Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)

Power Plant Piping Unit, Thirumayam – 622 507, Tamil Nadu

Tender Notice

NOTICE INVITING e-TENDER

Ref: **Tender No. PPPU: WC: 26: 020 dt. 24.07.2026.**

Subject: Two-part e-Tender inviting techno-commercial and price bids for "**PART PROCESSING OF HEADERS AT PPPU, THIRUMAYAM"**

Kindly submit your competitive offer for the above subject work as per the tender terms and conditions given in the tender document through GEM portal https://gem.gov.in/ only.

Scope of work	**PART PROCESSING OF HEADERS AT PPPU,THIRUMAYAM** (Scope of work and technical terms & conditions as per Techno- Commercial Part-I bid.)
Location of work	**BHEL PPPU Thirumayam -622507 (Tamilnadu)**
Date / Time of Pre Bid Meeting	**10:30 AM on 28.07.2026 via Webex** **Meeting link:** **https://bhel.webex.com/bhel/j.php?MTID=m87c2c71cd28e601d0557585961ca3561** **Meeting number: 2514 362 8745** **Meeting password: iTvuQMgV558**
Duration of Contract	**12 Months** from the date of commencement of work **as indicated in LOI.**
Last date/ time for receipt of tender	**Date and Time as indicated in GeM Portal**
Commencement of work	**On the date of commencement mentioned in the LOI**
Date / Time & place for opening of Techno-commercial bids	**Date and Time as indicated in GeM Portal via On line through GeM by Contracts, PPPU, Thirumayam** (In case of any change in opening date, if any, will be intimated later.)
Date/Time of Price Bid Opening	**The date/ time of price bid opening will be intimated separately.** **BHEL will finalize the rates through RA(Reverse Auction) in GeM portal as per GeM terms & conditions.**
EMD AMOUNT	**Rs. 2,00,000/-** (Rupees Two Lakhs only)
Working Area Contact details	**Sr Manager / OP&C** Power Plant Piping Unit, BHEL -Thirumayam – 622507, Contact No. **04333-279501, 9538403448** Email ID: shanmuga@bhel.in Vendors may visit the work area prior to submission of offer to understand the details of scope of work

Place: CRANGANORE
Date:

JAYARAM BALAKRISHNAN
Digitally signed by JAYARAM BALAKRISHNAN CRANGANORE
Date: 2026.07.24 11:02:17 +05'30'

Signature of Authorized Signatory
with seal & full address

Buyer Added Bid Specific Additional Terms & Conditions (ATC)

1. PRE QUALIFICATION CRITERIA:

1.1. **TECHNICAL:**

1.1.1. **STATUS OF THE COMPANY:**

- Proprietorship: PAN card on owner name
- For partnership firms: PAN card and PARTNERSHIP DEED
- For others: PAN card in the name of company / firm / business and CERTIFICATE OF INCORPORATION / MOA and AOA.
- GST Registration certificate

*As per point no. 1.5 of GCC.

1.1.2. PROOF OF EXPERIENCE AND FINANCIAL TURNOVER:

Bidders have to meet the following Pre-Qualification Criteria for Experience and Turnover for consideration of their offer:

a) PROOF OF EXPERIENCE:
Experience as per scope of work or work related to Fabrication in any Industrial Establishment or Central / State Govt. / PSU / Private company executed after 31st March, 2015 in any of the following ways:

a) Three similar completed works each costing not less than the contract value of ₹40 Lakhs[Excluding GST]

OR

b) Two similar completed works each costing not less than the contract value of ₹50 Lakhs[Excluding GST]

OR

c) One similar completed work costing not less than the contract value of ₹ 80 Lakhs[Excluding GST]

Proof of Work Order / Purchase Order/ Experience certificate should be attached. Proof of experience from any organization other than BHEL to be supported by TDS (Tax Deducted at Source) certificate issued by the organizations OR Form 26 AS or bank statement for transaction of payment.

Place:
Date:

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All the above conditions should be met by bidder firm only, not by any associate firm. Experience proof from BHEL shall contain work order copies.

The value of number of work orders allocated against same enquiry to a contractor will be considered as single work order value for qualifying purpose. Details of enquiry and the work orders linked to that enquiry shall be clearly indicated. There shall be sufficient document proof to ensure that the Work Orders submitted are against a single enquiry.

b) FINANCIAL TURNOVER:
Average Annual financial turnover for any of the two years during the last seven financial years, should be at least ₹ 30 Lakhs. Documents to Prove Financial Soundness of the Firm (in any of the following manner given below) for any two Financial years out of seven years i.e.2019-20, 2020-21. 2021-22, 2022-23, 2023-24,2024-25,2025-26 (Assessment Year 2019-20, 2020-21, 2021-22, 2022-23, 2023-24 ,2024-25,2025-26,2026-27) shall be submitted.

Any document certified by a Chartered Accountant /Cost Accountant showing turnover for the relevant period shall be submitted with the bid. The documents submitted must be signed by the Chartered Accountant /Cost Accountant, bear his seal, Name, firm name, Membership No., FRN No., UDIN and the capacity in which he is signing (Proprietor/Partner) date and place of signing. In case Balance sheet and Profit & Loss Account statements are submitted the same must be signed by the owner also

1.1.3 Tender document (all pages) & Duly filled Checklist (Annexure-1) to be Signed & seal by bidder's Authorized signatory along with annexures.[Digital sign on first page or Manual sign and seal on all pages]

1.1.4 No deviation certificate on bidder's Letter head

1.1.5 Local Content Self Declaration on bidder's Letter head

1.1.6 Duly signed Copy of Integrity pact shall be attached

1.1.7 Vendor shall visit BHEL Thirumayam before the submission of offers in order to understand the facilities available at BHEL PPPU, Thirumayam. MOM Copy of the visit should be enclosed along with the bid. Bids of such Vendors who have visited BHEL Thirumayam before Part-I bid opening will only be considered for further tender proceedings.

Place:
Date:

Signature of Authorized Signatory
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Integrity Pact (IP)

(a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

Sl	IEM	Email
1.	Dr. Sarat Kumar Acharya, Ex-CMD, NLC	iem1@bhel.in
2.	Shri R. Mukundan, IRPS (Retd.)	iem2@bhel.in
3.	Shri Madan Lal Meena, IAS (Retd.)	iem3@bhel.in

(b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

(c) Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the panel of IEMs. All correspondence with the IEMs shall be done through email only.

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:

Details of contact person(s):

(1)
Name: C. B. Jayaram
Dept: Contracts /MS /DTG
Address: BHEL PPPU Thirumayam
Phone: 04333-279551
Email: cbjayaram@bhel.in
Fax: NA

(2)
Name: Deepu Thomas
Dept: Contracts / DTG
Address: BHEL PPPU Thirumayam
Phone: 04333-279552
Email: dthomas@bhel.in
Fax: NA

Place:
Date:

Signature of Authorized Signatory
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2 SCOPE OF SUPPLY, Technical terms & Conditions:

1. The Contractor is responsible for part processing of the Headers, ensuring they meet the requirements outlined in BHEL-issued drawings, Quality Plan, and Welding Procedures for headers, involving welding of stubs/nipples/inspection nozzles/flat end cover/hydro dummies' welding of 24 header DUs in 10184 PGMA and 48 header DUs 10274 PGMA per Boiler. Contract period is 1 year.

2. All weldings as per scope must be carried out within BHEL Thirumayam's factory premises, in the facilities provided by BHEL Thirumayam. The Contractor must bring all necessary machines and tools required for the job including welding machines, grinding machines, welding cables, gas torches etc. BHEL will provide all consumables including the welding consumables, gas for heating, grinding wheels and other essential raw materials. Power & compressed air will be in BHEL's scope. Burners for job pre heating and post heating will be provided by BHEL.

3. The relevant drawings and Welding Procedure Specification (WPS), welding Technique(WT) will be supplied by BHEL. Welding must be performed by **IBR-certified welders**. All fabrication, inspection, and testing will adhere to relevant quality documents (CQP, SQP, SIP, QCP).

4. Contractor should have IBR qualification on contractor's company name before commencement of PO execution.

5. The Contractor should maintain a history card for the job, including details of any rework performed during the process. Compliance with production guidelines and notes as per the manufacturing GMS is mandatory.

Job details & work content:

1. Pipe for Header with stub holes will be provided at the facility. Stubs, stubs hydro dummies, Inspection nozzles, Inspection nozzle flat end cover and header hydro dummy with all relevant documents will be provided by BHEL.

2. Contractor has to carry out fit up and welding of stubs to pipe, fit up and welding of stub hydro dummies, fit up and welding of inspection nozzle, fit up and welding of inspection nozzle flat end covers and fit up and welding of hydro dummies as per the drawings and other relevant documents as per the process requirement of 10184 and 10274 PGMA's.

Details of no of attachments to be welded for each header of 10184 PGMA is given below:

ATTACHMENTS TYPE	NO OF ATTACHMENTS
STUB/NIPPLE/ATTACHMENT-(UPTO P22)	86
INSPECTION NOZZLE-UPTO P22	2
FLAT END COVER-UPTO P22	2
Grand Total	**90**

Following activities shall be covered under contractor's scope.

1. Stub/nipple/attachment: Fit up, welding (MPI & Hydro quality)
2. Inspection nozzle: Fit up, welding (RT/UT quality)
3. Flat end cover for inspection nozzle/stub/nipple: Fit up, welding (RT/UT quality)
4. Hydro test dummy for pipe, stub/nipple/inspection nozzle: Fit up & welding (MPI & Hydro quality)
5. Grinding and surface preparation for NDT of all the above

Applicable WPS for the PGMA are as follows.

1. P12 + F12 - INS. NOZZLE: TA.4.4.08
2. F12 + F12 - INZ. NOZZLE + FEC: TA.4.4.08
3. P12 + T12 - TUBE: A.4.4.17

Welding Techniques shall be as per the procedure WT 407.

Details of no of attachments to be welded for each header of 10274 PGMA is given below

ATTACHMENTS TYPE	NO OF ATTACHMENTS
STUB/NIPPLE-T91/92	286
FLAT END COVER FOR INSP. NOZZLE	2
FLAT END COVER-F91/92	1
LUG PLATE 40 THK	1
LUG PLATE 70 THK	2
TC NIPPLE D38	6
TC PAD	9
WELD PAD	9
Grand Total	**316**

Following activities shall be covered under contractor's scope.

1. Stub/nipple: Fit up, welding (MPI & Hydro quality)
2. Flat end cover for inspection nozzle : Fit up, welding (RT/UT quality)
3. Lug plate, TC pad and Weld pad : Fit up, welding (Wet MPI quality)

Place:
Date:

Signature of Authorized Signatory
with seal & full address

4. Hydro test dummy for pipe, stub/nipple/inspection nozzle: Fit up & welding (MPI & Hydro quality)
5. Grinding and surface preparation for NDT of all the above

All the stubs and pipe opening has to be welded with dummies (by the contractor) as per requirement to enable to Hydro Testing.

Applicable WPS for the PGMA are as follows.

P92 + T92 - STUB:	A.X.X.56
P92 + F92 - INS. NOZZLE:	TA.X.X.19
F92 + F92 - INZ. NOZZLE + FEC:	TA.X.X.19
S-304 + Gr22 – Tube Hydro Dummy :	A.5.8.29
P92 + F22 – Pipe Hydro Dummy :	TAS.5.5.02

Welding Techniques shall be as per the procedure WT 407.

Sample drawings are attached for reference.

The above work content is tentative for each header and may vary from project to project.

Contractor shall offer the job for stage inspection to BHEL QC during fitup stage of Stubs, Welding of Stubs, Fit up of Inspection Nozzles , Welding of inspection Nozzles, Hydro Test Dummy Welding of Stubs/header, PWHT(Post Weld Heat Treatment) clearance. Contractor shall inform BHEL QC if any deviation (drawing/process deviations) is noticed at any point of time.

3. The job should be cleaned and visually inspected before SR(Stress Relieving)/PWHT(Post Weld Heat Treatment) by contractor. The PWHT is under the scope of BHEL Thirumayam.

4. After the completion of PWHT, the grinding of welded portion and other spatter cleaning works to be carried out by the contractor and job should be made ready for UT (for full penetration welds) & MPI Test as per the process requirement of 10184 and 10274 PGMA's.

Any non-conformances, if found, to be repaired by the contractor and to be submitted for repeat NDT test.

5. The job should be offered to shop QC for final job dimensional inspection after all NDT clearance of welds by the contractor.

6. Job will be deemed accepted after successful NDT clearance and dimensional clearance by BHEL QC.

7. After completion of the job, Header shall be loaded to BHEL vehicle for movement to Hydro Testing at Trichy. Movement to Trichy and Hydraulic Test on the Header at Trichy will be conducted by BHEL at Trichy Boiler shops.

Note: Subsequent to the movement, If any leakages are detected during hydro testing, contractor has to deploy manpower at BHEL-Trichy, to rectify the defect. The consumable cost against the rectification and subsequent cost of Stress Relieving, if applicable, shall be borne by the contractor.

SCOPE OF BHEL

1. All raw materials in available sizes and consumables like welding electrodes, cutting gas, compressed air, grinding machines and wheels, weld chipper, electrical power and water will be supplied by BHEL at free of cost.

2. All attachments along with machined stubs will be provided by BHEL.

3. All relevant drawings, WPS and Quality Plan will be issued to the contractor by BHEL.

4. Cranes for loading, unloading and handling of Headers and stubs at marked facilities will be provided by BHEL.

5. All NDT (UT/RT/MPI /Wet MPI) and hydro test shall be under BHEL scope.

SCOPE OF CONTRACTOR

1. The contractor should bring adequate welding machines in good and safe working condition for TIG and SMAW welding and its accessories - welding holder, shield, cables, connectors, extension boards etc. with required spares for electrical connections. Machines condition, safe working and the safe electrical connections shall be certified by BHEL M&S team and shall be offered for inspection at any point of time.

2. Weld log sheet along with welder details and time duration , IBR number of welders to be hard stamped on the header(near to the stub welded) shall be recorded and followed.

3. The contractor should bring all the required necessary hand tools for fabrication.

Place:
Date:

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4. Contractor may bring the applicable Tools and Equipment's, if any, including Portable grinding machine, Weld flux chipper etc for completion of the job's scope of work with prior approval from BHEL on returnable basis.

5. The Contractor is responsible for supplying all safety hoses, welding earth cables, machine guards and other safety equipment for the machines.

6. All the measuring instruments and gauges will be under contractors' scope and should have valid Calibration certificates.

7. All PPE equipment, including welder apron, welding blankets for shielding during the pre-heat, post-heat of headers, safety equipment required for the employees, as per statutory requirements must be brought by the Contractor.

GENERAL INSTRUCTIONS

1. Period of contract will be one year.

2. The contractor has to ensure the following:

a. The contractor has to be capable of engaging experienced and qualified manpower for execution of work.

b. The contractor has to be capable of mobilizing skilled manpower during urgent requirements within short notice.

c. Manpower should have adequate knowledge in handling materials.

d. The contractor shall deploy adequate manpower to meet BHEL requirement and agreeable to work in A, B, C, G & N shifts as per BHEL timings.

e. Shall ensure that the workmen are not changed frequently.

f. All welders for the job should be IBR certified and should be on the contractors' company role.

Typical/Indicative Manpower requirement for each day (considering 6 header fabrication in a month is given below)

a) Welders- 22

b) Fitters- 13

c) Crane Operators & Rigger- 4

One Supervisor shall be present in each Shift for monitoring and reporting the status. QC Co-ordinator and Representative shall be engaged as per the contractor's requirement.

The above manpower is indicative and Contractor shall engage manpower depending on the load.

3.The contractor has to engage manpower for the execution of work during Sundays and holidays also, as per the production requirement.

4. The contractor shall ensure discipline inside factory premises and maintain safety work culture of their workmen during execution of work.

5. Attendance register should be maintained by the contractor.

6. Contractor shall depute adequate supervisors for all co-ordination works with BHEL and managing work force. Above Supervisors shall have adequate knowledge in Fabrication, Quality, NDE requirements.

7. All Safety equipment & PPE are to be arranged for the workmen by the contractor. BHEL Safety rules and regulations have to be strictly followed.

8. The contractor shall follow and comply with minimum wages along with other additional wages, ESI, PF, Bonus and other statutory regulations as stipulated in Factories act and other applicable State/ Central governments rules and regulations.

9. Any Defect or Damage and handling by the contractor / rejection by BHEL QC during fabrication of the product as per BHEL drawings, if any, the contactor has to attend necessary repairs and supply the product as per the acceptable norms. Materials and consumables will be issued on chargeable basis against repairs/rework.

10. Any damage to BHEL property by the contractor inside factory premises during execution of work will be chargeable at the cost of contractor.

11. Contractor has to ensure judicious usage of consumables and resources provided by BHEL.

12. Cost towards Re-SR due to repair /re-work will be recovered from the contractor as per latest prevailing rates

Place:
Date:

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2.1 BILL OF QUANTITY:

Sl no	Description of Activity	Unit of Measurement	Quantity	Percentage Allocation
1	Header Part Processing 10184 PGMA	Number	24	15
2	Header Part Processing 10274 PGMA	Number	48	85

**Bidder shall quote lumpsum rate (inclusive of GST) for a period of 12 months in GeM Portal after going through the scope of work in tender document.*

ITEM RATE CALCULATION:

Contractor shall only quote the total amount for the work and not the individual rates for every item of BOQ.

The rates for the individual items of BOQ would be arrived by BHEL as follows

Assuming the amount quoted by vendor is ₹ 2,00,00,000/- (Rupees Two crores only)

" Amount allocated for quantity stated in item 1(Header Part Processing 10184 PGMA) would be = 15% X 2,00,00,000 (since % allocation in BOQ is 15% for this item) i.e. ₹ 30,00000/-"

Hence, rate of Item 1 would be 3000000/24(Amount allocated for item1/Quantity of item1) = ₹ 1,25,000/-

"The rates will be rounded off to nearest two decimal places only, so as to match the total amount or closest to the total amount, quoted by the vendor. Rates so arrived by BHEL shall be final and binding on the contractor."

Similarly, rates of other items shall be calculated.

NOTE:

"The Vendor has to quote lump sum / package value only. Individual rates for each item shall be arrived based on % allocation for each item. Illustration for arriving at unit rate is detailed above. "

Place:
Date:

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Tender Price:

a) Unless explicitly stated in the tender document, the contractor shall be responsible for the whole works, based on the schedule of works, bill of quantities and payment shall be made as per accepted rates based on the activities carried out as in the scope of work.

b) While quoting the "service charge", bidders should consider all cost elements like financing cost, cost of maintenance of accounts, insurance-premium overheads, profit margins, conveyance charges, amount of security deposit, statutory requirements / obligations, contractual obligations and any other expenditure as deemed relevant by the bidder or cost of any other item under its scope and to meet any expenses / exigencies (including bearing of penalty by bidder as per tender document) so as to ensure continuity of services. While quoting the price, the bidder must keep in view the prevailing applicable minimum wages of the Government of Tamilnadu. It is the responsibility of the bidder to educate himself about all obligations to be performed under the contract, the financing cost, administrative expenses, statutory liabilities, etc and then submit the price accordingly.

c) The Minimum Wages as prescribed by the State Government from time to time should be paid to the contract Workers and the Wage and Attendance Registers should be produced to HR department every month.

The minimum wages are given below for reference: (w.e.f 01/04/2026)

Sl. No.	Category	Minimum Wages per day (Rs.)		
		Basic	DA	Total
1	**Unskilled Worker**	258.50	298.07	556.57
2	**Semi-Skilled Worker**	271.00	298.07	569.07
3	**Skilled Worker**	278.50	298.07	576.57
4	**Supervisor**	295.00	298.07	593.07

(The above table is for illustrative purpose only. Latest Govt circular shall be followed.)

2.2 Applicable Contractual Variations

Within the validity or any extension of contract thereof, "Service charge" shall remain Firm (in terms of value) without any escalation / variation for any reason, whatsoever, unless specifically provided herein. Contractor's obligation shall remain unaffected by such escalation / variation. However, during the validity of contract period, the contract value will vary depending on the followings:

a. Rates of basic plus VDA (subsequent to floating of this tender), as & when notified by Govt. of Tamilnadu will be applicable in the contract and accordingly the monthly bills of the contractor will get amended against the documentary evidence.

Place:
Date:

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b. Rates of EPF / EPS / EDLI / ESI /Min. monthly bonus etc. (subsequent to floating of this tender), as & when notified by governing statutory authorities will be applicable in the contract and accordingly the monthly bill(s) of the contractor will get amended against the documentary evidence.

2.3 Evaluation criteria: Splitting of contract is not applicable to this work, hence, package wise L1 will be decided and contract will be awarded for the full / complete work.

2.4 Payment Terms

Contractor shall be responsible for making payment of wages through Bank and submit the Digital Transfer receipt to the authorized representative of BHEL (Contract executing Agency) and after Certification the same has to be provided to HR for obtaining HR Clearance.
In case contractor fails to make payment of wages to his employees or remittance of contribution to the concerned authorities, the security deposit /other dues under the contract can be utilized by BHEL to discharge the liability of the contractor.

Contractor shall obtain Work Completion Certificate from Authorized BHEL Executive (Contract executing Agency) after providing all necessary records like DU list, DU Description, Category of Product, Weight, QC inspection date, Completion and Handover Date, etc.

Invoice shall be raised for DU weights given in BHEL's GMS/specification/drawing. Payments shall be for the GMS weight only. However, if the material weight changes over ± 5% from the total weight of a particular DU due to substitution, the fabrication cost for the difference in net weight shall be paid or recovered as applicable. The same can be claimed along with original invoice.

The consolidated statements and Bills in triplicate shall be prepared by the Contractor and can be submitted to PPPU(Thirumayam) personnel for the payment of completed portion of the work once in a month on pro-rata basis & after due Work Completion certification from Executive In charge Department the bills will be forwarded to Accounts Section.

Invoice shall indicate Work Order (W.O.) and W.O SI. No in all invoices for processing payment.

Place:
Date:

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The bill will be processed and payment will be made by BHEL after number of days mentioned below (depending on type of bidder) from CRAC/SDA:
(i)90 days for Non MSME Vendors, (ii) 60 days for Medium vendors & (iii) 45 days for MSE vendors

Together with the points mentioned above, please note the following when submitting invoices.
For goods / works / services on Indian Suppliers / Contractors: Irrespective of the value of the invoice amount, the supplier/ contractor should necessarily upload the invoice details on BHEL SUVIDHA portal at https://suvidha.bhel.in/suvidha/, prior to despatch/raising invoice. All documents as per contract checklist, along with additional documents (if any), must be uploaded on the portal. It is mandatory that tax invoices with a net amount (including taxes) exceeding Rs five lakhs uploaded on the portal are digitally signed using a Class 3 Digital Signature Certificate (DSC) issued by a licensed Certifying Authority. Submission of invoice document in hard copy is allowed for invoices with a net amount (including taxes) equal to and upto Rs five lakhs in case the requirement for digitally signed invoice is not explicitly mentioned in the contract checklist.The Invoice will not be accepted in absence of the above.

However, GST amount shall be reimbursed in line with compliance to Cl. No. 4 (Taxes & Duties) above. No Interest payable to Contractor & No interest shall be payable on the security deposit or any other money due to the contractor.

2.5 **Liquidated Damages (LD) / Penalty**

The contractor shall be able to complete the fabrication of 6 headers for each month or matched headers , whichever is lower. The undelivered portion of Headers which are 100 % matched (6 headers or matched headers, whichever lower) during the issue of monthly plan will only be considered for penalty calculation at the end of every month. The jobs which are accepted by BHEL Quality will only be considered as delivered. Any delays attributable to BHEL shall not be considered during Penalty calculation.

Penalty will be applicable as per the description given below and this amount will be deducted from running bill on monthly basis.

a. It would be responsibility of contractor to complete the jobs as per delivery requirement failing which penalty @ 0.5% per week of value of the undelivered quantum limited to maximum 10% of contract value shall be recovered on account of delay in completion of work.

b. Penalty for violation of safety norms - In case of violation of safety norms including non-use of personal protective equipment by the Bidder's employee, the Bidder shall be levied a penalty

of Rs.100/- per incident and if similar violation is repeated, an enhanced penalty of Rs 200/- per incident shall be imposed. Gate pass of Repeated defaulters shall be cancelled.

c. In case of any Labor Unrest (Strike, Agitation, Gherao, Unlawful Gathering etc.) due to any reason, it will be the responsibility of Supervisor/Contractor to Prevent Workers from leaving Work Place. They will address the concerns of their workers and Keep Crowd in Control. Penalty of Rs 5,000 /- per Incidence on respective bill of raised by the contractor for that period (Certified by Contract Executing Department executive and HR jointly) will be levied in case the Workers deployed against the Work Order are found involved in any such Unrests.

In case of any amendment / revision, Penalty shall be linked to the amended / revised PO value

Additionally, penalty as listed in the section "NON COMPLIANCE OF SAFETY RULES" will be levied if contract employees are violating norms.

2.6 POLICE VERIFICATION:

The Police Verification Certificate of each contract worker engaged to be submitted along with Contractors Bills during 1st month for clearance. Police verification for any new contract worker engaged during the contract period is mandatory for obtaining permit to work inside factory premises.

CONTRACT PERIOD:

1.The Contract Execution period will be 12 Months from the date of commencement of work as stated in LOI.

2. If required, BHEL reserves the right to extend this subject contract for a further period under same terms and conditions subject to mutual acceptance of both parties.

3. If at any time after the award of contract, BHEL shall for any reason whatsoever not require whole or any part of the work to be carried out, the same shall be communicated to the Contractor and the contract shall be closed.

3 **PRICE BASIS:**

Not applicable

4 TAXES & DUTIES:

4.1 The Supplier/Vendor shall pay all (save the specific exclusions as enumerated in this clause) taxes, fees, license, charges, deposits, duties, tools, royalty, commissions, other charges, etc. which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such

taxes/duties, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit along with the applicable overheads @5% and interest on the total value (i. e. amount paid by BHEL + overhead)

However, provisions regarding **GST** on output supply (goods/service) and TDS/TCS as per Income Tax Act shall be as per following clauses.

4.2 GST (Goods and Services Tax)

4.2.1 GST as applicable on output supply (goods/services) are excluded from Supplier/Vendor's scope; therefore, contractor's price/rates shall be **exclusive** of GST. Reimbursement of GST is subject to compliance of following terms and conditions. BHEL shall have the right to deny payment of GST and to recover any loss to BHEL on account of tax, interest, penalty etc. for non-compliance of any of the following condition.

4.2.2 The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract shall be limited to direct transactions between BHEL & its Supplier/Vendor. BHEL shall not consider GST on any transaction other than the direct transaction between BHEL & its Supplier/Vendor.

4.2.3 Supplier/Vendor shall obtain prior written consent of BHEL before billing the amount towards such taxes. Where the GST laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL shall have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Supplier/Vendor.

4.2.4 Supplier/Vendor has to submit GST registration certificate of the concerned state. Supplier/Vendor also needs to ensure that the submitted GST registration certificate should be in active status during the entire contract period.

4.2.5 Supplier/Vendor has to issue Invoice/Debit Note/Credit Note indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder.

4.2.6 Supplier/Vendor has to submit GST compliant invoice within the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, Supplier/Vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts to enable BHEL to meet its GST related compliances. Special care should be taken in case of month end transactions.

4.2.7 Supplier/Vendor has to ensure that invoice in respect of such services which have been provided/completed on or before end of the month should not bear the date later than last working day of the month in which services are performed.

4.2.8 Subject to other provisions of the contract, GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Supplier/Vendor: -

a) Supply of goods and/or services have been received by BHEL.
b) Original Tax Invoice has been submitted to BHEL.
c) Supplier/Vendor has submitted all the documents required for processing of bill as per contract/ purchase order/ work order.
d) In cases where e-invoicing provision is applicable, Supplier/Vendor is required to submit invoice in compliance with e-invoicing provisions of GST Act and Rules made thereunder.
e) Supplier/Vendor has filed all the relevant GST return (e.g. GSTR-1, GSTR-3B, etc.) pertaining to the invoice submitted and submit the proof of such return along with immediate subsequent invoice. In case of final invoice/ bill, contractor has to submit proof of such return within fifteen days from the due date of relevant return.
f) Respective invoice has appeared in BHEL's GSTR - 2A for the month corresponding to the month of invoice and in GSTR-2B of the month in which such invoices has been reported by the contractor along with status of ITC availability as "YES" in GSTR-2B. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the Supplier/Vendor.
g) Supplier/Vendor has to submit an undertaking confirming the payment of all due GST in respect of invoices pertaining to BHEL.

4.2.9 Any financial loss arises to BHEL on account of failure or delay in submission of any document as per contract/purchase order/work order at the time of submission of Tax invoice to BHEL, shall be deducted from Supplier/Vendor's bill or otherwise as deemed fit.

4.2.10 TDS as applicable under GST law shall be deducted from Supplier/Vendor's bill.

4.2.11 Supplier/Vendor shall comply with the provisions of e-way bill wherever applicable. Further wherever provisions of GST Act permits, all the e-way bills, road permits etc. required for transportation of goods needs to be arranged by the contractor.

4.2.12 Supplier/Vendor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or any other liability on account of failure of Supplier/Vendor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder.

4.2.13 In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/altered/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Supplier/Vendor's due payment.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

4.2.14 Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Supplier/Vendor in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the Supplier/Vendor.

4.2.15 In the event of any ambiguity in GST law with respect to availability of input credit of GST charged on the invoice raised by the contractor or with respect to any other matter having impact on BHEL, BHEL's decision shall be final and binding on the Supplier/Vendor.

4.2.16 Variation in Taxes & Duties:

Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability.

In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its Supplier/Vendor only and within the contractual delivery period only.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/ Supplier/Vendor 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.

4.3 **Income Tax**: TDS**/TCS** as applicable under Income Tax Act, 1961 or rules made thereunder shall be deducted/collected from Supplier/Vendor's bill.

(5.) SUBMISSION OF BILLS BY CONTRACTOR:

Bills should be submitted within a week after execution of work during the calendar month/ quarter. The Contractor shall submit a bill in triplicate detailing the various items of work done during the month/ quarter supported by the requisitions issued from time to time. The Contractor shall, once in every quarter, submit to the end user / executing agency, separately details of his claims for the work done by him up to and including the previous month which are not covered by his contract agreement in any of the following respects:

i) Deviation from the items provided in the contract documents.
ii) Extra items / new items of work.
iii) Items in-respect of which rates have not been settled. He should in addition furnish a clear certificate to the effect that the claims submitted by him as aforesaid cover all his claims and that no further claims shall be raised by him in respect of the work done up to and including the period under report.

iv) Along with bills, Contractors has to furnish self-attested copy of the following documents for further processing of bills:
v) Copy of PAN card.
vi) Documentary proof for payment of PF/ESI (for the last month) with respect to the employees engaged by the contractor with payment details relating to individual names to be submitted.
vii) Copy of payment challan of previous Month / Quarter as proof of deposit of GST along with a certificate from the Contractor that tax collected from BHEL has been remitted to tax authorities.
viii) If the Contractor is not registered for any statutory obligation and not liable there to, then a declaration shall be submitted along with offer that they are within the threshold limit.

Any other relevant document which is required from time to time as per BHEL requirement.

5 **BANK DETAILS FOR EMD & SECURITY SUBMISSION:** For Electronic Fund Transfer the details are as below:

a) Name of the Beneficiary: Bharat Heavy Electricals Limited
b) Bank Particulars (Details of Respectively executing region):

Name of the Company – BHEL, Trichy
Name of the bank - STATE BANK OF INDIA
Bank branch - HEAVY ELECTRICALS, KAILASAPURAM
City –Tiruchirappalli Branch code - 01363
Account Number – 10891588977
Account type – CC
IFSC code - SBIN0001363
MICR code - 620002004

6 BREACH OF CONTRACT, REMEDIES AND TERMINATION:

6.1 The following shall amount to breach of contract:

I. Non-supply of material/ non-completion of work by the Supplier/Vendor within scheduled delivery/ completion period as per contract or as extended from time to time.
II. The Supplier/Vendor fails to perform as per the activity schedule and there are sufficient reasons even before expiry of the delivery/ completion period to justify that supplies shall be inordinately delayed beyond contractual delivery/ completion period.
III. The Supplier/Vendor delivers equipment/ material not of the contracted quality.
IV. The Supplier/Vendor fails to replace the defective equipment/ material/ component as per guarantee clause.
V. Withdrawal from or abandonment of the work by the Supplier/Vendor before completion as per contract.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

VI. Assignment, transfer, subletting of Contract by the Supplier/Vendor without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

VII. Non-compliance to any contractual condition or any other default attributable to Supplier/Vendor.

VIII. Any other reason(s) attributable to Vendor towards failure of performance of contract. In case of breach of contract, BHEL shall have the right to terminate the Purchase Order/ Contract either in whole or in part thereof without any compensation to the Supplier/Vendor.

IX. Any of the declarations furnished by the contractor at the time of bidding and/ or entering into the contract for supply are found untruthful and such declarations were of a nature that could have resulted in non-award of contract to the contractor or could expose BHEL and/ or Owner to adverse consequences, financial or otherwise.

X. Supplier/Vendor is convicted of any offence involving corrupt business practices, antinational activities or any such offence that compromises the business ethics of BHEL, in violation of the Integrity Pact entered into with BHEL has the potential to harm the overall business of BHEL/ Owner.

Note-Once BHEL considers that a breach of contract has occurred on the part of Supplier/Vendor, BHEL shall notify the Supplier/Vendor by way of notice in this regard. Contractor shall be given an opportunity to rectify the reasons causing the breach of contract within a period of 14 days.

In case the contractor fails to remedy the breach, as mentioned in the notice, to the satisfaction of BHEL, BHEL shall have the right to take recourse to any of the remedial actions available to it under the relevant provisions of contract.

6.2 Remedies in case of Breach of Contract.

i. Wherein the period as stipulated in the notice issued under clause 14.1 has expired and Supplier/Vendor has failed to remedy the breach, BHEL will have the right to terminate the contract on the ground of "Breach of Contract" without any further notice to contractor.

ii. Upon termination of contract, BHEL shall be entitled to recover an amount equivalent to 10% of the Contract Value for the damages on account of breach of contract committed by the Supplier/Vendor. This amount shall be recovered by way of encashing the security instruments like performance bank guarantee etc available with BHEL against the said contract. In case the value of the security instruments available is less than 10% of the contract value, the balance amount shall be recovered from other financial remedies (i.e. available bills of the Supplier/Vendor, retention amount, from the money due to the Supplier/Vendor etc. with BHEL) or the other legal remedies shall be pursued.

iii. wherever the value of security instruments like performance bank guarantee available with BHEL against the said contract is 10% of the contract value or more, such security instruments to the extent of 10% contract value will be encashed. In case no security instruments are available or the

value of the security instruments available is less than 10% of the contract value, the 10% of the contract value or the balance amount, as the case may be, will be recovered in all or any of the following manners:

iv. In case the amount recovered under sub clause (a) above is not sufficient to fulfil the amount recoverable then; a demand notice to deposit the balance amount within 30 days shall be issued to Supplier/Vendor.

v. If Supplier/Vendor fails to deposit the balance amount within the period as prescribed in demand notice, following action shall be taken for recovery of the balance amount:
   a) from dues available in the form of Bills payable to defaulted Supplier/Vendor against the same contract.
   b) If it is not possible to recover the dues available from the same contract or dues are insufficient to meet the recoverable amount, balance amount shall be recovered from any money(s) payable to Supplier/Vendor under any contract with other Units of BHEL including recovery from security deposits or any other deposit available in the form of security instruments of any kind against Security deposit or EMD.

vi. In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against defaulted supplier/Vendor.

vii. It is an agreed term of contract that this amount shall be a genuine pre-estimate of damages that BHEL would incur in completion of balance contractual obligation of the contract through any other agency and BHEL will not be required to furnish any other evidence to the Supplier/Vendor for the purpose of estimation of damages.

viii. In addition to the above, imposition of liquidated damages, debarment, termination, de-scoping, short-closure, etc., shall be applied as per provisions of the contract.

Note:

1) The defaulting Supplier/Vendor shall not be eligible for participation in any of the future enquiries floated by BHEL to complete the balance work. The defaulting contractor shall mean and include:
   (a) In case defaulted Supplier/Vendor is the Sole Proprietorship Firm, any Sole Proprietorship Firm owned by same Sole Proprietor.
   (b) In case defaulted Supplier/Vendor is The Partnership Firm, any firm comprising of same partners/ some of the same partners; or sole proprietorship firm owned by any partner(s) as a sole proprietor.

7 MICRO AND SMALL ENTERPRISES (MSE):

Any Bidder falling under MSE category shall furnish the following details & submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer.

Type under MSE	SC/ST owned	Women owned	Others(excluding SC/DT & Women Owned)
Micro			

Place:
Date:

Signature of Authorized Signatory
with seal & full address

Small			

Note: If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.

a) MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS & DC, MSME) only if they submit along with the offer, attested copies of either Udyam Registration. Date to be reckoned for determining the deemed validity will be the last date of Technical Bid submission. Non-submission of supporting document in GeM portal will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if the above required documents are not uploaded at the time of bid submission. Documents submitted by the bidder shall be verified by BHEL for rendering the applicable benefits.

b) If MSEs quoted price is within price band L-1 + 15%, when L1 is non- MSE, the MSEs will be allowed to supply at least 25% of tendered quantity at L-1 rate subject to acceptance by MSEs to L-1 rate. (Minimum of 3% reservation for women owned MSEs and 6.25% for MSEs owned by SC/ST within the above mentioned 25% reservation). In case the contract cannot be split, the full/ complete supply of total tendered value shall be awarded to MSE at L-1 rate subject to acceptance by MSEs to L-1 rate. The preference to the MSEs will be given in order of their ranking L1, L2, L3, etc.

8 LIQUIDATED DAMAGE:

Liquidated Damages, wherever referred under this Tender/Agreement, shall mean and refer to the damages, not in the nature of penalty, which the contractor agrees to pay in the event of delay in delivery of supplies, breach of contract etc. as the case may be.

Liquidated Damages leviable upon the Supplier/Vendor is a sum which is agreed by the parties as a reasonable and genuine pre-estimate of damages which will be suffered by BHEL on account of delay/breach on the part of the Supplier/Vendor.

If the Seller/Service Provider fails to deliver any or all of the Goods/Services within the original/re-fixed delivery period(s) specified in the contract/PO, the Buyer/BHEL will be entitled to deduct/recover the Liquidated Damages for the delay, unless covered under Force Majeure conditions aforesaid, @ 0.5% of the contract value of delayed quantity per week or part of the week of delayed period as pre-estimated damages not exceeding 10% of the contract value of delayed quantity without any controversy/dispute of any sort whatsoever.

9 PREFERENCE TO MAKE IN INDIA:

For this procurement, the local content to categorize a Supplier/Vendor as a Class I local supplier/ Class II local Supplier/Non-Local Supplier and purchase preferences to Class I local supplier, is as defined in Public

Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the GeM Bid, the same shall be applicable even if issued after issue of this GeM Bid, but before opening of Part-II bids against this GeM Bid.

9.1 Compliance to Restrictions under Rule 144 (xi) of GFR 2017:

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. The Competent Authority for the purpose of this Clause shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Clause means: -
   a. An entity incorporated established or registered in such a country; or
   b. A subsidiary of an entity incorporated established or registered in such a country; or
   c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
   d. An entity whose beneficial owner is situated in such a country; or
   e. An Indian (or other) agent of such an entity; or
   f. A natural person who is a citizen of such a country; or
   g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

IV. The beneficial owner for the purpose of (III) above will be as under:
   1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.
      Explanation
      a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company.
      b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders' agreements or voting agreements.
   2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person has ownership of or entitlement to more than fifteen percent of the property or capital or profits of the such association or body of individuals.
4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

Note:

i. The bidder shall provide undertaking for their compliance to this Clause, in the format provided in Annexure-13. *(Green Highlight is done as per the model document)*
ii. Registration of the bidder with Competent Authority should be valid at the time of submission of bids and at the time of acceptance of the bids.

10 Settlement of Dispute

If any dispute or difference of any kind whatsoever shall arise between BHEL and the Supplier/Vendor, arising out of the contract for the performance of the work whether during the progress of contract termination, abandonment or breach of the contract, it shall in the first place referred to Designated Engineer for amicable resolution by the parties. Designated Engineer (to be nominated by BHEL for settlement of disputes arising out of the contract) who within 60 days after being requested shall give written notice of his decision to the contractor. Save as hereinafter provided, such decision in respect of every matter so referred shall forthwith be given effect to by the Supplier/Vendor who shall proceed with the work with all due diligence, whether he or BHEL desires to resolve the dispute as hereinafter provided or not.

If after the Designated Engineer has given written notice of this decision to the party and no intention to pursue the dispute has been communicated to him by the affected party within 30 days from the receipt of such notice, the said decision shall become final and binding on the parties. In the event the Supplier/Vendor being dissatisfied with any such decision or if amicable settlement cannot be reached then all such disputed issues shall be resolved through conciliation in terms of the BHEL Conciliation Scheme 2018 as per Clause 21.1

10.1 Conciliation:

Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the "Dispute") shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure as per BHEL Conciliation Scheme 2018. The proceedings of

Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in - "Procedure for conduct of conciliation proceedings" (as available in www.bhel.com)).

Note: Ministry of Finance has issued OM reference No. 1/2/24 dated 03.06.2024 regarding "Guidelines for Arbitration and Mediation in Contracts of Domestic Public Procurement. In the said OM it has been recommended that Government departments/

Entities/agencies are to encourage mediation under the Mediation Act. 2023. The said Act has not yet been notified by the Government. Therefore, the clause "Settlement of Disputes" shall be modified accordingly as and when the Mediation Act 2023 gets notified.

10.2 ARBITRATION:

10.2.4 Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided in Clause 14.1 herein above or otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or. in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, refer the disputes to **Madras High Court, Arbitration Centre (MHCAC)**and such dispute to be adjudicated by Sole Arbitrator appointed in accordance with the Rules of said Arbitral Institution.

10.2.5 A party willing to commence arbitration proceeding shall invoke Arbitration Clause by giving notice to the other party in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice') before referring the matter to arbitral institution. The Notice shall be addressed to the Head of the Unit, BHEL, executing the Contract and shall contain the particulars of all claims to be referred to arbitration with sufficient detail and shall also indicate the monetary amount of such claim including interest, if any.

10.2.6 After expiry of 30 days from the date of receipt of aforesaid notice, the party invoking the Arbitration shall submit that dispute to the Arbitral Institution- **Madras High Court, Arbitration Centre (MHCAC)**- and that dispute shall be adjudicated in accordance with their respective Arbitration Rules. The matter shall be adjudicated by a Sole Arbitrator who shall necessarily be a Retd Judge having considerable experience in commercial matters to be appointed/nominated by the respective institution. The cost/expenses pertaining to the said Arbitration shall also be governed in accordance with the Rules of the respective Arbitral Institution. The decision of the party invoking the Arbitration for reference of dispute to **Madras High Court, Arbitration Centre (MHCAC)**- for adjudication of that dispute shall be final and binding on both the parties and shall not be subject to any change thereafter. The institution once selected at the time of invocation of dispute shall remain unchanged.

10.2.7 The fee and expenses shall be borne by the parties as per the Arbitral Institutional rules.

10.2.8 The Arbitration proceedings shall be in English language and the seat of Arbitration shall be **Trichy**.

10.2.9 Subject to the above, the provisions of Arbitration & Conciliation Act 1996 and any amendment thereof shall be applicable. All matters relating to this Contract and arising out of invocation of Arbitration clause are subject to the exclusive jurisdiction of the Court(s) situated at **Trichy**.

10.2.10 Notwithstanding any reference to the Designated Engineer or Conciliation or Arbitration herein, a. the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree. Settlement of Dispute clause cannot be invoked by the Contractor, if the Contract has been mutually closed or 'No Demand Certificate' has been furnished by the Contractor or any Settlement Agreement has been signed between the Employer and the Contractor.

10.2.11 It is agreed that Mechanism of resolution of disputes through arbitration shall be available only in the cases where the value of the dispute is less than Rs. 10 Crores.

10.2.12 In case the disputed amount Claim, Counter claim including interest is Rs. 10 crores and above, the parties shall be within their rights to take recourse to remedies other than Arbitration, as may be available to them under the applicable laws after prior intimation to the other party. Subject to the aforesaid conditions, provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications or re-enactment thereof as amended from time to time, shall apply to the arbitration proceedings under this clause.

10.2.13 In case, multiple arbitrations are invoked (whether sub-judice or arbitral award passed) by any party to under this contract, then the cumulative value of claims (including interest claimed or awarded) in all such arbitrations shall be taken in account while arriving at the total claim in dispute for the subject contract for the purpose of clause 14.2.9. Disputes having cumulative value of less than 10 crores shall be resolved through arbitration and any additional dispute shall be adjudicated by the court of competent jurisdiction.

10.2.14 In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 05/0003/2019-FTS-10937 dated 14-12-2022 as amended from time to time.

11 Force Majeure

11.1 "Force Majeure" shall mean circumstance which is:

a. beyond control of either of the parties to contract,

b. either of the parties could not reasonably have provided against the event before entering into the contract,
c. having arisen, either of the parties could not reasonably have avoided or overcome, and
d. is not substantially attributable to either of the parties

And

Prevents the performance of the contract,

Such circumstances include but shall not be limited to:

i. War, hostilities, invasion, act of foreign enemies.
ii. Rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war.
iii. Riot, commotion or disorder by persons other than the contractor's personnel and other employees of the contractor and sub-contractors.
iv. Strike or lockout not solely involving the contractor's personnel and other employees of the contractor and sub-contractors.
v. Encountering munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the contractor's use of such munitions, explosives, radiation or radio- activity.
vi. Natural catastrophes such as earthquake, tsunami, volcanic activity, hurricane or typhoon, flood, fire, cyclones etc.
vii. Epidemic, pandemic etc.

11.2 The following events are explicitly excluded from Force Majeure and are solely the responsibilities of the non-performing party: a) any strike, work-to-rule action, go-slow or similar labour difficulty (b) late delivery of equipment or material (unless caused by Force Majeure event) and (c) economic hardship.

11.3 If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 15 (fifteen) days after the occurrence of such event.

11.4 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended by a period of time equal to period of delay caused due to such Force Majeure event.

11.5 Delay or non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall not

i. Constitute a default or breach of the Contract.
ii. Give rise to any claim for damages or additional cost expense occasioned thereby, if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.

11.6 BHEL at its discretion may consider short closure of contract after 1 year of imposition of Force Majeure in line with extant guidelines. In any case, Supplier/Vendor cannot consider deemed short-closure after 1 year of imposition of Force Majeure.

12 Cartel Formation

The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). 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. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.

13 Fraud Prevention Policy

Bidder along with its associate /collaborators /sub-contractors /sub-vendors / consultants / service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

14 Suspension of Business Dealings with Suppliers / Contractors:

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

If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution stage indulges in any act, including but not limited to, mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or tampers the tendering process or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860(Bhartiya Nyaya Samhita 2023) or any other law in force in India, or does anything which is actionable under the Guidelines for Suspension of Business dealings, action may be taken against such bidder / supplier / contractor as per extant guidelines of the company available on www.bhel.com and / or under applicable legal provisions. Guidelines for suspension of business dealings is available in the webpage: http://www.bhel.com/vender_registration/vender.php.

15 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. GeM Bid
c. Buyer Added Bid Specific ATC
d. BHEL General Conditions of Contract (GCC)
e. GeM Bid Technical Conditions of Contract (TCC)

Place:
Date:

Signature of Authorized Signatory
with seal & full address

f. GeM GTC

16 Enclosure:

Annexure-1: Check List.
Annexure-2: Offer forwarding letter / tender submission letter
Annexure-3: No Deviation Certificate
Annexure-4: Declaration regarding Insolvency/ Liquidation/ Bankruptcy Proceedings
Annexure-5: Declaration by Authorized Signatory
Annexure-6: Declaration by Authorized Signatory regarding Authenticity of submitted Documents
Annexure-7: Non-Disclosure Certificate
Annexure-8: Integrity Pact (Not applicable)
Annexure-9: Declaration confirming knowledge about Site Conditions *(Not Applicable)*
Annexure-10: Declaration reg. Related Firms & their areas of Activities
Annexure-11: Declaration for relation in BHEL
Annexure- 12: Declaration reg. minimum local content in line with revised public procurement
Annexure- 13: Declaration regarding compliance to Restrictions under Rule 144 (xi) of GFR 2017
Annexure-14: Bank Account Details for E-Payment
Annexure-15: Power of Attorney for submission of tender.
Annexure-16: Proforma of Bank Guarantee for Earnest Money.
Annexure-17: Proforma of Bank Guarantee for Performance Security.
Annexure-18: List of Consortium Bank.
Annexure-19: E-Payments
Annexure-20: Format of Letter Confirming the Lien on Fixed Deposit Receipt
Annexure-21: Format for filling General Details

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE- 1

CHECK LIST

NOTE: - Suppliers are required to fill in the following details in their Letterhead and no column should be left blank

A	**Name and Address of the Supplier**	
B	**GSTN No. the Supplier (Place of Execution of Contract / Purchase Order)**	
C	**Details of Contact person for this Tender**	Name: Mr./ Ms. Designation: Telephone No: Mobile No: Email ID:
D	**EMD DETAILS**	

E	**DESCRIPTION**	**APPLICABILITY (BY BHEL)**	**ENCLOSED BY BIDDER**
i.	Whether **Pre - Qualification Criteria** is understood and provided proper supporting documents.	Applicable/ ~~Not Applicable~~	YES / NO
ii.	Whether all pages of the Tender documents including annexures, appendices etc are read and understood	Applicable/ ~~Not Applicable~~	YES / NO
iii.	Audited Balance Sheet and profit & Loss Account as mentioned in the PQC	Applicable/ ~~Not Applicable~~	YES / NO
iv.	Copy of PAN Card & GST registration [Authorized signatory attested copy shall be submitted]	Applicable/ ~~Not Applicable~~	YES / NO
v.	Submission of **MSE certificate (UDYAM certificate)** as specified in Tender [Authorized signatory attested copy shall be submitted]	Applicable/ ~~Not Applicable~~	YES / NO
vi.	**Offer forwarding letter** / tender submission letter as per Annexure – 2	Applicable/ ~~Not Applicable~~	YES / NO
vii.	Submission of **Certificate of No Deviation** as per Annexure – 3	Applicable/ ~~Not Applicable~~	YES / NO

Place:
Date:

Signature of Authorized Signatory
with seal & full address

viii.	Declaration regarding **Insolvency/ Liquidation/ Bankruptcy Proceedings** as per Annexure – 4	Applicable/ ~~Not Applicable~~	YES / NO
ix.	Declaration by **Authorized Signatory** as per Annexure – 5	Applicable/ ~~Not Applicable~~	YES / NO
x.	Declaration by **Authorized Signatory regarding Authenticity** of submitted Documents Annexure – 6	Applicable/ ~~Not Applicable~~	YES / NO
xi.	Submission of **Non-Disclosure Certificate** as per Annexure – 7	Applicable/ ~~Not Applicable~~	YES / NO
xii.	Submission of **Integrity Pact** as specified in Tender as per Annexure – 8	Applicable/ ~~Not Applicable~~	YES / NO
xiii.	Declaration **confirming knowledge about Site Conditions** as per Annexure – 9	~~Applicable~~/ Not Applicable	YES / NO
xiv.	Declaration reg. **Related Firms & their areas of Activities** as per Annexure – 10	Applicable/ ~~Not Applicable~~	YES / NO
xv.	Declaration for **relation in BHEL** as per Annexure – 11	Applicable/ ~~Not Applicable~~	YES / NO
xvi.	Declaration reg. **minimum local content** in line with revised public procurement as per Annexure – 12	Applicable/ ~~Not Applicable~~	YES / NO
xvii.	Declaration regarding c**ompliance to Restrictions under Rule 144 (xi) of GFR 2017** as per Annexure – 13	Applicable/ ~~Not Applicable~~	YES / NO
xviii.	**Bank Account Details** for E-Payment as per Annexure – 14	Applicable/ ~~Not Applicable~~	YES / NO
xix.	**Power of Attorney** for submission of tender as per Annexure – 15	Applicable/ ~~Not Applicable~~	YES / NO
xx.	**Proforma of Bank Guarantee for Earnest Money** as per Annexure – 16	Applicable/ ~~Not Applicable~~	YES / NO
xxi	Submission of **General Details** as per Annexure-21	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:

Sign. of the AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE - 2

OFFER FORWARDING LETTER / TENDER SUBMISSION LETTER

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

Offer Reference No: ……. Date: ……

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Submission of Offer against GeM Bid No: ……

Having examined the tender documents against your GeM Bid No. _____ dated _____ and having understood the provisions of the said tender documents and having thoroughly studied the requirements of BHEL related to the work tendered for, in connection with _____ (name of work & project site), we hereby submit our offer for the proposed work in accordance with terms and conditions mentioned in the tender documents, at the prices quoted by us and as per the indicated delivery schedule.

Should our Offer be accepted by BHEL for Award, I/we further agree to furnish 'Performance Security' for the work as provided for in the Tender Conditions within the stipulated time as may be indicated by BHEL.

I/We further agree to execute all the works referred to in the said Tender documents upon the terms and conditions contained or referred to therein and as detailed in the appendices annexed thereto.

I/We have deposited herewith the requisite Earnest Money Deposit (EMD) as per details furnished in the Check List.

Authorised Representative of Bidder
Signature:
Name:
Address:

Place:
Date:

Signature of Authorized Signatory
with seal & full address

Place:
Date:

ANNEXURE- 3

CERTIFICATE OF NO DEVIATION

(To be Typed & submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Subject: ***No Deviation Certificate***

Ref: 1) GeM Bid No: ……,
2) All other pertinent issues till date

We hereby confirm that we have not changed/ modified/materially altered any of the tender documents as downloaded from the website/ issued by BHEL and in case of such observance at any stage, it shall be treated as null and void.

We also hereby confirm that we have neither set any Terms and Conditions and nor have we taken any deviation from the Tender conditions together with other references applicable for the above referred GeM Bid.

We further confirm our unqualified acceptance to all Terms and Conditions, unqualified compliance to Tender Conditions.

We confirm to have submitted offer in accordance with tender instructions and as per aforesaid references.

Thanking you,

Yours faithfully,

Date: **Sign. of the AUTHORISED SIGNATORY**

Place:
Date: Signature of Authorized Signatory with seal & full address

Place: **(With Name, Designation and Company seal)**

ANNEXURE- 4

UNDERTAKING

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir/Madam,

Sub: DECLARATION REGARDING INSOLVENCY/ LIQUIDATION/ BANKRUPTCY PROCEEDINGS

Ref: GeM Bid Specification No:

I/We,

_____

declare that, I/We am/are not admitted under insolvency resolution process or liquidation under Insolvency and Bankruptcy Code, 2016, as amended from time to time or under any other law as on date, by NCLT or any adjudicating authority/authorities.

Place: **Sign. of the AUTHORISED SIGNATORY**
Date: **(With Name, Designation and Company seal)**

Place: Signature of Authorized Signatory
Date: with seal & full address

Tender Notice

ANNEXURE – 5

DECLARATION BY AUTHORISED SIGNATORY OF BIDDER

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: **Declaration by Authorised Signatory**

Ref: 1) GeM Bid Specification No: ……

2) All other pertinent issues till date

I/We, hereby certify that all the information and data furnished by me with regard to the above Tender Specification are true and complete to the best of my knowledge. I have gone through the specifications, conditions, stipulations and all other pertinent issues till date, and agree to comply with the requirements and Intent of the specification.

I further certify that I am authorised to represent on behalf of my Company/Firm for the above mentioned tender and a valid Power of Attorney to this effect is also enclosed.

Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of the Bidder)

Date:

Enclosed: Power of Attorney

Place:
Date:

Signature of Authorized Signatory with seal & full address

ANNEXURE – 6

DECLARATION BY AUTHORISED SIGNATORY OF BIDDER

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: **Declaration by Authorised Signatory regarding Authenticity of submitted documents.**

Ref: 1) GeM Bid No. & Date: …….

2) All other pertinent issues till date

I/We, hereby certify that all the documents submitted by us in support of possession of "Qualifying Requirements" are true copies of the original and are fully compliant required for qualifying / applying in the bid and shall produce the original of same as and when required by Bharat Heavy Electricals Limited.

I / We hereby further confirm that no tampering is done with documents submitted in support of our qualification as bidder. I / We understand that at any stage (during bidding process or while executing the awarded contract) if it is found that fake / false / forged bid qualifying / supporting documents / certificates were submitted, it would lead to summarily rejection of our bid / termination of contract. BHEL shall be at liberty to initiate other appropriate actions as per the terms of the Bid / Contract and other extant policies of Bharat Heavy Electricals Limited.

Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of the Bidder)

Date:

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE- 7

NON-DISCLOSURE CERTIFICATE

(To be Typed & submitted in the Letter Head of the Company/Firm of Bidder)

I/We understand that BHEL Thirumayam is committed to Information Security Management System as per their Information Security Policy.

Hence, I/We M/s ……..

who are submitting offer for providing services to BHEL Thirumayam against GeM Bid No…… hereby undertake to comply with the following in line with Information Security Policy of < BHEL Thirumayam

- To maintain confidentiality of documents & information which shall be used during the execution of the Contract.
- The documents & information shall not be revealed to or shared with third party which shall not be in the business interest of BHEL Thirumayam

(Signature, date & seal of Authorized Signatory of the bidder)

Date:

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 8

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 _____
_____
_____ (hereinafter referred to as "Contract").

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 panel of Independent External Monitor(s)(IEMs), 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

Place:
Date:

Signature of Authorized Signatory
with seal & full address

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 Bharatiya Nyaya Sanhita(BNS)2023 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. The Bidder(s)/ Contractor(s) 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 Bharatiya Nyaya Sanhita(BNS) and Prevention of Corruption 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 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. 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.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and shall await their decision in the matter.

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, terminate the contract, if already awarded, exclude from future business dealings and /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(s) from the tender process before award / order acceptance according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.

4.1 If the Principal is entitled to terminate the contract according to Section 3, or terminates the Contract in application of Section 3 above, the Bidder(s) / Contractor(s) transgression through a violation of Section 2 above shall be construed breach of contract and the Principal shall be entitled to demand and recover from the Contractor an amount equal to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher, as damages, in addition to and without prejudice to its right to demand and recover compensation for any other loss or damages specified elsewhere in the contract.

Section 5 - Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3(three) years (to be reckoned from date of bid submission) with any other company in any country conforming to the anti-corruption approach in India that could justify his exclusion from the tender process. The date of such transgression, for the purpose of disclosure by the bidders in this regard, would be the date on which cognizance of the said transgression was taken by the competent authority. The transgression(s), for which cognizance was taken even before the said period of three years, but are pending conclusion, shall also be reported by the bidders.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

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 or action can be taken as per the separate "Guidelines on Banning of Business dealings with Suppliers / Contractors", framed by the Principal.

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

6.1 The Principal will enter into Integrity Pacts with identical conditions as this Integrity Pact with all Bidders and Contractors.

6.2 In case of a joint venture, all the partners of the joint venture should sign the Integrity Pact. In case of Sub-contracting, the Principal contractor shall be solely responsible for adherence to the provisions of IP by the sub-contractor(s).

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

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

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 panel of Independent External Monitor(s)(IEMs) for this Integrity Pact. The task of the IEMs is to review independently and objectively, whether and to what extent the parties comply with the obligations under this Integrity Pact on receipt of any complaint by them from the bidder(s).

8.2 The IEMs are 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 IEM shall be provided access to all documents / records pertaining to the Contract, for which a complaint or issue is raised before them as and when warranted. However, the documents / records / information having National Security implications and those documents which have been classified as / Top Secret are not to be disclosed.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

8.4 The Principal will provide to the IEMs 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 IEMs the option to participate in such meetings.

8.5 The role of IEMs is advisory and the advice of IEM is non- binding on the Organization. However, as the IEMs are invariably persons with rich experience who have retired as senior functionaries of the government, their advice would help in proper implementation of the IP.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of the tendering process, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an examination, and submit their joint recommendations to the Management. In case the full panel is not available due to some unavoidable reasons, the available IEM(s) will conduct examination of the complaints. Consent of the IEM(s), who may not be available, shall be taken on record.

8.7 The IEMs would examine all the representations/grievances/complaints received by them from the bidders or their authorized representative related to any discrimination on account of lack of fair play in modes of procurement and bidding systems, tendering method, eligibility conditions, bid evaluation criteria, commercial terms & conditions, choice of technology / specifications etc..

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

8.9 IEM should examine the process integrity; they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the Principal.

8.10 If the IEMs have reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Bharatiya Nyaya Sanhita(BNS)/ Prevention of Corruption 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 IEMs may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 After award of work, the IEMs shall look into any issue relating to execution of Contract, if specifically raised before them. As an illustrative example, if a Contractor who has been awarded the Contract, during the execution of Contracts, raises issue of delayed payment etc. before the IEMs, the same shall be examined by the panel of IEMs.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

8.12 However, the IEMs may suggest systemic improvements to the management of the Principal, if considered necessary, to bring about transparency, equity and fairness in the system of procurement.

8.13 The word `Monitor' would include both singular and plural.

Section 9 - Pact Duration

9.1 This Integrity Pact shall be operative from the date this Integrity Pact is signed by both the parties. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

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

Section 10 - Other Provisions

10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.

10.2 Changes and supplements as well as termination notices need to be made in writing.

10.3 If the Bidder(s) / Contractor(s) is a partnership or a consortium or a joint venture, this Integrity Pact must be signed by all partners of the partnership or joint venture or all consortium members.

10.4 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact 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 Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact would be a preliminary qualification.

10.6 In the event of any dispute between the Principal and Bidder(s) / Contractor(s) relating to the Contract, in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. If required, the Principal may adopt any mediation

rules for this purpose. However, not more than five meetings shall be held for a particular dispute resolution. The fees / expenses on dispute resolution shall be equally shared by both the parties. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms and conditions of the Contract.

For & On behalf of the Principal

(Office Seal)

Place THIRUMAYAM Date 24-07-2026

Witness: Deepu Thomas

(Name & Address) DEEPU THOMAS
Sr. MANAGER (CONTRACTS & DTG)
BHEL THIRUMAYAM

For & On behalf of the Bidder/ Contractor

(Office Seal)

Witness:

(Name & Address)

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 9

DECLARATION CONFIRMING KNOWLEDGE ABOUT SITE CONDITIONS

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Declaration confirming knowledge about Site conditions
Ref: 1) GeM Bid Specification No: ……
2) All other pertinent issues till date

I/We, _____ hereby declare and confirm that we have visited the Project Site as referred in BHEL Tender Specifications and acquired full knowledge and information about the Site conditions including Wage structure, Industrial Climate, the Law & Order and other conditions prevalent at and around the Site. We further confirm that the above information is true and correct and we shall not raise any claim of any nature due to lack of knowledge of Site conditions.

I/We, hereby offer to carry out work as detailed in above mentioned Tender Specification, in accordance with Terms & Conditions thereof.

Yours faithfully,

Place:
Date:

(Signature, Date & Seal of Authorized Representative of the Bidder)

Place:
Date:

Signature of Authorized Signatory with seal & full address

ANNEXURE – 10

DECLARATION

Date:_____

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir/ Madam,

Sub: **Details of related firms and their area of activities**

Please find below details of firms owned by our family members that are doing business/ registered for same item with BHEL, _____ (NA, *if not applicable*)

1	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	
2	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	
…		

***Note:* I certify that the above information is true and I agree for penal action from BHEL in case any of the above information furnished is found to be false.**

Regards,

(_____)

From: M/s _____

Place:
Date:

Signature of Authorized Signatory
with seal & full address

Tender Notice

Supplier Code: _____

Address: _____

_____

_____

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 11

DECLARATION FOR RELATION IN BHEL

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder failing which the offer of Bidder is liable to be summarily rejected)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Declaration for relation in BHEL

Ref: 1) GeM Bid Specification No: ……

I/We hereby submit the following information pertaining to relation/relatives of Proprietor/Partner(s)/ Director(s) employed in BHEL

Tick (√) any one as applicable:

1. The Proprietor, Partner(s), Director(s) of our Company/Firm DO NOT have any relation or relatives employed in BHEL

OR

2. The Proprietor, Partner(s), or Director(s) of our Company/Firm HAVE relation/relatives employed in BHEL and their particulars are as below:

   i.
   ii.

(Signature, Date & Seal of Authorized Signatory of the Bidder)

Note:

1. Attach separate sheet, if necessary.
2. If BHEL Management comes to know at a later date that the information furnished by the Bidder is false, BHEL reserves the right to take suitable against the Bidder/Contractor.

Place:
Date:

Signature of Authorized Signatory with seal & full address

ANNEXURE – 12

DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017 DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 04th June, 2020 and subsequent order(s).

Ref: 1) GeM Bid Specification No: ……
2) All other pertinent issues till date

We hereby certify that the items/works/services offered by…… (specify the name of the organization here) has a local content of _____ % and this meets the local content requirement for **'Class-I local supplier' / 'Class II local supplier' **** as defined in Public Procurement (Preference to Make in India), Order 2017-Revision dated 04.06.2020 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:

1. _____ 2. _____

3. _____ 4. _____

…

Thanking you,
Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of the Bidder)

****** - Strike out whichever is not applicable.

Place:
Date:

Signature of Authorized Signatory with seal & full address

Tender Notice

Note:

1. Bidders to note that above format, duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per BHEL Guidelines shall be initiated against the bidder.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 13

DECLARATION REGARDING COMPLIANCE TO RESTRICTIONS UNDER RULE 144 (xi) OF GFR 2017

(To be typed and submitted in the Letter Head of the Entity/ Firm providing certificate as applicable)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Declaration regarding compliance to Restrictions under Rule 144 (xi) of GFR 2017

Ref: 1) GeM Bid Specification No: ……
2) All other pertinent issues till date

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India. I certify that _____ (**SPECIFY THE NAME OF THE ORGANIZATION HERE**), is not from such a country/ has been registered with the Competent Authority (*attach valid registration by the Competent Authority, i.e., the Registration Committee constituted by the Dept. for Promotion of Industry and Internal Trade (DPIIT*).

I hereby certify that we fulfil all requirements in this regard and is eligible to be considered.

Thanking you,
Yours faithfully,

(Signature, Date & Seal of
Authorized Signatory of the Bidder)

Note: Bidders to note that in case above certification given by a bidder, whose bid is accepted, is found to be false, then this would be a ground for immediate termination and for taking further action in accordance with law and as per BHEL guidelines.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 14

BANK ACCOUNT DETAILS FOR E-PAYMENT

(To be given on Letter head of the Company /Firm of Bidder, and **ENDORSED (SIGNED & STAMPED) BY THE BANK** to enable BHEL release payments through Electronic Fund Transfer (EFT/RTGS)

---

1. Beneficiary Name:

2. Beneficiary Account No.:

3. Bank Name & Branch:

4. City/Place:

5. 9-digit M ICR Code of Bank Branch:

6. IFSC Code of Bank Branch:

7. Beneficiary E-mail ID:
   (for payment confirmation)

NOTE: In case Bank endorsed certificate regarding above has already been submitted earlier, kindly submit photocopy of the same

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 15

POWER OF ATTORNEY for SUBMISSION OF TENDER

(To be typed on non-judicial stamp paper of minimum Rs. 100/- and Notarized)

KNOW ALL MEN BY THESE PRESENTS, that I/We do hereby make, nominate, constitute and appoint Mr. …….. , whose signature given below herewith to be true and lawful Attorney of M/s…… hereinafter called 'Company', for submitting Tender/entering into Contract and inter alia, sign, execute all papers and to do necessary lawful acts on behalf of Company with M/s Bharat Heavy Electricals Ltd, Central Procurement Cell (CPC), in connection with……vide GeM Bid No: _____, dated _____.

And the Company do hereby agree to ratify and confirm all acts, deeds, things or proceedings as may be lawfully done by the said attorney and by or on behalf of the company and in the name of the company, by virtue of the powers conferred herein and the same shall be binding on the company and shall have full force and effect.

IN WITNESS WHEREOF, the common seal of the company has been hereunto affixed in the manner hereinafter appearing on the document.

Dated at _____, this _____ day of _____

Director/CMD/Partner/Proprietor

Signature of Mr. …… (Attorney)

Attested by: Director/CMD/Partner/Proprietor

Witness

Notary Public

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 16

PROFORMA OF BANK GUARANTEE FOR EARNEST MONEY

(On non-Judicial paper of appropriate value)

Bank Guarantee No…….
Date…….

To
(Employer's Name and Address)
……..

Dear Sirs,
In accordance with the terms and conditions of Invitation for Bids/Notice Inviting Tender No……[1](Tender Conditions), M/s. ……. having its registered office at ……[2] (hereinafter referred to as the 'Tenderer'), is submitting its bid for the work of**……**[3] invited by ……[4]. (name of the Employer) through its Unit at ……(

The Tender Conditions provide that the Tenderer shall pay a sum of Rs ……. as Earnest Money Deposit in the form therein mentioned. The form of payment of Earnest Money Deposit includes Bank Guarantee executed by a Scheduled Bank.

In lieu of the stipulations contained in the aforesaid Tender Conditions that an irrevocable and unconditional Bank Guarantee against Earnest Money Deposit for an amount of .....[5] ..... is required to be submitted by the Tenderer as a condition precedent for participation in the said Tender and the Tenderer having approached us for giving the said Guarantee,

we, the .....[Name & address of the Bank] ..... having our Registered Office at ……. (hereinafter referred to as the Bank) being the Guarantor under this Guarantee, hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer without any demur, merely on your first demand any sum or sums of Rs. ..... [5] (in words Rupees.....) without any reservation, protest, and recourse and without the beneficiary needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____ _____.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor/Contractor/Vendors in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment hereunder and the Tenderer shall have no claim against us for making such payment.

We …….. Bank further agree that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Tender or to extend the time of submission of from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Tenderer and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Tenderer or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Tenderer or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Tenderer and notwithstanding any security or other guarantee that the Employer may have in relation to the Tenderer's liabilities.

This Guarantee shall be irrevocable and shall remain in force upto and including……..[6] and shall be extended from time to time for such period as may be desired by the Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Tenderer but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms hereof. However, unless a demand or claim under this Guarantee is made on us in writing on or before the ……. [7] we shall be discharged from all liabilities under this Guarantee.

This Bank Guarantee shall be governed, construed and interpreted in accordance with the laws of India.

Courts at …… shall alone have exclusive jurisdiction over any matter arising out of or in connection with this Bank Guarantee

We, …… Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

a. The liability of the Bank under this Guarantee shall not exceed……[5]….

Place:
Date:

Signature of Authorized Signatory
with seal & full address

b. This Guarantee shall be valid up to ……[6]
c. Unless the Bank is served a written claim or demand on or before _____[7] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Date…….
Place of Issue…….

1 *Details of the Invitation to Bid/Notice Inviting Tender*
2 *Name and Address of the Tenderer*
3 *Details of the Work*
4 *Name of the Employer*
5 *BG Amount in words and Figures*
6 *Validity Date*
7 *Date of Expiry of Claim Period*

Notes:

1. Units are advised that expiry of claim period may be kept 3-6 months after validity date. It may be ensured that the same is in line with the agreement/ contract entered with the Vendor.

2. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Contractor/sub-contractor /vendor/ Bank issuing the guarantee.

3. In line with the GCC, SCC or contractual terms, Unit may carry out minor modifications in the Standard BG Formats. If required, such modifications may be carried out after taking up appropriately with the Unit/Region's Law Deptt.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

4. **In Case of Bank Guarantees submitted by Foreign Vendors-**

a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e., Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.

b. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)**

b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter-Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter-Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). The BG Format provided to them should clearly specify the same.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 17

BANK GUARANTEE FOR PERFORMANCE SECURITY

(On non-Judicial paper of appropriate value)

Bank Guarantee No:
Date:

To
NAME
& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at_____[1] through its Unit at…….(name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) with its registered office at_____[2] hereinafter referred to as the ' Vendor / Contractor / Supplier ', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No……dated ……[3] valued at Rs……[4] (Rupees ----------) / FC……(in words……..) for ……[5] (hereinafter called the 'Contract') and the Vendor / Contractor / Supplier having agreed to provide a Contract Performance Bank Guarantee, equivalent to ……% (….
Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

We, ……, (hereinafter referred to as the Bank), having registered/Head office at ……. and inter alia a branch at …… being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer any sum or sums upto a maximum amount of Rs ---------- [6] (Rupees ----------) without any demur, immediately on first demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor / Contractor / Supplier in any suit or proceeding pending before any Court or

Place:
Date:

Signature of Authorized Signatory
with seal & full address

Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Vendor / Contractor / Supplier shall have no claim against us for making such payment.

We the ……bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract/ satisfactory completion of the performance guarantee period as per the terms of the Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

We ……..BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Vendor / Contractor / Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Vendor / Contractor / Supplier and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Vendor / Contractor / Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Vendor / Contractor / Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Vendor / Contractor / Supplier and notwithstanding any security or other guarantee that the Employer may have in relation to the Vendor /Contractor / Supplier 's liabilities.

This Guarantee shall remain in force upto and including…… [7] and shall be extended from time to time for such period as may be desired by Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Vendor / Contractor / Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the ……..[8] we shall be discharged from all liabilities under this guarantee thereafter.

This Bank Guarantee shall be governed, construed and interpreted in accordance with the laws of India.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

Courts at …… shall alone have exclusive jurisdiction over any matter arising out of or in connection with this Bank Guarantee

We, …… BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

a. The liability of the Bank under this Guarantee shall not exceed…… [6]
b. This Guarantee shall be valid up to ……[7]
c. Unless the Bank is served a written claim or demand on or before _____[8] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of (Name of the Bank) Dated…….
Place of Issue…….

1. *NAME AND ADDRESS OF EMPLOYER i.e., Bharat Heavy Electricals Limited*
2. *NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.*
3. *DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE*
4. *CONTRACT VALUE*
5. *PROJECT/SUPPLY DETAILS*
6. *BG AMOUNT IN FIGURES AND WORDS*
7. *VALIDITY DATE*
8. *DATE OF EXPIRY OF CLAIM PERIOD*

Note:

1. Units are advised that expiry of claim period may be kept 3-6 months after validity date. It may be ensured that the same is in line with the agreement/ contract entered with the Vendor.

2. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

3. In line with the GCC, SCC or contractual terms, Unit may carry out minor modifications in the Standard BG Formats. If required, such modifications may be carried out after taking up appropriately with the Unit/Region's Law Deptt.

4**. In Case of Bank Guarantees submitted by Foreign Vendors-**

a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e.
Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.

b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)

b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter-Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). The BG Format provided to them should clearly specify the same.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 18

LIST OF CONSORTIUM BANK

Sl. No.	NAME OF THE BANK
1	State Bank of India
2	Canara Bank
3	IDBI Bank Limited
4	ICICI Bank Limited
5	HDFC Bank Limited
6	Axis Bank
7	IndusInd Bank Limited
8	Bank of Baroda
9	Exim Bank
10	Indian Bank
11	Punjab National Bank
12	Union Bank of India
13	Yes Bank Limited
14	RBL Bank Ltd.
15	Indian Overseas Bank
16	Kotak Mahindra Bank Limited
17	Federal Bank Limited
18	HSBC
19	South Indian Bank
20	Bank of India

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE – 19
E-PAYMENTS

- This annexure to the techno-commercial bid explains how to make e-payments to BHEL-Tiruchirappalli through SBI e-collect.
- Vendors (SD Payments payable by others) can utilize this facility.
- Payments can be made using Internet Banking, Debit Cards/Credit Cards etc.
- SBI Charges a minimum amount (Service Charge) for every transaction. This may vary according to the MODE selected.

STEP BY STEP PROCEDURE:
Login to https://www.onlinesbi.com

1. Select State Bank Collect available on the top (pre login page)
2. Accept the terms and conditions and click "PROCEED"
3. Select State "TAMILNADU "and Institution type "INDUSTRY ".
4. Select "BHEL TRICHY under "INDUSTRY".
5. In the next page, Select APPROPRIATE category, fill details correctly & click "SUBMIT".
6. If all details entered are correctly populated, click "CONFIRM "to proceed.
7. Make payment as per your convenience. (Options available are payment of fees through SBI Net Banking, State Bank ATM cum Debit Cards / Other Bank Debit / Credit Cards and through SBI Branches).
8. SAVE & Keep the copy of receipt for future reference.

HOW TO TAKE RECEIPT FOR A PAYMENT MADE, EVEN ON A LATER DATE:
(PLEASE CHECK THE STATUS BEFORE MAKING PAYMENT SECOND TIME)

1. Login to www.onlinesbi.com
2. Select State Bank Collect available on the top (pre login page)
3. Accept the terms and conditions and click "PROCEED"
4. Select "PAYMENT HISTORY "option available on the left side of screen.
5. Using two options as mentioned below, you can get the receipt:
    a. Type the same Date of Birth, Mobile Number which you have entered at the time of making payment through SB collect. Select the date range and submit.
    b. It you know the payment reference number, then enter the Reference number (DU…) along with anyone information (Date of Birth / Mobile number, which you have entered at the time of making payment). Select the date range and submit.
6. In the next page, take print out of receipt.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ANNEXURE-20

Format of Letter Confirming the Lien on Fixed Deposit Receipt
(On the Letter Head of Bank)

Reference No……. Date:

To

M/s Bharat Heavy Electricals Limited,
Finance Department, 2ND floor admin
building,
THIRUMAYAM-620014.

Dear Sir /Madam,

We refer to the fixed deposit receipt (FDR) bearing no. _____ dated _____ for Rs. _____ issued in the name of Bharath Heavy Electricals Ltd. (BHEL) Trichy-14. Account of ____ (Name of the vendor)

We hereby agree and confirm that,

1. There is no lock in period for encashment of the said FDR.

2. The amount under the said FDR would be paid to you on demand, at any point of time before, or upon maturity, without any reference to the _____ (name of the vendor).

3. Encashment whether premature or otherwise would not require any clearance from any other authority / person.

4. We agree that on encashment of FDR, the interest accrued will also be released to you.

5. We agree that the FDR will be auto renewed for such period/s initially mentioned in the FDR and the intimation of such renewal shall be sent to BHEL, Trichy-14 and …….(the name of the vendor) immediately after the renewal.

6. FDR will not be closed, encashed, changed or Discharged without the written permission / confirmation from M/s. BHEL, Trichy.

7. We acknowledge and agree that the Lien created on the FDR shall be in force until BHEL, Trichy gives us a Discharge Letter in this regard.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

Yours faithfully,

Authorised Signatory
(Bank Stamp/Seal)

This letter to be typed on Bank's letter head,
Bank email id:
Mobile no:
Landline no:
Address for communication:

Place:
Date:

Signature of Authorized Signatory
with seal & full address

Annexure-21

GENERAL DETAILS:

(To be filled by Bidder)

Tender Ref: PPPU: WC: 26: 020

01	*Name and full address of the Company / Firm*	
02	*Name of contact Person with Designation*	
03	*Contact Details:*	
	Landline No.	
	Mobile No.	
	email ID:	
04	*Local Office Address with Contact person, Phone No., Mobile No., email ID, Fax No. (If any)*	
05	*Vendor code allotted by BHEL **if any***	
06	*List of BHEL units in which vendor has executed any type of contract previously or is currently executing any type of contract*	
07	*Is the vendor under Ban Or Hold by any units of BHEL?*	
08	*Applicable GST percentage for this tender*	

Place:
Date:

Signature of Authorized Signatory
with seal & full address

General Conditions of Contract (GCC)

BHARAT HEAVY ELECTRICALS LIMITED
(A Govt. of India Undertaking)
Power Plant Piping Unit, Thirumayam – 622 507, Tamil Nadu

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2.18. Limitation on Liability
2.19. Other Issues

Place:
Date:

Signature of Authorized Signatory
with seal & full address

CHAPTER -1

1. GENERAL INSTRUCTION TO TENDERERS

1.1. DESPATCH INSTRUCTION

i. The General Conditions of Contract form part of the Tender specifications. **For this tender, bidders shall use electronic Signature viz Digital Signature Certificate while uploading the tender documents on the e-procurement portal.** The information furnished shall be complete by itself. The tenderer is required to furnish all the details and other documents as required in the following pages.

ii. Tenderers are advised to study all the tender documents carefully. Any submission of tender by the tenderer shall be deemed to have been done after careful study and examination of the tender documents and with the full understanding of the implications thereof. Should the tenderers have any doubt about the meaning of any portion of the Tender Specification or find discrepancies or omissions in the drawings or the tender documents issued are incomplete or shall require clarification on any of the technical aspect, the scope of work etc., he shall at once, contact the authority inviting the tender well in time (so as not to affect last date of submission) for clarification before the submission of the tender. Tenderer's request for clarifications shall be with reference to Sections and Clause numbers given in the tender documents. The specifications and terms and conditions shall be deemed to have been accepted by the tenderer in his offer. Non-compliance with any of the requirements and instructions of the tender enquiry may result in the rejection of the tender.

iii. Integrity pact (IP) shall be applicable for all tenders / contracts if indicated in NIT. This IP shall be issued as part of the Tender documents and shall be submitted by the bidder along with Techno-commercial bid duly filled, signed and stamped by the authorized signatory who signs the bid. Entering into this pact shall be a preliminary qualification.

1.2. SUBMISSION OF TENDERS

1.2.1. The tenderers must submit their tenders to Officer inviting tender as per instructions in the NIT.

1.2.2. Tenders shall be submitted through E-Procurement portal as per instruction in NIT. Tenderers to upload offers well in advance in order to avoid last minute congestion in e-procurement website. However, after submission of the tender, the tenderer can re-submit revised tender but before due date and time of submission of tender as notified.

1.2.3. Tenders shall be opened by Officer of BHEL at the time and date as specified in the NIT. For this tender, bidders may attend through online mode, if provisions are available in e-procurement portal.

1.2.4. Tenderers whose bids are found techno commercially qualified shall be notified through e-procurement system about the date and time of opening of the Price Bids. BHEL's decision in this regard shall be final and binding.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

1.2.5. The information given in the tender documents is for general guidance and shall not be construed as contractually binding on BHEL/ Owner. All relevant site data/ information as may be necessary for bidding shall have to be obtained/ collected by the Tenderer.

1.2.6. The Tenderers are advised to physically visit the site to acquaint and satisfy themselves about the weather conditions, working culture in the area, socio-political environment, safety & security aspects, law & order situation, law of the land, transportation routes, various distances, surroundings of plant/ project premises together with all statutory, obligatory, mandatory requirements of various authorities and obtain for themselves all necessary information as to the risks, contingencies and all other circumstances, which may influence or affect the discharge of various obligations under the Contract during contract period including extended period (if any).

1.2.7. The submission of bid will tantamount to due diligence having been done and it shall be deemed that:

a) the Tenderer has obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Works

b) the Tenderer accepts total responsibility for having foreseen all difficulties and costs of successfully completing the Works

c) the Tenderer accepts that, the Contract Price shall not be adjusted to take account of any unforeseeable or unforeseen difficulties or costs and the Tenderer shall not raise any claims/ disputes against BHEL and/ or Owner at later date in any manner whatsoever.

1.3. QUALIFICATION OF TENDERERS

i. Only tenderers who have previous experience in the work of the nature and description detailed in the Notice Inviting Tender and/or tender specification are expected to quote for this work duly detailing their experience along with offer.

ii. Offers from tenderers who do not have proven and established experience in the field shall not be considered.

iii. The offers of the bidders who are on the debarred list shall be rejected. Further, offer of the bidders, who engage the services of the debarred firms or associated with the debarred firm, for present bid, shall also be rejected. The list of **debarred firms** is available on BHEL web site www.bhel.com. (Refer clause 28.0 of NIT).

iv. Tenderers who have been suspended, debarred or black listed by BHEL, Tiruchirappalli - 620014 or any other unit of BHEL/ any other PSU or GOI/ any State Govt. or against whom incident (live) raised by BHEL Thirumayam in GeM will not be allowed to participate in the tender, and bidder should declare in the tender that they are not suspended, debarred or blacklisted by any of the agencies stated above. Even during the course of evaluation/ finalization of tender if it is found that a bidder is so suspended, debarred or black listed, BHEL shall not consider them for further participation in the tender.

v. Offers from tenderers who do not comply with the latest guidelines of Ministry/Commissions of Govt. of India shall not be considered.

1.4. EVALUATION OF BIDS

i. Technical Bids submitted by the tenderer will be opened first and evaluated for fulfilling the Pre- Qualification criteria and other conditions in NIT/Tender documents, based on documentary evidences submitted along with the offer.

ii. In case the same qualifying experience is claimed by more than one agency, then:
   a. The agency who has executed the work as per documentary evidence submitted shall only be qualified. Scope of qualifying work should be totally with the agency who has executed and in case it is only labour and consumables without T&P, then the credentials of execution is assigned to the first agency and not to the agency who has executed only as labour supply contractor. Further, BHEL reserves the right to ask for any other proof for the said job.
   b. However, if the same is on account of subletting, part of scope by one agency to another agency in a project of BHEL, experience of both the agencies may be considered for the sublet portion of the work provided subletting has been done with the approval of BHEL.

iii. In case the qualifying experience is claimed by bidder is based on 'Work Order' and 'Experience Certificates' from any organization other than BHEL (main agency), then it shall be the responsibility of the bidder to submit (in addition to the experience certificate from main agency) relevant certificate regarding qualifying experience from the end Customer or the Turnkey-Contractor (if any) who has awarded the work to main agency, as a proof for having executed subject qualifying work. BHEL reserves the right to ask for any other proof for the said job.

iv. Assessing Bidder's Capacity for executing the current tender shall be as per Notice Inviting Tender.

v. Price Bids of shortlisted bidders shall only be opened through the electronic price bid opening with/without Reverse Auction, at the discretion of BHEL. Unless specified otherwise in the tender, the L1 bidder amongst all the shortlisted bidders shall be considered for award. However, the L1 bidder shall have no claim on the award & BHEL reserves the right to award the tender at its sole discretion.

vi. Price Bids of unqualified bidders shall not be opened. Reasons for rejection shall be intimated in due course either through system generated e-mail or through letter/e-mail after award to successful bidder.

vii. Bidders are advised to also refer to clause no 2.9.4 regarding evaluation of their performance in ongoing projects.

1.5. DATA TO BE ENCLOSED

Full information shall be given by the tenderer in respect of the following. Non-submission of this information may lead to rejection of the offer.

i. INCOME TAX PERMANENT ACCOUNT NUMBER

Certified copies of Permanent Account Numbers as allotted by Income Tax Department for the Company/Firm/Individual Partners etc. shall be furnished along with tender.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

ii. An attested copy of the Power of Attorney, in case the tender is signed by an individual other than the sole proprietor.

iii. **IN CASE OF INDIVIDUAL TENDERER**:
His / her full name, address, PAN and place & nature of business.

iv. **IN CASE OF PARTNERSHIP FIRM**:
The names of all the partners and their addresses, copy of the **partnership deed/instrument of partnership dully certified by the Notary Public shall be enclosed.**

v. **IN CASE OF COMPANIES**:
a) Date and place of registration including date of commencement certificate in case of Public Companies (certified copies of Memorandum and articles of Association are also to be furnished).
b) Nature of business carried on by the Company and the provisions of the Memorandum relating thereof.

1.6. AUTHORIZATION AND ATTESTATION

Tenders shall be signed by a person duly authorized/empowered to do so, for which a Power of Attorney is to be submitted along with the tender offer. For company, a Power of Attorney (as per format in Volume-I D) shall be submitted.

1.7. EARNEST MONEY DEPOSIT

1.7.1. Every tender must be accompanied by the prescribed amount of Earnest Money Deposit (EMD) in the manner described herein.

i. EMD shall be furnished before tender opening / along with the offer in full as per the amount indicated in the NIT.

ii. The EMD up to an amount of Rs. 2 Lakh is to be paid only in the following forms:
a) Cash deposit as permissible under the extant Income Tax Act (before tender opening).
b) Electronic Fund Transfer credited in BHEL account (before tender opening).
c) Banker's cheque / Pay order / Demand draft, in favour of 'Bharat Heavy Electricals Limited' and payable at Regional HQ issuing the tender (along with offer).
d) Fixed Deposit Receipt (FDR) issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL) duly marking lien in favour for BHEL (along with offer). The Fixed Deposit in such cases shall be valid for at least six months from the due date of tender submission.
e) Insurance Surety Bonds
f) In case EMD amount is more than Rs. Two Lakhs, Tenderer has the option to submit the amount in excess of Rs. Two lakhs in the forms described above in clause no. 1.9.1. ii) (a) to (e) or in the form of Bank Guarantee from Scheduled Bank (along with the Offer). The Bank Guarantee in such cases shall be valid for at least six months from the due date of tender submission. The Bank Guarantee format for EMD shall be in the prescribed formats.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

iii. No other form of EMD remittance shall be acceptable to BHEL.

iv. Proof of EMD: Bidder shall upload the scanned copy of EMD along with bid submission through BHEL e-procurement Portal. However, for the purpose of realization, the bidder shall send the demand draft/ banker's cheque/ pay order/ Bank Guarantee/ FDR/ Insurance Surety Bonds, in original, to the designated officer through post/courier or by hand within reasonable time.

1.7.2. EMD by the Tenderer will be forfeited as per NIT conditions, if:

i. After opening the tender and within the offer validity period, the tenderer revokes his tender or makes any modification in his tender which is not acceptable to BHEL.OR

ii. The successful Contractor, on whom the work has been awarded, fails to deposit the required Security deposit or commence the work within the period as per LOI/ LOA/ Contract or refuse to accept the LIO/LOA/Contract.

iii. EMD by the tenderer shall be withheld in case any action on the tenderer is envisaged under the provisions of extant "Guidelines on Suspension of business dealings with suppliers/ contractors" of BHEL and forfeited/ released based on the action as determined under these guidelines.

1.7.3. EMD shall not carry any interest.

1.7.4. EMD given by all unsuccessful tenderers shall be refunded normally within fifteen days of award of work.

1.7.5. Cash portion of EMD of successful tenderer will be retained as part of Security Deposit. EMD submitted in the form of Bank Guarantee/ FDR shall be retained by BHEL until the receipt of the Security Deposit.

1.7.6. Micro and Small Enterprises (MSEs) or Start-ups as recognized by Department for Promotion of Industry and Internal Trade (DPIIT) shall be exempted from payment of EMD

1.8. SECURITY DEPOSIT

1.8.1. Upon acceptance of Tender, the successful bidder shall be required to deposit the 5% of the contract value as Security Deposit towards fulfilment of any obligations in terms of the provisions of the contract.

1.8.2. The Security Deposit shall be furnished before start of the work by the contractor.

1.8.3. The required Security Deposit may be accepted in the following forms.

i. Cash (as permissible under the extant Income Tax Act).

ii. Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL.

iii. Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL).

iv. **Bank Guarantee from Scheduled Banks/ Public Financial Institutions as defined in** the Companies Act. The Bank Guarantee format for Security Deposit shall be in the prescribed formats.

v. Insurance Surety Bonds.

Note:

i. BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

ii. In case of delay in submission of Security Deposit, enhanced security deposit which would include interest (Repo rate + 4%) for the delayed period, shall be submitted by the bidder before submission of first bill

1.8.4. The Security Deposit shall not carry any interest.

1.8.5. In case the value of work exceeds the awarded / accepted value, the Security Deposit shall be correspondingly enhanced as given below:

i. The enhanced part of the Security Deposit shall be immediately deposited by the Contractor or adjusted against payments due to the Contractor.

ii. Contract value for the purpose of operating the increased value of Security Deposit due to Quantity Variation, shall be exclusive of Price Variation Clause, Over Run Compensation and Extra works done on man-day rates.

iii. The recoveries made from running bills can be released against submission of equivalent Bank Guarantee in acceptable form, but only once, before completion of work, with the approval of competent authority of BHEL.

1.8.6. The validity of Bank Guarantees towards Security Deposit shall be initially up to the completion period as stipulated in the Letter of Intent/ Award + Guarantee Period + 3 months, and the same shall be kept valid by proper renewal by the contractor till the acceptance of Final Bills of the Contractor by BHEL

1.8.7. BHEL reserves the right of forfeiture of Security Deposit in addition to other claims, damages and remedies in the event of the Contractor's failure to fulfil any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit against any claims of other contracts with BHEL by giving prior notice to the contractor.

1.8.8 There is no exemption of Performance security deposit submission for MSE / Start-Ups Vendors.

1.9. RETURN OF SECURITY DEPOSIT

Security Deposit shall be released to the contractor upon fulfillment of contractual obligations as per terms of the contract including completion of Guarantee Period after deducting all expenses / other amounts due to BHEL under the contract.

1.10. BANK GUARANTEES

Where ever Bank Guarantees are to be furnished/submitted by the contractor, the following shall be complied with

i. Bank Guarantees shall be from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. Bank Guarantees issued by Co-Operative Banks/ Financial Institutions shall not be accepted.
ii. The Bank Guarantees shall be as per prescribed formats.
iii. It is the responsibility of the bidder to get the Bank Guarantees revalidated/extended for the required period as per the advice of BHEL Site Engineer / Construction Manager. BHEL shall not be liable for issue of any reminders regarding expiry of the Bank Guarantees.
iv. In case extension/further extensions of any Bank Guarantees are not required, the bidders shall ensure that the same is explicitly endorsed by the Construction Manager and submitted to the Regional HQ issuing the LOI/LOA.
V In case the Bank Guarantees are not extended before the expiry date, BHEL reserves the right to invoke the same by informing the concerned Bank in writing, without any advance notice/communication to the concerned bidder.
Vi Bidders to note that any corrections to Bank Guarantees shall be done by the issuing Bank, only through an amendment in an appropriate non judicial stamp paper.
Vii The Original Bank Guarantee shall be submitted to contracting Department

1.11. VALIDITY OF OFFER

The rates in the Tender shall be kept open for acceptance for a minimum period of **SIX MONTHS** from latest due date of offer submission (including extension, if any). In case BHEL (Bharat Heavy Electricals Ltd) calls for negotiations, such negotiations shall not amount to cancellation or withdrawal of the original offer which shall be binding on the tenderers.

1.12. REJECTION OF TENDER AND OTHER CONDITIONS

1.12.1. The acceptance of tender will rest with BHEL which does not bind itself to accept the lowest tender nor any tender and reserves to itself full rights for the following without assigning any reasons whatsoever: -

a) To reject any or all of the tenders.
b) To split up the work amongst two or more tenderers as per NIT.
c) To award the work in part if specified in NIT.
d) In case of either of the contingencies stated in (b) and (c) above, the time for completion as stipulated in the tender shall be applicable.

1.12.2. Conditional tenders, unsolicited tenders, tenders which are incomplete or not in the form specified or defective or have been materially altered or not in accordance with the tender conditions, specifications etc. are liable to be rejected.

1.12.3. Tenders are liable to be rejected in case of unsatisfactory performance of the tenderer with BHEL or tenderer under suspension (debarred) by any unit / region / division of BHEL or

tenderers who do not comply with the latest guidelines of Ministry/Commissions of Govt of India. BHEL reserves the right to not consider a bidder for further processing of tender in case it is observed that they are overloaded and may not be in a position to execute this job as per the required schedule **in line with clause no. 9.0 of the 'NIT'**. The decision of BHEL will be final in this regard.

1.12.4. If a tenderer who is a proprietor expires after the submission of his tender or after the acceptance of his tender, BHEL may at their discretion, cancel such tender. If a partner of a firm expires after the submission of tender or after the acceptance of the tender, BHEL may then cancel such tender at their discretion, unless the firm retains its character. In case BHEL resolves to cancel the tender under this clause, BHEL will issue a notice in this regard containing reasons as to the cancellation of tender. The contractor shall be required to furnish his response to such notice within a period of 14 days from the date of receipt of such notice through any means (BHEL reserves the right to decrease the period upto 05 days). BHEL after due consideration of the representation made by contractor shall communicate its final decision within a reasonable period.

In case contractor fails to submit any response to the notice issued by BHEL within the period stipulated in the notice, BHEL at its discretion may proceed to cancel the contract.

Contractor shall not be eligible for any compensation whatsoever for the cancellation of contract under this clause

1.12.5. BHEL will not be bound by any Power of Attorney granted by changes in the composition of the firm made subsequent to the execution of the contract. BHEL may, however, recognize such power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor concerned.

1.12.6. If the tenderer deliberately gives wrong information in his tender, BHEL reserves the right to reject such tender at any stage or to cancel the contract if awarded and forfeit the Earnest Money/Security Deposit/any other money due.

1.12.7. Canvassing in any form in connection with the tenders submitted by the Tenderer shall make his offer liable to rejection.

1.12.8. In case the Proprietor, Partner or Director of the Company/Firm submitting the Tender, has any relative or relation employed in BHEL, the authority inviting the Tender shall be informed of the fact as per specified format, along with the Offer. Failing to do so, BHEL may, at its sole discretion, reject the tender or cancel the contract and forfeit the Earnest Money/Security Deposit.

1.12.9. The successful tenderer (Contractor) shall not sub-contract any portion of work detailed in the tender specification undertaken by him without written permission of BHEL's Construction Manager/Site in charge. BHEL, at its discretion, may consider the written request from the Contractor and permit subletting of part scope. However, the Contractor is solely responsible to BHEL for the work awarded to him.

1.12.10. The Tender submitted by a techno commercially qualified tenderer shall become the property of BHEL who shall be under no obligation to return the same to the bidder.

1.12.11. Unsolicited discount received after the due date and time of Bid Submission shall not be considered for evaluation. However, if the party who has submitted the unsolicited discount/rebate becomes the L-1 party, then the awarded price i.e. contract value shall be worked out after considering the discount so offered.

1.12.12. BHEL shall not be liable for any expenses incurred by the bidder in the preparation of the tender irrespective of whether the tender is accepted or not.

1.13. INTIMATION OF CHANGE OF NAME/ RE-CONSTITUTION OF THE ORGANIZATION

In the event of the organization (Proprietorship/Partnership/Company) undergoing any change of name or reconstitution, prior intimation of the same shall be given to BHEL. Upon such changes coming into effect, the same is to be intimated to BHEL immediately with supporting documents as applicable.

Further, the new entity has to give undertaking in writing that they will honor all the earlier commitments in respect of the subject contract.

CHAPTER -2

2.1. **DEFINITION:** The following terms shall have the meaning hereby assigned to them except where the context otherwise requires

i. BHEL shall mean Bharat Heavy Electricals Limited, a company registered under Indian Companies Act 1956, having its Registered Office at BHEL HOUSE, SIRI FORT, NEW DELHI – 110 049, and its CPC (Central Procurement Cell) -PSHQ (inviting tenders) or its Power Sector Regional Offices or its Authorized Officers or its Site Engineers or other employees authorized to deal with any matters with which these persons are concerned on its behalf.

ii. "EXECUTIVE DIRECTOR" or "GENERAL MANAGER (In- charge)" or "GENERAL MANAGER" shall mean the Officer in Administrative charge of the respective UNIT/Power Sector Region.

iii. "COMPETENT AUTHORITY" shall mean BHEL Officers who are empowered to act on behalf of BHEL.

iv. "ENGINEER" or "ENGINEER IN CHARGE" shall mean an Officer of BHEL as may be duly appointed and authorized by BHEL to act as "Engineer" on his behalf for the purpose of the Contract, to perform the duty set forth in this General Conditions of Contract and other Contract documents. The term also includes 'CONSTRUCTION MANAGER' or 'SITE INCHARGE' as well as Officers at Site or at the Headquarters of the respective Power Sector Regions.

v. "SITE" shall mean the places or place at which the plants/equipments are to be erected and services are to be performed as per the specification of this Tender.

vi. "CLIENT OF BHEL" or "CUSTOMER" shall mean the project authorities with whom BHEL has entered into a contract for supply of equipments or provision of services.

vii. "CONTRACTOR" shall mean the successful Bidder/Tenderer who is awarded the Contract and shall include the Contractor's successors, heirs, executors, administrators and permitted assigns.

viii. "CONTRACT" or "CONTRACT DOCUMENT" shall mean and includes the Agreement or Work Order, the accepted appendices of Rates, Schedules, Quantities if any, Offer submitted by contractor including acceptance to General Conditions of Contract, Special Conditions of Contract, Instructions to the Tenderers, Drawings, Technical Specifications, the Special Specifications if any, the Tender documents, subsequent amendments /corrigendum to Tender mutually agreed upon and the Letter of Intent/Award/Acceptance issued by BHEL. Any conditions or terms stipulated by the contractor in the tender documents or subsequent letters shall not form part of the contract unless, specifically accepted in writing by BHEL in the Letter of Intent/Award and incorporated in the agreement or amendment thereof.

ix. "GENERAL CONDITIONS OF CONTRACT" shall mean the 'Instructions to Tenderers' and 'General Conditions of Contract' pertaining to the work for which above tenders have been called for.

x. "TENDER SPECIFICATION" or "TENDER" or "TENDER DOCUMENTS" shall mean General Conditions, Common Conditions, Special Conditions, Price Bid, Rate Schedule, Technical Specifications, Appendices, Annexures, Corrigendums, Amendments, Forms, Procedures, Site information etc. and drawings/documents pertaining to the work for which the tenderers are required to submit their offers. Individual specification number will be assigned to each Tender Specification.

xi. "LETTER OF INTENT/ AWARD" shall mean the intimation by a Letter/Fax/email to the tenderer that the tender has been accepted in accordance with provisions contained in the letter. The responsibility of the contractor commences from the date of issue of this letter and all terms and conditions of the contract are applicable from this date.

xii. "COMPLETION TIME" shall mean the period by 'date/month' specified in the 'Letter of Intent/Award' or date mutually agreed upon for handing over of the intended scope of work, the erected equipment/plant which are found acceptable by the Engineer, being of required standard and conforming to the specifications of the Contract.

xiii. "PLANT" shall mean and connote the entire assembly of the plant and equipments covered by the contract.

xiv. "EQUIPMENT" shall mean equipment, machineries, materials, structural, electricals and other components of the plant covered by the contract.

xv. "TESTS" shall mean and include such test or tests to be carried out on the part of the contractor as are prescribed in the contract or considered necessary by BHEL in order to ascertain the quality, workmanship, performance and efficiency of the contractor or part thereof.

xvi. "APPROVED", "DIRECTED" or "INSTRUCTED" shall mean approved, directed or instructed by BHEL.

xvii. "WORK or CONTRACT WORK" shall mean and include supply of all categories of labour, specified consumables, tools and tackles and Plants required for complete and satisfactory site

transportation, handling, stacking, storing, erecting, testing and commissioning of the equipments to the entire satisfaction of BHEL.

xviii. "SINGULAR AND PLURALS ETC" words carrying singular number shall also include plural and vice versa, where the context so requires. Words imparting the masculine Gender shall be taken to include the feminine Gender and words imparting persons shall include any Company or Associations or Body of Individuals, whether incorporated or not.

xix. "HEADING" – The heading in these General Conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken as instructions thereof or of the contract.

xx. "MONTH" shall mean calendar month unless otherwise specified in the Tender.

xxi. 'Day' or 'Days' unless herein otherwise expressly defined shall mean calendar day or days of twenty-four (24) hours each. A Week shall mean continuous period of seven (7) days.

xxii. "COMMISSIONING" shall mean the synchronization testing and achieving functional operation of the Equipment with associated system after all initial adjustments, trials, cleaning, re-assembly required at site if any, have been completed and Equipment with associated system is ready for taking into service.

xxiii. "WRITING" shall include any manuscript type written or hand written or printed statement or electronically transmitted messages, under the signature or seal or transmittal of BHEL.

xxiv. "TEMPORARY WORK" shall mean all temporary works for every kind required in or for the execution, completion, maintenance of the work.

xxv. 'CONTRACT PRICE' or 'CONTRACT VALUE' shall mean the sum mentioned in the LOI/LOA/Contract Agreement subject to such additions thereto or deductions there from as may be made under provisions hereinafter contained.

xxvi. 'EXECUTED CONTRACT VALUE' shall mean actual value of works executed by the contractor and certified by BHEL. This value shall not include PVC, ORC, Extra Works and Taxes.

xxvii. "COMMENCEMENT DATE" or "START DATE" shall mean the commencement/start of work at Site as per terms defined in the Tender.

xxviii. "SHORT CLOSING" or "FORE CLOSING" of Contract shall mean the premature closing of Contract, for reasons not attributable to the contractor and mutually agreed between BHEL and the contractor.

xxix. "TERMINATION" of Contract shall mean the pre mature closing of contract due to reasons as mentioned in the contract.

xxx. "DE MOBILIZATION" shall mean the temporary winding up of Site establishment by Contractor leading to suspension of works temporarily for reasons not attributable to the contractor.

xxxi. "RE MOBILIZATION" shall mean the resumption of work with all resources required for the work after demobilization.

2.2. **LAW GOVERNING THE CONTRACT AND COURT JURISDICTION**

The contract shall be governed by the Laws of India. Subject to clause 2.21.1.1 of this contract, the Civil Court having original Civil Jurisdiction at Tiruchirappalli, shall alone have exclusive jurisdiction in regard to all matters in respect of the Contract.

2.3. **ISSUE OF NOTICE**

2.3.1. **Service of notice to the Contractor**

Any notice to be given to the Contractor under the terms of the contract shall be served by sending the same by **Email/ Registered Post/Speed Post to or leaving the same at** the Contractor's last known address of the principal place of business (or in the event of the contractor being a company, to or at its Registered Office). In case of change of address, the notice shall be served at changed address as notified in writing by the Contractor to BHEL. Such dispatch or display posting or leaving of the notice as the case may be shall be deemed to be good service of such notice and the time mentioned to the condition for doing any act after notice shall be reckoned from the date so mentioned in such notice.

2.3.2. **Service of notice to on BHEL**

Any notice to be given to BHEL In-charge of the Unit under the terms of the Contract shall be served by sending the same by Registered/AD or Speed post to BHEL address or changed address as notified in writing by BHEL to the Contractor.

2.4. **USE OF LAND**

No land belonging to BHEL or their Customer under temporary possession of BHEL shall be occupied by the contractor without written permission of BHEL.

2.5. **COMMENCEMENT OF WORK**

2.5.1. The contractor shall commence the work as per the time indicated in the Letter of Intent/Award from BHEL and shall proceed with the same with due expedition without delay.

2.5.2. If the contractor fails to start the work within stipulated time as per LOI/ LOA or as intimated by BHEL, then BHEL at its sole discretion shall have the right to cancel the contract. The Earnest Money and/or Security Deposit furnished by the contractor to under this tender will stand forfeited without any further reference to him and without prejudice to BHEL's other rights and remedies under this contract and the applicable laws in this regard.

2.5.3. All the work shall be carried out under the direction and to the satisfaction of BHEL.

2.6. **MEASUREMENT OF WORK AND MODE OF PAYMENT:**

2.6.1. All payments due to the contractors shall be made by e mode only, unless otherwise found operationally difficult for reasons to be recorded in writing

2.6.2. For progress running bill payments: - The Contractor shall present detailed measurement sheets in triplicate, duly indicating all relevant details based on technical documents and connected drawings for work done during the month/period under various categories in line with terms of payment as per contract. The basis of arriving at the quantities, weights shall be relevant documents and drawings released by BHEL. These measurement sheets shall be prepared jointly with BHEL Engineers and signed by both the parties.

2.6.3. These measurement sheets will be checked by BHEL Engineer and quantities and percentage eligible for payment under various groups shall be decided by BHEL Engineer. The abstract of quantities and percentage so arrived at based on the terms of payment shall be entered in Measurement Book and signed by both the parties.

2.6.4. Based on the above quantities, contractor shall prepare the bills, along with statutory documents, in prescribed format and work out the financial value. These will be entered in Measurement Book and signed by both the parties. Payment shall be made by BHEL after effecting the recoveries due from the contractor.

2.6.5. All recoveries due from the contractor for the month/period shall be effected in full from the corresponding running bills unless specific approval from the competent authorities is obtained to the contrary.

2.6.6. Measurement shall be restricted to that portion of work for which it is required to ascertain the financial liability of BHEL under this contract.

2.6.7. The measurement shall be taken jointly by persons authorized on the part of BHEL and by the Contractor.

2.6.8. The Contractor shall bear the expenditure involved if any, in making the measurements and testing of materials to be used/ used in the work. The contractor shall, without extra charges, provide all the assistance with appliances and other things necessary for measurement.

2.6.9. If at any time due to any reason whatsoever, it becomes necessary to re-measure the work done in full or in part, the expenses towards such re measurements shall be borne by the contractor unless such re measurements are warranted solely for reasons not attributable to contractor.

2.6.10. Passing of bills covered by such measurements does not amount to acceptance of the completion of the work measured. Any left out work has to be completed, if pointed out at a later date by BHEL.

Final measurement bill shall be prepared in the final bill format prescribed for the purpose based on the certificate issued by BHEL Engineer that entire works as stipulated in tender specification has been completed in all respects to the entire satisfaction of BHEL. The Contractor shall submit the final bill in line with WAM 7 format as per tender documents with an additional recording of the dispute, if any and shall sign with the following declaration:

I/ We hereby certify that I/We have performed the work as per the terms and conditions of Contract Agreement/Work Order No……. dated……for which payment is claimed as above and that I/We have no further claim under this agreement/work order* except for the following (nature of claim with details & amount claimed, if any. NIL may be mentioned if there are no further claims). –

a) …….

b) ……

c) …….

Place:
Date:

Signature of Authorized Signatory
with seal & full address

It is agreed that the authorized signatory of Contractor shall necessarily record his claims/ dispute in Form WAM 7 only and any claim(s)/ dispute in any other form/ letter shall not be taken cognizance of by BHEL and admissible before any forum. BHEL shall make the payment of undisputed amount within the stipulated time without any unreasonable delay.

All the tools and tackles loaned to him should be returned in satisfactory condition to BHEL. The abstract of final quantities and financial values shall also be entered in the Measurement Books and signed by both parties to the contract. The Final Bill shall be prepared and paid within a reasonable time after completion of work.

2.7. **RIGHTS OF BHEL**

BHEL reserves the following rights in respect of this contract during the original contract period or its extensions if any, as per the provisions of the contract, without entitling the contractor for any compensation.

2.7.1. To withdraw any portion of work and/or to restrict/alter quantum of work as indicated in the contract during the progress of work and get it done through other agencies to fulfil BHEL's commitment to its customer or the date of completion is advance due to other emergent reasons/ BHEL's obligation to its customer.

In case of inadequate manpower deployed by the, BHEL reserves the right to deploy manpower to meet such shortfall, through any other agency for expediting activities in the interest of the project. Supplied manpower shall be put on job by the contractor and payments and other statutory compliances related to such manpower shall be the contractor's responsibility. In case of contractor's failure to fulfill his obligations in respect of such manpower, BHEL reserves the right to take necessary action as per contract conditions.

2.7.2 BREACH OF CONTRACT, REMEDIES AND TERMINATION

BHEL shall notify the contractor by way of 14 days' notice to rectify/improve the breaches mentioned herein within the time prescribed in the said notice. If the contractor fails to rectify/improve the breaches with the stipulated time period, then terms of the contract shall be considered to have been breached. In that Case BHEL shall have the right to terminate the contract in any of the following breaches:

i) Contractor's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor including unexecuted portion of work does not appear to be executable within balance available period considering its performance of execution.

ii) Withdrawal from or abandonment of the work by contractor before completion of the work as per contract.

iii) Non-completion of work by the Contractor within scheduled completion period as per Contract or as extended from time to time, for the reasons attributable to the contractor.

iv) Repeated failure of contractor in deploying the required resources, to comply the statutory requirements etc. even after given by BHEL in writing.
v) Strike or Lockout declared is not settled within a period of one month.
vi) Termination of Contract on account of any other reason (s) attributable to Contractor.
vii) Assignment, transfer, subletting of Contract without BHEL's written permission.
viii) Non-compliance to any contractual condition or any other default attributable to Contractor.

LD against delay in executed work in case of Termination of Contract:

LD against delay in executed work shall be calculated in line with LD clause no. 2.7.9 of GCC, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of "LD against delay in executed work in case of termination of contract" is given below.

i. Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1
ii. Let the value of executed work till the time of termination of contract= X
iii. Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y
iv. Delay in executed work attributable to contractor i.e. T2=[1-(X/Y)] x T1
v. LD shall be calculated in line with LD clause (clause 2.7.9) of the Contract for the delay attributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

2.7.2.1 **Remedies in case of Breach of Contract**.

i. Wherein the period as stipulated in the notice issued under clause 14.1 has expired and Contractor has failed to remedy the breach, BHEL will have the right to terminate the contract on the ground of "Breach of Contract" without any further notice to contractor.
ii. Upon termination of contract, BHEL shall be entitled to recover an amount equivalent to 10% of the Contract Value for the damages on account of breach of contract committed by the Contractor. This amount shall be recovered by way of encashing the security instruments like performance bank guarantee etc available with BHEL against the said contract. In case the value of the security instruments available is less than 10% of the contract value, the balance amount shall be recovered from other financial remedies (i.e. available bills of the contractor, retention amount, from the money due to the Contractor etc. with BHEL) or the other legal remedies shall be pursued.
iii. wherever the value of security instruments like performance bank guarantee available with BHEL against the said contract is 10% of the contract value or more, such security instruments to the extent of 10% contract value will be encashed. In case no security instruments are available or the value of the security instruments available is less than 10%

of the contract value, the 10% of the contract value or the balance amount, as the case may be, will be recovered in all or any of the following manners:

iv. In case the amount recovered under sub clause (a) above is not sufficient to fulfil the amount recoverable then; a demand notice to deposit the balance amount within 30 days shall be issued to Contractor.

v. If Contractor fails to deposit the balance amount within the period as prescribed in demand notice, following action shall be taken for recovery of the balance amount:
   a. from dues available in the form of Bills payable to defaulted Contractor against the same contract.
   b. If it is not possible to recover the dues available from the same contract or dues are insufficient to meet the recoverable amount, balance amount shall be recovered from any money(s) payable to Contractor under any contract with other Units of BHEL including recovery from security deposits or any other deposit available in the form of security instruments of any kind against Security deposit or EMD.
   c. In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against defaulted Contractor.

vi. It is an agreed term of contract that this amount shall be a genuine pre-estimate of damages that BHEL would incur in completion of balance contractual obligation of the contract through any other agency and BHEL will not be required to furnish any other evidence to the Contractor for the purpose of estimation of damages.

vii. In addition to the above, imposition of liquidated damages, debarment, termination, de-scoping, short-closure, etc., shall be applied as per provisions of the contract.

Note:

1) The defaulting contractor shall not be eligible for participation in any of the future enquiries floated by BHEL to complete the balance work. The defaulting contractor shall mean and include:
   (a) In case defaulted contractor is the Sole Proprietorship Firm, any Sole Proprietorship Firm owned by same Sole Proprietor.
   (b) In case defaulted contractor is The Partnership Firm, any firm comprising of same partners/ some of the same partners (but not including any new partner); or sole proprietorship firm owned by any partner(s) as a sole proprietor.

2.7.2. In case Contractor fails to deploy the resources as per requirement informed by BHEL in writing to expedite the work, BHEL can deploy own/hired/otherwise arranged resources and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads or as defined in TCC.

2.7.3. To terminate the contract or to restrict the quantum of work and pay for the portion of work executed in case BHEL's contract with their customer are terminated for any reason, whatsoever.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

2.7.4. Whenever any Claim or Claims for payment of any sum of money(s) arises under this or any other contract against the contractor, BHEL shall be entitled to withhold and also have a lien to retain such sum of money(s) in whole or in part from any money(s) payable to contractor and/or security deposits furnished or deducted in cash from the bills of contractor, (if any) under this contract. In the event of the securities or the amounts payable to Contractor, being insufficient to cover BHEL claims, then BHEL shall be entitled to withhold and have a lien to the extent of such claims from any sum or sums found payable or which at any time thereafter may become payable to the contractor under this or any other contract with BHEL.

a) Claim or Claims for payment of any sum of money(s) arising from the Contractor under this or any other contract against the contractor, shall mean, the sum of money(s) actually incurred by BHEL in fulfilling the contractual responsibilities of contractor under the contract, to which he has failed to fulfil plus applicable overheads (@ 5%) along with interest as applicable under the Contract on total amount (i.e. money actually incurred plus overheads)

b) It is an agreed term of the contract that, the sum or sums of money so withheld or retained under the lien by BHEL will be kept withheld or retained as such by BHEL till the claims arising out of this or any other contract are finally adjudicated wither through Arbitration or a Court of competent jurisdiction as the case may be in accordance with the terms of contract. Intimation given by the BHEL Engineer regarding withholding of such money(s) shall be considered as sufficient and relevant date for all purposes. No Interest shall be payable on such sum(s) of money which becomes due or as the case may be adjudged to be due from BHEL to Contractor, whether under contract or otherwise.

c) Where the contractor is a partnership firm, BHEL shall be entitled to withhold and also have a lien to retain towards such claims in whole or in part, from any other money(s) payable to any partner, whether in his individual capacity or otherwise.

d) If any money(s) shall, as a result of any claim or application made under the relevant provisions of any Labour Welfare Act and/ or Rules, including but not limited to Contract Labour Regulation & Abolition Act, Minimum Wages Act, Payment of Gratuity Act, BOCW (RE&CS) Act, Provident Fund Act, Employee State Insurance Act, be directed to be paid by the BHEL, such money shall be deemed to be moneys payable to the BHEL by the Contractor.

e) Where the Contractor fails to repay to BHEL such moneys along with applicable overheads (@ 5%) and interest, as aforesaid within seven days of being demanded, BHEL shall be entitled to recover the same from Contractor's bills/ Security Deposit or any other money(s) payable to Contractor under this Contract or any other Contract with BHEL.

2.7.5. While every endeavor will be made by BHEL to this end, yet BHEL cannot guarantee uninterrupted work due to conditions beyond its control. The Contractor will not be normally entitled for any

compensation/extra payment on this account unless otherwise specified elsewhere in the contract.

2.7.6. BHEL may permit or direct contractor to demobilize and remobilize at a future date as intimated by BHEL in case of following situations for reasons other than Force majeure conditions and not attributable to contractor:

i. suspension of work(s) at a Project either by BHEL or Customer,
or
ii. where work comes to a complete halt or reaches a stage wherein worthwhile works cannot be executed and there is no possibility of commencement of work for a period of not less than three months

In such cases, charges towards demobilization and remobilization shall be as decided by BHEL after successful remobilization by contractor at site, and decision of BHEL shall be final and binding on the contractor. After remobilization, all conditions as per contract shall become applicable. In case Contractor does not remobilize with adequate resources or does not start the work within the period as intimated, then BHEL reserves the right to terminate the contract and effect remedies under Clause 2.7.2.1. In case of any conflict, BHEL decision in this regard shall be final and binding on the contractor.

2.7.7. In the unforeseen event of inordinate delay in receipt of materials, drawings, fronts etc. due to which inordinate discontinuity of work is anticipated, BHEL on its own or contractor's request at its discretion may consider to short close the contract in any of the following cases:

a) The balance works (including but not limited to Trial Operation, PG Test etc.) are minor vis a vis the scope of work envisaged as per the contract.
b) There has been no significant work in past 6 months OR no significant work is expected in next 6 months (example in Hydro projects or in projects where work has stopped due to reasons beyond the control of BHEL).
c) The balance works cannot be done within a reasonable period of time as they are dependent on unit shut down or on other facilities of customer or any other such reasons not attributable to the contractor.

At the point of requesting for short closure, contractor shall establish that he has completed all works possible of completion and he is not able to proceed with the balance works due to constraints beyond his control. In such a case, the estimated value of the unexecuted portion of work (or estimated value of services to be provided for carrying out milestone/stage payments like Trial Operation/PG Test etc.) as decided by BHEL, shall however be reduced from the final contract value.

Note: The Contractor shall not be eligible for any compensation on account of Quantity Variation arising out of short-closure of contract as per clause no. 2.7.8 (b) above.

2.7.8. **LIQUIDATED DAMAGES**

Liquidated Damages, wherever referred under this Tender/Agreement, shall mean and refer to the damages, not in the nature of penalty, which the contractor agrees to pay in the event of delay in delivery of stores, installation, commissioning, breach of contract etc. as the case may be.

Liquidated Damages leviable upon the contractor is a sum which is agreed by the parties as a reasonable and genuine pre-estimate of damages which will be suffered by BHEL on account of delay/breach on the part of the contractor.

Liquidated Damages shall be calculated in the manner stipulated hereinafter:

In case the work is not completed within the stipulated time period, BHEL at its discretion may grant provisional time extension to contractor for the sole purpose of completion of balance works keeping its right reserved under the contract and law.

Grant of any provisional time extension shall by no means be considered as waiver of BHEL rights under the contract or law.

After the completion of work, duly certified by Engineer Incharge, a comprehensive delay analysis shall be carried out to ascertain the attribution of delays in the provisional time extensions granted to contractor. The delay analysis shall record:

a) Delays solely attributable to contractor
b) Delays attributable to BHEL
c) Delays on account of Force Majeure (as specified elsewhere in the contract)

The total period under the final time extension shall be equal to the period between the scheduled date of completion and the actual date of completion of contract. LD shall be imposed/ levied for the portion of time

extensions solely attributable to contractor and recoverable from the dues payable to the contractor.

For the periods, wherein the delay as per the comprehensive delay analysis carried out is solely attributable to contractor, BHEL shall have the right to impose Liquidated Damage at the rate of 0.5% of the contract value, per week of delay or part thereof subject to a maximum of 10% of the contract value.

Contract Value for this purpose, shall be the final executed value exclusive of ORC, Extra Works executed on Man-day rate basis, Supplementary/ Additional Items and PVC. Before levying LD, the contractor shall be duly intimated the amount and reasons thereof for imposition of LD.

2.7.9 If at any time after the award of contract, BHEL shall for any reason whatsoever not require whole or any part of the work to be carried out, the HOD/Contracts Dept. or his authorized representative, shall give notice in writing of the fact to the Contractor who shall have no claim to any payment of compensation or otherwise howsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of the fore-closing of the work.

2.8. **RESPONSIBILITIES OF THE CONTRACTOR IN RESPECT OF LOCAL LAWS, EMPLOYMENT OF WORKERS ETC.**

The following are the responsibilities of the contractor in respect of observance of local laws, employment of personnel, payment of taxes etc. The subcontractor shall fully indemnify BHEL against any claims of whatsoever nature arising due to the failure of the contractor in discharging any of his responsibilities hereunder:

2.8.2. As far as possible, Unskilled Workers shall be engaged from the local areas in which the work is being executed.

2.8.3. The contractor at all times during the continuance of this contract shall, in all his dealings with local labour for the time being employed on or in connection with the work, have due regard to all local festivals and religious and other customs.

2.8.4. The contractor shall comply with all applicable State and Central Laws, Statutory Rules, Regulations, Notifications etc. such as Payment of Wages Act, Minimum Wages Act, Workmen Compensation Act, Employer's Liability Act, Industrial Disputes Act, Employers Provident Fund and Miscellaneous Provisions Act, 1952, Employees State Insurance Scheme, Contract Labour (Regulation and Abolition) Act, 1970, Payment of Bonus & Gratuity Act, Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996, The Building and Other Construction Workers' Welfare Cess Act 1996 and other Acts, Rules, and Regulations for labour/workers as applicable and as may be enacted by the State Government and Central Govt. during the tenure of the Contract and having force or jurisdiction at Site. The Contractor shall also comply with provisions of and give all such notices to the local Governing Body, Police and other relevant Authorities as may be required by the Law.

2.8.5. The Contractor shall obtain independent License under the Contract Labour (Regulations and Abolition) Act, 1970 for engaging contract labour as required from the concerned Authorities based on the certificate (Form- V or as applicable) issued by the Principal Employer/Customer.

2.8.6. The contractor shall pay and bear all taxes, fees, license charges, Cess, duties, deposits, tolls, royalties, commission or other charges which may be leviable on account of his operations in executing the contract.

2.8.7. While BHEL would pay the inspection fees and Registration fees of Boiler/Electrical Inspectorate, all other arrangements for site visits periodically by the Inspectorate to site, Inspection certificate etc. will have to be made by contractor. However, BHEL will not make any payment to the Inspectorate in connection with contractor's Welders/Electricians qualification tests etc.

2.8.8. Contractor shall be responsible for provision of Health and Sanitary arrangements (more particularly described in Contract Labour Regulation & Abolition Act), Safety precautions etc. as may be required for safe and satisfactory execution of contract.

2.8.9. The contractor shall be responsible for proper accommodation including adequate medical facilities for personnel employed by him.

2.8.10. The contractor shall be responsible for the proper behaviour and observance of all regulations by the staff employed by him.

2.8.11. The contractor shall ensure that no damage is caused to any person/property of other parties working at site/company" premises. If any such damage is caused, it is responsibility of the contractor to make good the losses or compensate for the same.

2.8.12. All the properties/equipments/components of BHEL/their Client loaned with or without deposit to the contractor in connection with the contract shall remain properties of BHEL/their Client

2.8.13. The contractor shall use such properties for the purpose of execution of this contract. All such properties/equipments/components shall be deemed to be in good condition when received by the contractor unless he notifies within 48 hours to the contrary. The contractor shall return them in good condition as and when required by BHEL/their Client. In case of non-return, loss, damage, repairs etc. the cost thereof as may be fixed by BHEL Engineer will be recovered from the contractor.

2.8.14. In case the contractor is required to undertake any work outside the scope of this contract, the rates payable shall be those mutually agreed upon if the item rates are not mentioned in existing contract.

2.8.15. Any delay in completion of works/or non-achievement of periodical targets/or non-execution of contract due to the reasons attributable to the contractor, the same may have to be compensated by the contractor either by increasing manpower and resources or by working extra hours and/or by working more than one shift. All these are to be carried out by the contractor at no extra cost.

2.8.16. The contractor shall arrange, coordinate his work in such a manner as to cause no hindrance to other agencies working in the same premises.

2.8.17. All safety rules and codes applied by the Customer /BHEL at site shall be observed by the contractor without exception. The contractor shall be responsible for the safety of the equipment/material and works to be performed by him and shall maintain all light, fencing guards, slings etc. or other protection necessary for the purpose. Contractor shall also take such additional precautions as may be indicated from time to time by the Engineer with a view to prevent pilferage, accidents, fire hazards. Due precautions shall be taken against fire hazards and atmospheric conditions. Suitable number of Clerical staff, watch and ward, store keepers to take care of equipment/materials and construction tools and tackles shall be posted at site by the contractor till the completion of work under this contract.

The contractor shall arrange for such safety devices as are necessary for such type of work and carry out the requisite site tests of handling equipment, lifting tools, tackles etc. as per prescribed standards and practices.

Contractor has to ensure the implementation of Health, Safety and Environment (HSE) requirements as per directions given by BHEL/Customer. The contractor has to assist in HSE audit by BHEL/Customer and submit compliance Report. The contractor has to generate and submit record/reports as per HSE plan/activities as per instruction of BHEL/Customer.

2.8.18. The contractor shall be directly responsible for payment of wages to his workmen/labours before the expiry of seven days from the last day of wage period and to ensure disbursement of wages in the presence of the representative from BHEL. As a precautionary measure to avoid any delay beyond 07th for payment of wages, the contractor may pay the wages within 05 days (05th) of next month. A pay roll sheet giving all the payments given to the workers and duly signed by the contractor's representative should be furnished to BHEL site for the purpose of maintaining the records for compliance,

Contractor shall create awareness amongst their workforce by helping & encouraging in opening bank accounts and to encourage them to adopt digital mode of transactions. While releasing wages/ salary to their workers/ supervisors/ staff, Contractor shall comply with the GOI's guidelines for maximizing such transactions through Non-Cash / digital means.

2.8.19. In case of any class of work for which there is no such specification as laid down in the contract, such work shall be carried out in accordance with the instructions and requirements of the Engineer.

2.8.20. Also, no idle charges will be admissible in the event of any stoppage caused in the work resulting in contractor's labour and Tools & Plants being rendered idle due to any reason at any time.

2.8.21. The contractor shall take all reasonable care to protect the materials and work till such time the plant/equipment has been taken over by BHEL or their Customer whichever is earlier.

2.8.22. The contractor shall not stop the work or abandon the site for whatsoever reason of dispute, excepting force majeure conditions. All such problems/disputes shall be separately discussed and settled without affecting the progress of work. Such stoppage or abandonment shall be treated as breach of contract and dealt with accordingly.

2.8.23. The contractor shall keep the area of work clean and shall remove the debris etc. while executing day-to-day work. Upon completion of work, the contractor shall remove from the vicinity of work, all scrap, packing materials, rubbish, unused and other materials and deposit them in places specified by the Engineer. The contractor will also demolish all the hutments, sheds, offices etc. constructed and used by him and shall clean the debris. In the event of his failure to do so, the same will be arranged to be done by the Engineer and the expenses recovered from the contractor.

2.8.24. The contractor shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work and timely execution shall be the essence of this contract. The contractor shall be responsible to ensure that the quality, assembly and workmanship conform to the dimensions and clearance given in the drawings and/ or as per the instructions of the Engineer.

2.8.25. The Contractor to note that some of BHEL's T&Ps/MMDs may not be insured. The Contractor will take necessary precautions and due care to protect the same while in his custody from any damage/ loss till the same is handed over back to BHEL. In case the damage / loss is caused due to carelessness/ negligence on the part of the contractor, the Contractor is liable to get them repair/

replaced immediately and in case of his failure to do so within a reasonable time, BHEL shall lto recover the loss from the contractor.

2.8.26. For all works having contract value of Rs. 5,00,000/- or above, BHEL shall recover the amount of compensation paid to victim(s) by BHEL towards loss of life/ permanent disability due to an accident which is attributable to the negligence of contractor, agency or firm or any of its employees as detailed below.

a) Victim: Any person who suffers permanent disablement or dies in an accident as defined below.
b) Accident: Any death or permanent disability resulting solely and directly from any unintended and unforeseen injurious occurrence caused during the manufacturing/ operation and works incidental thereto at BHEL factories/ offices and precincts thereof, project execution, erection and commissioning, services, repairs and maintenance, trouble shooting, serving, overhaul, renovation and retrofitting, trial operation, performance guarantee testing undertaken by the company or during any works/ during working at BHEL Units/ Offices/ townships and premises/ Project Sites.
c) Compensation in respect of each of the victims:
    i. In the event of death or permanent disability resulting from Loss of both limbs: Rs. 10,00,000/- (Rs. Ten Lakh).
    ii. In the event of other permanent disability: Rs.7,00,000/- (Rs. Seven Lakh)
d) Permanent Disablement: A disablement that is classified as a permanent total disablement under the proviso to section 2 (I) of the Employee's Compensation Act, 1923.

2.8.27. Contractor shall be fully responsible for the safety of their T&Ps and other material mobilized at site. In any case, BHEL shall not be liable for any damage/loss/misuse of any item(s) belong to the contractor.

2.8.28. Contractor will ensure that the work/job is executed through his/her employees on and under no circumstances, the contractor shall subcontract the job without prior written permission from BHEL.

2.8.29. The liability for any compensation on account of injury sustained by an employee of the contractor will be exclusively that of the contractor.

2.9. **EXECUTION PLAN, PROGRESS MONITORING, MONTHLY REVIEW AND PERFORMANCE EVALUATION**

2.9.2. A tentative plan/ programme for completion of the contractual scope of work as per the time schedule given in the contract shall be made jointly by BHEL and Contractor, before commencement of work. The above programme shall be supported by month wise deployment of resources viz Manpower, T&P, Consumables, etc. Progress will be reviewed periodically (Daily/Weekly/Monthly) vis-à-vis this jointly agreed programme.

Subsequently, every month, quarterly rolling plan will be made by BHEL based on budgeted targets.

Monthly plan in F-14 format shall be drawn from this Quarterly plan. Monthly plan shall necessarily include activities required for achieving targets/ milestones unless inputs/ fronts are not available. While planning and arriving on asking rate all available inputs shall be taken into consideration.

Vendor will be required to execute the monthly plan in that month in addition to make full efforts to minimize the cumulative shortfall attributable to him up to the month.

BHEL may require monthly work plan up to one and half times of average monthly value and demand matching manpower.

Where, Average Monthly Value = Total Contract Value (as per latest revision) / Period of Contract (in months)

Provided, this requirement is reflected in the rolling quarterly plan two months in advance.

If the Contractor refuses to sign the F-14 format, those F-14 formats requiring Contractor's signature shall be deemed to have been signed and accepted by the Contractor, if communicated to the Contractor through email or any other mode as stated in clause 2.3.1.

The Contractor shall submit periodical progress reports (Daily/Weekly/Monthly) and other reports/information including manpower, consumables, T&P mobilization etc. as desired by BHEL.

2.9.3. Monthly progress review between BHEL and Contractor shall be based on the agreed programme as above, availability of inputs/fronts etc., and constraints if any, as per prescribed formats (i.e. Form F-14). Manpower, T&P and consumable reports as per prescribed formats shall be submitted by contractor every month. Release of RA Bills shall be contingent upon certification by BHEL Site Engineer of the availability of the above prescribed formats duly filled in and signed.

2.9.4. The burden of proof that the causes leading to any shortfall is not due to any reasons attributable to the contractor is on the contractor himself. The monthly progress review shall record shortfalls attributable to (i) Contractor, (ii) Force Majeure Conditions, and (iii) BHEL

2.9.5. Performance of the Contractor shall be assessed as per prescribed formats and shall form the basis for 'Assessment of Capacity of Bidder' for Tenders where the Contractor is a bidder. BHEL reserves the right to revise the evaluation formats during the course of execution of the works.

2.10. **TIME OF COMPLETION**

2.10.2. The time for completion shall be as mentioned in the LOA/Contract. The time for completion shall be reckoned from the date of commencement of work at Site as certified/notified in writing by BHEL Engineers.

2.10.3. Time being the essence of the contract, the entire work shall be completed by the contractor within the time schedule or within such extended periods of time as may be allowed by BHEL under clause 2.11.

2.11. **EXTENSION OF TIME FOR COMPLETION**

2.11.2. If the completion of work as detailed in the scope of work gets delayed beyond the contract period, the contractor shall request for an extension of the contract and BHEL at its discretion may extend the Contract. If the completion of work gets delayed for reasons not attributable to the contractor, the contract period may be suitably extended at the sole discretion of BHEL.

2.11.3. Based on the F-14 formats, the works balance at the end of original contract period less the backlog attributable to the contractor shall be quantified, and the number of months of 'Time extension' required for completion of the same shall be jointly worked out. Within this period of 'Time extension', the contractor is bound to complete the portion of backlog attributable to the contractor. Any further 'Time extension' or 'Time extensions' at the end of the previous extension shall be worked out similarly.

2.11.4. However, if any 'Time extension' is granted to the contractor to facilitate continuation of work and completion of contract, due to backlog attributable to the contractor alone, then it shall be without prejudice to the rights of BHEL to impose penalty/LD for the delays attributable to the contractor, in addition to any other actions BHEL may wish to take under Clause 2.7.2 of GCC i.e. Breach of Contract, Remedies and Termination.

2.11.5. Planning, progress monitoring, monthly review and performance monitoring shall be carried out as per clause 2.9 of GCC.

2.12. **INSURANCE**

2.12.2. BHEL/their customer shall arrange for insuring the materials/properties of BHEL/customer covering the risks during transit, storage, erection and commissioning.

2.12.3. It is the sole responsibility of the contractor to insure his materials, equipment, workmen etc. against accidents and injury while at work and to pay compensation, if any, to workmen as per Workmen's compensation Act. The work will be carried out in a protected area and all the rules and regulations of the client /BHEL in the area of project which are in force from time to time will have to be followed by the contractor.

2.12.4. If due to negligence and or non-observation of safety and other precautions by the contractors, any accident/injury occurs to the property / manpower belong to third party, the contractor shall have to pay necessary compensation and other expense, if so decided by the appropriate authorities.

2.12.5. The contractor will take necessary precautions and due care to protect the material, while in his custody from any damage/ loss due to theft or otherwise till the same is taken over by BHEL or customer. For lodging / processing of insurance claim, the contractor will submit necessary documents. BHEL will recover the loss including the deductible franchise from the contractor, in case the damage / loss is due to carelessness / negligence on the part of the contractor. In case of any theft of material under contractor's custody, matter shall be reported to Police by the contractor immediately and copy of FIR and subsequently police investigation report shall be submitted to BHEL for taking up with insurance. However, this will not relieve the contractor of his contractual obligation for the material in his custody.

2.13. **STRIKES & LOCKOUT**

2.13.2. The contractor will be fully responsible for all disputes and other issues connected with his labour. In the event of the contractor's labour resorting to strike or the Contractor resorting to lockout and if the strike or lockout declared is not settled within a period of one month, it may be

considered as 'Breach of Contract' under Clause 2.7 and the remedies under Clause 2.7.2.1 may be executed, at the discretion of BHEL.

For all purposes whatsoever, the employees of the contractor shall not be deemed to be in the employment of BHEL.

2.14. **FORCE MAJEURE**

2.14.2. "Force Majeure" shall mean circumstance which is:

a) beyond control of either of the parties to contract,
b) either of the parties could not reasonably have provided against the event before entering into the contract,
c) having arisen, either of the parties could not reasonably have avoided or overcome, and
d) is not substantially attributable to either of the parties

And

Prevents the performance of the contract,

Such circumstances include but shall not be limited to:

i. War, hostilities, invasion, act of foreign enemies.
ii. Rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war.
iii. Riot, commotion or disorder by persons other than the contractor's personnel and other employees of the contractor and sub-contractors.
iv. Strike or lockout not solely involving the contractor's personnel and other employees of the contractor and sub-contractors.
v. Encountering munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the contractor's use of such munitions, explosives, radiation or radio- activity.
vi. Natural catastrophes such as earthquake, tsunami, volcanic activity, hurricane or typhoon, flood, fire, cyclones etc.
vii. Epidemic, pandemic etc.

2.14.3. The following events are explicitly excluded from Force Majeure and are solely the responsibilities of the non-performing party: a) any strike, work-to-rule action, go-slow or similar labour difficulty (b) late delivery of equipment or material (unless caused by Force Majeure event) and (c) economic hardship.

2.14.4. If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 15 (fifteen) days after the occurrence of such event.

2.14.5. The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or

delayed. The Time for Completion shall be extended by a period of time equal to period of delay caused due to such Force Majeure event.

2.14.6. Delay or non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall not

a) Constitute a default or breach of the Contract.
b) Give rise to any claim for damages or additional cost expense occasioned thereby, if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.

2.14.7. BHEL at its discretion may consider short closure of contract after 1 year of imposition of Force Majeure in line with extant guidelines. In any case, Supplier/Vendor cannot consider deemed short-closure after 1 year of imposition of Force Majeure

2.15. **Settlement of Dispute**

If any dispute or difference of any kind whatsoever shall arise between BHEL and the Supplier/Vendor, arising out of the contract for the performance of the work whether during the progress of contract termination, abandonment or breach of the contract, it shall in the first place referred to Designated Engineer for amicable resolution by the parties. Designated Engineer (to be nominated by BHEL for settlement of disputes arising out of the contract) who within 60 days after being requested shall give written notice of his decision to the contractor. Save as hereinafter provided, such decision in respect of every matter so referred shall forthwith be given effect to by the Supplier/Vendor who shall proceed with the work with all due diligence, whether he or BHEL desires to resolve the dispute as hereinafter provided or not.

If after the Designated Engineer has given written notice of this decision to the party and no intention to pursue the dispute has been communicated to him by the affected party within 30 days from the receipt of such notice, the said decision shall become final and binding on the parties. In the event the Supplier/Vendor being dissatisfied with any such decision or if amicable settlement cannot be reached then all such disputed issues shall be resolved through conciliation in terms of the BHEL Conciliation Scheme 2018 as per Clause 2.15.1

2.15.2. **CONCILIATION**

Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the “Dispute”) shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure as per BHEL Conciliation Scheme 2018. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in - “Procedure for conduct of conciliation proceedings” (as available in www.bhel.com)).

2.15.3. **ARBITRATION:**

2.15.2.1. Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided in Clause 14.1 herein above or

otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or. in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, refer the disputes to **Madras High Court, Arbitration Centre (MHCAC)**and such dispute to be adjudicated by Sole Arbitrator appointed in accordance with the Rules of said Arbitral Institution.

2.15.2.2. A party willing to commence arbitration proceeding shall invoke Arbitration Clause by giving notice to the other party in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice') before referring the matter to arbitral institution. The Notice shall be addressed to the Head of the Unit, BHEL, executing the Contract and shall contain the particulars of all claims to be referred to arbitration with sufficient detail and shall also indicate the monetary amount of such claim including interest, if any.

2.15.2.3. After expiry of 30 days from the date of receipt of aforesaid notice, the party invoking the Arbitration shall submit that dispute to the Arbitral Institution- **Madras High Court, Arbitration Centre (MHCAC)**- and that dispute shall be adjudicated in accordance with their respective Arbitration Rules. The matter shall be adjudicated by a Sole Arbitrator who shall necessarily be a Retd Judge having considerable experience in commercial matters to be appointed/nominated by the respective institution. The cost/expenses pertaining to the said Arbitration shall also be governed in accordance with the Rules of the respective Arbitral Institution. The decision of the party invoking the Arbitration for reference of dispute to **Madras High Court, Arbitration Centre (MHCAC)**- for adjudication of that dispute shall be final and binding on both the parties and shall not be subject to any change thereafter. The institution once selected at the time of invocation of dispute shall remain unchanged.

2.15.2.4. The fee and expenses shall be borne by the parties as per the Arbitral Institutional rules.

2.15.2.5. The Arbitration proceedings shall be in English language and the seat of Arbitration shall be Trichy.

2.15.2.6. Subject to the above, the provisions of Arbitration & Conciliation Act 1996 and any amendment thereof shall be applicable. All matters relating to this Contract and arising out of invocation of Arbitration clause are subject to the exclusive jurisdiction of the Court(s) situated at **Trichy**.

2.15.2.7. Notwithstanding any reference to the Designated Engineer or Conciliation or Arbitration herein, a. the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree. Settlement of Dispute clause cannot be invoked by the Contractor, if the Contract has been mutually closed or 'No Demand Certificate' has been furnished by the Contractor or any Settlement Agreement has been signed between the Employer and the Contractor.

2.15.2.8. It is agreed that Mechanism of resolution of disputes through arbitration shall be available only in the cases where the value of the dispute is less than Rs. 10 Crores.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

2.15.2.9. In case the disputed amount Claim, Counter claim including interest is Rs. 10 crores and above, the parties shall be within their rights to take recourse to remedies other than Arbitration, as may be available to them under the applicable laws after prior intimation to the other party. Subject to the aforesaid conditions, provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications or re-enactment thereof as amended from time to time, shall apply to the arbitration proceedings under this clause.

2.15.2.10. In case, multiple arbitrations are invoked (whether sub-judice or arbitral award passed) by any party to under this contract, then the cumulative value of claims (including interest claimed or awarded) in all such arbitrations shall be taken in account while arriving at the total claim in dispute for the subject contract for the purpose of clause 14.2.9. Disputes having cumulative value of less than 10 crores shall be resolved through arbitration and any additional dispute shall be adjudicated by the court of competent jurisdiction.

2.15.2.11. In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 05/0003/2019-FTS-10937 dated 14-12-2022 as amended from time to time.

2.15.4. **NO INTEREST PAYABLE TO CONTRACTOR**

Notwithstanding anything to the contrary contained in any other document comprising in the Contract, no interest shall be payable by BHEL to Contractor on any moneys or balances including but not limited to the Security Deposit, EMD, Retention Money, RA Bills or the Final Bill, or any amount withheld and/or appropriated by BHEL. etc., which becomes or as the case may be, is adjudged to be due from BHEL to Contractor whether under the Contract or otherwise.

2.15.5. **Final Bill**

Final Bill' is used for final payment on closing of Running Account for works or for single payment after completion of works. 'Final Bill' shall be submitted as per prescribed format after completion of works as per scope and upon material reconciliation, along with the following:

i) 'No Claim Certificate' by Contractor
ii) Clearance certificates where ever applicable viz. Clearance Certificates from Customer, various Statutory Authorities like Labour department, PF Authorities, Commercial Tax Department etc.
iii) Indemnity Bond as per prescribed format.
iv) BHEL shall settle the final bills after deducting all liabilities of Contractor to BHEL.

2.16. **CLOSING OF CONTRACTS**

The Contract shall be considered completed and closed upon completion of contractual obligations and settlement of Final Bill or completion of Guarantee period whichever is later. Upon closing of Contract, BHEL shall issue a performance/ experience certificate as per standard format, based on specific request of Contractor as per extant BHEL guidelines through the online portal available at https://suvidha.bhel.in only.

2.17. **SUSPENSION OF BUSINESS DEALINGS**

BHEL reserves the right to take action against Contractors who either fail to perform or Tenderers/Contractor who indulge in malpractices, by suspending business dealings with them in line with BHEL guidelines issued from time to time.

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

If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution stage indulges in any act, including but not limited to, mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or tampers the tendering process or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, or does anything which is actionable under the Guidelines for Suspension of Business dealings, action may be taken against such bidder / supplier / contractor as per extant guidelines of the company available on www.bhel.com and / or under applicable legal provisions.

Guidelines for suspension of business dealings is available in the webpage:
http://www.bhel.com/vender_registration/vender.php

2.18. **LIMITATION ON LIABILITY:**

Notwithstanding anything to the contrary in this Contract or LOA or Work Order or any other mutually agreed document between the parties, the maximum liability, for damages, of the contractor, its servants or agents, shall under no circumstances exceed an amount equal to the Price of the Contract or the Work Order. The Contractor shall not in any case be liable for loss of profit or special, punitive, exemplary, indirect or consequential losses whatsoever. This shall not be applicable on the recoveries made by Customer from BHEL on account of Contractor, any other type of recoveries for workmanship, material, T&P etc. due from the contractor.

2.19. **OTHER ISSUES**

2.19.2. Value of Non judicial Stamp Paper for Bank Guarantees and for Contract Agreement shall be not less than Rs. 100/- unless otherwise required under relevant statutes.

2.19.3. In case of any conflict between the General Conditions of Contract and Special Conditions of Contract, provisions contained in the Special Conditions of Contract shall prevail.

2.19.4. Unless otherwise specified in NIT, offers from consortium/ JVs shall not be considered.

Place:
Date:

Signature of Authorized Signatory
with seal & full address

Tender Notice

NON COMPLIANCE OF SAFETY RULES

NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND BHEL HAS RIGHT TO IMPOSE FINES ON THE CONTRACTOR/SUB-CONTRACTOR AS UNDER FOR EVERY INSTANCE OF VIOLATION NOTICED.

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slinging properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric W Inches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-

Legend:-

*: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of “Repeated violation” will be counted from subsequent days.

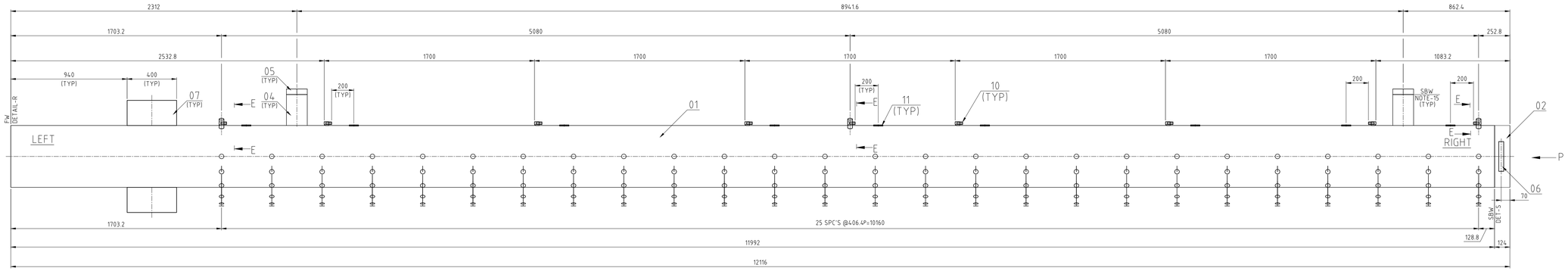
#: For repeated fatal incident in the same Unit incremental penalty to be imposed. The contractor/sub-contractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same contractor/sub-contractor for the same package in the same unit.

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the subcontractor.

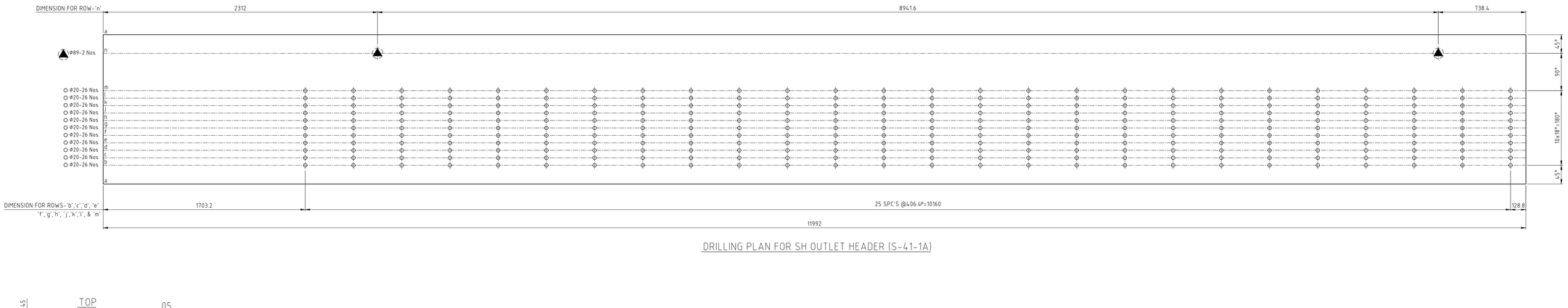
Place:
Date:

Signature of Authorized Signatory
with seal & full address

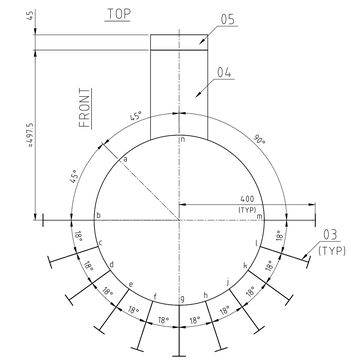
DRAWING NO: 0-10-274-01979



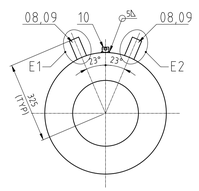
FRONT ELEVATION VIEW OF FINISH SH OUTLET HEADER (S-41-1A)



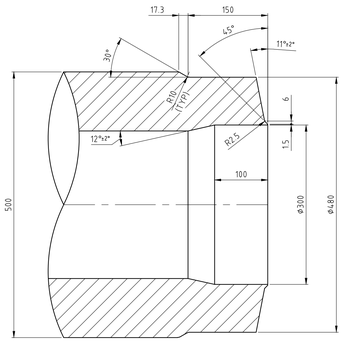
DRILLING PLAN FOR SH OUTLET HEADER (S-41-1A)



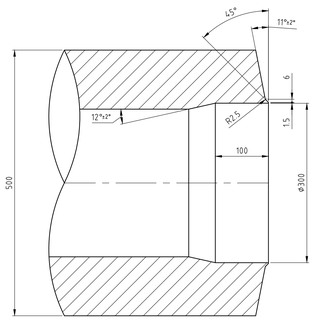
ENLARGED VIEW-P



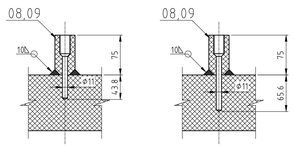
SECTION-EE



DETAIL-R

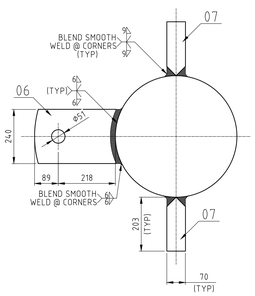


DETAIL-S

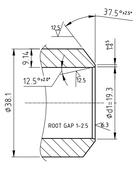


DETAIL-E1

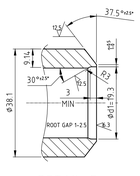
DETAIL-E2



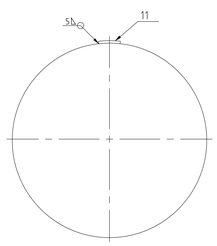
DETAILS OF TORQUE BOX & GUIDE LUG ATTACHMENTS (VIEW -P)



DETAIL-D



DETAIL-B



WELDING DETAIL OF ITEM NO:13

NOTES:

01. DESIGN, MANUFACTURING AND INSPECTION AS PER IBR.
02. DESIGN PRESSURE : 291.9 kg/cm² (g).
03. DESIGN TEMPERATURE : 603 °C.
04. HEAT TREATMENT AS PER IBR.
05. FABRICATION TOLERANCE AS PER DWG:1-03-000-00034 UNLESS OTHERWISE SPECIFIED.
06. HEADER DRILLING FOR NIPPLES AS PER DWG.NO: 3-10-274-10354
    TUBE EDGE PREPARATION AS PER STYLE B/D
07. RADIOGRAPHY OF CIRCUMFERENTIAL BUTT JOINTS :100%.
08. EDGE PREPARATION FOR OPTIONAL JOINTS AS PER DETAIL-S.
09. ALL CAST NOS AND INSPECTION MARKS TO REMAIN VISIBLE AT ALL TIMES.
10. ALL THE HOLES TO BE DEPTH CONTROLLED.
11. EDGE PREPARATION FOR SITE WELDING TO BE DONE AT SHOP AND TO BE SUITABLY PROTECTED WHILE SHIPPING
12. PAINT MARK NO."S-41-1A" ON HEADER.
13. PAINT 'LEFT', 'RIGHT' , 'FRONT' AND 'TOP' AS INDICATED IN THE DRAWING.
14. HYDRAULIC TEST NEED NOT BE DONE AT SHOP.
15. FOR WELDING DETAIL OF INSPECTION NOZZLE & FEC, REFER DWG.NO: 3-10-274-10355
16. QUANTITY TO BE PRODUCED : 1 NO/BOILER.
17. F.W DENOTES FIELD WELD. S.B.W DENOTES SHOP BUTT WELD.
18. TC NIPPLES ARE TO BE PLUGGED FOR SHIPPING WITH PLUG PROVIDED AND TO BE CLEANED OF ALL DRILLING, DIRT, GREASE AND FOREIGN MATTER BEFORE INSTALLING THE PLUG.

SHOP MARK NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER		ITEM NO. / MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	QTY	ZONE
						VAR NO. / MATERIAL SPECN		DI	QUANTITY		
	11	WELD PAD		4-10-274-06942		159421590000	C		0.118		
						SA387GR91			9		
	10	TC PAD		4-10-274-06941		15339409000	C		0.095		
						SA182F91			9		
	09	PLUG FOR TC NIPPLE		3-10-274-10022		15339342000	C		0.150		
					02	SA182F22CL3			6		
	08	TC NIPPLE Ø38, 75 LONG		3-10-274-10022		15339490000	C		0.500		
					01	SA182F91			6		
	07	LUG 70 x 203 x 400		3-10-274-10356		159425210000	C		40.600		
					02	SA387GR91			2		
	06	LUG 40 x 240 x 337.7		3-10-274-10356		159421570000	C		22.200		
					01	SA387GR91			1		
	05	FLAT END COVER Ø168.3, T=45 (NOM)		3-10-274-10355		920700390000	A		15.000		
					02	SA182F92			2		
	04	INSPECTION NOZZLE Ø168.3, T=39.7 (MIN)		3-10-274-10355		920840290000	A		31.470		
					01	SA182F92			2		
	03	NIPPLE Ø38.1 x 9.14		3-10-274-10354					1.114		
						WELDMENT			286		
	02	FLAT END COVER Ø500, T=124 (NOM)		4-10-274-06940		920700500000	A		170.580		
						SA182F92			1		
	01	PIPE ID300 X 100 THK 11992 LONG				150971635500	A		11828.909		
						SA335P92			1		

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	SAJI P J		28.06.2025
CHD	SAJI P J		30.06.2025
APPD	NIRMAL RAJ		01.07.2025

REV	DATE	ALTERED :
01		CHD & APPD :

ZONE

DEPT PP | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (kg) 12520.250 | REF TO ASSY / OLD DWG

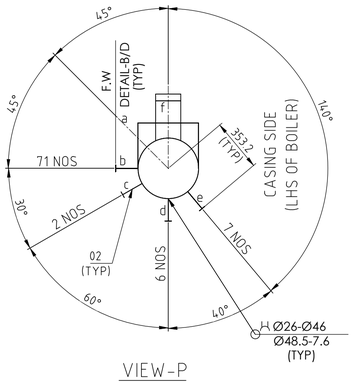
CODE 121

TITLE: FINISH SH OUTLET HEADER (S-41-1A)

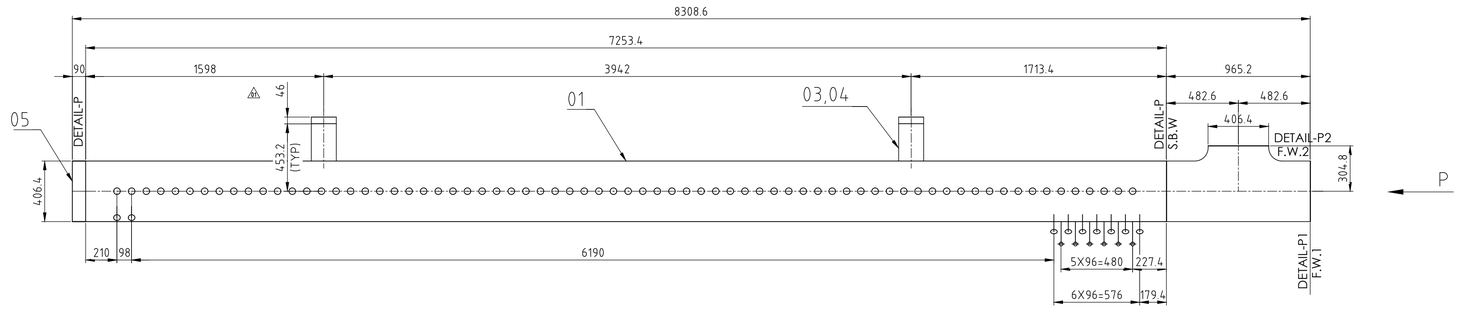
DRAWING NO : 0-10-274-01979 | REV 00

DRAWING NO: 1-10-184-01827

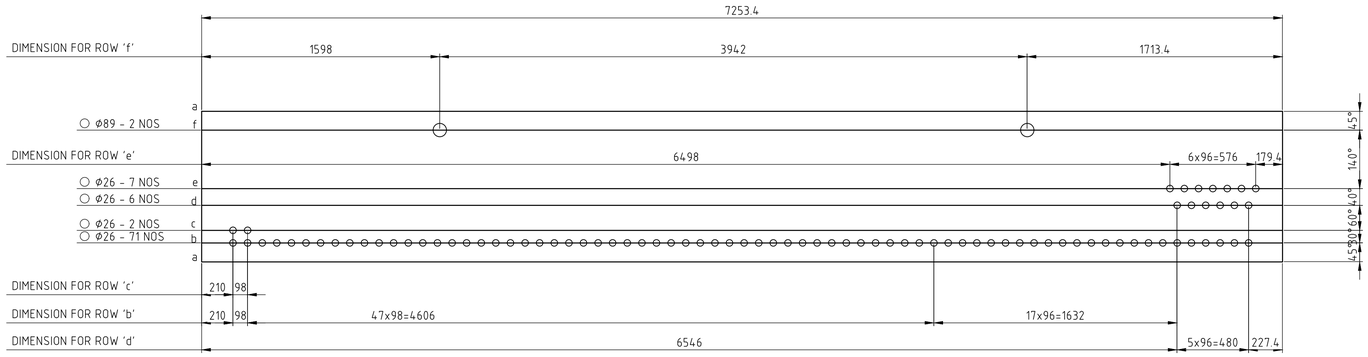
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



VIEW-P



ARRANGEMENT OF BP EXT. LEFT SIDE INLET HEADER (S-06-01)
FURNACE SIDE ELEVATION VIEW (VIEW-A)

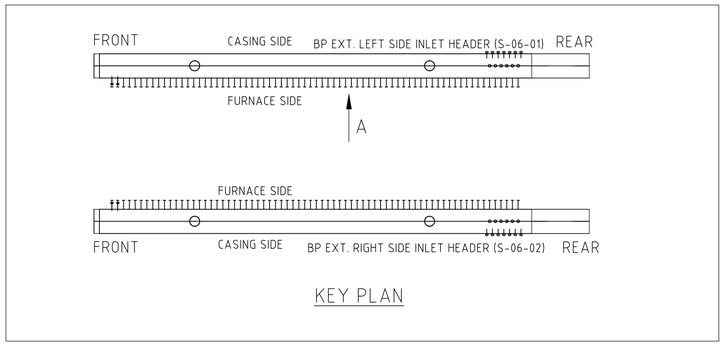


DRILLING PLAN

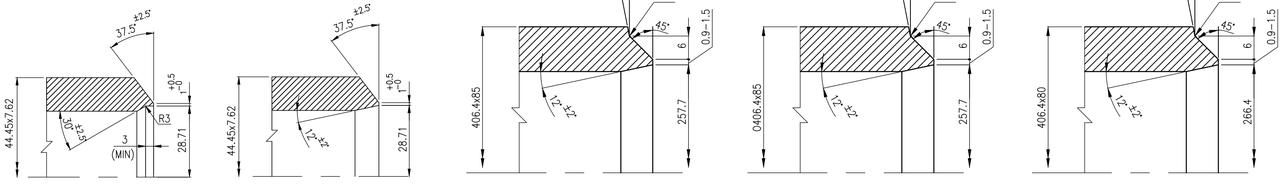
ITEM NUMBER		DESCRIPTION	STD	DRAWING NUMBER			A/C/P			GS	ZONE
					ITEM NO	MATERIAL CODE		UNIT	UNIT WEIGHT		
					VAR NO	MATERIAL SPECN		DI	QUANTITY		
	06	EQUAL TEE D406.4X85(N) / D406.4X80(N)		3-10-184-10323		921054120000	A		710.00		
						SA234WP12CL1			1		
	05	HDR FLAT END COVER OD406.4; THK=74(MIN)		4-10-184-06876		920701300000	A		112.00		
						SA182F12CL2			1		
	04	FLAT END COVER D168.3;T=34(MIN)		3-10-184-10067		920701760000	A		12.300		
					02	SA182F12CL2			2		
	03	INSPECTION NOZZLE D168.3 x 39.7(MIN)		3-10-184-10067		920846970000	A		36.950		
					01	SA182F12CL2			2		
	02	NIPPLE D44.45 x 7.62 161.1+10 LONG		4-10-184-06875		15 494 065 0001	A		1.250		
						SA213T12			86		
	01	PIPE D406.4 x 85 THK. L=7253.4				150 907 164000	A		4886.471		
						SA335P12			1		

GENERAL NOTES :

01. DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
02. DESIGN PRESSURE : 321.9 kg/sq.cm (g)
03. DESIGN TEMPERATURE : 443°C
04. HEAT TREATMENT AS PER I.B.R.
05. FABRICATION TOLERANCE AS PER DRG 1-03-000-00034 UNLESS OTHERWISE NOTED.
06. RADIOGRAPHY OF CIRCUMFERENTIAL BUTT JOINTS :100 %
07. HEADER DRILLING FOR NIPPLES AS PER DWG. NO: 1-10-183-01282
10. THE PART DRAWINGS LISTED IN THE B.O.M. ARE FOR INTERNAL USE ONLY.
09. FOR WELDING DETAIL OF INSPECTION NOZZLE & FEC REFER DWG. NO: 3-10-184-10067
10. ALL THE HOLES TO BE DEPTH CONTROLLED
11. F.W. DENOTES FIELD WELD & S.B.W. DENOTES SHOP BUTT WELD.
12. ALL CAST NOS. AND INSPECTION MARKS TO REMAIN VISIBLE AT ALL TIMES
13. EDGE PREPARATION FOR SITE WELDING TO BE DONE AT SHOP AND TO BE SUITABLE PROTECTED WHILE SHIPPING.
14. PAINT THE MARK No: "S-06-01 (LEFT)".
15. PAINT WORDS "TOP" , "FRONT" & "REAR" WHERE INDICATED.
16. HYDRAULIC TEST NEED NOT BE DONE AT SHOP.



KEY PLAN



DETAIL-B | DETAIL-D | DETAIL-P (FOR S.B.W & OPTIONAL JOINT) | DETAIL-P1 (F.W.1) | DETAIL-P2 (F.W.2)

REV	DATE	ALTERED :	
01	27.10.25	CHD & APPD :	VENKAT D
ZONE	B4	DRAFTING ERROR CORRECTED	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355-053

	NAME	SIGNATURE	DATE
DRN	VENKAT D		25.01.25
CHD	VENKAT D		27.01.25
APPD	NIRMALRAJ		27.01.25

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP			NTS	5914.471	PPA MODEL/REV00
CODE 121					

TITLE: ARRANGEMENT OF BP EXT. LEFT SIDE INLET HEADER (S-06-01)

DRAWING NO : 1-10-184-01827 | REV 01

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014, INDIA

QUALITY CONTROL PROCEDURE FOR — QCP: 001 / 10

FABRICATION OF PRESSURE PARTS
(OTHER THAN TUBULAR PRODUCTS)

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Revision No.	Date	Approved by	Signature
00	01/04/93	SM / QA	
01	01/01/95	SM / QA	
02	15/07/96	SM / QA	
03	13/11/97	DGM / QA	
04	01/04/03	SDGM / QA	
05	31/12/05	AGM / QA	
06	17/08/11	AGM/QA	
07	22/04/15	AGM/QA	
08	26/03/18	AGM/QA & BE	
09	08/02/2021	SDGM/QA	
10	***15/02/2024***	***AGM/QA & BE***	15/02/2024

RECORD OF REVISIONS

Rev No.	Date	Clause No.	Details of revision
00	01/04/93		This document consolidates all the general requirements and technical disciplines covered in the various QCPs.
01	01/01/95		This document has been modified to delete the scope of Tubular products. All amendments issued has been regularized and editorial corrections made for better clarity. Scope of machining also added in this document.
02	15/07/96		Totally revised and the clauses re-arranged.
03	13/11/97	3.2, 3.3.3.1. 3.3.9, 3.5.8, 3.6, 3.9.6 & Annexure I	Modified based on feedback
		3.5.9	Deleted
04	01/04/03	3.1.5, 3.1.6, 3.2.2.2, 3.2.2.4, 3.2.2.5, 3.2.6, 3.2.3.5, 3.2.4.3, 3.3.2.1, 3.3.3.1, 3.3.5.1, 3.3.9, 3.5.7.1, 3.4.2.2, 3.4.3.1, 3.5.5, 3.5.6, 3.5.8	Modified
		3.5.10, 3.5.11, 3.5.12, 3.5.15	Modified and re-numbered as 3.5.9, 3.5.10, 3.5.11 & 3.5.14 respectively
		3.5.13, 3.5.14	Re-numbered as 3.5.12 & 3.5.13 respectively
		3.2.4.3.1	Introduced from Amendment A1 dated 05/10/00 issued for Revision 03.
		3.2.4.3.2	Introduced from Amendment A2 dated 21/07/01 issued for Revision 03.
		3.3.3.2, 3.3.10	Added
		3.4.2.4	Introduced from Amendment A3 dated 15/11/01 issued for Revision 03.
		Annexure I	Modified
05	31/12/05	3.2.4.3	Soaking requirements modified for CS.
		3.5.8, 3.5.9	PWHT temperature for P4 material altered.
		3.5.13	Guidelines for interruptions during heat treatment altered based on Amendment A1 dated 13/03/04.
06	17/08/2011	3.2.4.3, 3.5.7.5,3.5.8, 3.3.10, 3.5.9, 3.6.1, Annexure I	Amendments A1 to A4 introduced.

07	22/04/2015	3.1.8 3.3.1, 3.3.1.1, 3.2.3.	Amendments A1 to A2 included.
		3.1.5	Amendment A2 & Gr.23 included.
		3.2.3.3	Included P15EGr.1 & P92 material & deleted Plate Formed pipes.
		3.2.4.3.2	Governing thickness for determining PFHT soaking time revised based on internal review.
		3.3.2.2	Included Amendment A1 with inclusion of method of removal of temporary attachments.
		3.3.3.1	Tolerances for butt joints surface mismatch revised based on ASME Sec-I
		3.4.2.4	Revised based on Boiler board's decision.
		3.4.2.6	Amendment A2 included and the term "dissimilar welds" is changed as "different P No. welds"
		3.5.7.5.1	New clause added. Cl 3.5.8(d) changed as 3.5.7.5.1 with modification in selection of Governing thickness for interstage PWHT for P15EGr.1 & P92 materials
		3.5.8(a), 3.2.4.3	Code case no. for Gr.92 updated.
		3.5.8(b)	Maximum Rate of heating/Cooling for P91/P92 added and the limiting temperature for controlled Heating and cooling for Gr.23 included.
		3.5.8(d)	Cl 3.5.8(e) in Amendment A2 included with deletion of P3 combination. Also the terms "similar P No. weldment" and "dissimilar P No. weldment" were changed as "same P No. weldment" and "different P No weldment" respectively.
		3.5.10	Thickness ranges re-grouped for determining maximum soaking time during SR.
		3.6.1	T92 code case 2179-8 revision updated.
		Annexure I	Material list updated
		Annexure II	Drawing list updated
08	23/03/2018	3.5.6.3, 3.5.6.4, 3.5.8(a), (e) & 3.5.9 (i)	Amendments A1 to A2 included.
		1.1 (d)	Typographical error corrected
		3.3.10, 3.4.2.5, 3.5.7.5.1, 3.5.8 (a) & (d), 3.5.9 & 3.6.1	P92 material merged with P15EGr.1
		3.4.2.4, 3.5.7.5 & 3.5.8 (a),(d) & 5.5	Modified
		Annexure I	Material list updated

09	08/02/2021	3.1.6, 3.3.5.1 & 3.3.10	Modified based on changes in ASME Sec-I
		3.3.5.2	New clause added catering to preheating with Resistance heating pads on P15E materials As per ASME Sec-I
		3.5.6 & 3.6.1	Amendment A1 incorporated
		Annexure I	Material list updated
10	15/02/2024	3.2.4.3	Modified for clarity
		3.4.2.5, 3.4.2.6	Clarity brought on NDE of CSEF steels
		Annexure I	Material list updated

1.0 SCOPE

1.1 This procedure details out various disciplines to be followed during fabrication of pressure parts other than tubular products with respect to:

a. material identification and traceability
b. process controls
c. inspection and testing
d. calibration/verification of equipment and instruments
e. handling, storage, preservation and dispatch

1.2 The specific product quality requirements are detailed in relevant Std. Quality Plan (SQP)/Inspection & Test Procedure (SIP)

2.0 MATERIAL IDENTIFICATION AND TRACEABILITY

2.1.1 During incoming inspection, the raw materials, welding consumables and sub deliveries are to be verified for correctness through test certificates (TC) as per relevant Technical delivery condition (TDC) / Material Specification/Purchase specification. This is applicable for Customer supplied materials also. Components received from subcontracting works are to be verified for correctness through Inspection/Dimension report.

2.1.2 Issue of materials shall be as per the MIV/MRS/CRS and freedom from visual damages like pitting, dents, laminations, scales, warpages etc. shall be ensured.

2.1.3 When in raw materials, defects are noticed, the same shall be confirmed by using appropriate NDE techniques and corrected, in consultation with QC.

2.1.4 The requirements of material traceability (ATTEST/CERTIFY) is as indicated in the respective drawings / material requisition slips (MRS) / Material issue vouchers (MIV).

2.1.5 ATTEST/PRODUCT ATTEST items, indicated as “A/P" in drawings, are traceable to the test certificates (TC) and identified as below. These items are issued with Attestation Form correlating the TCs and product through Work Order.

Product form	**Identification**	**Method**
Plates	Specification, Melt No, Plate No.	Stamping
Pipes ϕ >= 80mm, Forgings, Bar stock	Specification, Melt No	Stamping
Pipes ϕ < 80mm & Tubes >= 31.8mm	Specification, Melt No	Stenciling / Engraving and Color code
Tubes < 31.8mm	Specification, Melt No	Lot wise on a tag Color code on individual tube
For Color codes refer SIP: PP: 21 (Latest)		

2.1.6 CERTIFIED items, indicated as "C" in drawings, are traceable to Specification / Grade only and identified by stamping/ engraving/ stenciling/ color coding/ marking.

2.1.7 Raw materials not covered by the above shall be identified by its W.O.No/ material code/ specification/ grade by painting or stenciling or engraving. All sub deliveries shall be identified by its material code by painting or through tags / name plates.

2.1.8 In case of marking, cutting or machining, the transfer of material identification shall be certified by QC. In case of tubes, the color code shall be transferred.

2.1.9 For stock raw materials, which are upgraded for special contract requirements, QC shall ensure that the respective TCs and laboratory reports satisfy specification/Contract, TDC/CQP as applicable and identified with W.O.No.

2.1.10 Unidentified materials if found in processing shall be verified for specification and H.T.condition through appropriate checks and shall be upgraded (wherever required) for relevant application.

3.0 **PROCESS CONTROL** [Refer Annexure I for P number grouping of materials & Annexure II for tolerance drawings].

3.1 **FABRICATION**

3.1.1 Ensure correctness of raw material identification and attestation to drawing requirements, as required. Traceability to the contract shall be ensured by stamping or marking / painting applicable WO No. and DU / Part no.

3.1.2 Whenever marking operation is carried during shell plate layout, openings on shells, dished ends or pipes, hole locations on baffles/ girth flanges/ tube sheets, attachments locations etc., the marking correctness shall be ensured as per relevant drawing. The marking shall be identified with punch marks. Wherever required the allowance for cutting/ machining shall be provided.

3.1.3 Before removal of any identification marks during cutting / machining they shall be transferred on adjacent area and certified by QC. All marking inspection shall be performed by QC prior to further operation. The material Specn./Grade/Melt No./Attestation No., as applicable, are to be transferred on balance raw materials for future use.

3.1.4 Reference line mark shall be ensured at a distance of about 100mm from the free ends. For pipes meant for bending and attachment welding, center line marking shall be done.

3.1.5 Cutting may be done by shearing, saw cutting or gas cutting. Stainless steel shall be plasma cut or sheared. Where shearing is for thickness > 25 mm, the cut edges shall be ground. Only saw/plasma/water jet cutting shall be used for X20 and P91/P92 & Gr 23 materials.

3.1.6 During gas cutting and thermal gouging, proper preheating shall be ensured. The requirements of preheating for gas cutting / gouging is as follows.

Carbon steel up to and including 25 mm	::	10 °C min
Carbon steel above 25 mm	::	100 °C.min.
Alloy steel (all t) & SA299	::	150 °C.min.
Stainless steel, X20 & P91, P92	::	Not applicable

3.1.7 The thermal cut edges shall be ground to be free from surface irregularities, scales and burrs, chips etc. The ends prepared for welding shall conform to the relevant drawing. Unless and otherwise specified in SQP/CQP all bevels / edges, which are gas cut and are to be welded to pressure parts, shall be ground to 1 to 2 mm for removal of HAZ and checked by LPI/MPI.

3.1.8 The following shall be carried out before edge preparation of P91/92 pipes and bends:

a) Fixing of spiders inside pipes before taking up N&T process for bends.

b) Carrying out mechanical correction of ovality using hydraulic jack before machining of the pipes and bends.

3.2 **FORMING**

3.2.1 **General.**

3.2.1.1 Forming shall be done using proper tooling free from high spots and damages. The process/tooling shall have been qualified by a first off trial and the records shall be verified for compliance before production, as applicable.

3.2.1.2 The method of forming (Cold or Hot) shall be as specified in OPS/Traveler.

3.2.1.3 The pre-bend profile shall be ensured for correctness before forming shells to final radius.

3.2.1.4 The profile shall be checked using a template of forming radius and chord length at least equal to 1/4 ID. Surface waviness shall be suitably sized. Variations of the profile shall not be abrupt but shall merge gradually in the specified shape.

3.2.1.5 Surface depression in formed areas shall be merged gradually into the base material surface to 1:4 taper. Minimum thickness after forming shall be verified & ensured.

3.2.1.6 Carbon Steel Plates shall be normalized before cold forming if the plates are received in "as rolled condition".

3.2.2 **Cold Forming:**

3.2.2.1 Fiber Elongation (FE)in % = 50t/R for single radius and 75t/R for multiple radius, Where t = thickness, R = Mean radius

3.2.2.2 Cold Forming/Sizing can be done for Material Groups P1 to P5 without inter stage Heat Treatment under the following conditions.

I. For thickness 50 mm and below, if outer fiber elongation does not exceed 5 %.
II. For thickness above 50 mm and up to 100 mm, if outer fiber elongation does not exceed 3.5 %.
III. For thickness above 100 mm and up to 150 mm if outer fiber elongation does not exceed 3 %.
IV. For thickness above 150 mm cold forming is not recommended.

3.2.2.3 When the above conditions are not met, forming in 2 stages is required. Initial forming shall be done to a radius which satisfies above conditions. Then an inter stage heat treatment is to be carried out as per Clause 3.5.8 before forming to finishing radius.

3.2.2.4 When cold rerolling of shells is to be done after welding, the following shall be ensured.

a. Flush grinding of weld reinforcement on both surfaces prior to rerolling.

b. Interstage Heat Treatment of Shells after welding and before rerolling is required as below.

- P1 upto P4 Group Matls. : if thickness exceeds 50 mm
- P5 Group of materials : For all thickness
- Inter stage heat treatment shall be as per Cl: 3.5.8 except that a soaking for minimum period of 1/2 hour is sufficient for any thickness in case of Carbon steel and 1 hour in case of Alloy steel.

c. LPI/MPI shall be done on weld seams after re-rolling.

3.2.2.5 During cold forming of stainless steel plates suitable nonmetallic pads shall be used to avoid direct contact with ferritic materials. Cold forming of austenitic stainless steel material (P8) can be done without further heat treatment if the outer fibre elongation does not exceed 10%.

3.2.2.6 Heat treatment after cold forming of P8 steels shall be as per relevant SQP/CQP.

3.2.3 **Hot Forming:**

3.2.3.1 During hot forming the material shall be heated all round uniformly to the specified temperature.

3.2.3.2 After hot forming and prior to cold sizing / weld fit up of material groups P3, P4, P5, a tempering operation shall be carried out. The temperatures shall be as per Cl: 3.5.8 unless

otherwise stated.

3.2.3.3 Post form heat treatment can be combined with PWHT of the product/component as per Clause 3.5.8 except for P5, P15EGr.1 Formed fittings.

3.2.3.4 After hot forming, Heat Treatment shall be carried when required as per relevant SQP/CQP . The temperature shall be as per relevant SQP/CQP.

3.2.3.5 P8 materials when Hot Formed require Solution Annealing (SA) as detailed out in the relevant SQP/CQP.

3.2.4 Heat Treatment Parameters:

3.2.4.1 The temperatures shall be as per relevant SQP/CQP.

3.2.4.2 **Rate of Heating:**

Hot Working/Normalizing/Solution Annealing	For t ≤ 100mm, 200°C/hour max.
	For t > 100mm, 150°C/hour max.
SR(/PWHT)/Tempering	As per Clause 3.5.8

3.2.4.3 **Soaking** during heating / Post forming heat treatment / SR (or PWHT) shall be as per below guidelines:

HT Cycle	**Soaking Time**
Hot Working/ Normalizing	For P5B, P-15E Gr1 (P91) & P92: ½ hour per inch of "t" or 30 minutes whichever is greater & for all others ½ hour per inch of "t" or 15 minutes min whichever is greater.
SR(/PWHT)/Tempering – Carbon Steels	1 hour per inch of "t" for "t" upto 2 inches with an additional 15 minutes for every inch above 2 inches (15 minutes minimum).
SR(/PWHT)/Tempering – Alloy Steels	1 hour per inch of "t" with below mentioned minimum soaking times:
	(P3 & P4) - 30 minutes minimum.
	(P5A) - 60 minutes minimum except for P5A pipes of OD ≤ 127mm and t ≤ 13mm, which require only 30 minutes)
	(P5B, P-15 E Gr 1 ***and P92***) - 60 minutes minimum
Solution Annealing	1 hour per inch of "t" (15 minutes minimum)

where " t " is maximum thickness for plates, pipes and diameter for bar stock or weld metal thickness (as applicable), whichever is higher.

3.2.4.3.1 In case of mixed loads of materials not covered under simulation HT, the maximum soaking time for Hot working/ Normalising of any item shall not exceed twice the minimum calculated as above. For Tempering/SR(/PWHT), this shall be as per Cl. 3.5.10.

3.2.4.3.2 In case of pipe bends / fittings, thickness " T " for determining soaking time shall be the measured maximum thickness available at the bend intrados region.

3.2.4.4 Rate of Cooling

Normalizing, Tempering : Air Cooling
Stress Relieving/PWHT : As per Clause 3.5.8
Sol. Annealing : Air Blast / Water Cooling

3.2.5 The temperatures are only indicative. The actual temperature shall be as per material Mill TC wherever Simulation Heat Treatment is a requirement.

3.2.6 All heat treatment shall be applied only after the component temperature falls below 200 deg. C (below 100 deg. C for P5B, P91 & P92). Temperature of the furnace during loading shall be below 300 deg. C.

3.2.7 Any scales due to hot forming shall be removed by suitable blasting in case of ferritic steel (P91, P92) and pickling/passivation in case of stainless steel.

3.3 **WELDING**

3.3.1 Fit-up of the weld joints including tube to tube joints shall be ensured as per drawing. All run out pieces, bridges on pieces and temporary attachments shall be identified. The weld area and the adjoining area shall be thoroughly cleaned to remove dust, rust, scale, oil etc. Weld with necessary preheat and matching electrodes. The minimum size of the start & run-off plates shall be 10mm thick and 150mm long. For other attachments, the size of the attachments is based on the job requirement.

3.3.1.1 The material for temporary attachments shall be as per the following table:

Base Material/Combination of materials	**Selection of bridge pieces/start &run off plates/temporary attachments etc**
Carbon steel and alloy steels up to Gr 22	Either compatible with base material or carbon steel
Gr 23 and combination welds including Gr 23	Gr 23
Gr 91 and combination welds including Gr 91	Gr 91
Gr 92 and combination welds including Gr 92.	Gr 92
Stainless steels	Stainless steel

3.3.2 Tack welds used to secure alignment shall either be removed completely when they have served their purpose or their stopping and starting ends ground or dressed by other means suitably so that they may be incorporated into the final weld.

3.3.2.1 Tack welds shall be done to a sufficient length (25 mm minimum) and width using qualified procedure and personnel. Tack welds found defective during visual examination shall be removed.

3.3.2.2 After the completion of operation, the welded-on bridge pieces/start & run -off plates /temporary attachments etc shall be removed by grinding off the weld. The weld area and the adjoining area shall be ground flush. Ensure the tack welded area is free from defects by conducting LPI/MPI.

3.3.3 For single side welding, the maximum misalignment for butt welds shall not exceed 1.6mm. However, where backing rings are used, the gap between backing ring and surface shall not exceed 0.4mm

3.3.3.1 Tolerance for alignment (surface mismatch) of butt welds shall be as per table below unless requirements are otherwise specified in respective Standard/Contract Quality Plans.

Section Thickness	**Long seam**	**Cir seam**
Up to 13mm	1/4t	1/4t
Over 13mm to 19mm	3 mm	1/4t
Over 19mm to 38mm	3 mm	5 mm
Over 38mm to 50mm	3 mm	1/8t
Over 50 mm	Lesser of 1/16t or 10mm	Lesser of 1/8t or 19mm

3.3.3.2 If plate edges of unequal thickness are abutted and the surface offset exceeds the limits mentioned above on either side, the thicker plate shall be thinned down to a smooth taper of 1:4 minimum over the width of the weld.

3.3.4 Weld and adjacent base material surface approximately 15 mm on either side of weld shall be thoroughly cleaned and ensured free from oil, grease, rust, scales etc. For tube to tube sheet joints cleanliness of tube and tube sheet holes shall be ensured before fit up.

3.3.5 Preheat/Inter pass requirements for welding shall be as per the WPS and controls shall be exercised as detailed below. No welding shall be carried out on boiler components when the temperature of the metal is below 10°C.

3.3.5.1 Preheating must be applied using gas burner or induction / resistance heating method before starting each cycle of welding as specified in WPS. Preheat temperature, subsequent extended preheat/inter pass temp. shall be maintained and verified throughout welding using thermal chalks (temperature indicating crayons) / thermocouples. For tubes and pipes with an outside diameter and wall thickness not exceeding 250 mm and 25 mm respectively, minimum preheat is to be established for a distance not less than 3 times the thickness of the weld on either side of the weld. For all other welds, the preheat shall be applied for a width of 75 mm or 1.5 times the base metal thickness, whichever is more, around the point of welding (not less than 25 mm in case of tack welding) in all directions.

3.3.5.2 When heating pads are used for preheating P15E materials,
(a) they shall be symmetrically located on either side of the weld preparation. The heating pads shall be installed such that the edges of the pads shall be approximately 25 mm away from the edge of the weld preparation.
(b) Each side of the weld shall be considered a separate and distinct heated area with its own temperature monitoring and control zones.
(c) Preheat temperature shall be monitored at a number of locations around the weld, with each location 13 mm away from the edge of the weld preparation. At a minimum, the six o'clock position shall be monitored to ensure that the minimum preheat has been achieved.
(1) There shall be at least one control thermocouple installed per control zone, and in the case of horizontally oriented pipe and tube, at least one of these control thermocouples shall be installed at the twelve o'clock position.
(2) One control or monitoring thermocouple shall be installed under each heater.

3.3.6 Welding shall be performed with qualified procedures and qualified personnel. Welding procedures are qualified to ASME Sec IX and personnel to IBR/ASME Sec IX, unless specified otherwise.

3.3.7 Ensure correctness of welding consumables before use including baking and drying. Where specified, the batch traceability shall be maintained through records.

3.3.8 Wherever post heating is specified in WPS, the preheat temperature shall continue after welding till attaining the post heat temperature and maintained for the required time and cooled slowly.

3.3.9 In Headers and Piping products, the distance between any two pipe butt joints shall be greater than one diameter and shall not be less than 500 mm. For tubes, the minimum distance between butt joints shall be 150 mm except for inserts which shall be as per drawing.

3.3.10 In case of interruptions in welding, the minimum preheat temperature shall be maintained until any required PWHT is performed, except interruption of welding is permitted when the following conditions as appropriate are satisfied:

i. A minimum of at least 10 mm thickness of the weld is deposited or 25% of the weld groove is filled, whichever is less (the weldment shall be sufficiently supported to prevent overstressing the weld if the weldment is to be moved or otherwise loaded).
ii. For P1, P3, P4 and P5A materials, the weld is allowed to cool slowly to room temperature.
iii. For P5B, P15E Gr1, and P6 materials, the weld is subjected to an adequate intermediate stress relieving (PWHT).
iv. After cooling and before welding is resumed, visual examination of the weld shall be performed to assure that no cracks have formed.
v. Required preheat shall be applied before welding is resumed.

3.4 WELD INSPECTION (Visual, NDE) AND REPAIRS

3.4.1 **Visual Inspection**

3.4.1.1 After completion of welding, visual inspection shall be done as per SIP: PP: 02 (latest), unless specified otherwise in the relevant SQP/CQP.

3.4.1.2 Where parts of different thickness are welded, the change in thickness shall be made gradual, either by grinding or machining to a 1:4 taper.

3.4.1.3 Stray arcs shall be avoided. Arc spots, if any, shall be ground and checked by LPI/MPI. Ensure thickness requirements in such cases.

3.4.2 **Nondestructive Examination (NDE)**

3.4.2.1 The extent and type of NDE are specified in the respective SQP/CQP.

3.4.2.2 NDE shall be performed using qualified procedures and personnel only. NDE techniques are based on ASME Sec V unless specified otherwise. The acceptance norms shall be based on the relevant code of construction, built into the respective NDE procedures and approved by the statutory authorities, as required.

3.4.2.3 The Welder Number, radiography Number and reference axis marks shall be punched in case of radiography joints of size above 108 mm. In case of other welds suitable records can be maintained correlating the weld joint.

3.4.2.4 In drums and alloy steel headers (X20 & P15E.Gr.1 headers), when tube holes are envisaged on weld seams (longitudinal and circumferential), such welds shall be radiographed/ Ultrasonically tested and stress relieved prior to tube hole drilling. For other headers, such welds shall be radiographed prior to tube hole drilling.

3.4.2.5 For Welds of P5B ***and all CSEF grades (Gr.23, Gr.91 and Gr.92): RT,*** LPI, Wet MPI or UT (as applicable) shall be carried out only after stress relieving/PWHT.

3.4.2.6 In case of different P No. welds involving higher grade materials like Gr 91/92, wet MPI (for all welds), RT/UT (only for butt welds) and hardness check (only for butt welds) shall be carried out ***only*** after PWHT.

3.4.3 **Repairs**

3.4.3.1 Defects noticed shall be removed by air arc gouging, drilling, machining or grinding with suitable bevel for welding. When defects are air arc gouged preheat shall be applied as required for gas cutting of material and the cavity shall be ground to remove black spots. The area shall be free of any irregularities that might trap slag during welding. Gouging is not permitted for P5B, P91, P92 and X20 materials.

3.4.3.2 MPI/LPI shall be conducted on the cavity to ensure complete removal of defects, such as cracks, ICP and lack of fusion. For other defects such as slag, pores etc., a thorough visual inspection is necessary before repair welding.

3.4.3.3 All repair welding shall be using qualified WPS and qualified welders.

3.4.3.4 Defects in the completed test plates shall not be repaired. Defect free portion can be used for testing.

3.4.3.5 The repair welds shall be subjected to the same NDE as per the original weld.

3.4.3.6 After all welding, NDE and successful weld repairs, the welds shall be visually inspected for completeness and cleared for heat treatment wherever applicable.

3.5 **POST WELD HEAT TREATMENT (PWHT)**

3.5.1 The parts/assemblies shall be cleaned prior to PWHT.

3.5.2 PWHT shall be by furnace or local heat treatment.

3.5.3 The thermocouples and recording instruments shall be calibrated and records maintained. The furnace shall have been qualified for temperature distribution.

3.5.4 All components shall be loaded in raised platforms to avoid flame impingement during heat treatment in gas furnaces. The components shall be adequately supported to minimize distortion. Ensure test plate loading if applicable.

3.5.5 Thermocouples shall be attached to the component as per the following guidelines:

a. Thermocouples shall be placed such that the entire component (including the anticipated hottest and coldest zones) is covered.
b. The maximum distance between any two thermocouples shall not exceed 4.5 meters.
c. The temperature variation between any 4.5 meter distances shall be 100 deg. C maximum for temperature above 400 deg. C during heating.

3.5.6 Local heat treatment can be done either by Resistance heating or by Induction heating. P91, P92 and X20 components shall be locally heat-treated using induction heating only. However, for P91 and P92 components of thickness up to 32 mm, Resistance heating coils may be employed (resistance element wire shall be of gauge 16 or higher). When OD ≤ 170 mm, PWHT by resistance heating may be used for thickness beyond 32 mm and up to 40 mm, provided the heat treatment is performed in two stages as follows:

i. In the first stage, half of the total weld thickness shall be deposited and PWHT shall be carried out for the deposited weld thickness (soaking time not less than 60 minutes).
ii. In the second stage, the balance thickness shall be deposited and PWHT shall be carried out for the total thickness.

3.5.6.1 When heat treating butt joints, width of the circumferential heating band on either side of the weld must be at least 3 times the width of the widest part of the weld groove; but not less than twice the thickness of the thicker part welded.

3.5.6.2 When heat treating nozzles and attachment welds, the width of the heating band on either side of weld shall be 6 times the base material thickness beyond the welding to be heat treated. The heating band shall extend axially around the entire vessel.

3.5.6.3 Width of the insulation band shall be at least twice the total width of the heating band.

3.5.6.4 A minimum of three thermocouples shall be placed such that at least one is on the weldment / HAZ and the other two on the base material on either side of the weldment within the heating band. Two Thermocouples are sufficient for Piping & Header items. Thermocouples shall be fixed on the job using capacitor discharge welding method. Thermocouple leads shall be attached within 6 mm of each other. Availability of a Welding Procedure Specification describing the low-energy capacitor discharge equipment, the combination of materials to be joined, and the technique of application shall be ensured. No preheating is required. The energy output of the welding process shall be limited to 125 W-sec. After the thermocouples are removed, the areas shall be visually examined.

3.5.6.5 The winding arrangement shall be established to attain the required temperature. The rate of heating shall be maintained minimum such that it stabilizes at the required rate before reaching 400 deg C.

3.5.7 Unless otherwise specified in SQP/CQP, the following rules shall apply to establish the governing thickness (T) for determining the soaking **time for PWHT.** Soaking time is accounted as the time between the temperature crossing and leaving the minimum recommended temperature.

3.5.7.1 For Butt welds; “T” shall be thickness of the weld. For bar stock “T” shall be the diameter. For fillet welds, "T" shall be the throat thickness. If a fillet weld is used in conjunction with a groove weld, "T" shall be the total of the depth of the groove plus the fillet throat thickness.

3.5.7.2 For partial penetration branch welds, the thickness shall be the depth of the groove prior to welding.

3.5.7.3 For repairs, the thickness shall be depth of the groove as prepared for repair welding.

3.5.7.4 For combination of different welds in a component, the higher governing thickness “T" shall govern.

3.5.7.5 For IBR items having welded joint connecting parts of different thickness, the governing thickness (T) for determining the **soaking time for PWHT** shall be the maximum thickness of the part welded (at the weld joint) or weld metal thickness, whichever is higher.

3.5.7.5.1 In case of P5B, P15E Gr 1, when multiple PWHT cycles are envisaged, maximum weld metal thickness shall be taken for calculating the soaking time for each inter stage PWHT Cycle, prior to final PWHT.

3.5.8 Guidelines for selecting soaking temperature for SR/PWHT unless specified otherwise in relevant WPS / SQP.

a)

MATERIAL	**TEMPERATURE (deg. C)**
P1, P9 B	595-625
P3	620-660
P4	650-680
P5A	680-720
P5B, P15E Gr 1	750-770
P8	PWHT Nil

b) Rate of heating / cooling for SR(/PWHT) and rate of heating for tempering shall be as below unless otherwise specified. Incase of SR(/PWHT), cooling shall be in furnace up to 400 deg. C (350 deg. C for X20, P91, P91+P22, P92, P92+P91, 300 deg. C for Gr.23 material with any combination) and further in Air.

Thickness of Material	**Maximum Rate of Heating & Cooling above 400 deg. C**
Up to 25mm	220°C/Hr
Over 25 - 50mm	110°C/Hr
Over 50 - 75mm	75°C/Hr
Over 75mm	55°C/Hr

Heating and cooling rates for PWHT of P91/P92 materials shall not exceed 140°C/hour above 350°C

c) Soaking shall be as per Clause 3.2.4.3.

d) The following PWHT temperatures (under column 4) shall be followed for weldments of similar P-No materials, even when weldments between different P-No materials are available (as indicated ibn Column 3) in the same product:

Sl No (1)	Similar P-No weldment (2)	Dissimilar P-No weldment (3)	PWHT temp (°C) for similar P-No weldments of Column 2 (4)	Applicable to Products (5)
1	P5A + P5A	P5A+P15E	695±15	Separators, Storage Tanks, Headers, Piping
2	P4+P4	P4+P5A	665±15	
3	P1+P1	P1+P4 or P1+P5A	610±15	

For all the PWHT cycles mentioned under column 4, local PWHT may be carried out.

3.5.9 Unless otherwise specified, in case of mixed loads of materials not covered under simulation HT, the following heat treatment temperatures shall be followed. In such cases, guidelines for soaking can be taken from Clause 3.5.10.

i) Where a component has a butt joint between P1 & P4, or P3 & P4, the cycle shall be 650-680 deg. C.
ii) Where a component has a butt joint between P4 & P5A, the cycle shall be 680 - 720 deg. C.
iii) Where a component has a butt joint between P1 & P3, the cycle shall be 620-660 deg. C.
iv) Where a component has a butt joint between P5A, P5B, P15E Gr1, the cycle shall be 730-770 deg. C.
v) For P1+P5A material combination, follow the WPS requirements.

The following jobs shall not be combined in the same cycle during PWHT.

i) Separate jobs of P1 and P4
ii) Separate jobs of P4 and P5
iii) Separate jobs of P5A and any/all of P5B, P15E Gr1.

3.5.10 For SR/PWHT of materials not covered under simulation heat treatment, in case of combination cycles mentioned above, calculate the minimum soaking time for individual components as 2.5 minutes/mm of the thickness of weld/material whichever is applicable. Soaking time selected for the cycle shall not exceed the limits given below:

Material	Thickness (mm)	Max. soaking time (minutes)
P1 (A,B,C), P4, P5A, P1 (A,B,C) + P4, P4 + P5A, P1 (A,B,C) + P3, P5B, P15E Gr1, P5A+P15E Gr1	Up to 25 mm	125
	26 - 50 mm	200
	51 - 80 mm	250
	81 - 130mm	325
	131 – 170mm	425

3.5.11 After PWHT, the charts shall be correlated with the job and cleared by QC. The charts shall contain the cycle No., date, recorder number, and WO & material details. The cycle temperature, ROH, ROC & soaking time shall be calculated from the chart and entered in the chart signed off by QC and statutory authorities as required.

3.5.12 Wherever specified, the test plate shall be tested and reports obtained to complete the clearance of heat treatment operation.

3.5.13 For interruptions during heat treatment, the following action has to be taken depending on the stage of occurrence:

Type of Heat treatment	Stage of interruption	Action to be taken
Stress Relieving (/PWHT)	Heating	Heat treat subsequently as specified
	Soaking	Heat treat subsequently for balance soaking with minimum 15 minutes.
	Cooling	If the ROC during interruption meets the specified rate, cool subsequently at the required rate. Otherwise, reheat to the soaking temperature, hold for 15 minutes and then cool at the specified rate
Tempering	Heating	Heat treat subsequently as specified
	Soaking	Heat treat subsequently for balance soaking with minimum 15 minutes.
	Cooling	Not applicable

Normalising & Solution annealing	Heating	Heat treat subsequently as specified
	Soaking	Heat treat subsequently for full soaking
	Cooling	Not applicable

3.5.14 If any thermocouple fails during furnace heat treatment, it shall be ensured that at least two thermo couples (covering the entire equipment / batch) reasonably are functioning within 4.5 metre distance. In case of local heat treatment, at least one thermocouple monitoring the temperature of the weld zone shall be functioning. One stand by thermocouple may be provided in the weld zone, which can be connected to the recorder in case the already connected thermocouple fails. Otherwise, PWHT is to be discontinued and restarted.

3.6 HOT CORRECTION AFTER PWHT

3.6.1 When hot correction for bow, distortion, alignment etc. is required, flame heating may be adopted, limiting the maximum temperature as below.

P1 (CS) :950 deg.C.(if weld joints are not getting heated)
:650 deg C (if weld joints are getting heated)
P3/P4 :720 deg.C.
P5A/12X1MF:760 deg.C.
P5B, P15E Gr1: 760 deg.C

For C.S, T91 & T92, the temperatures shall not exceed the above values. For others, if the temperature exceeds the above limits, the items shall be subsequently stress relieved. The metal temperature shall be checked using thermal chalks or other suitable means. Flame heating shall be avoided on headers, piping and vessels but correction can be done by mechanical means/induction heating limited to the temperatures specified above.

3.6.2 If the points of contact during mechanical correction are exactly on the butt joints, such butt joints shall be tested by RT/UT after correction.

3.7 TUBE EXPANSION

3.7.1 Before expansion of Tube to tube sheet joints, ensure thorough cleanliness of the tube ends for a distance equal to tube sheet thickness plus 30 mm.

3.7.2 Suitable lubricants shall be used for expansion. The expansion toolings like mandrel, rollers etc. shall be examined periodically to be free from damage.

3.7.3 Expansion shall be done using the qualified torque for the required length.

3.7.4 QC/Shop shall ensure correctness of expansion in each shift periodically. In the case of expansion to full thickness of Tube sheet it shall be ensured that the expansion shall terminate 3 mm from the back face of the Tube sheet.

3.7.5 The expanded area and the tube sheet face shall be cleaned thoroughly.

3.8 AIR LEAK TEST, HYDROSTATIC TEST

3.8.1 The surface shall be thoroughly cleaned before pressurizing.

3.8.2 Wherever air leak test is called for, the test medium shall be air or Nitrogen. The test pressure shall be raised gradually. Test parameters shall be as per SQP/Drawing.

3.8.3 Wherever hydrostatic test is specified, the same shall be performed in accordance with SIP: PP: 04 (latest) or relevant SQP/Drawing.

3.9 MACHINING

3.9.1 The work center for finish machining shall be identified on the OPS based on the process capability of the machine or Machine accuracy established to suit the tolerances. All cutting tools shall have been ensured for correctness before use.

3.9.2 Software used in case of CNC/NC machines shall have been validated through trials or inspection of similar components produced and accepted.

3.9.3 Ensure verticality and parallelity of the jobs on the machine by using the reference markings or dialing the surfaces after clamping the job and periodically during machining.

3.9.4 After machining the surfaces shall be suitably deburred and cleaned. After removing from the machine it shall be properly stored.

3.9.5 During drilling or tapping, the removal of chips shall be done periodically to prevent clogging of chips inside the hole. For deep drilling ensure that run out, drill travel are verified in free condition and ensure proper clamping of the tools.

3.9.6 Ensure proper reaming allowances for finish operations.

3.9.7 During boring operations, control on feed for finish cut shall be ensured to achieve required size and finish.

3.10 UNTOLERANCED DIMENSIONS

3.10.1 Unless otherwise specified, the tolerances for untoleranced dimensions shall be as per Plant Standard No TP: 023:0299 (latest).

3.11 SURFACE CLEANING & PAINTING

3.11.1 Unless otherwise specified, all completed parts/assemblies shall be cleaned thoroughly using wire brush or power tools to remove scales, dirts and any other foreign material before painting.

3.11.2 Where blast cleaning is mentioned before application of special paint, sand or shot blasting shall be done at area with moisture protected environment. Blasting shall be done with suitable nozzle with constant velocity and pressure. Compressed air used for blasting shall be free from moisture. The finished blasted surface shall have metal finish without any black spots and other foreign matters.

3.11.3 Painting shall be applied within shortest period after blasting is completed.

3.11.4 Any marking about dispatch details shall be as per relevant drawing/SQP. This shall be painted in bold white paint stenciled letters on the part/assembly.

4.0 CALIBRATION/VERIFICATION OF EQUIPMENT AND INSTRUMENTS

4.1 Ensure the following.
-Usage of calibrated measuring instruments, and test gauges.
-Usage of validated test hardware like jigs, fixtures and copying templates etc.
-Checking of shop made templates before use.
-Validation of software and programs used on NC machines.

5.0 HANDLING, STORAGE, PRESERVATION & DISPATCH

5.1 All materials shall be handled with properly maintained equipment, tools and tackles to ensure handling damages. This is applicable at stores, various shops and shipping .

5.2 Ensure capacity of the handling equipment based on the part to be handled.

5.3 Materials/components shall be stored at identified location properly for easy retrieval.

5.4 The stored components/ materials shall be preserved/protected to prevent damages/ rusting/ warpages.

5.5 Storing and preservation of Welding consumables till issue shall be ensured as per recommendation of WTC. The issue of welding consumables shall be authorized by WTC. At manufacturing shops the welding consumable are ensured for adequate baking and drying before use. The issue of welding consumables/requisition slip shall be authorized by shop.

5.6 Components/Products shall be packed in such a manner to avoid damage/transit loss. All packages shall be identified with packing slips duly certified.

5.7 The assembly shall be securely anchored for dispatch to prevent any damage during transit. Protrusions from main components shall be suitably protected. All openings shall be suitably blanked.

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Annexure_I

ASME MATERIALS & P - NUMBER GROUPING

P-No.	PLATES	PIPES	TUBES	FORGINGS /FITTINGS
P1/Gr 1 (Carbon Steel)	SA 515 Gr 60 SA 516 Gr 60 SA 283 Gr A-D SA 285 Gr C SA 334 Gr 1,6 SA/IS 2062 E250A, B & C	SA 106 GrA,B SA 333 Gr 1,6	SA 178 Gr A,C SA 179 SA 192 SA 210 Gr A1	SA 350 LF1 SA 266 Cl1
P1/Gr 2 (Carbon Steel)	SA 515 Gr 70 SA 516 Gr 70 SA 299 Gr A SA 537 Cl 1	SA 106 Gr C	SA 178 Gr D SA 210 Gr C	SA 105 SA 266 Cl2, Cl3 SA 350 LF2
P3/Gr 1 (L A S)	SA 204 Gr A SA 387 Gr2/Cl1	SA 335 P1,P2	SA 209 T1,T1A SA 213 T2	
P3/Gr 2 (L A S)	SA 204 Gr B,C	--	--	SA 182 F1,F2
P4/Gr 1 (L A S)	SA 387 Gr11 Cl 1 & Cl 2 SA 387 Gr12 Cl 1 & Cl 2	SA 335 P11 SA 335 P12	SA 213 T11 SA 213 T12 SA 199 T11	SA 182 F11 Cl 1,2,3 SA 182 F12 Cl 1,2 SA 234 WP11 Cl 1 SA 234 WP12 Cl 1 SA 336 F11 Cl 1,2,3 SA 336 F12
P5A/Gr 1 (L A S)	SA 387 Gr22 Cl 1 & Cl 2	SA 335 P22	SA 213 T22 SA 199 T22	SA 182 F22 Cl 1,3 SA 234 WP22 Cl 1 SA 336 F22 Cl3
Code Case (2199-*9*)	SA 1017 Gr 23	SA 335 P23	SA 213 T23	SA 182 F23
P5B/Gr 1 (A S)	SA387 Gr5/Cl1 SA387 Gr9/Cl2	SA 335 P5 SA 335 P9	SA 199 T5 SA 199 T9	SA 182 F5, F9 SA 234 WP5, WP9 SA 336 F5, F9
P15E Gr 1 (A S)	SA 387 Gr 91 Type 1 SA 387 Gr 91 Type 2	SA 335 P91 Type 1 SA 335 P91 Type 2	SA 213 T91 Type 1 SA 213 T91 Type 2	SA 182 F91 Type 1 SA 182 F91 Type 2 SA 234 WP91 Type 1 SA 234 WP91 Type 2 SA 336 F91 Type 1 SA 336 F91 Type 2
P15E Gr 1 Code Case (2179-*11*)	--	SA 335 P92 SA 369 FP92	SA 213 T92	SA 182 F92
P6/Gr 1 (SS 410)	SA 240 TP 410	--	SA 268 TP 410	SA 182 F6aCl1
P6/Gr 2 (SS 429)	SA 240 TP 429	--	SA 268 TP 429	--
P6/Gr 3 (S S)	--	--	--	SA 182 F6aCl2 SA 336 F6
P7/Gr 1 (SS 410S)	SA 240 TP 410S, TP 405, TP 409	--	SA 268 TP 405, TP 409	--
P7/Gr 2	--	--	SA 268 TP 430	--
P8/Gr 1 (S S)	SA 240 TP 304, 304L, 304H, 316, 316L, 321, 347, 347L, 347H	SA 312 TP 304, 304L, 316, 316L, 321, 347	SA 213 TP 304H, 316, 316H, 321H, 347H, 316 Ti ***SA 213 UNS S30432(Super304H)***	SA 182 F304H SA 182 F347H
P9B/Gr1 (L A S)	SA 203 Gr D,E,F	SA 333 Gr 3	SA 334 Gr 3	SA 350 LF3

For Clad plates & Non ASME Materials, refer to the respective Standard / Contract QPs.

ANNEXURE - II

TOLERANCE DRAWINGS

Sl.No.	Drawing No.	Description	Product
01	0-03-000-00001	Allowable Drum Tolerance	Drum
02	1-03-000-00011, 1-10-183-01282	Socket seat weld plain ends Socket seat weld plain ends (for Supercritical Boiler)	Headers
03	1-03-000-00014 1-10-183-01283	Socket seat weld tapered ends Socket seat weld tapered ends (for Supercritical Boiler)	Headers
04	1-03-000-00034	Header Tolerance	Headers
05	2-03-000-00001	Socket seat weld plain ends for schedule pipes	Headers
06	2-03-000-00028	Fabrication Tolerance for Feeder headers and down comers (Waste heat boilers)	HRSG Header & Down comers
07	2-03-000-00029	Fabrication tolerance for Module box assembly (for Waste heat boiler)	HRSG
08	2-03-000-00030	Fabrication tolerance for Shop assembled piping	HRSG
09	2-03-000-00031	Fabrication tolerance for Module (Waste heat boiler)	HRSG modules
10	3-PV-000-00075	Vessel Tolerance	Pressure Vessels
11	TEMA Table RCB 7.41	Tube sheet Hole Diameter Tolerance	Heat Exchangers
12	TEMA Table RCB 7.42	Tube sheet Holes Ligament and Drill drift	Heat Exchangers
13	TEMA Fig.F1	External dimensions, Nozzle and Support locations	Heat Exchangers
14	TEMA Fig.F2	Recommended Fabrication Tolerances	Heat Exchangers
15	TEMA Fig.F3	Tube sheets, Partitions, Covers & Flanges - Machining Tolerances	Heat Exchangers

Note: Revision status of these drawings/standards shall be ensured before use.

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BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI 620014

QUALITY ASSURANCE

PREHEAT, POST HEAT AND POST WELD HEAT TREATMENT REQUIREMENTS FOR ASME BOILER COMPONENTS

REV.	DATE	PREPARED	REVIEWED	APPROVED
00	01/10/08	S. Selvarajan	U. Revisankaran	C.R. Raju
01	01/03/14	A. Sivananthan	S. Selvarajan	U. Revisankaran
02	19/05/15	Vaibhav Saxena	Manu Shankar Harish	U. Revisankaran
03	24/03/18	A.Sakthi Ganesh	J.V.V Aruna Kumar	Amit Roy
04	29/09/18	Vaibhav Saxena	A. Sakthi Ganesh	J.V.V Aruna Kumar
05	29/01/2021	A. Sakthi Ganesh	J.V.V Aruna Kumar	
06	*14/02/2024*	*A. Sakthi Ganesh* 14-02-2024	*V Deepesh* 14-02-2024	*J.V.V Aruna Kumar* 14/02/2024

RECORD OF REVISIONS

Rev. No.	Clause No.	Details of Revision
00	--	Fresh issue
01	Cl 4.1.2, 4.1.4, 4.1.7 with sub-clauses, 4.1.8 with sub-clauses, 4.1.9 (iv), 4.1.13, Tables 4.2.2 (a), 4.2.2 (b), 4.2.3 (a), 4.2.3 (b) & 4.2.4 (a) Cl 4.2.2.3, 4.2.2.6, 4.2.4.1 and Annexure I	Modified
	4.1.5.1, 4.2.2, 4.2.2.8, 4.2.3, 4.2.4	Added
02	Cl.4.1.5.d	Details on TC fixing Added
03	Cl. 4.1.6.3 Cl. 4.1.8.1, 4.1.9, 4.2.2(a),(b) & 4.2.3(a),(b) Cl.4.1.10, 4.2.2(a),(b) & 4.2.3(a),(b) Cl. 4.2.2.3 Cl. 4.2.2.5 Cl. 4.2.2.6 & 4.2.2.7 Cl.4.2.2.6 Annexure-I	Typographical error corrected Material group P15E was corrected as P15E Gr.1 for clarity Modified Modified in-line with WPS Revised for clarity Deleted Earlier Cl. 4.2.2.8 renumbered as Cl. 4.2.2.6 Updated
04	Cl. 4.1.6.5, 4.1.8.1, 4.1.8.2, 4.1.9, 4.1.10, 4.1.13, 4.2.2, 4.2.2 (a), 4.2.2 (b) Cl. 4.2.2.3.2 Cl. 4.2.2.3.4, 4.2.3(a), 4.2.3(b), 4.2.4(a), 4.2.4(b)	Modified Deleted Modified
05	Title & Cl. 1.1	Modified
	Cl. 4.1.6	Modified
	Cl. 4.2.2 (a), 4.2.3 (a), 4.2.3 (b), 4.2.4 (a) & 4.2.4 (b)	Modified
	Annexure-I	Updated
06	*Cl. 4.1.8.1*	***Revised for clarity on SS welds***

	4.2.3 a & b	*Revised in line with ASME Sec-I and to bring clarity on SS welds.*
	4.2.4 a	*Modified based on collaborator's document*
	Annexure-I	*Updated*

1.0 **SCOPE**

1.1 This procedure details out the preheat, post heat and post weld heat treatment requirements for pressure parts used in boilers constructed in line with ASME Section I.

2.0 **REFERENCE DOCUMENTS**

2.1 ASME Section I

3.0 **MATERIALS**

3.1 The materials covered and their P-No. Grouping is given in Annexure - 1.

4.0 **PWHT Requirements**

4.1 General requirements:

4.1.1 The parts/assemblies shall be cleaned prior to PWHT.

4.1.2 PWHT shall be by furnace or local heat treatment. In case of Tubular Products (coils, panels, loose tubes etc.), PWHT may be done in Continuous Discharge Furnace (CDF).

4.1.3 The thermocouples and recording instruments shall be calibrated and records maintained. The furnace shall have been qualified for temperature distribution.

4.1.4 All materials shall be loaded in raised platforms to avoid flame impingement during heat treatment in gas furnace. Ensure test plate loading along with the components, if applicable.

4.1.5 Thermocouples shall be attached to the component as per the following guidelines:

a. Thermocouples shall be placed such that the entire component (including the anticipated hottest and coldest zones) is covered.

b. The maximum distance between any two thermocouples shall not exceed 4.5 metres.

c. The temperature variation between any 4.5 metre distances shall be 100 deg. C maximum for temperature above 400 deg. C during heating.

d. The Thermocouples shall be fastened to the job by either of two means.

(i) Cleat method: Metallic cleats compatible with the material of the component being heat treated, made to suit the profile of the thermo couples shall be welded at the identified locations on the surface of the component to be heat treated, using qualified WPS and qualified welders. The thermocouple end shall be inserted into the cleat for approximately ¾th of the length of the cleat and the curved ends of the cleat shall be peened by hammer to ensure thermocouple in tight contact position.

(ii) Contact method: The Thermo couple shall be inserted through the holes provided in the furnace at the desired locations. The TC shall be pulled inside the furnace and placed in such a manner that it is in contact with the component surface. A suitable weight shall be placed on the TC to ensure that it is not disturbed during the heat treatment cycle.

4.1.5.1 In case of Continuous Discharge Furnace, thermocouples need not be attached to the job, provided the Continuous discharge furnace is calibrated with a dummy job attached with thermocouples for establishing the furnace temperatures corresponding to the job temperature for a particular heat treatment cycle. The furnace qualification shall be done once in two years or whenever a major overhaul of the furnace or furnace walls is done.

4.1.6 Local heat treatment can be done either by Resistance heating or by Induction heating. P91/P92 components shall be locally heat treated using induction heating only. However, for P91 and P92 components of thickness up to 32 mm, Resistance heating coils may be employed (resistance element wire shall be of gauge 16 or higher). When OD ≤ 170 mm, PWHT by resistance heating coils may be used for thickness beyond 32 mm and up to 40 mm, provided the heat treatment is performed in two stages as follows:

i. In the first stage, half of the total weld thickness shall be deposited and PWHT shall be carried out for the deposited weld thickness (soaking time not less than 60 minutes).

ii. In the second stage, the balance thickness shall be deposited and PWHT shall be carried out for the total thickness.

4.1.6.1 When heat treating butt joints, width of the circumferential heating band on either side of the weld must be at least 3 times the width of the widest part of the weld groove; but not less than twice the thickness of the thicker part welded.

4.1.6.2 When heat treating nozzles and attachment welds, the width of the heating band on either side of weld shall be 3 times the base material thickness beyond the welding to be heat treated. The heating band shall extend axially around the entire vessel.

4.1.6.3 Width of the insulation band shall be at least twice the total width of the heating band.

4.1.6.4 A minimum of three thermocouples shall be placed such that at least one is on the weldment / HAZ and the other two on the base material on either side of the weldment within the heating band. Two Thermocouples are sufficient for Piping & Header items.

4.1.6.5 The winding arrangement shall be established to attain the required temperature. The rate of heating, when applicable, shall be maintained minimum such that it stabilizes at the required rate before reaching 400 deg C or 350 deg C, as required.

4.1.7 Unless otherwise specified in Quality Plans, the following rules shall apply to establish the governing thickness (T) for determining the soaking **time for PWHT.** Soaking time is accounted as the time between the temperature crossing and leaving the minimum recommended temperature.

4.1.7.1 For full penetration butt welds, "T" shall be thickness of the thinner part being joined.

4.1.7.2 For full penetration branch welds, the nominal thickness is the depth of the weld.

4.1.7.3 For partial penetration groove and material repair welds, the nominal thickness is the depth of the weld. The total depth of partial or full penetration groove welds made from both sides shall be taken as the sum of the depth of both sides at a given location.

4.1.7.4 For fillet welds, "T" shall be the throat thickness. If a fillet weld is used in conjunction with a groove weld, "T" shall be either the depth of the groove weld or the fillet throat dimension whichever is greater.

4.1.7.5 For combination of different welds in a component, the higher governing thickness "T" shall govern the soaking time.

4.1.8 Guidelines for selecting PWHT parameters, unless specified otherwise in relevant WPS/QP, shall be as follows.

4.1.8.1 Soaking temperature and soaking time

MATERIAL	SOAKING TEMPERATURE deg. C	SOAKING TIME in Minutes
P1	595-625	2.5 minutes per mm for "T" up to 50 mm plus additional 15 minutes for every 25mm thickness above 50mm –15 minutes minimum
P3	620-660	-do-
P4	650-680	2.5 minutes per mm for "T" up to 125 mm plus additional 15 minutes for every 25mm thickness above 125mm –15 minutes minimum
P5A	680-720	-do-
T23	720 - 760	2.5 minutes per mm for "T" – 30 minutes minimum
P15E Gr.1	750-770 (other than Tubular Products) 730 – 760 (Tubular Products)	2.5 minutes per mm for "T" up to 125 mm plus additional 15 minutes for every 25mm thickness above 125mm – 30 minutes minimum for T91/T92 tubes and 60 minutes minimum for P91/P92 pipes
P8	*Based on material spec. (refer WPS)*	*Based on material spec. (refer WPS)*

4.1.8.2 Rate of heating (ROH) / cooling (ROC). Cooling shall be in furnace up to 400 deg. C (350 deg. C for P91/P92) and further in Air.

Thickness of Material	**Maximum ROH & ROC above 400 deg. C (350 deg. C for P91/P92)**
Up to 25mm	220 °C/Hr (140°C/Hr for P91/P92)
Over 25 - 50mm	110 °C/Hr
Over 50 - 75mm	75 °C/Hr
Over 75	55 °C/Hr

4.1.8.3 Rate of heating / cooling for PWHT is not applicable for Tubular products heat treated in Continuous Discharge Furnaces.

4.1.9 Unless otherwise specified, in case of mixed loads of materials not covered under simulation HT, the following heat treatment temperatures shall be followed. In such cases, guidelines for soaking can be taken from Clause 4.1.10.

i) Where a component has a butt joint between P1 & P4, or P3 & P4, the cycle shall be 650 - 680 deg. C.
ii) Where a component has a butt joint between P4 & P5A, the cycle shall be 680 - 720 deg. C.
iii) Where a component has a butt joint between P1 & P3, the cycle shall be 620-660 deg. C.
iv) Where a component has a butt joint between P5A & P15E Gr.1, the cycle shall be 750 – 770 °C (for other than Tubular Products).
v) For P1+P5A material combination, follow the WPS requirements.

4.1.10 For PWHT of materials not covered under simulation heat treatment, in case of combination cycles mentioned above, calculate the minimum soaking time for individual components as 2.5 minutes/mm of the thickness of weld. Soaking time selected for the cycle shall not exceed the limits given below:

Material	Thickness (mm)	Max. soaking time (minutes)
P1 (A,B,C), P4, P5A,	Up to 25 mm	125
P1 (A,B,C) + P4,	Over 25 – 50 mm	200

P4 + P5A, P1 (A,B,C) + P3, P5B, P15E Gr1, P5A+P15E Gr1	Over 50 – 80 mm	250
	Over 80 – 130 mm	325
	Over 130 – 170 mm	425

4.1.11 After PWHT, the charts shall be correlated with the job and cleared by QC. The charts shall contain the cycle No., date, recorder number, and WO & material details. The cycle temperature, ROH, ROC & soaking time shall be calculated from the chart and entered in the chart signed off by QC and statutory authorities as required.

4.1.12 Wherever specified, the test plate shall be tested and reports obtained to complete the clearance of heat treatment operation.

4.1.13 for interruptions during heat treatment, the following action shall be taken depending on the stage of occurrence:

Type of Heat treatment	Stage of interruption	Type of furnace	
		Batch type	Continuous discharge
Stress Relieving	Heating	Heat treat subsequently as specified	Switch off roller movement. On resumption of power/ Gas supply, raise the temperature to the level at which the interruption occurred and then switch on roller movement after stabilizing for 5 minutes
	Soaking	Heat treat Subsequently for balance soaking with minimum 15 minutes	Switch off roller movement. On resumption of power/ Gas supply, raise the temperature to the level at which the interruption occurred and then switch on roller movement after stabilizing for 5 minutes
	Cooling	If the ROC during interruption meets the specified rate, cool subsequently at the required rate. Otherwise, reheat to the soaking temperature, hold for 15 minutes and then cool at the specified rate	Not applicable

4.2 **HEAT TREARMENT TABLES**:

4.2.1 Boiler drums (P1 material): PWHT at 610 +/- 15 °C.

4.2.2 Headers, Separator & Storage Tank and Spheres

4.2.2(a) Preheat, Post heat and Post weld heat treatment temperatures for Headers - Butt Joints

Header Pipe Material	**Weld Thickness (mm)**	**Preheat °C**	**Post Heating °C**	**PWHT °C** Note 4.2.2.1
P1 Grp 1 + P1 Grp 1	t<=25	10	Nil	610+/-15
	t>25 <=75	100	Nil	610+/-15
	t>75	150	Nil	610+/-15
P1 Grp 2 + P 1 Grp 2	All	150	150°C for 2 Hrs	610+/-15
P1 Grp 1+ P4 Grp 1	All	150	Nil	665+/-15
P1 Grp 2+ P4 Grp 1	All	150	150°C for 2 Hrs	665+/-15
P4 Grp 1 + P4Grp1	All	150	Nil	665+/-15
P4 Grp 1 + P5A Grp1	All	150	250 for 2 hrs	695+/-15

		(Note 4.2.2.2)		
P5A Grp 1 + P5A Grp1	All	150 (Note 4.2.2.2)	250 for 2 hrs	695+/-15
T22 + T23	All	220	250 for 2 hrs	745 +/- 15°C
P5A Grp 1 + P15E Gr.1	All	220	Note 4.2.2.3	760+/-10 Note 4.2.2.3
P15E Gr.1 + P15E Gr.1	All	220	Note 4.2.2.3	760+/-10 Note 4.2.2.3

4.2.2(b) Preheat, Post heat and Post weld heat treatment temperatures for Headers - Stub Joints

Header Pipe Material	Stub Material	Weld Thickness (mm)	Preheat °C	Post Heating °C	PWHT °C Note 4.2.2.1
P1 Grp1	P1 Grp 1 P1Grp2 P3 Grp1 P4 Grp1 P5A Grp1	All	150	NIL	610+/- 15 610+/- 15 635+/- 15 Note-4.2.2.4 665+/- 15 Note-4.2.2.5 Note-4.2.2.5
P1 Grp2	P1 Grp 1 P1Grp2 P3 Grp1 P4 Grp1 P5A Grp1	All	150	150 for 2 hrs	610+/- 15 610+/- 15 635+/- 15 Note-4.2.2.4 665+/- 15 Note-4.2.2.5 Note-4.2.2.5
P4 Grp1	P1 Grp 1	All	150	Nil	665+/- 15
	P1Grp2				665+/- 15
	P4 Grp1				665+/- 15
	P5A Grp1				Note-4.2.2.5
	T23		220		720 - 745
P5A Grp1	P4 Grp1 P5A Grp1	All	150	250 for 2 hrs	695+/-15
	T23		220		745 +/- 15
P5A Grp1	P15E Gr.1	All	220	Note-4.2.2.3	760+/-10 Note-4.2.2.3
P15E Gr.1	P15E Gr.1 P5A Gr.1	All	220	Note 4.2.2.3	760+/-10 Note 4.2.2.3

4.2.2.1 Inter stage heat treatment at the required temperature for 30 minutes (minimum) soaking is required for headers prior to cold straightening operation. Alternatively, straightening can be done after final PWHT. Any P5A Header with weld thickness above 50 mm requires inter stage Heat Treatment at 680-710°C for 30 minutes minimum soaking (Maximum shall be limited to 2.5 minutes/mm of thickness). Inter stage heat treatment can be combined with final heat treatment of other headers if temperature range is appropriate.

4.2.2.2 Castings or forgings of P5A materials require a preheat of 200°C (minimum) for any thickness.

4.2.2.3 Preheat, Hydrogen Baking and PWHT requirements for P15E Gr.1 materials:

4.2.2.3.1 Preheat temperature shall be maintained on P91/P92 materials throughout the welding process, without interruption, until the welding is completed, at which time the weld joint shall receive a post-weld-heat-treatment (PWHT), or a hydrogen bake.

4.2.2.3.3 Hydrogen Bake

a) A hydrogen bake shall be performed on the weld joints in the temperature range 260-400°C for one hour per 25 mm thickness, up to a maximum of four hours and cool in still air. The minimum hold time shall be 30 minutes.

b) Prior to the beginning of the hydrogen bake, the surface temperature of the weld joint should be reduced to below 95 °C.

4.2.2.3.4 PWHT

a) Following completion of weld joint, the outside surface temperature of the weld joint shall be dropped to below 95 °C. The weld joint then shall be post weld heat-treated within eight (8) hours.

b) If it is not possible to perform PWHT within eight (8) hours, a hydrogen bake shall be performed prior to the initiation of PWHT.

c) The component shall be maintained at a temperature above 95 °C or kept in a clean, dry environment until the PWHT is initiated. Dry means that at no time shall the weld come in contact with liquids, including condensate, from the time that it is welded until the PWHT is completed.

d) The joint shall not be subjected to significant thermal reaction loads or mechanical loads in the as-welded condition until PWHT.

e) PWHT shall be done within 7 days after the completion of Hydrogen Bake.

f) Heating and cooling rates for PWHT of P91/P92 shall be as per clause 4.1.8.2; but shall not exceed 140 deg./hour and Controlled cooling shall be done up to 350 deg. C.

4.2.2.4 P1 header with P3 (T1) stubs can be stress relieved with P1 cycle (610+/-15deg.C) in case the T1 stubs are all straight stubs or they are separately heat treated in case of bends.

4.2.2.5 Heat treatment cycle for the header is governed by the header pipe material. Fillet Welds, Partial Penetration Welds and full penetration welds through the tube or pipe thickness attaching P-No.4 or P-No.5A tubes and pipes to headers of lower P-Number material, may be post weld heat treated as per below table provided the P-No.4 or P-No.5A tubes and pipes comply with the following conditions:

Header Pipe + Stub/Pipe	PWHT Temperature After meeting all the below requirements	PWHT temperature if any one of the below conditions is not met
P1+P4	610 ± 15°C	665+/-15°C
P1 + P5A	610 ± 15°C	As per WPS
P4 + P5A	665 ± 15°C	695+/-15°C

1. A maximum specified Chromium content of 3.0%.
2. A maximum outside diameter of 102 mm
3. A maximum thickness of 13 mm
4. A maximum specified Carbon Content of not more than 0.15%
5. R/D ≥ 2, in case of bent stubs
6. or R/D < 2, and the stubs are separately heat treated.

4.2.2.6 Fillet Welds, Partial Penetration Welds and full penetration welds through the tube or pipe thickness, attaching P15E tubes and pipes to headers of P5A material, may be post welded heat treated at 745+/-l5 deg. C unless otherwise specified in QP/WPS.

4.2.3 Piping

4.2.3(a) Preheat, Post heat and Post weld heat treatment temperatures for Piping - Butt Joints/stub welds/nozzle welds (other than attachment welds)

BUTT / STUB / BASE METAL	P1 Group 1 (Gr. B), Steel 20, 15 Mo3, P1 Group 2 (Gr.C) t<=19	P1 Group 1 (Gr. B), Steel 20, 15 Mo3, P1 Group 2 (Gr.C) t>19	P3 (OD <=127 & T<=13)	P3 (OD >127 or T>13)	P4, 13CrMo44 (OD <=127 & T<=13)	P4, 13CrMo44 (OD >127 or T>13)	P5A, 10CrMo910 (OD<=102 & T<=8) (@)	P5A, 10CrMo910 (OD>102 or T>8) (@)	P15 E Group 1 (P91/P92)	X20CrMov121 **	12X1M (t up to 52mm)	P8
P1 Group 1 (Gr. B), Steel 20, 15 Mo3, P1 Group 2 (Gr.C) t<=19	Pre Heat=10°C Post Heat: Nil PWHT: Nil	Pre Heat=150 ($$$) Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT:610+/-15 #	Pre Heat=150 Post Heat: Nil PWHT: If PH – Nil (10°C min), Else 635+/-15	Pre Heat=150 Post Heat: Nil PWHT: 635+/-15	Pre Heat=150 Post Heat: Nil PWHT: If PH – Nil (10°C min), Else 665+/-15	Pre Heat=150 Post Heat: Nil PWHT: 665+/-15	Pre Heat=150 Post Heat: Nil PWHT: If PH – Nil (10°C min), Else *690+/-15*	Pre Heat=150 Post Heat: Nil PWHT: *690+/-15*	NA	NA	NA	NA
P1 Group 1 (Gr. B), Steel 20, 15 Mo3, P1 Group 2 (Gr.C) t>19	Pre Heat=150 ($$$) Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT: 610+/-15 #	Pre Heat=150 ($$$) Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT:610+/-15 #	Pre Heat=150 ($$$) Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT: If PH 610+/-15 #, else 635+/-15	Pre Heat=150 Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT: 635+/-15	PH=150 ($$$) Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT: If PH 610+/-15 #, else 665+/-15	PH=150 Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT: 665+/-15	PH=150 ($$$) Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT: If PH 610+/-15 #, else *690+/-15*	PH=150 Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT:*690+/-15*	NA	NA	NA	NA
P3 (OD <=127 & T<=13)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P3 (OD >127 or T>13)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P4, 13CrMo44 (OD <=127 & T<=13)	PH=150 Post Heat: Nil PWHT: 665+/-15(*)	PH=150 ($$$) Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT: if PH 610+/-15, else 665+/-15	PH=150 Post Heat: Nil PWHT: If PH – Nil (10°C min), Else 665+/-15	PH=150 Post Heat: Nil PWHT: 665+/-15	PH=150 Post Heat: Nil PWHT: If PH – Nil (10°C min), Else 665+/-15	PH=150 Post Heat: Nil PWHT: 665+/-15	PH=150 Post Heat: Nil PWHT: If PH – Nil (10°C min), Else 695+/-15	PH=150 Post Heat: Nil PWHT: 695+/-15	NA	NA	NA	NA
P4, 13CrMo44 (OD >127 or T>13)	PH=150 Post Heat: Nil PWHT: 665+/-15	PH=150 Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT:665+/-15	PH=150 Post Heat: Nil PWHT: 665+/-15	PH=150 Post Heat: Nil PWHT: 665+/-15	PH=150 Post Heat: Nil PWHT: 665+/-15	PH=150 Post Heat: Nil PWHT: 665+/-15	PH=150 Post Heat: Nil PWHT: 695+/-15	PH=150 Post Heat: Nil PWHT: 695+/-15	NA	NA	NA	NA
P5A, 10CrMo910 (OD<=102 & T<=8) (@)	PH=150 Post Heat: Nil PWHT: If PH- Nil (10°C min), Else *690+/-15*	PH=150 ($$$) Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT: If PH -610+/-15, else *690+/-15*	PH=150 Post Heat: Nil PWHT: If PH- Nil (10°C min), Else *690+/-15*	PH=150 Post Heat: Nil PWHT: 635+/-15	PH=150 Post Heat: Nil PWHT: If PH- Nil (10 °C min), Else 695+/-15	PH=150 Post Heat: Nil PWHT: 665+/-15	PH=150 Post Heat: Nil PWHT: If PH- Nil (10°C min), Else 695+/-15	PH=150 Post Heat: Nil PWHT: 695+/-15	PH=220 Post Heat: (Refer Cl. 4.2.2.3) PWHT: 760+/-10##	NA	NA	PH=150 Post Heat: Nil PWHT: 695+/-15(*)

BUTT / STUB / BASE METAL	P1 Group 1 (Gr.B), Steel 20, 15 Mo3, P1 Group 2 (Gr.C) t<=19	P1 Group 1 (Gr.B), Steel 20, 15 Mo3, P1 Group 2 (Gr.C) t>19	P3 (OD <=127 & T<=13)	P3 (OD >127 or T>13)	P4, 13CrMo44 (OD <=127 & T<=13)	P4, 13CrMo44 (OD >127 or T>13)	P5A, 10CrMo910 (OD<=102 & T<=8) (@)	P5A, 10CrMo910 (OD>102 or T>8) (@)	P15 E Group 1 (P91/P92)	X20CrMov121 **	12X1M (t up to 52mm)	P8
P5A(OD>102 or T>8) (@)	PH=150 Post Heat: Nil PWHT: *690+/-15*	PH=150 Post Heat: Nil (150 for 2 hrs for P1 Group 2) PWHT:*690+/-15*	PH=150 Post Heat: Nil PWHT: *690+/-15*	PH=150 Post Heat: Nil PWHT: *690+/-15*	PH=150 Post Heat: Nil PWHT: 695+/-15	PH=150 Post Heat: Nil PWHT: 695+/-15	PH=150 Post Heat: Nil PWHT: 695+/-15	PH=150 Post Heat: Nil PWHT: 695+/-15	PH=220 Post Heat: (Refer Cl. 4.2.2.3) PWHT: 760+/-10 ##		PH:220 Post Heat: Nil PWHT: 725+/-15	PH=150 Post Heat: Nil PWHT: 695+/-15
P15 E Group 1 (P91/P92)	NA	NA	NA	NA	NA	NA	PH=220 Post Heat: (Refer Cl. 4.2.2.3) PWHT: 760+/-10 ##	PH=220 Post Heat: (Refer Cl. 4.2.2.3) PWHT: 760+/-10 ##	PH=220 Post Heat: (Refer Cl. 4.2.2.3) PWHT: 760+/-10 ##	PH=220 Post Heat:280 for 2 hours PWHT: 760+/-10 ##	NA	NA
X20CrMov121 **	NA		NA	NA	NA	NA	NA	NA	NA	PH: 250-300 for GTAW and 400-450 for SMAW Post Heat:80-100deg C for 90 minutes minimum PWHT: 740-760	NA	NA
12X1M (t up to 52mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	PH:220 Post Heat: Nil PWHT: 725+/-15	NA
P8	NA	NA	NA	NA	NA	NA	PH=150 Post Heat: Nil PWHT: 695+/-15(*)	PH=150 Post Heat: Nil PWHT: 695+/-15	NA	NA	NA	PH=10°C Post Heat=Nil PWHT=Nil

@ Preheat temperature for castings and forgings of P5A shall be 200 deg. C (min)
$$$ Preheating is not required for P1 group 1 (Gr. B), steel 20, 15 Mo3 materials for thickness <=25.
For thickness above 50mm, PWHT shall be carried out at 610+/-15 deg.C with a soaking time of one hour/ inch of T upto 50mm plus 15 minutes for every 25mm thickness above 50mm.
Preheat shall be maintained for P15E Group 1 (P91, P92) until the welding operation is completed. Interpass temperature for P15E group1 welding shall be limited to 350 deg C.
* If not preheated.
** For X20 piping: Producer gas shall not be used for heating and heat treatment. Inter pass temp: 450 Deg.C (max.) After the completion of the welding, the welds shall be maintained at 80-100°C (Optimum: 90°C) till PWHT (SR) is carried out.

Stress Relieving Cycle: 740-760 Deg.C.
Soaking: Thickness 60mm and below : 2 hrs (Min.)
Thickness above 60mm : 3 hrs (Min.).
Heating Rate: Thickness below 40 mm : 200°C/hrs (Max.)
Thickness between 40-70mm : 120°C/hr.(max.)
Thickness between 70-95mm : 85°C./hr.(max.)
Cooling Rate: Thickness below 40 mm : 150 Deg.C./hr.
Thickness between 40-70mm : 100 Deg.C./hr.
Thickness between 70-95mm : 80 Deg.C./hr.
Controlled Cooling : upto 350 Deg.C.
Maintain at: 80°-100°C for 1½ hrs.minimum (Optimum:90°C.)

4.2.3(b) Preheat, Post heat and Post weld heat treatment temperatures for Piping – Non Pressure Part Attachment welds

Base Material (Pressure Part)	**Attachment material (Non-pressure part)**	**Preheat °C**	**Post Heat °C**	**PWHT °C**
P1 Group 1, steel 20, 15 Mo3, P1 Group 2 (t<=19)	Any	10	Nil	Nil if throat thickness <=19 else 610+/-15
P1 Group 1, steel 20, 15 Mo3, P1 Group 2 (t>19)	Any	150	Nil (150 for 2 hours for P1 Group 2)	610+/-15
P3 Group (OD<=127 & t<=13)	Any	150	Nil	Nil if throat thickness <=13 else 635+/-15
P3 Group (OD>127 or t>13)	Any	150	Nil	635+/-15
P4 Group (OD<=127 & t<=13)	Any	150	Nil	Nil if throat thickness <=13 else 665+/-15
P4 Group (OD>127 or t>13)	Any	150	Nil	665+/-15
P5A Group (OD<=102 & t<=8)	Any	150/ 220 @	Nil	1. Nil if throat thickness <=8 else 695+/-15 2. 760+/-10(only if Gr 91/92 attachment)
P5A Group (OD>102 or t>8)	Any	150/ 220 @	Nil	1. 695+/-15 2. 760+/-10(only if Gr 91/92 attachment)
P91/92	Any	220	Refer Cl. 4.2.2.3	760+/-10

Base Material (Pressure Part)	Attachment material (Non-pressure part)	Preheat °C	Post Heat °C	PWHT °C
P8 Group	P1 Group 1, steel 20, 15 Mo3, P1 Group 2 (t<=19)	150	Nil (150 for 2 hours for P1 Group 2)	Nil if throat thickness <=19 else 610+/-15
	P1 Group 1, steel 20, 15 Mo3, P1 Group 2 (t>19)	150	Nil (150 for 2 hours for P1 Group 2)	610+/-15
	P3 Group (t<=13)	150	Nil	Nil if throat thickness <=13 else 635+/-15
	P3 Group (t>13)	150	Nil	635+/-15
	P4 Group (t<=13)	150	Nil	Nil if throat thickness <=13 else 665+/-15
	P4 Group (t>13)	150	Nil	665+/-15
	P5A Group (t<=8)	150/ 220 @	Nil	Nil if throat thickness <=8 else 695+/-15
	P5A Group (t>8)	150/ 220 @	Nil	695+/-15
	P91/92	220	Refer Cl. 4.2.2.3	760+/-10
	P8	10°C	Nil	Refer WPS

4.2.4 Tubular Products

4.2.4(a) Preheat, Post heat and Post weld heat treatment temperatures for PIPES/TUBES OF OD <=108 & t <= 19mm (Notes 4.2.4.1 to 4.2.4.5)

Tube/Pipe Material	Thickness in mm	BUTT welds		Attachment welds			
		Preheat	PWHT	Fillets Length <=100mm		Others	
				Preheat	PWHT	Preheat	PWHT
P1 group 1 SA 178 A,C SA 192, SA 210A1,Steel 20	All	10°C	610±15°C For bifurcates and flash butt welds only	10°C	NIL	NIL	610±15°C For fusion Welded Panel, Burner panel** and attachments of throat >13mm only
P1 Group 2 SA210Gr C	1) T<=9 & C≤0.3% 2) T>9 to ≤20 & C≤0.25	10°C	610±15°C For bifurcates and flash butt welds only	10°C	NIL	NIL	610±15°C For Fusion welded Panel, burner panels** and attachments of throat >13mm only
	3) T>9 to ≤20 & C>0.25 to ≤0.3% 4) All "T" if C > 0.3%	10°C	610±15°C	10°C	NIL	NIL	610±15°C For Fusion welded Panel and attachments of throat >13mm only
P3 group 1	T ≤ 13	10°C	635±15°C A) For IPW & B) For bifurcates	10°C	635±15°C For P8 attachments only.	NIL	635±15°C
	T>13	10°C	635±15°C	10°C	635±15°C For P8 attachments only.	NIL	635±15°C

Tube/Pipe Material	Thickness in mm	BUTT welds		Attachment welds			
				Fillets Length <=100mm		Others	
		Preheat (°C)	PWHT (°C)	Preheat (°C)	PWHT (°C)	Preheat (°C)	PWHT (°C)
P3 Group 2 **P4 Group 1**	T ≤ 13	150°C	665±15°C only 1) for IPW 2) for Bifurcates 3) if not pre heated	10°C	NIL	150°C	@@ 665±15°C
	T>13	150°C	665±15°C	10°C	Nil	150°C	665±15°C
P5A group 1 **OD ≤ 102**	T ≤ 8	150°C	695±15°C only 1) for IPW 2) for Bifurcates 3) if not pre heated	10°C	Nil	150°C	695±15°C If throat >13mm or if not preheated.
	T>8	150°C	695±15°C	10°C	Nil	150°C	695±15°C
SA 213 T91 **SA 213 T92** **SA213 T23**	All T	220°C 150 °C	745±15°C	220°C 150°C	745±15°C	220°C	745±15°C
SA 213 TP304H **SA213 TP316** **SA312 TP316**	All T	10°C	NIL	10°C	*Solution annealing if throat >13mm at 1050-1080°C / 15 minutes*	10°C	*Solution annealing at 1050-1080°C / 15 minutes' minimum*
SA213 TP347H	All T	10°C	NIL	10°C	*Solution annealing at 1105-1135°C/ 30 minutes' minimum*	10°C	*Solution annealing at 1105-1135°C / 30 minutes minimum*
SA213 UNS30432 (Super 304H)	All T	10°C	NIL	10°C	*Solution annealing at 1120-1150°C/ 30 minutes' minimum*	10°C	*Solution annealing at 1120-1150°C / 30 minutes' minimum*

@@ For peg fin welds of P4, P5 fins, FW Panel, Fin welded Panel and All P8 attachments only. For all other attachments -only if not pre heated or if throat thickness is > 13mm.

** For PWHT of burner panels done in batch type furnaces. 510 ± 15°C cycles shall be followed with a soaking time of 25 minutes per mm of thickness.

4.2.4.1 When scheduled for PWHT, pre heating is not required except for P15E and T23.

4.2.4.2 For attachment welds of different P Group No. on Tubes, PWHT temperature of tube material shall apply. However, for welding of Austenitic

materials with ferritic materials, pre heat & PWHT of ferritic materials shall apply.

4.2.4.3 PWHT of Stud welding shall be as per approved WPS.

4.2.4.4 PWHT of Bifurcate leg welding, except for P5 group materials, can be clubbed with Heat treatment of assembly / panels.

4.2.4.5 When a number of attachments are welded to tube, each length of weld shall be separated from one another by a length of at least equal to the longer of the adjacent weld. Otherwise, total length of all such welds must be considered for PWHT.

4.2.4(b): PWHT requirement for the welds between support members (Lug-to-Lug) in tube supports (Not applicable for welds on tubes)

Material	P1 (Carbon Steel)			P4 (1 or 1.25 Cr, 0.5 Mo Steel)			P5A (2.25 Cr, 1 Mo Steel) & Gr. 23			P15 E Group 1 & Gr.92			P8 (Stainless Steel includes super 304)		
	Thickness	parameter	variable	Thickness	parameter	variable	Thickness	parameter	variable	Thickness	parameter	variable	Thickness	parameter	variable
P1	P1<=38	Preheat	10°C	P4<=13 P1<=38	Preheat	10°C	P5A<=13 P1<=38	Preheat	150				P8 All P1<=38	Preheat	*10°C*
		PWHT	NIL		PWHT	NIL		PWHT	NIL					PWHT	NIL
				P4>13 &<=25 P1<=38	Preheat	120	P5A>13 &<=25 P1<=38	Preheat	150						
					PWHT	NIL		PWHT	695+/-15						
				P4>25 &<=38 P1<=38	Preheat	120									
					PWHT	665+/-15									
P4				P4 <= 13	Preheat	*10°C*	P5A<=13 P4<=25	Preheat	150				P8 All P4<=13	Preheat	*10°C*
					PWHT	NIL		PWHT	NIL					PWHT	NIL
				P4>13 &<=25	Preheat	120	P5A<=13 &P4>25& <=38	Preheat	150				P8 All P4>13& <=25	Preheat	120
					PWHT	NIL		PWHT	695+/-15					PWHT	NIL
				P4>25 &<=38	Preheat	120	P5A>13 &<=25 P4<=38	Preheat	150				P8 All P4>25& <=38	Preheat	120
					PWHT	665+/-15		PWHT	695+/-15					PWHT	665+/-15
P5A & Gr 23							P5A<=13	Preheat	150				P8 All P5A<=13	Preheat	150
								PWHT	NIL					PWHT	NIL
							P5A>13& <=25	Preheat	150				P8 All P5A>13&<=25	Preheat	150
								PWHT	695+/-15					PWHT	695+/-15
P15E Group 1 & Gr 92							All t	Preheat	220	All t	Preheat	220	All t	Preheat	220
								PWHT	745+/-15		PWHT	745+/-15		PWHT	745+/-15
P8 & Super 304													P8 All	Preheat	10°C
														PWHT	NIL

Annexure I

ASME MATERIALS & P - NUMBER GROUPING

P-No.	PLATES	PIPES	TUBES	FORGINGS / FITTINGS
P1/Gr 1 (Carbon Steel)	SA 515 Gr 60 SA 516 Gr 60 SA 283 Gr A-D SA 285 Gr C SA 334 Gr 1,6	SA 106 GrA, B SA 333 Gr 1,6	SA 178 Gr A, C SA 179 SA 192 SA 210 Gr A1	SA 350 LF1 SA 266 Cl1
P1/Gr 2 (Carbon Steel)	SA 515 Gr 70 SA 516 Gr 70 SA 299 SA 537 Cl 1	SA 106 Gr C	SA 178 Gr D SA 210 Gr C	SA 105 SA 266 Cl2, Cl3 SA 350 LF2
P3/Gr 1 (L A S)	SA 204 Gr A SA 387 Gr2/Cl1	SA 335 P1,P2	SA 209 T1, T1A SA 213 T2	
P3/Gr 2 (L A S)	SA 204 Gr B,C			SA 182 F1,F2
P4/Gr 1 (L A S)	SA 387 Gr11 Cl 1 & Cl 2 SA 387 Gr12 Cl 1 & Cl 2	SA 335 P11 SA 335 P12	SA 213 T11 SA 213 T12 SA 199 T11	SA 182 F11 Cl 1,2,3 SA 182 F12 Cl 1,2 SA 234 WP11 Cl 1 SA 234 WP12 Cl 1 SA 336 F11 Cl 1,2,3 SA 336 F12 Cl 1,2
P5A/Gr 1 (L A S)	SA 387 Gr22 Cl 1 & Cl 2	SA 335 P22	SA 213 T22 SA 199 T22	SA 182 F22 Cl 1,3 SA 234 WP22 Cl 1
P5B/Gr 1 (A S)	SA387 Gr5/Cl1 SA387 Gr9/Cl2	SA 335 P5 SA 335 P9	SA 199 T5 SA 199 T9	SA 182 F5, F9 SA 234 WP5, WP9 SA 336 F5, F9
P15E Gr 1 (A S)	SA 387 Gr 91 Type 1 SA 387 Gr 91 Type 2	SA 335 P91 Type 1 SA 335 P91 Type 2	SA 213 T91 Type 1 SA 213 T91 Type 2	SA 182 F91 Type 1 SA 182 F91 Type 2 SA 234 WP91 Type 1 SA 234 WP91 Type 2 SA 336 F91 Type 1 SA 336 F91 Type 2
P15E Gr 1 Code Case (2179-*11*)	--	SA 335 P92 SA 369 FP92	SA 213 T92	SA 182 F92
P8 (S S)	SA 240 TP 304, 304L, 304H, 316, 316L, 321, 347, 347L, 347H	SA 312 TP 304, 304L, 316, 316L, 321, 347, 347H	SA 213 TP 304H, 316, 316H, 321H, 347H, 316 Ti, *UNS S30432 (Super 304H)*	SA 182 F304H SA 182 F347H
Code Case (2199-*9*)	SA 1017 Gr 23	SA 335 P23	SA 213 T23	SA 182 F23

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
QUALITY ASSURANCE DEPARTMENT

AMENDMENT TO QUALITY WORK INSTRUCTIONS (QWI)

QWI NO: **SQP:PP:02 REV:07**

AMENDMENT SL NO: **A4** **DATE: 24.06.2025** **Page 1 of 1**

DESCRIPTION: **HEADERS AND SUCTION MANIFOLD**

Clause No	Amended as ...	Remarks / Basis for Amendment
3.2 - Completeness	Remarks: Inside cleaning shall be checked by Borescope for all closed end headers that are without elbows or tees (where visual examination of inside surface is not possible) before end capping of the stub open ends.	Based on site feedback citing foreign material presence in headers
NOTE	The above changes will be incorporated in the QWI during next revision of the document.	

Prepared By: Md Fahad, Dy Manager/QA	Reviewed & Approved By: A.Sakthi Ganesh, Sr Manager/QA
Signature & Date: 24.06.2025	Signature & Date: 24.06.2025

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
QUALITY ASSURANCE DEPARTMENT

AMENDMENT TO QUALITY WORK INSTRUCTIONS (QWI)

QWI NO: **SQP:PP:02 REV:07**

AMENDMENT SL NO: **A3** **DATE: 14.06.2021** **Page 1 of 2**

DESCRIPTION: **HEADERS AND SUCTION MANIFOLD**

<table>
<tr><td>Clause No</td><td>Amended as ...</td><td>Remarks / Basis for Amendment</td></tr>
<tr><td>Table II</td><td>The Table II shall be read with the following material combination in addition to the existing combinations.
<table>
<tr><th>Header Pipe material + Butt Joints / Stubs / Nozzles / End Covers (Note a)</th><th>Thickness (mm)</th><th>Preheat (°C)</th><th>Post Heating (°C)</th><th>PWHT (°C)</th></tr>
<tr><td>P15E Gr1+ T23</td><td>All</td><td>220</td><td>Note g</td><td>760±10°C</td></tr>
</table></td><td>Parameters for the combination of P15EGr1, and T23 addressed</td></tr>
<tr><td>Cl.2.2 & Cl.2.3.1</td><td>Please refer the next page</td><td>Self-inspection by task performers introduced</td></tr>
<tr><td>NOTE</td><td colspan="2">The above changes will be incorporated in the QWI during next revision of the document.</td></tr>
</table>

Prepared By: A.Sakthi Ganesh, Dy Manager/QA	Reviewed & Approved By: JVV Aruna Kumar, SDGM/QA
Signature & Date: 14.06.2021	Signature & Date: 14.06.2021

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
QUALITY ASSURANCE DEPARTMENT

AMENDMENT TO QUALITY WORK INSTRUCTIONS (QWI)

QWI NO: **SQP:PP:02 REV:07**

AMENDMENT SL NO: **A3** **DATE: 14.06.2021** **Page 2 of 2**

DESCRIPTION: **HEADERS AND SUCTION MANIFOLD**

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY M	AGENCY C	AGENCY N	REMARKS
1	2	3	4	5	6	7	8	9		** 10			11
2.2	Stubs / Nozzles	Dimensions	B	Measurement	5% @	Drawing & SIP:PP:11		R		P	QC ^		Ensure PFHT as required. @ 100% measurement for nozzles ^ For Stubs, self-inspection by task performers. QC to verify records.
2.3.1	Weld fitup- butt joints, stubs & attachments	Weld angle, Root gap, Location, Mismatch, Orientation & Dimensions;	B	Measurement	100%	Drawing		RS		P	QC ^^		Note 3.0 $ For stub welds, welder correlation list shall be maintained. ^^ For non-pressure attachments, self-inspection by task performers. QC to verify records.

NOTE	The above changes will be incorporated in the QWI during next revision of the document.

Prepared By: A.Sakthi Ganesh, Dy Manager/QA	Reviewed & Approved By: JVV Aruna Kumar, SDGM/QA
Signature & Date: 14.06.2021	Signature & Date: 14.06.2021

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
QUALITY ASSURANCE DEPARTMENT

AMENDMENT TO QUALITY WORK INSTRUCTIONS (QWI)

QWI NO: **SQP:PP:02 REV:07**

AMENDMENT SL NO: **A2** **DATE: 26.08.2019**

DESCRIPTION: **HEADERS AND SUCTION MANIFOLD**

Clause No	Amended as ...	Remarks / Basis for Amendment
2.6.1.1	For non-load carrying attachment welds on stubs and header pipes, the clause shall be read as "100% Visual and 10% LPI/MPI" (LPI procedure: BHE:NDT:PB:PT-01)	Amended based on feedbacks and aligned in-line with Tubular products
2.6.2	The acceptance norms for Hardness on Butt joints of P91/P92 Headers shall be read as **180 – 300 HB**	Amended based on feedbacks

NOTE	The above changes will be incorporated in the QWI during next revision of the document.

Prepared By: A.Sakthi Ganesh, Dy Manager/QA	Reviewed & Approved By: JVV Aruna Kumar, SDGM/QA
26-08-2019 Signature & Date: 26.08.2019	26/8/2019 Signature & Date: 26.08.2019

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014
QUALITY ASSURANCE DEPARTMENT

AMENDMENT TO QUALITY WORK INSTRUCTIONS (QWI)

QWI NO: QP NO. : **SQP: PP: 02 REV.: 07**

AMENDMENT SL NO: A1 DATE: 04-08-2015

DESCRIPTION: HEADERS AND SUCTION MANIFOLDS

<table>
<tr><th>Clause No</th><th>Amended as...</th><th>Basis for amendment</th></tr>
<tr><td>Table II (Page 8)</td><td>Table number and name added as "Table II. PREHEAT, POST HEAT AND PWHT OF HEADERS".</td><td>Table – II - Title added.</td></tr>
<tr><td>Table II</td><td>PWHT temperature for P4 material changed from 655±15°C to 665±15°C as below:
Table II. PREHEAT, POST HEAT AND PWHT OF HEADERS
<table>
<tr><th>Header Pipe material + Butt Joints / Stubs / Nozzles / End Covers (Note a)</th><th>Thickness (mm)</th><th>Preheat (°C)</th><th>Post Heating (°C)</th><th>PWHT (°C)</th></tr>
<tr><td rowspan="3">P1 A,B + P1 A,B; Steel 20 + Steel 20</td><td>t ≤ 25</td><td>Nil</td><td rowspan="3">Nil</td><td rowspan="3">615±20</td></tr>
<tr><td>t>25 to 75</td><td>100</td></tr>
<tr><td>t>75</td><td>150</td></tr>
<tr><td>P1 C + P1 C</td><td>All</td><td>150</td><td>150 for 2 hrs</td><td>615±20</td></tr>
<tr><td rowspan="3">P1+P3</td><td>t ≤ 25</td><td>Nil</td><td rowspan="3">Nil</td><td rowspan="3">635±15</td></tr>
<tr><td>t>25 to 75</td><td>100</td></tr>
<tr><td>t>75</td><td>150</td></tr>
<tr><td>P4 + P4 & P1A,B + P4</td><td>All</td><td>150</td><td>Nil</td><td>665±15°C</td></tr>
<tr><td>P5A + P5A</td><td>All</td><td>150 (Note e)</td><td>250 for 2 hrs</td><td>695±15 (Note b)</td></tr>
<tr><td>P4 + P5A</td><td>All</td><td>150 (Note e)</td><td>250 for 2 hrs</td><td>Note c</td></tr>
<tr><td>P1C + P4</td><td>All</td><td>150</td><td>150 for 2 hrs</td><td>665±15°C</td></tr>
<tr><td>P1C+P5A</td><td>All</td><td>150</td><td>150 for 2 hrs</td><td>Note c</td></tr>
<tr><td>P5A+ P15E Gr1</td><td>All</td><td>150</td><td>Note g</td><td>760±10 (Note g)</td></tr>
<tr><td>P4 + T23</td><td>All</td><td>220</td><td>Nil</td><td>720-745</td></tr>
<tr><td>P5A+T23/ T22+T23</td><td>All</td><td>220</td><td>250 for 2 hrs</td><td>745±15</td></tr>
<tr><td>P15E Gr1 + P15E Gr1</td><td rowspan="5">All</td><td rowspan="5">220</td><td rowspan="5">Note g</td><td rowspan="5">760±10 (Note g)</td></tr>
<tr><td>P15E Gr1 + P5A</td></tr>
<tr><td>P92 + P92/T92</td></tr>
<tr><td>P15E Gr1+T92</td></tr>
<tr><td>P92+ P15E Gr1</td></tr>
<tr><td>12X1MF+12X1MF</td><td>Upto 52</td><td>220</td><td></td><td>725±15</td></tr>
</table></td><td>HT cycle for P4 material changed to meet IBR & ASME</td></tr>
</table>

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014
QUALITY ASSURANCE DEPARTMENT

AMENDMENT TO QUALITY WORK INSTRUCTIONS (QWI)

QWI NO: QP NO. : **SQP: PP: 02 REV.: 07**

AMENDMENT SL NO: A1 DATE: 04-08-2015

DESCRIPTION: HEADERS AND SUCTION MANIFOLDS

<table>
<tr><th>Clause No</th><th>Amended as...</th><th>Basis for amendment</th></tr>
<tr><td>Note c</td><td>The content of the clause has been modified to change the PWHT temperature of P4 material from 655±15°C to 665±15°C as below:
<table>
<tr><th>Header Pipe + Stub/Pipe</th><th>PWHT Temperature After meeting all the below requirements</th><th>PWHT temperature if any one of the below conditions are not met</th></tr>
<tr><td>P1+P4</td><td>615 ± 20°C</td><td>665±15°C</td></tr>
<tr><td>P1 + P5A</td><td>615 ± 20°C</td><td>As per WPS</td></tr>
<tr><td>P4 + P5A</td><td>665±15°C</td><td>695+/-15°C</td></tr>
</table></td><td>HT cycle for P4 material changed to meet IBR & ASME.</td></tr>
<tr><td>NOTE</td><td colspan="2">The above-mentioned changes will be incorporated in the relevant QWI during the next revision of the document.</td></tr>
</table>

Prepared by: A. Sakthi Ganesh	Approved by: S. Selvarajan
Signature & Date: 04-08-2015	Signature & Date 04-08-2015

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014, INDIA

STANDARD QUALITY PLAN FOR HEADERS AND SUCTION MANIFOLD

SQP:PP:02 / 07
Page 1 of 9

Prepared by Quality Assurance	A.SAKTHI GANESH

Reviewed by	Signature
Quality Assurance (Manu Shankar H/ SM)	
Manufacturing Shops (I. Kamalakannan/ AGM)	
O P & C (G.Rajendran/ DGM)	
Quality Control (T.Chithambararajan/ DGM)	
Engineering (I.Kalyanasundaram/ AGM)	

Revision No.	Date	Approved by	Signature
00	01/04/93	SM / QA	
01	30/10/93	SM / QA	
02	01/02/95	SM / QA	
03	15/07/96	DGM / QA	
04	01/04/03	SDGM / QA	
05	31/12/05	DGM / QA	
06	17/11/11	AGM / QA	
07	25/03/15	AGM / QA & BE	

RECORD OF REVISIONS

Rev No	Details of Revision	Remarks
00	SQP 02/00, QCP2:2:033/07,QCP 2:2:464/00, PR:QE:160/ 00 and HT SCHEDULE together in this document.	
01	2.2/2.3.1/2.3.3-2.3.5, 2.5.2/2.7/3.1 Notes:1.0/2.0/2.1/3.4/4.2/5.2.1/5.3/5.4/5.5/8.3/9.1/9.1.1/ 9.2/9.3/9.5/10.3/ 11.1, Annexure-I,Note a of Annexure II	Revised
02	Totally revised by rearranging and Optimizing the information and incorporating the amendments.	
03	Title	Modified to include Suction manifold.
	Note 1.0	TDC numbers updated in Steel 20 & P91 materials added.
	PR:QEs replaced with SIPs as applicable.	
	Cl. 2.4.3, 2.4.4, 3.1 & 3.2	Modified
	Cl. 2.4.7 added & 2.6.3	Deleted
	Cl. 2.6.4	Renumbered as 2.6.3.
	Notes 8.1, 8.2, 12.0 & Table II	Modified.
04	Cl. 2.1 & 2.3	Re-numbered. Remarks added in 2.1.
	Cl. 2.0, 2.4.1, 2.4.3, 2.4.7, 2.6.1, 2.6.2, 2.7, 2.6.3, 3.1, 3.2 & 3.3	Modified.
	Cl. 2.3.1	Added to incorporate the Amendment issued to Rev. 03.
	Notes 1.0, 5.0, 8.2, 11.0 & 12.0	Modified.
	Table II and the corresponding notes a, b, c, d & f	Modified in line with latest IBR requirements. Note h added under Table II.
05	Cl. 2.4.2, 2.4.6, 2.6.2	RT Ref.doc/Acceptance std. no changed.
	Cl. 2.4.5, 2.4.7	UT Ref.doc/Acceptance std. no changed.
	Cl. 2.4.6	Type of check changed as RT/ UT.
	Note 1.0	TDC numbers updated
	Note 9.0	Editorial correction made.
	Table II	Minimum PWHT temperature for P4-ASME material is added. Editorial corrections made in Note c & d.
06	Cl 2.3, 2.4, 2.4.3.1, 2.4.7, 2.6.2 (a), 3.2, Table II & Note a, c, h of Table II	Included Amendments A1, A2, A3, A4. **For P91/P92:** Requirements of post heating deleted in Table II and Hydrogen baking added in Note h.
	Amendment A5 (Heat Treatment Requirements for Bend Tubes of SA 213 T23).	Included in SIP:PP:11.
	Note 1	TDC list updated.
	Note c of Table II for PWHT of P1+P4 combination	Deleted as it is not covered in current version of ASME Sec I.
	Note c of Table II for PWHT of P1+P5A combination	Added as it is covered in current version of ASME Sec I.
	Cl 1, 2, 3	Indicated class against each clause and documents required for data folder. Legend modified. Other minor corrections done.
	Cl 2.3.1, 2.4.8	PMI included as per decision of PCM.
	Cl 2.4.7, 2.6.1, 2.6.2	Requirements of full penetration welds, hardness on P91 & 92 added.

07	Cl 2.2	Quantum of check included
	Cl 2.3.1	Format of record for stub welds included
	Cl.2.3.2	Clause for Inter stage heat treatment added for clarity
	Cl 2.4.2, 2.6.2(a) & (d)	Included Amendment A3. Hardness requirement for P91/92 headers amended.
	Cl 2.4.2	RT for tube to tube butt joints included
	Cl 2.4.8	Type of check - Spectro changed as Spectro Test.
	Cl 2.6.2 (e)	Hardness requirement for T23 butt joints included
	Cl 3.2	DFT measurement included in type of check
	Note 1	TDC list updated. Code case no. included for Gr.23 & Gr.92
	Note 2	Fabrication tolerance drawings list updated.
	Note 6	Amended for clarity.
	Table II	Amendment A1, A2, A4 Included. T22 with T23 safe end combination included and preheat temperature revised for T23 material. P92 with T92 added.
	Table II Note b	Soaking time calculation for Inter stage heat treatment of Gr.91/92 added.
	Note c of Table II for PWHT of P1+P4 P1+P5A P4+P5A	Amendment A5 Included. Higher PWHT temperature for P1+P5A combination deleted as per instructions from Inspecting Authority
	Note e	Amended for better clarity.
	Note g	Amended for better clarity.

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
										M	C	N	SQP:PP:02/07 Page 4 of 9
1	2	3	4	5	6	7	8	9	D*	** 10			11
1.0	**MATERIALS##:**	##Raw materials shall be procured from BHEL approved vendors. Pressure parts Material shall be as per IBR approved drawing.											
1.1	Pipes, Tubes, Plates, Bars, Forgings & Fittings	Chemical & mechanical properties and Soundness	A	Review of documents	100%	Material Specification and TDC	TC	√		P	QC		Note 1.0
2.0	**INPROCESS CONTROL**	(Process Control: QCP:001(Latest))											
2.1	Layout marking	Dimensions	B	Measurement	100%	Drawing, Note 2.0 #	R			P	QC		# Reference line marking at 100mm from the end.
2.2	Stubs / Nozzles	Dimensions	B	Measurement	5% @	Drawing & SIP:PP:11	R			P	QC		Ensure PFHT as required. @ 100% measurement for nozzles
2.3	Welding	Procedure qualification	B	Document Review	100%	ASME Sec.IX	WPS			P	QC		.
		Personnel Qualification	B	Document Review	100%	IBR	WQR			P	QC		
2.3.1	Weld fitup- butt joints, stubs & attachments	Weld angle, Root gap, Location, Mismatch, Orientation & Dimensions;	B	Measurement	100%	Drawing	R$			P	QC		Note 3.0 $ For stub welds, welder correlation list shall be maintained.
		PMI (Alloy Steels)	A	Spectro test	100%	Drawing & Material Spec	R			P	QC		
2.3.2	Inter stage Heat treatment (Where applicable)	Temperature/ Time control	A	Review of Charts	100%	Drawing, Table II - Note b	R			P	QC		
2.4	**NDE before PWHT**												
2.4.1	Surface examination of welds	Size, profile, Surface defects	C	Visual & Measurement	100%	Drawing, SIP:PP:02	R			P	QC		Note 9.0
2.4.2	Butt welds in Pipes, Headers; Hand Hole Pipe+End Cover	Weld Quality	B	RT	100%	BHE:NDT:PB:RT-01	R			P	ND		(Other than X20, Gr 91 & 92)
	X20+SS Stub Butt welds	Weld Quality	B	Fluoroscopy	100%	BHE:NDT:PB:FT-01	R			P	ND		Note 4.0
	Butt welds in nipple tubes (if applicable)	Weld Quality	B	RT	100%	BHE:NDT:PB:RT-01	R			P	ND		

LEGEND : Class : A- Critical, B- Major, C- Minor; * D : Records for Data folder; ** M : MANUFACTURER (BHEL/APPD.SUBCONTRACTORS); C : BHEL/NOMINATED INSPECTION AGENCY; N : CUSTOMER; QC : Quality Control; ND: NDT Lab; R: Record; P-Perform.

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY M	AGENCY C	AGENCY N	REMARKS
1	2	3	4	5	6	7	8	9		** 10			11
2.4.3	Nozzle / Stub Fillet welds	Surface defects	C	MPI	10%$	BHE:NDT:PB:MT-01		R		P	ND		$For P22 &12X1MØ headers
2.4.3.1	Nozzle/Stub fillet welds with FCAW.	Surface Defects – Ist Layer;	C	Visual	100%	SIP:PP:02 (latest)		R		P	QC		
		Finished Weld Quality	C	LPI#	100%	BHE:NDT:PB:PT-01		R		P	ND		#After PWHT for P91/P92 Headers.
2.4.4	Nozzle welds having backing rings	Surface defects	C	LPI#/Visual*	100%	BHE:NDT:PB:PT-01 Note 5.0		R		P	ND/ QC		* For welds not accessible. #LPI after PWHT for P91/ P92 Headers.
2.4.5	Plug type End covers with groove welds	Weld Quality	B	UT#	100%	BHE:NDT:PB:UT-01, BHE:NDT:PB:UT-21		R		P	ND		#After PWHT for P91/P92 Headers.
2.4.6	Butt Joints of P22 thickness >50mm#	Weld Quality	B	RT/UT	100%	BHE:NDT:PB:RT-01 / BHE:NDT:PB:UT-01		R		P	ND		# After Interstage HT
2.4.7	Full Penetration nozzles welds#	Weld Quality	B	MPI+ UT	100%	BHE:NDT:PB:MT-01, BHE:NDT:PB:UT-01		R		P	ND		# Except for P91/P92.
2.4.8	PMI (Alloy Steels)@	Matl Specification	B	Spectro test	@	Drawing & Matl Spec		R		P	QC		@100% for weldments & 10% for raw materials.
2.5	**Final PWHT**	Temperature & Time control	A	Review of charts.	100%	Table I & II		R		P	QC		Note 6.0
2.6	**NDE after PWHT**												
2.6.1	Full Penetration nozzles welds of P91 & P92	Weld Quality	B	MPI+ UT	100%	BHE:NDT:PB:MT-05, BHE:NDT:PB:UT-21		R		P	ND		
2.6.1.1	Stubs, Other nozzles, load carrying & other attachment welds	Surface defects	B	MPI / UT*	100%	BHE:NDT:PB:MT-01/ MT-05 @ BHE:NDT:PB:UT-21		R		P	ND		@ MT-05 for X20/P91/P92. *Note 7.0 for X20.
2.6.2	Butt Joints												
	a) P91/P92 Headers*	Weld Quality (Note 8.2)	B	MPI + RT/UT	100%	BHE:NDT:PB: MT-05, RT-01, UT21		R		P	ND		* Also includes welds involving Gr 91/92 + Other grades.
		Hardness on P91 & P92.	B	Measurement	*	160-300BHN Max.		R		P	QC		*3 spots at random on each butt joint only.

LEGEND : Class : A- Critical, B- Major, C- Minor; * D : Records for Data folder; ** M : MANUFACTURER (BHEL/APPD.SUBCONTRACTORS); C : BHEL/NOMINATED INSPECTION AGENCY; N : CUSTOMER; QC : Quality Control; ND: NDT Lab; R: Record; P-Perform.

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
										M	C	N	SQP:PP:02/07 Page 6 of 9
1	2	3	4	5	6	7	8	9	D*	** 10			11
2.6.2	b) X20 + SS Stub welds	Weld Quality	B	LPI +RT	100% 5%	BHE:NDT:PB:PT-01, RT-03		R		P	ND		
	c) HH Pipes+End covers	Weld Quality	B	RT	100%#	BHE:NDT:PB:RT-01		R		P	ND		# Welded after PWHT
	d) Butt joints of X20	Weld Quality (Note 8.2)	B	MPI+UT	100%	BHE:NDT:PB:MT-05, UT-21		R		P	ND		
	e) Butt joints involving T23 tubes	Hardness	B	Measurement	10%*	160-260 BHN		R		P	QC		* per header
2.6.3	Handhole Plate & RG plug seal welds	Surface defects	B	MPI + LPI	100%	BHE:NDT:PB:MT-01, PT-01		R		P	ND		Note 10.0
2.7	Hydro Test	Strength & Leak tightness	A	Visual	**	Drawing, IBR, SIP:PP:04		R		P	QC		** As indicated in the Drawing.
3.0	**FINAL INSPECTION**												
3.1	Dimensional inspection.	Orientation, Location, Pitch, Length, EP, Bow,Alignment, height, Scarfing of stubs, Through bore for socket, hose/sponge test for bent stubs;	B	Measurement & Visual	100%	Drawing.		R		P	QC		Note 8.1
3.2	Completeness	Cleanliness (Inside & Outside), Paint finish, DFT, Stamping, rub off, Identification, End capping, Marking axis, Left/Right & Front/Rear, Colour coding	B	Visual DFT Measurement	100%	Drawing,SIP:PP:22 Note:11.0, 12.0, SIP:PP:04		- - R - - - - -		P P	QC QC		
3.3	Certification	Compilation of Records	C	Document Review	100%	IBR forms, TC Extracts		R	√	P	QC		

LEGEND : Class : A- Critical, B- Major, C- Minor; * D : Records for Data folder; ** M : MANUFACTURER (BHEL/APPD.SUBCONTRACTORS);
C : BHEL/NOMINATED INSPECTION AGENCY; N : CUSTOMER; QC : Quality Control; ND: NDT Lab; R: Record; P-Perform.

NOTES:

1.0 The materials normally used and their TDC Nos. are given below.
For specific material grades to be used, the respective drawings are to be referred.

Product Form	Material Specification	TDC No (Latest Rev)
Pipes	SA 106 GrB & C, SA 335 P11, P12, P22	0:101, 0:112
	SA 335 P91, P92(Code case 2179)	0: 123
	X20 Cr Mo V121	0:104
	12X 1MF, Steel 20	0:103
Plates	SA 515 Gr.70, SA 387 Gr. 12, 22, 91	0:202
	SA 299 Gr A	0:201
Forgings	SA 105,SA 182 F12, F22, F91 & F92 SA 336 F12, F22	0:404
	12X 1MF, Steel 20	0:402
Bars	SA 105, SA 182 F12 & F22	0:309
	X20 Cr Mo V121	0:310
Fittings	SA234 WPB & WPC,WP11, SA234 WP12,WP22, WP91	0:423
Tubes	SA192, SA210Gr.A1, C, SA 209 T1, SA 213 T2, T11 & T22	0:102, 0:111
	SA 213 TP 316, TP304H, 347H	0:102
	SA 213 T12, T23(Code case 2199), T91, T92	0:124
	12X 1MF, Steel 20	0:103

2.0 The fabrication tolerances shall be as per the drawings given below (Latest):1-03-000-00011, 1-03-000-00014, 1-03-000-00034, 2-03-000-00001, 1-10-183-01282, 1-10-183-01283.

3.0 During cir-seam matching, verify the orientation of Ells, Tees, matching of quadrant lines, and the nipples axis alignment. Mark main axes of header and maintain till end.

4.0 Defective butt joints between nipples of X20 and Stainless steel shall be cut by grinding, edge prepared and tested by LPI before re-welding.

5.0 Backing rings, where used, shall be removed by machining and the backing ring removed areas in the case of full penetration nozzles of length below 200mm and ID above 100 mm shall be tested by LPI.

6.0 Before PWHT, the header straightness at two perpendicular axes shall be checked to arrange in the furnace suitably during heat treatment to reduce out of straightness and to avoid further distortion.

7.0 In case of X20 headers, in addition to MPI, UT shall be conducted on all full penetration nipples of ID > 100mm and set on nipples of ID > 150mm and attachment welds with full penetration welds.

8.0 STRAIGHTNESS AND NIPPLE ALIGNMENT

8.1 After PWHT, the header bow shall be checked & ensured as per tolerance drawing.

8.2 During press straightening, if the points of contact of press, support etc. are exactly on the butt joints, such butt joints are to be subjected to radiography after straightening operation .In case of X20/P91/P92 headers, UT shall be done for such joints. The joints coming in between contact points shall be tested by MPI after straightening.

9.0 Repair welding is not required when the design thickness is ensured and local depression does not exceed 2 mm in depth and is smoothly merged.

10.0 Hand hole plates shall be fitted and seal welded as per SIP: PP: 18 (Latest).

11.0 STAMPING DETAILS: Each header shall be hard stamped as below.

BHEL TIRUCHIRAPPALLI
W.O. NO. YEAR OF MAKE
DU NO. HEADER DESIGNATION
TESTED TO KG/CM²(G) ON (As applicable)
W.P KG/CM²(G)
INSPECTING OFFICER'S OFFICIAL STAMP

12.0 PACKING:

In the case of Stainless steel stubs, suitable size of plastic end caps shall be firmly fixed on to the stub with adhesive tape. For other stubs, plastic end caps shall be provided with capping channels. Header open ends shall be provided with metallic end caps [Refer SIP: PP: 01]. No tack welding is Permitted on X20/P91/T91/P92/T92/T23 materials.

Table I. POST WELD HEAT TREATMENT CYCLE FOR X20 HEADERS

Preheating	250-300^{0}C for GTAW + one layer SMAW
	400-450^{0}C for SMAW.
Inter pass temperature	450^{0}C (max.)
Cooling to:	80-100^{0}C (Optimum :90^{0}C)
Cooling Rate:	For "t" below 40 mm: 150 ^{0}C/hr. For "t" between 40 mm to 70mm: 100^{0}C /hr. For "t" between 70 mm to 95mm: 80^{0}C /hr. Maintain at: 80-100^{0}C for 1½ hrs minimum (Optimum: 90^{0}C) up to the time of PWHT(SR), after the welding is over, the welds shall be kept at 80-100^{0}C (Optimum:90^{0}C)
Stress Relieving Cycle	740-760^{0}C.
Soaking:	Thickness 60mm and below: 2 hrs.(min.)
	Thickness above 60mm: 3 hrs.(min.)
Heating Rate:	Thickness below 40 mm: 200^{0}C /hr (max.)
	Thickness between 40-70mm: 120^{0}C /hr (max.)
	Thickness between 70-95mm: 85^{0}C/hr (max.)
Cooling Rate:	150^{0}C /hr (max.) Controlled Cooling: up to 350^{0}C.

Header Pipe material + Butt Joints / Stubs / Nozzles / End Covers (Note a)	Thickness (mm)	Preheat (°C)	Post Heating (°C)	PWHT (°C)
P1 A,B + P1 A,B; Steel 20 + Steel 20	t ≤ 25	Nil	Nil	615±20
	t>25 to 75	100		
	t>75	150		
P1 C + P1 C	All	150	150 for 2 hrs	615±20
P1+P3	t ≤ 25	Nil	Nil	635±15
	t>25 to 75	100		
	t>75	150		
P4 + P4 & P1A,B + P4	All	150	Nil	655±15 # (# min.650 for ASME jobs)
P5A + P5A	All	150 (Note e)	250 for 2 hrs	695±15 (Note b)
P4 + P5A	All	150 (Note e)	250 for 2 hrs	Note c
P1C + P4	All	150	150 for 2 hrs	655±15 # (# min 650 for ASME jobs)
P1C+P5A	All	150	150 for 2 hrs	Note c
P5A+ P15E Gr1	All	150	Note g	760±10 (Note g)
P4 + T23	All	220	Nil	720-745
P5A+T23/ T22+T23	All	220	250 for 2 hrs	745±15
P15E Gr1 + P15E Gr1	All	220	Note h	760±10 (Note g)
P15E Gr1 + P5A				
P92 + P92/T92				
P15E Gr1+T92				
P92+ P15E Gr1				
12X1MF+12X1MF	Upto 52	220		725±15

Note a: Soaking for PWHT shall be at the rate of 2.5 minutes per mm of thickest weld (minimum 30 minutes for P1, P3, P4; minimum 1 hour for P5A, P91and P92 materials). Soaking time for 12X1MF header material shall be 4 minutes/mm of applicable thickness with a minimum of 180 minutes. Also, refer Cl 3.2.4.3 of QCP: 001 (latest) for soaking times. When non-pressure parts are welded to pressure parts, the post weld heat treatment temperature of the pressure parts shall govern.

Note b: (1) Inter stage heat treatment at 680-710°C for 30 minutes(minimum) soaking is required for P5A Headers prior to cold straightening operation. Alternatively, straightening can be done after final PWHT. Any P5A Header with weld thickness above 50 mm requires Inter stage Heat Treatment at 680-710^{0}C for 30 minutes minimum soaking (Maximum shall be limited to 2.5 minutes/mm of thickness). Inter stage heat treatment can be combined with final heat treatment of other headers if temperature range is appropriate.

(2) Wherever the process calls for interstage heat treatment for Gr91/92 headers, the soaking time shall be calculated for the effective maximum weld thickness of the joint under consideration.

Note c: Heat treatment cycle for the header is governed by the header pipe material. Fillet Welds, Partial Penetration Welds and full penetration welds through the tube or pipe thickness attaching P-No.4 or P-No.5A tubes and pipes to headers of lower P-Number material, may be post weld heat treated as per below table provided the P-No.4 or P-No.5A tubes and pipes comply with the following conditions:

Header Pipe + Stub/Pipe	PWHT Temperature After meeting all the below requirements	PWHT temperature if any one of the below conditions are not met
P1+P4	615 ± 20°C	655+/-15°C
P1 + P5A	615 ± 20°C	As per WPS
P4 + P5A	655 ± 15°C	695+/-15°C

1. A maximum specified Chromium content of 3.0%.
2. A maximum outside diameter of 102 mm
3. A maximum thickness of 13 mm
4. A maximum specified Carbon Content of not more than 0.15%
5. R/D ≥ 2, in case of bent stubs
6. or R/D < 2, and the stubs are separately heat treated.

Note d: Hand hole plates & RG plugs welded after final PWHT, do not require further HT if throat size ≤ 10 mm and preheating is done as per Table II, except for P91/P92 and X20.

Note e: Castings or forgings of P5 materials require preheat of 200°C (min) for all thickness.

Note f: PWHT is not required for HH pipe + End cover joints of Steel 20 & P1 Materials, if the weld thickness does not exceed 19 mm and Carbon content does not exceed 0.25%.

Note g: Preheat shall be maintained for P91/P92 till welding is completed. Interpass temperature for P91/P92 welding shall be limited to 350°C. After completion of welding on P91/P92, allow the component to cool below 95°C.
Immediately following cooling, all weldments must receive:
a) immediate PWHT within 8 hrs or
b) a Hydrogen bake at 260°C to 400°C. Hold for 1hour per inch of thickness (Minimum 30 minutes and Maximum 4 hrs). Cool in still air

Alternatively, after welding completion, the preheat temperature shall be maintained so that the weldments are kept above 150°C until the furnace is ready for PWHT. Allow the component to cool to less than 95°C before loading into furnace.

The component must be:
(1) maintained in a dry environment or above 95°C till PWHT.
(2) stored without application of significant thermal or mechanical loads until PWHT.
Dry environment means that at no time shall the weld come into contact with liquids, including atmospheric condensation (water).

Heating and cooling rates for PWHT of P91/P92 headers shall be as per QCP: 001 (latest); but shall not exceed 140^{0}C /hour, and Controlled cooling shall be done up to 350^{0}C.

101-401
Dt: 16.04.2016

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
WELDING TECHNOLOGY CENTRE

WELDING PROCEDURE SPECIFICATION

WPS No. : A.4.4.17 Date : 15/07/1997 Supporting PQR No. : 508 & 555
Rev No. : 01 Date : 04/08/2016

Welding Process : SMAW Type : Manual
(Auto/Semi-Auto/Manual/Machine)

Application : Welding of P4 Gr.1 component with P4 Gr.1 component with Preheat and with PWHT.

JOINTS (QW-402)
Joint Design : Groove / Fillet as per Production drawing
Backing (Yes/No) : As per Production drawing
Backing Material (Type) : As per Production drawing
(Metal/Non fusing metal/Non metallic/Other)
Retainers : Nil

BASE METAL (QW-403)
P. No. : 4 Group No : 1 TO P. No. : 4 Group No : 1
OR
Specification and type / grade or UNS Number : NA
to Specification and type / grade or UNS Number: NA
OR
Chem. Analysis & Mech. Prop : NA
to Chem. Analysis & Mech. Prop : NA

Thickness Range
Base Metal Groove : 1.5 - 200.0 mm Fillet : Unlimited
Max.Pass thickness ≤ 13.0 mm (Yes/No) : Yes
Other : Nil

FILLER METALS (QW-404)

AWS No. (Class) : E8018-B2
Specn. No. (SFA) : 5.5
F. No. : 4
A. No. : 3

Filler Metal Product Form : NA
Size of Filler Metal : Refer Table
Flux Trade Name : NA
Electrode-Flux (Class) : NA
Consumable Insert : NA
Supplemental Filler Metal : NA
Alloy Elements : Nil

Thickness Range
Weld Metal Groove : Max.200.0 mm
Fillet : Unlimited
Other : Nil

POSITION (QW-405)
Position(s) of Groove : All
Position(s) of Fillet : All
Weld Progression : Up hill
Other : Nil

PREHEAT (QW-406)
Preheat Temp. (Min) : 150 °C
Interpass Temp. (Max) : 300 °C
Preheat Maintenance : Nil
Other : Nil

PWHT (QW-407)
Temp. Range : 665 ±15°C
Time Range : 2.5 minutes/ mm (Minimum 60 minutes)
Other : 695 ± 15 °C, If assembly contains P5A Gr.1 material.

GAS (QW - 408) Percent Composition

	Gas(es)	(Mixture)	Flow Rate
Shielding	NA	---	----
Trailing	NA	---	----
Backing	NA	---	----

ELECTRICAL CHARACTERISTICS (QW – 409)

Current (AC/DC) : Refer Table
Amps (Range) : Refer Table
Tungsten Electrode type and size : NA
Mode of Metal transfer for GMAW : NA
Electrode wire feed speed range : NA
Pulsing current (GTAW) : NA
Heat input (Max) : NA
Polarity : Refer Table
Volts : Refer Table

TECHNIQUES (QW-410)

String or Weave Bead : String or Weave (Max.3Ø of the electrode)
Oscillation / Weaving : NA
Initial and Interpass Cleaning : Brushing / Chipping / Grinding
Method of Back Gouging : Grinding. When required
Orifice or Gas cup size : NA
Contact tube to work distance : NA
Multiple or Single Pass (Per Side) : Single or Multiple
Multiple or Single Electrode : Single
Electrode Spacing : NA
Travel Speed Range : NA
Peening : NA
Use of thermal process : Nil
Closed to out chamber : NA
Manual or Automatic : Manual
Other : Nil

Weld Layer(s)	Process	Filler Metal		Current		Volt (Range)	Travel speed (Range)	Other
		Classification	Dia. (mm)	Type & Polarity	Amps. (Range)			
Root	SMAW	E 8018-B2	2.5	DCEP	70 – 100	---	NA	Nil
Further	SMAW	E 8018-B2	3.15	DCEP	100 -140	---	NA	Nil
Further	SMAW	E8018-B2	4.0	DCEP	135-190	---	NA	Nil
Further	SMAW	E8018-B2	5.0	DCEP	180-230	---	NA	Nil

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BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
WELDING TECHNOLOGY CENTRE

101-401
Dt. 16.04.2016

WELDING PROCEDURE SPECIFICATION

WPS No : A.X.X.56 Date : 03/08/2011 Supporting PQR No: 1468
Rev No : 01 Date : 02/11/2017
Welding Process : SMAW Type : Manual
(Auto/Semi-Auto/Manual/Machine)
Application : Welding of P92/F92 to P92/T92/F92 with Preheat and with PWHT

JOINTS (QW-402)

Joint Design : Groove/Fillet as per production drawing
Backing (Yes/No) : Yes
Backing Material (Type) : Metal
(Metal/Non fusing metal/Non metallic/other)

BASE METAL (QW-403)

P.No : 15E Group No : 1 TO P.No : 15E Group No : 1
OR
Specification and type / grade or UNS Number: SA335P92/SA182F92
To Specification and type / grade or UNS Number: SA335P92/ SA182F92/SA213 T92
OR
Chem. Analysis & Mech. Prop. : NA
To Chem. Analysis & Mech. Prop. : NA

Thickness Range of base material: - Groove: 5.0 mm to 200.0 mm Fillet : Unlimited
Max. Pass Thickness ≤13 mm : Yes
Other : Nil

FILLER METALS (QW-404)

AWS No. (Class) : E9015-B92
Specn.No. (SFA) : 5.5
F.No. : 4
A.No. : 5
Filler Metal Production form : NA
Filler Metal Brand : NA
Supplemental filler metal : Nil
Size of filler metal : Refer table
Flux trade name : NA
Electrode-Flux (Class) : NA
Consumable Insert : NA
Alloy Element : Nil
Weld Metal Thickness range
Groove : Max. 200.0 mm Fillet : Unlimited
Other : Nil

POSITION (QW-405)

Position(s) of Groove : All
Position(s) of Fillet : All
Weld Progression : Vertical up
Other : Nil

PREHEAT (QW-406)

Preheat Temp. (Min) : 220°C
Interpass Temp. (Max) : 350°C
Preheat Maintenance : Refer page 3 of 3
Other : Nil

PWHT (QW-407)

Temp.Range : 760 ±10°C
Time Range : 2.5 minutes/mm, (60 minutes minimum)
Other : Refer page 3 of 3

*Refer Annexure-1

GAS (QW-408)

		Percent Composition Gas(es) (Mixture)	Flow Rate
Shielding	: NA	---	---
Trailing	: NA	---	---
Backing	: NA	----	----

ELECTRICAL CHARACTERISTICS (QW-409)

Current (AC/DC)	:	Refer table	Polarity	:	Refer table
Amps (Range)	:	Refer table	Volts	:	Refer table
Tungsten Electrode type and size	:	NA			
Mode of metal transfer for GMAW	:	NA			
Electrode wire feed speed range	:	NA			
Pulsing current (GTAW)	:	NA			
Heat Input (max)	:	NA			

TECHNIQUES (QW-410)

String or Weave Bead	:	String or Weave (for weave: Max.3 Diameter of electrode)
Oscillation/Weaving	:	NA
Initial and interpass cleaning	:	Brushing / Chipping / Grinding to remove dirt, grease or other contamination from the groove and adjacent surfaces.
Method of back gouging	:	Nil
Orifice or Gas cup size	:	NA
Contact tube to work distance	:	NA
Multiple or single pass per side	:	Multiple
Multiple or single Electrode	:	Single
Electrode spacing	:	NA
Travel speed range	:	NA
Use of thermal process	:	Nil
Closed to out chamber	:	NA
Manual or Automatic	:	Manual
Peening	:	Nil
Other	:	Nil

Weld Layer(s)	Process	Filler metal		Current		Voltage (Range)	Travel Speed (Range)	Other
		Classification/ Trade Name	Diameter	Type	Amps. (Range)			
Root	SMAW	E9015-B92	2.5 mm	DCEP	70-120	NA	NA	Nil
Further	SMAW	E9015-B92	3.2 mm	DCEP	90-140	NA	NA	Nil
Further	SMAW	E9015-B92	4.0 mm	DCEP	155-190	NA	NA	Nil

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Lloyd's Register

Preheat (QW 406):

1. Preheat temperature shall be maintained throughout the welding process, without interruption, until the welding is completed, at which time the weld joint receive a post-weld-heat-treatment (PWHT), or a hydrogen bake.

Preheat Interruption:

2. Upon preheat interruption, the temperature at the outside surface shall be dropped to below 95 °C and a hydrogen bake be performed immediately.

Hydrogen bake:

3. A hydrogen bake shall be performed on the weld joints in the temperature range 260-400 °C for one hour per 25 mm thickness, up to a maximum of four hour and cool in still air. The minimum hold time shall be 30 minutes.

4. Prior to the beginning of the hydrogen bake, the surface temperature of the weld joint should be reduced to below 95 °C.

PWHT (QW 407):

5. Following completion welding of weld joint, the outside surface temperature of the weld joint shall be dropped to below 95 °C. The weld joint then shall be post weld heat-treated within eight (8) hours.

6. If it is not possible to perform PWHT within eight (8) hours, a hydrogen bake shall be performed as per point No. 3 prior to the initiation of PWHT.

7. The component shall be maintained at a temperature above 95 °C or kept in a clean, dry environment until the PWHT is initiated. Dry means that at no time shall the weld come in contact with liquids, including condensate, from the time that it is welded until the PWHT is completed.

8. The joint shall not be subjected to significant thermal reaction loads or the applied loads in the welding condition.

9. PWHT shall be done within 7 days after the completion of Hydrogen Bake.

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
WELDING TECHNOLOGY CENTRE

WELDING PROCEDURE SPECIFICATION

WPS No. : **TA.4.4.08** Date : 06 / 12 / 2010 Supporting PQR No.: 1415 & 555
Rev No. : **01** Date : 12 / 03 / 2011

Welding Process(es) : GTAW + SMAW Type : Manual (Auto/Semi-Auto/Manual/Machine)

Application : Groove / Fillet welding of P4 Material with P4 Material with preheat and with PWHT.

JOINTS (QW-402)

Joint Design : As per Production drawing
Root Spacing : 1 – 3 mm
Backing (Yes/No) : GTAW : No SMAW : Yes
Backing Material (Type) : GTAW : Nil SMAW : Weld Metal
(Metal/Non fusing metal/ Non metallic/Other)
Retainers : Nil

BASE METAL (QW-403)

P. No. : 4 Group No : 1 TO P. No. : 4 Group No : 1
OR
Specification and type / grade or UNS Number : NA
to Specification and type / grade or UNS Number : NA
OR
Chem. Analysis & Mech. Prop : N.A.
to Chem. Analysis & Mech. Prop : NA
Thickness Range
Base Metal : Groove : 5.0 mm To 200.0mm Fillet : Unlimited
Maximum Pass thickness ≤ 13mm : Yes
Other : Nil

FILLER METALS (QW-404)

	GTAW	SMAW
AWS No. (Class)	ER80S-B2	E8018-B2
Specn. No. (SFA)	5.28	5.5
F. No.	6	4
A. No.	3	3
Filler metal product form	Solid	NA
Supplemental filler metal	Nil	Nil
Size of filler metal	Refer Table	Refer Table
Flux trade name	NA	NA
Flux type	NA	NA
Electrode-flux (Class)	NA	NA
Consumable insert	NA	NA
Alloy elements	Nil	Nil

Weld metal thickness range
Groove : Max. 200.0mm {GTAW :Max.12.6mm, Max 3mm/pass ; SMAW : Balance }
Fillet : Unlimited
Other : Nil

POSITION (QW-405)

Position(s) of Groove : All
Position(s) of Fillet : All
Weld Progression(Up/Down) : Uphill
Other : Nil

PREHEAT (QW-406)

Preheat Temp. (min) : 150°C
Interpass Temp. (max) : 300 °C
Preheat Maintenance : NA
Other : Nil

PWHT (QW-407)
Temp. Range : 650 -680 °C
Time Range : 2.5mts / mm (min.30 mts)

Other : Nil

GAS (QW - 408) Percent composition

	Gas(es)	(Mixture)	Flow Rate
Shielding	: Argon.Grll*	Single	6 – 14 LPM
Trailing	: NA	---	----
Backing	: NA	---	----
Other	: Nil		

*Indian Standard

ELECTRICAL CHARACTERISTICS (QW – 409)

Current (AC/DC) : Refer Table
Amps (Range) : Refer Table
Tungsten Electrode type and size : EW Th-2 / EW Ce-2 Ø 2.4mm
Mode of Metal transfer for GMAW : NA
Electrode wire feed speed range : NA
Pulsing current (GTAW) : Nil
Heat Input (Max) : NA

Polarity : Refer Table
Volts : Refer Table

TECHNIQUES (QW-410)

String or Weave Bead : GTAW : String Bead
SMAW : String / Weave(For weave : Max. 3 dia of electrode)
Oscillation / Weaving : N.A
Initial and Interpass Cleaning : Brushing / Chipping / Grinding
Method of Back Gouging : Nil
Orifice or Gas cup size : 6 / 9 / 13 for GTAW
Contact tube to work distance : N.A
Multiple or single pass (per side) : Multiple
Multiple or single Electrode : Single
Electrode spacing : N.A
Travel Speed Range : N.A
Peening : Nil
Use of Thermal Process : N.A
Closed to out Chamber : N.A
Manual or Automatic : Manual
Other : Nil

Weld pass(es)	Process	Filler Metal Class	Filler Metal Dia.(mm)	Current Type & Polarity	Current Amps. (Range)	Volt (Range)	Travel speed (Range)	Other
Root	GTAW	ER80S-B2	2.4	DCEN	70 – 100	18-22	NA	Nil
Further	SMAW	E8018-B2	2.5	DCEP	70 – 110	18-22	NA	Nil
Further	SMAW	E8018-B2	3.15	DCEP	105 – 155	20-24	NA	Nil
Further	SMAW	E8018-B2	4.0	DCEP	130 – 200	22-24	NA	Nil
Further	SMAW	E8018-B2	5.0	DCEP	200 - 275	22-26	NA	Nil

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Welding Er./ WTC

Approved By:

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SDGM / WTC

101-401

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
WELDING TECHNOLOGY CENTRE

WELDING PROCEDURE SPECIFICATION

WPS No	:	TA.X.X.19	Date	: 03 / 08 / 2011	Supporting PQR No: 1468 & 1609
Rev No	:	01	Date	: 07 / 12 /2015	

Welding Process : GTAW + SMAW Type : Manual (Auto/Semi-Auto/Manual/Machine)

Application : Tacking, welding and repair of P15E Gr.1 materials with P15E Gr.1 materials with PWHT.

JOINTS (QW-402)

Joint Design	:	Groove & Fillet		
Backing (Yes/No)	:	GTAW: No	SMAW:	Yes
Backing Material (Type) (Metal/Non fusing metal/Non metallic/other)	:	GTAW: Nil	SMAW:	Metal

BASE METAL (QW-403)

P.No : 15E Group No : 1 TO P.No : 15E Group No : 1

OR

Specification and type / grade or UNS Number : SA213 T92/SA335 P92/SA182 F92

To Specification and type / grade or UNS Number : SA335 P92 OR

Chem. Analysis & Mech. Prop. : NA

To Chem. Analysis & Mech. Prop. : NA

Thickness Range of Base material Groove : 5.0 mm to 200.0 mm Fillet: Unlimited

Max. Pass Thickness ≤13 mm : Yes

Other : Nil

FILLER METALS (QW-404)

		GTAW	SMAW
AWS No. (Class)	:	Nil	E9015-B92
Specn.No. (SFA)	:	Nil	5.5
F.No.	:	Nil	4
A.No.	:	Nil	5
Filler Metal Production form	:	Solid	NA
Supplemental filler metal	:	Nil	Nil
Size of filler metal	:	Refer table	Refer table
Flux trade name	:	NA	NA
Brand Name	:	9CrWV TIG of M/s Metrode Thermanit MTS 616 of M/S Bohler	NA
Consumable Insert	:	NA	NA
Alloy Element	:	Nil	Nil

Weld Metal Thickness range

Groove: Max. 200 mm : Max. 5.0 mm Balance

Fillet : Unlimited Other : Nil

POSITION (QW-405)

Position(s) of Groove	:	All
Position(s) of Fillet	:	All
Weld Progression	:	Vertical up
Other	:	Nil

PREHEAT (QW-406)

Preheat Temp. (Min)	: 220 °C
Interpass Temp. (Max)	: 350°C
Preheat Maintenance	: Refer page 3 of 3
Other	:

PWHT (QW-407)

Temp.Range	:	760±10 ^{0}C
Time Range	:	2.5 minutes/mm (60 minutes minimum)
Other	:	Refer page 3 of 3

GAS (QW-408) (Applicable for GTAW process)

	Percent Compositions		
	Gas (es)	(Mixture)	Flow Rate
Shielding:	Argon	Single	6-14 LPM
Trailing	NA	---	---
Backing*	Argon	Single	10-16 LPM
Other :	Nil	(* Maintain for minimum 2 layers)	

ELECTRICAL CHARACTERISTICS (QW-409)

Current (AC/DC)	:	Refer table	Polarity	:	Refer table
Amps (Range)	:	Refer table	Volts	:	Refer table
Tungsten Electrode type and size	:	EW Th-2/EW Ce-2	Ø2.4 mm/Ø3.2 mm		
Mode of metal transfer for GMAW	:	NA			
Electrode wire feed speed range	:	NA			
Pulsing current (GTAW)	:	Nil			
Heat Input (max)	:	NA			

TECHNIQUES (QW-410)

String or Weave Bead	:	String or Weave (weave: Max.3 Diameter of electrode)
Oscillation/Weaving	:	NA
Initial and interpass cleaning	:	Brushing / Chipping/Grinding to remove dirt, grease or other contamination from the groove and adjacent surfaces
Method of back gouging	:	When required, chip, grind, or file to sound weld metal followed by cleaning if necessary
Orifice or Gas cup size	:	6-9mm
Contact tube to work distance	:	NA
Multiple or single pass per side	:	Multiple
Multiple or single Electrode	:	Single
Electrode spacing	:	NA
Travel speed range	:	NA
Use of thermal process	:	Nil
Closed to out chamber	:	NA
Manual or Automatic	:	Manual
Peening	:	Nil
Other	:	Nil

Weld Layer(s)	Process	Filler metal		Current		Voltage (Range)	Travel Speed (Range)	Other
		Classification	Dia. (mm)	Type & Polarity	Amps. (Range)			
Root	GTAW	9CrWV TIG/ Thermanit MTS 616	2.4	DCEN	70-110	NA	NA	Nil
Further	SMAW	E9015-B92	2.5	DCEP	70-100	NA	NA	Nil
Further	SMAW	E9015-B92	3.2	DCEP	100-140	NA	NA	Nil
Further	SMAW	E9015-B92	4.0	DCEP	135-185	NA	NA	Nil

Prepared by:

(L.Praveen Kumar)
Sr.Welding Engineer / WTC

Tiruchirappalli Office
Lloyd's Register
04/09/18

Approved by:

(S.Singaravelu)
SDGM / WTC

Preheat (QW 406):

1. Preheat temperature shall be maintained throughout the welding process, without interruption, until the welding is completed, at which time the weld joint receive a post-weld-heat-treatment (PWHT), or a hydrogen bake.

Preheat Interruption:

2. Upon preheat interruption, the temperature at the outside surface shall be dropped to below 95 °C and a hydrogen bake be performed immediately.

Hydrogen bake:

3. A hydrogen bake shall be performed on the weld joints in the temperature range 260-400 °C for one hour per 25 mm thickness, up to a maximum of four hour and cool in still air. The minimum hold time shall be 30 minutes.

4. Prior to the beginning of the hydrogen bake, the surface temperature of the weld joint should be reduced to below 95 °C.

PWHT (QW 407):

5. Following completion welding of weld joint, the outside surface temperature of the weld joint shall be dropped to below 95 °C. The weld joint then shall be post weld heat-treated within eight (8) hours.

6. If it is not possible to perform PWHT within eight (8) hours, a hydrogen bake shall be performed as per point No. 3 prior to the initiation of PWHT.

7. The component shall be maintained at a temperature above 95 °C or kept in a clean, dry environment until the PWHT is initiated. Dry means that at no time shall the weld come in contact with liquids, including condensate, from the time that it is welded until the PWHT is completed.

8. The joint shall not be subjected to significant thermal reaction loads or the applied loads in the welding condition.

9. PWHT shall be done within 7 days after the completion of Hydrogen Bake.

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI-620014
WELDING TECHNOLOGY CENTRE

101-401

WELDING PROCEDURE SPECIFICATION

WPS No. : TAS.5.5.02 Date : 22 / 05 / 1999 Supporting PQR No : 1158
Rev No. : 05 Date : 07 / 12 / 2015
Welding Process : GTAW + SMAW + SAW Type : Manual { GTAW & SMAW } + Machine (SAW)
Application : Tacking, Welding and Repair of P22 pipe to P91 pipe and P92 pipe to P22 pipe with PWHT

JOINTS (QW-402)
Joint Design : Groove
Root space : 1 - 3 mm
Backing (Yes/No) : GTAW: Nil; SMAW & SAW: Yes
Backing Material (Type) : GTAW: NA; SMAW & SAW: Metal
(Metal/Non fusing metal/ Nonmetallic/Other)
Retainers : Nil

BASE METAL (QW-403)
P. No. : 5A Group No : 1 TO P. No. : 15E Group No : 1
Spec. Type & Grade : NA
Chem. Analysis & Mech. Prop : NA
Base Metal Thickness Range Groove : 5.0mm to 200.0mm Fillet : NA

Max.Pass thickness ≤ 13mm (Yes/No) : Yes
Other : Nil

FILLER METALS (QW-404)

	GTAW	SMAW	SAW
AWS No (Class)	ER90S-B3	E9018-B3	EB3 + Flux
Specn. No. (SFA)	5.28	5.5	5.23
F. No.	6	4	6
A. No.	4	4	4
Filler metal product form	Solid	NA	Solid
Supplemental filler metal	Nil	Nil	Nil

Size of filler metal : Refer Table
Flux trade name : Tapadia Gr.80M
Flux-Wire (Class) : Nil
Flux Type : Basic
Consumable insert : Nil
Alloy elements : Nil
Recrushed slag : Nil

Weld Metal Thickness Range:
Groove : 200.0mm Max. [GTAW: 6.0mm. Max ; SMAW:20mm Max.; Balance: SAW]
Fillet : Nil Other: Nil

POSITION (QW-405)
Position(s) of Groove : All (GTAW & SMAW) 1G (SAW)
Position(s) of Fillet : NA
Weld Progression : Vertical up (For GTAW & SMAW)
Other : Nil

PREHEAT (QW-406)
Preheat Temp. (min) : 220 °C
Interpass Temp. (max) : 350 °C
Preheat Maintenance : } Refer Page 3 of 3
Other : }

BHEL
Tiruchirappalli – 14

WPS No. : **TAS.5.5.02** Rev. No. : **05**

PWHT (QW-407)
Temp. Range : 760 ± 10 °C
Time Range : 2.5 minutes / mm
Minimum 60 minutes
Other : Refer Page 3 of 3

GAS (QW - 408) (Applicable for GTAW Process only)

	Gas(es)	(Mixture)	Flow Rate
Shielding	: Argon	Single	6 – 14 LPM
Trailing	: NA	---	---
Backing*	: Argon	Single	10 – 15 LPM

(*Maintain for a minimum 2 layers)

ELECTRICAL CHARACTERISTICS (QW – 409)
Current (AC/DC) : Refer table
Amps (Range) : Refer table
Tungsten Electrode type and size : EW Th-2 / EW Ce-2 Ø2.4mm / Ø3.2mm
Mode of Metal transfer for GMAW : N.A
Electrode wire feed speed range : N.A
Pulsing current (GTAW) : Nil
Heat Input (Max) : NA
Polarity : Refer table
Volts : Refer table

TECHNIQUES (QW-410)
String or Weave Bead : SAW : String ; GTAW &SMAW : String or Weave (Max.3 Dia of Electrode)
Orifice or Gas cup size (GTAW) : 6-13 mm
Initial and Interpass Cleaning : Brushing / Chipping / Grinding to remove dirt, grease or other contamination from the groove and adjacent surfaces.
Method of Back Gouging : When required, chip, grind, or file to sound weld metal followed by cleaning if necessary.
Oscillation /Weaving : NA
Contact tube to work distance (SAW) : 25 – 35mm
Multiple or single pass (per side) : Multiple
Multiple or single Electrode : Single
Electrode spacing : NA
Travel Speed Range : NA
Use of thermal processes : Nil
Closed to out chamber : NA
Manual or Automatic : GTAW & SMAW : Manual; SAW : Machine
Peening : Nil
Other : Nil

Weld Layer(s)	Process	Filler Metal		Current		Volt (Range)	Travel speed Range (mm/min)	Other
		Classification	Dia. (mm)	Type & polarity	Amps. (Range)			
Root	GTAW	ER90S – B3	2.4	DCEN	90 - 130	NA	NA	Nil
Further	SMAW	E9018 – B3	3.15	DCEP	100 - 140	NA	NA	Nil
	SMAW	E9018 – B3	4.0	DCEP	140 - 190	NA	NA	Nil
	SAW	EB3 + Flux (Flux: Tapadia Gr.80M)	3.2	DCEP	320 – 465	27-32	380 -520	
			4.0	DCEP	465 – 565	28-33	380-520	

Prepared By:
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Sr.Welding Engineer/WTC

Approved By:
Tiruchirappalli Office Lloyd's Register 20/08/18
(S.Singaravelu)
SDGM / WTC

Preheat (QW 406):

1. Preheat temperature shall be maintained throughout the welding process, without interruption, until the welding is completed, at which time the weld joint receive a post-weld-heat-treatment (PWHT), or a hydrogen bake.

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2. Upon preheat interruption, the temperature at the outside surface shall be dropped to below 95 °C and a hydrogen bake be performed immediately.

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PWHT (QW 407):

5. Following completion welding of weld joint, the outside surface temperature of the weld joint shall be dropped to below 95 °C. The weld joint then shall be post weld heat-treated within eight (8) hours.

6. If it is not possible to perform PWHT within eight (8) hours, a hydrogen bake shall be performed as per point No. 3 prior to the initiation of PWHT.

7. The component shall be maintained at a temperature above 95 °C or kept in a clean, dry environment until the PWHT is initiated. Dry means that at no time shall the weld come in contact with liquids, including condensate, from the time that it is welded until the PWHT is completed.

8. The joint shall not be subjected to significant thermal reaction loads or the applied loads in the welding condition.

9. PWHT shall be done within 7 days after the completion of Hydrogen Bake.

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-14
WELDING TECHNOLOGY CENTRE

WT-407
REV.01

DATE: 24/05/06

TECHNIQUE FOR WELDING OF NIPPLES/TUBES TO HEADER BY SMAW PROCESS

1.0 SCOPE

This document details the techniques to be followed in welding of Nipples/Stubs to Headers using SMAW Process.

2.0 MATERIALS

The materials involved are Carbon Steel, Alloy Steel (½Mo, 1Cr/1.25Cr 0.5Mo, 2.25Cr 1Mo, 12X1MØ and 9Cr1Mo0.25V) and Stainless Steel.

3.0 TECHNIQUES

3.1 The weld area shall be cleaned thoroughly to remove rust, oil, grease and paint before tacking/welding.

3.2 TACK WELDING

3.2.1 Preheating shall be maintained as per the relevant WPS.

3.2.2 Tackweld the tubes to header using only dia. 3.15 mm electrodes and in Flat position only. Place 2 tacks per nipple at the deep sides of socket seat (2 to 4 O'clock & 10 to 8 O'clock).

3.2.3 The tack weld shall be at least 15mm long and not more than 3mm height. During tacking the arc shall be directed towards the header to ensure fusion of the root.

3.2.4 Tacks shall be of shape to render it to be fused by the root pass.

3.2.5 Slag shall be removed immediately after each tack weld and the weld shall then be examined visually to ensure that no defects like undercut, porosity, crater crack, improper bead shape etc. exist.

3.3 GENERAL (Instructions applicable for all passes)

3.3.1 Relevant WPS to be referred for Preheat, Postheat, Consumable specifications, current range etc.

3.3.2 Welding shall be done in the 1G Position. Use stringer bead technique only.

3.3.3 All start stops should be staggered by at least an overlap of 12mm.

3.3.4 The welding shall be completed all around the tube (360°) in each layer before proceeding to the next layer. (i.e. Root to Filler layer or Filler to Capping layer).

3.3.5 The slag shall be cleaned using chipper/wire brush after every pass. The weld shall be visually checked for any porosity, improper bead shape, undercut, burn-through etc. In case of burn-through stop welding and replace the stub. Other defects shall be removed by gouging/grinding. Check for complete defect removal by NDE and only then take up for further welding.

3.3.6 Special care to be taken to clean the slag at the start/stop area to ensure complete fusion of this spot by the overlapping pass.

3.4 ROOT LAYER

3.4.1 The maximum Dia of Electrode to be used for Root welding shall be 4.0 mm.

3.4.2 The arc shall be so directed to ensure proper fusion at the root.

3.4.3 Care to be taken to remelt the tack weld area thoroughly.

3.5 FURTHER LAYERS

3.5.1 The maximum Dia of Electrode to be used for these layer(s) shall be 4.0 mm.

3.5.2 The arc shall be so directed to ensure proper inter-bead fusion and result in deposition of a uniform weld bead that merges smoothly with the header pipe/previous bead.

3.6 CAPPING LAYER

3.6.1 This layer shall be welded with dia. 3.15 mm electrode.

3.6.2 The arc shall be so directed to ensure proper inter-bead fusion and resulting in deposition of a uniform weld bead around the tube neck that merges smoothly with the tube surface without any undercutting.

Prepared by :	Reviewed by :	Approved by :
(Kinkar P. Narzary)	(Dr. K. P. Dhandapani)	(S. Ramesh)
WE / WTC	DGM / WTC & WCMC	SDGM / WTC & WCMC

ANNEXURE-A TRAINING RECORD FORMAT

CONTRACTOR NAME:

WO NO:

WO DATE:

DESCRIPTION OF WORK:

BAY :

S.NO	NAME OF THE EMPLOYEE	TRADE	NATURE OF WORK TRAINED	TRAINING HOURS

SIGNATURE OF THE CONTRACTOR WITH SEAL & DATE