Email ID:<br>Fax No: | |
| 3.b | Details of alternate Contact person for this Tender | Name : Mr/Ms<br>Designation:<br>Telephone No:<br>Mobile No:<br>Email ID:<br>Fax No: | |
| 4 | EMD DETAILS | DD No: Date :<br>Bank : Amount:<br>Please tick ( √ ) whichever applicable:-<br>ONE TIME EMD / ONLY FOR THIS TENDER | |
| 5 | Validity of Offer | TO BE VALID FOR SIX MONTHS FROM DUE DATE | |
| | | APPLICABILITY(BY BHEL) | ENCLOSED BY BIDDER |
| 6 | Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format | Applicable | YES / NO |
| 7 | Audited profit and Loss Account for the last three years | Applicable/Not Applicable | YES/NO |
| 8 | Copy of PAN Card | Applicable/Not Applicable | YES/NO |
| 9 | Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed | Applicable/Not Applicable | YES/NO |
| 10 | Integrity Pact | Applicable/Not Applicable | YES/NO |
| 11 | Declaration by Authorised Signatory | Applicable/Not Applicable | YES/NO |
| 12 | No Deviation Certificate | Applicable/Not Applicable | YES/NO |
| 13 | Declaration confirming knowledge about Site Conditions | Applicable/Not Applicable | YES/NO |
| 14 | Declaration for relation in BHEL | Applicable/Not Applicable | YES/NO |
| 15 | Non Disclosure Certificate | Applicable/Not Applicable | YES/NO |

| | | | |
|---|---|---|---|
| 16 | Bank Account Details for E-Payment | Applicable/Not Applicable | YES/NO |
| 17 | Capacity Evaluation of Bidder for current Tender | Applicable/Not Applicable | YES/NO |
| 18 | Tie Ups/Consortium Agreement are submitted as per format | Applicable/Not Applicable | YES/NO |
| 19 | Power of Attorney for Submission of Tender/Signing Contract Agreement | Applicable/Not Applicable | YES/NO |
| 20 | Analysis of Unit rates | Applicable/Not Applicable | YES/NO |

NOTE : STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

**DATE :**

**AUTHORISED SIGNATORY**
**(With Name, Designation and Company seal)**

**ANNEXURE - 3**

## GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit „online sealed bid" in the Reverse Auction. Non-submission of „online sealed bid" by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

3. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

6. Bidders have to fax the Compliance form before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

8. Reverse auction will be conducted on scheduled date & time.

9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, as provided on case-to-case basis to Service provider within two working days of Auction without fail.

11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL"s standard practice.

12. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the „Business Rules of Reverse Auction", which will be communicated before the Reverse Auction.

13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

15. In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

ANNEXURE – 4

## Authorization of representative who will participate in the on-line Reverse Auction Process;

| | | |
|---|---|---|
| 1 | NAME & DESIGNATION OF OFFICIAL | |
| 2 | POSTAL ADDRESS (COMPLETE) | |
| 3 | TELEPHONE NOS. (LAND LINE & MOBILE BOTH) | |
| 4 | FAX NO. | |
| 5 | E-MAIL ADDRESS | |
| 6 | NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION | |

# INTEGRITY PACT

## Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi – 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

## and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

## Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____

_____

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

## Section 1 – Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

## Section 2 – Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved

in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

## Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors". framed by the Principal.

## Section 4 – Compensation for Damages

4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

## Section 5 – Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

## Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

6.1 The Bidder(s)/ Contractor(s) undertake(s) to obtain from all subcontractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20 % of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/ Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).

6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

## Section 7 – Criminal Charges against violating Bidders/ Contractors /Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

## Section 8 –Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the

Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

## Section 9 – Pact Duration

9.1 This Pact begins and shall be binding on and from the submission of bid(s) by bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

## Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

---

For & On behalf of the Principal

(Office Seal)

---

For & On behalf of the Bidder/ Contractor

(Office Seal)

Place----------

Date----------

Witness: _____

(Name & Address) _____

_____

Witness: _____

(Name & Address)_____

_____

Rev 01
1st June
2012

# TECHNICAL CONDITIONS OF CONTRACT (TCC) PART-I

(Document No PS:MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED

## 1. Project Information

### 1.1. Introduction

NHPC Ltd., with their headquarters at Faridabad, Haryana, has placed an order on consortium M/s HCC Ltd. (Lead partner of consortium with BHEL) for turnkey execution of 3x110 MW Kishanganga HEP in J&K. BHEL has been awarded for supply and service of E&M packages vides Contract agreement No. SC/100/KGHEP/340/005-1 dated 16.12.2009 and Contract agreement No. SC/100/KGHEP/340/005-2 dated 16.12.2009 respectively.

Kishanganga Hydro Electric Project is a run-off river scheme which involves transfer of water from Kishanganga River in Gurez valley to Bonar Nallah near Bandipore in Kashmir valley. The power house site is near Bandipore in Kashmir Valley of J&K.

The underground powerhouse complex having machine hall cavern (size 103mx21mx45.5m) is located at El. 1760 m near Bandipore which is about 70 km from Srinagar, 370 km from Jammu and 955 km from Delhi. Jammu is the nearest railway station and Srinagar is the nearest airport connected throughout the year.

**Open store:** Open store of 8000 sqm. approx. is situated at Ajar on Sonarwani Road approx. at 5 km distance from powerhouse on the way from Bandipore to powerhouse.

**Closed Storage Shed**: Closed storage Shed of approx. 2000 sqm. Is located about 1 KM from Powerhouse including length of MAT and approx. 200m from MAT.

**Switchyard**: Switchyard is located near Kralpora village, approx. 3 km from Powerhouse.

**BFV House**: BFV House is located approx. 3 km from Powerhouse.

## 2. Scope of Works

### 2.1. Scope of these specifications cover complete work of

### 2.1.1. Material handling:

Complete material handling at site which includes unloading of all the incoming material of all packages including packages not in erection scope of PSNR but in scope of Bhopal, ISG, TBG groups and other units of BHEL/their vendors, by truck/ trailer/ carriers, reporting damages, providing necessary helps in insurance claim lodging, shifting of material to open/ closed storage yards, proper storing and stacking, material verification and shortage reporting, material preservation as per instructions, On receipt of demand for material from erection site, loading of material on truck/ trailer/ carriers, transporting the same to powerhouse/ erection place/other work site (including BFV House, Switchyard etc.). The total materials to be handled are approximately **6700 MT and total materials to be erected are approx. 5000 MT**. The details of total materials to be handled and to be erected are per **Chapter- IV, Part-I of TCC**.

In total 6700 MT, approximately 2800 MT is already unloaded by other contractor of BHEL and kept at open store and closed storage shed. Taking over of already unloaded approx. 2800MT materials, material management forms duly filled/Records generated in stocks (Stock registers and computers) and certified by Engineer its verification, proper storage, re-stacking, preservation in project open store / closed storage shed and its transportation including loading from project open store / closed storage shed to power house or other work site (incl. Switchyard, BFV House etc.), unloading with EOT Crane/Mobile Crane and handing over for erection shall be in scope of contractor and shall be paid with rate as per **Sl. No. 3 of Rate Schedule**.

Out of 2800 MT unloaded materials, some electrical materials approx. 150 MT is unloaded at open store, which will be required to be shifted to closed storage shed for proper preservation. As closed storage shed is near to Main Access Tunnel (MAT) and between open store and Powerhouse, Hence, only extra loading and unloading will be done during shifting of the electrical items. The contractor has to build up the price for shifting of such type of materials in quoted price only. No separate payment will be given for shifting of these materials.

**Storage & Preservation:**

**Facilities in contractor's scope with respect of Storage & preservation besides SCC Clause No. 6.0:**

Contractor has to store all items in closed storage shed which require indoor storage not limited to Bolts, pins, packing, tools, insulation materials, electrical parts with electrical devices attached, electric motors and excitation equipment, instruments, welding material and equipment, all small parts and all parts of the plant which already have been finally painted etc. Partition required inside the closed storage shed for proper storage of items, shall be done by contractor.

Sufficient heaters/infrared lamps etc. shall be provided for the insulation items of stator and rotor to maintain the temperature $10^0$C to $15^0$C above ambient for proper heating arrangement. Humidity Control should be maintained and periodically recorded. Thermometer cum Hygrometer shall be installed in the closed storage shed for temperature and humidity measurement.

Regular preservation of the machined items like Shaft, Bearing housing, rotor spider, rim studs & nuts etc. by checking its TRP film, re-applying it or part. Short shelf life insulating items like tapes, resins, paints are to be stored at below $5^0$C.

Rusting of rim punchings is prevented by the use of VCI paper wrapped in polythene. Those involved in storage, handling & erection are to buy enough rolls of VCI paper, for replacing spoiled or ineffective paper. Oil must not be applied on rim punchings for any purpose. If for any reason the rim punchings have greasiness, these should be cleaned by volatile degreasing agents like trichloroethylene before use.

Thrust & Guide pads should be stored in such a way as to prevent abrasion, scoring etc. These pads must not be stacked one over another.

Instruments are to be repacked with adequate cushioning and protection against impacts. All instruments should be stored in a vibration free area. Packing cases containing instruments are marked ‘fragile’. Jerks and impacts should be avoided in handling these.

The packaging and storage of electronic equipment shall be strictly in accordance with internationally accepted standards. Electronic equipment shall be stored in anti-static packing. Packages containing electronic equipment shall be stored in humidity controlled environment.

**Brief Description of Equipments for material handling**

1. 3 sets of embedded parts including embedded pipelines
2. 3 sets of Distributor and pipings
3. 3 sets of Pelton Turbines & accessories
4. 3 sets of Digital Governing System & accessories
5. 3 sets of MIV (spherical) & accessories

6. 1 no. of Penstock Valve (BF valve) & accessories
7. 3 sets of Generator & auxiliaries system including automatic water sprinkler type fire fighting system for Generators
8. 3 sets of Static Excitation system, excitation transformer, DVR & accessories.
9. 3 sets of 13.8KV IP Bus Duct including CTs & PTs, LAVT, VT & NG cubicles
10. 10 Nos. 13.8/220/√3 kV, 45MVA, 1ϕ GSU transformer & accessories
11. 1 no. 220/33kV, 12 MVA, 3 ϕ & 1 no. 33/11KV, 6 MVA, 3 ϕ Power transformer
12. 1 lot 220 kV XPLE Cables
13. 1 lot 220/33 KV Outdoor Switchyard
14. 1 lot 220V & 48V DC System for Powerhouse (PH)
15. 1 lot DC system for switchyard
16. 1 lot C&M (SCADA) system excluding OFC between Dam, Valve House and Power House
17. 1 lot Protection system
18. 1 lot of cabling system for PH & Switchyard
19. 1 lot of 11 kV Switchgear
20. 1 lot DG sets
21. 1 lot 415 V Switchgear & Valve House Transformer
22. 1 lot UAT & SST
23. 1 lot Switchyard Transformer & Distribution board in Switchyard
24. 1 lot of illumination system for PH area
25. 1 lot of illumination system for switchyard
26. 1 lot of Communication System
27. 1 lot of Electrical Workshop
28. 2 nos. EOT cranes of 150/20/10T capacity with monorail crane & 1 no. EOT crane of 100T capacity for BFV
29. 1 lot of Cooling Water & Partial Dewatering system including pipings
30. 1 lot HVAC system for PH area
31. 1 lot HVAC system for switchyard
32. 1 lot of grounding system for PH area including Underground Earthing Network and Over Ground Earthing Network.
33. 1 lot of grounding system for switchyard
34. 1 lot of HP & LP Compressed Air system
35. 1 lot of Fire Fighting System for Powerhouse area
36. 1 lot of Fire Fighting System for switchyard
37. 1 lot of Oil Handling System-Lubricating Oil
38. 1 lot of Oil Handling System-insulating oil
39. 1 lot of Mechanical Workshop
40. 1 lot of elevators
41. Spares of all above system
42. Other miscellaneous Mechanical/Electrical assemblies
43. Field efficiency testing turbine equipments

44. Field efficiency testing & testing of combined output of 330 MW at generator terminals equipments.
45. 1 lot of any other item not covered above but required for project completion.

**Note:**

1. *As per rough estimate approx. 1500 MT material will be unloaded at closed storage shed and approx. 4700 MT at open store. Rate for transportation of materials / equipments including loading either from project open store or closed storage shed to power house/other work site, unloading with EOT Crane/Mobile Crane and handing over for erection, will be same. Contractor has to build the price for above impact in their quoted price.*

2. *Entire material handling for all materials (excluding unloading of approx. 2800 MT materials) will be the responsibility of contractor and shall be paid as per Sl. No. 2, 3, 4 and 5 of Rate Schedule.*

3. *Erection of one no. EOT crane in service bay is completed. Erection of 2nd EOT crane has also been started.*

4. *2 No. Hydra of 14 MT and one no. Mobile crane of 55 MT will have to be shifted from other site of BHEL by November, 2013 and same will be available for contractor immediately after their deputation.*

5. *In case of unavailability of EOT crane/Mobile Crane/Hydra to be provided by BHEL for any reason, Mobile crane/Hydra required for material handling including loading/unloading at stores/Powerhouse/ other work site shall be arranged by contractor at his own cost.*

6. *The contractor has to handle whatever actual materials are dispatched for the project irrespective of any variations and payments shall be released for the actual gross tonnage handled for material handling purposes.*

**2.1.2. <u>Erection & Commissioning:</u>**

Pre-erection assembly, erection, testing (including hydraulic, NDT, electrical, stage & final HV including dry out etc. of relevant equipments at various stages during erection), pre-commissioning and commissioning including trial run, handing over to M/s NHPC/HCC, of the following equipments for three units of 3x110 MW Kishanganga HEP housing 640 metres head, 375 RPM clockwise vertical Pelton type Hydro Turbines,

suspended type hydro generators, auxiliaries and all other associated equipment. The total materials to be erected are approximately **5000 *MT.***

**Brief description of equipments for erection, testing & commissioning**

1. 3 sets of embedded parts including embedded pipelines
2. 3 sets of Distributors and pipings
3. 3 sets of Pelton Turbines & accessories
4. 3 sets of Digital Governing System & accessories
5. 3 sets of MIV (spherical) including oil pressure system & accessories
6. 1 no. of Penstock Valve (BF valve) including oil pressure system & accessories
7. 3 sets of Generator & auxiliaries system including automatic water sprinkler type firefighting system for Generators.
8. 3 sets of Static Excitation system including excitation transformer, DVR & accessories.
9. 3 sets of 13.8KV IP Bus Duct including CTs & PTs, LAVT, VT & NG cubicles
10. 10 Nos. 13.8/220/√3 kv, 45MVA, 1ϕ GSU transformer & accessories.
11. 1 no. 220/33kV, 12 MVA, 3 ϕ & 1 no. 33/11KV, 6 MVA, 3 ϕ Power transformer
12. 1 lot 220V & 48V DC System for Powerhouse
13. 1 lot C&M (SCADA) system excluding laying of Fibre Optice Cables between Dam, Valve House and Power House.
14. 1 lot Protection system
15. 1 lot of cabling system for Powerhouse.
16. 1 lot of 11 kV Switchgear
17. 1 lot 415 V Switchgear & Valve House Transformer
18. 1 lot UAT & SST
19. 1 lot of Cooling Water & Partial Dewatering system including pipings
20. 1 lot of grounding system for PH area including Underground Earthing Network and Over ground Earthing Network.
21. 1 lot of HP & LP Compressed Air system
22. 1 lot of Oil Handling System-Lubricating Oil
23. 1 lot of Oil Handling System-Insulating Oil
24. Other miscellaneous Mechanical/Electrical assemblies
25. Extended support for conducting Field efficiency testing.
26. Field efficiency testing & testing of combined output of 330 MW at generator terminals.
27. 1 lot of any other item not covered above but required for project completion

**Note:**

**1.** EOT crane (s) in powerhouse may not be available for erection of 1st stage pipings, pit liners, turbine housing and central frame works of unit(s). Erection of the same may be completed by contractor through other alternate arrangement, to be facilitated by BHEL/HCC.

2. **Construction Power of 200 kW during erection and 1 MVA to 1.5 MVA for equipment testing during pre-commissioning and post spinning, shall be provided free of cost.**

**Detailed scope of work is as given below**

1. Turbine, MIV & Penstock Valve- as per BRIEF DESCRIPTION OF TURBINE below.

2. Digital Governors comprising of hydro mechanical cabinet& EHGC, hydraulic over speed device, complete Oil pumping system oil leakage units, moisture detectors, oil level relays, pressure transmitters, Electrical transducers, emergency slide valve, flow meter, Temperature scanner, oil level indicator & controller, Head/tail race measuring equipment and feedback mechanism along with piping and associated equipment.

3. Generator- as per BRIEF DESCRIPTION OF GENERATOR below.

   The stator frame appx 7000 mm A/F shall be dispatched to site in segments.. The stator core O/D and I/D are appx 5850 mm and 4866 mm respectively. The core height is appx. 1900 mm. The complete core assembly and winding, flux test, the HV test and other tests shall be carried out at the site. The thrust collar is separate which is to be pressed / assembled at site., air coolers, anti-condensation pit heaters and control panels,

   -Rim type rotor to be assembled at site.

   -Assy of molded air guides while maintaining proper gaps with fans to suit the assembly at site.

   -thrust and guide bearing above the rotor, plug in type oil coolers,

   Braking & Jacking system, HS lubrication system, carbon dust collection system for slip rings, brake dust collection system consisting of extraction unit, hoppers, hoses etc.

   -Upper and lower brackets, upper and lower air baffles, generator covering sheets, turbine pit cover sealing,

   -Cooling water system with starter panels, flow, pressure, temperature monitoring and necessary regulating/ check valves etc.

   -Water Sprinkler type fire extinguishing system.

   -various indicating & measuring instruments and devices like over speed, vibration monitoring, temperature, partial discharge monitoring, SSG, moisture detectors in oil, limit switches, shaft current monitor etc,

-Various foundation plates, foundation bolts, barrel access door, lighting arrangement for barrel, dome and turbine pit areas, various instruments/ control devices etc.

-Blue matching of bearing pads with shafts and of load components of thrust bearing thrust bolt, thrust block etc with corresponding parts shall be carried out, along with associated equipment.

4. Excitation System including excitation transformers.

5. Isolated phase 13.8 KV , 6300 Amps Bus ducts mainly comprising of 3 sets each of main bus duct, Delta bus duct, tap off bus duct for LAVT, NG, UAT and Excitation transformer, galvanized steel structures, earthing switches etc along with various rubber bellows, seal off bushings, CTs, PTs and other associated equipment. Field tests during erection/ commissioning current carrying capacity, voltage withstand test etc. Connection and disconnection of various shorting links etc during pre-commissioning and commissioning is included in this contract.

6. Generator transformers 45 MVA, 13.8/220/√3kV single phase along with set of valves, piping, hangers, hardware, CW system consisting of radiators & coolers etc, oil , rails and other associated equipment. All ten nos. transformers including one no. spare to be installed in transformer cavern. All routine tests except HV test shall be conducted at site. The connection on HV side to the 220kV overhead lines shall be done by other contractor and not in the scope of this work.

7. Power transformers 1 no. 220/33kV, 12 MVA, 3 ϕ & 1 no. 33/11KV, 6 MVA, 3 ϕ Power transformer along with set of valves, piping, hangers, hardware, CW system consisting of radiators & coolers etc, oil , rails and other associated equipment. All routine tests except HV test shall be conducted at site.

8. D.C. System:- 220V D.C. system comprising battery, charger, DC distribution board, 220VDC/415V AC invertor etc.

   48V DC system comprising battery, charger, DC distribution board, Incoming feeder, Outgoing feeder & specified spares.

9. Control & Monitoring system (SCADA) equipment , Local control Boards equipments, Computerized Control Equipments in Central Control Room (CCR), Process Control Networks & Power house Lane, RTU at Dam, RTU at Butterfly Valve House, Software, Time Synchronization system, miscellaneous items and spare parts.

Local Control Boards are provided for UCB for each Generating Units, Local Control Board (LCB) for Common and Station Services, Dam Control & Monitoring, LCB for Electrical power supply service board, LCB for 220 kV and 33 kV s/yard control boards. Interface to protection system shall be provided in the respective UCB/LCB.

Computerized system in central control room consisting of desktop, laptop, max LINC PC , max STORIAN PC, Training simulator PC, printers, table, desk etc.

Process Control Networks & Power house LAN having Fibre optic network between Ethernet switches and UCB/ LCB forming Plant control network, Fibre optic link between Ethernet switches and various computers, printers located in CCR forming Central Room Network. Fibre optic power house LAN has redundant Gigabit Ethernet switches suitable for various 24 ports, one no. 24 port 10/100 base T Ethernet switch connected to PH LAN with two wireless LAN access point covering machine hall floor, one no. 24 port 10/100 base T Ethernet switch connected to PH LAN with one wireless access point in training hall, one no. 24 port 10/100 base T Ethernet switch connected to PH LAN with one wireless access point in conference room. Process Control Networks has various computers, printers, software etc.

Commissioning of all this system shall be carried out by BHEL engineers. However erection associated cabling works and all assistance for Pre commissioning and commissioning for the same shall be provided under the scope of this contract.

Fibre Optical Cable between Dam, butterfly valve house and powerhouse shall be laid by M/s HCC and excluded from the scope of contractor.

10. Protection system for turbine, generators transformers, 11 KV switchgear, 33KV feeders, 33KV Bus coupler, 33kV line relay, station Aux. transformer and various relay panels.

11. One lot of grounding system for PH area including Underground Earthing Network for Transformer Hall, Powerhouse, Penstock Valve, Tail Race and other adjoining functional areas and Over ground Earthing Network for Transformer Floor, Generator Floor, all other floors of Powerhouse, any other areas where earth fault current may flow. Connections of risers/earthing to equipments/panels shall be in the scope of contractor.

12. Power, control and instrumentation cables complete with cable terminals, accessories, trays/ support structures, cabling/-wiring, proper dressing, identification tags, clamping of cables on trays for all the hydro generating equipment, transformers, bus

ducts, along with associated items & auxiliaries. BUT excluding the cabling for switchyard & transmission line, few BOPs namely EOT Cranes, Fire Fighting System, illumination system, HVAC system, elevators, communication system.

Lugs, ferrules, sleeves etc. supplied by Manufacturing Unit, will be released to contractor free of cost. However, additional quantities (if required) of lugs, ferrules, sleeves and cable ties upto 2.5 sq.mm for cable termination are in the scope of contractor.

13. 11 kV, switchgear cubicles, circuit breakers etc.

14. 415V Switchgear & Aux. Transformers comprising 415 V switchgear, UAB/SSB/SAB/VHM/MATB/TRTB, current breaker, mounded case circuit breaker , CT, UAT, SST, switchyard auxiliary transformer, valve house transformer etc.

15. Auxiliary Transformers as below,

- 3 nos. of 13.8/0.415 kV, 1000KVA Dry Type unit aux. transformers & accessories
- 2 nos. of 11/0.415 kV, 1500 KVA, Dry Type Station Service Transformers & accessories.

16. One set of cooling water system and Partial Dewatering System for complete powerhouse shall comprise of six nos. horizontal centrifugal pump-motor sets for cooling water circuit (2 nos. per unit), six nos, submersible pump motor sets of cooling water pump well (2 nos. per unit), six nos. automatic back wash strainers for cooling water circuit, six nos. cyclone separators with automatic purging system, six nos. motorized gate valves, one set of anti-condensation lagging on exposed piping, piping, valves, supports, fittings, instruments, special tools and specified spares etc.

    Cooling water system shall comprise of twin cooling water circuit for turbine, generators, transformers and HVAC system of each unit.

    The cooling water for each unit shall be taken from cooling water sump fed by tail race of respective unit by two nos. horizontal centrifugal pumps and discharge water to respective tail race.

    Outgoing water shall discharges water into tail race or downstream side of tail race gates.

    Two nos. backwash strainers shall be provided in each cooling water circuit. The same pump motor sets shall be used to dewater the tail race outside the tail race gates. The system shall be complete with valves and instruments.

The powerhouse drainage system: two nos. submersible pump-motor set shall be installed in the pump well provided for each unit on the upstream side.

All leakage and seepage of this pump-well shall be drained out by these pump motor sets. Also the seepage and leakage of power house shall be drained into the tail race.

All the exposed piping shall be provided with suitable insulation against condensation. Operational tests for proper functioning of system and leakage test of pining shall be done at site.

17. Drainage water systems along with piping, valves, fittings, starter panels, water tight manhole doors and associated equipment for drainage of power house(two submersible pump/motor) ,transformer oil water sump (one submersible pump/motor). The drainage water shall be pumped out through discharge header and finally into tail race above maximum flood level.

18. One set of HP Compressed air system for complete power house for supplying pressurized air to governing oil system of turbine, and MIV and generator breaks. It comprises of two reciprocating air compressor-motor sets , air dryers HP air receiver for turbine and MIV with necessary fittings etc. , one set of pressure reducer valves, necessary valves, drain traps, seamless pipings, fittings and supporters etc. it has also one set of instruments and safety devices along with one set of specified spares.

19. One set of LP compressed air system for complete power house for intermittent supply of air to cater the needs of generator brakes system of the generating units and other station service requirement.

20. Oil Handling System for insulating oil consists of 2 Nos. Oil Filteration Plant 6000 LPH, 2 Nos. Trolly Mounted insulating oil tank of capacity 25000 Ltrs, dryers, oil hoses, evacuation system for transformer tanks and specified spares and tools & tackles.

    Oil Handling System for lubricating oil consists of 2 Nos. centrifuging type Oil Filteration Plant 1200 LPH, 2 Nos. Trolly Mounted Lubricating oil tank of capacity 600 Ltrs, pump, hoses and specified spares and tools & tackles.

21. Erection of 1$^{st}$ stage embedded , 2$^{nd}$ stage embedded and surface/ exposed air, oil, water or any other pipelines for all above systems including fabricating/making site bends, cleaning, clamping, flushing, hydraulic testing as per drawing requirements and standard practices etc. Pipes shall in general be supplied in straight lengths and to be

bent at site as per requirement. For medium and large size pipes, regular bends may not be supplied and therefore bends shall have to be fabricated at site.

The ends of the pipelines shall be kept covered during concreting and/or other civil works. Insulation of the pipelines as per requirements given in the relevant drawings of different systems shall be done at site.

22. Finish painting of equipment as per drawing requirements. Paints shall be supplied by BHEL. Painting may also be required on embedded / foundation parts prior to concreting etc.

23. Some of the main tests apart from the routine tests during erection, pre commissioning and commissioning shall include HV, SCC, OCC, load rejection tests upto 110 %, emergency stop tests, over speed tests, turbine & generator output tests, vibration measurement & balancing, etc on all units and field efficiency test and type test on one unit. Inspection of the units shall be carried out after load throw off tests and re-tightening of wedges, fasteners etc if required shall be carried out.

24. Any other works required to be carried out which have not been explicitly mentioned above but are essentially required to be carried out to complete the individual assemblies and the unit/ units as a whole including pre commissioning and commissioning.

**BRIEF DESCRIPTION OF TURBINE**

**1. TURBINE SYSTEM**

**A. Embedded part**

The embedded parts comprise mainly of Turbine Housing (Housing cone, Top cover) Lower Pit Liner, Central Frame Work and embedded pipings in 1st stage primary concreting.

**Turbine Housing:** - Turbine housing consisting of cylindrical portion s, top cover portion in pieces to be assembled & welded together at site . A flange is provided for supporting the turbine guide bearing.

Steel aeration pipes are provided in the top cover for the aeration of turbine.

Suitable ejector along with valves and pipings shall be supplied for draining any water that may find its way above the housing. The pressurized water to ejector system shall be supplied from the unit cooling water system. The total weight of turbine housing will be around 63 MT. Dia of turbine housing is appx. 8562 mm , thickness 20 mm, height is appx 4270 mm.

**Lower Pit Liner:** It shall be supplied in parts. This will be welded together and to turbine housing at site. Weight of lower pit liner is 20 T aprox..

Central Frame Work: The Central Frame Work is supplied in grid section which shall be bolted together at site. These grid sections are supported on set of ISM beam. It shall be provided to permit access to nozzle and runner for general inspection purposes. An opening of ample dimensions shall be provided in the central frame work for lowering the runner with trolley on the rails below the central frame work.

Trolley for the transportation of runner shall be provided. Necessary track (rails) and the support structure etc. shall be supplied.

The embedded pipelines (Carbon Steel and SS) weighing total about 125 tonnes for all units have been foreseen in primary concreting which mainly comprise penstock drain, distributor drain, brake jet valve piping etc. All welding shall be checked as per drawings. Pipes shall in general be supplied in straight lengths and to be bent at site as per requirement**.** For medium and large size pipes, regular bends will not be supplied and therefore bends shall have to be fabricated at site within the quoted rates. The pipes are to be laid and welded at site as per drawing. The pipe routing can be suitable modified at site. All welds are to be tested as per drawing requiremnts. All pipes are to be hydraulically tested at site after welding.

The embedded tubes for field efficiency test of turbine weighing 2 T approx for all the units have been foreseen. Major portion of this piping will be embedded in first stage concreting, rest is exposed piping.

**B. Foundation parts**

The foundation parts comprise mainly distributor piping, inlet pipe to distributor and upper pit liner and embedded pipes in secondary concreting.

**Distributor Piping:** It shall be of fabricated constructions with branch outlets for five nozzles. It shall be supplied in about six segments to site alongwith make up pieces. Thickness of sections varies from 28 mm to 60 mm appx.

Edge preparation has to be done at site. The welding of distributor to be NDT as per drawing requirement. These joints are to be Stress relieved as per drawings of distributor after welding at site.

The distributor assembly after welding shall be hydraulically tested as per drawing requirements. . The test cone shall be installed at distributor inlet end for pressure testing. The distributor piping shall be kept pressurized during the process of concreting.

**C. Embedded pipe lines in secondary stage foundation**

For various functions for all units embedded pipelines have been provided. Necessary cutting in pit liner etc wherever required for the embedded pipelines, acid pickling etc. shall have to be done at site. Pipes shall in general be supplied in straight lengths and to be bent at site as per requirement. For medium and large size pipes, regular bends may not be supplied and therefore bends shall have to be fabricated at site within the quoted rates. The pipes are to be laid and welded at site as per drawing. All welds are to be tested as per drawing requirements. All pipes are to be hydraulically tested at site after welding.

**D. Nozzle Servomotor and Deflector Servomotor assembly**

There are five internal nozzle servomotor / deflector servomotor assembly in one unit. Each set consists of Nozzle Inlet/Spider, Nozzle tip and nozzle tip liner(SS), jet deflector, needle and needle stem, nozzle servomotor, deflector servomotor etc. Before erection, complete nozzle and deflector assembly are to be tested in S/bay. Weight of each nozzle assembly is approximately 7.3 tonnes.

Deflector operating mechanism: It shall consist of servomotor connecting rod, lever, inter connecting links etc.

Oil headers for nozzle servomotor assembly and deflector servomotor assembly: Supplying oil for opening and closing of nozzle servomotors and deflector servomotors oil headers are provided.

**E. Runner & shaft assembly**

The Pelton type runner assembly having 21 buckets with OD 3405.4 mm appx and height 770 mm is weighting approximately 16 tonnes.

The turbine shaft nominal dia appx 805 mm with flanges at both ends is bolted to runner at turbine end with shear bush and fitted bolt. Upper flange of turbine shaft is bolted with fitted bolt to generator shaft bottom flange. Total length of shaft is approx. 5460 mm and aprox. weight is 32 tonnes.

The shaft is provided with a collar to support the runner and shaft assembly on the turbine guide bearing housing when uncoupled from generator end.

**F. Turbine guide bearing**

Turbine Guide bearing shall be of self-oil lubricating shell type with cooling arrangement. The bearing shall be located above the turbine runner.

The bearing shall permit sufficient vertical movement of the runner and shaft to allow for adjustment of the generator thrust bearing.

**G. Turbine sealing**

Conventional shaft sealing arrangement is not provided in pelton turbine. For shaft sealing serrations is provided in bottom cone of turbine housing.

**H. Other standard assembles**

Various assembles like feedback system, oil pumping system, oil air receives, oil leakage unit as generally provided in any hydro unit are all foreseen which shall be erected at site.

**I. Feedback mechanism**

It comprises of wire rope mechanism and LVDT to transmit signal of the movement of nozzle servo motor (opening/closing ) to the hydro mechanical cabinet (HMC) of governor.

**J. Installation of metering instruments**

Pressure and temperature measuring instruments are installed on this metering panel to measure the pressures of different points like distributer, sealing air & water pressures, servomotor closing & opening pressures etc. The pipelines shall be hydraulically tested to required pressure.

**K. Oil, water, air pipelines**

Laying and clamping /supporting of oil pipe lines ,water pipe lines and compressed air pipe lines are shown indicative in respective drawing .which can be decided to suit site condition. Pipes shall in general be supplied in straight lengths and to be bent at site as per requirement. For medium and large size pipes, regular bends may not be supplied and therefore bends shall have to be fabricated at site within the quoted rates .The pipes are to be welded at site as per drawing. All welds are to be tested as per drawing requiremnts. All pipes are to be hydraulically tested at site after welding. Cleaning of pipe acid pickling to be carried out as per drawing requirement.

**L. Other Miscellaneous Mechanical assembly**

Other miscellaneous mechanical assembly like, hatch covers, platform and ladders etc. are envisaged.

**M. Main Inlet Valve (Spherical Valve):**

**Main Inlet Valve**: 1600 mm nominal diameter spherical type including inlet pipe, outlet pipe with dismantling joint, Service seal( main seal) on U/S and Maintenance seal on D/S side is piston type, two levers, two servomotors, Bypass valve, Air release/Decompression valve and anti-vacuum valve, drain valve, flow measurement device etc. The upstream and downstream cast machined bodies are bolted together. The valve door shall be of casting with trunnions on both sides bolted. Weight closure is envisaged.

**Inlet pipe of MIV:** The inlet pipe (56 mm thick) is in one piece of diameter 1600 mm at upstream side and is welded to penstock and at downstream side flanged to MIV. Welding shall be subjected to NDT as per drawings.

**Outlet Pipe with dismantling joint:** The outlet pipe (56 mm thick) with dismantling joint is in one piece of diameter 1600 mm. At upstream side it is flanged to MIV and at downstream side flanged to distributor.

**N. Penstock Valve (Butterfly Valve):**

One nos. 4000 mm dia Butterfly Valve, is provided with servomotors, counterweight, lever arm assembly, needle type by-pass valve, air release & anti vacuum valves, differential pressure switch, over velocity trip mechanism, hydraulic & electric control panel, oil pressure system etc.

**Inlet Pipe of Penstock Valve:** It is fabricated and supplied in two halves bolted together and to be sealed welded at site. On downstream side it is flanged to BF valve and welded to penstock on upstream side. Necessary connection, tapping and fittings for pressure gauge, penstock drains and bypass connection shall be provided on this pipe. NDT of inlet pipe with penstock shall be carried out as per drawings.

**Outlet Pipe with dismantling joint of Penstock Valve:** It is fabricated from steel plates of same diameter as penstock. It is flanged to penstock valve at upstream side and welded to penstock at downstream side. Necessary connections, tapings and fittings for pressure gauges, air release valves, anti-vacuum valves, drainage valve, manhole and bypass connections etc. shall be provided.

**BRIEF DESCRIPTION OF GENERATOR**

**GENERAL DESCRIPTION OF VARIOUS ASSEMBLIES:**

The generator is a vertical suspended type coupled to a Pelton turbine.

**Stator**

The stator frame shall be dispatched to the site in segments. The frame's outer A/F is 7000 mm appx. . The core building and stator winding shall be done on-site. The stator core O/D and I/D are approx. 5850 mm and 4866 mm respectively. The core height is 1900 mm. The core flux test, the HV test and other tests shall be carried out on the completed stator at the site.

**Rotor**

The rotor consists of the bottom shaft, spider, rim, poles, top shaft and tubular shaft. The turbine shaft is bolted to the turbine at the bottom and the bottom shaft at the top. The bottom shaft is coupled with the spider. The top shaft is bolted to the top of the spider and the tubular shaft sits on top of the top shaft.

The rotor spider is a fabricated structure made in a single piece. Its O/D is 2720 mm. The rotor rim, which shall be assembled around the spider on-site, is built by stacking sheet steel laminations in several staggered layers. The rim height is 1960 mm appx.. All the laminations shall have to be degreased, cleaned, de-burred, segregated by weight and accordingly assembled. This ensures uniform weight distribution which is a

necessity. After assembly, the laminations are clamped between steel end plates using studs and nuts. The rim is secured to the spider using a 5-key arrangement at each of the spider's key bars.

There are 16 poles to engage with the corresponding slots in the rotor rim. The weight of each pole is approximately 4400 kg.

The axial fan, consisting of 16 segments at the top and 16 segments at the bottom, is bolted onto the rim end plates.

**Bearings**

The thrust bearing and the upper guide bearing are positioned above the rotor in the upper bracket. The upper bracket shall be bolted onto the stator frame. The lower guide bearing is positioned below the rotor in the lower bracket.

The thrust bearing consists of 12 pads that rest on a spring mattress. Both guide bearings consist of 12 pads each. The pads are mounted on a support ring provided on the brackets. The bearings are all self-lubricating and immersed in an oil bath in its respective brackets. Plug-in type oil coolers are provided in the brackets to help dissipate the heat.

**Brackets**

The upper bracket is a fabricated steel structure having a central bearing housing and radial arms. The center and arms shall be assembled on-site and the entire assembly shall be bolted onto the stator frame.

The bottom bracket is a fabricated steel structure having a central bearing housing and 4 radial arms. The center and arms shall be assembled on-site and the entire assembly shall rest on the bottom bracket sole plates.

**Sole plates**

Two sets of sole plates – 8 stator sole plates and 4 bottom bracket sole plates – shall be grouted into the foundation. Foundation bolts are used to secure the sole plates.

**Slip Rings & Brush Gear**

A static excitation system is provided for energizing the field winding of the rotor. The excitation is fed to the rotor through slip rings located at the top of the rotor. The slip rings are mounted during erection. The brush gear shall be mounted on the brush gear

casing which is mounted on the upper bracket. The carbon dust generated by the rubbing of the brushes is collected in cleanable filters mounted on the brush gear casing.

**Ventilation**

The generator has a closed-circuit air ventilation system. Air coolers that are mounted on the stator frame help dissipate the heat from the stator core. Air guides and air baffles are provided to control the direction of the air-flow.

**Braking and Jacking System**

Pneumatic brake units are mounted on the lower bracket. They are also used for jacking the rotor during maintenance. The brakes are operated using a control panel located outside the generator barrel. For trapping and subsequently disposing the dust generated during braking, brake dust collection equipment has also been provided.

**Cooling Water System**

Cooling water pipelines are provided to supply cooling water to the air coolers and oil coolers. Pressure gauges, temperature indicators and flow meters shall be installed at various locations on the pipelines for monitoring purposes. Lagging material shall be wrapped around all pipes after its assembly on-site.

**Water Sprinkler Type Fire Extinguishing System**

An automatic water sprinkler system complete with ring headers, discharge nozzles, heat detectors, smoke detectors, etc. has been provided.

**Other major equipment**

- Partial discharge analyser
- Online vibration monitoring system
- Shaft current monitor
- Moisture detector
- Hydrostatic lubrication system
- Oil vapour piping system
- Generator flooring (segmental)
- Barrel Lighting
- Space heaters
- Pit access door

**General:**

Special welding electrodes for main assemblies like distributor piping, distributor inlet pipe, MIV(Spherical valve) and its inlet pipe, Penstock valve, its inlet pipe/outlet pipe, major piping works of turbine eg: CW Systems, drainage/dewatering system etc. shall be provided by BHEL manufacturing units and shall be issued to contractor for subject work free of cost.. Contractor shall maintain proper records for all those consumables. Any additional requirements resulting due to reasons namely but not Limited to avoidable wastages, mis-handling, poor storage, high rate of rejections due to poor quality of welding or deployment of insufficiently experienced welders etc shall be arranged by contractor at his own cost within their quoted price for subject work.. General purpose welding rods shall be arranged by contractor at his own cost. In case the electrodes supplied issued by BHEL are found inadequate/unusable, contractor has to arrange the same from market as per provision SCC 4.1.5 and actual cost reimbursable basis. General purpose welding rods shall be arranged by contractor at his own cost.

-Insulating materials for stator winding shall be provided by BHEL.

-First filling of oil with 10% extra for turbine and generator bearings, OPU system, and transformers shall be supplied by BHEL. Any undue wastage of oil due to mis-handling, poor quality of piping and/or other works resulting into leakages or spillages shall have to be arranged by contractor at his cost or recoverable from him.

-In order to save time of assembly/erection of distributor piping, the welding shall be carried out by MIG process as far as possible.

**NDT:**

Distributer Segments, Inlet pipe with taper piece- 100% NDT tested as per drawing. All other butt welds shall be as per drawing requirements.

**2.2.** The equipment and piping shall be erected in conformity with the provision of standard/ specification and as may be directed by BHEL. The method of welding (Arc, gas, TIG, MIG/MAG or other method) may be indicated in the detailed drawing/ schedules. BHEL engineer will have option of changing the method of welding as per site requirements.

**2.3. Fibre Optical Cable between Dam Area & Valve House and Valve House & Power House including termination link for interface of HM control System with SCADA System of Power House is excluded from the scope of contractor. However, contractor shall be responsible for the integration of remote termination unit (RTU)**

**at Dam Area, Valve House and Power House for interfacing of Control System of HM Works with SCADA System of the Power House.**

**2.4.** Connection piece on upstream of MIV for connection with penstock/Pressure Shaft including its welding at interface point shall be in the scope of BHEL's customer and therefore excluded from the scope of contractor. However, taper piece on downstream of MIV for connection with distributer is in scope of work of Sub-contractor including required welding for connection.

**2.5.** Connection piece on upstream & downstream of Penstock Valve for connection with Penstock/Pressure Shaft including welding at interface points shall also be in the scope of BHEL's customer and excluded from the scope of contractor.

**2.6.** Construction drawings and documents shall be provided at site to the successful bidder for erection of work.

**2.7.** Details with Weight & Dimension of major equipment supplied by BHEL under this scope are given in **Chapter-IV, Part-I of TCC**. However, changes in design may occur as is usual in such large project, for which no additional compensation will be payable and contractor shall complete the entire work as detailed in the tender specifications within finally accepted rates/ prices.

## 3. Time Schedule

### 3.1. Initial Mobilization

After receipt of LOI, Contractor shall discuss with Project Manager / Construction Manager of BHEL regarding initial mobilization. Contractor shall mobilize necessary resources within 2 weeks of issue of letter of intent or as per the directive of Project Manager / Construction Manager. Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

### 3.2. 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 mobilize resources as per requirement to commence the work of erection, testing etc. as per scope of work, and progressively augment the resources to match schedule of the project.

### 3.3. Commencement of Contract Period and Tentative Schedule

BHEL Engineer will certify the actual date of start of work (zero date) after adequate mobilization of manpower, T&P and other pre-requisites for starting the works as stated in the contract.

Material handling works which are in progress with material already arriving at site shall be undertaken immediately, after issue of LOI. Fronts for earth mat laying, 1$^{st}$ stage embedment etc. will be available at site and contractor have to start erection at available fronts immediately after their mobilization at site as per the directive of Project Manager/Construction Manager of BHEL.

The contractor has to subsequently augment his resources in such a manner that major milestones of erection, testing & commissioning shall be achieved as per tentative schedule in **ANNEXURE- II**. Detail activity wise schedule will be discussed and finalized with successful bidder after their mobilization at site.

### 3.4. Contract Period

The contract period for completion of entire works including material handling, erection, testing & commissioning and handing over of all units will be **28 (Twenty eight) Months** from the actual date of start (zero date).

### 3.5. Consequence of Delay

As per 2.7.9 of GCC.

## 4. Tentative Weight Schedule

**4.1.** Detail package weight & dimension are as per **Annexure-I**. Total material to be handled is approx. **6700 MT** and to be erected is approx. **5000 MT**. Out of **6700 MT** material, approx. **2800 MT** material has already been unloaded by other contractor of BHEL. Refer Note of **Clause 2.1.2 of Chapter –II, Part- I of TCC** for detail.

**4.2.** Detail of materials to be handled as per **Clause 2.1.1 of Chapter –II, Part- I of TCC** and to be erected as per **Clause 2.1.2 of Chapter –II, Part- I of TCC.**

**4.3.** Weights and package size mentioned for the above items are tentative and may change during detail design.

**4.4.** Number of Panels for complete Control & Monitoring system, excitation system, protection system, starter panels etc. shown are tentative and likely to change during detail design. Complete scope of PSNR shall be the scope of Erection Contractor.

**4.5.** Type and size of cable mentioned above is tentative and likely to change during detail design. Complete scope of PSNR shall be the scope of Erection Contractor.

## 5. Rate Schedule/BOQ

### 5.1. Rate Schedule

| Sl. No. | DESCRIPTION OF WORK | Rate in Rupees / MT(in figures and words) | Price in Rupees in figures and words) |
|---|---|---|---|
| **MAIN RATES** | | | |
| 1. | **Lumpsum price** for receiving of material at work site, fabrication, erection, testing, commissioning and handing over the entire works of 3 x 110 MW Kishanganga HEP **(Approx. tonnage involved is 5000 MT).** Refer Clause 2.1.2 (Chapter-II, Part-I of TCC) | **LUMPSUM PRICE** | **LUMPSUM PRICE** |
| 2. | **Rate in Rs./ MT** for entire scope of work as defined in this tender specification in respect of receipt, unloading of materials / equipments from Trucks/Trailers etc., its verification, proper storage, stacking and preservation of materials / equipments in project open store / closed storage shed and of transportation of materials / equipments including loading from project open store / closed storage shed to power house or other work site, unloading with EOT Crane/Mobile Crane and handing over for Erection**.** **(Approx. tonnage involved is 3400 MT)** Refer Clause 2.1.1(Chapter-II, Part-I of TCC) | **Rate in Rs./ MT** | |

| | | | |
|---|---|---|---|
| 3. | **Rate in Rs./ MT** for entire scope of work for already unloaded material at stores as defined in this tender specification in respect of verification, proper storage, stacking and preservation of materials / equipments in project open store / closed storage shed and of transportation of materials / equipments including loading from project open store / closed storage shed to power house or other work site, unloading with EOT Crane/Mobile Crane and handing over for Erection**.**<br>**(Approx. tonnage involved is 2800 MT)**<br>Refer Clause 2.1.1(Chapter-II, Part-I of TCC) | **(70% of Rate quoted in against Sl. No. 2 of Rate Schedule )** | |
| 4. | **Rate in Rs./ MT** for entire scope of work as defined in this tender specification in respect of receipt, unloading of materials / equipments from Trucks/Trailers **with EOT Crane/Mobile Crane directly at powerhouse sites/Other Work site**, its verification, proper storage, stacking and preservation of materials / equipments.<br>(**Approx. tonnage involved is 500 MT**) | **Rate in Rs./ MT** | |
| 5. | Loading of materials including packing (if required) in the truck/ trailers to be placed by carriers at site/ stores & booking of the same to destination as per instructions of Engineer. **(Approx. tonnage involved is 200 MT)** | **Rate in Rs./ MT** | |
| **TOTAL PRICE OF CONTRACT** | | | |

**5.1.1.** **Rate for Sl. No. 3 shall be taken as 70% of rate quoted against Sl. No. 2 Contractor not to separately quote for this Sl No.3.**

**5.1.2.** On the discretion of BHEL site engineer, some of the material can be directly unloaded in the powerhouse/other work site. Contractor shall keep record of the same. **(Approx. tonnage involved is 500 MT).**For such works contractor shall be paid under as **Sl. No. 4 of Rate Schedule**.

**5.1.3.** On the discretion of BHEL site engineer, some of the material can be loaded including packing (if required) in the truck/ trailers to be placed by carriers at site/ stores & booking of the same to destination as per instructions of Engineer. **(Approx. tonnage involved is 200 MT)**.For such works contractor shall be paid under as **Sl. No. 5 of Rate Schedule**.

**5.1.4.** Contractor shall fully understand equipment description and **Scope of Work including Notes, Inclusion and Exclusion** before quoting. The scope of work and responsibility of the contractor as mentioned under these specifications shall be covered within the quoted rates.

**5.1.5.** **Contractor is required to go through the Chapter-VIII & X of Part-I of TCC for facilities and T&P to be given to contractor free of cost before quoting the price and bidder has to quote his price keeping in mind such facilities and T&P to be given free of cost.**

**5.1.6.** Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender.

**5.1.7.** The tenderer shall quote the rates as per the rate schedule only. No cutting/ erasing / over writing shall be done.

## 5.2. BILLING BREAK UP FOR SUB CONTRACTOR FOR SL. NO. 1 OF RATE SCHEDULE (Clause 5.1, Chapter-V, Part-I Of TCC)

| Sr. No. | ACTIVITY | UNIT NO. | | | COMMON | TOTAL |
|---|---|---|---|---|---|---|
| | | I | II | III | | |
| **1** | **Pelton Turbine and Accessories** | | | | | |
| 1.1 | Erection of first stage pipings, pit liners, turbine housing & central frame works. | 1.5 | 1.5 | 1.5 | | 4.5 |
| 1.2 | Erection of foundation parts comprising distributor piping, inlet pipe to distributor, including hydraulic testing etc. | 2.5 | 2.5 | 2.5 | | 7.5 |
| 1.3 | Nozzle servomotors, deflector servomotors assembly | 1.5 | 1.5 | 1.5 | | 4.5 |
| 1.4 | Shaft and runner assembly | 0.3 | 0.3 | 0.3 | | 0.9 |
| 1.5 | Guide bearing including pad scraping | 0.5 | 0.5 | 0.5 | | 1.5 |
| 1.6 | OPU with sump tank and associated pipings for Governor and MIVs. | 0.2 | 0.2 | 0.2 | | 0.6 |
| 1.7 | OPU adjustment, Dry stroking and time adjustment of Nozzle Servomotors, Deflector Servomotors etc. | 0.3 | 0.3 | 0.3 | | 0.9 |
| **2** | **Digital Governing system & Accessories** | | | | | |
| 2.1 | Installation of Governor HMC and EHGC. | 0.3 | 0.3 | 0.3 | | 0.9 |
| 2.2 | Erection of governor control oil pipeline. | 0.5 | 0.5 | 0.5 | | 1.5 |
| **3** | **Turbine MIV & Accessories (Spherical Valve)** | | | | | |
| 3.1 | MIV(Spherical), inlet pipe, outlet pipe, accessories, servomotors assembly and testing & pipings. | 2 | 2 | 2 | | 6 |
| **4** | **Penstock Valves & Accessories (Butterfly valve)** | | | | | |
| 4.1 | Penstock Valve(BF), inlet pipe ,outlet pipe and associated equipments including OPU System and pipings. | | | | 2 | 2 |

| Sr. No. | ACTIVITY | UNIT NO. | | | COMMON | TOTAL |
|---|---|---|---|---|---|---|
| **5** | **Generator & Accessories** | | | | | |
| 5.1 | Dressing of foundations | 0.1 | 0.1 | 0.1 | | 0.3 |
| 5.2 | Stator core building and Core flux test of stator at Service bay | 2 | 2 | 2 | | 6 |
| 5.3 | Stator winding & HV test of complete stator. | 1.5 | 1.5 | 1.5 | | 4.5 |
| 5.4 | Stator shifting to pit and its alignment, leveling etc. | 0.1 | 0.1 | 0.1 | | 0.3 |
| 5.5 | Rotor assembly in service bay, HV etc. | 2 | 2 | 2 | | 6 |
| 5.6 | Rotor lowering in pit | 0.1 | 0.1 | 0.1 | | 0.3 |
| 5.7 | Installation of lower bracket in pit, alignment etc. | 0.25 | 0.25 | 0.25 | | 0.75 |
| 5.8 | Assembly of brake and jack system. | 0.2 | 0.2 | 0.2 | | 0.6 |
| 5.9 | Upper bracket assembly including Generator flooring in service bay. | 0.25 | 0.25 | 0.25 | | 0.75 |
| 5.10 | Installation of upper bracket in pit, alignment etc. | 0.2 | 0.2 | 0.2 | | 0.6 |
| 5.11 | Blue matching of bearing pads and thrust bearing components assy. | 0.2 | 0.2 | 0.2 | | 0.6 |
| 5.12 | Installation of stator air coolers including CW piping and lagging on pipelines. | 0.2 | 0.2 | 0.2 | | 0.6 |
| 5.13 | Water sprinkler type fire protection system of generator. | 0.05 | 0.05 | 0.05 | | 0.15 |
| 5.14 | Erection of brake dust collector. | 0.05 | 0.05 | 0.05 | | 0.15 |
| 5.15 | Generator instrumentation, gauge panel including calibration. | 0.2 | 0.2 | 0.2 | | 0.6 |
| 5.16 | Rotor-generator shaft coupling including any correction for alignment of generator shaft. | 0.1 | 0.1 | 0.1 | | 0.3 |
| 5.17 | Extension shaft, slip ring, brush gear, CCL including alignment etc. | 0.3 | 0.3 | 0.3 | | 0.9 |

| Sr. No. | ACTIVITY | UNIT NO. | | | COMMON | TOTAL |
|---|---|---|---|---|---|---|
| **6** | **Static Excitation system including excitation transformers & DVR** | **0.3** | **0.3** | **0.3** | | **0.9** |
| **7** | **13.8KV Bus duct** | | | | | |
| 7.1 | 13.8 KV Bus duct including CTs, VTs, PTs, LAVT, NG Cubicles, Steel Structure including NDT & HV | 2 | 2 | 2 | | 6 |
| **8** | **13.8 KV/220 / √3 KV, 1 Φ 45MVA Generator step up transformers** | | | | | |
| 8.1 | Erection of Generator transformers and auxiliaries including 01 no. spare Generator transformer) | 1.1 | 1.1 | 1.1 | 0.5 | 3.8 |
| **9** | **220V DC System & 48V DC System** | | | | | |
| 9.1 | 220V DC system for Powerhouse | | | | 0.3 | 0.3 |
| 9.2 | 48V DC system for Powerhouse | | | | 0.2 | 0.2 |
| **10** | **Control & Monitoring system** | | | | | |
| 10.1 | Control & Monitoring (SCADA) system including computers, VDU's, printers, RTUs, optic fibre cable( all control desk and control panels in control room including Alarm & annunc., sync panels, instruments, relays, automatic energy metering system etc. | 1 | 1 | 1 | | 3 |
| **11** | **Protection system** | **0.5** | **0.5** | **0.5** | | **1.5** |
| | | | | | | |
| **12** | **Cabling system including cable trays & accessories** | | | | | |
| 12.1 | Installation of cable trays | 0.5 | 0.5 | 0.5 | | 1.5 |
| 12.2 | Power cable laying | 0.4 | 0.4 | 0.4 | | 1.2 |
| 12.3 | Control cable laying | 0.6 | 0.6 | 0.6 | | 1.8 |
| **13** | **Power Transformers & 11 KV Switchgear system** | | | | | |
| 13.1 | 11 kV Air Insulated Switchgear with all accessories | | | | 0.9 | 0.9 |

| Sr. No. | ACTIVITY | UNIT NO. | | | COMMON | TOTAL |
|---|---|---|---|---|---|---|
| 13.2 | Power Transformers (12 MVA & 6MVA) | | | | 0.25 | 0.25 |
| **14** | **UAT ,SST & 415 V AC Switchgear system** | | | | | |
| 14.1 | 415 V LT Switchgear | | | | 0.5 | 0.5 |
| 14.2 | 1000 kVA UATs, 1500 kVA SSTs, 312 KVA SAT & 250 KVA Valve House Transformer. | | | | 0.5 | 0.5 |
| **15** | **Cooling Water system & Partial dewatering system** | | | | | |
| 15.1 | CW system (one for each unit) with primary & secondary loop circuit for turbine, generator and transformer, piping etc. | 1.5 | 1.5 | 1.5 | | 4.5 |
| 15.2 | Partial dewatering system | | | | 1.5 | 1.5 |
| **16** | **Grounding system (Excluding switchyard)** | | | | | |
| 16.1 | Grounding system for power house area including connections of risers/ earthing to equipments/panels | 0.4 | 0.4 | 0.4 | 0.4 | 1.6 |
| **17** | **HP & LP Compressed air system** | | | | | |
| 17.1 | HP Compressed System & LP comp air system with compressors, accessories, piping etc. | 0.3 | 0.3 | 0.3 | 0.3 | 1.2 |
| **18** | **Oil Handling System** | | | | **0.2** | **0.2** |
| **19** | **Unit axis alignment** | **0.5** | **0.5** | **0.5** | | **1.5** |
| **20** | **Boxing up of units** | **1.25** | **1.25** | **1.25** | | **3.75** |
| **21** | **Pre commissioning checks** | **1** | **1** | **1** | | **3** |
| **22** | **Painting of equipments** | **0.2** | **0.2** | **0.2** | | **0.6** |
| **23** | **Spinning and bearing run of units** | **1** | **1** | **1** | | **3** |
| **24** | **Synchronizing including commissioning tests prior to synchronizing** | **0.7** | **0.7** | **0.7** | | **2.1** |
| **25** | **Generator Field efficiency testing & testing of combined output of 330 MW at generator terminals** | | | | **0.5** | **0.5** |
| | **TOTAL** | | | | | **100** |

**Note:**

1. In order to facilitate part payment, BHEL Site Engineer at his discretion may further split the contracted rates/percentages to suit site conditions, cash flow requirements according to the progress of work as per GCC Cl. 2.23.1 v).

2. The above billing break up may not include all the activities for Erection, testing & commissioning of E&M package under scope of contract. However, erection, testing & commissioning of all the equipments of scope of contract will be in the scope of contractor within the quoted price.

## 6. Terms of Payment

**6.1.** The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

**6.2.** Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

**6.3.** Shortage / damage reports to be submitted on BHEL standard materials management forms. No payment shall be released till the contractor submits these reports and are verified by the Engineer.

**6.4.** Retention amount shall be withheld from each RA bill as per provision of clause 2.22 of GCC regarding retention amount.

**6.5.** Price Variation Compensation- In reference to Clause No. **2.17 of GCC**, please note that **COMPONENT (K)** for **LABOUR ORIENTED PACKAGES** will be applicable for the scope of work covered under this contract.

**6.6.** Subject to any deduction which BHEL may be authorized to make under the contract, the contractor on the certificate of the Engineer at site is entitled for payment as explained hereunder.

**6.6.1. <u>PROGRESSIVE PAYMENT ON PRORATA BASIS:</u>**

**6.6.1.1. Sl. No. 1 of the Rate Schedule (Clause 5.1, Chapter-V, Part-I of TCC**)

100 % of contract rate of Sl. No. 1 of Rate Schedule shall be payable as per Billing Break UP in **Clause 5.2, Chapter-V, Part-I of TCC**.

**6.6.1.2. Sl. No. 2 of the Rate Schedule (Clause 5.1, Chapter-V, Part-I of TCC**)

**A.** **30** % of the rate shall be payable on prorata basis for material handling after the materials are safely unloaded and recorded in stocks as per BHEL practices such as GR/LWB/loading advice/box packing slip subject to furnishing of following information along with the bills as per above clause

- Proof of claim lodged with Railways/Transporters in respect of shortage/open delivery.
- Material Management forms duly filled/Records generated in stocks (Stock registers and computers) and certified by Engineer.

**B.** **20 %** of the rate shall be payable on prorata basis after safekeeping/stacking, proper verification in line with documents and records as per BHEL standards is ensured. Opening of cases/ repacking, wherever necessary (with contractors own T&P and

labour), submission of information as per Material management forms by contractor immediately after verification of materials as certified by Engineer. Required Performa would be supplied by site.

**C.** **10 %** of the rate shall be payable on pro-rata basis for proper preservation till these are transported to Power house/Work site.

**D.** **40 %** of the rate shall be payable on pro-rata basis for transportation of materials including packing (if required) and loading in trucks/trailors from project open store / closed storage shed to powerhouse or other work site, unloading with EOT Crane/Mobile Crane and handed over for erection.

**6.6.1.3. Sl. No. 3 of the Rate Schedule (Clause 5.1, Chapter-V, Part-I of TCC**)

**A.** **30 %** of the rate shall be payable on prorata basis after taking over of unloaded materials, material management forms duly filled/Records generated in stocks (Stock registers and computers) and certified by Engineer, safekeeping/stacking, proper verification in line with documents and records as per BHEL standards is ensured. Opening of cases/ repacking, wherever necessary (with contractors own T&P and labour), submission of information as per Material management forms by contractor immediately after verification of materials as certified by Engineer. Required Performa would be supplied by site.

**B.** **15 %** of the rate shall be payable on pro-rata basis for proper preservation till these are transported to Power house/Work site.

**C.** **55 %** of the rate shall be payable on pro-rata basis for transportation of materials including packing (if required) and loading in trucks/trailors from project open store / closed storage shed to powerhouse or other work site, unloading with EOT Crane/Mobile Crane and handed over for erection.

**6.6.1.4. Sl. No. 4 of the Rate Schedule (Clause 5.1, Chapter-V, Part-I of TCC**)

**A.** **60**% of the rate shall be payable on prorata basis for material handling after the materials are safely unloaded directly in the Power House using the EOT crane of the Power house and recorded in stocks as per BHEL practices such as GR/LWB/loading advice/box packing slip subject to furnishing of following information along with the bills as per above clause

- Proof of claim lodged with Railways/Transporters in respect of shortage/open delivery.
- Material Management forms duly/Records generated in stocks (Stock registers and computers) and certified by Engineer.

**B.** **40%** of the rate shall be payable on prorata basis after proper safekeeping/stacking, proper verification in line with documents and records and proper preservation as per BHEL standards is ensured. Opening of cases/ repacking, wherever necessary (with contractors own T&P and labour), submission of information as per Material management forms by contractor as certified by Engineer. Required Performa would be supplied by site.

**6.6.1.5. Sl. No. 5 of the Rate Schedule (Clause 5.1, Chapter-V, Part-I of TCC**)

**100%** of the unit rate shall be paid on completion of particular items**.**

**Note:**

1. Above payment shall be released after adjustment of the contract value based on actual work carried out.
2. No payment shall be made for handling of T & P items, testing kits, testing/ handling devices issued from BHEL stores for use at site and its return to BHEL stores.
3. In order to facilitate part payment, BHEL Site Engineer at his discretion may further split the contracted rates/percentages to suit site conditions, cash flow requirements according to the progress of work as per GCC Cl. 2.23.1 v).
4. 5% retention shall be made as per clause 2.22 of GCC.

## 7. Taxes and Other Duties

**7.1.** The contractor shall be responsible for payment of all Taxes/Duties/Levies etc. The contractor's prices are deemed to be inclusive of all such taxes/duties/levies etc. as applicable.

**7.2.** Applicable TDS shall be deducted at the time of release of payments.

**7.3.** Contractor shall get his organization registered with concerned Sales Tax authorities within 30 days of award of this contract, if applicable. The sales tax/VAT registration for this contract shall be forwarded to BHEL within 30 days from the date of LOI. In case the contractor is already registered with the concerned Sales Tax authorities, he must quote his registration no. , while submitting the tender.

**7.4.** 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.

**Note:**

The bidder shall not include liability on account of J&K Works Contract Tax in their prices as the liability for same rests with the main contractor and no deduction will be made against it.

## 8. Facilities in the scope of Contractor/BHEL

| Sl.No | Description<br><br>PART I | Scope / to be taken care by | | Remarks |
|---|---|---|---|---|
| | | BHEL | Bidder | |
| **1.1.0** | **ESTABLISHMENT** | | | |
| **1.1.1** | **FOR CONSTRUCTION PURPOSE:** | | | |
| A | Space for BHEL stores(open and closed storage shed) | Yes | | |
| B | Facilities in closed storage shed for storage & preservation of materials. | | Yes | Under heading "**Storage & Preservation"** in Cl. 2.1.1 of Chapter –II, Part-I of TCC |
| C | Space for bidders stores, canteen and office. | Yes | | Shall be given free of cost on as is where is basis from customer |
| C.1 | Construction of bidder's office, canteen and bidder storage building including supply of materials and other services. | | Yes | |
| C.2 | Bidder's all office equipments, office / store / canteen consumables. | | Yes | |
| C.3 | Canteen facilities for the bidder's staff, supervisors and engineers etc. | | Yes | |
| C.4 | Fire fighting equipments like buckets, extinguishers etc. | | Yes | |
| C.5 | Fencing of bidder storage area, office, canteen etc. | | Yes | |
| **1.1.2** | **FOR LIVING PURPOSES OF THE BIDDER** | | | |

| Sl.No | Description<br><br>PART I | Scope / to be taken care by | | Remarks |
|---|---|---|---|---|
| | | BHEL | Bidder | |
| A | Area for labour colony | Yes | | Around 2000 sq. m area for labour colony within 2 km of MAT will be provided free of cost on as is where is basis. |
| B | Living accommodation | | Yes | To be developed by contractor. |
| **1.2.0** | **ELECTRICITY** | | | |
| **1.2.1** | **Electricity For construction purposes** | | | |
| 1.2.1.1 | Single point source | Yes | | Shall be provided free of cost . |
| 1.2.1.2 | Consumption charges for construction Power. | Yes | | M/s HCC (BHEL's customer) shall provide construction power of 200 kW during erection and 1 MVA to 1.5 MVA during pre-commissioning/commissioning, free of cost. |
| 1.2.1.3 | Further distribution for the work to be done which include supply of materials and execution. | | Yes | |
| 1.2.1.4 | Maintenance of lighting, distribution boards at suitable working area. | | Yes | |
| 1.2.1.5 | Providing of the consumables such as sockets, switches, MCCB, bulbs etc. | | Yes | |

| Sl.No | Description<br><br>PART I | Scope / to be taken care by | | Remarks |
|---|---|---|---|---|
| | | BHEL | Bidder | |
| **1.2.2** | **Electricity for BHEL's stores** | | | |
| 1.2.2.1 | Single point sources | | Yes | To be arranged by contractor either through getting connection from HCC or DG set provided by BHEL. |
| 1.2.2.2 | Distribution from single point including supply of materials and service. | | Yes | |
| | Supply, installation and connection of material of energy meter including operation and maintenance. | | Yes | |
| 1.2.2.3 | Payment of electricity consumption | | Yes | Running cost of DG or metering charges shall be given by contractor. |
| 1.2.2.4 | Duties and deposits including statutory clearances for the above. | | Yes | |
| 1.2.2.5 | Living facilities for office use including charges. | | Yes | |
| 1.2.2.6 | Maintenance of lighting, distribution boards at suitable working area. | | Yes | |
| 1.2.2.7 | Providing of the consumables such as sockets, switches, MCCB, bulbs etc. | | Yes | |
| 1.2.2.8 | Demobilization of the facilities after completion of works. | | Yes | |
| **1.2.3** | **Electricity for the bidder office, stores, canteen etc. which include:** | | | |
| 1.2.3.1 | Distribution from single point including supply of materials and service | | Yes | |

| Sl.No | Description<br><br>PART I | Scope / to be taken care by | | Remarks |
|---|---|---|---|---|
| | | BHEL | Bidder | |
| 1.2.3.2 | Supply, installation and connection of material of energy meter including operation and maintenance | | Yes | |
| 1.2.3.3 | Duties and deposits including statutory clearances for the above | | Yes | |
| 1.2.3.4 | Living facilities for office use including charges | | Yes | |
| 1.2.3.5 | Payment of electricity consumption. | | Yes | |
| 1.2.3.5 | Demobilization of the facilities after completion of works | | Yes | |
| **1.2.4** | **Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines** | | **Yes** | |
| **1.2.5** | **Electric connection incl. installation of meter for BHEL Porta Cabins at stores/powerhouse area from available one point source/DG set.** | | | |
| 1.2.5.1 | Distribution from single point including supply of materials and service. | | Yes | |
| 1.2.5.2 | Supply, installation and connection of material of energy meter including operation and maintenance. | | Yes | |
| 1.2.5.3 | Payment of electricity consumption | | Yes | If electricity will be provided through DG set on sharing basis with contractor, the contractor shall bear the electricity charges. |
| **1.3.0** | **WATER SUPPLY** | | | |
| **1.3.1** | **For construction purposes:** | | | |

| Sl.No | Description<br><br>PART I | Scope / to be taken care by | | Remarks |
|---|---|---|---|---|
| | | BHEL | Bidder | |
| 1.3.1.1 | Making the water available at single point. | Yes | | M/s HCC (BHEL's customer) shall provide construction water for hydraulic testing of distributor of all units and coolers etc., Potable water free of cost. |
| 1.3.1.2 | Further distribution as per the requirement of work including supply of materials and execution. | | Yes | |
| **1.3.2** | **Water supply for bidder's office, stores, canteen etc** | | **Yes** | |
| 1.3.2.1 | Making the water available at single point. | | Yes | |
| 1.3.2.2 | Further distribution as per the requirement of work including supply of materials and execution. | | Yes | |
| 1.3.3 | **Water supply for BHEL stores** | | | |
| 1.3.3.1 | Making the water available at single point | | Yes | |
| 1.3.3.2 | Further distribution as per the requirement of work including supply of materials and execution | | Yes | |
| **1.4.0** | **LIGHTING** | | | |
| 1.4.1 | For construction work (supply of all the necessary materials)<br>1. At the preassembly area<br>2. At the construction site /work area. | Yes | | |

| Sl.No | Description<br><br>PART I | Scope / to be taken care by | | Remarks |
|---|---|---|---|---|
| | | BHEL | Bidder | |
| 1.4.2 | For construction work (execution of the lighting work/ arrangements)<br>1. At the preassembly area<br>2. At the construction site /work area. | Yes | | |
| 1.4.3 | Maintenance of Lighting materials such as lamps, extension boards, hand lamps, cables etc. for stores (open and closed) | | Yes | |
| 1.4.4 | Providing the necessary consumables like bulbs, switches, etc during the course of construction. | | Yes | |
| 1.4.5 | Lighting for the living purposes of the bidder at the colony / quarters for his use. | | Yes | |
| **1.5.0** | **COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER** | | | |
| 1.5.1 | Telephone, fax, internet, intranet, e-mail etc. | | Yes | |
| **1.6.0** | **COMPRESSED AIR SUPPLY** | | | |
| 1.6.1 | Supply of Compressor and all other equipments required for compressor and compressed air system including pipes, valves, storage systems etc. | | Yes | |
| 1.6.2 | Installation of the above system and operation and maintenance of the same. | | Yes | |
| 1.6.3 | Supply of the all the consumables for the above system during the contract period. | | Yes | |

| Sl.No | Description | Scope / to be taken care by | Remarks |
|---|---|---|---|

| | **PART II**<br><br>**ERECTION FACILITIES** | **BHEL** | **Bidder** | |
|---|---|---|---|---|
| 2.1.0 | Engineering works for construction: | | | |
| 2.1.1 | Providing the erection drawings for all the equipments covered under this scope. | Yes | | |
| 2.1.2 | Drawings for construction methods. | Yes | | In consultation with BHEL |
| 2.1.3 | As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes | Yes | Yes | Bidder to help BHEL in making as built drawings. |
| 2.1.4 | Shipping lists etc for reference and planning the activities. | Yes | | |
| 2.1.5 | Preparation of site erection schedules and other input requirements. | Yes | Yes | To be jointly done on regular basis. |
| 2.1.6 | Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments. | Yes | Yes | To be jointly done on regular basis. |
| 2.1.7 | Weekly erection schedules based on Sl No 2.1.5 | | Yes | To be jointly done on regular basis. |
| 2.1.8 | Daily erection / work plan based on Sl No 2.1.7 | | Yes | To be prepared by bidder in consultation with BHEL. |
| 2.1.9 | Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months. | | Yes | |
| 2.1.10 | Preparation of preassembly bay. | | Yes | |

**8.1.** BHEL/ HCC shall provide limited open space for contractor's store free of rental charge. It is the responsibility of the contractor to construct temporary sheds for his use and to dismantle and clear the site after completion of work or as and when required, as a part of his scope of work.

**8.2.** **BHEL/HCC shall provide 2000 sq.m area for labour colony free of cost, approx. 2 Kms from powerhouse.** Contractor shall have to arrange accommodation for his workmen/ staff on his own within the awarded rates. Contractor shall be responsible for providing all necessary facilities to staff and workmen like construction of residential accommodation with electricity & water inside the rooms, proper sanitation, transport, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations.

**8.3.** **Construction Power of 200 kW during erection and 1 MVA to 1.5 MVA for equipment testing during pre-commissioning and post spinning, shall be provided free of cost.** Contractor at his cost shall do further distribution**.** However, electricity for stores shall be arranged by contractor either through getting connection from HCC or DG set of adequate capacity (if not available). All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply.

**8.4.** BHEL/HCC will provide construction water for hydraulic testing of distributor of all units and coolers etc., Potable water free of cost. Contractor shall lay network of pipelines at his cost to various work spots requiring construction water. For shortage of water, Contractor will be responsible for alternative arrangements.

**8.5.** Provision of distribution lines of electrical power from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper/ Brass clamps, copper conductor, change over switches pipes etc. at his own cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.

**8.6.** General lighting of powerhouse, switchyard and other work area during erection, testing and commissioning shall be provided by HCC free of cost. Additional lighting arrangement such as flood lights, hand lamps and area lighting shall be arranged by the contractor at the site of construction, storage area etc within finally accepted rates.

**8.7.** On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, 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 Engineer will be done it and expenses incurred shall be recovered

from the contractor along with prevailing overhead. The decision of BHEL Engineer in this regard shall be final.

**9. T&Ps and MMEs to be deployed by Contractor:**

| **INDICATIVE LIST OF TOOLS AND PLANTS FOR MATERIAL HANDLING & ERECTION TO BE ARRANGED BY THE CONTRACTOR AT HIS OWN COST** | | | |
|---|---|---|---|
| **S.NO.** | **ITEM/ DESCRIPTION** | **QTY.(Nos.)** | **REMARKS** |
| 1 | Truck -10 T | As Per Requirement (APR) | As Per Requirement (APR) |
| 2 | Trailer with pulling unit - 20 T | 1 | APR |
| 3 | Hydra Crane - 14 T | 1 | APR tentatively for six months |
| 3 | Mobile Crane – 55 T | 1 | APR tentatively for six months |
| 4 | Trailer with pulling unit -60/70 T | As Per Requirement | APR |
| 5 | Fork lift – 3 T | 1 | APR |
| 7 | Fire extinguishers 10 Kg A,B,C & dry powder type | Minimum 15 nos | APR |
| 8 | General purpose material handling T&P | As Per Requirement | APR |
| 9 | Torque Wrenches up to 2000 NM | 1 set | APR |
| 10 | Impact Wrench (Pneumatic) up to 2400 NM | 1 set | APR |
| 11 | Chain pulley block of various capacities (2T, 5T, 10T), Pull lift | Min.2 nos. each or as required | APR |
| 12 | Turn Buckle ( 2 T, 5 T, 10T etc) | 4 each | APR |
| 13 | Hydraulic / Mechanical Jacks of various capacities (5-10-20-50 T) | 4 each | APR |
| 14 | Gas cutting set (Acetylenes Cylinder, Oxygen Cylinder cutting set with hose & regulator. | As Per Requirement | APR |

| | | | |
|---|---|---|---|
| 16 | Air Arc Gouging Arrangement | 1 no. | APR |
| 17 | Electrode Oven | 4 nos | APR |
| 18 | Pneumatic straight grinders | 4 nos | APR |
| 19 | Pneumatic Angle grinders | 4 nos | APR |
| 20 | Hydraulic test pump (100 Kg/cm2)with pressure gauge | 1 no | APR |
| 21 | Air Compressor. | As Per Requirement | APR |
| 22 | Hydraulic pump (hand operated). | 1 no | APR |
| 23 | High vacuum filter machine (2000 L P H ) | 1 no | APR |
| 24 | Vacuum pump for evacuation of transformer tank. | 1 | APR |
| 25 | Oil Tank – 10000 L | 1 | APR |
| 26 | Hydraulic Jacks 50 Tons | 4 | APR |
| 27 | Welding machine set . | 10 set | APR |
| 28 | MIG Welding machine set . | 2 set | APR |
| 29 | Gas cutting set with gas & cutting set. | 3 set | APR |
| 30 | DG set of sufficient capacity for back up power for construction power | 01 no. | APR |
| 31 | Precision tools (IMT) TENTATIVE QUANTITY<br>1. 0.02 accuracy block level-2 nos<br>2. Dumpy level with accessories- 1 no<br>3. Theodolite work station-01 no<br>4. Inside micrometer – as per requirement<br>5. Outside micrometer-0-25, 25/50, 50-75, 75-100, 100-150<br>6. Vernier callippers150, 300 – 2 each<br>7. Telescopic gauge- 2 sets<br>8. Slip gauge- 1 set<br>9. Feeler gauges- as per requirement<br>10. Dial gauge with magnetic stand- 12 nos | As Per Requirement | As Per Requirement (APR) |

| | | | |
|---|---|---|---|
| | | | |

**Note:**

1. The above list specifies only major T & P (may not be complete in items or numbers) to be deployed by the contractor. All additional/ other tools and plants required for timely and satisfactory completion of works/ testing etc. shall also be deployed by the contractor with in the finally accepted rates/ contract prices.
2. Other terms and conditions regarding above shall be as per the special condition of the contract clause no. SCC 4.2.1 (Tools & Plants, IMTEs).
3. Consignments which cannot be handled by above cranes of contractor/BHEL, has to be unloaded / handled by sleeper jack method. Alternatively suitable capacity crane is to be arranged by contractor for handling such consignments. The bidders are required to take note of it while submitting their offer.

**INDICATIVE LIST OF IMTE`s (ELECTRICAL) TO BE ARRANGED BY THE CONTRACTOR AT HIS OWN COST**

| **S.N** | **ITEM** | **QTY.(Nos.)** | REMARKS |
|---|---|---|---|
| 1 | Analog Multimeter<br>voltage AC/DC 2.5-2500Vcurrent AC /DC-100Ma to 10A, Resistance upto 200 Mohm | 03 | As Per Requirement (APR) |
| 2 | Digital Multimeter 4 &half digit | 06 | APR |
| 3 | Meggar hand operated<br>500V / 1000V 200 Mohms | 02 | APR |
| 4 | Meggar motorized<br>2500V / 500V 2500 00 Mohms | 01 | APR |
| 5 | Phase sequence indicator<br>110-450V | 02 | APR |
| 6 | Frequency meter 0-100 HZ (0-110-230-415 V) | 01 | APR |
| 7 | Tong tester | 02 | APR |
| 8 | Single phase variac 0-220 V, 8A | 03 | APR |
| 9 | Three phase variac<br>0-415,15A | 01 | APR |

| | | | |
|---|---|---|---|
| 10 | Rheostat<br>0-250 ohms 2A, 0-8 Ohms 15A, 0-8 Ohms 15A, 0-26 Ohms 5A, 0-165 ohms 2 Amps | 03 each | APR |
| 11 | Hand tachometer(Digital)<br>0-15000 r.pm | 01 | APR |
| 12 | Digital micro Ohm meter | 01 | APR |
| 13 | A.C. H.V. Test Kit | 01 | APR |
| 14 | Dead weight Tester for calibration of pressure gauge. | 02 | APR |
| 15 | Digital Recorder | 01 | APR |
| 16 | Stop watch | 02 | APR |
| 17 | Precision Thermometer | 02 | APR |
| 18 | Primary injection test kit (1000 Amp.) | 01 | APR |
| 19 | Digital Handhold Temperature meter | 01 | APR |

**Note:**

1. The above list specifies only major IMTE – Electrical (may not be complete) to be deployed by the contractor. All additional/ other IMTEs required for timely and satisfactory completion of works/ testing etc. shall also be deployed by the contractor within the finally accepted rates/ contract prices.

2. Other terms and conditions regarding above shall be as per the special condition of the contract clause no. SCC 4.2.1 (Tools & Plants, IMTEs).

3. The IMTEs marked BHEL in the remarks column shall be arrange by BHEL.

## 10. T&Ps and MMEs to be deployed by BHEL on sharing basis

| Sl. No. | Equipment | Capacity | Quantity |
|---|---|---|---|
| 1. | Hydra Crane | 14 T | 02 |
| 2. | Mobile Crane | 55 T | 01 |
| 3. | DG sets | 62.5 kVA | 02 |
| 4. | EOT crane for power house | 150/20 T | 02 |
| 5. | EOT Crane for BFV | 100 T | 01 |

**Note:**

1. One hydra crane of 14 T capacities is already at site and will be handed over to contractor immediately after their deployment. Shifting of another Hydra Crane of 14 T capacity from other site of BHEL is in progress and will be made available to contractor tentatively by 15th November, 2013. One no. 55MT mobile crane is being transported from other site of BHEL and same shall be made available to contractor by 15th November, 2013. Two DG sets as per above will made available to contractor tentatively by 15th November, 2013. The DG sets/Cranes provided by BHEL (may not be complete in items or numbers as per requirement). All additional/ other Hydra cranes/Mobile Cranes/DG sets required for timely and satisfactory completion of works/ testing etc. shall be deployed by contractor within the finally accepted rates/ prices.

2. The above mentioned capacity Hydra cranes/Mobile Crane without slings & lifting tackles will be provided by BHEL on sharing basis. The Operation and Maintenance of crane shall be the responsibility of contractor. The contractor shall arrange at his own cost of operators, fuel, mobile oil, grease, DM water and other consumables. However, major maintenance shall be in the scope of BHEL and additional manpower/helpers if any required during preventive/breakdown maintenance, assembly/disassembly shall be provided by contractor at no extra cost. Co-ordination and calling to authorized service centre(s) for checkup shall be the responsibility of contractor. However, BHEL shall bear the cost for attending of authorized service centre. In addition to this Refer SCC 4.2.2.16.

3. EOT cranes are being installed by BHEL Bhopal/another agency. The EOT cranes shall be provided free of hire charges and on sharing basis. BHEL Bhopal/another agency shall carry the AMC of the cranes. The day-to-day routine maintenance shall be in the

scope of the contractor for the period of crane being used for their scope of erection works. The said contractor shall also deploy the requisite number of crane operators (two or three nos. operator simultaneously) as per the instructions of BHEL engineer for operation of the crane for his scope of work in connection with Electromechanical works of BHEL. The crane operator may have to work in overtime also depending upon the work conditions for which no extra charge shall be payable to the contractor. The contractor will also provide the EOT crane services (including the operators) to the other contractors working in the powerhouse for civil and mechanical works if required. However, contractor will not be entitled for any compensation due to non-availability of EOT crane.

4. Operation & Maintenance of DG sets shall be in the scope of contractor. Above two nos. DG sets in running condition will be handed over to contractor for the entire period of contract for its use as per requirement at Powerhouse/Stores/Other Work area/BHEL's office. Operation & Maintenance and running cost including diesel cost, consumables etc. shall be in the scope of contractor at their own cost. However, major maintenance, repair/replacement of any parts other than diesel; consumables shall be responsibility of BHEL. Co-ordination and calling to authorize service Centre for checkup shall be the responsibility of contractor. If DG set(s) will be used at BHEL office/field hostel/guest house then diesel cost will be reimbursed to the contractor on actual based on producing receipt of diesel bill.

5. Above Cranes and DG sets will be provided to contractor in connection with works under this contract. These cranes/DG set will be used by contractor as per the instructions of BHEL engineer.

**11. Any other requirement**

Not Applicable

Rev 01
1st June,
2012

# TECHNICAL CONDITIONS OF CONTRACT (TCC) PART-II

(Document No PS:MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED

## 1 General

a) Receiving and Unloading of consignments from the Trucks/Trailers arriving from BHEL manufacturing units and its suppliers/vendors.

b) Proper Stacking, Storage and Preservations of all the material.

c) Keeping records and status of all materials as per BHEL practices. Verification of all the material received by contractor. Prepare shortages/damaged reports, if any.

d) Verification, proper storage, re-stacking and preservation of materials / equipments in project open stores / closed storage shed already unloaded by other contractor of BHEL.

e) Transportation of materials from site stores to the powerhouse service bay or the pre assembly area as per site requirement and the instructions of site engineer.

f) Shifting of material from open store to closed storage shed or vice versa as per instruction of site engineer.

g) Taking over of already unloaded materials, material management forms duly filled/Records generated in stocks (Stock registers and computers) and certified by Engineer its verification.

h) Construction of temporary shelters on some of the special items as per the instruction of the site engineer.

i) Unloading and stacking of certain items in the service bay / work area with the help of EOT cranes / loading arrangement as per the instruction of BHEL engineer.

j) Proper Housekeeping and safe working.

k) Handing over of all the spares to HCC/NHPC at their stores.

l) Handling and Transportation of scrap from power house to Customer stores / scrap yard as per the instructions of BHEL engineer

m) Re-conciliation of materials with BHEL and HCC/NHPC.

n) Erection, Testing, Commissioning and handing over as per BHEL drawings, contract specifications and as per the instructions of the BHEL engineers.

BHEL has been awarded the work of Design, Manufacture, supply, installation, erection, testing & commissioning of 3X110 MW Kishnaganga Hydro Electric Power Project. The equipment mainly consists of items detailed under **clause No. 2, Chapter-II, Part-I of TCC.**

These materials will be supplied from BHEL's manufacturing units located all over the country as well as BHEL's vendors located both inland and overseas. The scope of work under this tender consists of taking delivery of the materials from transporters, unloading, shifting to its designated locations, verification & stacking etc. The delivery of

these materials will mostly be inside the project campus by road transport. However, delivery of some items may also have to be taken from Godowns of transporters.

Approx. weight to be handled under this contract is around **6700 MT** in which approx. **2800 MT** materials have already been unloaded and kept at open store. Approx. weight of materials are to be erected is 5000 MT. Brief descriptions of different packages with its weights are indicated under Clause 4, Chapter-IV, Part-I of TCC .The contractor has to handle whatever actual materials are dispatched for the project irrespective of any variations and payments shall be released for the actual gross tonnage handled for material handling purposes.

Though most of the material is being planned to be made available at site well in time for erection requiring proper handling, verification and storage, however certain items may be delayed, requiring direct delivery at site for erection. In such cases contractor has to unload the material directly in powerhouse/ work place and verification to be carried out, contractor for subject work will be eligible for payment as per **Sl. No. 4 of the Rate Schedule under Chapter-V , Part-I of TCC**. Besides above BHEL, entirely at its discretion may get unloaded / handle at any location in the premises of powerhouse, items like Generator stator sectors, shafts, transformers or any other materials at the discretion of BHEL engineer and availability of space in powerhouse.

**Note:**

The scope of work consists of material handling of all items dispatched from BHEL Manufacturing Units and their Vendors as detailed in clause 2.1, Chapter-II, Part-I of TCC and erection, testing & commissioning of Pelton type turbine, generator, transformer and auxiliaries as detailed in clause 2.2, Chapter-II, Part-I of TCC. The contractor shall start the work to complete the entire scope of works i,e. Material handling, erection, testing & commissioning and handing over of 3X110 MW Kishanganga HEP. Over Run Charges (ORC) will be applicable as per Clause No. 2.12 of GCC. Bidders are advised to note this and quote accordingly. No additional charges/compensation will be paid by BHEL on this account.

1.1 The contractor shall carry out the work in accordance with standard practices/ codes/ instructions/ drawings/ documents/ specification supplied by BHEL/HCC/NHPC from time to time.

1.2 Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices:

(a) Keeping all the storage and erection areas neat and clean.

(b) Documentation and records (Films/Movies/Photographs) from embedment to evacuation.

1.3 The contractor under this contract shall also provide free of cost services of skilled persons for a total period of 140 Man-months exclusively for use by BHEL. This manpower will be required for following services:

a) Highly skilled workers (Qualified computer operators) for office and stores work for 28 manmonths,

b) Skilled workers for office, colony, stores, for 56 manmonths.

c) Unskilled workers for office, colony, stores for 56 manmonths.

Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed.

In case contractor fails to provide above-mentioned manpower as desired by BHEL, the later shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the manmonths as per above provision, fully or partly, recovery at the rate of the prevailing minimum wages at site for the categories given plus 10% will be made from the final bill of the contractor.

1.4 Contractor has to deploy within the awarded rates following minimum commissioning engineer and supervisor for 16 manmonths exclusively for working with BHEL commissioning engineers during commissioning, having requisite commissioning experience.

a) Engineers 1 Nos. for total 8 manmonths MINIMUM
b) Supervisors (Diploma holders) 1 Nos. for total 8 manmonths MINIMUM

If the contractor fails to deploy this minimum manmonths (MM), then deduction shall be made from his bills at the rate of Rs 20000/= per MM for a) and Rs. 15000/= per MM for b).

The contractor shall specifically mention the deployment of the above persons in the deployment plan so submitted by him along with the tender.

1.5 In order to meet the environmental concerns it is expected that the contractor shall **plant at least 25 trees and maintain the trees throughout the period of Contract** in the vicinity of the project as per advice of Engineers.

1.6 **The contractor shall comply with following towards Social Accountability;**

a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.

b) The contractor shall not engage Forced/Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.

c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.

d) The Contractor shall abide by UN convention w.r.t Human Rights and shall be liable for Decimation/Corporal punishment for failure in meeting with relevant requirements.

e) The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.

f) The Contractor shall abide by the statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.

g) The Contractor shall arrange potable drinking water to its employees & workers.

1.7 Tenderer may note that as the place of work is inside the POWER PROJECT and being manned by Security/Safety Force of HCC/NHPC, all necessary system related to entry of men, vehicle & material, safety & security systems, work permit system etc. as applicable will have to be followed by the contractor.

## 2 Preliminary & Civil Works

2.1 The contractor shall as a first field activity check all the foundations for the correctness of the same as per the drawings and satisfy himself in all respects such as location of foundations, absence of voids, **levels**, correctness of **bolt holes, pocket levels**, centre lines etc. and all measurements should be recorded and submitted to engineer **for approval** before erection.

2.2 Before starting erection job, contractor shall ensure that area connected to his scope of work is sufficiently enclosed against ingress of dust and water and all debris have been cleared of from the floor to a designated area as per instruction of engineer. The contractor shall arrange to get the working area and surroundings cleared daily to ensure the dust free atmosphere for working and shall maintain sufficient labour for general cleaning of work areas. Delay of work on this account will not be acceptable.

2.3 The contractor shall cover all opening on floor and put temporary hand railing on all sides of the floor to avoid any accident to the working personnel.

2.4 Contractor shall fix up and maintain plates, supports for X & Y axis and elevation at different locations as required for each unit and **transfer the same from bench mark and XY axis given at one point by BHEL's client.** Joint protocol records for such benchmarks shall be got signed from BHEL's Engineer, HCC's/NHPC's Supervisory and QA Engineer.

2.5 Once X-Y axis and elevation are fixed at different floors and protected, marking for other equipment's shall be transferred from these and joint protocol as above shall be got signed for each equipment or as required as per drawings.

2.6 All matching surfaces of components shall be well cleaned with cleaning agent and burrs shall be removed by filling and blue matched. Wherever necessary sealing/lubricating/anti-sieze compounds shall be applied as per recommendation of Engineer. Machining/grinding required for fitting of keys, pins, packers , dowels etc. shall be carried out by contractor.

2.7 The accuracy of all equipment/ instruments and its functioning shall be established before they are permitted for use on the job. If the Engineer doubts the accuracy of the precision tools, at any time during erection, the contractor shall arrange the checking of tools/ equipment/ instruments at his cost.

2.8 All the works shall be performed to the lines, grades and elevations indicated on the drawings. The contractor shall be responsible to locate and layout the works. The

horizontal & vertical control points established by the engineer shall be used as datum for the works under this contract. Any work done without being properly located may be removed and dismantled by the Engineer at the contractor's expenses if the contractor refuses to do it.

2.9 The contractor shall create all the facility at storage site as per the tender scope of work for unloading the equipment, its safekeeping and proper record and well protected. No material should be lying loose any where in the power house as well as stores.

2.10 De-watering of the areas/ floors in general will be carried out by M/s HCC (HCC). However contractor has to take care of general cleanliness in his area of work. For area cleaning within the premises of his work, the cleanliness shall be the total responsibility of contractor. Contractor within his scope of work shall keep the separate gang of workers for cleanliness operations. If the area under the scope is found unclean, BHEL can take measures on its own for cleaning and deduct the amount so spent from the running bills of contractor.

2.11 Necessary civil works shall be provided by BHEL client. The dimensions & locations shall be checked by the contractor for its correctness as per drawings. Further, top elevation and axis/ centrelines of all the foundations shall be checked with respect to benchmark etc. During the civil works, contractor shall check for all the block-outs, dimensions as required in its various mechanical drawings for installation of components/ assemblies and help BHEL wherever required for checking. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 25 to 50 mm, enlarging the pockets in foundations etc., and repair of same as may be required for the erection of equipment shall be carried out by the contractor within the finally accepted rates.

2.12 Besides above, any works required for safe and efficient operation of tools and tackles like grouting/ excavation/ casting of foundation/ anchor points for derricks, winches, guy ropes fastening scaffoldings etc. or any other temporary supports shall also be the contractor's responsibility. For these works all materials including cement/ steel and required facilities will have to be arranged by contractor at his own cost.

2.13 While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required as per drawings/ manufacturing unit, the embedded sole plates shall be scraped and checked with Prussian blue to get the required contact with frames at no extra cost to BHEL.

2.14 The contractor shall ensure perfect matching of packer plates including scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer.

2.15 The contractor shall provide his T&P stores for special tools and instruments at a convenient place near to the working area.

2.16 All mechanical works of machine related to civil works including foundations, grouting, concreting, erection of chequered plates along with embedment in concrete, grouting of liners, any civil works relating to setting of anchor bolts and foundation bolts including preparation of bolt holes will be in the scope of contractor.

2.17 BHEL's client M/s HCC has provided open store of approx. 8000 Sq. m. fenced from all sides with entrance about 5 km from Power house including 720 m of MAT located on the way from Bandipore to power house and closed storage shed of 2000 Sq.m approx 1 km from power house including MAT of 720 m. This open area is being used by other contractor of BHEL for storage of materials received from various MUs/Vendor of BHEL. Contractor shall take over these areas (storage yard) including materials stored already from BHEL/Other contractor of BHEL. This area shall be used for storage of further plant material received from various manufacturing units of BHEL. BHEL shall be providing the General Security arrangement at stores and powerhouse.

However responsibility of security (watch and ward) arrangement of plant material/equipment during handling, in stores of BHEL, in stores of contractor, in power house and all plant and equipments whether erected/ yet to be erected shall lie with the contractor.

## 3 Materials Management at Stores & Power House

3.1 The scope of work mainly involves receipt, unloading from road carriers (Trucks/Trailers etc) of total materials for all units of 3x110 MW of Kishanganga HEP (Hydro-turbines, valves, generators, bus-duct, piping, auxiliaries equipment, C&I, BOP and other miscellaneous materials/ equipment) at site or bringing from road carrier godowns to site stores/ storage yards and shifting from place of unloading to actual storage area (stores developed by BHEL), proper storing, stacking/ restacking of materials/ equipment (in closed store sheds/ open storage yards/ project site), verification of components including opening of cases, re-packing/ stacking and preservation of the same after verification including liasioning with carrier for waiver/ reduction of demurrage, security ( for details refer cl. 2.17, Chapter 2, Part-II of TCC) arrangement of plant material/equipment shall lie with the contractor. Fire fighting equipments including fire extinguishers is to be provided in closed, open storage yard and power house. Scope also includes transportation of materials to erection site as and when required. The contractor is to use Cranes (provided by BHEL) and trucks/trailers (arranged by contractor) for the above work. Any other T&P required for transportation and material handling shall be arranged by the contractor.

The contractor shall maintain record of material such as receipts, issue, return, in Day – Book, ledgers, stock registers and computers, issue gate passes, record of shortages & MDR etc as per BHEL procedures and instructions. The contractor shall also assist BHEL for all correspondence regarding the insurance including preparation of claims.

3.2 Approx. weight to be handled for all three units as indicated in Clause 4, Chapter-IV, Part-I of TCC is of the order of **6700 MT** (**Refer Note under Clause 2.1.1, Chapter-II, Part-I of TCC for scope of material handling**). But the contractor required handling whatever actual materials are dispatched for the project irrespective of variations in weight and dimensions. Some equipment as per the direction of engineer may be unloaded in powerhouse with the help of EOT crane from the truck/ trailers depending upon the requirement. The bidders are required to take note of above points while quoting.

3.3 **Clause 4, Chapter-IV, Part-I of TCC** gives the general idea for tender's information about the weights and dimensions of some major components/ equipment. The weights and dimensions shown are approximate and are liable to vary. No increase in quoted/ accepted rates/ prices should be allowed due to change in weights and dimensions of the equipment/ materials.

3.4 The contractor shall deploy adequate number of supervisors, storekeepers, riggers, carpenter, fitters and other skilled and unskilled workers as per requirement having adequate experience of jobs of similar nature till completion of work.

3.5 Contractor shall provide all necessary preservatives, paints, thinners, rust preventives, grease, lubricants etc. for preservation of components. All tools and tackles and other consumables required for the contractor at his own cost shall also provide preservation of components including supervision. Preservation of components also includes applying preservatives, paints, rust preventives, greasing of threaded portions, repainting of work order Nos./ DU nos./component codes etc. After preservation wherever necessary, components will be stacked properly as per original stacking for which no additional payment shall be made.

3.6 It shall be the responsibility of the contractor to keep in touch with Engineer at site and find out arrival of road consignments. The Contractor shall collect all the lorry waybills from BHEL site office either personally or through an authorised representative. The HCC/NHPC or his authorized representative shall, for the purpose, visit the said office every day and collect available LWB, PWB etc. While collecting the LWB, PWB contractor or his authorised representative will sign the register maintained for the purpose indicating the date and time of collection. The contractor shall keep in touch with carriers and arrange to effect delivery of consignments immediately on its receipts. Delay may cause deterioration of goods apart from attracting demurrage charges. Contractor shall also maintain a register indicating date of LWB, PWB date of collection of the materials from road transport agencies/ lorries and date of stacking them at storage yard of BHEL.

3.7 The contractor is required to find out and follow up regularly with carriers regarding arrival of consignments even prior to the receipt of GR, if any, and take delivery of the same on 'INDEMNITY BOND'. Indemnity bonds would be executed by BHEL when the Contractor furnishes intimation regarding arrival of consignment.

3.8 It is possible that in certain cases, LWBs, PWB may not be received in time but BHEL may receive Photostat copies of the same, it is, therefore, the responsibility of contractor to collect such Photostat copies while furnishing indemnity bond from BHEL authorities at site.

3.9 Payment of all demurrages/ wharfages that results due to contractor's faults would be the responsibility of contractor and to his account. If BHEL have to make payment of demurrage/ wharfage together with freight, the amount so paid as demurrage/ wharfage for the reasons stated above shall be paid by the contractor forthwith or would be recovered from bills of the contractor.

3.10 In any case contractor will pursue with concerned Carrier authorities at all level (local/ HQ etc) for waiver/ reduction to the minimum of such demurrage /wharfage charges. Whenever such demurrages/ wharfages become payable due to reasons not

attributable to contractor, contractor will immediately bring it to the notice of BHEL with specific request to bear such charges. The decision of the Engineer in such case will be final and binding on the contractor.

3.11 The contractor has to ensure the unloading and removal of materials from unloading place within the permitted time and ensure to keep the area free and avoid jamming. Any loss to BHEL on this account shall be recovered from the contractor.

3.12 Any discrepancy/ shortage/ damage found in the consignment after taking delivery from the carriers after giving clear receipt would be the responsibility of the contractor and the amount liable to be lost by BHEL on such accounts is recoverable from the contractor.

3.13 In case of apparent damages/ shortages in consignments/ packing noticed by the contractor, such cases shall be brought to the notice of BHEL and cleared only with their consent/ approval. The contractor shall provide all the necessary assistance to BHEL for lodging the insurance claim and all correspondence with the insurer, surveyor and transport agency. The contractor shall also help in maintaining all the records in connection of insurance claims.

3.14 It would be responsibility of the contractor to examine the packages, consignments etc. on arrival and bring to the notice of carriers and BHEL authorities regarding loss/ damages, if any, observed in the consignments proposed to be taken delivery of.

3.15 Before taking delivery, particularly of consignments in 'smalls' the weight of the package shall be checked with the invoiced weight of the packages and any discrepancy shall be reported immediately to BHEL/ carriers. In all case of loss/ damages the contractor will take open delivery from the carriers and forward such open delivery certificates (ODC) to the engineer with in 15 days of receipt of such consignment. All expenses connected there with shall be to the account of contractor. BHEL reserves right to claim losses, if any, accrued to BHEL in the event of contractor non-compliance to above.

3.16 In case of short delivery and non-delivery, immediate notice of loss shall be filed with the carrier at places of dispatch and destination as also at any intermediate stations, if it is different one, under intimation to BHEL authorities at site.

3.17 BHEL reserves the right to recover from the contractor any loss which arises out of undue delay/ discrepancy/ shortage/ damages or any other cause during transit between the carriers godown/ weigh bridges and BHEL storage yard/ store sheds/ project site or during unloading at carrier godown/ storage yard/ store shed/ project site or during stacking or any time during the custody of contractor. This is applicable for optional items.

3.18 Unloading from lorries, transportation, unloading at storage area/ work site of heavy sophisticated equipment like stator, panels etc. shall be done in the presence of and as per the directions of BHEL representative, including stacking and re-stacking, if necessity arises.

3.19 Certain packages are likely to be received by BHEL by passenger bus. The relevant waybills will also be handed over to the contractor for clearing the from the Bus station. It is the responsibility of the contractor to clear the same at the bus station, transport and hand over to BHEL authorities at site under the scope of the contract. All the tender provisions indicated in the tender shall be applicable in this case also.

3.20 Since the trucks/ trailers are expected to arrive during any time of the day/ night, the contractor shall have his workmen round the clock at site as well as other places as required to unload the materials.

3.21 Consignments coming on Sundays and Holidays are also required to be handled by the contractor promptly. It will be the responsibility of the contractor to contact the site engineer /authorised representative of BHEL at their residence, if required, and obtain instructions to make suitable arrangements.

3.22 In the event unloading from the carrier is delayed by the contractor, the detention charges, if any, will be contractors account.

3.23 Under the scope of this contract, it shall be the responsibility of the contractor to provide all necessary facilities to open the packages in the presence of the engineer, verifying the contents of the packages, repackaging where ever and whenever necessary, properly stacking them as may be directed by the engineer so as to facilitate proper handling, periodical verification of material, receipt position, stock taking etc. for this, the contractor shall have experienced person at site who can maintain the records of dispatch/ receipt/ stacking/ verification/ shortages/ damage/ missing items etc. The verification of materials shall be carried out with in 15 days and report shall be submitted as a documentary proof.

3.24 All material shall be stored 6 inches above ground level by use of concrete or wooden sleepers. No material shall be left to remain on ground at any time. Material shall not be stacked in low-lying areas where it is likely flooded during rains. Wooden sleepers/ concrete block and tarpaulins for this purpose, wherever deemed necessary be arranged by the contractor. These items shall be stacked/ stored properly at the location(s) specified by BHEL when not in use.

3.25 It is possible that certain heavy items/ consignments will require fabrication of temporary steel coverings over it. These shelters will be covered with suitable CGI sheets or tarpaulin. The contractor will be required to fabricate such sheds. All materials for these will be provided by Contractor. All expenses towards manpower, T&P,

consumables, etc. will be borne by the contractor. After completion of the work the contractor will dismantle the same and return the same to BHEL stores. Contractor shall be paid @ Rs 10000/MT for such works.

3.26 The material/ equipment requiring indoor storage will be handed and stacked inside the storage shed (provided by BHEL) by the contractor using material handling equipment like Hydra crane, Fork lift etc.

3.27 For checking/ verification of the components with packing slips/ LWB/ PWB etc. The contractor shall provide sufficient experience persons and other facilities as and when required by the engineer.

3.28 Stacking of the material shall be done as per the instruction and to the satisfaction of engineer. The materials shall be so stacked that the same should facilitate easy handling. In the event of any improper stacking BHEL may ask the contractor to restock the material properly or failing which BHEL may get the job done by another agency at the risk and cost of the contractor.

3.29 The contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence. Any loss to BHEL due to contractor's lapse /negligence shall have to be made good by the contractor.

3.30 In case contractor is not able to unload, transport, stack the material at a pre-determined area, as per direction of the engineer for any reason whatsoever (including non-availability of crane, tractor, trailer and other T&P etc.) BHEL shall be at liberty to get the work done by engaging other agency/ equipment / T&P etc at the risk and cost of the contractor.

3.31 It shall be responsibility of the contractor to keep the storage areas (closed/ open) in neat and tidy conditions. Any vegetation like grass, bushes, sarkandas etc. shall be cut in open storage area and removed as per requirement and instruction of BHEL engineer within the contractual value. All surplus/ unusable packing materials shall be removed and deposited at location(s) specified by BHEL within the project premises (including weighment of the same within the project premises if required).

3.32 Normally the consignments from BHEL manufacturing units/ their sub-suppliers are sent on freight paid basis. In case any consignment is received at any place or freight to pay basis, it will be the responsibility of the contractor to pay the freight and take delivery of such consignments. The amount of freight paid by the contractor at any point of time in such cases will be limited to Rs.5000/-. However, the freight paid by the contractor will be reimbursed by BHEL within a week's time on production of relevant receipt. In case of freight amounts exceed Rs.5000/- contractor may request BHEL well in time to issue cheque/ Draft for such additional amounts in favour of carriers towards freight charges. Receipt of payment and proof of taking delivery of consignment shall be submitted to

BHEL by the contractor. Delay in issuance of cheque/ drafts as above shall not in any case be taken as a cause of delay in taking delivery of consignment resulting in wharfage / demurrage leviable by carriers.

3.33 In case some materials are required to be dispatched from Site to Manufacturing Units, other sites or any other place, the contractor may be asked by the engineer to get the same packed, loading into carriers godown and get the same booked. The contractor are therefore, requested to quote his rate for this work in rate schedule. In case of material required to be booked as freight paid the freight for the consignment limited to Rs. 3000/- shall be paid by the contractor. However it shall be reimbursed by BHEL on submission of receipt within a week's time. The funds for freight charges exceeding Rs. 3000/- shall be arranged by BHEL. Packing material required shall be provided by BHEL free of cost.

3.34 In case of consignment to be dispatched on full truck/ trailer load basis, where the carriers will place his fleet inside the plant for loading the contractor may be asked to collect them from different locations of stores shed / yard and load by using his crane and labour. Tenderers are required to quote rates for the work in rate schedule.

3.35 For any exigencies during execution of the contract, the contractor shall have to depute his personnel for collection/ delivery of any material meant for site from/ to outstation if desired and instructed by the Engineer. The contractor will however be reimbursed expenses incurred for such work for person deputed, as below:

a) 2nd class train fare worth reservation / supplementary charges/ bus fare subject to furnishing details regarding ticket nos., journey details, amount of fare etc.

b) Local conveyance charges (Actual bus/ cycle rickshaw/ auto rickshaw fare for local journeys at outstation) as permitted by the Engineer.

c) Daily allowances @ Rs.100/- per day and @ Rs.250/- per day for lodging.

d) Postal/ telegraph/ telephone charges if any subject to production of proof of having incurred such expenditure.

e) Freight and other charges, if any, paid on production of actual receipts.

f) Payment for the above will be made by BHEL with in a month from the date of submission of bill along with details/ desired documents by the contractor subject to completion of work assigned to contractors personnel and to the entire satisfaction of engineer.

## 4 Material Handling and Storage & Transportation To Power House

4.1 Contractor shall plan in consultation with BHEL engineer, plant/ material to be received/ delivered in powerhouse as per erection progress/ schedules and fill in the requisite formats in standard forms.

4.2 Responsibility of security (for details refer cl. 2.17, Chapter- II, Part-II of TCC**)** arrangement shall lie with the contractor. In case any equipment/ material is lost/ damaged while in the custody of the contractor, the cost of repair/ replacement if any to bring back the equipment in original order shall be deducted from the contractor's bill. BHEL's decision in this regard shall be final and binding on the contractor.

4.3 All electrical panels, control gear, motors and such other devices shall be dried by heating before they are installed and energized. Exposed parts those required special protection such as bearings, slip rings, commutators and other fragile items shall be protected against moisture ingress and corrosion during storage and are periodically inspected.

4.4 Contractor shall also ensure that lifting heavy equipment such as generator rotor, stator, Main inlet valve, shafts etc. shall be done strictly in accordance with drawing given for the purpose and using of lifting tackles supplied for the purpose. Wherever required rubber/ leather pads shall be given between the slings and the machined parts to avoid any damages, scratches to the machined surface. Contractor shall cover bearing journals with grease and cloth as per direction of engineer to avoid damages to the surface.

4.5 As per the erection requirement contractor shall deliver material to powerhouse/ work site. The maximum care has to be taken during that time of loading the material at storage area, transportation and unloading at powerhouse. No untoward damage should occur to the material at that time. Any loss of item/ damages shall be to the contractors account.

4.6 Please Refer Clause 6.1 of SCC for more details.

## 5 Preservation of Components

Refer Clause 6.2 of SCC.

## 6 Cleaning of Equipments

6.1 The contractor shall thoroughly clean all the components before installation of the components whose surfaces are coated with protective coating and sent to site are to be thoroughly cleaned by suitable mechanical/ chemical means as per the approved procedure.

6.2 Contractor shall ensure that the items identified by BHEL shall be cleaned with kerosene/ petrol/ CRC before assembly and erection of the equipment.For cleaning purposes he shall use only soft cotton cloth. Contractor shall avoid use cotton waste for cleaning any equipment. The electrical equipment before erection shall be cleaned with dry air/ vacuum cleaner.

6.3 The contractor shall clean inside of all pipes and fittings from dirt, sand and loose scales, mechanically/ chemically and by air blowing before being erected. All pipe lines be thoroughly blown/ flushed. If necessary certain pipelines may have to be cleaned by acid pickling/ chemical cleaning. The procedure for the same shall be provided by BHEL. All chemicals and inhibitors shall be arranged by the contractor with in the contract. Disposal of chemical has to be carried out by the contractor at his own cost.

## 7 Erection

7.1 All works such as cleaning, checking, levelling, blue matching, aligning, assembling, temporary erection for alignment dismantling of certain equipment for checking, cleaning, surface preparation, fabrication at site, cutting, grinding, straightening, chamfering, filing, chipping, drilling, reaming, dowelling, scrapping, machining, surface grinding, shaping, fitting up welding, tube expansion etc. as may be applicable in such erection works are to be treated as incidental to erection and necessary to complete the work satisfactorily & shall be carried out by the contractor as part of the work.

7.2 Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost within the finally accepted rates.

7.3 No members of the ladder/ structure/ platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify/ repair in a manner acceptable to BHEL/ NHPC without any additional cost.

7.4 The contractor shall erect scaffolding/ temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion & removed from work site.

7.5 Corrections like straightening of ladders, tube support plates adjustment/ removal of ovulates in pipes and opening or closing the fabricated bends of piping to suit the layout shall be considered part of the work and the contractor is required to carry out such work within finally accepted price/ rate as per instructions of Engineer.

7.6 The contractor shall fabricate pipes, special bends, etc. threading and welding as required and carry out the chemical cleaning of fabricated piping.

7.7 The servicing and realignment of skid-mounted equipment if required or if directed by BHEL shall be carried out by the contractor at no extra cost to BHEL.

7.8 The contractor shall completely erect & test all the piping systems, covered in the specification including sampling lines up to and including sample coolers, hangers & supports, valves & accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning & painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes

except where flanged screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines & elevation as indicated in the drawings.

7.9 Pipes sent in standard length shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths. Bends shall be prepared and/or fabricated at site.

7.10 The contractor shall ensure lowering of pipes in position with adequate precautions as to avoid any damage to either material or men. Only the anchoring points earmarked for the purpose of lowering the pipes are to be used.

7.11 Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/ add extra lengths to suit the final layout after preparing edges a fresh by adopting specified heat treatment procedures, at no extra cost.

7.12 It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.

7.13 The contractor shall be responsible for any modifications of shop fabricated pipes prior to installation to accommodate minor site alteration in pipe routing at no extra cost.

7.14 All vents and drains for piping equipment covered in the scope whether shown in the drawings or not shall terminate in atmosphere and to pit as directed by BHEL.

7.15 Wherever piping erected by the contractor is connected to equipment/ piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor of this specification.

7.16 Normally the valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like `T' pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or overhauled in full or in part before erection after chemical cleaning and during commissioning.

7.17 The contractor shall be responsible for correct orientation of all valves so that seats, stems & hand wheels will be in desired location. It is the responsibility of the contractor

to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.

7.18 Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.

7.19 The adjustment of all supports erected for maintaining the proper slopes of piping wherever required is also included in the scope of the contractor.

7.20 No temporary supports should be welded on the piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases heat treatment if required, shall be carried out by the contractor as part of subject work.

7.21 All supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and provided by the contractor. The raw materials required for fabricating such supports shall be arranged by BHEL.

7.22 Contractor shall install piping in such a way that no excessive or destructive expansion forces exist under any condition.

7.23 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The methods used, the tools and the equipment deployed shall be subject to the approval of Engineer. All the torque wrenches shall be calibrated at the start of each days work and at least once during the day. The bolting work shall be carried out by the competent technicians.

7.24 The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer.

7.25 Layout of small bore piping as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection or from aesthetic point of view which should be carried out at no extra cost.

7.26 All the valves, including motorised valves, flap valves, etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates.

7.27 Additional platforms and ladders of permanent nature incidental to the job for approaching different equipment/ valves as per site requirement, which may not be indicated in drawings, shall be fabricated and installed by the contractor. The materials required will be supplied by BHEL free of cost.

7.28 Erection and welding of necessary instrumentation tapping points, valves to be provided on equipment, auxiliaries and pipe lines covered within the scope of this specification, will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer at no extra cost.

7.29 All the items will be supplied in pieces/ loose and are to be assembled bolted and welded at site. Contractor has to work as per the drawings and instruction issued at site for erection and testing purposes. Weights for handling and erection in the Clause 4, Chapter-IV, Part-I of TCC are indicative only. No claim will be entertained on account of variations in weights or change from conventional design e.g from bolted to welded connections and vice versa, increase in number of pieces etc. The bidders should take care of this point while quoting lumpsum price for subject works for handling and erection works.

## 8 Welding & NDT

8.1 The equipment and piping shall be erected in conformity with the provisions of standard/ specification and as may be directed by BHEL. The method of welding (arc, gas, TIG, MIG or other method) may be indicated in the detailed drawings/ schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.

8.2 Welding being a special process, all-welding shall be carried out by skilled and experienced welders holding valid certificates as per requirements of ISO 9002. The certificate shall be checked by BHEL before allowing the welders to be engaged on welding. BHEL at its own discretion may ask any or all welders to under go welder Qualification Test as per Standard Procedure in accordance with requirements of ISO 9002 and as per welding manual of BHEL. The deployment of qualified welder and subsequent site testing of requisite numbers of welders shall be one of the prerequisite of contractor's site mobilisation completion.

8.3 All welders including tack welder, structural and pipe welder shall be tested as per ASME section IX and approved by BHEL Engineer before they are actually engaged on work though they may possess the certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor in Performa given by BHEL Engineer shall maintain the records of qualification of welders. All the welders qualified for the work will be issued an identity card by BHEL Engineer and welder will keep the same with him at work place.

8.4 BHEL Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by a particular welder which, in the opinion of the Engineer will adversely affect the quality of the welding though the welder has earlier passed the tests prescribed by Engineer. The welder'shaving passed qualification tests does not absolve contractor of contractual obligation to continuously check the welder's performance.

8.5 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expenses including cost of materials. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. Radiography or any other NDT on completed field welds shall be conducted as per drawings or instructions of BHEL engineer.

8.6 The contractor shall carry out the root run welding of all piping, valves, instrumentation, tapping points etc. by TIG/ SMAW / MIG welding process. The contractor shall have to carry out full TIG welding of butt weld joints of tubes /pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and

during welding have to purge the pipes with inert gas in case of stainless steel. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.

8.7 All charges for testing of contractor's welders including consumables for welding / destructive and non destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. The test coupons raw material will be supplied by BHEL free of cost.

8.8 The regulators used on welding machines shall be calibrated before putting these into use for work. Periodic calibration for the same shall also be arranged by the Contractor at his cost.

8.9 Only BHEL/HCC/NHPC approved electrodes and filler wire will be used. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate will have co-relation with the lot No. /batch No given on electrode packets. No electrodes will be allowed to be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved / accredited test house traceable to National / International standards will be submitted to BHEL before putting the oven in use. Periodical calibration for the same shall also be arranged by the contractor within the finally accepted rates.

8.10 All butt / fillet welds shall be subject to dye penetration test as per drawing and document requirement and have to be carried out as per the instructions of the engineer within the quoted / finally accepted rates for this contract .

8.11 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or other wise of the welds shall be final. All site welding joints shall be subject to acceptance by BHEL Engineer.

8.12 All welds shall be painted with anticorrosive red oxide paint once radiography and stress reliving works are over. Necessary consumables and scaffolding etc. Including paints shall be provided by contractor at his own cost.

8.13 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL. Wherever possible machining or automatic flame cutting will be allowed only wherever edge preparation otherwise is impractical. All slag's / burrs shall be removed from cuts and all the hand cuts shall be ground smooth to the satisfaction of engineer.

8.14 Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part of erection work and shall be carried out by the contractor in accordance with the instructions of Engineer. All equipment and consumables essential for carrying out the above process shall be arranged by contractor at his cost.

8.15 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. Also the contractor shall have to arrange for labour, heating elements, thermocouples, etc. insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL. The contractor has to provide thermal chalks, temperature recorders, thermocouple attachment units, graphs sheets, etc. for checking within the finally accepted rates. All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost. The contractor shall obtain the signature of BHEL Engineer or his representative on the chart of the recorder after setting up the weld joints for heat treatment operation prior to the starting..

8.16 The contractor shall also be equipped for carrying out other NDT like DP/ MPI / UT etc. as required as per welding schedule/ drawings within the finally accepted price/ rates.. Necessary help including surface preparation and scaffolding required for conducting all the shall be rendered by contractor at his own cost.

8.17 The technical particulars, specification and other general details for NDT work shall be in accordance with ASME, ISO or as specified by Drawings and Manuals of BHEL / HCC/NHPC.

8.18 Low speed high contrast, fine grain films (D-7 or equivalent) in 10cm. width only be used for weld joint radiography. Film density shall be between 2.0 to 4.0.

8.19 Iridium – 192/any other approved shall be used by contractor for radiography work. The geometric un-sharpness shall not exceed 0.05 mm. Taking adequate safety precautions shall be the responsibility of the contractor while carrying out radiography. Necessary

safe guards required for radiography (including personnel from BARC) shall be arranged by contractor at his own cost.

8.20 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.

8.21 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract no., joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.

8.22 Lead intensifying screens for front and back of the film should be used as per the above referred ASME specification.

8.23 The joint is to be marked with permanent mark A, B, C, etc. to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down stream side of the weld.

8.24 For multiple exposures, an overlap of about 25 mm of film should be provided.

8.25 Radiography personnel with sufficient experience and certified by M/s BARC as Radiographer for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed . These personnel should also be registered with BARC for film badge service.

8.26 All arrangements for carrying out radiography work including dark room with air conditioner/ blower and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved/ accredited by BARC and/or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.

8.27 The contractor shall have a dark room fully equipped with radiography equipment, film (unexposed), chemicals and any other dark room accessories such as Airconditioner/ Blower etc. There should be adequate number of radiography personnel with sufficient experience and certified by M/s BARC as Radiographer for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection. These personnel should also be registered with BARC for film badge service.

8.28 Contractor shall note that 100% radiography will be done at the initial stages on all the welding joints as specified in the drawings. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out.

8.29 All the Radiographs shall be properly preserved and shall become the property of BHEL.

8.30 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ NHPC shall be strictly followed. BARC certificate/permission letter to be provided before taking up the work.

8.31 Radiography of joints shall be so planned that it does not interfere with the ongoing erection works keeping in mind the safety of the persons due to radiation exposure. The testing of the welding joints shall also be planned in a way that it is carried out at the earliest possible so as to assess the soundness of the weld joints and performance of HP welders. If the performance of welder is unsatisfactory, he shall be replaced immediately.

8.32 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radio graphed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if the defect persists after first repair, as per radiograph, carrying out radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radio graphed at contractor's cost.

8.33 If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.

8.34 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary arrangements including labour, supervisors/ Engineer required for the work as per directions of BHEL.

8.35 The contractor shall assist BHEL Engineer in preparing complete field welding schedule/procedure for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days

prior to the scheduled start of erection work at site. Such schedules shall be strictly adhered to by the contractor.

## 9 Testing, Pre-Commissioning, Commissioning & Post-Commissioning

9.1 On completion of erection of equipment, the contractor shall get the equipment checked up by the NHPC, BHEL and their deputed supervisors, specialists concerned with the particular item of work. The testing of various equipment will be carried under the supervision of BHEL/ NHPC with the assistance of the Contractor in the manner decided by and in the presence of the owner and other authorised supervisors concerned, and to their entire satisfaction. On completion of these preliminary checks by the equipment supplier, the contractor shall make the equipment ready for conducting the test. The contractor shall rectify all defects found during the checking / testing as directed by the BHEL/ Consortium partner /Owner to ensure satisfactory operation of the equipment.

9.2 The contractor shall carry out the required tests as instructed by BHEL using contractor's own consumables, labour and scaffoldings.

9.3 All the tests shall be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. Contractor shall also carry out repair of all the welded joints (site and suppliers) failed during testing.

9.4 The scope of testing activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning, or for any other tests as the case may be and will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the off site disposal of effluents.

9.5 For testing of distributor pipings, the necessary test pump and bulk heads shall be supplied by BHEL. Any other item which may be required additionally shall be arranged by contractor. The necessary blanks, pressure gauge, valve etc for testing of piping system including hardware shall be arranged by the contractor within his scope of work.

9.6 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors including necessary consumables, T&Ps, IMTEs etc., and any other assistance required during testing of equipment and attending any problem in the equipment erected by the contractor till handing over. Association of BHEL's/ Client's staff during above period will not absolve contractor from above responsibilities.

9.7 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the

contractor to his employees may be involved. The contractor's finally accepted rates/ price shall be inclusive of all these factors also.

9.8 In case, any rework is required because of contractor's faulty erection which is noticed during testing, the same has to be rectified by the contractor at his cost. If any equipment/ part is required to be inspected during testing, the contractor will dismantle /open up the equipment / part and reassemble / redo the work without any extra claim.

9.9 During testing, opening/ closing of valves, changing of gaskets, realignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price shall also include all such work.

9.10 The contractor shall make all necessary arrangements including making of temporary closures on piping/ equipment for carrying out the hydro test on all piping equipment covered in the specification at no additional cost.

9.11 In case any defect is noticed during tests such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment are necessary, the same shall be done as per Engineer's instructions including repair, rectification and replacement work by the contractor at his cost. The parts to be replaced shall be provided by BHEL.

9.12 The contractor shall carry out cleaning and servicing of valves prior to testing of the equipment under his scope. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.

9.13 Cleaning & servicing of all the filters/ strainers, toppings of oils coming in the system shall be done by the contractor within the accepted price.

9.14 At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the Engineer and incorporate the same at no extra cost.

## 10 Finish Painting

10.1 Primer painting wherever peeled off or damaged or if required is to be carried out after thoroughly cleaning of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL and the same being inspected and approved by the engineer before painting. Bare surfaces / unpainted surfaces shall be provided with two coats of suitable primer. The gas cut stubs / weld seams would require be cleaning / grinding before painting. After applying the primer paints all the equipments / items shall be finished with two coats of enamel paint or any other paint as issued by BHEL. The exterior surface may have to be cement / coal tar painted as directed by BHEL.

10.2 As the equipment/ items are to be spray painted, the contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job/ site shall be permitted only items approved by the owner / Engineer.

10.3 While the primers and paints will be issued by BHEL as free issue item, all tools and other consumables including scaffolding materials required for finish painting shall be supplied by contractor within their quoted rate.

## 11 Any other requirement

**Not Applicable**

**Annexure - I**

# KISHANGANGA HEP (3 X 110 MW)

## PACKAGE WEIGHTS & DIMENSIONS

**TURBINE (PELTON) & ACCESSORIES**

| S.NO. | DESCRIPTION | No. of pieces/package | Total no. of pieces/packages | Dimension L (mm) | Dimension W (mm) | Dimension H (mm) | Unit Weight (Kg) | Total Wt. (3 Units) for Matl. Handling (T) | Total Wt. (3 Units) for Erection (T) |
|---|---|---|---|---|---|---|---|---|---|
| **A)** | **TURBINE (each)** | | | | | | | | |
| 1.00 | Central frame work | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 8620.00 | 25.86 | 25.86 |
| 2.00 | Lower Pit liner | 9.0 | 27.00 | ----In suitable no. of packages------ | | | 19775.00 | 59.33 | 59.33 |
| 3.00 | Embeded tubes for field efficiency test | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 2116.00 | 6.35 | 6.35 |
| 4.00 | Pipe and embedments in second stage | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 1915.00 | 5.75 | 5.75 |
| 5.00 | Testing devices for nozzle assembly | 1.0 | 1.00 | ----In suitable no. of packages------ | | | 2113.00 | 2.11 | 2.11 |
| 6.00 | Runner (21 Buckets) | 1.0 | 3.00 | 3500.00 | 3500.0 | 800.0 | 15855.00 | 47.57 | 47.57 |
| 12.00 | Tools and tackles for power house | 1.0 | 1.00 | ----In suitable no. of packages------ | | | 280.00 | 0.28 | 0.28 |
| 13.00 | Metering Instruments | 1.0 | 1.00 | ----In suitable no. of packages------ | | | 35.85 | 0.04 | 0.04 |
| 14.00 | Guide Bearing | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 5340.00 | 16.02 | 16.02 |
| 15.00 | Shaft | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 32005.00 | 96.02 | 96.02 |
| 16.00 | Testing devices for distributor | 1.0 | 1.00 | ----In suitable no. of packages------ | | | 43500.00 | 43.50 | 43.50 |
| 17.00 | Turbine housing | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 63324.00 | 189.97 | 189.97 |
| 18.00 | Distributor (in segment) | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 102120.00 | 306.36 | 306.36 |
| 19.00 | Nozzle assembly | 5.0 | 3.00 | ----In suitable no. of packages------ | | | 7300.00 | 109.50 | 109.50 |
| 20.00 | Decompression valve dia 50 | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 125.00 | 0.38 | 0.38 |
| 21.00 | Misc & other left items | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 100000.00 | 300.00 | 300.00 |
| | **Sub Total** | | | | | | | **1209.01** | **1209.01** |
| | | | | | | | | | |
| **B)** | **MAIN INLET VALVE (each)** | | | | | | | | |
| 11.00 | MIV (Spherical valve 1600 dia) | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 99470.00 | 298.41 | 298.41 |
| 7.00 | Inlet pipe of MIV | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 6360.00 | 19.08 | 19.08 |
| 8.00 | Tools, tackles & erection devices for MIV | 1.0 | 1.00 | ----In suitable no. of packages------ | | | 1150.00 | 1.15 | 1.15 |
| 9.00 | Outlet pipe with dismantling joint for MIV | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 11631.00 | 34.89 | 34.89 |
| 10.00 | Bypass valve | 1.0 | 3.00 | ----In suitable no. of packages------ | | | 360.00 | 1.08 | 1.08 |
| | **Sub Total** | | | | | | | **354.61** | **354.61** |
| | | | | | | | | | |
| **C)** | **PENSTOCK VALVE (each)** | | | | | | | | |
| | Penstock Valve (BFV 4000 dia) 1 No. with all accessories | 1.0 | 1.0 | ----In suitable no. of packages------ | | | 100000.00 | 100.00 | 100.00 |
| | **Sub Total** | | | | | | | **100.00** | **100.00** |
| | | | | | | | | | |
| **D)** | **AUXILIARIES (one set for complete power house)** | | | | | | | | |
| 1.00 | Plate Type Heat Exchanger for Cooling Water | 1 set | ------In suitable no. of boxes------ | | | | | 2.00 | 2.00 |
| 2.00 | Cooling Water Pump Motor Set | 1 set | ------In suitable no. of boxes------ | | | | | 10.00 | 10.00 |
| 3.00 | Cooling Water Automatic Filter | 1 set | ------In suitable no. of boxes------ | | | | | 3.50 | 3.50 |
| 4.00 | LP Compressor motor set | 1 set | ------In suitable no. of boxes------ | | | | | 5.00 | 5.00 |
| 5.00 | Dewatering Pump motor set | 1 set | ------In suitable no. of boxes------ | | | | | 10.00 | 10.00 |
| 6.00 | Drainage Pump motor set | 1 set | ------In suitable no. of boxes------ | | | | | 15.00 | 15.00 |
| 7.00 | LP Air Receiver | 1 set | ------In suitable no. of boxes------ | | | | | 5.00 | 5.00 |
| 8.00 | Misc. piping, valves, fittings for C-1 to C-7 | ------In suitable no. of boxes------ | | | | | | 100.00 | 100.00 |
| | **Sub Total** | | | | | | | **150.50** | **150.50** |
| | **SUB TOTAL WEIGHT** | | | | | | | **1814.13** | **1814.13** |

**MAJOR ITEMS OF GOVERNING GROUP**

| S.NO. | DESCRIPTION | NO. OF PACKAGES | PACKAGE DIMENSIONS (EACH) (mm) | (mm) | (mm) | WT.OF EACH PACKAGE (KG) | TOTAL WT. OF PACKAGE (KG) | Total Wt. (3 Units) for Matl. Handling (T) | Total Wt. (3 Units) for Erection (T) |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | HYDRO MECHANICAL CABINET (HMC) for deflector control | 3.00 | 3000(H) | 1600(W) | 1500(D) | 2100.00 | 6300.00 | 6.30 | 6.30 |
| 2.00 | MICROPROCESSOR BASED ELECTRO HYDRAULIC GOVERNOR CONTROLLER(EHGC) | 3.00 | 2520(H) | 1200(W) | 1000(D) | 1200.00 | 3600.00 | 3.60 | 3.60 |
| 3.00 | OIL SUMP TANK FOR GOV. (2.5 M. Cu) | 1.00 | 2400(L) | 2100(W) | 2100(H) | 2700.00 | 2700.00 | 2.70 | 2.70 |
| 4.00 | OIL SUMP TANK FOR MIV (8 M. Cu) | 1.00 | 2400(L) | 2100(W) | 2100(H) | 3500.00 | 3500.00 | 3.50 | 3.50 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.00 | OIL SUMP TANK FOR BFV (6.3 M. Cu) | 1.00 | 2400(L) | 2100(W) | 2100(H) | 4000.00 | 4000.00 | 4.00 | 4.00 |
| 6.00 | Oil Pressure Vessel with oil for MIV | 3.00 | 2200(L) | 1800(W) | 4700(H) | 30000.00 | 90000.00 | 90.00 | 90.00 |
| 7.00 | HYDRAULIC CONTROL PANEL FOR MIV. | 3.00 | 2450(H) | 1020(W) | 820(D) | 350.00 | 1050.00 | 1.05 | 1.05 |
| 8.00 | Turbine Junction Box for MIV | 3.00 | | | | | 500.00 | 0.50 | 0.50 |
| 9.00 | TROLLY MOUNTED OIL STORAGE TANK CAPACITY - 10 KL | 1.00 | 5000(L) | 2000(W) | 3000(H) | 8000.00 | 8000.00 | 8.00 | 8.00 |
| 10.00 | CENTRIFUGING OIL PURIFIER | 1.00 | 8000(L) | 3000(W) | 5000(H) | 20000.00 | 20000.00 | 20.00 | 20.00 |
| 11.00 | FIRST FILLING OF OIL | 3.00 | -----In suitable no. of drums------ | | | 10000.00 | 30000.00 | 30.00 | 30.00 |
| 12.00 | Instruments | | | | | | 5000.00 | 5.00 | 5.00 |
| 13.00 | SPARES | 1 SET | ---In suitable no. of packages------ | | | | 20000.00 | 20.00 | 20.00 |
| | **SUB TOTAL WEIGHT** | | | | | | | **194.65** | **194.65** |

**MAJOR ITEMS OF HYDRO GENERATOR**

| S.NO. | NAME OF COMPONENT | QTY. PER M/C | TOTAL NO. OF QUANTITY | DIMENSION | | | WT. PER QTY. | Total Wt. (3 Units) for Matl. Handling | Total Wt. (3 Units) for Erection |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | W | H | | | |
| | | | | (m) | (m) | (m) | (KG) | (T) | (T) |
| 1.00 | Stator Frame Segment | 4.00 | 12.00 | 5600.00 | 3200.00 | 2000.00 | 7500.00 | 90.00 | 90.00 |
| 2.00 | Poles | 16.00 | 52.00 | 2400.00 | 1000.00 | 800.00 | 4800.00 | 249.60 | 249.60 |
| 3.00 | Rim Punching | 38.00 | 114.00 | 1800.00 | 1000.00 | 500.00 | 2600.00 | 296.40 | 296.40 |
| 4.00 | Stator Punching | 96.00 | 288.00 | 1000.00 | 750.00 | 500.00 | 1200.00 | 345.60 | 345.60 |
| 5.00 | Top Shaft | 1.00 | 3.00 | 3200.00 | 2000.00 | 1800.00 | 10000.00 | 30.00 | 30.00 |
| 6.00 | Bottom shaft | 1.00 | 3.00 | 3200.00 | 2200.00 | 1800.00 | 17000.00 | 51.00 | 51.00 |
| 7.00 | Thrust Collar | 1.00 | 3.00 | 1800.00 | 1800.00 | 1400.00 | 5000.00 | 15.00 | 15.00 |
| 8.00 | Spider | 1.00 | 3.00 | 2900.00 | 2900.00 | 2200.00 | 17000.00 | 51.00 | 51.00 |
| 9.00 | Top bracket housing | 1.00 | 3.00 | 3200.00 | 3200.00 | 1800.00 | 22000.00 | 66.00 | 66.00 |
| 10.00 | Top bracket arm | 8.00 | 24.00 | 2200.00 | 700.00 | 1700.00 | 3000.00 | 72.00 | 72.00 |
| 11.00 | Bottom bracket housing | 1.00 | 3.00 | 3200.00 | 3200.00 | 900.00 | 9000.00 | 27.00 | 27.00 |
| 12.00 | Bottom bracket arm | 4.00 | 12.00 | 1000.00 | 1000.00 | 750.00 | 1000.00 | 12.00 | 12.00 |
| 13.00 | Air Coolers | 8.00 | 28.00 | 2000.00 | 2200.00 | 700.00 | 1000.00 | 28.00 | 28.00 |
| 14.00 | Plug in type oil coolers for upper bearings | 8.00 | 28.00 | 900.00 | 850.00 | 750.00 | 500.00 | 14.00 | 14.00 |
| 15.00 | Plug in type oil coolers for lower bearings | 2.00 | 7.00 | 800.00 | 850.00 | 750.00 | | 0.00 | 0.00 |
| | **Miscellaneous Packages** | | | | | | | | |
| 16.00 | Large Packages | 12.00 | 36.00 | 3000.00 | 1500.00 | 1200.00 | 1500.00 | 54.00 | 54.00 |
| 17.00 | Medium Packages | 18.00 | 54.00 | 2000.00 | 1000.00 | 1000.00 | 1000.00 | 54.00 | 54.00 |
| 18.00 | Small Packages | 24.00 | 72.00 | 1200.00 | 800.00 | 800.00 | 800.00 | 57.60 | 57.60 |
| | **SUB TOTAL WEIGHT** | | | | | | | **1513.20** | **1513.20** |

**SCHEDULE OF PANELS FOR STATIC EXCITATION SYSTEM**

| S.NO. | SCOPE OF SUPPLY | NO. OF PANELS PER SET | NO. OF SETS | DIMENSION | | | WIGHT OF EACH SET | Total Wt. (3 Units) for Matl. Handling | Total Wt. (3 Units) for Erection |
|---|---|---|---|---|---|---|---|---|---|
| | | | | W | D | H | | | |
| | | | | (m) | (m) | (m) | (KG) | (T) | (T) |
| 1.00 | Regulation Panel with AVR | 1.00 | 3.00 | 1.15 | 1.25 | 2.32 | 1000.00 | 3.00 | 3.00 |
| 2.00 | Thyristor converter Panel | 2.00 | 3.00 | 0.68 | 1.25 | 2.32 | 700.00 | 4.20 | 4.20 |
| 3.00 | Field Flashin Panels | 1.00 | 3.00 | 1.15 | 1.25 | 2.32 | 800.00 | 2.40 | 2.40 |
| 4.00 | Field Breaker Panel | 1.00 | 3.00 | 1.15 | 1.25 | 2.32 | 800.00 | 2.40 | 2.40 |
| 5.00 | AC Breaker Panel | 1.00 | 3.00 | 1.15 | 1.25 | 2.32 | 1400.00 | 4.20 | 4.20 |
| 6.00 | Aux Transformer Panel | 1.00 | 3.00 | 1..5 | 1.25 | 2.32 | 1500.00 | 4.50 | 4.50 |
| 7.00 | D.B. Isolator Panel | 1.00 | 3.00 | 2.80 | 2.00 | 2.32 | 2000.00 | 6.00 | 6.00 |
| 8.00 | Excitation Transformer with cubicle | 1.00 | 3.00 | 2.60 | 1.50 | 2.85 | 6500.00 | 19.50 | 19.50 |
| | **SUB TOTAL WEIGHT** | | | | | | | **46.20** | **46.20** |

**ELECTRICAL BOP ITEMS**

| S.NO. | NAME OF COMPONENT | | TOTAL NO. OF QUANTITY | DIMENSION | | | WT. PER QTY. | Total Wt. (3 Units) for Matl. Handling | Total Wt. (3 Units) for Erection |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | W | H | | | |
| | | | | (m) | (m) | (m) | (Kg) | (T) | (T) |
| 1.00 | HT Cable | drum | 20.00 | 650x2000 | | | 1500.00 | 30.00 | 30.00 |
| 2.00 | LT Power Cable | drum | 90.00 | 600x1500 | | | 1200.00 | 108.00 | 108.00 |
| 3.00 | Control Cable | drum | 35.00 | 600x1500 | | | 1000.00 | 35.00 | 35.00 |
| 4.00 | Inst. Cable | drum | 30.00 | 500x1500 | | | 1000.00 | 30.00 | 30.00 |
| 5.00 | Cable Tray | tray | 4000.00 | 2500x600x110 | | | 80000.00 | 80.00 | 80.00 |
| 6.00 | Cable accessories | lot | 1.00 | | | | 1500.00 | 1.50 | 1.50 |
| 7.00 | Termination Kit | lot | 1.00 | | | | 750.00 | 0.75 | 0.75 |
| 8.00 | Motor Control Panels | panels | 30.00 | 1200x600x1000 | | | 200.00 | 6.00 | 6.00 |
| 9.00 | 220 V battery | (2 lot)cells | 240.00 | 2200x750x1500 for each rack | | | 40.00 | 9.60 | 9.60 |
| 10.00 | 48 V Battery | (1lot)cells | 38.00 | 1900x450x800 | | | 18.00 | 0.68 | 0.68 |
| 11.00 | 220V Charger | Nos. | 2.00 | 4000.00 | 1000.00 | 2300.00 | 2000.00 | 4.00 | 4.00 |
| 12.00 | 48V Charger | Nos. | 2.00 | 1100.00 | 850.00 | 1600.00 | 1000.00 | 2.00 | 2.00 |
| 13.00 | 220V DCDB | Nos. | 2.00 | 4600.00 | 450.00 | 2000.00 | 2200.00 | 4.40 | 4.40 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 14.00 | UPS | No | 1.00 | 3030.00 | 1047.00 | 2050.00 | 600.00 | 0.60 | 0.60 |
| 15.00 | UAB | Nos. | 3.00 | 8600.00 | 1200.00 | 2300.00 | 5300.00 | 15.90 | 15.90 |
| 16.00 | SSB | Nos. | 2.00 | 7100.00 | 1200.00 | 2300.00 | 6300.00 | 12.60 | 12.60 |
| 17.00 | Misc Boards | Nos. | 5.00 | 1600.00 | 600.00 | 1800.00 | 600.00 | 3.00 | 3.00 |
| 18.00 | Earthing Material | lot | 1.00 | 40mm dia MS rod of 6m length, 75x12mm GI Flat,50x10mm GI Flat | | | 8000.00 | 8.00 | 8.00 |
| 19.00 | DG Sets | No | 2.00 | 7000.00 | 250.00 | 3000.00 | 10500.00 | 21.00 | 0.00 |
| 20.00 | AMF Panel | No | 1.00 | 200.00 | 600.00 | 1800.00 | 1400.00 | 1.40 | 0.00 |
| 21.00 | Daily tank | No | 1.00 | 1000 Ltr | | | 800.00 | 0.80 | 0.00 |
| 22.00 | Storage Tank | No | 1.00 | 30000 Ltr | | | 8000.00 | 8.00 | 0.00 |
| 23.00 | Illumination system | Nos. | 2.00 | 1600x600x1800 MLDB | | | 1200.00 | 2.40 | 0.00 |
| 24.00 | Lighting, fixures, wires, conduits etc. | lot | 1.00 | | | | 5000.00 | 5.00 | 0.00 |
| 25.00 | Communication System | lot | 1.00 | | | | 3000.00 | 3.00 | 0.00 |
| 26.00 | 250 kVA, 11/0.415 kV, 3 phase Valve house tranasformer | No. | 1.00 | | | | 2000.00 | 2.00 | 2.00 |
| 27.00 | 11 kV Switchgear System | Lot | 1.00 | | | | 10000.00 | 10.00 | 10.00 |
| | **SUB TOTAL WEIGHT** | | | | | | | **405.63** | **354.03** |

**BUS DUCT**

| | **TENTATIVE LENGTH IN M** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **S NO.** | **DESCRIPTION** | **NO. PER UNIT** | **DIMENSIONS (EACH)** | | | **Weight of single unit** | **Weight** | **Total Wt. (3 Units) for Matl. Handling** | **Total Wt. (3 Units) for Erection** |
| | | | **L** | **W** | **H** | | | | |
| | | | **(m)** | **(m)** | **(m)** | **(Kg)** | **(Kg)** | **(T)** | **(T)** |
| 1.00 | Isolated Phase Bus duct (Main) | 50.00 | 5000.00 | 876.00 | 876.00 | 565.00 | 28250.00 | 84.75 | 84.75 |
| 2.00 | Isolated Phase Bus duct (delta) | 14.00 | 5000.00 | 780.00 | 780.00 | 450.00 | 6300.00 | 18.90 | 18.90 |
| 3.00 | Isolated Phase Bus duct (Tap off) | 14.00 | 2500.00 | 680.00 | 680.00 | 345.00 | 4830.00 | 14.49 | 14.49 |
| 4.00 | NG CUBICLES | 1.00 | 2000.00 | 1500.00 | 2500.00 | 1200.00 | 1200.00 | 3.60 | 3.60 |
| 5.00 | LAVT Cubicles | 1.00 | 3200.00 | 3000.00 | 4500.00 | 4200.00 | 4200.00 | 12.60 | 12.60 |
| 6.00 | Miscellaneous Items Packages & | 1.00 | 1300.00 | 1300.00 | 600.00 | 20000.00 | 20000.00 | 60.00 | 60.00 |
| | **SUB TOTAL WEIGHT** | | | | | | | **194.34** | **194.34** |

**SWITCHYARD MATERIAL OF TBG SCOPE**

| **S.NO.** | **DESCRIPTION** | **QTY. PER Generator** | **TOTAL QTY.** | **DIMENSION** | | | **UNIT WEIGHT** | **Total Wt. (3 Units) for Matl. Handling** | **Total Wt. (3 Units) for Erection** |
|---|---|---|---|---|---|---|---|---|---|
| | | | | **L** | **W** | **H** | | | |
| **S.NO.** | | | | **(m)** | **(m)** | **(m)** | **(T)** | **(T)** | **(T)** |
| 1.00 | 220 kV XLPE Cables | ------In suitable no. of boxes------ | | | | | | | |
| 2.00 | 220/33 kV Outdoor Switchyard equipment | ------In suitable no. of boxes------ | | | | | | | |
| 3.00 | DC System for Switchyard | ------In suitable no. of boxes------ | | | | | | | |
| 4.00 | Cabling system | ------In suitable no. of boxes------ | | | | | | | |
| 5.00 | Switchyard Transformer & Distribution board | ------In suitable no. of boxes------ | | | | | | | |
| 6.00 | Illumination System | ------In suitable no. of boxes------ | | | | | | | |
| 7.00 | HVAC System | ------In suitable no. of boxes------ | | | | | | | |
| 8.00 | Grounding system | ------In suitable no. of boxes------ | | | | | | | |
| 9.00 | Fire Fighting System | ------In suitable no. of boxes------ | | | | | | | |
| 10.00 | Spares and Tools & Instruments | ------In suitable no. of boxes------ | | | | | | | |
| | **SUB TOTAL WEIGHT** | | | | | | | **1065.00** | **0.00** |

**HSE(MECHANICAL) & EMRP PACKAGES**

| **S.NO.** | **DESCRIPTION** | **NO. OF BOXES** | **PACKAGE DIMENSIONS (EACH)** | | | **WT.OF EACH PACKAGE** | **TOTAL WT. PACKAGE** | **Total Wt. (3 Units) for Matl. Handling** | **Total Wt. (3 Units) for Erection** |
|---|---|---|---|---|---|---|---|---|---|
| | | | **(m)** | **(m)** | **(m)** | **(KG)** | **(T)** | | |
| **A** | **Mechanical Workshop Equipments & Elevator (All cove** | ------In suitable no. of boxes------ | | | | | 49.38 | 49.38 | 0.00 |
| | | | | | | | | | |
| **B** | **Electical Workshop** | ------In suitable no. of boxes------ | | | | | 1.36 | 1.36 | 0.00 |
| | | | | | | | | | |
| **C** | **Ventilation & Air conditioning System (All covered store)** | | | | | | 20.00 | 20.00 | 0.00 |
| | | ------In suitable no. of boxes------ | | | | | | | |
| **D** | **Earthing Circuit & Lightening Protection** | ------In suitable no. of boxes------ | | | | | 80.00 | 80.00 | 80.00 |
| | | | | | | | | | |
| **E** | **Water level monitoting system** | ------In suitable no. of boxes------ | | | | | 0.50 | 0.50 | 0.00 |
| | | | | | | | | | |
| **F** | **Flood detection system** | ------In suitable no. of boxes------ | | | | | 2.00 | 2.00 | 0.00 |
| | | | | | | | | | |
| **G** | **False door** | ------In suitable no. of boxes------ | | | | | 10.00 | 10.00 | 0.00 |
| | | | | | | | | | |
| **H** | **Passenger Lift (All covered store)** | ------In suitable no. of boxes------ | | | | | 10.00 | 10.00 | 0.00 |
| | | | | | | | | | |
| **I** | **EOT Cranes** | | | | | | | | |
| **1.00** | **2 nos. of 150/20T/10T Crane for PH & 1 No. 100 T for BFV House** | ------In suitable no. of boxes------ | | | | | 263.00 | 263.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **J** | **Fire Detection & Fire Protection System** | ------In suitable no. of boxes------ | | | | | 10.00 | 10.00 | 0.00 |
| | | | | | | | | | |
| **K** | **Fire detection system** | | | | | | 5.00 | 5.00 | 0.00 |
| | | | | | | | | | |
| **L** | **Telecommunication system** | | | | | | 5.00 | 5.00 | 0.00 |
| | | | | | | | | | |
| | **SUB TOTAL WEIGHT** | | | | | | | **456.24** | **80.00** |

**SCHEDULE OF PANEL/DESK FOR CONTROL & MONITORING SYSTEM**

| S.NO. | DESCRIPTION | NO. OF SETS | NO. OF PANELS/SUITES/DESKS PER SET | Size of each panel/suite/desk | | | WEIGHT OF EACH PANEL | Total Wt. (3 Units) for Matl. Handling | Total Wt. (3 Units) for Erection |
|---|---|---|---|---|---|---|---|---|---|
| | | | | W | D | H | | | |
| | | | | (mm) | (mm) | (mm) | (Kg) | (T) | (T) |
| **1.00** | **CONTROL BOARDS/PANELS** | | | | | | | | |
| **1.10** | **Unit Control Board (UCB)** | | | | | | | | |
| 1.1.1 | Control & Monitoring Panel | 3.00 | 1 suit | (750+750+750+750+750) | 800.00 | 2320.00 | 2000.00 | 6.00 | 6.00 |
| 1.1.2 | Temp. Measuremnet Panel | 3.00 | 1.00 | 950.00 | 800.00 | 2320.00 | 500.00 | 1.50 | 1.50 |
| | Inst. Panel | 3.00 | 1.00 | 950.00 | 800.00 | 2320.00 | 500.00 | 1.50 | 1.50 |
| | Gauge Panel | 3.00 | 1.00 | 1000.00 | 800.00 | 2320.00 | 500.00 | 1.50 | 1.50 |
| | | | | | | | | | |
| **1.20** | **Common Auxiliaries Control Board** | | | | | | | | |
| 1.2.1 | Control & Monitoring Panel | 1.00 | 1.00 | (750+750+750+750+750) | 800.00 | 2320.00 | 2000.00 | 2.00 | 2.00 |
| | | | | | | | | | |
| **1.30** | **LCB for Electrical Power Supply Service Board** | | | | | | | | |
| 1.3.1 | Control & Monitoring Panel | 1.00 | 1.00 | (750+750+750+750+750) | 800.00 | 2320.00 | 2000.00 | 2.00 | 2.00 |
| | | | | | | | | | |
| **1.40** | **LCB for 220 kV & 33 kV Switchyard Control Board** | | | | | | | | |
| 1.4.1 | Control & Monitoring Panel | 1.00 | 1.00 | (750+750+750+750+750) | 800.00 | 2320.00 | 2000.00 | 2.00 | 2.00 |
| | | | | | | | | | |
| **2.00** | **Computerized System in Central Control Room** | | | | | | | | |
| 2.0.1 | Operator Station | 1.00 | 1.00 | 3600.00 | 800.00 | 1100.00 | | | |
| 2.0.2 | Engineer's Station (Desk top) | 1.00 | 1.00 | 900.00 | 800.00 | 1100.00 | | | |
| 2.0.3 | Engineer's Station (Lap top) | 2.00 | 1.00 | 900.00 | 800.00 | 1100.00 | | | |
| 2.0.4 | maxLINC PC | 1.00 | 1.00 | 900.00 | 800.00 | 1100.00 | | | |
| 2.0.5 | maxSTORIAN PC | 2.00 | 1.00 | 900.00 | 800.00 | 1100.00 | | | |
| 2.0.6 | Training Simulator PC | 1 set | 1.00 | 900.00 | 800.00 | 1100.00 | | | |
| 2.0.7 | Tables for Plant Computers Servers & Printers | 8.00 | 1.00 | 900.00 | 800.00 | 1100.00 | | | |
| 2.0.8 | Printers | 1.00 | 2.00 | 2000.00 | 750.00 | 1000.00 | | 20.00 | 20.00 |
| **3.00** | **Network Interface panel** | **1.00** | **1.00** | **750.00** | **750.00** | **1000.00** | | | |
| **4.00** | **Global Positioning System Based time synchronization system** | **1.00** | **1.00** | | | | | | |
| **5.00** | **Dam RTU** | | | | | | | | |
| **5.10** | UPS for RTU | **1 set** | **1.00** | | | | | | |
| **6.00** | **RTU at BF Valve House** | **1.00** | **1 set** | **1000.00** | **800.00** | **2320.00** | | | |
| **6.10** | **UPS for RTU** | **1 set** | **Later** | | | | | | |
| | **SUB TOTAL WEIGHT** | | | | | | | **36.50** | **36.50** |

**GENERATOR TRANSFORMER**

| S.NO. | DESCRIPTION | QTY. TRNASFORMER | TOTAL QTY. | DIMENSION, MM | | | Weight per Transformer | Total Wt. (3 Units) for Matl. Handling | Total Wt. (3 Units) for Erection |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | B | H | | | |
| | | | | (mm) | (mm) | (mm) | (KG) | (T) | (T) |
| 1.00 | 10 Nos. 13.8/220/√3 kv, 45MVA, 1ϕ GSU transformer & accessories | | 10.00 | 5000.00 | 5000.00 | 8000.00 | 55000.00 | 550.00 | 550.00 |
| 2.00 | 1 no. 220/33kV, 12 MVA, 3 ϕ | | 1.00 | ------In suitable no. of boxes------ | | | 40000.00 | 40.00 | 40.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.00 | 1 no. 33/11KV, 6 MVA, 3 ϕ Power transformer | | 1.00 | ------In suitable no. of boxes------ | | | 25000.00 | 25.00 | 25.00 |
| 4.00 | Oil Handling System | | 1.00 | ------In suitable no. of boxes------ | | | 10000.00 | 10.00 | 0.00 |
| | **SUB TOTAL WEIGHT** | | | | | | | **625.00** | **615.00** |

**AUXILIARY AND STATION SERVICE TRANSFORMER**

| S.NO. | DESCRIPTION | QTY. PER TRNASFORMER | TOTAL QTY. | DIMENSION, MM | | | WIGHT PER PACKAGE | Total Wt. (3 Units) for Matl. Handling | Total Wt. (3 Units) for Erection |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | B | H | | | |
| | | | | (mm) | (mm) | (mm) | (KG) | (T) | (T) |
| 1.00 | 13.8kv/0.415 kv,3 phase, 1000 kVA cast resin Dry Type station aux. Transformers | | 3.00 | 2600.00 | 2300.00 | 2800.00 | 5000.00 | 15.00 | 15.00 |
| 2.00 | 11/0.415kv,1500 KVA,3 phase, cast resin Dry Type Station Service Transformers | | 2.00 | 2600.00 | 2300.00 | 2800.00 | 6500.00 | 13.00 | 13.00 |
| | **SUB TOTAL WEIGHT** | | | | | | | **28.00** | **28.00** |

**MISCELLANEOUS**

| S.NO. | DESCRIPTION | NO. OF QTY. | PACKAGE DIMENSIONS (EACH) | | | UNIT WEIGHT | TOTAL WT. | Total Wt. (3 Units) for Matl. Handling | Total Wt. (3 Units) for Erection |
|---|---|---|---|---|---|---|---|---|---|
| | | | (mm) | (mm) | (mm) | (T) | (T) | (T) | (T) |
| **1.00** | **SPARES (one set for complete power house)** | ------In suitable no. of boxes------ | | | | | | 150.00 | 0.00 |
| 2.00 | Tools tackles, handling & testing devices | ------In suitable no. of boxes------ | | | | | | 50.00 | 0.00 |
| 3.00 | Other miscellaneous Mechanical/Electrical assemblies | | | | | | | 125.00 | 125.00 |
| | **SUB TOTAL WEIGHT** | | | | | | | **325.00** | **125.00** |
| | **SUM TOTAL FOR MAT HANDLING** | | | | | | | **6703.89** | |
| | **SUM TOTAL FOR ERECTION** | | | | | | | | **5001.05** |

**Note :**

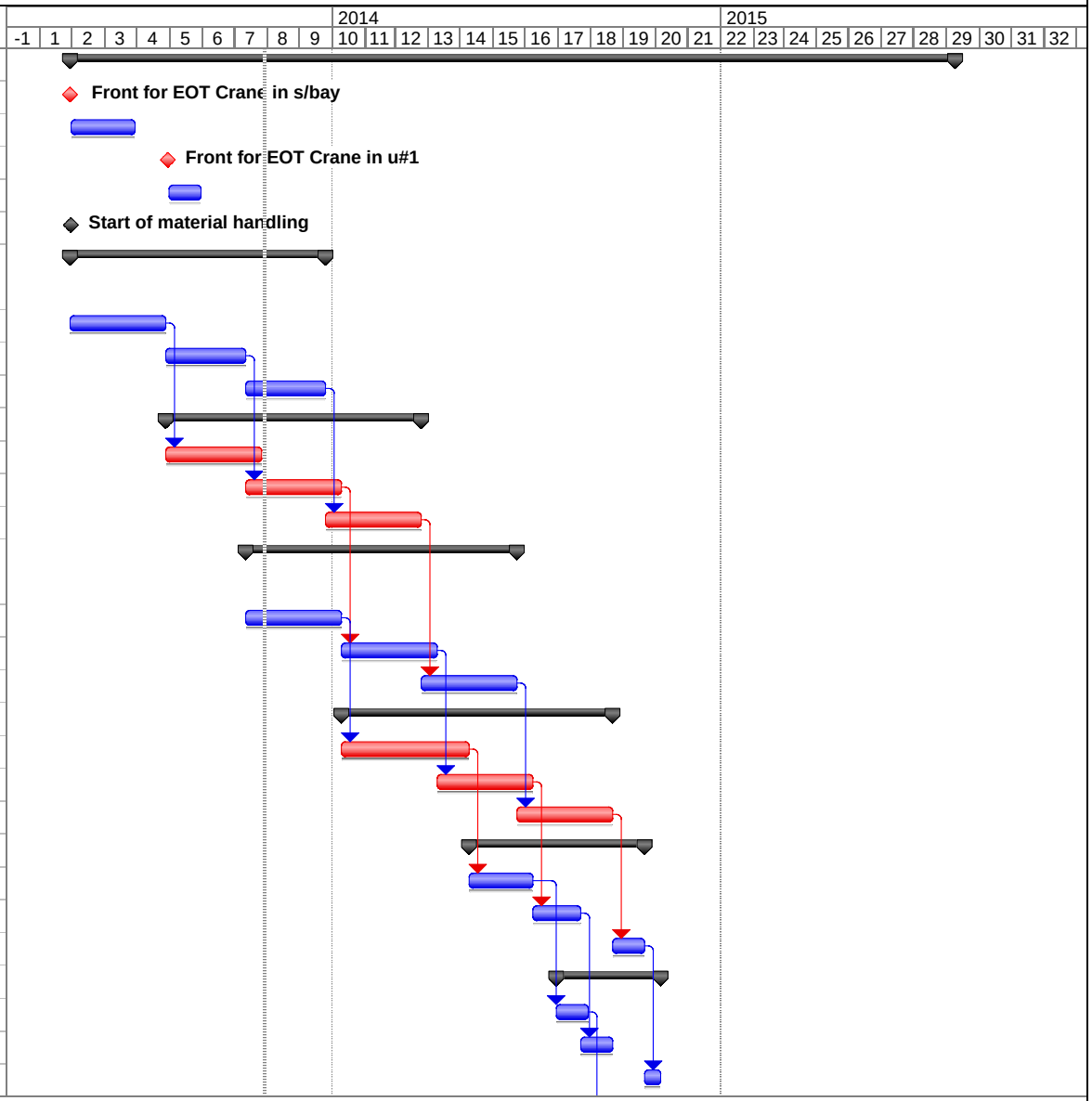
Weights and package size mentioned for the above items are tentative and may change during detail design.

Number of Panels for complete Control & Monitoring system, excitation system,starter panels etc.shown are tentative and may be change in detail design/engg. Complete scope of PSNR shall be the scope of contractor.

# Tentative Milestone Schedule for Kishanganga HEP

**Annexure- II**

| ID | Task Name |
|---|---|
| 1 | **Erection of E&M Packages** |
| 2 | Front for EOT Crane in s/bay |
| 3 | E&C of EOT crane in s/bay |
| 4 | Front for EOT Crane in u#1 |
| 5 | Approach of EOT Crane in u#1 area |
| 6 | Start of material handling |
| 7 | **Erection of 1st stage embedments and pit liners** |
| 8 | U#1 |
| 9 | U#2 |
| 10 | U#3 |
| 11 | **Concreting upto distrubutor pedestals** |
| 12 | U#1 |
| 13 | U#2 |
| 14 | U#3 |
| 15 | **Erection of distributor& 2nd stage embedments** |
| 16 | U#1 |
| 17 | U#2 |
| 18 | U#3 |
| 19 | **Concreting upto Gen Barrel** |
| 20 | U#1 |
| 21 | U#2 |
| 22 | U#3 |
| 23 | **Turbine Assy** |
| 24 | U#1 |
| 25 | U#2 |
| 26 | U#3 |
| 27 | **Lowering of Lower Bracket** |
| 28 | U#1 |
| 29 | U#2 |
| 30 | U#3 |




Project: Kishanganga Schedule 3x110
Date: Tue 29/10/13

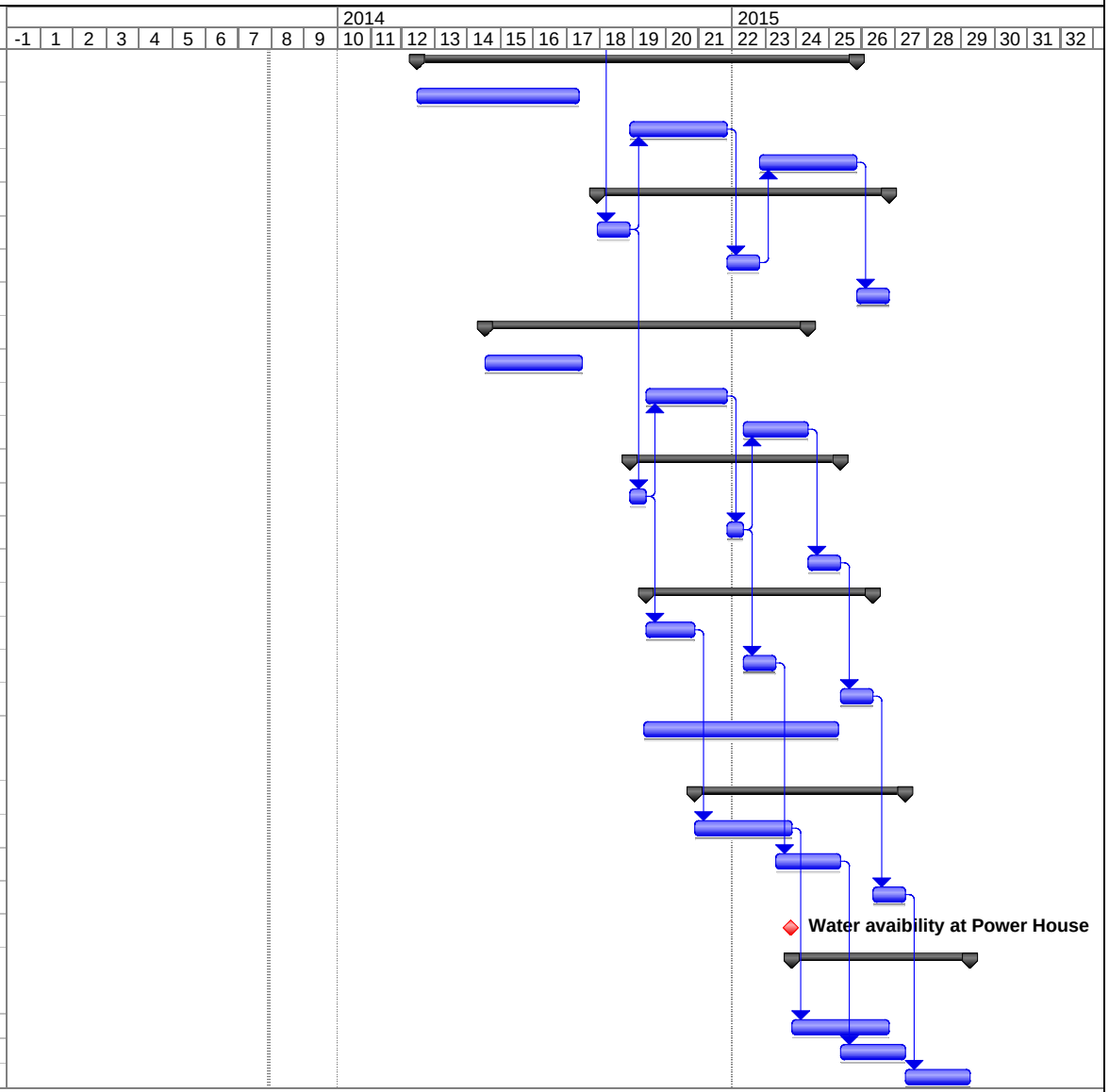
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Above tentative schedule includes some major activities.

# Tentative Milestone Schedule for Kishanganga HEP

**Annexure- II**

| ID | Task Name |
|---|---|
| 31 | **Stator Assy in s/bay** |
| 32 | U#1 |
| 33 | U#2 |
| 34 | U#3 |
| 35 | **Lowering of stator** |
| 36 | U#1 |
| 37 | U#2 |
| 38 | U#3 |
| 39 | **Rotor assy in s/bay** |
| 40 | U#1 |
| 41 | U#2 |
| 42 | U#3 |
| 43 | **Lowering of rotor & upper bracket** |
| 44 | U#1 |
| 45 | U#2 |
| 46 | U#3 |
| 47 | **Unit Axis Alignment** |
| 48 | U#1 |
| 49 | U#2 |
| 50 | U#3 |
| 51 | **Cabling Works, Bus Duct & other Auxiliaries for unit box up** |
| 52 | **Boxing Up** |
| 53 | U#1 |
| 54 | U#2 |
| 55 | U#3 |
| 56 | **Water avaibility at Power House** |
| 57 | **Pre-Commissioning , Commissioning & Handing Over** |
| 58 | U#1 |
| 59 | U#2 |
| 60 | U#3 |




Project: Kishanganga Schedule 3x110
Date: Tue 29/10/13

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Above tentative schedule includes some major activities.